Abstracts
OF THE PSYCHONOMIC SOCIETY

Volume 25 • November 2020

61st ANNUAL MEETING

Held virtually Thursday, November 19–Saturday, November 21

All times are in Eastern Standard Time (EST).

KEYNOTE ADDRESS

Thursday, November 19. . . . . 7:30–8:30 PM EST

TMI: Disengagement and Memory
Lynn Hasher, *University of Toronto*

OPENING VIRTUAL RECEPTION

Thursday, November 19. . . . . 8:30–9:30 PM EST
(immediately following Keynote Address)

POSTER SESSIONS

Session I: Thursday, November 19 . . . . . 5:30–7:30 PM EST

Session II: Friday, November 20 . . . . . 4:00–6:00 PM EST

Session III: Saturday, November 21 . . . . . 4:00–6:00 PM EST

AWARDS AND BUSINESS MEETING

Saturday, November 21 . . . . . 3:00–4:00 PM EST

Meeting includes presentation of all Psychonomic Society Awards and the business of the Psychonomic Society.

FUTURE MEETINGS

2021 San Diego, CA, November 18–21
2022 Washington, DC, November 17–20
2023 San Francisco, CA, November 16–19
2024 New York City, NY, November 21–24
2025 Denver, CO, November 20–23
2026 San Diego, CA, November 19–22

SYMPOSIA

Symposium I: Estimating and Communicating Probabilistic Information
Friday, November 20 . . . . . 9:00–11:00 AM EST

Symposium II: How Do We Decide What Is True?
Friday, November 20 . . . . . 11:00 AM–1:00 PM EST

Symposium III: Age Differences in Episodic Memory Control Processes
Friday, November 20 . . . . . 12:00–2:00 PM EST

Special Symposium IV: Seeing Race in Cognitive Psychology
Friday, November 20 . . . . . 2:00–4:00 PM EST

Symposium V: Emerging Research on Creative Cognition and Neuroscience of Insight
Saturday, November 21 . . . . . 9:00–11:00 AM EST

Symposium VI: Cognitive Off-Loading and Prospective Memory
Saturday, November 21 . . . . . 11:00 AM–1:00 PM EST

Symposium VII: Using Network Science to Understand Language
Saturday, November 21 . . . . . 12:00–2:00 PM EST

Symposium VIII: Verbal Working Memory: Domain General or Domain Specific?
Saturday, November 21 . . . . . 1:00–3:00 PM EST

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PSYCHONOMIC SOCIETY®

A PSYCHONOMIC SOCIETY PUBLICATION
www.psychonomic.org

OPENING SESSION/KEYNOTE ADDRESS

TMI: Disengagement and Memory

Lynn Hasher, *University of Toronto*

THURSDAY, NOVEMBER 19, 7:30–8:30 PM EST

Captioning and an American Sign Language (ASL) interpreter will be available for this address.

Can you really have too much information? And what happens when you do? Our research program focuses on these questions and may help explain patterns of age-related cognitive deficits as well as spared functioning.

Older adults show a shift from intentionally biased processing of information to a more incidental bias, which results in excessive encoding and, subsequently, in delays in disengaging from nonrelevant information. As a consequence, too much information can be active at any one point in time, resulting in poor explicit recall—and sometimes, in superior implicit memory. This pattern may be especially pronounced in older adults, but it is not unique to them. A limited literature suggests that positive moods and circadian disruptions can produce similar outcomes.

VIRTUAL OPENING RECEPTION

THURSDAY, NOVEMBER 19, 8:30–9:30 PM EST OR IMMEDIATELY FOLLOWING THE KEYNOTE ADDRESS.

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REGISTRATION

Register online at www.psychonomic.org/2020registration.

All attendees must register for the conference by November 16, 2020, in order to access the virtual meeting platform.

Members
Registration is still **free** for current members and includes unlimited access to the Keynote Address and all symposia, talks, poster sessions, and networking events. **All members must register.**

Become a Member for Free!
Anyone who qualifies for Member or Student Member status with the Society and is not a current member may now join for free (2020 dues waived) and attend the Annual Meeting for free. (Conference registration is not automatic when you join; you must both join and register for the conference.) Visit www.psychonomic.org/membership to join.

Non-Members
The registration fee for non-members is $75.00. Undergraduates may attend for free but must still register. Membership in the Society is inexpensive and strongly encouraged. In addition, for 2020 only, anyone who qualifies for membership but has not yet joined the Society may do so for free.

Registration Refunds
Requests to refund registrations for non-members will be considered if received via email at info@psychonomic.org by November 16, 2020. Refund requests will be processed after the meeting. "No-shows" receive no refund.

ABSTRACT AND PROGRAM BOOK

The abstract book is available as a downloadable PDF at www.psychonomic.org/page/2020program. The book will not be printed this year.

Within this book, by an author's name indicates a recipient of the Psychonomic Society Clifford T. Morgan Distinguished Leadership, Mid-Career, or Early Career Award. by an author's name indicates a recipient of the J. Frank Yates Student Conference Award or Graduate Conference Award.

MOBILE APP

A free mobile app for this year's meeting will be available for download in Apple's App Store and the Google Play Store. The app includes the full program and all abstracts. It is recommended you download the mobile app before the conference begins so that you can browse the program and take full advantage of all the app features.

POSTER SESSIONS

All posters will be available for on-demand viewing beginning November 5, 2020, and will remain available for viewing for six months after the conference. Poster presentations are prerecorded and captioned. Presenters are available online during their poster session for a live Q&A.

RECEPTIONS

Opening Virtual Reception
Thursday, November 19, 8:30–9:30 PM EST, or immediately following the Keynote Address

Diversity & Inclusion Virtual Reception
Friday, November 20, 3:00–4:00 PM EST

Friday Virtual Networking Reception
Friday, November 20, 4:00–6:00 PM EST

Saturday Virtual Networking Reception
Saturday, November 21, 4:00–6:00 PM EST

2020 PROGRAM

There were 1,302 total submissions and 1,294 valid submissions. Of the 1,294 papers that were placed on the program, 243 are spoken papers and 1,051 are posters. In addition, there were 8 accepted symposia.

PROGRAM HISTORY

Year–Site	Valid Submissions
2020–Virtual	1,294
2019–Montréal	1,507
2018–New Orleans	1,523
2017–Vancouver	1,438
2016–Boston	1,514

DRAFT

Watson

Awh

Fenn

Gutchess

Henderson

Lewandowsky

Hunt

2020 PROGRAM COMMITTEE

Duane Watson, Chair, *Vanderbilt University*
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Louis Shomette, Executive Director, *Psychonomic Society*, ex officio

PROGRAM AND CONFERENCE ORGANIZATION

The Secretary, Reed Hunt, has the responsibility for organizing the program, and the Program Committee reviews the schedule. They do so with the indispensable help of Louis Shomette, Executive Director; Tiffany Aurora, Director of Membership, Marketing, & Communications; Stephanie Dylkiewicz, Director of Meetings; and Brianna Johnson, Director of Operations.

PSYCHONOMIC SOCIETY STATEMENT ON HARASSMENT

The Psychonomic Society is an inclusive and welcoming organization. Our annual and affiliate meetings, and our professional communications, should reflect those values. Society members, conference attendees, and digital event participants should enjoy freedom of speech, freedom of thought, and freedom from harassment and discrimination of all kinds.

We encourage members to be mindful of others' perspectives and to consider how a question, comment, or invitation might be received, particularly when there is a power differential between parties. Constructive criticism is an essential part of science. No participant should feel vulnerable to harassment or discrimination, nor should they endure a climate of fear or hostility, at our meetings or in our digital events.

Let's all work together to ensure that our values of inclusion, respect, and professionalism are ones that are enjoyed by all of our members and event participants.

PHOTOGRAPHIC RELEASE

As part of your registration for the 2020 Annual Meeting, the Psychonomic Society reserves the right to use photographs and video taken during the virtual meeting for future marketing purposes. If you do not wish to have your photograph or video used for such purposes, please contact us at info@psychonomic.org.

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AFFILIATE MEETINGS

BMW: Bilingualism Matters across the World
Thursday, November 19, 2020
12:00–2:00 PM EST
Website: https://sites.google.com/view/bilingualism-matters-world/home

Second Annual Culture and Cognition Pre-Conference
Thursday, November 19, 2020
9:00 AM–3:00 PM EST
Website: www.brandeis.edu/gutchess/culture-cog-preconference.html

Society for Computation in Psychology (SCiP) Annual Meeting
Thursday, November 19, 2020
10:00 AM–4:00 PM EST
Website: www.scip.ws

Society for Mathematical Psychology Symposium on Current Trends in Mathematical Psychology
Thursday, November 19, 2020
8:00 AM–3:30 PM EST
Website: www.mathpsych.org

SPARK Society 3rd Annual Meeting
Thursday, November 19, 2020
2:30–4:00 PM EST
Website: www.sparksociety.org/

Tactile Research Group (TRG) Annual Meeting
Thursday, November 19, 2020
9:00 AM–4:00 PM EST
Website: http://trg.objectis.net

Women in Cognitive Science (WiCS) 20th Annual Meeting
Thursday, November 19, 2020
4:00–7:00 PM EST
Website: http://womenincogsci.org/meetings

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Congratulations to the

2020 Clifford T. Morgan Distinguished Leadership Award Recipients

The Psychonomic Society is pleased to announce the 2020 recipients of our Clifford T. Morgan Distinguished Leadership Award: **Nora S. Newcombe (Temple University)** and **Henry L. Roediger, III, (Washington University in St. Louis).**

The Clifford T. Morgan Distinguished Leadership Award honors individuals for their significant contributions to the field of cognitive psychology. Recipients have been in the field for at least 10 years and have demonstrated sustained leadership and service to the discipline. In addition, recipients demonstrate commitment and dedication to developing and advancing the Psychonomic Society in its mission to foster the science of cognition through the advancement and communication of basic research in experimental psychology and allied sciences.

The 2020 recipients of the Clifford T. Morgan Distinguished Leadership Award will be recognized at the Awards and Business Meeting on Saturday, November 21, from 3:00–4:00 PM EST. Read more about the award at www.psychonomic.org/page/leadershipaward.

Nora S. Newcombe
Temple University

Nora S. Newcombe is the Laura H. Carnell Professor of Psychology at Temple University and from 2006–2018 served as principal investigator of the Spatial Intelligence and Learning Center (SILC), headquartered at Temple and involving Northwestern University, the University of Chicago, and the University of Pennsylvania as primary partners.

Dr. Newcombe has served as editor of the *Journal of Experimental Psychology: General* and as associate editor of *Psychological Bulletin*, as well as on numerous editorial boards and grant review panels. She is currently an associate editor for *Cognitive Psychology* and for *WIRES in Cognitive Science*.

Honors include the William James Fellow Award from the Association for Psychological Science; the George Miller Award and the G. Stanley Hall Awards from the American Psychological Association; the Award for Distinguished Service to Psychological Science, also from the American Psychological Association; and the Women in Cognitive Science Mentor Award.

Newcombe is a Fellow of four divisions of the American Psychological Association (General, Experimental, Developmental, and Psychology of Women), of the American Psychological Society, and of the American Association for the Advancement of Science, and has been a Visiting Professor at the University of Pennsylvania, Princeton University, and the Wissenschaftskolleg in Berlin. She is a member of the American Academy of Arts and Sciences and the Society of Experimental Psychologists. She has served on the Psychonomic Society's Governing Board and the board of the Federation of Associations in Behavioral & Brain Sciences.

Henry L. Roediger, III
Washington University in St. Louis

Henry L. Roediger, III, (aka Roddy) is the James S. McDonnell Distinguished University Professor at Washington University in St. Louis. Roediger's research interests lie in human learning and memory, spanning topics such as false memory, retrieval practice effects, implicit memory phenomena, and collective memory, among others.

Roediger served as editor of the *Journal of Experimental Psychology: Learning Memory and Cognition,* and he was the founding editor of *Psychonomic Bulletin & Review*. He has served as president of the Association for Psychological Science, the Midwestern Psychological Association, and the Experimental Psychology Division of the American Psychological Association. In addition, Roediger served as chair of the Governing Board of the Psychonomic Society, chair of the Society of Experimental Psychologists, and chair of the Psychology section of the American Association for the Advancement of Science.

Honors include the William James Fellow Award and the Mentor Award from the Association for Psychological Science; the Howard Crosby Warren Medal from the Society of Experimental Psychologists; the John P. McGovern Award from the American Association for the Advancement of Science; a John Simon Guggenheim Award; and a doctor of social science, *honoris causa*, from Purdue University.

Roediger is a member of the Society of Experimental Psychologists, the American Academy of Arts and Sciences, and the National Academy of Sciences.

About Clifford T. Morgan

Born in 1915 in Minolta, New Jersey, Clifford Thomas Morgan received his undergraduate education at Maryville College and his PhD from Rochester University in 1939. Morgan held academic positions at Harvard University; Johns Hopkins University; University of Wisconsin; the University of California, Santa Barbara; and, finally, at the University of Texas. He was a founding member of the Psychonomic Society and the first Governing Board Chair, and he led the Society's journal program for many years. He passed away in 1976 in Austin, Texas.

DRAFT

2020 Mid-Career Award Recipients

The Psychonomic Society is pleased to announce the recipients of the 2020 Mid-Career Award: **Jan De Houwer (Ghent University)** and **Jeffrey M. Zacks (Washington University in St. Louis).**

The Psychonomic Society Mid-Career Award is presented for exceptional contributions to the field of experimental and cognitive psychology and related areas by an individual who is in the middle of their career. The purpose is to raise the visibility of our science and of our very best mid-career scientists to the field, the awardees' institutions, the press, and the community at large. Many universities are carefully scrutinizing departments and programs in deciding upon the deployment of limited resources, and among the most important criteria are those that indicate academic and scientific quality. Recipients of the Mid-Career Award will be recognized at the Awards and Business Meeting on Saturday, November 21, from 3:00–4:00 PM EST.

Jan De Houwer
Ghent University

After receiving his PhD from the Katholieke Universiteit Leuven (Belgium) in 1997, Jan De Houwer was a Lecturer at the University of Southampton (UK) from 1998 to 2001. Since 2001, he has worked at Ghent University (Belgium), where he heads the Learning and Implicit Processes Laboratory.

De Houwer's research is related to the manner in which spontaneous (automatic) preferences are learned and can be measured. Regarding the learning of preferences, he focuses on the role of stimulus pairings (i.e., conditioning). With regard to the measurement of preferences, he examines the nature and utility of various reaction time measures. Other interests include fear conditioning; learning via instructions and observation; the relation between learning, persuasion, and impression formation; meta-theory; and composing silly songs. In his research, he combines the strengths of behavior analytic approaches with those of the cognitive approach to psychology.

De Houwer (co-)authored more than 300 papers as well as a monograph on the psychology of learning. He was co-editor of the journal *Cognition and Emotion* and is currently an Academic Editor for *PLOS ONE*, as well as a member of the editorial board of several journals including *Journal of Experimental Psychology: General, Psychological Bulletin,* and *Personality and Social Psychology Review.*

Jeffrey M. Zacks
Washington University in St. Louis

Jeffrey M. Zacks is Professor and Associate Chair of Psychological & Brain Sciences and Professor of Radiology at Washington University in St. Louis. He received his BA from Yale University and his PhD from Stanford University in 1999.

Zacks's research has been funded by the Defense Advanced Research Projects Agency, the National Science Foundation, the National Institutes of Health, the Office of Naval Research, and the James S. McDonnell Foundation. He has served as associate editor of the journals *Cognition, Cognitive Research: Principles & Implications,* and *Collabra;* chair of the Board of Scientific Affairs of the American Psychological Association; and chair of the Governing Board of the Psychonomic Society. He is the recipient of scientific awards from the National Science Foundation, Psychonomic Society, American Psychological Association, and American Psychological Foundation and is a Fellow of the American Association for the Advancement of Science, the Association for Psychological Science, the American Psychological Association, the Midwest Psychological Association, and the Society of Experimental Psychologists.

Zacks is the author of three books, *Flicker: Your Brain on Movies, Event Cognition* (with G.A. Radvansky), and *Ten Lectures on the Representation of Events in Language, Perception, Memory, and Action Control*, and co-editor of *Understanding Events* (with Thomas F. Shipley) and *Representations in Mind and World: Essays Inspired by Barbara Tversky* (with Holly A. Taylor). He has published more than 90 journal articles and has written for *Salon, Aeon,* and *The New York Times.*

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2020 Early Career Award Recipients

The Psychonomic Society is pleased to announce the recipients of the 2020 Early Career Award: **Karen L. Campbell (Brock University), Aidan J. Horner (University of York), Roland Pfister (Julius-Maximilians-Universität Würzburg),** and **Karen B. Schloss (University of Wisconsin – Madison)**.

The Psychonomic Society Early Career Award recognizes exceptional research accomplishments among our members. Nominees must have completed their terminal degree (typically PhD) within the past 10 years and must be a Fellow or member of the Society. Nominations are made by members of the Society, and each candidate must be endorsed by two members.

Up to four awards can be bestowed each year. One nominee, whose research is closest to the areas of perception and attention, will receive the Steven Yantis Early Career Award. Selection of the awardees is made by a committee consisting of members of the Governing Board and other members of the Society. Recipients will be recognized at the Awards and Business Meeting on Saturday, November 21, from 3:00–4:00 pm EST.

Karen L. Campbell
Brock University

Karen L. Campbell is an Assistant Professor and Canada Research Chair in Cognitive Neuroscience of Aging in the Department of Psychology at Brock University in St. Catharines, Ontario. She completed her PhD in Psychology at the University of Toronto in 2012, followed by postdoctoral fellowships at the University of Cambridge and Harvard University. Her research combines neuroimaging techniques (fMRI, EEG) with cognitive-behavioural methods (including eye-tracking) to determine how age differences in attentional control affect other cognitive processes such as memory binding and language comprehension. Her research has been funded by the Natural Sciences and Engineering Research Council of Canada, the Canadian Foundation for Innovation, and the Canada Research Chairs Program.

Aidan J. Horner
University of York

Aidan J. Horner is an Assistant Professor in the Department of Psychology and a member of the York Biomedical Research Institute, University of York, United Kingdom. His research focuses on long-term memory and spatial navigation, using experimental psychology, brain imaging, neuropsychology, and computational modelling. He received his BSc in Psychology (2005) and MSc in Cognitive Neuroscience (2006) from the University of York before completing his PhD in Cognitive Neuroscience (2010) at the Cognition and Brain Sciences Unit, University of Cambridge. He held postdoctoral research positions at the University of Cambridge, Otto von Guericke University Magdeburg, and University College London. His research has been funded by the Wellcome Trust and Economic and Social Research Council.

Roland Pfister
Julius-Maximilians-Universität Würzburg

Roland Pfister investigates cognition in action, from basic mechanisms of human action control to high-level processes such as rule-breaking and subjective agency. Simple and elegant behavioral experiments are his method of choice, occasionally supplemented by physiological measures. Further recurring themes touch upon research methods and statistics as well as (pre-)history of psychology. Since receiving his PhD in 2013 from the University of Würzburg, Germany, his work has received several awards from the Psychonomic Society and the German Psychological Society, among others. He has published more than 100 journal articles and a German textbook on inferential statistics. He serves as associate editor for the journals *Psychological Research* and *The Quantitative Methods for Psychology*.

Karen B. Schloss
University of Wisconsin – Madison

Steven Yantis Early Career Award Recipient

Karen B. Schloss is an Assistant Professor in the Department of Psychology and Wisconsin Institute for Discovery at the University of Wisconsin – Madison. She received her BA from Barnard College, Columbia University, and her PhD from the University of California, Berkeley. Her research has been funded by the National Science Foundation (CAREER award). She has served as a consulting editor for *Psychonomic Bulletin & Review,* a feature editor for the *Journal of Vision,* and a program committee member for IEEE VIS. She is a Fellow of the Psychonomic Society, a founding member of FoVea (Females of Vision et al.), and secretary of the Configural Processing Consortium. She has published more than 35 journal articles and chapters and has appeared in interviews by the *Wall Street Journal, Data Stories, Psychology Today,* and *Scientific American.*

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2020 Best Article Award Recipients

Sponsored by Springer

The Psychonomic Society Best Article Award recognizes the best article published in each of the Psychonomic Society's journals in 2020. Selections are made by the editorial team of each journal. Award recipients (the lead author) receive a certificate and honorarium of $1,000 USD and be recognized at the Awards and Business Meeting on Saturday, November 21, from 3:00-4:00 PM EST.

Psychonomic Bulletin & Review

(Editor: James R. Brockmole)

Anna Coenen, Jonathan D. Nelson, Todd M. Gureckis

"Asking the right questions about the psychology of human inquiry: Nine open challenges"

DOI: 10.3758/s13423-018-1470-5

Memory & Cognition

(Editor: Ayanna Thomas)

Sydney M. Garlitch, Christopher N. Wahlheim

"The role of attentional fluctuation during study in recollecting episodic changes at test"

DOI: 10.3758/s13421-020-01018-4

Attention, Perception, & Psychophysics

(Editor: Michael Dodd)

Owen J. Adams, Nicholas Gaspelin

"Assessing introspective awareness of attention capture"

DOI: 10.3758/s13414-019-01936-9

Cognitive, Affective, & Behavioral Neuroscience

(Editor: Marie Banich)

Dominique Makowski, Marco Sperduti, Jérôme Pelletier, Phillippe Blondé, Valentina La Corte, Margherita Arcangeli, Tiziana Zalla, Stéphane Lemaire, Jérôme Dokic, Serge Nicolas, Pascale Piolino

"Phenomenal, bodily and brain correlates of fictional reappraisal as an implicit emotion regulation strategy"

DOI: 10.3758/s13415-019-00700-8

Learning & Behavior

(Editor: Jonathon D. Crystal)

Andy J. Wills, Michael J. Beran, Kimberly Andrews Espy, David A. Washburn

"Simians in the Shape School: A comparative study of executive attention"

DOI: 10.3758/s13420-020-00409-6

Behavior Research Methods

(Editor: Marc Brysbaert)

Anne S. Hsu, Jay B. Martin, Adam N. Sanborn, Thomas L. Griffiths

"Identifying category representations for complex stimuli using discrete Markov chain Monte Carlo with people"

DOI: 10.3758/s13428-019-01201-9

Cognitive Research: Principles & Implications

(Editor: Jeremy M. Wolfe)

Andrew L. Cohen, Jeffrey J. Starns, Caren M. Rotello, Andrew M. Cataldo

"Estimating the proportion of guilty suspects and posterior probability of guilt in lineups using signal-detection models"

DOI: 10.1186/s41235-020-00219-4

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Visit www.psychonomic.org/awards for more information and to view previous recipients.

2020 SPECIAL EVENTS

Diversity & Inclusion Virtual Networking Reception

FRIDAY, NOVEMBER 20, 3:00–4:00 PM EST
VIA AIRMEET

Supported by the Psychonomic Society Diversity & Inclusion Committee

As the preeminent society for the experimental study of cognition, the Psychonomic Society celebrates scientific merit and the diversity of researchers in the field and the Society. Please join members of the Governing Board and the Diversity & Inclusion Committee for a virtual networking session open to all scientists, including graduate students, early- and mid-career investigators, and senior researchers.

Information Session: Funding at the National Science Foundation

SATURDAY, NOVEMBER 21, 12:00-1:00PM EST

Organizer/Speaker: Betty Tuller, PhD, Director, Perception, Action, and Cognition Program, National Science Foundation

NSF opportunities change all the time! Come hear the latest and get your questions answered. This presentation and Q&A session will cover current funding opportunities relevant to the Psychonomics community, NSF merit criteria, and the review process. Program officers will discuss (1) how to find the appropriate program for your work, (2) how to apply for NSF funding, (3) the grant-writing process, and (4) tips for writing successful proposals. If you would like to schedule a one-on-one virtual meeting after the conference to discuss specifics of your research and how to get it funded, sign up at https://doodle.com/poll/cpwnf8mfprmqc5ce.

Awards and Business Meeting

SATURDAY, NOVEMBER 21, 3:00–4:00 PM EST
(TIME SUBJECT TO CHANGE)

Join the Psychonomic Society's leadership as they provide updates on Society business and honor the 2020 award recipients.

Individuals to be recognized include recipients of the following 2020 awards:

- Clifford T. Morgan Distinguished Leadership Award
- Mid-Career Award
- Early Career Award
- Best Article Award
- J. Frank Yates Student Conference Award
- Graduate Conference Award
- Governing Board Service Recognition

Jogonomics at Virtual Psychonomics

ANYTIME BETWEEN THURSDAY, NOVEMBER 19 AND SATURDAY, NOVEMBER 21

Organizers: Jeffrey Zacks & Marianne Lloyd

Where: A route of your choosing

Because we cannot run together at Psychonomics this year, the organizers came up with a series of activities to keep the camaraderie going. Although this is traditionally a running event, this year we are encouraging whatever movement you prefer. Here are some suggestions:

1. Run (Or walk! Or Rollerblade! Or bike!) 6.1 kilometers or 6.1 miles.
2. Follow a route that draws a 61 on your running app.
3. Choose an activity with a duration of 61 minutes.
4. Show off by doing 1–3 in the same workout!

Then show your success by sending a watch pic, uploaded Strava screen, photos of you running, etc., to taurora@psychonomic.org to be posted on the Jogonomics page. Include your name, city, state, and country. Don't forget to tweet to the #psynom20 and #jogonomics20 hash tags.

Please consider going to www.psychonomic.org/donations to donate to one of the following causes:

- **J. Frank Yates Student Conference Award**—Supporting underrepresented students through diversity and inclusion in cognitive psychology
- **SPARK Society**—Giving students of color the tools to become innovates in the cognitive sciences.

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IN MEMORIAM

Psychonomic Society Members
July 1, 2019–June 30, 2020

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Gordon H. Bower (1932–2020)

Gordon Bower spent his 50-year career at Stanford University, retiring in 2008 as the Albert Ray Lang Professor of Psychology. His major contributions across diverse research areas in memory and learning led to many honors, including the President's National Medal of Science and election to the NAS. He was president of several major societies and received three honorary degrees. Gordon influenced many young researchers, including more than 50 PhD students, leading to the 2018 Association for Psychological Science Mentoring Award, of which he was very proud. Beyond his accomplishments, Gordon was...Gordon. He had a disarming country accent behind which was a keen analytical mind. His students and colleagues have favorite Gordon stories, often involving tough (but insightful) questions at Friday seminars. Gordon died in his home June 17, 2020. He is survived by Sharon, his life-long love whom he married in 1957, their three children, and five grandchildren.

Written by Brian Ross, Andrea Halpern, and Larry Barsalou

Karl Anders Ericsson (1947–2020)

K. Anders Ericsson died June 17, 2020, in Tallahassee, Florida. He received his PhD at the University of Stockholm in 1976, was a postdoctoral fellow at Carnegie Mellon University, associate professor at University of Colorado Boulder, and associate research professor at Max Planck Institute for Human Development and Education in Berlin. He joined Florida State University in 1992. Anders developed a highly influential theory about the role of deliberate practice in skill acquisition. Other accomplishments included honing the use of think-aloud verbal protocols to trace cognitive processes, generating ingenious case studies of memory experts, and developing the construct of long-term working memory. Importantly, Anders showed a genuine interest in people as human beings first and as fellow scientists second. He was a towering and inspiring role model to all who had the privilege to work with him.

Written by Neil Charness

Robert A. Rescorla (1940–2020)

Bob Rescorla died on March 24, 2020, after a fall at his home. As a graduate student in Richard L. Solomon's laboratory at the University of Pennsylvania, Bob wrote two important *Psychological Review* papers; from then on, his ideas, more than those of any other scholar, drove theorizing in the field of associative learning. His many incisive empirical papers, marked by elegant experimental designs, generally included multiple experiments with replications, making the findings ironclad. Bob was on faculty at Yale University (1966–1981) and then at the University of Pennsylvania (1981–2009), where he was the James M. Skinner Professor of Science (1986–2000, while serving as department chair and later as dean) and the Christopher H. Browne Distinguished Professor of Psychology (2000–2009). His many awards included election to the NAS, the Howard Crosby Warren Medal of the SEP, APA's Distinguished Scientific Contribution Award, and the Ira Abrams Teaching Award from the University of Pennsylvania.

Written by Vincent M. LoLordo

Marilyn Chapnik Smith (1942–2019)

Marilyn Smith was born in Toronto on the Ides of March, 1942; she died in Toronto on November 8, 2019, at the age of 77. Marilyn did her undergraduate degree at the University of Toronto and her PhD at the Massachusetts Institute of Technology, where she was supervised by Wayne Wickelgren. At the age of 24, she returned to the University of Toronto as a professor at what was then the new Scarborough campus, where she remained until her retirement in 2004. An active member of the university's memory group—the Ebbinghaus Empire—Marilyn had research interests that ranged from basic perceptual phenomena to attention and memory. She served as associate editor of the *Journal of Experimental Psychology*: *Learning, Memory, and Cognition* in the 1980s and wrote an influential *Psychological Bulletin* article on hypnosis and memory. Upon retirement, along with her longstanding work as an artist, her interest in cognition and the law led her to become an arbitrator.

Written by Colin M. MacLeod

Robert R. Provine (1943–2019)

Robert Provine died in Baltimore on October 17, 2019. His training focused on neuropsychology and neuroembryology. His mentors included Nobel Laureate Rita Levi-Montalcini and Viktor Hamburger, a winner of the National Medal of Science. He was emeritus professor of psychology at the University of Maryland, Baltimore County, and a Fellow of the American Association for the Advancement of Science and the Association for Psychological Science. His research on yawning, laughter, tickling, and emotional tears provided fascinating insights into the fundamentals of human social behavior. Labeling his ethological approach "sidewalk neuroscience," he demonstrated how insights could be obtained with careful observation and very simple equipment. His two books, *Laughter* and *Curious Behavior*, received stellar reviews, and his work is widely cited in textbooks. He is survived by his wife, his daughter and son, and three grandchildren. His friends and colleagues will miss his brilliance, excitement for discoveries, and great intellectual energy.

Written by Helen R. Weems

Peggy Intons-Peterson (1930–2019)

Peggy Intons-Peterson completed her BA and PhD at the University of Minnesota, married Lloyd Peterson in 1953, and moved to Indiana University in 1956 when Lloyd joined the faculty. They carried out research on memory, including their ground-breaking 1959 *Journal of Experimental Psychology* article, "Short-term retention of individual verbal items." Indiana University recognized Peggy's outstanding research contributions, achieved while raising four children and teaching part-time, by appointing her directly to a full professorship in 1969. Her seminal research contributions in articles and five books extended to augmentation of memory; visual imagery and its perception-like operation and its role in creativity; and early research on gender issues, including bias and discrimination, across ages and cultures. Peggy was editor of the *Journal of Experimental Psychology: Human Perception and Performance* (1980–1982), and *Memory & Cognition* (1989–1993), associate dean of Arts and Science (1972–1974), interim dean of the faculties (1974–1977), and chair of the Department of Psychological and Brain Sciences (1989–1995).

Written by Richard M. Shiffrin

Henry C. Ellis (1927–2019)

Henry Ellis died on July 4, 2019. He received his PhD from Washington University in St. Louis in 1958, supervised by Marion Bunch. Henry immediately joined the faculty of the University of New Mexico, where he remained his entire career. His early research reflected Bunch's interest in perception and memory and in transfer of learning, focusing on the effect of verbal labels on memory for visual shapes and on transfer of strategies in free recall. Later, his research turned to studies of emotion and memory. Henry established the department's honors program in 1959 and served as chair from 1975–1984. He was appointed distinguished professor in 1987 and distinguished research professor in 1994. Henry was preceded in death by his wife of 58 years, Florence, who was the surrogate mother of numerous generations of graduate students as well as a successful real estate executive.

Written by Reed Hunt

Patrick Cabe (1944–2019)

Scots-Irish, he said, Patrick Allen Cabe was born June 7, 1944, in Toccoa, Georgia, and died August 13, 2019, in Fearrington Village, North Carolina. He was a distinguished ecological perceptionist, with theoretical papers lately on perceptual learning and the useful invariants in visual inputs. Pat's recent studies on haptic information in forces often were based on insightful demos with pulleys and strings. Earlier experiments were on picture perception in birds. Good-humoured and straightforward, he was friendly to students and highly supportive of fellow researchers. He received his BA and MA at the University of Akron and his PhD at Cornell University (extending J. J. and E. J. Gibson's ideas). He collaborated around North America, publishing right up to 2019. His University of North Carolina at Pembroke base presented him with teaching and research awards. With Suellen, his wife of more than 50 years, Pat paired international conferences with travel, hiking, and kayaking to see firsthand the results of geological forces. The Tactile Research Group, his home for decades, dedicated their 2019 meeting to Pat.

Written by John M. Kennedy

DRAFT

2020 APCAM

19th Annual Auditory Perception, Cognition, and Action Meeting

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Thursday, November 19, 2020
VIRTUAL EVENT
8:00 am – 5:00 pm EST

Featuring **Keynote address by Dr. Edward Golob, University of Texas at San Antonio**

APCAM brings together researchers from different perspectives to present research on auditory cognition, perception, and aurally guided action, and is a unique meeting in its broad inclusion of basic and applied research that targets multiple levels of processing, theoretical perspectives, and methodologies.

Organizing Committee
Timothy Hubbard (Chair)
Laura Getz (Co-chair)
Devin McAuley
Kristopher Patten
Peter Pfordresher
Hannah Shatzer

APCAM is supported in part by the Auditory Perception and Cognition Society and the Psychonomic Society. Work from accepted abstracts may be submitted for consideration in a special issue of *Auditory Perception & Cognition*.

The internet address for the virtual meeting will be provided upon registration.

Visit www.apcsociety.org for registration and more information.

Second Annual Culture and Cognition Preconference of the Psychonomic Society

Fully Virtual

Thursday November 19th, 2020

Invited Speakers

Krishna Savani, Nanyang Technological University, Singapore
Holistic Cognition Beyond East-West Comparisons: Evidence from South Asia, South-east Asia, West Asia, North Africa, and Latin America

Rachael Jack, University of Glasgow, the United Kingdom
Discovering facial expression communication across cultures using data-driven methods

Serge Caparos, Université Paris 8, France
Seeing the forest or the trees: Impact of experience-related factors on perceptual bias

Qi Wang, Cornell University, USA
Culture and Memory Specificity in Literature

Abstract submissions are invited for posters.
Trainee and works in progress poster submissions are encouraged.
We will follow up those registered to invite poster submissions for a later deadline.
Depending on the submissions received, a data blitz session may be developed.
Presentations will be made using a remote format.

Advanced registration is required. For more information and to register, please visit:
https://www.brandeis.edu/gutchess/preconference.html

Founded and Organized by
Suparna Rajaram, Stony Brook University
Angela Gutchess, Brandeis University

Student Organizers
Nicholas Pepe, Stony Brook University
Ashley Gilliam, Brandeis University

This meeting is made possible through support from the Psychonomic Society.

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3rd Annual Meeting of the
SPARK Society
Join us for a panel discussion with our scholars on how to build a more diverse and inclusive lab!
NOV. 19, 2020
2:30 - 4:00 PM
Moderator
• Tori Peña (Stony Brook University)
Panelists
• Keith Maddox (Tufts University)
• Wendy Francis (University of Texas El Paso)
• Ariel James (Macalaster College)
• Alejandro Lleras (University of Illinois Urbana-Champaign)
REGISTER HERE AT PSYCHONOMICS!
For more information, email
sparkcognitivescience@gmail.com

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THURSDAY EVENING, NOVEMBER 19, 2020

Poster Session I with Authors Present ..... 5:30–7:30 PM EST

Animal Learning and Cognition (1001–1010)
Attentional Control (1011–1041)
Attention and Visual Search (1042–1061)
Decision Making I (1062–1089)
Music Cognition (1090–1098)
Bilingual Comprehension and Production (1099–1110)
Psycholinguistics I (1111–1133)
Language Production and Writing (1134–1151)
Emotion and Cognition (1152–1177)
Visual Working Memory (1178–1189)
Associative Learning (1190–1203)
Learning and Memory: Reward, Motivation and Emotion (1204–1220)
Recall (1221–1249)
Test Effects on Learning and Memory (1250–1273)
Human Learning and Instruction I (1274–1295)
Implicit Memory (1296–1304)
Spatial Cognition and Memory (1305–1325)
Cognitive and Motor Skills (1326–1335)
Sensation and Perception (1336–1349)

FRIDAY MORNING, NOVEMBER 20, 2020

Symposium I: Estimating and Communicating Probabilistic Information (SYM1-SYM5) ..... 9:00–11:00 AM EST
Social/Cultural Influences on Memory and Language (1–5) ..... 9:00–11:00 AM EST
Concepts and Categories (6–10) ..... 9:00–11:00 AM EST
Bilingualism (11–16) ..... 9:00–11:00 AM EST
Decision Making I (17–22) ..... 9:00–11:00 AM EST
Recall and Recognition Memory (23–28) ..... 9:00–11:00 AM EST
Speech Perception (29–34) ..... 10:00 AM–12:00 PM EST
Visual Working Memory: Features and Objects (35–39) ..... 10:00 AM–12:00 PM EST
Memory Changes in Aging (40–43) ..... 10:00 AM–11:40 PM EST
Reasoning (44–49) ..... 10:00 AM–12:00 PM EST
Spatial Cognition and Memory (50–55) ..... 10:00 AM–12:00 PM EST

FRIDAY MIDDAY, NOVEMBER 20, 2020

Symposium II: How Do We Decide What is True? (SYM6–SYM10) ..... 11:00 AM–1:00 PM EST
Rules, Norms, Morality: Cognition and Action (56–60) ..... 11:00 AM–1:00 PM EST
Memory Processes (61–65) ..... 11:00 AM–1:00 PM EST
Attention and Visual Search I (66–72) ..... 11:00 AM–1:00 PM EST
Emotion and Cognition (73–78) ..... 11:00 AM–1:00 PM EST
Decision Making II (79–85) ..... 11:00 AM–1:00 PM EST

FRIDAY AFTERNOON, NOVEMBER 20, 2020

Symposium III: Age Differences in Episodic Memory Control Processes (SYM11–SYM15) ..... 12:00–2:00 PM EST
Perception (86–90) ..... 12:00–2:00 PM EST
Attention: Development and Individual Differences (91–95) ..... 12:00–2:00 PM EST
Comparative Cognition and Learning (96–101) ..... 12:00–2:00 PM EST
Working Memory II (102–107) ..... 12:00–2:00 PM EST
Judgment: Processes and Data (108–113) ..... 12:00–2:00 PM EST
Special Symposium IV: Seeing Race in Cognitive Psychology (SYM16–SYM19) ..... 2:00–4:00 PM EST

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FRIDAY EVENING, NOVEMBER 20, 2020

Poster Session II with Authors Present . . . . . 4:00–6:00 PM EST

Statistics and Methodology (2001–2013)
Attention Capture and Automatic Processing (2014–2037)
Attention to Features and Objects (2038–2051)
Bilingualism and Cognitive Control (2052–2064)
Lifespan Cognitive Development (2065–2097)
Numerical Cognition (2098–2110)
Judgment (2111–2133)
Reasoning and Problem Solving (2134–2157)
Cognitive Control (2158–2186)
Cognition and Technology (2187–2198)
Discourse Processes (2199–2219)
Psycholinguistics II (2220–2242)
Semantics and Language (2243–2258)
Autobiographical Memory (2259–2270)
Eyewitness Identification (2271–2290)
False Memory (2291–2311)
Human Learning and Instruction II (2312–2333)
Vision (2334–2353)

SATURDAY MORNING, NOVEMBER 21, 2020

Symposium V: Emerging Research on Creative Cognition and Neuroscience of Insight (SYM20–SYM25). . . . . 9:00–11:00 AM EST
Memory and Learning (114–118). . . . . 9:00–11:00 AM EST
Neural Indices of Cognition (119–124) . . . . . 9:00–11:00 AM EST
Attention and Cognitive Control (125–130) . . . . . 9:00–11:00 AM EST
Psycholinguistics (131–136) . . . . . 9:00–11:00 AM EST
Metacognition and Metamemory (137–142) . . . . . 9:00–11:00 AM EST
Visual Working Memory (143–148). . . . . 10:00 AM–12:00 PM EST
Long-Term Memory Failures (149–153) . . . . . 10:00 AM–12:00 PM EST
Attention and Visual Search II (154–159) . . . . . 10:00 AM–12:00 PM EST
Cognition and Technology (160–165) . . . . . 10:00 AM–12:00 PM EST
Statistical Inference (166–171) . . . . . 10:00 AM–12:00 PM EST

SATURDAY MIDDAY, NOVEMBER 21, 2020

Symposium VI: Cognitive Off-Loading and Prospective Memory (SYM26–SYM31) . . . . . 11:00 AM–1:00 PM EST
Development of Knowledge and Language (172–174) . . . . . 11:00 AM–12:20 PM EST
Associative Learning Theory (175–179) . . . . . 11:00 AM–1:00 PM EST
Letter/Word Processing I (180–184) . . . . . 11:00 AM–12:40 PM EST
False Memory and Eyewitness Identification (185–190). . . . . 11:00 AM–1:00 PM EST
Autobiographical Memory (191–195) . . . . . 11:00 AM–12:40 PM EST

SATURDAY AFTERNOON, NOVEMBER 21, 2020

Symposium VII: Using Network Science to Understand Language (SYM32–SYM35). . . . . 12:00–2:00 PM EST
Decision Making and Learning: Reward and Motivation (196–199) . . . . . 12:00–2:00 PM EST
Event Cognition (200–204) . . . . . 12:00–2:00 PM EST
Human Learning and Memory (205–210) . . . . . 12:00–2:00 PM EST
Language Process (211–216) . . . . . 12:00–2:00 PM EST
Symposium VIII: Verbal Working Memory: Domain General or Domain Specific? (SYM36–SYM41) . . . . . 1:00–3:00 PM EST
Recognition Memory: Forgetting and Confidence (217–221) . . . . . 1:00–3:00 PM EST
Reading (222–226) . . . . . 1:00–2:40 PM EST
Letter/Word Processing II (227–232). . . . . 1:00–3:00 PM EST
Emotion: Attention, Memory, and Language (233–238). . . . . 1:00–3:00 PM EST
Sensation and Perception (239–243) . . . . . 1:00–2:40 PM EST

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SATURDAY EVENING, NOVEMBER 21, 2020

Poster Session III with Authors Present . . . . . 4:00–6:00 PM

Perception and Action (3001–3016)
Metacognition and Memory (3017–3058)
Working Memory (3059–3085)
Recognition Memory (3086–3116)
Prospective Memory (3117–3127)
Reading (3128–3139)
Letter/Word Processing (3140–3168)
Speech Perception (3169–3196)
Social/Cultural Effects on Cognition (3197–3220)
Event Cognition (3221–3232)
Embodied Cognition (3233–3239)
Decision Making II (3240–3272)
Concepts and Categories (3273–3294)
Bilingualism: Individual Differences and Development (3295–3307)
Consciousness and Attention (3308–3322)
Attention (3323–3339)
Neural Mechanisms in Cognition (3340–3349)

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	Symposia	Spoken Sessions	Poster Sessions	Receptions and Special Events	Affiliate Events
Thursday			**5:30–7:30 PM EST** Poster Session I	**7:30–8:30 PM EST** Keynote Address: TMI: Disengagement and Memory, *Lynn Hasher, University of Toronto* **8:30–9:30 PM EST** Virtual Opening Reception	**12:00–2:00 PM EST** BMW: Bilingualism Matters across the World **9:00 AM–3:00 PM EST** Culture and Cognition Preconference **10:00 AM–4:00 PM EST** SCiP Annual Meeting **8:00 AM–3:30 PM EST** Society for Mathematical Psychology Symposium on Current Trends in Mathematical Psychology **2:30–4:00 PM EST** SPARK Society 3rd Annual Meeting **9:00 AM–4:00 PM EST** Tactile Research Group (TRG) Annual Meeting **4:00–7:00 PM EST** Women in Cognitive Science (WiCS) 20th Annual Meeting

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	Symposia	Spoken Sessions	Poster Sessions	Receptions and Special Events	Affiliate Events
Friday	**9:00–11:00 AM EST** Symposium I: Estimating and Communicating Probabilistic Information **11:00 AM–1:00 PM EST** Symposium II: How Do We Decide What is True? **12:00–2:00 PM EST** Symposium III: Age Differences in Episodic Memory Control Processes **2:00–4:00 PM EST** Special Symposium IV: Seeing Race in Cognitive Psychology	**9:00–11:00 AM EST** Social/Cultural Influences on Memory and Language Concepts and Categories Bilingualism Decision Making I Recall and Recognition Memory **10:00 AM–12:00 PM EST** Speech Perception Visual Working Memory: Features and Objects Memory Changes in Aging (ends 11:40 AM) Reasoning Spatial Cognition and Memory **11:00 AM-1:00 PM EST** Rules, Norms, Morality: Cognition and Action Memory Processes Attention and Visual Search I Emotion and Cognition Decision Making II **12:00–2:00 PM EST** Perception Attention: Development and Individual Differences Comparative Cognition and Learning Working Memory II Judgment: Processes and Data	**4:00–6:00 PM EST** Poster Session II	**3:00–4:00 PM EST** Diversity & Inclusion Virtual Reception **4:00–6:00 PM EST** Friday Virtual Networking Reception	

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	Symposia	Spoken Sessions	Poster Sessions	Receptions and Special Events	Affiliate Events
Saturday	**9:00 AM-11:00 AM EST** Symposium V: Emerging Research on Creative Cognition and Neuroscience of Insight **11:00 AM-1:00 PM EST** Symposium VI: Cognitive Off-Loading and Prospective Memory **12:00 PM-2:00 PM EST** Symposium VII: Using Network Science to Understand Language **1:00 PM-3:00 PM EST** Symposium VIII: Verbal Working Memory: Domain General or Domain Specific?	**9:00 AM–11:00 AM EST** Memory and Learning Neural Indices of Cognition Attention and Cognitive Control Psycholinguistics Metacognition and Metamemory **10:00 AM-12:00 PM EST** Visual Working Memory Long-Term Memory Failures Attention and Visual Search II Cognition and Technology Statistical Inference **11:00 AM–1:00 PM EST** Development of Knowledge and Language (ends 12:20 PM) Associative Learning Theory Letter/Word Processing I (ends 12:40 PM) False Memory and Eyewitness Identification Autobiographical Memory (ends 12:40 PM) **12:00 PM-2:00 PM EST** Decision Making and Learning: Reward and Motivation Event Cognition Human Learning and Memory Language Process **1:00 PM-3:00 PM EST** Recognition Memory: Forgetting and Confidence Reading (ends 2:40 PM) Letter/Word Processing II Emotion: Attention, Memory, and Language Sensation and Perception (ends 2:40 PM)	**4:00–6:00 PM EST** Poster Session III	**4:00–6:00 PM EST** Saturday Virtual Networking Reception	

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THURSDAY EVENING, NOVEMBER 19, 2020

5:30 PM-7:30 PM EST

Poster Session I (1001-1349)

Animal Learning and Cognition (1001-1010)

(1001) Whitham, Beran, Washburn
(1002) Flaim, Blaisdell
(1003) Ham, Lilley, Hill
(1004) Taniuchi, Heya, Nishikawa
(1005) Smith, Greene, Pepperberg
(1006) Santana, Garcia-Mijares, Blaisdell
(1007) González, Blaisdell
(1008) Smith, Krichbaum, Vaughn, Cox, Katz
(1009) Schwob, Weiss
(1010) Rosa, Jackson

Attentional Control (1011-1041)

(1011) Elliott, Strayer, Robison, Blais, McClure, Brewer
(1012) Rheem, Blais
(1013) Tomko, Proctor
(1014) Wang, LaPointe, Sun, Milliken
(1015) Ballestero-Arnau, Moreno-Sánchez, Cunillera
(1016) Girgis, Kaya, Hansma, Donmez, Pratt
(1017) Jun, Toh, Sisk, Remington, Jiang
(1018) Aguerre, Bajo, Gomez-Ariza
(1019) Barrington, Miller, Roodenrys
(1020) Krasovskaya, Kristjánsson, MacInnes
(1021) Lohmar, Gillenwater, White
(1022) Dey, Bugg
(1023) Albal, Ma, Key, Sali
(1024) Sclodnick, Milliken, Shore, MacLellan
(1025) Schneider, Macias
(1026) Spinelli, Lupker
(1027) Colvett, Jeliazkova, Bugg
(1028) Gade, Rey-Mermet, Paelecke
(1029) Hirsch, Moretti, Koch
(1030) Tae, Almasi, Weldon, Lee, Sohn
(1031) Haciahmet, Frings, Pastötter
(1032) Song, Kim, Cho
(1033) Valle, Bajo, Gomez-Ariza
(1034) Shamli Oghli, Makani, Weinberg, Sullivan, Spaniol
(1035) Castro, Bukowski, Lupiáñez, Wodniecka
(1036) Whitehead, Mahmoud, Seli, Egner
(1037) Keintzel, Pfeuffer
(1038) Lee, Song, Lim, Cho
(1039) Rey-Mermet, Singh, Gignac, Brydges, Ecker
(1040) Patterson, Kahan
(1041) Voyer, Goodine

Attention and Visual Search (1042-1061)

(1042) Talcott, Gaspelin
(1043) Burnham
(1044) Chen L, Shen, Chen H
(1045) Mine, Most, Le Pelley
(1046) Rodriguez, Becker, Peltier
(1047) Höfler, Arsenović, Gilchrist, Bauch, Körner
(1048) Nguyen, Peterson
(1049) Yu, Cox, Nag, Kramer, Spangler, Kravitz, Mitroff
(1050) Vilanova-Goldstein, Huffman, Brockmole
(1051) Leonard, Vilanova-Goldstein, Cruz
(1052) Madrid, Hout, White, Godwin, Scarince
(1053) Lanagan-Leitzel
(1054) Cimminella, D'Innocenzo, Della Sala, Iavarone, Musella, Coco
(1055) Zupan, Blagrove, Watson
(1056) Hong, Kim
(1057) Saiki
(1058) Lim, Pratt
(1059) Sun, Wang, Milliken
(1060) Toh, Remington, Jiang
(1061) Paquette, Schmidt

Decision Making I (1062-1089)

(1062) Krusche, Newell, Le Pelley
(1063) He, Bhatia
(1064) Lagator, Le Pelley, Newell
(1065) Yamauchi, Leontyev, Razavi
(1066) Akrenius
(1067) Allan, Ripberger, Gupta, Cokely, Silva, Jenkins-Smith
(1068) Casteel
(1069) Costa, Keating, Arantes
(1070) Gomilsek, Hoffmann, Neth, Gaissmaier
(1071) Growns, Kukucka
(1072) Han, Joslyn
(1073) Martin, Kusev
(1074) Zhou, Myung, Pitt
(1075) Nakamura
(1076) Noda, Tanabe, Kimura
(1077) Oberholzer, Olschewski, Scheibehenne
(1078) Oehler, Horn, Wendt
(1079) Grunevski, Pleskac, Yu, Liu
(1080) Makani, Chowdhury, Spaniol
(1081) Teal, Kusev
(1082) Xie, Hayes
(1083) Ybarra, Cokely, Cho, Ramasubramanian, Allan, Feltz, Garcia-Retamero
(1084) Zinn, Houpt, Fific
(1085) Beard, Chein, Venkatraman
(1086) Kleitman, Zhang, Fullerton, Blanchard, Stankov, Lee, Thompson
(1087) Kurinec, Stenson, Hinson, Whitney, Van Dongen
(1088) Ramasubramanian, Patel, Turner, Ybarra, Cokely
(1089) Stenson, Kurinec, Hinson, Whitney, Van Dongen

Music Cognition (1090-1098)

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(1090) Sifonis
(1091) Guthridge, Kennison
(1092) Johnson, Gordon
(1093) Buxó-Lugo, Slevc
(1094) Van Hedger, Johnsrude, Batterink
(1095) Gryder, Dowling
(1096) Greenspon, Honan, Pruitt, Halpern, Pfordresher
(1097) Ma, Baker, Vukovics, Davis, Elliott
(1098) Slater, Kobosry, Dalla Bella, Palmer

Bilingual Comprehension and Production (1099-1110)
(1099) Ratiu, Azuma
(1100) Riaño Rincon, Raney, Naser, Ma
(1101) Yum, Fan
(1102) Raney, Riaño, Miller, Christofalos, Pambuccian, Campbell
(1103) Miller, Garcia, Raney
(1104) Mercan
(1105) Botezatu, Kroll, Trachsel, Guo
(1106) Friesen, Edwards, Lamoureux
(1107) Exton, Newman
(1108) Wolff, Seañez, Ivanova
(1109) Ahn, Gollan, FERREIRA
(1110) Schmidtke, Rahmanian, Moro

Psycholinguistics I (1111-1133)
(1111) Gullifer, Kousaie, Gilbert, Grant, Giroud, Coulter, Klein, Baum, Phillips, Titone
(1112) Ahn, Kim, Lee, Jo, Nam
(1113) Pambuccian, Raney
(1114) Yu, Stone, McBeath, Benitez
(1115) Aveni, Ahmed, Borovsky, McRae, Jenkins, Sprengel, Fraser, Orange, Knowles, Roberts
(1116) Diachek, Brown-Schmidt
(1117) Colvin, Warren
(1118) Wong, Law
(1119) Riedmann, Horton
(1120) Yee, Harris-Starling, Semenza, Molnar
(1121) Ward, Brownsett, McMahon, de Zubicaray
(1122) Wagner
(1123) Semenuks
(1124) Oralova, Boshra, Kyröläinen, Connolly, Kuperman
(1125) Cheung, Lau, Yum, Su
(1126) Gross, Leahy, Mangat, Gonzales, Plotkowski
(1127) Pissani, de Almeida
(1128) AlJassmi, McGowan, White, Paterson
(1129) Perdomo, Watson
(1130) Fernandes, Feldman, Wiener
(1131) Siew, Chan, Castro
(1132) Buades-Sitjar, Duñabeitia
(1133) Lowder, Zhou, Cardoso, Pittman

Language Production and Writing (1134-1151)
(1134) Kelley, Dell
(1135) Guydish, Fox Tree
(1136) Wang, Cheng, Maurer, Chen
(1137) Alderete, Baese-Berk, Goldrick, Leung
(1138) Mascelloni, McMahon, Piai, Kleinman, de Zubicaray
(1139) Chee, Yap, Goh, Treiman
(1140) Williams, Schleicher, Ivanova
(1141) Lau, Li, Ferreira
(1142) Hu, Chang, Abrams
(1143) Scolaro
(1144) Patra, Middleton
(1145) Taikh, Gagné, Spalding
(1146) James, Baynard-Montague, Ghaffari, Lagervall, Hanna
(1147) Wright, Baese-Berk
(1148) Roembke, Philipp, Koch
(1149) Hambric, O'Seaghdha
(1150) Kondyles, Swets
(1151) Lebkuecher, MacDonald, Weiss

Emotion and Cognition (1152-1177)
(1152) Kaull, Steinhauer, Zigarac, Cammarata, Carlson
(1153) Clancy, Wyman, Fenske
(1154) Welhaf, Hood, Hutchison, Banks, Boals
(1155) Koshino, Bonsel
(1156) Voltz, Osgood, Fang, Carlson
(1157) Caulfield, Kan
(1158) Kiat, Luck
(1159) Takarangi, Simister, Bridgland
(1160) Flynn, Kurko, Kan
(1161) Jara, Rodas, Greene
(1162) Chesebrough, Chrysikou, Kounios
(1163) Zukerman, Del Vecchio, Chesney
(1164) Techentin, Cann, Lupton, Phung
(1165) Shafto, Abrams, James, Hu, Gray
(1166) Kelly, Chrysikou
(1167) Sanson, Takarangi, Zajac, Garry
(1168) Lawson, Mayer
(1169) Kapucu, Kılıç, Yüvrük, Sivri
(1170) Manno, Rossit, Bayliss, Zhao
(1171) Moeck, Matson, Takarangi
(1172) Yee, Newman, Walker, Toumbelekis, Most
(1173) Vatakis, Nikolopoulou
(1174) Faiciuc
(1175) Wraga, Yan, Lednicky
(1176) Lomayesva, Lord, Isham
(1177) Krestar, Oller, Baker, Sanchez

Visual Working Memory (1178-1189)
(1178) Yu, Shui, Shen, Wyble, Chen
(1179) Truuvert, Pratt, Ferber
(1180) Clement, Lim, Pratt
(1181) Rhilinger, Waner, Metcalf, Rose
(1182) He, Buonauro, Meyerhoff, Franconeri, Stieff, Hegarty

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(1183) Udale, Manohar, Klar, Husain
(1184) Ye, Xu, Li, Ruohonen, Liu, Astikainen
(1185) Peterson, Swanson, Cannella, Hanson
(1186) Hedayati, Wyble
(1187) Jeanneret, Bartsch, Vergauwe
(1188) Krasnoff, Oberauer, Singmann
(1189) Ramzaoui, Mathy

Associative Learning (1190-1203)
(1190) Dames, Ragni, Kiesel, Pfeuffer
(1191) Siritzky, Overman, Stephens, Greenwood
(1192) Hughes, Thomas
(1193) Barth, Stahl, Haider
(1194) Thomasius, Stahl, Greenwald
(1195) Civile, McLaren R, Milton, McLaren I
(1196) Shabahang, Yim, Dennis
(1197) Rickert, Foerster, Pfister, Schmadlak, Pfeuffer
(1198) Aicher
(1199) Antony, Romero, Palmer, Whitwam, Vierra, Tewari, Bennion
(1200) Thomas, Caplan
(1201) Thorwart, Hartanto, Griffiths, Livesey
(1202) Seitz, Tomiyama, Blaisdell
(1203) Jou, Martinez, Guzman, Hut, Sierra

Learning and Memory: Reward, Motivation and Emotion (1204-1220)
(1204) Utsumi, Miranda, Pompéia
(1205) Reppa
(1206) Byrne, Six
(1207) Cabrera-Haro, Lin, Reuter-Lorenz
(1208) Ferron, Alves, Chiew
(1209) Skinner, Smith, Hunt
(1210) Siegel, Schwartz, Castel
(1211) Chao, Gallant, Bowen
(1212) Tae, An, Lee, Weldon, Sohn
(1213) Gaskins, Langley, Adams
(1214) Raw, Rorke, Ellis, Murayama, Sakaki
(1215) West, Mulligan
(1216) Sklenar, McCurdy, Frankenstein, Urban Levy, Leshikar
(1217) Gholston, Chiew
(1218) Zepeda, Butler
(1219) Harris, Chiew
(1220) Ksander, Madan, Gutchess

Recall (1221-1249)
(1221) Aitken, O'Connor, Jentzsch
(1222) Newbury, Crowley, Rastle, Tamminen
(1223) Clarke, Farrell
(1224) Whillock, Meade, Scott, Woolman
(1225) Rait, DuBrow
(1226) Chastain, Kazanas
(1227) Simal, Jolicoeur
(1228) Sommer, King, Musolino, Hemmer
(1229) Pepe, Wang, Rajaram
(1230) Brewer, Jones, Quinn, Kazanas
(1231) Mah, Campbell, Tamburri, Grannon, Lindsay
(1232) Glavan, Houpt
(1233) Finch, Eakin
(1234) Sivashankar, Fernandes
(1235) Richie, He, Bhatia
(1236) Dester, Lazarus, Uitvlugt, Healey
(1237) Rawlinson, Kelley
(1238) Avery, Altarriba
(1239) Chang, Brainerd
(1240) Crowley, Newbury, Rastle, Tamminen
(1241) Ren, Coutanche
(1242) Aka, Bhatia, McCoy
(1243) Roberts, MacLeod, Fernandes
(1244) Carvalho, Marmurek
(1245) Sorenson, Kelley
(1246) Martinez Guzman, Akpinar, Nassuna, Stevens, Bamford, Kelley
(1247) Hood, Whillock, Meade, Hutchison
(1248) Zhang, Norman, Griffiths
(1249) Pepe, Moyer, Peña, Rajaram

Test Effects on Learning and Memory (1250-1273)
(1250) Lapa, Garcia-Marques
(1251) DiMarco, Marmurek
(1252) Oliva, Storm
(1253) Boustani, Owens
(1254) Mera, Migueles, Marin-Garcia
(1255) Su, Buchin, Mulligan
(1256) Frankenstein, Mozen, Sklenar, Urban Levy, Leshikar
(1257) Biwer, Wiradhany, oude Egbrink, de Bruin
(1258) Imundo, Zung, Pan
(1259) Shumaker, Middlebrooks, Arnold
(1260) Soriano-Cruz, Morris, Lu, Arndt
(1261) Pastötter, Frings
(1262) DiPietro, Payne, Koen
(1263) Vitrano
(1264) Brabec, Bjork E, Bjork R
(1265) Brabec, Pan, Bjork E, Bjork R
(1266) Vaughn, Hartin
(1267) Uner, Roediger
(1268) Ekuni, Pompeia
(1269) Myers, Rhodes
(1270) Dessenberger, Sommers
(1271) Ariel, Tauber
(1272) Shaffer, Balota, McDermott
(1273) Carvalho, Koedinger

Human Learning and Instruction I (1274-1295)
(1274) Ciesielski, Hausman, Hargis, Rhodes
(1275) Alakbarova, Peper, Ball
(1276) Milburn, Diehl, Maddox, Tullis
(1277) Hausman, Rhodes
(1278) Thomas, Maass
(1279) Ahn, Chan, Heeren
(1280) St. Hilaire, Carpenter

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(1281) Guo
(1282) Agarwal, Nunes, Blunt
(1283) Schmitt, Pan, Sana, Bjork
(1284) Sheel, Geller
(1285) Geller, Davis, Peterson
(1286) Miller, Wissman
(1287) Wang, Clark, Yan
(1288) Eglington, Pavlik
(1289) Tucker, Eghterafi, Zhang, Son, Stigler
(1290) Lalchandani, Healy
(1291) Fries, Son, Stigler
(1292) Kershaw, Gordon
(1293) Lithander, Karaca, Dipano, Geraci
(1294) Martella, Karpicke
(1295) Guerrero, Griffin, Wiley

Implicit Memory (1296-1304)
(1296) Ordonez Magro, Fagot, Grainger, Rey
(1297) Tosatto, Rey
(1298) Otsuka
(1299) Graham, Was
(1300) Palma, Batterink, Titone
(1301) Lukics, Lukács
(1302) Gleason, Francis
(1303) Emerson, Conway
(1304) Malejka, Vadillo, Dienes, Shanks

Spatial Cognition and Memory (1305-1325)
(1305) Durand, Macuga, Boone
(1306) Sensibaugh, Milbradt-Massiquet, Minear
(1307) Macuga, Chiou, Babbar-Sebens
(1308) Muto
(1309) Cheng, Chrastil
(1310) Faghihi, Park, Dixit, Vaid
(1311) Perrera, Garcia, Pruden
(1312) Myer, Shipley
(1313) Gardony, Horner, Hendel, Brunyé
(1314) Garcia, Faghihi, Vaid
(1315) Burte, Gardony, Hutton, Taylor
(1316) Chen, Lee, McNamara, Wolbers
(1317) Hund, Roberts, Millard
(1318) He, Boone, Hegarty
(1319) Brunye, Horner, Gardony, Taylor
(1320) Carpenter, Colle
(1321) Wernette, Altmann, Fenn
(1322) Roberts, Sanchez
(1323) Sampaio, Wang
(1324) Newman, McNamara
(1325) Wong-Goodrich, Bartley, Lowry, James

Cognitive and Motor Skills (1326-1335)
(1326) Ha
(1327) Singh, Conway
(1328) Bego, Chastain, DeCaro
(1329) Kole, Barshi, Healy, Schneider, Buck-Gengler
(1330) Kluger, Caplan, Oladimeji, Tan, Brown
(1331) LaFollette, Satterfield, Lazar, Esbit, Anlap, Macnamara, Killgore
(1332) Osman, Ng, Kerlan, Jaffe, Schafer
(1333) Dahm, Weigelt, Rieger
(1334) Clark, Harwell, Ericsson, Boot
(1335) Harwell, Ericsson, Boot, Clark

Sensation and Perception (1336-1349)
(1336) Fotiadis, Tsogli, Vatakis
(1337) Floyd, Lang, Harrison, Levitan, Sherman
(1338) Soma Tsutsuse, Vibell, Sinnett
(1339) Desmarais, Schneeberger
(1340) Yokosawa, Uno, Asano
(1341) Han, Sanchez, Sherman, Levitan
(1342) Cacciamani, Tranquada-Torres, MacLeod
(1343) Suzuki, Nagai
(1344) Uno, Yokosawa
(1345) Haase, Fisk, Rosenberger
(1346) McFeaters, Voyer
(1347) Merz, Soballa, Frings, Spence
(1348) Lynch, Cheng, Little
(1349) Xu, Tsay, Ivry

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FRIDAY MORNING, NOVEMBER 20, 2020
9:00 AM-11:00 AM EST
Symposium (SYM1-SYM5) and Spoken Sessions (1-28)

Symposium I: Estimating and Communicating Probabilistic Information (SYM1-SYM5)
9:00-9:15 AM Dhami
9:20-9:35 AM Jenkins
9:40-9:55 AM Harris
10:00-10:15 AM Mandel
10:20-10:35 AM Budescu

Social/Cultural Influences on Memory and Language (1-5)
9:00-9:30 AM Rajaram
9:40-9:55 AM Clark, Campbell, Htet, Rosas, Magnet, Dewindt, Kylasa
10:00-10:15 AM Guida, Fartoukh, Mathy
10:20-10:35 AM Mazerolle, Rotolo, Maquestiaux
10:40-10:55 AM Hubert Lyall, Järvikivi

Concepts and Categories (6-10)

9:00-9:30 AM Schloss
9:40-9:55 AM Heffernan, Adema, Mack
10:00-10:15 AM Bhatia, Richie
10:20-10:35 AM Turner, Blanco, Unger, Kvam, Ralston, Sloutsky
10:40-10:55 AM Horner, Cockcroft, Gaskell, Berens

Bilingualism (11-16)

9:00-9:15 AM Prior, Mor
9:20-9:35 AM Francis, Baca
9:40-9:55 AM Schwartz
10:00-10:15 AM Hirosh, Degani
10:20-10:35 AM Gullifer, Titone
10:40-10:55 AM Paap, Anders-Jefferson, Mason, Zimiga

Decision Making I (17-22)

9:00-9:15 AM Wolfe, Lyu, Levari, Nartker, Little
9:20-9:35 AM Hayes, Wisken, Cruz
9:40-9:55 AM Scheibehenne, Olschewski
10:00-10:15 AM Marti, Broniatowski, Reyna
10:20-10:35 AM Rottman, Zhang
10:40-10:55 AM Chang, Pitt, Myung

Recall and Recognition Memory (23-28)

9:00-9:15 AM deBettencourt, Vogel, Awh
9:20-9:35 AM Robison, Gibson, Healey, Trost, Schor
9:40-9:55 AM Kloft, Hett, Butt, Monds, Cantanho
10:00-10:15 AM Osth
10:20-10:35 AM Yim, O'Brien, Stone, Osth, Dennis
10:40-10:55 AM Madan, Elizur, Tuen, Esposito, Palombo

FRIDAY MORNING, NOVEMBER 20, 2020
10:00 AM-12:00 PM EST
Spoken Sessions (29-55)

Speech Perception (29-34)

10:00-10:15 AM McMurray, Chiu, Sarrett, Black, Aslin
10:20-10:35 AM Samuel, Dumay
10:40-10:55 AM Pattamadilok, Welby, Tyler
11:00-11:15 AM Bosker, Peeters
11:20-11:35 AM van Heugten
11:40-11:55 AM Bradlow

Visual Working Memory: Features and Objects (35-39)

9:00-9:30 AM Oberauer
9:40-9:55 AM Moore
10:00-10:15 AM Lleras, Buetti
10:20-10:35 AM Majerus
10:40-10:55 AM Wyble, Nieuwenstein, Marinov, Bowman

Memory Changes in Aging (40-43)

10:00-10:30 AM Campbell
10:40-10:55 AM Szpunar, Li, Shrikanth, Leshikar
11:00-11:15 AM Scarampi, Gilbert
11:20-11:35 AM Plancher, Jarjat, Portrat

Reasoning (44-49)

10:00-10:15 AM Morey, Hoekstra
10:20-10:35 AM Cruz, Goswami, Hayes
10:40-10:55 AM Aktunc, Karsilar
11:00-11:15 AM Geipel, Keysar
11:20-11:35 AM Sharps, Herrera, Price-Sharps
11:40-11:55 AM Stephens, Kang, Hayes, Dunn

Spatial Cognition and Memory (50-55)

10:00-10:15 AM Yang, Merrill
10:20-10:35 AM Hegarty, He, Boone, Chrastil
10:40-10:55 AM Boone, Bullock, MacLean, Santander, Raymer, Stuber, Jimmons, Okafor, Grafton, Miller, Giesbrecht, Hegarty
11:00-11:15 AM Singer, Nardi
11:20-11:35 AM Dai, Thomas, Taylor
11:40-11:55 AM Samuel, Cole, Eacott

FRIDAY MIDDAY, NOVEMBER 20, 2020
11:00 AM-1:00 PM
Symposia II (SYM6-SYM10) and Spoken Sessions (56-85)

Symposium II: How Do We Decide What is True? (SYM6-SYM10)

11:00-11:15 AM Fazio
11:20-11:35 AM Asp
11:40-11:55 AM Mayo
12:00-12:15 PM Woolley
12:20-12:35 PM Barber

Rules, Norms, Morality: Cognition and Action (56-60)

11:00-11:30 AM Pfister
11:40-11:55 AM Giese, Hoffmann
12:00-12:15 PM Paruzel-Czachura, Pypno, Białek, Gawronski
12:20-12:35 PM Paruzel-Czachura, Białek, Domurat
12:40-12:55 PM Martin, Kusev, van Schaik

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Memory Processes (61-65)

11:00-11:30 AM	Anderson
11:40-11:55 AM	Evans, Madden
12:00-12:15 PM	Panoz-Brown, Crystal
12:20-12:35 PM	Mickes, Morgan
12:40-12:55 PM	Day, Popp

Attention and Visual Search I (66-72)

11:00-11:15 AM	Kramer, Cox, Yu, Mitroff, Kravitz
11:20-11:35 AM	Gronau, Nartker, Yakim, Utochkin, Wolfe
11:40-11:55 AM	MacInnes, Murzyakova, Dobnyuk, Merzon
12:00-12:15 PM	Redden, MacInnes, Klein
12:20-12:35 PM	Becker, Brascamp
12:40-12:55 PM	Weidler, Taylor, Hilchey, Pratt
1:00-1:15 PM	Anderson, Mrkonja, Liao

Emotion and Cognition (73-78)

11:00-11:15 AM	Crawford, Ramlackhan, Singh, Fenske
11:20-11:35 AM	Makovski, Chajut
11:40-11:55 AM	Logan, Cox, Annis, Lindsey
12:00-12:15 PM	Dumay, Crossley
12:20-12:35 PM	Bernstein, Giroux, Hunsche, Kumar, Erdfelder
12:40-12:55 PM	Becker, Tybur, Varnum, Neuberg

Decision Making II (79-85)

11:00-11:15 AM	Wolfe, Dandignac, Reyna
11:20-11:35 AM	Bruine de Bruin, Carman, Parker
11:40-11:55 AM	Yechiam
12:00-12:15 PM	Wang X, Wang P
12:20-12:35 PM	Wedell, Hayes
12:40-12:55 PM	Marsh, Kleinberg
1:00-1:15 PM	Yin, Lessard, Schloss

FRIDAY AFTERNOON, NOVEMBER 20, 2020

12:00 PM-2:00 PM

Symposium III (SYM11-SYM15) and Spoken Sessions (86-113)

Symposium III: Age Differences in Episodic Memory Control Processes (SYM11-SYM15)

12:00-12:15 PM	Wahlheim
12:20-12:35 PM	Campbell
12:40-12:55 PM	Touron
1:00-1:15 PM	Thomas
1:20-1:35 PM	Bergström

Perception (86-90)

12:00-12:30 PM	Peterson
12:40-12:55 PM	March
1:00-1:15 PM	Le Pelley, Cheng, Rich
1:20-1:35 PM	Harding, Shiffrin
1:40-2:00 PM	Ziat, Chin, Raisamo

Attention: Development and Individual Differences (91-95)

12:00-12:30 PM	Ferguson
12:40-12:55 PM	von Bastian, Blais, Brewer, Gyurkovics, Hedge, Kałamała, Meier, Oberauer, Rey-Mermet, Rouder, Souza, Bartsch, Conway, Draheim, Engle, Frischkorn, Friedman, Gustavson, Koch, Redick, Smeekens, Wiemers, Whitehead
1:00-1:15 PM	Horowitz, Treviño, Zhu, Lu, Scheuer, Huang, Germine
1:20-1:35 PM	Goodhew
1:40-1:55 PM	Lopez, Orr

Comparative Cognition and Learning (96-101)

12:00-12:15 PM	Hill, Svetieva, Dietrich, Zwahr, Cardoso, Salgado, Gallegos, Humphries, Mireles
12:20-12:35 PM	Lilley, Ham, Hill
12:40-12:55 PM	Nakamoto, Couvillon
1:00-1:15 PM	Chow, Boehly, Krasheninnikova, Bayern
1:20-1:35 PM	Seitz, Stolyarova, Blaisdell
1:40-1:55 PM	Luzardo, Howard

Working Memory II (102-107)

12:00-12:15 PM	Woodward
12:20-12:35 PM	Logie, Cowan, Camos, Barrouillet, Naveh-Benjamin, Doherty, Belletier, Jaroslawska, Rhodes, Forsberg
12:40-12:55 PM	Hughes, Harvey, Mills
1:00-1:15 PM	Bartsch, Souza, Oberauer
1:20-1:35 PM	Mizrak, Oberauer
1:40-1:55 PM	Morey, von Bastian, Kostova, Vergauwe

Judgement: Processes and Data (108-113)

12:00-12:15 PM	Kellen
12:20-12:35 PM	Pachur
12:40-12:55 PM	Jarecki, Wilke
1:00-1:15 PM	Harding, Cousineau
1:20-1:35 PM	Prike, Bijak, Higham
1:40-1:55 PM	Brashier, Pennycook, Berinsky, Rand

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FRIDAY AFTERNOON, NOVEMBER 20, 2020
2:00 PM-4:00 PM EST
Special Symposium IV (SYM16-SYM19)

Special Symposium IV: Seeing Race in Cognitive Psychology (SYM16-SYM19)

2:00-2:15 PM	Banaji	2:40-2:50 PM	Amodio
2:20-2:35 PM	Goff, Swencionis, Rau	3:00-3:15 PM	Gaither

FRIDAY EVENING, NOVEMBER 20, 2020
4:00 PM-6:00 PM
Poster Session II (2001-2353)

Statistics and Methodology (2001-2013)

(2001) Mihaylova, Gorin, Reber, Rothen
(2002) Zhang, Castro, Hosseini Ghomi, Cohen
(2003) McKenzie, Yim, Stone, Dennis
(2004) Grant, Weissman
(2005) Tamber-Rosenau, Yörük
(2006) Anderson, Etherton
(2007) Djalal, Pradipto, Wiradhany
(2008) Henninger, Shevchenko, Mertens, Kieslich, Hilbig
(2009) Juvina, Aue, Minnery, Hitzler, Nadella, Sarker
(2010) Hershman, Milshtein, Henik
(2011) Majima
(2012) James
(2013) Daly, Pitt, Van Zandt

Attention Capture and Automatic Processing (2014-2037)

(2014) Lyphout-Spitz, Maquestiaux, Ruthruff, Arexis-Lages
(2015) Zinchenko, Conci, Töllner, Müller, Geyer
(2016) Smith, Krenzer, Gomez, Quinn
(2017) Han, Proctor
(2018) Maxwell, Ruthruff
(2019) Gurbuz, Gokce
(2020) Lawriw, Mock, Golob
(2021) Sinha
(2022) Kim, Anderson
(2023) Skarratt, Cole
(2024) Bradley, Harris, Mattingley
(2025) Liao, Britton, Anderson
(2026) Kim, Hansen, Anderson
(2027) Blumberg, Harrison, Wilson
(2028) Lawrence, Schneider, Pratt
(2029) Muhl-Richardson, Parker, Davis
(2030) Choi, Cho
(2031) Adams, Gaspelin
(2032) Le, Watson, Le Pelley
(2033) Wilbiks, Hall
(2034) Minor, Hannula
(2035) Gregoire, Haena, Andy, Anderson
(2036) Karlinsky, Yoxon, Chen, Gregory, Welsh
(2037) Hayes, Henderson

Attention to Features and Objects (2038-2051)

(2038) Popovkina, Palmer, Moore, Boynton
(2039) Nowack, Finke, Biel, Keller, Müller, Conci
(2040) Chao, Hsiao
(2041) Ceja, Franconeri
(2042) Gan, Sun, Sperling
(2043) Im, Tiurina, Utochkin
(2044) Schabacker, Williams
(2045) Xu, Lleras, Buetti
(2046) Chin-Parker, Gerlach
(2047) Moneer, Williams, Little
(2048) Cochrane, Gu, Pratt
(2049) Ngiam, Loetscher, Vogel, Awh
(2050) Ding, Greer, Kahan
(2051) Pereira, Birmingham, Ristic

Bilingualism and Cognitive Control (2052-2064)

(2052) Elena-Martin, Hevia-Tuero, Incera, Suarez-Coalla
(2053) Berry
(2054) Li, Gollan
(2055) Lowry, Dubé, Schotter
(2056) Spinelli, Goldsmith, Morton
(2057) Gade, Declerck, Philipp, Rey-Mermet, Koch
(2058) Alateeq, Azuma
(2059) Gross, Altarriba
(2060) Bodet III, Hernandez
(2061) Cho, Song, Park, Morton
(2062) Ronderos, Castilla-Earls, Bunta, Hernandez
(2063) Green, Alateeq, Azuma
(2064) Martin, Altarriba

Lifespan Cognitive Development (2065-2097)

(2065) Skrotzki, Truong, Yang
(2066) Nicosia, Cohen-Shikora, Balota
(2067) Namias, Maxwell, Huff, Schwartz
(2068) D'Souza, Anderson, McKetton, Levine, Troyer
(2069) Martinčević, Vranić
(2070) Chung, Berkowitz, Schulte-Bisping, Cormia
(2071) Fields, Bowen, Daley, Parisi, Gutchess, Kensinger
(2072) De Pue, Gillebert, Dierckx, Vanderhasselt, De Raedt, Van

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den Bussche
(2073) Garlitch, Wahlheim
(2074) Zhao, Abdelkarim, Monroe, West, Hutchison, Sivakolundu, Thomas, Liu, Spence, Lu, Bart
(2075) Tsai, Gilbert
(2076) Gao, Wolters
(2077) Rieker, Reales, Muiños, Ballesteros
(2078) Castro, Robinson, Schaie, Grabowski, Willis
(2079) Cheimariou, Farmer, Gordon
(2080) Scaringi, Li, Yang
(2081) Hosokawa
(2082) Harada, Ishii
(2083) Coane, Umanath
(2084) Hardin-Sigler, Stern, Finch, Gore, Howard, Deason
(2085) Brazauskiene, Markostamou, Ashaye, Kvavilashvili
(2086) Kuhns, Touron
(2087) Emery, Whisman
(2088) Taylor, Marsh, Samanez-Larkin
(2089) Sanger, Anderson
(2090) Jaroslawska, Rhodes, Forsberg, Doherty, Belletier, Naveh-Benjamin, Cowan, Camos, Barrouillet, Logie
(2091) Savic, Barkhimer, Yim, Unger, De Deyne, Dennis, Sloutsky
(2092) Faber, Arsalidou
(2093) Weng, Schneider, Qi
(2094) Ha
(2095) Ren, White
(2096) Segura, Pompeia
(2097) De Lillo, Foley, Woodrow-Hill, Bradford, Ferguson

Numerical Cognition (2098-2110)
(2098) Storozuk, Maloney
(2099) Bertram, Nelson, Schulz
(2100) Garcia, Faghihi, Raola, Vaid
(2101) Marupudi, Varma
(2102) Bowman, Faulkenberry
(2103) Clarmann von Clarenau, Appelhoff, Spitzer, Pachur
(2104) Hildebrand, Barth, Patalano, Cordes
(2105) Weeks, Williams, Barth, Patalano
(2106) Vargas, Starns, Cohen
(2107) Stenbaek, Williams, Barth, Patalano
(2108) Carrillo, Taraban
(2109) Li, Reynvoet, Sayim
(2110) Olid, Koshino

Judgment (2111-2133)
(2111) Ramsey, Trueblood
(2112) Thoma, Schulze, Trippas, Kurvers, Pachur
(2113) Calvillo, Garcia, Mayers, Bertrand
(2114) Cho, Ramasubramanian, Allan, Feltz, Garcia-Retamero, Cokely
(2115) Carlson, Jang
(2116) Leong, McKenzie
(2117) Ashburner, Risko
(2118) Schmidt, Heck
(2119) Cai, Pleskac
(2120) Poch, Duñabeitia
(2121) Lewis, Becker
(2122) Duffek, Bayen, Schaper, Niziurski
(2123) Chesney, Bixter
(2124) Schall, Nikiforova, Chesney
(2125) Jordan, Garry
(2126) Obrecht, Collazo
(2127) Avci, Oral, Boduroglu
(2128) Lorenz-Spreen, Geers, Pachur, Hertwig, Lewandowsky, Herzog
(2129) LaCour, Serra
(2130) Galloway, Gauthier, Blais, Fiset, Boutet
(2131) Bishara, Tanton, Guthrie
(2132) Suzuki, Tsukamoto, Takahashi
(2133) Gupta, Sanabria

Reasoning and Problem Solving (2134-2157)
(2134) Zhao, Roskos
(2135) Langston
(2136) George
(2137) Frischkorn, von Bastian
(2138) Connor Desai, Hayes
(2139) Kenett, Beaty, Hass, Schacter
(2140) Stuyck, Cleeremans, Van den Bussche
(2141) Boissin, Raoelison, Caparos, De Neys
(2142) Raoelison, Keime, De Neys
(2143) Ricco, Bonsel, Monteza, Owens, Sierra, Koshino
(2144) Overoye, Ditta, Storm
(2145) Darowski, Lotulelei, Erekson
(2146) Quartararo, Thompson
(2147) Gugerty, Shreeves
(2148) Paige, Stewart, Sun, Shute, D'Mello, Duran
(2149) Ellis, Brewer
(2150) Ng, Lee, Lovibond
(2151) Brockbank, Vul
(2152) Bogomolov, Lazareva, Makarov, Smirnitskaya, Vladimirov
(2153) Sanders, Payne
(2154) Raden, Dygert, Jarosz
(2155) Mielicki, Thompson
(2156) Korovkin, Savinova, Makarov, Sosedko
(2157) Mielicki, George

Cognitive Control (2158-2186)
(2158) Ashitaka, Shimada
(2159) Sanchez, Church, Boomer, Zakrzewski, Smith
(2160) Bejjani, Egner
(2161) Davidson, Kitchen, Walsh, White
(2162) Mallick, Nieto, Parisi, Witkin, Jha, Banks
(2163) Garrett, Howard, Little, Eidels, Townsend
(2164) Fernandes, Garcia-Marques
(2165) Ye, Damian
(2166) Wiradhany, de Bruin
(2167) Adams, Washburn

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(2168) Ding, Whitlock, Lo, Sahakyan
(2169) Imburgio, Orr
(2170) Dykstra, Hazeltine
(2171) Meijer, Van den Bussche
(2172) Festini, Katz
(2173) O'Donnell, Chrysikou
(2174) Nack, Chiu
(2175) Fröber, Dreisbach
(2176) Schuch, Dignath
(2177) Byrd
(2178) Friedgen, Koch, Stephan
(2179) Pfeuffer, Kiesel
(2180) Kang, Chiu
(2181) Oliveira, Remondes, Garcia-Marques
(2182) Richardson, Fournier
(2183) Isaacs, Weimer, McBride
(2184) Villarreal, McBride
(2185) Stephan, Josten, Friedgen, Koch
(2186) Román-Caballero, Marotta, Lupiáñez

Cognition and Technology (2187-2198)
(2187) Widdowson, Ballew, Yoon, Merrill, Hovakimyan, Wang
(2188) Vivas, Yerro Avincetto, Passoni, González, Romanelli
(2189) Namba, Krumhuber, Küster
(2190) Kotsiou, Wegerif, Ellefson
(2191) Carragher, Hancock
(2192) Wright, Lee, Levin
(2193) Eliseev, Marsh
(2194) Soares, Storm
(2195) Riordan, Glikson
(2196) Wells, Mayer
(2197) Czarnowski, Unal, Walker, Solovey, Arrington
(2198) Snoddy, Kurtz

Discourse Processes (2199-2219)
(2199) Navarro, Goring, Conway
(2200) Wong, Law
(2201) Kim, Orcutt, Butterfuss, Choi, Harsch, Will, Johnson, Kendeou
(2202) Brunstein A, Brunstein J, Rosenstock
(2203) Barzy, Williams, Ponari, Ferguson
(2204) Christofalos, Raney
(2205) Cosgrove, Zhang, Diaz
(2206) Johnson, Olney, Kreuz
(2207) Nguyen, Fox Tree
(2208) Helder, Calloway, Perfetti
(2209) Chia, Kaschak
(2210) van Moort, Helder, Perfetti
(2211) Long, Kaschak
(2212) Biro, Olmstead, Viswanathan, Schuster
(2213) Oviedo, Fox Tree
(2214) Gleni, Wiley
(2215) Sonia, Creer, McCarthy, Allen
(2216) Hutson, Feller, McCarthy, Greenberg, Tighe, Loschky, Newell, Magliano
(2217) Öncel, Creer, Barker, Mills, Allen
(2218) Butterfuss, Kendeou
(2219) Krason, Fenton, Vigliocco

Psycholinguistics II (2220-2242)
(2220) Holmes, Doherty, Flusberg
(2221) Nalabandian, Ireland
(2222) Auch, Gagne, Spalding
(2223) Lakhzoum, Izaute, Ferrand
(2224) Antúnez, Mancini, Hernández-Cabrera, Hoversten, Barber, Carreiras
(2225) Simovic, Chambers
(2226) Liu, Lei, van Hell
(2227) Malone, van Heugten
(2228) Getty, Fraundorf
(2229) Qahtani, Warrington, Paterson, White
(2230) Goldshtein, Christianson
(2231) Wilck, Altarriba
(2232) Cox, Goldrick
(2233) Soo, Babel
(2234) Colby, Smith, Rooff, McMurray
(2235) Korochkina, Nickels, Bürki
(2236) Deibel, Folk
(2237) de Long, Folk
(2238) Reynoso, Pyers, Emmorey
(2239) Zahn, Dial, Schnur, Martin
(2240) Dufau, Armando, Grainger
(2241) Dempsey, Christianson
(2242) Ovans, Huang, Novick

Semantics and Language (2243-2258)
(2243) Li, Hills
(2244) Malt, Yang, Joseph
(2245) Diachek, Brown-Schmidt, Polyn
(2246) Muraki, Pexman
(2247) Yasa Kostas, MacPherson, Wolters
(2248) Liu, Lupyan
(2249) Avery, Goldstone, Jones
(2250) van Scherpenberg, Abdel Rahman, Regenbrecht, Obrig
(2251) Curley, Castro, Hertzog
(2252) Kumar, Balota
(2253) Grant, Geipel, Keysar
(2254) Reid, Katz, Al-Azary
(2255) Black, Wood, Choi, Jackson, Evans
(2256) Kalsi, Paterson, Filik
(2257) Brand, Scholl, Meyerhoff
(2258) Van Bogaert, Arnaud, Van Vlierberghe, Pochet, Leybaert

Autobiographical Memory (2259-2270)
(2259) Meek, Phillips-Meek, Powell
(2260) Chien, Antunez, Gutchess
(2261) Öner, Bilgin, Adıgüzel
(2262) Karademir, Tekcan
(2263) Cash, Papesh

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(2264) Putnam, Drake, Wang, DeSoto
(2265) Kavdır, Tekcan
(2266) Erman, Tekcan
(2267) Deffler, Umanath
(2268) Anderson, Dobbins, Ellis, McDermott
(2269) Wardell, Esposito, Madan, Palombo
(2270) Yeung, Fernandes

Eyewitness Identification (2271-2290)
(2271) Erickson, Corona, Patton
(2272) Ridgway, Aquino, Mann, Pelzner, Parks, Copeland
(2273) Bialer, Brainerd
(2274) Kim, Kwon, Ceci
(2275) Alfano, Toglia, Berman, Todorovic
(2276) O'Donnell, Chan, Manley
(2277) Reyes, Collins
(2278) Shahvaroughi, Ehsan, Hatami, Monajem, Paulo
(2279) Wooten, Lockamyeir, Carlson C, Carlson M, Jones, Gibson, Hemby
(2280) Jones, Carlson C, Lockamyeir, Hemby, Carlson M, Wooten
(2281) Yilmaz, Wilson, Wixted
(2282) Yilmaz, Wilson, Wixted
(2283) Wilson, Colloff
(2284) Baldassari, Weatherford
(2285) Colloff, Wilson, Seale-Carlisle, Wixted
(2286) Mote, Moreland, Clark
(2287) Lockamyeir, Carlson C, Jones, Wooten, Carlson M, Hemby
(2288) Davis, Peterson
(2289) Seale-Carlisle, Wilson, Semmler, Mickes
(2290) Gettleman, Dodson

False Memory (2291-2311)
(2291) Yu, Miller, Chamberlain, Gallo
(2292) Johnson, Chrobak
(2293) Lu, MacLeod
(2294) Maraver, Lapa, Raposo, Garcia-Marques
(2295) Day, Fenn
(2296) Fernandes, Luna, Albuquerque
(2297) Ulatowska, Olszewska
(2298) Poyer, Quamme
(2299) Sastry, Serra
(2300) Pillai, Brown-Schmidt, Fazio
(2301) Su, Brainerd
(2302) Rindal, Thatcher, Baker
(2303) Moore
(2304) Vijayarajah, McAlister, Schlichting
(2305) Smith K, Pazos, Smith J, Huff
(2306) Loprinzi, Smith, Reed Hunt
(2307) Stiver, Lagunas, Asp, Bennion
(2308) Wulff, Agurcia, Pandey, Karanian, Race, Thomas
(2309) Beato, Suarez
(2310) Torrance, Race, Thomas, Karanian
(2311) Botía, Cadavid

Human Learning and Instruction II (2312-2333)
(2312) Kappel-Larian, Banai
(2313) Limpo, Magalhães, Cordeiro, Rocha, Olive, Castro
(2314) Wright, Levin, Salas, Carter
(2315) Kern, Yue
(2316) Tsapali, Ellefson
(2317) Smelter, Bratton, Velazquez, Crum, Calvillo
(2318) Sullivan
(2319) Heydari, Jarosz, Jaeger
(2320) Imundo, Rapp
(2321) Double, Chow, Livesey, Hopfenbeck
(2322) Nájera, Tsuboi, Francis
(2323) Moen
(2324) Zhang, Fiorella
(2325) McClellan, Chastain, DeCaro
(2326) Emeny, Hartwig, Rohrer
(2327) Broeren, Verkoeijen, Heijltjes, Smeets, Arends
(2328) DeCaro, Thomas
(2329) Tekin, Roediger
(2330) LaPaglia, Miller, Protexter
(2331) Kane, St. Hilaire, Carpenter
(2332) Northern, Tauber
(2333) Zuppichini, Ma, Okuda, Rypma

Vision (2334-2353)
(2334) Fernandez-Prieto, Scarpina, Fontana, Scacchi, Mauro, Giordano, Budui, Zampini
(2335) Gross, Han, Schooler
(2336) White, Wayne
(2337) Sadil, Cowell, Huber
(2338) Doyle, Ferber
(2339) Hosseini, Soto
(2340) Sasia, Cacciamani
(2341) Marma, Bulatov, Bulatova, Mickienė
(2342) Khvostov, Markov, Brady, Utochkin
(2343) Langley, McBeath, Khalil
(2344) Farshchi, Kiba, Sawada
(2345) Semizer, Yu, Rosenholtz
(2346) Rummens, Sayim
(2347) Lukashevich, Khvostov, Utochkin
(2348) Kilic, Bahar Inan
(2349) Krause, Herbort
(2350) Hale, McDunn
(2351) Venkateshan, Sekuler, Bennett
(2352) Kobayashi, Morikawa
(2353) Carboni, Wnuczko, Kennedy

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SATURDAY MORNING, NOVEMBER 21, 2020
9:00 AM-11:00 AM
Symposium V (SYM20-SYM25) and Spoken Sessions (114-142)

Symposium V: Emerging Research on Creative Cognition and Neuroscience of Insight (SYM20-SYM25)

9:00-9:15 AM Danek, Wiley
9:20-9:35 AM Laukkonen, Kaveladze, Protzko, Tangen, Schooler
9:40-9:55 AM Storm
10:00-10:15 AM Wiley, George, Koppel
10:20-10:35 AM Seli, Brosowsky, Gross, Schooler
10:40-10:55 AM Salvi

Memory and Learning (114-118)

9:00-9:30 AM McDermott
9:00-9:55 AM Zepeda, Martin, Butler
10:00-10:15 AM Imundo, Pan, Bjork E, Bjork R
10:20-10:35 AM Fisher, Radvansky
10:40-11:00 AM Shanks, Yang, Luo, Vadillo, Yu

Neural Indices of Cognition (119-124)

9:00-9:30 AM Turner
10:00-10:15 AM McDonough, Chen, Gallo
10:20-10:35 AM Peterson, Cacciamani, Skocypec, Flowers, Perez
10:40-10:55 AM Thoma
11:00-11:15 AM Halpern, May, Casey
11:20-11:35 AM Bezdek, Betzel, Sporns, Bobick, Zacks

Attention and Cognitive Control (125-130)

9:00-9:15 AM Van den Bussche, Alves, Murray, Hughes
9:20-9:35 AM Moher
9:40-9:55 AM Paelecke, Gade
10:00-10:15 AM Grant, Weissman
10:20-10:35 AM Bertenthal, Lewis, Alexeev, Fagan
10:40-10:55 AM Beier, Chantavarin, Ferreira

Psycholinguistics (131-136)

9:00-9:15 AM King, Gentner, Forbus
9:20-9:35 AM Cevoli, Watkins, Gao, Rastle
9:40-9:55 AM Buchanan, Valentine, Maxwell, Taylor, Montefinese
10:00-10:15 AM Jouravlev, Hodgins, Jennings
10:20-10:35 AM Brown, Fox, Strand
10:40-10:55 AM Liu, Reichle, Yu

Metacognition and Metamemory (137-142)

9:00-9:15 AM Metcalfe, Schwartz, Eich
9:20-9:35 AM Mitrani-Rosenbaum, Glickman, Fleming, Usher
9:40-9:55 AM Ackerman, Levontin
10:00-10:15 AM Callender, Roberts
10:20-10:35 AM Jang
10:40-10:55 AM Brainerd, Chang, Bialer

SATURDAY, NOVEMBER 21, 2020
10:00 AM-12:00 PM
Spoken Sessions (143-171)

Visual Working Memory (143-148)

10:00-10:30 AM Brady, Störmer
10:40-10:55 AM Stilwell, Vecera
11:00-11:15 AM Magen, Emmanouil
11:20-11:35 AM Shoval, Makovski
11:40-11:55 AM Souza, Thaler, Skoda, Liesefeld, Santos, Peixoto, Albuquerque
12:00-12:15 PM Oberauer, Shepherdson, Hell

Long-Term Memory Failures (149-153)

10:00-10:30 AM Horner, Andermane, Joensen
10:40-10:55 AM Janssen, Anthony, Chang, Choong, Neoh, Lim
11:00-11:15 AM Schweickert, Han
11:20-11:35 AM Dennis, Laliberte, Yim, Stone
11:40-11:55 AM Healey, Wahlheim

Attention and Visual Search II (154-159)

10:00-10:15 AM Carlisle
10:20-10:35 AM Van Pelt, Lowe, Robinson, Donaldson, Johnston, Yamamoto
10:40-10:55 AM Gil-Gómez de Liaño, Wolfe
11:00-11:15 AM Cox, Kravitz, Mitroff
11:20-11:35 AM Carrigan, Charlton, Foucar, Wiggins, Georgiou, Palmeri, Curby
11:40-11:55 AM Gallup

Cognition and Technology (160-165)

10:00-10:15 AM Matzen, Trumbo
10:20-10:35 AM Friehs, Dechant, Vedress, Frings, Mandryk
10:40-10:55 AM Plant
11:00-11:15 AM Boutet, Leblanc, Chamberland, Collin
11:20-11:35 AM Lewandowsky, Jetter, Ecker
11:40-11:55 AM Lupyan, Sulik, Pontikes, Evans

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Statistical Inference (166-171)

10:00-10:15 AM White, Waters, Simchy-Gross
10:20-10:35 AM Tillema, Verkoeijen, Bouwmeester, Heijltjes
10:40-10:55 AM Donkin, Szollosi
11:00-11:15 AM Haines, Kvam, Turner
11:20-11:35 AM Ballard, Alister, Vickers-Jones, Sewell
11:40-11:55 AM Wilson, Harris, Wixted

SATURDAY MIDDAY, NOVEMBER 21, 2020
11:00 AM-1:00 PM
Symposium VI (SYM26-SYM31) and Spoken Sessions (172-195)

Symposium VI: Cognitive Off-Loading and Prospective Memory (SYM26-SYM31)

11:00-11:15 AM Risko, Lu, Kelly, Pereira
11:20-11:35 AM Guynn
11:40-11:55 AM Ball, Peper, Alakbarova, Brewer
12:00-12:15 PM Gilbert
12:20-12:35 PM Scullin, Jones, Kiselica, Keefe, Benge
12:40-12:55 PM Shelton, Sanford, Whittemore

Development of Knowledge and Language (172-174)

11:00-11:30 AM Newcombe
11:40-11:55 AM Read, Vo
12:00-12:15 PM Smolík, Bláhová

Associative Learning Theory (175-179)

11:00-11:30 AM De Houwer
11:40-11:55 AM Soto, Perez
12:00-12:15 PM Whitlock, Sahakyan
12:20-12:35 PM Rey, Bogaerts, Tosatto, Bonafos, Franco, Favre
12:40-12:55 PM Lindsey, Logan

Letter/Word Processing I (180-184)

11:00-11:15 AM Treiman, Jewell, Berg, Aronoff
11:20-11:35 AM Barach, Feldman, Sheridan
11:40-11:55 AM Kinoshita, Basclain
12:00-12:15 PM Avcu, Newman, Xin, Gow
12:20-12:35 PM Kochupurackal, Tickle-Degnen, Cohen-Goldberg

False Memory and Eyewitness Identification (185-190)

11:00-11:15 AM Greene, Nash, Murphy
11:20-11:35 AM Starns
11:40-11:55 AM Smith
12:00-12:15 PM Carlson C, Hemby, Wooten, Jones, Lockamyeir, Carlson M, Whittington, Dias
12:20-12:35 PM Hyman, Jr., Carroll, Crooks, Schorn, Reyna, Hansen
12:40-12:55 PM Smalarz, Smith, Wells, Lampinen

Autobiographical Memory (191-195)

11:00-11:15 AM Westerberg, Paller, McGaugh, Zee, Warby, Lacourse, Florczak, Reid, Stark S, Stark C
11:20-11:35 AM Kraft, Alexander, Hove, Wollett
11:40-11:55 AM Niziurski
12:00-12:15 PM Matsumoto, Nishimura, Nishiguchi, Tabuchi, Hasegawa, Masuyama, Oi, Fukui, Oikawa, Tanno, Mochizuki
12:20-12:35 PM Brown

SATURDAY AFTERNOON, NOVEMBER 21, 2020
12:00 PM-2:00 PM
Symposium VII (SYM32-SYM35) and Spoken Sessions (196-216)

Symposium VII: Using Network Science to Understand Language (SYM32-SYM35)

12:00-12:15 PM Tiv, Gullifer, Feng, Titone
12:20-12:35 PM Benham
12:40-12:55 PM Castro
1:00-1:15 PM Vitevitch, Mullin

Decision Making and Learning: Reward and Motivation (196-199)

12:00-12:30 PM Anderson
12:40-12:55 PM Newell, Liew, Embrey
1:00-1:15 PM Garavito, Reyna, DeTello, Landow, Tarpinian
1:20-1:35 PM Heilman, Petko

Event Cognition (200-204)

12:00-12:30 PM Zacks
12:40-12:55 PM Kelly, Khemlani
1:00-1:15 PM Hubbard
1:20-1:35 PM Kersten, Earles, Smithwick, Petroz
1:40-1:55 PM Sagi

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Human Learning and Memory (205-210)

12:00-12:15 PM Wohldmann, Healy
12:20-12:35 PM Steyvers, Schafer, Ng, Osman, Galdo, Turner
12:40-12:55 PM DeCaro, Bego, Newman, Velic
1:00-1:15 PM Tullis, Qiu
1:20-1:35 PM Chechile, Pintea
1:40-1:55 PM Gilbert, Zhu, Dupont

Language Process (211-216)

12:00-12:15 PM Galati, Alviar, Dale, Coco
12:20-12:35 PM Zhang, Frassinelli, Tuomainen, Skipper, Vigliocco
12:40-12:55 PM Myers, Jacobs, Buxo-Lugo, Watson
1:00-1:15 PM St. Pierre, Johnson
1:20-1:35 PM Baese-Berk, Haupt, Jaggers, Samuel, Trebon, Wallace, Wesson
1:40-1:55 PM Lelonkiewicz, Ktori, Crepaldi

SATURDAY AFTERNOON, NOVEMBER 21, 2020

1:00 PM-3:00 PM EST

Symposium VIII (SYM36-SYM41) and Spoken Sessions (217-243)

Symposium VIII: Verbal Working Memory: Domain General or Domain Specific? (SYM36-SYM41)

1:00-1:15 PM Nozari
1:20-1:35 PM MacDonald
1:40-1:55 PM Nozari, Hepner
2:00-2:15 PM Martin, Yue
2:20-2:35 PM Redick
2:40-2:55 PM Nozari

Recognition Memory: Forgetting and Confidence (217-221)

1:00-1:30 PM Roediger, Tekin
1:40-1:55 PM Miller, Layher
2:00-2:15 PM Koriat
2:20-2:35 PM Maxcey, De Leon, Torres, Wick, Fukuda
2:40-2:55 PM Zhao, Woodman

Reading (222-226)

1:00-1:15 PM Angele, Rocabado, Duñabeitia
1:20-1:35 PM Duñabeitia, Zelazny, Puig-Mayenco, Casaponsa, Herranz, Rothman
1:40-1:55 PM Andrews, Wong, Yu, Veldre, Reichle
2:00-2:15 PM Christianson, Tsiola, Deshaies, Kim
2:20-2:24 PM Carr, Pescuma, Crepaldi

Letter/Word Processing II (227-232)

1:00-1:15 PM Gomez, Marcet, Baciero, Perea
1:20-1:35 PM Massol, Grainger
1:40-1:55 PM Kerr, Mirault, Grainger
2:00-2:15 PM Perea, Baciero, Rocabado, Marcet
2:20-2:35 PM Content, Amighi, Chetail
2:40-2:55 PM Veldre, Yu, Andrews, Reichle

Emotion: Attention, Memory, and Language (233-238)

1:00-1:15 PM McBeath, Patten
1:20-1:35 PM Bak, Altarriba
1:40-1:55 PM Krumhuber, Küster, Namba
2:00-2:15 PM Lander
2:20-2:35 PM Murty
2:40-2:55 PM Onie, MacLeod, Most

Sensation and Perception (239-243)

1:00-1:15 PM Rosenbaum
1:20-1:35 PM Pfister, Foerster, Moeller, Huffman, Kunde, Frings
1:40-1:55 PM Jacob, Potter, Huber
2:00-2:15 PM Sekuler, Song, Bennett, Sun
2:20-2:40 PM Isham, Lomayesva, Grimm, Grilli

SATURDAY EVENING, NOVEMBER 21, 2020

4:00 PM-6:00 PM

Poster Session III (3001-3349)

Perception and Action (3001-3016)

(3001) Scerrati, Rubichi, Iani
(3002) Williams, Pratt, Ferber
(3003) Terry, Trick
(3004) Miles
(3005) Möller, Mayr
(3006) Saneyoshi, Toyama, Inada, Tsujita, Hayakawa, Kumagaya
(3007) Hall, Kim, Large, Paxton
(3008) Mantell, Steelman
(3009) Bégel, Demos, SorgerBrock, Palmer
(3010) Böffel, Müsseler
(3011) Bermeitinger, Hackländer
(3012) Gagnon, Na, Heiner, Stefanucci, Creem-Regehr, Bodenheimer
(3013) Liesner, Kunde

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(3014) Xu, Xiong, Proctor
(3015) Yoshida, Chihak
(3016) Louth, Rosenbaum

Metacognition and Memory (3017-3058)
(3017) Gier, Kreiner
(3018) Decker, Naveh-Benjamin
(3019) Mitchell, Ferraro, Lessner
(3020) Hughes, Touron
(3021) Laursen, Fiacconi
(3022) Leslie, Layher, Durdle, Santander, Miller
(3023) Jiang, Newman, Schwarz
(3024) French, Lyle
(3025) Newman, Thompson
(3026) Sidi, Blau
(3027) Mason, Thomas, Brunye, Taylor
(3028) Colloff, Ingham
(3029) Lipko-Speed, Wagaman, Akinyemi, Wolf
(3030) Schwartz, Silaj, Siegel, Castel
(3031) Sachdeva, Gilbert
(3032) Hildenbrand, Sanchez
(3033) Hanson, Muenks, Yan
(3034) Huebert, White, Cleary
(3035) Rivers, Dunlosky
(3036) Badali, Rawson, Dunlosky
(3037) Stone, Stanley, Marsh
(3038) Kurpad, Geraci, Tirso, Gray
(3039) Tirso, Geraci, Lench
(3040) Zuniga, Mueller, Santana, Kelemen
(3041) Jang, Lee, Kim, Min
(3042) Fulton, Gray, Huber, Madison, Crum
(3043) Flurry, Eakin
(3044) Chamberlain, Hirsch, Gallo
(3045) Martin Luengo, Luna, Shtyrov
(3046) Witherby, Carpenter
(3047) Dalterio, Burns D, Burns S
(3048) Schaper, Bayen
(3049) Krogulska, Golik, Barzykowski, Maylor
(3050) Murphy, Agadzhanyan, Whatley, Castel
(3051) Krueger
(3052) Maxwell, Huff
(3053) Becerra, Gronlund
(3054) Mitton, Fiacconi
(3055) Pournaghdali, Schwartz, Lee
(3056) McLane, Frank
(3057) Dollois, Poore-Buchhaupt, Fiacconi
(3058) Ardıç, Besken

Working Memory (3059-3085)
(3059) Hardy, Pruyser, Romero, Zakarian, Sepulveda, Rose, Morgan, Fernandez
(3060) Vallejo, Zuniga, Morrison
(3061) Smith, Groff, Smolker, Kim, Lewis-Peacock, Banich
(3062) Debraise, Gauvrit, Mathy
(3063) Mohan, Weisman, Bowman, Bolger, Rickles
(3064) Hakim, Awh, Vogel, Rosenberg
(3065) Hautekiet, Langerock, Vergauwe
(3066) Vergauwe, Langerock
(3067) Otsuka, Shizawa, Sato, Itakura
(3068) Valentini, Souza, Shimi, Overkott, Vergauwe
(3069) Langerock, Jacot De Alcantara, Monnet, Vergauwe
(3070) Langerock, Jacot de Alcantara, Monnet, Vergauwe
(3071) Higo, Okamoto
(3072) Forsberg, Guitard, Cowan
(3073) Saito, Morita, Nishiyama, Camos, Barrouillet, Minamoto, Chooi, Logie
(3074) Ricker, Vergauwe
(3075) Loaiza
(3076) Burnett, Richmond, Morrison, Ball
(3077) Ishiguro, Saito
(3078) Feng, Pahor, Seitz, Jaeggi
(3079) Werner, Parks
(3080) Cotton, Ricker
(3081) Hein
(3082) Roth
(3083) Krichbaum, Vaughn, Katz
(3084) Hao, Navarro, Rosales, Conway
(3085) Perez-Martinez, Rivera, Sierra, Marino, Pahor, Seitz, Reimer

Recognition Memory (3086-3116)
(3086) Weatherford, Myers, Darling, Ramos, Crane, Anderson, Hout, White
(3087) Greene, Naveh-Benjamin
(3088) Urban Levy, Frankenstein, Skenar, McCurdy, Leshikar
(3089) Muhmenthaler, Meier
(3090) Dubravac, Meier
(3091) Kulkarni, Hannula
(3092) Madore, Khazenzon, Wagner
(3093) Towler, Dunn, White
(3094) Sloane, Curl, White, Donkin
(3095) Fallow, Kitagami, Takeno, Lindsay
(3096) Krause, Stornelli, Berman
(3097) Onyper, Oakes
(3098) Checknita, Te, Madan, Palombo
(3099) Tan, Hockley, MacLeod
(3100) DeVore, McBride
(3101) Hodel, Prieto, Olszewska
(3102) Yeh, Koen
(3103) Janakiefski, Scotti, Maxcey
(3104) Jeye, Slotnick
(3105) Aikhuele, Spinelli, Maxcey
(3106) Ahmad, Tremblay, Karkuszeski, Hockley
(3107) Fox, Osth
(3108) Olszewska, Ulatowska, Opolka, Markle
(3109) Price, Allen, Wu, Naselaris, Kay, Hutchinson
(3110) Zhang, Hupbach
(3111) Anderson, Baena, Yang, Kohler
(3112) McNeely-White, Huebert, Cleary

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(3113) Hourihan, Taylor
(3114) Kraemer, Black, McDonough
(3115) Hancock
(3116) Layher, Abbey, Durdle, Leslie, Santander, Miller

Prospective Memory (3117-3127)
(3117) Streeper, Arbuckle, Maxwell, Bugg
(3118) Kytola, Reese-Melancon, Harrington, Turner, Pasaribu
(3119) Jones, Benge, Scullin
(3120) Huang, Samlow
(3121) Kelly, Love, James, Perdue, Flessert, Beran
(3122) Love, Kelly, Parrish, Perdue, Little, Beran
(3123) Munaretto, Mäntylä, Del Missier
(3124) Peper, Alakbarova, Ball
(3125) Gil, Aizpurua, Migueles
(3126) Schnitzspahn, Pupillo
(3127) Morita

Reading (3128-3139)
(3128) Shlanta, Ashby
(3129) Luke, Carter
(3130) Antalek, De Haan, Wydell
(3131) Nisbet, Siegelman, Kuperman
(3132) Thakkar, Richardson, Dang, Centanni
(3133) Withall, Sagi
(3134) Martin, Sahouria, Bernatchez, Stiegler-Balfour
(3135) Faber, Smith, Loyed, Stetson, Mills
(3136) Yu, Xiong, Veldre, Drieghe, Reichle, Andrews
(3137) Li Y, Li H, Hui, Wang
(3138) Smejkalova, Chetail
(3139) Hughes Berheim, Morett, Shelley-Tremblay

Letter/Word Processing (3140-3168)
(3140) Lee, Choo, Koh
(3141) Apfelbaum, Goodwin, McMurray
(3142) Ziaka, Zelihic, Svendsen Nordli, McMurray, Protopapas
(3143) Fernández-López, Marcet, Perea
(3144) Tibi, Fitton, McIlraith
(3145) Uceda, Duñabeitia
(3146) Lee, Martinez, Mirault, Emmorey
(3147) Liu, Yoshihara, Lupker, Nakayama
(3148) WannerKawahara, Yoshihara, Stephen, Nakayama
(3149) Knoph, Lawrence
(3150) Parker, Woodhead
(3151) Hirshorn, Wojszynski
(3152) Pérez Serrano, Nogueroles López, Duñabeitia Landaburu
(3153) Baciero, Perea, Gomez, Duñabeitia
(3154) Marcet, Baciero, Perea
(3155) Deng, Kusunose, Yoshihara, Lupker, Hino, Nakayama
(3156) McLaughlin, Zink, Gaunt, Spehar, Van Engen, Sommers, Peelle
(3157) Chetail, Sauval
(3158) Isselé, Chetail, Content
(3159) Warrington, Sidhu, McGowan, Soltan, Gopikrishna, Kołodziejczyk, Paterson, White
(3160) Ciaccio, Veríssimo
(3161) Zhang, Yang, Wang, Jiang
(3162) Martinez, Lee, Emmorey, Holcomb, Midgley
(3163) Goh, Chee, Yap
(3164) Chi, Lupker
(3165) Milligan, Schotter
(3166) Tachibana, Kida, Hino
(3167) Mirault, Grainger
(3168) Stone, Walenchok

Speech Perception (3169-3196)
(3169) Knight, Mattys
(3170) Mepham, Bi, Mattys
(3171) Crandell, Silcox, Payne
(3172) Fitzroy, Breen
(3173) Hunter
(3174) Kim, Samuel, Kapnoula, Nash, Dumay
(3175) Chiu, Freeman, McMurray
(3176) Tecoulesco, Lapides, Skoe, Naigles
(3177) Wang, Gibson
(3178) Saltzman, Luthra, Myers, Magnuson
(3179) Zhang, Wiener, Holt
(3180) Grubb, Dalal, Daniel, Peraza-Santiago, Luthra, Saltzman, Xie, Crinnion, Magnuson
(3181) Charoy, Samuel
(3182) Black, Toscano
(3183) Alexander, Dupree, Brogan
(3184) Meemann, Smiljanic
(3185) Clayards, Suh, Otto
(3186) Fung, Fecher, Johnson
(3187) Keerstock, Smiljanic
(3188) Brown, Dillman-Hasso, Li, Ray, Mamantov, Van Engen, Strand
(3189) Peraza-Santiago, Beeson, Luthra, Saltzman, Crinnion, Magnuson
(3190) Luthra, Mechtenberg, Myers
(3191) Neergaard, Waegemaekers
(3192) Buntrock, Newman
(3193) Jaekel, Weinstein, Newman, Goupell
(3194) Mechtenberg, Myers
(3195) Peelle, Murray, Graegin
(3196) McGarrigle, Rakusen, Knight, Geller, Mattys

Social/Cultural Effects on Cognition (3197-3220)
(3197) Purcell, Stewart
(3198) Lorimer, McCormack, Jaroslawska, Hoerl, Beck, Johnston, Feeney
(3199) Sierra, Martinez, Guzman, Hut, Jou
(3200) Cheung, Yum, Jiang
(3201) Heanoy, Shi, Brown
(3202) Baess, Ecker, Janssen, Zheng, Bermeitinger

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(3203) Simonson, Yu, Kumakiri, Weigel, Royg-Quevedo, Ueda, Saiki, Loschky
(3204) Voorrips, Desender, Hughes, Van den Bussche
(3205) Autry
(3206) Oates, Thornton
(3207) Briones, Marshall
(3208) Irons, Gillentine, Fischer-Baum
(3209) Cantarutti
(3210) Hacıbektasoglu, Boduroglu
(3211) García-Arch, Cucurell, Fuentemilla
(3212) Fronzek, Luhmann
(3213) Williams, Copeland
(3214) Jeon, Banquer, Navangul, Kim
(3215) Khan, Luo, Wu
(3216) Greenberg
(3217) Basnight-Brown, Buchanan, Wagge, Chen
(3218) Price, Cervantes Chavez, Flores-Mondragon, Lucatero, Smith
(3219) Antunez, Chien, Gutchess
(3220) Martin, Butler

Event Cognition (3221-3232)
(3221) Capozzi, Ristic
(3222) Smith, Martin, Brucks, Bailey
(3223) Moeller, Frings
(3224) Pitts, Bailey, Eisenberg, Zacks
(3225) Logie, Donaldson
(3226) Yan, McCarthy, Ackerman, Kurby, Mar, Magliano
(3227) Gouret, Pfeuffer
(3228) Schreiner, Meiser, Bröder
(3229) Bezdek, Bobick, Fox, Cunningham, Zacks
(3230) Carrasco, Bangert, Kurby
(3231) Dhaim, Chiovaro, Blau
(3232) Sasmita, Swallow

Embodied Cognition (3233-3239)
(3233) Millett, Cole
(3234) Zheng, Liu, Tversky
(3235) Aldugom, Cook
(3236) Chistopolskaya, Kuritsyn
(3237) Hancock, Hilverman, Wagner Cook, Halvorson
(3238) Bueno, Seigneuric, Megherbi
(3239) Kim, Kingstone, Hodges, Sinnett

Decision Making II (3240-3272)
(3240) Markant, Padro, Mostafavi
(3241) Liang, Sloane, Donkin, Newell
(3242) Ungson, Marsh, Packer, Abrahams
(3243) Joslyn, Savelli, Qin, Demuth, Morss, Ash
(3244) Jiang, Merner, Olejko, Lim, King, Macnamara
(3245) Luthra, Todd
(3246) Glickman, Moran, Usher
(3247) Guðmundsdóttir, Nilsdóttir, Shepherdson
(3248) Weldon, Bien-Aime, Caprak
(3249) Horn, Freund
(3250) Hayes, Wedell
(3251) Sui, Rao
(3252) Wilson, Qian, Jerolmack, Shipley, Roberts, Ham, Koditschek
(3253) Crossby, Barideaux Jr
(3254) Burnell, Garry
(3255) Hoover, Cohen, Rotello
(3256) Stornelli, Krause, Berman
(3257) Michal, Zhong, Shah
(3258) Szollosi, Donkin, Newell
(3259) Servant, Logan, Gajdos, Evans
(3260) Hasan, Eichbaum, O'Daniels, Trueblood
(3261) Haroz
(3262) Zhou, Osth, Lilburn, Smith
(3263) Hatz, McCarthy, Davis-Stober
(3264) Zilker
(3265) Zhu, Hsieh, Yang
(3266) Feng, Budescu
(3267) Oehler, Schneider
(3268) Park, Anderson
(3269) Xiong, Stokes, Franconeri
(3270) Kim, Harman, Beck
(3271) Howatt, Young
(3272) Yang, Worthy

Concepts and Categories (3273-3294)
(3273) Little, Jayme
(3274) Lautz, Annand, Walkwitz, Davis
(3275) Wetzel, Kurtz
(3276) Mason, Wetzel, Kurtz
(3277) Hemmatian, Chan, Sloman
(3278) Hosch, Schlegelmilch, von Helversen
(3279) Killingsworth, Kleider-Offutt, Meacham, Bohil
(3280) Tio, Lakshmanan
(3281) Rissman, Lupyan
(3282) Livesey, Greenaway, Chow, Don
(3283) Noh, Roads, Love, Preston
(3284) Cabral, Don, Goldwater, Worthy, Davis
(3285) Babineau, Tauber
(3286) Schuetze, Yan
(3287) Jackson, Church, Smith
(3288) Clapper, Alvarez, Appel
(3289) Church, Jackson, Mercado
(3290) Banerjee, Shipley, Kastens
(3291) Rago, Baross, Borbely
(3292) Yang
(3293) Cornwall, Davis, Byrne, Worthy
(3294) Dubova, Goldstone

Bilingualism: Individual Differences and Development (3295-3307)
(3295) Reed, Kim, Bukach, Couperus
(3296) Whitford, Joanisse
(3297) Berry
(3298) Tiv, Kutlu, Gullifer, Feng, Titone

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(3299) Olkoniemi, Bertram, Kaakinen
(3300) Meade, Holcomb
(3301) Buffington, Morgan-Short
(3302) Hazel, Frank, López
(3303) Finestrat, Morgan-Short
(3304) Padt, Kerschen, Wodniecka, Jackson
(3305) Sarrett, Shea, McMurray
(3306) Link, Carlson, Weiss
(3307) Vaid, Fox Tree

Consciousness and Attention (3308-3322)
(3308) Koch, Aliff
(3309) Hills
(3310) Welhaf, Smeekens, Kane
(3311) Charbonneau, Hood, Marois, Watson, Hutchison
(3312) Zhang, Anderson, Miller
(3313) Arnicane, Souza
(3314) Raffaelli, Wilcox, Mills, de Stefano, Chambers, Boyilla, Fitzgerald, Majeed, Zarnescu, Malusa, Andrews, Mehl, O'Connor, Andrews-Hanna
(3315) Wu, Shu, Pashler
(3316) Reppa, Jiga, Swainston
(3317) Hemed, Mark-Tavger, Hertz, Bakbani-Elkayam, Eitam
(3318) Wyer
(3319) Colby, Gliser, Allen, Kun, Mills
(3320) Saad, Musolino, Hemmer
(3321) Strohmaier, Jones, Cane
(3322) Cole

Attention (3323-3339)
(3323) Schacherer, Hazeltine
(3324) Johnson, Palmer, Boynton
(3325) Wilson, Peltier, Daley, Handy
(3326) Sisk, Jiang
(3327) Mackey, Crocco, Jardin
(3328) Ruppel, McElveen
(3329) Mitchell, Kemmel, Smith, Houser
(3330) Paruzel-Czachura, Farny, Gawronski, Luke
(3331) Ruiz, Mock, Golob
(3332) Charbonneau, Marois, Millspaugh, Poehlman, Moffitt, Szolosi, Watson
(3333) Song, Al-Shamali, Hussain, Hayward
(3334) MacDonald, Levesque, Feltmate, Klein, Redden
(3335) Greve, Was, Hollis
(3336) Jefferies
(3337) Yorzinski, Karstadt, Anderson, Birmingham
(3338) Rehrig, Hayes, Henderson, Ferreira
(3339) Cronin, Peacock, Henderson

Neural Mechanisms in Cognition (3340-3349)
(3340) Schubert, Löffler, Höpfner, Hagemann
(3341) Sperling, Sun
(3342) Toth, Daniels, Holsten
(3343) Song, Finn, Rosenberg
(3344) Green, Lyday, Laurienti, Dagenbach
(3345) Lim, Hélie
(3346) Karanian, Rabb, Wulff, Torrance, Thomas, Race
(3347) Sutterer, Woodman, Polyn
(3348) Doshier, Stuart, Primous II, Ryals
(3349) Hunsberger

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Welcome/Keynote Address
Thursday, November 19, 7:30 PM EST
Lynn Hasher, University of Toronto
TMI: Disengagement and Memory

Virtual Opening Reception Immediately Following Keynote

Symposium I: Estimating and Communicating Probabilistic Information

Virtual, Friday, 9:00-11:00 AM EST

Chaired by Mandeep K. Dhami, *Middlesex University*

9:00-9:15 AM (SYM1)

Effects of Positive and Negative Context on Linguistic Probabilities. MANDEEP DHAMI, *Middlesex University* – When people use high and low probability terms such as probable and improbable, they intend for them to have discriminable meanings. However, the context in which such terms are applied can affect how they are interpreted and how well they are discriminated. In Experiment 1, we examined the effect of context (i.e., positive vs. negative event) on the numeric interpretations of high and low probability terms. In Experiment 2, we additionally examined the effect of intensifying a term (e.g., very likely). Both experiments also examined the effect of these variables on judgments made on the basis of statements containing the terms. We found that compared to the positive context, the negative context significantly reduced discrimination for both the interpretation of probability terms and judgments. We discuss the potential reasons for why negative contexts may reduce the discriminability of probability terms.

9:20-9:35 AM (SYM2)

Communicating Probabilistic Information – The Role of Format on Understanding and Perceived Communicator Credibility. SARAH JENKINS, *University College London* – Much previous research has explored the effect of communication format on understanding, mainly in relation to verbal probability expressions [VPEs, e.g., 'unlikely']. However, very little has investigated the effect of format on the perceived credibility of a communicator – a vital component for the effective communication of probabilistic information. In two studies communicating natural hazard risks, we compare VPEs, numerical expressions (e.g., '20% likelihood') and mixed expressions in two orders (verbal-numerical, e.g., 'unlikely [20% likelihood]' and numerical-verbal format, e.g., '20% likelihood [unlikely]'). We find considerable differences in the way these formats are understood, with use of verbal and verbal-numerical formats leading to an 'extremity effect'. We show that this understanding has downstream effects for the perceived credibility of a communicator. We conclude by proposing a pragmatic account of communication format, in which individuals draw inferences from the communicator's choice of format.

9:40-9:55 AM (SYM3)

Is People's Use of Attribute Frame Information Adaptive When Receiving Probabilistic Communications? ADAM HARRIS, *University College London* – The informational leakage account of attribute framing effects proposes that a speaker's choice of frame provides informational value, such that different frames are not informationally equivalent. Across three studies communicating food risks, we investigated the adaptiveness of a listener's use of frame information by manipulating the degree to which the speaker ostensibly had a choice over how the information was framed. Within-participants framing effects were observed across all studies, and these effects were not moderated by the speaker's degree of choice. If framing effects are driven by the informational value contained in frame choice, people do not appear to be sensitive to situations where that choice is removed.

10:00-10:15 AM (SYM4)

Arithmetic Computation with Probability Words and Numbers. DAVID MANDEL, *Defence Research and Development Canada* – Probability information is often communicated verbally (e.g., "likely") rather than numerically (e.g., "p=.75"). However, people learn to do arithmetic with decimals but not with verbal probabilities. We hypothesized—and found in two experiments (Ns=213 and 201) that manipulated communication format (numeric, verbal) between-subjects—that the accuracy and coherence (i.e., respecting normative constraints) of averaging and multiplying probabilities is poorer when individuals receive verbal rather than numeric probability information. In Experiment 2, translating probabilities from the verbal format to the numeric format improved accuracy, whereas translating from the numeric format to the verbal format reduced accuracy. Whereas incoherence was related to (low) numeracy and verbal-reasoning ability in the numeric condition, it was not related to either cognitive performance measure in the verbal condition. Communicating probabilities numerically improved arithmetic computation and, evidently, many individuals do not have a schema for performing arithmetic operations on verbal probabilities.

10:20-10:35 AM (SYM5)

Estimation of Subjective Probability Distributions with Ratio Judgments and Scaling (RJS) Methodology. DAVID BUDESCU, *Fordham University* – We propose a new methodology for estimating subjective probabilities of continuous variables. Under the new method (a) the range of the variable is divided into C exhaustive and mutually exclusive intervals, (b) each judge is asked to compare and provide ratio judgments regarding the relative likelihood for each of the C(C-1)/2 pairs of intervals, and (c) a statistical algorithm is used to find the distribution that best fits the collection of judgments. A simulation study and two experiments manipulating the number of intervals, C, and their spacing for various distributions show that these estimates are highly consistent, more accurate, and less sensitive to the partition procedure than direct estimates. We recommend the adoption of the new method and illustrate its use in real life contexts.

Social/Cultural Influences on Memory and Language

Virtual, Friday, 9:00-11:00 AM EST

Chaired by Marie Mazerolle, *Université Bourgogne Franche-Comté*

9:00-9:30 AM (1)

Invited Talk: Collaborative Remembering and Collective Memory. SUPARNA RAJARAM, *Stony Brook University* – Interest in the experimental study of memory as a social process can be traced back to Bartlett's seminal treatise in 1932. In parallel, inspired by the stringent

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laboratory procedures Ebbinghaus (1885) espoused, over a century of research on memory has produced a wealth of theoretical and empirical principles about memory functions when individuals work in isolation. I will discuss research from my lab group in which we integrate these distinct research traditions and develop new paradigms to examine how collaborative remembering shapes group memory and, in turn, the post-collaborative memory of each group member. I will present findings from our work to elucidate cognitive mechanisms that underlie memory enhancement, forgetting, and false memory transmission in shared remembering, the influence of group structure on memory transmission, and the cascading effects of these components on the emergence of collective memory.

Email: Suparna Rajaram, suparna.rajaram@stonybrook.edu

9:40-9:55 AM (2)

Interacting Minds in Recognition Memory. STEVEN CLARK, STEPHEN CAMPBELL, MIN HTET, CINDY ROSAS, ALEJANDRA MAGNET, KAYLENE DEWINDT, and POOJA KYLASA, *University of California, Riverside* – Following a 64-word study list, pairs of participants completed a 2 alternative forced-choice recognition memory task twice – the first time by themselves and the second time together. Confidence judgments were given for both individual and collaborative decisions. A simple signal-detection model of recognition memory predicts that collaborative accuracy will exceed individual accuracy (i.e., the accuracy of the better individual) to the extent that the difference in individual accuracy is small and disagreements are resolved in terms of confidence (higher confidence wins). Results were generally consistent with this model, showing a negative correlation (r's between -.65 and -.75) between the magnitude of the collaborative accuracy advantage and the difference in individual's accuracy.

Email: Steven E. Clark, clark@ucr.edu

10:00-10:15 AM (3)

When Do Westerners Start Thinking from Left to Right? ALESSANDRO GUIDA, *Université Rennes,* MICHAËL FARTOUKH and FABIEN MATHY, *Université Côte d'Azur* – When Western participants are asked to keep in mind a sequence of verbal items, they tend to associate the first items to the left and the last items to the right. This phenomenon, known as SPoARC (Spatial Positional Association Response Codes) effect, has been interpreted as showing that individuals spatialize the memoranda by creating a left-to-right mental line with it. One important gap in our knowledge concerns the development of this phenomenon: when do Western individuals start organizing their thought from left to right? To answer this question, 274 participants in seven age groups were tested (Kindergarten, Grade 1, Grade 2, Grade 3, Grade 4, Grade 5, Adults). We used a new protocol meant to be children-friendly, which involved associating two caves to two animals using a two-alternative spatial forced choice. Participants had to guess in which cave a specific animal could be hidden. Results showed that it is from Grade 3 that participants spatialize information in working memory in a left-to-right fashion like adults, which indicates a probable link between spatialization and education.

Email: Alessandro Guida, alessandro.guida@univ-rennes2.fr

10:20-10:35 AM (4)

Examining the Impact of Stereotype Threat on the Gap between Younger and Older Adults on Associative Learning Tasks. MARIE MAZEROLLE and LUCAS ROTOLO, *Université Bourgogne Franche-Comté,* FRANÇOIS MAQUESTIAUX, *Université Bourgogne Franche-Comté & Institut Universitaire de France* – There is now ample evidence that age-related stereotypes can alter older adults' memory performance. For example, older adults under stereotype threat recall and recognize less words (Kang & Chasteen, 2009), or demonstrate smaller working-memory capacity (Mazerolle, Régner, Morisset, Rigalleau, & Huguet, 2012). Here we aim at examining how stereotype threat may influence the gap between younger and older adults on a classic associative learning task inspired from Touron & Hertog (2004). Participants were randomly assigned to a Threat condition or a Reduced-threat condition by emphasizing/de-emphasizing the relevance of the test to examine memory capacity. Results show that stereotype threat may, in part, be responsible for the "classic" gap observed between younger and older adults on performance but also on the strategies used to complete the associative learning task. Results will be discussed in the light of two competing hypotheses in the stereotype threat literature: the Executive Control Interference Integrated Process Model (Schmader, Johns, & Forbes, 2008), and the Regulatory Focus Model of Stereotype Threat (Barber, 2017). Practical implications for older adults' memory assessment will also be considered.

Email: Marie Mazerolle, marie.mazerolle@univ-fcomte.fr

10:40-10:55 AM (5)

Changes in Pupil Size During Auditory Language Comprehension are Correlated with the Listener's Disgust Sensitivity and Political Views. ISABELL HUBERT LYALL and JUHANI JÄRVIKIVI, *University of Alberta* – During spoken language comprehension, listeners consider many different sources of information, such as prior discourse and context. However, the role of the listener's personality in language comprehension has been under-researched. We report findings from a pupillometry study that investigated the on-line processing of three different types of anomalies – morpho-syntactic errors, semantic anomalies, and socio-cultural clashes relying on existing gender stereotypes – in spoken language, in which we correlated the observed changes in pupil size with the listener's disgust sensitivity and political views. Our findings indicate that disgust sensitivity and political views at least partially predict pupillary responses to semantically anomalous utterances and socio-cultural clashes. Results agree with theories of language comprehension that assign importance to extra-linguistic variables and individual differences, and are discussed with regards to the influence of extra-linguistic variables on resource allocation and linguistic anticipation.

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Concepts and Categories

Virtual, Friday, 9:00-11:00 AM EST

Chaired by Emily Heffernan, *University of Toronto*

9:00-9:30 AM (6)

Invited Talk: Understanding Visual Reasoning for Visual Communication. KAREN SCHLOSS (2020 Early Career Award Recipient), *University of Wisconsin – Madison* – What do organizing recyclables using different colored bins, thinking through logic using Venn diagrams, and analyzing neuroimaging data using brain maps all have in common? All of these tasks require visual reasoning, in which people infer meaning from visual features, and use those inferences to make judgments about the world. Previous work has primarily focused on visuospatial relations, suggesting that surface properties like color are less useful, and even harmful for visual reasoning. However, my research suggests people use a reasoning process called assignment inference, which makes visual reasoning through color far more robust than previously thought. I will discuss recent empirical evidence and modeling that supports this position and present a theoretical account that unites this recent work with earlier work to understand visual reasoning for visual communication.

Email: Karen B. Schloss, kschloss@wisc.edu

9:40-9:55 AM (7)

Identifying the Neural Dynamics of Category Decisions with Computational Model-Based fMRI. EMILY HEFFERNAN, JULIANA ADEMA, and MICHAEL MACK, *University of Toronto* (Presented by Michael Mack) – Successful categorization requires careful coordination of attention, representation, and decision making. Comprehensive theories that span levels of analysis are key to understanding the computational and neural dynamics of categorization. Here, we build on recent work linking neural representations of category learning to computational models to investigate how category decision making is driven by neural signals across the brain. Specifically, we test the hypothesis that category evidence as reflected in distinct neural signals drives decision-making behaviour. We combine functional magnetic resonance imaging with hierarchical drift-diffusion modelling and exemplar-based category representation to show that trial-by-trial fluctuations in neural activation from regions of occipital, cingulate, and lateral prefrontal cortices are linked to category decisions. Notably, we demonstrate that lateral prefrontal cortex activation is also associated with exemplar-based model predictions of trial-by-trial category evidence. We propose that these brain regions underlie distinct functions that contribute to successful category learning and provide a novel analytic framework for linking psychological theory to brain dynamics.

Email: Michael L. Mack, michael.mack@utoronto.ca

10:00-10:15 AM (8)

A Computational Model of Concept Knowledge. SUDEEP BHATIA and RUSSELL RICHIE, *The University of Pennsylvania* – Our goal is to quantitatively model and predict human knowledge of real-world concepts. This has traditionally been difficult, owing to the complexity of knowledge acquired over years of learning. However, the field of distributed semantics (DS) has made great progress in obtaining knowledge representations of concepts from large-scale text. In this paper we fine-tune representations obtained from a recent DS model, BERT, using property norms data from previous psychology studies. We show that our model makes accurate judgments for thousands of concepts, and tens of thousands of properties, including concepts and properties not in its training data. Crucially, the model is capable of accommodating hierarchy and structure, and thus exceeds the accuracy rates of previous association-based DS models. Finally, our model reproduces 13 classic findings involving response time, choice, and typicality-ratings, using stimuli from 16 papers on semantic cognition. We are the first to quantitatively model most of these findings, and our ability to make successful predictions for existing stimuli sets (not in our training data) illustrates the generality and power of our approach.

Email: Sudeep Bhatia, bhatiasu@sas.upenn.edu

10:20-10:35 AM (9)

Cognitive Inertia: When Learning Distorts Reality. BRANDON TURNER, NATHANIEL BLANCO, and LAYLA UNGER, *The Ohio State University,* PETER KVAM, *University of Florida,* ROBERT RALSTON and VLADIMIR SLOUTSKY, *The Ohio State University* – The decisions we must make in our everyday lives often require us to navigate through a barrage of information, so that we can base our decisions only on information that is relevant to our goals. Selectively attending only to goal-relevant dimensions of information can help us efficiently navigate this barrage of information, but presents its own challenges, as we must often learn what information is most relevant. Here, we investigate the dynamic interactions between selective attention, learning, and memory that unfold as learners seek to identify dimensions of information that will help them make consistently accurate decisions. Using a multi-pronged behavioral, eye-tracking, and computational modeling approach, we reveal how learned selective attention can support efficient decision-making, but at the cost of luring learners into traps in which they become blind to readily available goal-relevant information.

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10:40-10:55 AM (10)

The Presence of a Schema Modulates Generalisation Behaviour for Schema-Irrelevant Information. AIDAN HORNER (2020 Early Career Award Recipient), JAMIE COCKCROFT, and GARETH GASKELL, *University of York,* SAM BERENS, *University of Sussex* – Our ability to extract patterns from a set of related experiences allows us to make predictions about future events. The extraction of a 'schema' modulates behaviour for schema-congruent and schema-incongruent information, but we know less about its effect on schema-irrelevant information. Using a word-location memory experiment, we probed both memory and generalisation for schema-congruent and schema-irrelevant information. Words belonged to two semantic categories. The circular locations for one word-list were clustered in an area of the circle (forming a pattern; clustered), whereas the circular locations for the other list were randomly distributed (non-clustered). We presented both old (memory) and new (generalisation) words at test, requiring participants to either identify the remembered location or make a best guess. Participants placed new words in the clustered condition according to the underlying pattern. Importantly, we saw avoidance behaviour in the non-clustered condition, with participants being less likely to place new words in the location of the clustered pattern. Therefore, we show that the presence of

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a pattern modulates generalisation behaviour for both schema-congruent and schema-irrelevant information.
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Bilingualism

Virtual, Friday, 9:00-11:00 AM EST

Chaired by Anat Prior, *University of Haifa*

9:00-9:15 AM (11)

Reading Efficiency Is Language Specific: Comparing L1 and L2 Reading Efficiency in Different-Script Bilinguals. ANAT PRIOR and BILLY MOR, *University of Haifa* – Reading efficiently in L2 is a crucial, but not universally achieved, skill. Here we ask whether it is better captured as a language specific skill or is mostly shared across languages. To this end, we examined word frequency and predictability effects, and tested the same readers in L1 and L2, during single word reading (Experiment 1, lexical decision) or sentence reading (Experiment 2, recording of eye-movements). Participants were Hebrew-English bilinguals, languages that use different scripts, allowing for a clearer distinction between L1 and L2 processing. Word frequency and word predictability effects were more pronounced in participants' L2 than in the L1, suggesting that both lower level and higher-order processes in reading are sensitive to language proficiency. We also found that for different-script bilinguals, efficient reading in the L2 is a highly specific skill, dependent upon proficiency in that language, and drawing less on L1 and general language ability.
Email: Billy Mor, billymor@gmail.com

9:20-9:35 AM (12)

Dependencies in Memory for Language and Modality in Bilinguals. WENDY FRANCIS and PAOLA BACA, *University of Texas at El Paso* – In bilinguals, words are understood through either of two languages and through the visual or auditory modality. However, long-term memory for language and modality and how they might be related are less well understood. One possibility is that language and modality are stored as independent episodic features bound to an encoding event and later retrieved through the event memory. Another possibility is that modality retrieval depends on successful language retrieval, which would be expected if these characteristics are retrieved by attempting to access the original word form. English-Spanish bilinguals (N=96) studied English and Spanish words presented in visual and auditory modality, with languages and modalities randomly intermixed. At test, pictures were presented as cues, and participants indicated both the language and modality in which words were studied. Multinomial processing-tree models were used to isolate probabilities of remembering language and modality while accounting for guessing. Bilinguals were less likely to remember modality than language, with substantial dependency, and retrieval of both features depended on word frequency. Supported by NSF grant 1632283.
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9:40-9:55 AM (13)

Evidence for Recruitment of General Cognitive Control in Language Selection during Bilingual Reading Comprehension. ANA SCHWARTZ, *University of Texas at El Paso* – Across two eye-tracking experiments highly-proficient bilinguals read sentences that were language pure or had a mid-sentence switch, from L2-L1 or L1-L2. In Experiment 1, the cognate status of the switch word was manipulated. In Experiment 2, the language switch was cued by font color or not cued. In Experiment 1, there was an overall language switch cost, evident through longer first fixation, gaze durations and fewer skipping rates. This cost was not modulated by cognate status or switch direction. This suggests language-level inhibition, supporting earlier proposals of language nodes in the bilingual lexicon. The observed pattern is not consistent with the assumption that switch costs in comprehension are solely based on lexical retrieval dynamics. In Experiment 2, switch costs were significantly reduced when they were cued by font color relative to a non-cued baseline condition. This was evident in first fixation, gaze durations and total reading times of the switched word. This suggests that general cognitive control process, outside of the lexicon are recruited in language selection during comprehension. Implications for current models of the bilingual lexicon will be discussed.
Email: Ana I. Schwartz, aischwartz@utep.edu

10:00-10:15 AM (14)

Multilingual Novel Word Learning as a Function of Language of Instruction: Is Learning Better Through L1 or L2? ZOYA HIROSH and TAMAR DEGANI, *University of Haifa* (Presented by Tamar Degani) – When learning vocabulary through translations in the first-language (L1), bilinguals may have more available cognitive resources compared to when leaning through the second-language (L2), and may enjoy increased experience in L1 regulation. To test Language of Instruction (LOI) effects, 59 Hebrew-English bilinguals auditorily learned 55 German words over two-sessions, including three word-types: Cognates, overlapping in form and meaning between English and German; False-cognates (FC) overlapping in form but not meaning; and Controls. Critically, half of the participants learned through their L1 Hebrew, and half through their L2 English (which is also more similar to German). Results showed a significant LOI effect, with better learning through the (less similar) L1, especially for control items. Cognates were learned better in both LOIs, but a FC advantage over controls was more prominent in English, and for individuals with lower L1 proficiency. The LOI effects highlight the mechanisms at play during multilingual novel word-learning.
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10:20-10:35 AM (15)

Engaging Proactive Control: Influences of Diverse Language Experiences Using Insights from Machine Learning. JASON GULLIFER and DEBRA TITONE, *McGill University* (Presented by Debra Titone) – We used insights from machine learning to address whether bilingual language experience is associated with executive control. We assess proactive executive control for over 400 young adult bilinguals via reaction times on an AX continuous performance task (AX-CPT). We measured bilingual experience as a multidimensional spectrum (AoA, language entropy, language exposure). Mixed effects regression revealed significant associations between bilingual language experience and proactive control, consistent with previous work. Machine learning procedures (information criteria, cross-validation, penalized regression) further suggested that these factors can help predict data from novel, unmodeled participants. Critically, cross-validation indicated that similar

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predictive performance could also be achieved through simpler models that include only information about AX-CPT trial type. These results suggest that the effects of bilingual experience on proactive control, if they exist in young adults, are likely small. To reveal predictive effects on novel participants, future studies will require even larger or qualitatively different samples (e.g., older adults, children) in combination with valid, granular quantifications of bilingualism.
Email: Debra Titone, debra.titone@mcgill.ca

10:40-10:55 AM (16)

A Direct Test of the Adaptive Control Hypothesis. KEN PAAP and REGINA ANDERS-JEFFERSON, *San Francisco State University,* LAUREN MASON, *Tufts University,* BRANDON ZIMIGA, *San Francisco State University* – In a highly influential article, Green and Abutalebi (2013) proposed "The Adaptive Control Hypothesis." The ACH considered three interactional contexts that differ in terms of the required control processes. Dual Language contexts were assumed to require more goal maintenance, interference control, salient cue detection, selective response inhibition, task engagement and disengagement than the other two groups Dual Language bilinguals will use both languages across many different contexts and frequently switch languages, but only occasionally within utterances. Dense Code-Switchers who frequently switch languages within sentences are assumed to operate in an open control mode. Based on a language usage inventory 20 attributes were obtained from 342 college students who were sorted into five groups: Single Language, Dual Language, Dense-Code Switching, Pure Monolingual, and other. These groups were tested on four nonverbal interference tasks, a color-shape switching task, conjunctive visual search, and a morphing ambiguous figures task. Separate ANOVAs on each measure failed to show any significant differences between the groups.
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Decision Making I

Virtual, Friday, 9:00-11:00 AM EST

Chaired by Jeremy Wolfe, *Brigham and Women's Hospital & Harvard Medical School*

9:00-9:15 AM (17)

Having it Both Ways: How Decreasing Target Prevalence Can Produce Diametrically Opposed Effects on the Same Perceptual Decision. JEREMY WOLFE, *Brigham and Women's Hospital & Harvard Medical School,* WANYI LYU, *Brigham and Women's Hospital,* DAVID LEVARI, *Harvard University,* MAKAELA NARTKER, *Johns Hopkins University,* DANIEL LITTLE, *Bowdoin College* – Target prevalence influences how targets are perceived and categorized. Many experiments show that low prevalence produces a classic "low prevalence effect" (LPE) where observers (Os) adopt conservative detection criteria and miss rare targets. However, Levari et al. (2018) produced the opposite effect in a task where Os identified dots on a blue-purple continuum as "blue" or not. At low prevalence, ambiguous dots were more likely to be classified as "blue" – a liberal criterion shift. In a series of replications and extensions of the paradigm, we find that feedback is a critical variable. With feedback, Os become more conservative at low prevalence (the LPE). Without feedback, they become more liberal as in Levari's studies. Os' may base behavior on different information in the two conditions. With feedback, Os may monitor the ratio of false positive and false negative errors. Without feedback, Os may monitor the ratio of positive and negative responses.
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9:20-9:35 AM (18)

A Rational Explanation for the "Popularity Bias" in Socially-Mediated Choice. BRETT HAYES, ASHTON WISKEN, and NICOLE CRUZ, *University of New South Wales* – Choosing between options requires consideration of a) the mean value of each option on some quality dimension, b) the sample size on which these means are based. Powell, Yu, DeWolf and Holyoak (2017) examined how people use these cues in simulated online reviews of product options. Contrary to an intuitive statistical model of choice, they found a "popularity bias" with overweighting of sample size information. Two experiments examined the hypothesis that this "bias" reflects people's causal models of the review process. Participants were presented with choices between products which varied in their mean quality rating and the size of the sample on which means were based. When there was no explanation for sample size differences, we replicated the popularity bias. When we supplied an explanation of this difference that was unrelated to quality (e.g., length of time on the market), the bias was substantially reduced. We discuss implications for how social information affects integration of evidential strength and weight in choice tasks.
Email: Brett Hayes, b.hayes@unsw.edu.au

9:40-9:55 AM (19)

Betting on Known Unknowns: How Additional Information Affects Estimation Accuracy and Experience-Based Risk Taking. BENJAMIN SCHEIBEHENNE, *Karlsruhe Institute of Technology,* SEBASTIAN OLSCHEWSKI, *Warwick Business School, University of Warwick* – Whenever risk taking is based on information sampling, more information should decrease uncertainty, provided that it can be accurately integrated. This study examines the cognitive limits of sequential information integration and whether risk taking is adaptive to the actual uncertainty people face. A student population (N=60) estimated the mean of number distributions from sequential samples and then bet on their estimation accuracy. Results show that an increase in sample size while controlling statistical risk decreased estimation accuracy. Irrespective of actual sample size, the effective number of integrated samples was about four, indicating noticeable cognitive limits. However, participants' betting stakes and perceived probability of winning, hence their risk taking and perception, were well aligned with their actual (rather than their statistical) estimation accuracy. Consequently, supposed behavioral biases such as insensitivity to sample size or little information search are adaptive to given cognitive limitations.
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10:00-10:15 AM (20)

A Critical Test of Fuzzy-Trace Theory and Cumulative Prospect Theory: The Fourfold Pattern of Risk Preference. DENIZ MARTI and DAVID BRONIATOWSKI, *The George Washington University,* VALERIE REYNA, *Cornell University* (Presented by David Broniatowski) – Cumulative Prospect Theory (CPT) predicts risk seeking for low-probability gains and high-probability losses, but risk-aversion for low-probability losses and high probability gains, whereas, Fuzzy-Trace

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Theory (FTT) predicts that risk attitudes are mediated by meaningful gist representations that can be manipulated by truncating decision complements. Here, we used the mathematical formulation of CPT to calculate parameter values that might explain observed results from an experiment conducted on a sample of 285 MTurk workers manipulating frame (gain/loss), probabilities (5% / 95%), and truncation conditions (standard, nonzero, zero) within subjects. Main effects of frame and probability were significant, as were all two-way interactions. CPT parameter values could not consistently explain how truncating complements attenuated or strengthened framing effects regardless of probability. Replicating experimental results requires assuming parameter values that oppose CPT's prediction that high probabilities are overweighted and low probabilities are underweighted. Rather, consistent with FTT's predictions, outcomes depended on qualitative gist representations.
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10:20-10:35 AM (21)

Causal Learning with Delays Up to 21 Hours. BENJAMIN ROTTMAN and YIWEN ZHANG, *University of Pittsburgh* – An important question in the field of causal learning as well as associative learning is whether people can learn causal relations when there are delays between causes and effects (e.g., Buehner & McGregor, 2006). However, previous studies have only investigated delays on the order of seconds. In the current study we attempted to test whether people can learn a cause-effect relation with long delays, similar to how someone might test how quickly a medicine works by taking the medicine on certain days. The delays between the cause and effect were either 0, 3, 9, or 21 hours, and the study lasted 16 days via smartphone. Surprisingly, we found that participants were able to learn the causal relation about equally as well in all four conditions. These findings demonstrate a remarkable ability to accurately learn causal relations in a realistic timeframe that has never been tested before.
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10:40-10:55 AM (22)

Data-Driven Modeling of Delay Discounting Identifies Novel Discounting Behavior. JORGE CHANG, MARK PITT, and JAY MYUNG, *The Ohio State University* – Delay discounting measures the rate at which individuals discount future rewards. Computational modeling efforts in delay discounting have faced significant challenges in describing the full range of behavior observed in participants. One way to address this problem is by introducing more flexible models with relaxed assumptions. Here, we propose a data-driven, thus model-free Bayesian approach to model development of delay discounting. Our approach fits the data to a model while simultaneously selecting highly informative experimental designs in each trial based on responses from earlier trials. Novel data patterns challenge common normative assumptions made by virtually all parametric models. We offer possible explanations that could account for two of these patterns and propose enhancements to existing parametric models motivated by these explanations.
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Recall and Recognition Memory

Virtual, Friday, 9:00-11:00 AM EST

Chaired by Megan deBettencourt, *debetten@uchicago.edu*

9:00-9:15 AM (23)

Multifaceted Fluctuations of Attention Determine Long-Term Memory. MEGAN DEBETTENCOURT, EDWARD VOGEL, and EDWARD AWH, *University of Chicago* – Attention inevitably fluctuates over time, and these fluctuations determine what we remember. However, prior work has not distinguished whether fluctuations of attention correspond to global sustained attention and/or specific fluctuations of spatial attention. Across three experiments, we dissected the relationship between attention and long-term memory, using a sensitive continuous report procedure and spatial cues. Overall, we found that long-term memory response error was predicted both by where subjects were spatially attending in addition to whether subjects were sustaining attention well. Furthermore, using multivariate analyses of EEG, we tracked both spatial attention and sustained attentional state prior to stimulus onset. Intriguingly, even during moments of low sustained attention, there was no decline in the representation of the spatially attended location. In sum, both sustained and spatial attention can each influence our memories. These results suggest a taxonomy of how distinct attentional processes form long-term memories.
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9:20-9:35 AM (24)

Individual Differences in Arousal Regulation and Long-Term Memory Abilities. MATTHEW ROBISON, *University of Texas at Arlington,* BRADLEY GIBSON, *University of Notre Dame,* M. KARL HEALEY, *Michigan State University,* JAMIE TROST and DANIEL SCHOR, *University of Notre Dame* – The present study examined individual differences in episodic memory abilities and arousal regulation via pupillometry. Participants completed 28 lists of a verbal immediate free recall task while their pupil and gaze position were continuously recorded via an eye-tracker. Participants who showed greater variability in pre-list and pre-item pupil diameter demonstrated lower recall accuracy and were less able to retrieve items that were remote from the currently recalled item on the studied list, though all participants showed a strong forward temporal bias in retrieval. These findings are consistent with the notion that fluctuations in arousal represent an important underlying source of individual differences in cognitive ability.
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9:40-9:55 AM (25)

Retention Interval and Acute Alcohol Intoxication During Encoding on the Accuracy and Informativeness of Memory Reports. LILIAN KLOFT, *University of Maastricht,* DANIELLE HETT and MUHAMMED BUTT, *University of Birmingham,* LAUREN MONDS, *University of Sydney,* RICARDO CANTANHO, *University of Leicester* – We investigated how people regulate memory reports for a mock crime when tested immediately and again 24 hours later, using a two-phase testing procedure each time. In phase 1, participants provided fine-grained (i.e., precise) and coarse-grained (i.e., broad) answers plus confidence ratings to cued-recall questions. In phase 2, they were asked which answer they would volunteer (coarse- or fine-grained, or neither),

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if interviewed by police. We also varied alcohol consumption prior to encoding (mean BAC=05%), with alcohol expectancy controlled. Phase 1 coarse-grained compared to fine-grained answers were more accurate, regardless of intoxication and expectancy. Participants, regardless of intoxication, coarsened their answers when interviewed 24 hours later, enabling them to maintain overall accuracy of their memory report over time. However, there was evidence that participants could have increased their accuracy by coarsening their answers even more. Findings imply that encouraging coarse answers when interviewing witnesses might be beneficial.
Email: Heather Flowe, h.flowe@bham.ac.uk

10:00-10:15 AM (26)

Integrating Word-Form Representations with Global Similarity Computation in Recognition Memory. ADAM OSTH, *The University of Melbourne* – It has been well established in recognition memory that words that are perceptually similar to the studied words exhibit higher false alarm rates. In memory models, this is captured by global similarity computation – choice probability is proportional to the aggregated similarity between the probe and each of the study list words. However, such models have not integrated perceptual representations of words. In this work, I explore a variety of word-form representations from the psycholinguistics of reading. These include representations where similarity is a function of the number of in-position letter matches (slot codes and both edges representation), representations with noisy position codes (the overlap model; Gomez, Ratcliff, & Perea, 2008), along with matches based on relative position matches (bigram models). Global similarity among the representations was linked to choice and response times using the LBA (Brown & Heathcote, 2008). Results demonstrated (a) a superiority of bigram models, (b) changes in perceptual representations under shallow processing, and (c) comparable interference from perceptual similarity as semantic similarity, where semantic similarity was calculated using Word2Vec (Mikolov et al., 2013).
Email: Adam Osth, adam.osth@unimelb.edu.au

10:20-10:35 AM (27)

Using Emails to Quantify the Impact of Prior Exposure on Word Recognition Memory. HYUNGWOOK YIM, COURTNEY O'BRIEN, BENJAMIN STONE, ADAM OSTH, and SIMON DENNIS, *The University of Melbourne* – Recognition memory studies have reliably demonstrated the word frequency effect (WFE), where low-frequency words are more accurately recognized than high-frequency words. The context noise account of WFE argues that pre-experimental exposure to stimuli generates interference that compromises high-frequency words more than low-frequency words. Because the representations of the contexts associated with more recent exposures are assumed to overlap more with the representation of the study context, stimuli that have been seen more recently are thought to generate the most interference. We asked participants to log their daily email for two months. Based on the participant's email corpus, we constructed an individualized study-test recognition memory task to investigate the effect of recency. Results show that recency has a graded effect on recognition memory that extends for at least two months providing support for the context noise account.
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10:40-10:55 AM (28)

Affective Bleed: The Transfer of Valence to Novel Episodes. CHRISTOPHER MADAN, *University of Nottingham,* LEOR ELIZUR, YOUNG JI TUEN, CHRISTIAN ESPOSITO, and DANIELA PALOMBO, *University of British Columbia* – Previous experiences can bias our affective reactions and memory. For example, famous landmarks persist beyond our own experiences, but individual affective experiences may bias our later affective judgments and memory. Moreover, studies have consistently found that negative emotion weakens memory binding: Memory for associations between the elements that comprise an episode is attenuated in the presence of negative emotional information. In a series of studies, here we examined how affect influences direct and indirect memory tests, by examining associative memory and shifts in affective judgments (i.e., pleasantness ratings). Across multiple studies, we replicate the attenuating effect of negative emotion on associative memory. Critically, we also show that emotion alters the affective judgements of pre-experimentally neutral stimuli, shifting judgements towards the valence of learned associates. We further show that this shift in affective valence is greater when association learning is successful, suggesting that this indirect test of memory is still related to explicit memory. These findings highlight ambiguity in the boundaries of episodic memory.
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Speech Perception

Virtual, Friday, 10:00 AM-12:00 PM EST

Chaired by Bob McMurray, *University of Iowa*

10:00-10:15 AM (29)

Decoding the Neural Dynamic of Spoken Word Recognition from EEG. BOB MCMURRAY, *University of Iowa and Haskins Laboratories,* SAMANTHA CHIU and MCCALL SARRETT, *University of Iowa,* ALEXIS BLACK, *University of British Columbia,* RICHARD ASLIN, *Haskins Laboratories* – There is unparalleled consensus on the mechanisms of spoken word recognition. From the earliest moments of the input listeners activate multiple words that compete for recognition. This has been shown by measures like the Visual World Paradigm (VWP). However, we have little understanding of the neural basis of lexical competition: no ERP components directly reflect it. We thus present a new approach using machine learning with EEG. Stimuli were eight words or matched nonwords within each word had an onset competitor (e.g., baggage/badger, musheme/muspil). We recorded 64 channel EEGs from 14 listeners and trained a support vector machine to identify which item was heard on each trial over successive 20 msec increments. Results mirrored empirical results (from the VWP) and computational models: Early on, the decoder was equally likely to report the target or the competitor, but by 350 msec, competitors were suppressed. This was reliable in each subject.
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10:20-10:35 AM (30)

What Happens to Sublexical and Lexical Representations After They Have Been Used to Understand Speech? ARTHUR SAMUEL, *Stony Brook University & Basque Center on Cognition, Brain and Language (BCBL),* NICOLAS DUMAY, *University of Exeter* – Speech comprehension

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entails activation of lexical and sublexical representations. Sumner and Samuel (2007) demonstrated that 15-20 minutes after such activation, recognition of a nonword (e.g., "jub") was facilitated by having heard a similar nonword (e.g., "jup"), but was inhibited by having heard a similar word (e.g., "job"). Here, we replicate both of these effects at this time scale, using a different initial exposure task (i.e., phoneme monitoring, rather than lexical decision). In addition, we test for both effects after a 12-hour delay in the awake state. We find that the lexical inhibition effect remains, whereas the sublexical facilitation is gone. These results indicate that lexical activation persists for at least 12 hours after word exposure, and that the sublexical components remain active for more than 15 minutes but less than 12 hours.

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10:40-10:55 AM (31)

The Contribution of Articulatory Gestures and Orthography to Speech Processing: Evidence from Novel Word Learning. CHOTIGA PATTAMADILOK and PAULINE WELBY, *Aix-Marseille University, CNRS, &* Laboratoire Parole et Langage (*LPL),* MICHAEL TYLER, *Western Sydney University* – Auditory speech is linked to articulatory gestures and orthography through different mechanisms. Yet, both types of visual information strongly influence speech processing. We directly compared their contributions, using a paradigm in which French speakers learned novel English words contrasting /f/ with /θ/ (a sound not present in French). Three training methods were used, exposing participants to auditory forms of novel words alone, to auditory forms associated with articulatory gestures or to auditory forms associated with orthography. The benefits of each method were measured during training to examine the "online" impact of visual cues, and at two post-training time points (at which visual cues were no longer available) to examine their "residual" impact. While both types of visual cues were beneficial when simultaneously presented with speech, only orthography showed a residual impact leading to a consolidation of lexical knowledge and reinforcing of phonological categories, thus enhancing contrast discrimination.

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11:00-11:15 AM (32)

Beat Gestures Can Make You Hear Different Vowels. HANS RUTGER BOSKER, *Max Planck Institute for Psycholinguistics,* DAVID PEETERS, *Max Planck Institute for Psycholinguistics & Tilburg University* – Beat gestures – biphasic movements of the hand – are among the most frequently encountered co-speech gestures in human communication. They are closely temporally aligned to the prosodic characteristics of the speech signal, typically occurring on lexically stressed syllables. But can these simple 'flicks of the hand' influence speech perception? In two experiments, participants saw a speaker produce a beat gesture aligned to either the first or second syllable of disyllabic words, carrying ambiguous cues to lexical stress. Experiment 1 demonstrated that observing a beat gesture on the first syllable biases participants to report hearing stress on the first syllable (e.g., OBject vs. obJECT). Experiment 2 showed that this effect on lexical stress perception, in turn, influences the perception of Dutch vowel length contrasts (e.g., /ɑ/ vs. /a:/). Thus, we provide converging evidence for a manual McGurk effect: the perception of lexical stress and vowel identity is influenced by speakers' hand gestures.

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11:20-11:35 AM (33)

Children's Navigation of Linguistic Diversity. MARIEKE VAN HEUGTEN, *University at Buffalo, SUNY* – In many parts of the world, children grow up in linguistically diverse communities, where individuals differ tremendously in the way they speak. In order to develop mature communication skills, children must learn to rapidly accommodate all of these different speaking styles they encounter. This is not a trivial task, especially for young children whose cognitive and linguistic capacities have yet to fully mature. Here, I will show how language learners cope with accent-related variability in their input. In particular, I will describe a series of experiments showing (i) how surface-level variation in the pronunciation of words affects children's word recognition, (ii) how this does not necessarily prevent comprehension altogether, but (iii) that the interpretation of words is sometimes accent-dependent. The results of this work underline the incredible flexibility of early spoken language processing.

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11:40-11:55 AM (34)

Second-Language French, Spanish, and English All Exhibit Low Information Rate Relative to First-Language Speech. ANN BRADLOW, *Northwestern University* – Listening to even highly intelligible foreign-accented speech can be slow and effortful. This research proposes that the extra effort required for L2 speech understanding is related to its sub-optimal information transmission profile. Specifically, slow speech rate (i.e. few syllables/second) combines with low information density (i.e. more syllables for a given text/meaning) to yield very low information rate (i.e. less information conveyed/second) for L2 versus L1 speech. Based on L1 and L2 recordings of a standard text, we show that L2 English, L2 French and L2 Spanish all exhibit slower speech rates and lower information densities than their L1 counterparts. Lower information density for L2 speech results from substantial syllable reduction in L1 speech (all languages) in contrast to either no reduction (Spanish) or syllable epenthesis (English and French) in L2 speech. Thus, across languages, L2 speech involves slow and information sparse syllables leading to sub-optimal information transmission to the listener.

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Visual Working Memory: Features and Objects

Virtual, Friday, 10:00 AM-12:00 PM EST

Chaired by Cathleen Moore, *University of Iowa*

9:00-9:30 AM (35)

Invited Talk: Toward a Comprehensive Computational Model of Visual Working Memory. KLAUS OBERAUER, *University of Zurich* – I will introduce a neural-network implementation of the Interference Model (IM) of visual working memory (Oberauer & Lin, 2017) that accounts for a broader range of behavioral and neural findings than previous models. The model consists of two modules: A set of spatially organized feature maps that encode feature-location conjunctions in parallel, and a general mechanism for binding population codes of features and contexts together, one object at a time. The model accounts for several behavioral findings:

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Set-size effects and error distributions in continuous reproduction and change detection; serial-position effects; contrasts of simultaneous and sequential presentation; effects of presentation rate. The model also offers tentative links of its processes to some of the neural correlates of visual working memory, such as the contralateral delay activity (CDA) and alpha-power suppression, and the decoding of working-memory contents from multivariate neural signals.
Email: Klaus Oberauer, k.oberauer@psychologie.uzh.ch

9:40-9:55 AM (36)

Is that Object-Based Attention or Mitigation of Limited Spatial Precision? CATHLEEN MOORE, *University of Iowa* – According to theories of object-based attention, information that is represented as deriving from a single object, or organized into a perceptual group, can be selectively processed as a unit, despite originating from spatially discontinuous locations. I present results from three paradigms and question some of the most frequently cited evidence in favor of object-based selection, and argue that it instead reflects the effect of image-level differences that mitigate limitations of spatial precision in visual processing. Specifically, I review a recent study showing that when image-level spatial factors are controlled, there is no evidence that perceptually grouped flankers and targets yield larger congruence effects than ungrouped ones. I relate those findings to previous results from an attentional-walk task and to recent results from a visual-crowding task that fail to show predicted grouping effects when image-level spatial factors are controlled. This analysis does not challenge the general assertion that selection can be object based. Rather, it challenges the relevance of some of the evidence that is cited as supporting that assertion, and highlights how image-level effects can masquerade as object-level effects.
Email: Cathleen Moore, cathleen-moore@uiowa.edu

10:00-10:15 AM (37)

Top-Down Contrast Drives Attention. ALEJANDRO LLERAS and SIMONA BUETTI, *University of Illinois at Urbana-Champaign* – Many theories of visual attention propose that attention is guided by feature values: when looking for a red object in a scene, the visual system boosts the perceptual processing of red items. We propose that there is no such feature boosting mechanism in visual search. Rather, top-down knowledge of a target feature helps drive attention toward likely target items because it allows the computation of a top-down distinctiveness (or contrast) signal: how much unlike the target is each object in the scene. Computing this contrast signal leverages the known processing limitations of peripheral vision: large featural differences can be computed in parallel across the scene without needing access to precise feature information at each location. The visual system can then quickly discard objects that are unlikely to be the target. We present evidence from color search in favor of the contrast account and against the feature-boosting hypothesis. We also discuss how we have used this framework to understand how distinctiveness signals across different feature dimensions (e.g., color and shape or shape and texture) are combined to produce the overall top-down contrast signal of an object.
Email: Alejandro Lleras, alejandrolleras@gmail.com

10:20-10:35 AM (38)

The Role of Top-Down and Bottom-Up Attentional Processes in Working Memory. STEVE MAJERUS, *University of Liège* – Theories of working memory consider two aspects of attention supporting working memory (WM). "Scope of attention" reflects a bottom-up process that defines the amount of memoranda available to awareness at a given time. "Control of attention" is a top-down process allowing for controlled attentional focalization on specific memoranda or task aspects. The respective contribution of these attentional processes to WM and the stability of these processes across the human life span are still poorly understood. We investigated, in young and older adults (N=274), associations between tasks assessing scope vs. control of attention and tasks assessing different aspects of WM capacity. In young adults, Bayesian multiple regression showed that scope of attention capacity predicted WM capacity for item or order information; control of attention capacity additionally predicted maintenance of combined item and order information as well as manipulation of memoranda. In older adults, control but not scope of attention predicted all aspects of working memory. This study highlights the age-dependent role of bottom-up and top-down attentional processes in WM, with top-down processes increasing as a function of task complexity and age.
Email: Steve Majerus, smajerus@uliege.be

10:40-10:55 AM (39)

Emerging Perspectives on the Attentional Blink: A Role in Learning and Development. BRAD WYBLE, *The Pennsylvania State University,* MARK NIEUWENSTEIN, *University of Groningen,* TOMA MARINOV, The Pennsylvania State University, HOWARD BOWMAN, *University of Kent at Canterbury & University of Birmingham* – The attentional blink occurs when people try to detect two targets in close succession and has often been construed as a limitation of processing resources. However, the fact that two targets are easily detected when closely spaced in time and space complicates this explanation. An alternative view we have been developing is that the attentional blink accelerates learning of the visual system, both in infancy and throughout life. By segmenting information into distinct temporal episodes, the blink allows the multitude of visual areas to coalesce towards a single interpretation. This discretization would improve understanding of what is currently perceived but may also accelerate learning of the statistical structure of sense data Such discretization is consistent with the fixational nature of vision, which briefly locks gaze in an allocentric frame despite head movements. The talk will explicate this theory, current support for it, and emerging methods for testing it.
Email: Brad Wyble, bwyble@gmail.com

Memory Changes in Aging

Virtual, Friday, 10:00-11:40 AM EST

Chaired by Karl Szpunar, *Ryerson University*

10:00-10:30 AM (40)

Invited Talk: Hyper-Binding Over Time: Implications for Event Memory with Age. KAREN CAMPBELL (2020 Early Career Award Recipient), *Brock University* – Recent work suggests that event boundaries trigger attentional mechanisms that update one's mental

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representation of the current situation or context. This process allows for ongoing experience to be stored in long-term memory as a series of discrete events, with details from an event better recalled when a cue is taken from within the same event than across an event boundary. What happens to these discrete event memories when attentional processes break down, for instance with advancing age? In this talk, I will present a series of studies which suggest that older adults are less able to update their mental workspace, or suppress recently attended information, and this leads to the formation of associations across event boundaries (or "hyper-binding" over time). While these cross-event associations may often lead to memory errors, they may also enable a greater appreciation of overarching themes and contribute to older adults' status as better story-tellers.

Email: Karen Campbell, Karen.Campbell@brocku.ca

10:40-10:55 AM (41)

Age-Related Changes in Future Thinking and Their Relation to Collective Action. KARL SZPUNAR, *Ryerson University,* YUCHEN LI, SUSHMITA SHRIKANTH, and ERIC LESHIKAR, *University of Illinois at Chicago* – Future-oriented cognition is often portrayed as a mental faculty that is in decline with increasing age. Nonetheless, older adults are more likely than younger adults to engage in a variety of actions that benefit the future of society. Across two large-scale experiments (N=527), we demonstrate that there is a fundamental shift across the lifespan in how people think about their future. Specifically, age-related decreases in thinking about personal events—i.e., events that might occur in the future of the individual—are offset by age-related increases in thinking about collective events—i.e., events that might occur in the future of society. Moreover, we show that the tendency to think about collective events as relevant to the personal future mediates the relation between age and collective action. We relate our findings to extant research on age-related differences in goal orientation and concern for others, and conclude by highlighting new directions for the study of future thinking across the lifespan.

Email: Karl Szpunar, karl.szpunar@ryerson.ca

11:00-11:15 AM (42)

Strategic Reminder Usage in a Delayed Intentions Task: Do Older Adults Compensate for Memory Difficulties? CHIARA SCARAMPI and SAM GILBERT, *University College London* – Ageing can be accompanied by a variety of memory changes, including difficulties remembering to fulfil delayed intentions. A key question is whether older adults are able to use "cognitive offloading" strategies to compensate for impaired memory abilities and whether metacognition can influence the use of such strategies. To explore this, we administered a computerised task requiring a sample of older and younger participants to remember delayed intentions for a brief period and manipulated the possibility of setting reminders to create an external cue. Furthermore, we collected prospective metacognitive judgements by asking participants to rate how confident they were to remember to fulfil the intentions. Performance was significantly poorer for the older group than the younger group but there was a trend towards reduced age effects when offloading was permitted. Moreover, at the group level, older adults were overconfident in their unaided memory abilities. These findings suggest that older adults possess limited metacognitive knowledge about their prospective memory limits and may not fully utilise cognitive offloading strategies to compensate for memory decline.

Email: Chiara Scarampi, c.scarampi@ucl.ac.uk

11:20-11:35 AM (43)

Core Mechanisms Underlying the Long-Term Stability of Working Memory Traces Still Work in Aging. GAEN PLANCHER, *University of Lyon,* GABRIEL JARJAT, [1]*University of Lyon & Grenoble Alpes University,* SOPHIE PORTRAT, *Grenoble Alpes University* – Working memory (WM) is the keystone of general cognitive achievement, but it declines with aging. The present study aims to investigate the consequence of WM deficits on the stability of WM traces over time. In a complex span task, two factors aiming at varying the amount of attention available for maintaining WM traces were orthogonally manipulated: the cognitive load of the processing task and the number of distractors. A group of young and of older participants performed this task and were tested for immediate and delayed recall. Older adults elicited lower immediate performance than younger adults, but only for a memory score that included stabilized traces. For delayed memory, younger adults outperformed older adults, but a similar pattern of results was observed in both groups. First, the two factors affected long-term memory performance to the same extent in young and older adults. Second, a non-linear relationship between delayed recall performance and the time accumulated for attentional maintenance between encoding and immediate recall was observed, and this relationship did not differ between groups. These findings suggest that the core mechanisms underlying the long-term stability of WM traces still work in aging.

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Reasoning

Virtual, Friday, 10:00 AM-12:00 PM

Chaired by Richard Morey, *Cardiff University*

10:00-10:15 AM (44)

Use of Significance Test Logic by Scientists in a Novel Reasoning Task. RICHARD MOREY, *Cardiff University,* RINK HOEKSTRA, *University of Groningen* – Although statistical significance testing is one of the most widely-used techniques across science, previous research has suggested that scientists have a poor understanding of how it works. If scientists misunderstand one of their primary inferential tools the implications are dramatic: potentially unchecked, unjustified conclusions and wasted resources. Scientists' apparent difficulties with significance testing have led to calls for its abandonment or increased reliance on alternative tools, which would represent a substantial, untested, shift in scientific practice. However, if scientists' understanding of significance testing is truly as poor as thought, one could argue such drastic action is required. We show using a novel experimental method that scientists do, in fact, understand the logic of significance testing and can use it effectively. This suggests that scientists may not be as statistically-challenged as often believed, and that reforms should take this into account.

Email: Richard D. Morey, moreyr@cardiff.ac.uk

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10:20-10:35 AM (45)

Dissecting the Logic-Liking Effect: The Roles of Deduction and Consistency. NICOLE CRUZ, SPRIHA GOSWAMI, and BRETT HAYES, *University of New South Wales* – People tend to rate inference conclusions as more likeable when the inferences are deductively valid. This logic-liking effect has been interpreted as evidence for dual-process accounts of reasoning, where people have an intuitive sensitivity to logical structure information independently of whether they process this information explicitly in working memory. Two experiments examined the origin of the logic-liking effect comparing people's liking ratings for (a) logically necessary = deductive inferences, where the negation of the conclusion is inconsistent with the premises; (b) logically possible inferences, where the conclusion and its negation are both consistent with the premises; and (c) logically impossible inferences, whose conclusion is inconsistent with the premises. Participants disliked (c) but gave similar liking ratings to (a) and (b), regardless of deductive status. We discuss the implications for the logic-liking effect and question the need to posit a dual-process framework to account for them.
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10:40-10:55 AM (46)

Uncertainty Reduction and Reaction Times in Wason's Rule Discovery Task. EMRAH AKTUNC and HAKAN KARSILAR, *Ozyegin University* – The original and a novel version of Wason's rule discovery task were employed in a computerized setting. The participants were told the triple 2-4-6 conforms to the experimenter's rule and asked to generate new triples by entering numbers in three boxes on a screen. Participants' reaction times on entering numbers were recorded. For each triple, they received feedback on whether it fit the experimenter's rule. In the novel version, participants were also given informal uncertainty reduction feedback depending on the kinds of triples generated; e.g., for 8-10-12 reduction was 0% but for a triple such as 2-3-8 it was 3% and for one such as 3-5-2 it was 5%. Preliminary results showed no differences between the groups on success rates of rule discovery or on reaction times of first button presses. However, significantly greater numbers of non-fitting triples of various kinds were generated in the uncertainty reduction group which indicates that the participants' strategies were shaped by the feedback. Thus, uncertainty reduction may be a useful conceptual tool in manipulating and explaining inductive reasoning in the context of various models of inductive reasoning.
Email: Mahir Emrah Aktunc, emrah.aktunc@ozyegin.edu.tr

11:00-11:15 AM (47)

Modality Shapes Reasoning: Spoken Language Promotes Intuition, Written Languages Promotes Analysis. JANET GEIPEL and BOAZ KEYSAR, *University of Chicago* – It is widely assumed that reasoning performance is independent of the language modality in which people encounter reasoning problems, as logical conclusions either follow or do not follow from premises independent of whether we hear or read them. Five experiments (N=1225) tested this assumption and found that reasoning is modality dependent. Reasoning based on written language enhanced performance on problems that involved a conflict between an intuitive and analytic response, but not for ones that did not involve such a conflict. This was true for reasoning with syllogisms, insight problems and semantic distortions, while using English or Mandarin. We argue that written language engages more controlled processing than spoken language, while spoken language engages intuition. This might result from how language modalities emerge in development and how we use them over time. Our discovery has implications for domains where reasoning is central such as law, medicine and business.
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11:20-11:35 AM (48)

Dissociative and Cognitive Processes in Paranormal Beliefs. MATTHEW SHARPS and MEGAN HERRERA, *California State University, Fresno,* JANA PRICE-SHARPS, *Walden University* – Research in our laboratory has shown that subclinical dissociative processes are important to the acceptance of unreal and unsubstantiated beliefs, in that these processes reduce the feature-intensive processing on which critical thinking is based. This effect, however, has proven inconsistent across subject matter domains. Additional related factors were therefore anticipated to be important. It was suggested that these would lie specifically in the realms of cognitive disorganization and diminished attentional processes, both of which might be present in the relatively dissociated. Using standard instruments, this hypothesis was tested in a study involving 200 adult respondents. Regression analyses showed that attention deficits were directly related to cognitive disorganization and to dissociation, although not directly to paranormal beliefs. However, dissociation and cognitive disorganization were significantly related to the acceptance and endorsement of paranormal beliefs. These results help to clarify the relationship of attentional, dissociative, and organizational processes in the cognitive domain to the reduction of critical thinking necessary for the endorsement of unreal or unsubstantiated beliefs.
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11:40-11:55 AM (49)

Fast and Slow Judgments of the Healthiness of Foods: Two Processes or One? RACHEL STEPHENS and SEOK-JUN KANG, *University of Adelaide,* BRETT HAYES, *University of New South Wales,* JOHN DUNN, *University of Western Australia* – Evaluating the healthiness of foods is complex; food packaging can include various cues, such as front-of-package nutritional labels (e.g., Health Star Ratings [HSRs]), detailed nutrition information panels (NIPs), and branding. According to popular dual-process theories, healthiness judgments can be based on fast, intuitive Type 1 processing, or slower, effortful Type 2 processing – depending on factors such as time and motivation. In contrast, single-process theories propose that common mechanisms underlie these judgments under a range of contexts. To distinguish between the competing theories, we instantiate them using a signal detection framework, and test them against a novel experiment. Participants viewed fictional food labels with healthy versus unhealthy HSRs, NIPs and branding. They made an initial, intuitive healthiness-rating, followed by a subsequent healthiness-rating based on careful consideration of the NIP. We found differential effects of HSRs, NIPs and branding on the two ratings, but cannot yet rule out simpler single-process accounts.
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Spatial Cognition and Memory

Virtual, Friday, 10:00 AM-12:00 PM EST

Chaired by Yingying Yang, *Montclair State University*

10:00-10:15 AM (50)

A Systematic Review of the Development of Wayfinding Skills. YINGYING YANG, *Montclair State University,* EDWARD MERRILL, *University of Alabama* – Wayfinding refers to the ability to identify one's current location and successfully navigate to an unseen location in the environment. It represents a complex spatial ability that occurs in large-scale environments. We conducted a systematic literature review of wayfinding skills in children 4-16 years old between 1965 to 2020. Initial search using Psychinfo generated 3,028 non-duplicated records. After applying our exclusion criteria, we included about 250 studies in this review. We coded studies in terms of participant ages, environmental features, experimental manipulations, and outcome measures. Our review found great methodological heterogeneities. In particular, studies differed greatly in constructed environments in terms of indoor vs. outdoor, virtual vs real-life, levels of familiarity, and size. Our review also found increasing numbers of studies on individual differences focusing on atypical development and predictors of wayfinding abilities. We hope our review helps lay the foundation for a theoretical framework for understanding wayfinding development. We also identified future directions.

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10:20-10:35 AM (51)

Individual Differences in Wayfinding Strategies in Real and Virtual Environments. MARY HEGARTY and CHUANXIUYUE HE, *University of California, Santa Barbara,* ALEXANDER BOONE, *Oregon State University,* ELIZABETH CHRASTIL, *University of California, Irvine* – Navigating to goal locations in a known environment (wayfinding) can be accomplished by different strategies, notably by taking habitual, well-learned routes (response strategy) or by using spatial knowledge to find novel paths, such as shortcuts (place strategy). In recent studies, participants learned a route through a novel desktop virtual environment and were then asked to navigate to goal locations in the environment. Results showed individual differences in preference for place versus response strategies, and sex differences such that men used more place strategies than women. Here, we used the same paradigm to study wayfinding strategies in two ambulatory environments; a real outdoor environment, and a walking immersive virtual environment. We found the same range of strategies as in previous studies. However, place strategies were more common in real and walking immersive environments and sex differences were less evident in these environments compared to the previous desktop versions. We discuss how differences in the learning and testing conditions across these environments may have affected both spatial knowledge acquisition and strategy use.

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10:40-10:55 AM (52)

Navigation Strategy is Resilient to Physical, Psychosocial, and Fatigue-Based Stress. ALEXANDER BOONE, TOM BULLOCK, MARY MACLEAN, TYLER SANTANDER, JAMIE RAYMER, ALEXANDER STUBER, LIANN JIMMONS, GOLD OKAFOR, SCOTT GRAFTON, MICHAEL MILLER, BARRY GIESBRECHT, and MARY HEGARTY, *University of California, Santa Barbara* – Different navigation strategies are supported by different brain regions. Response-based navigation consists of following known routes, supported by the caudate nucleus. Place-based navigation is flexible allowing for shortcuts and is supported by the hippocampus. Stress-based cortisol binds more in the hippocampus than the caudate and may impede the use of shortcuts. Three experiments were conducted using different acute stressors (Trier social stress, cold pressor, physical fatigue) and their matched active control conditions to investigate whether navigation strategy and efficiency would be disrupted by acute stress. Each stressor task increased cortisol levels relative to its control condition. Participants navigated similarly after the trier social stressor and the cold pressor compared to their control conditions; however, physical fatigue stress led to an increase in shortcutting. Acute stress may not uniformly inhibit strategic navigation processes as predicted by previous research. The effect of the stress may be contextually-related to the navigation task.

Email: Alexander Paul Boone, alexanderpaulboone@gmail.com

11:00-11:15 AM (53)

Non-Visual Spatial Navigation: A Field Study. KATELYN SINGER and DANIELE NARDI, *Ball State University* – Human spatial navigation and memory have mostly been studied with sighted individuals and with access to visual cues in the environment. Although it is known that navigation can also be guided by haptic, kinesthetic, and auditory cues, most of this evidence comes from lab studies, with only limited testing of the ecological validity. Here we examined the ability of sighted, young adult participants to navigate using non-visual cues in an outdoor field study. Blindfolded participants were tasked with finding and remembering the location of a target object in a campus lawn; then, after disorientation, they had to replace it back where it was. Two testing sites were used, one with a gentle slant and one horizontal. In the horizontal site, there was no indication that participants remembered the location of the target. However, in the slanted site, participants replaced the target with smaller errors and could remember the location of the target. These results generalize previous findings from lab studies and suggest that in a non-visually accessed outdoor environment, sighted participants can spontaneously encode the slant of the terrain and use it to guide navigation.

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11:20-11:35 AM (54)

Measuring Strategic Regulation of Environment Learning Using Direct and Indirect Methods. RUIZHI DAI, *Tufts University & The University of Hong Kong,* AYANNA THOMAS and HOLLY TAYLOR, *Tufts University* – Environment learning (EL) happens when individuals navigate within an environment (route perspective) or study a map (survey perspective). Modern technology allows people to flexibly switch between route and survey perspectives, indicating a role of metacognitive control. In 2 experiments, we explored how learners exercise control in EL, and whether strategic regulation would differ when assessed using indirect or direct measures of metacognitive control. Experiment 1 measured indirect metacognitive processes by examining perspective switching via looking behavior (eye-tracking) between two displays: a route perspective and a map overview. In Experiment 2, we measured direct control by asking participants to press a key to switch between

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perspectives. Results showed that with eye-movement, participants were more likely to switch perspectives when moving along the path segments, whereas with key-pressing, they were more likely to switched between displays in intersections. These findings indicated that learners might apply differential regulate behavior when explicitly directed.
Email: Ruizhi Dai, rdai@hku.hk

11:40-11:55 AM (55)

Embodied Perspective-Taking and Being in Two Places (and Nowhere) at the Same Time. STEVEN SAMUEL, GEOFF COLE, and MADELINE EACOTT, *University of Essex* – In order to understand how a scene appears from an alternative point of view (Level 2 perspective-taking) adults usually engage an embodied process by which we integrate our motor representations with the imagined perspective, essentially imagining our physical selves in a new location relative to the scene. An interesting question that follows concerns the consequences of this process for our sense of where we actually are. How can we be in two places at once? In this talk, I will present the results of research showing that when we take another visual perspective we sometimes erroneously perform manual actions consistent with that perspective rather than our own. If we are instructed to act according to an imagined perspective instead, we make more accurate responses from that perspective than our own, effectively 'reversing' egocentricity. Additionally, we find no evidence that embodied perspective-taking is disrupted by real physical barriers between the participant and the desired perspective location, suggesting participants represent themselves and the scene in imaginary rather than real space. The ramifications for our understanding of embodied perspective-taking and egocentricity more broadly are discussed.
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Symposium II: How Do We Decide What Is True?

Virtual, Friday, 11:00 AM-1:00 PM

Chaired by Lisa K. Fazio, *Vanderbilt University; Sarah J. Barber, Georgia State University*

11:00-11:15 AM (SYM6)

The Effects of Repetition on Belief: The Role of Prior Knowledge and Development. LISA FAZIO, *Vanderbilt University* – Repetition increases belief in false statements. This illusory truth effect occurs with many different types of statements (e.g., trivia facts, news headlines, advertisements), and even occurs when the false statement contradicts participants' prior knowledge. I will present a series of studies demonstrating that the effects of repetition are near universal – occurring for even very implausible statements and occurring across development. Across two studies, we measured the effect of repetition on belief for statements across the full range of plausibility (extremely implausible to extremely plausible). Regardless of whether plausibility was measured using general knowledge norms or individual knowledge, our results suggest repetition increases belief in all statements. We also find that repetition increased belief in false statements even for young children. Five-year-olds, 10-year-olds, and adults were all more likely to judge repeated statements as true. Implications for theoretical explanations of the illusory truth effect will be discussed.

11:20-11:35 AM (SYM7)

Doubt Deficit: The Neuropsychology of Credulity. ERIK ASP, *Hamline University* – In the early 1990s Dr. Daniel Gilbert contrasted two psychological models of belief and doubt: The Cartesian model (belief is subsequent and separate from comprehension) and the Spinozan model (belief and comprehension are the same process). Typically, cognitive resource depletion has been used as the standard method to adjudicate between the two models. Here, neuroscientific data will be brought to bear on the issue. The diverse constellation of deficits and symptomology following prefrontal cortex damage will be examined, and several empirical studies conducted in lesion patients will be described. Broadly, our results suggest that damage to the prefrontal cortex tends to increase credulity generally. Of the lesion patients studied, no one showed a dissociation between comprehension and belief. These neuropsychological data argue for a Spinozan perspective: belief is inextricably linked to comprehension, and the prefrontal cortex mediates retroactive doubt. Finally, a rudimentary neural circuitry model of belief and doubt will be offered using recent discoveries in fear conditioning processes as a guide.

11:40-11:55 AM (SYM8)

Are We Naturally Gullible or Naturally Skeptical? RUTH MAYO, *Hebrew University* – The main claim for the strength of the influence of misinformation is that the process of comprehension entails believing as a primary process, while rejection is only a secondary process, prone to failure. I will present research demonstrating that rejection can be successful and primary. Specifically, I will report studies demonstrating that together with a gullible mindset, humans also have a skeptical mindset. The mindsets alter according to context and individual differences regarding trust. Critically, we find that in a skeptical mindset, one's initial response is to reject information, hence eliminating congruent effects such as priming, confirmatory biases, accessibility effects and routine reasoning. I will end with a discussion suggesting that the skeptical mindset offers new insights both regarding cognitive antecedents as well as possible remedies for the post-truth era.

12:00-12:15 PM (SYM9)

Developmental Origins of the Ability to Differentiate Between Real and Not-Real. JACQUELINE WOOLLEY, *University of Texas at Austin* – Children spend considerable time in worlds in which reality and non-reality are intertwined. Storybooks and television present events that merge real and fantastical elements, peers pretend one thing is another, and parents go to great lengths to promote belief in fantastical beings. How do children decide what to believe? I argue that young children have sophisticated tools for figuring this out and use a range of cues and strategies to make these decisions. I will present a series of empirical studies that show that, with age, children increasingly use physical evidence, cues in peoples' everyday conversations, and context to make reality judgments about novel entities. I will also present evidence that children use existing knowledge and beliefs about both the world and the people in it to draw conclusions about what's real. I conclude that the process of determining reality status can reveal much about how we think.

12:20-12:35 PM (SYM10)

Perceived Truth as a Function of the Number and Spacing of Repetitions. SARAH BARBER, *Georgia State University* – Repeated

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information is perceived as more truthful than new information. This is known as the illusory truth effect. It occurs because repetition increases processing fluency. Because fluency and truth are often correlated, people use processing fluency as a marker for truthfulness. Although this is a robust effect, almost all prior studies examining it have used three or fewer repetitions, and no study has examined whether repetition spacing matters. In a series of experiments, we examined how the number and spacing of repetitions affected the perceived validity of trivia statements. We found that perceived validity increased as the number of repetitions increased (up to 27 repetitions). We also found that perceived validity was higher for spaced repetitions than for massed repetitions, and tended to increase as the lag between the repetitions increased. These findings add to our theoretical understanding and have applications for advertising, politics, and the propagation of "fake news".

Rules, Norms, Morality: Cognition and Action

Virtual, Friday, 11:00 AM-1:00 PM

Chaired by Petko Kusuv, *The University of Huddersfield*

11:00-11:30 AM (56)

Invited Talk: Rules and Behavior. ROLAND PFISTER (2020 Early Career Award Recipient), *Universität Würzburg* – Rules and social norms permeate almost every aspect of our everyday lives. But how are such rules and norms actually represented in the human cognitive system? I will present a series of experiments that approach this question by assessing cognition and behavior right at the moment when an agent enacts a deliberate rule violation. Results indicate that rules shape rule-violation behavior in a wide variety of settings and across different populations, suggesting that rules become ingrained deeply into the cognitive system. These findings challenge current views in fields such as behavioral economics and sociology, and they prepare the ground for an agent-centered, psychological perspective on rules and rule-violation behavior.
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11:40-11:55 AM (57)

Scrutinizing Social Sampling Models of Norm Estimation. HELGE GIESE, *University of Konstanz,* JANINA HOFFMANN, *University of Bath* (Presented by Janina Hoffmann) – People regularly overestimate how often others engage in unfavorable behavior, misperceiving the social norm. Social sampling models propose that people infer such social norms from the behavior of their own social circle. Yet, despite its centrality, the assumption that individuals sample acquaintances from their own social surrounding has remained largely untested. We investigated this key assumption by asking a friendship network of college freshmen to report their own behavior and norm perceptions across eight domains, such as alcohol consumption. Replicating previous work, freshmen systematically misperceived the average social norm within their cohort. Yet, they failed to judge the behavior of their own social circle more accurately than the behavior of the whole cohort, indicating that sampling from social circles does not fully explain normative biases. Cognitive modelling suggested that individuals unlikely limited their search to individuals from their own social circle. Taken together, our study provides the first direct test of how sampling processes shape norm perception in a complete social network. Apparently, remembering socially close individuals is not the main driver of biased norm perceptions.
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12:00-12:15 PM (58)

The Influence of Alcohol Consumption on Moral Decisions. MARIOLA PARUZEL-CZACHURA, KATARZYNA PYPNO, *University of Silesia in Katowice,* MICHAŁ BIAŁEK, *University of Wroclaw,* BERTRAM GAWRONSKI, *University of Texas at Austin* – Moral psychology researchers analyze variables that change people's moral decisions. One of these possible variables is the consumption of alcohol, which can change the perception of reality, although it still allows people to make some decisions like moral ones. First studies using classical trolley and footbridge dilemmas showed that people after drinking alcohol are more utilitarian. We will present the results of an experimental study (N=300) in which we were using a different set of moral dilemmas, based on the CNI model (Gawronski et. al., 2020). According to the CNI approach, people are either sensitive to consequences, sensitive to norms, or show a general preference for inaction over action regardless of consequences and norms. In our study, we compare the results of participants from experimental (alcohol intoxication, where the level of drank alcohol was matched to the participants' weight), placebo, and control groups.
Email: Mariola Paruzel-Czachura, mariola.paruzel-czachura@us.edu.pl

12:20-12:35 PM (59)

The Moral Superadditivity Effect Among Children. MARIOLA PARUZEL-CZACHURA, *University of Silesia in Katowice,* MICHAŁ BIAŁEK, *University of Wroclaw,* ARTUR DOMURAT, *Kozminski University* – Moral psychologists study many possible factors that we may take into account when deciding about other's morality. One of them is the emotions (like feeling guilt) and beliefs (like thinking that what I did is unacceptable) of the transgressor. Our latest series of studies (N > 1000) showed that the expression of both guilt and beliefs influence judgments about transgressor morality strongly, even in the situation of murder. The moral superadditivity effect says that when a person who did something wrong is also holding socially desirable beliefs and feeling guilt for breaking moral rules, then a person gains more than just the sum of what could be gained by expressing just one of these independently. However, the effect was not found in the within-subjects study design. We decided to replicate our results among children (N=250). We confirmed the existence of the moral superadditivity effect among children in between-subjects design for all the vignettes (for moral and conventional behaviors), showing that it is stronger compared to adults. We want to discuss how studying children's moral judgments may bring a new light in understanding moral judgments in general.
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12:40-12:55 PM (60)

How Perspective-Taking Accessibility Eliminates the Moral Hypocrisy Between People's Moral Judgments and Moral Behavior. ROSE MARTIN and PETKO KUSEV, *The University of Huddersfield,* PAUL VAN SCHAIK, *Teesside University* – In preparation for road collisions, Autonomous Vehicles (AVs) can be programmed to save the greatest number of lives (utilitarian) or save the passenger at all costs (passenger-protective). In a series of studies, Bonnefon et al. (2016) revealed a moral

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hypocrisy between peoples' moral judgments and behaviors; people do not want to buy the utilitarian AV that they judge to be the most moral. I argue that the cause for this moral hypocrisy is partial perspective-taking (PT) accessibility in hypothetical scenarios (only the perspective of the passenger is accessible to participants). I demonstrate that presenting full PT accessibility (the perspective of the passenger and pedestrians) to participants eliminates the moral hypocrisy. In particular, informed by their utilitarian moral judgments, participants are more willing to ride, buy and spend money on utilitarian than passenger-protective AVs. These novel findings provide AV manufacturers and policymakers with new evidence regarding consumers' ethical preferences for AVs.
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Memory Processes

Virtual, Friday, 11:00 AM-1:00 PM EST

Chaired by Ruth Day, *Duke University*

11:00-11:30 AM (61)

Invited Talk: Inducing Amnesia in Healthy Individuals via Global Hippocampal Inhibition. MICHAEL ANDERSON, *University of Cambridge* – The amnesic patient H.M. illustrates how hippocampal damage profoundly disrupts the ability to store new memories. Amnesic windows might also occur in healthy people due to disturbed hippocampal function arising during cognitive processes that systemically reduce hippocampal activity. Intentionally suppressing (stopping) episodic retrieval reduces hippocampal activity via control mechanisms mediated by the lateral prefrontal cortex. Here I present evidence that when people suppress retrieval given a reminder of an unwanted memory, they are far more likely to forget unrelated "bystander" experiences from periods surrounding suppression. This amnesic shadow follows a dose-response function, becomes more pronounced after practice suppressing retrieval, exhibits characteristics indicating disturbed hippocampal function, and is predicted by reduced hippocampal activity. Retrieval suppression appears to reduce hippocampal activity via GABAergic inhibition, broadly compromising hippocampal encoding, consolidation, and retrieval processes, mimicking organic amnesia. Cognitively triggered amnesia constitutes an unrecognized forgetting process that may account for significant memory lapses following trauma.
Email: Michael Anderson, Michael.Anderson@mrc-cbu.cam.ac.uk

11:40-11:55 AM (62)

Active Decontextualization, Not Sleep, Unbinds Scene Context from Object Memory. KARLA EVANS and EMILY MADDEN, *University of York* – Memory consolidation includes separation of memory for objects from the learning context or decontextualization. Consolidation is shown to be assisted by sleep. Given a significant decrement in visual recognition observed when scene context is changed between study and test, can decontextualization during encoding reduce it and be further moderated by sleep? Using a standard visual long-term memory paradigm, we probed memory for objects both semantically congruent and incongruent to the scene, embedded in real-world scenes. Observers encoded target objects twice; (1) in two different background contexts or (2) in the same background context. One group was tested after 12 hours of wakefulness and another after a night's sleep. Memory improved with higher hit and lower false alarm rates for objects studied in two different contexts. Decontextualization was greater for incongruent objects with increased hit rate but an overall absent modulatory effect of sleep. Findings challenge the assumption that sleep facilitates the decontextualization of visual episodic memory.
Email: Karla K. Evans, karla.evans@york.ac.uk

12:00-12:15 PM (63)

Episodic Memory Selectively Declines with Age in a Transgenic Rat Model of Alzheimer's Disease. DANIELLE PANOZ-BROWN and JONATHON CRYSTAL, *Indiana University* (Presented by Jonathon Crystal) – Vivid episodic memories in people have been described as the replay, or detailed remembering, of multiple unique events and the contexts in which they occurred. Because episodic memory is impaired in Alzheimer's disease (AD), we characterized episodic memory function in a transgenic Alzheimer's rat model (referred to as TgF344-AD and known to manifest age-dependent AD neuropathology) using the items-in-context approach previously developed by our lab (Panoz-Brown et al., 2016, Current Biology). We asked if TgF344-AD rats remember a series of odors and the contexts in which they occurred using episodic memory under conditions that dissociate familiarity. Here we show that episodic memory was intact in TgF344-AD rats at an early timepoint (9-10 months) and selectively impaired at a late timepoint (21-23 months) relative to age-matched wildtype controls. Control conditions suggest that the impairment in TgF344-AD rats was selective for episodic memory and not dependent on familiarity or non-specific factors (e.g., learning, motivation, olfaction, etc.). Our work validates a transgenic rat model of Alzheimer's disease as a tool to test novel therapeutics that specifically target episodic memory function.
Email: Jonathon D. Crystal, jcrystal@indiana.edu

12:20-12:35 PM (64)

What is the Right Type of Evidence to Support the Claim that Sleep Benefits Memory? LAURA MICKES, *University of Bristol, and* DAVID MORGAN, *University of Heidelberg* – A commonly made claim is that memory performance is boosted after a period of sleep compared to an equal period of wakefulness. One standard method of measuring the differences is to use the AM-PM PM-AM design. This design requires participants in the wake group to study in the AM and test in the PM and participants in the sleep group to study in the PM and test in the AM. To control for potential time of day effects, two control groups of participants are often included: One group studies and tests in the AM and the other group studies and tests in the PM. Understanding the interactions of memory scores between the groups and time of day is necessary to claim that sleep benefits memory. We present results from three different memory experiments in which the AM-PM PM-AM design was used, and in none of them is an interaction present.
Email: Laura Mickes, laura.mickes@bristol.ac.uk

12:40-12:55 PM (65)

Global Side Effects: Public Knowledge with Ads (US) vs. Without (UK). RUTH DAY and PHILIPP POPP, *Duke University* – Prescription drug ads are pervasive in the US but banned elsewhere. What effect do they have on public knowledge of key information such as side effects?

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Do ads enhance general knowledge or dull it? Participants in the US (ads allowed) and the UK (ads banned) engaged in cognitive tasks to assess their existing knowledge about drug side effects. Tasks included generating possible side effects, recognizing examples, and rating factors such as severity. Results are examined in terms of overall knowledge levels and differences between US vs. UK groups. Also, results for specific side effects associated with a relatively new but heavily advertised type of drug permit a direct test of ad effects. This research shows how implicit learning and memory work in the everyday world and provides an ecologically valid way to study them.
Email: Ruth S. Day, ruthday@duke.edu

Attention and Visual Search I

Virtual, Friday, 11:00 AM-1:00 PM EST

Chaired by Michelle Kramer, *The George Washington University*

11:00-11:15 AM (66)

Demonstrating Dissociable Time Scales of Implicit Learning in Human Behavior Consistent with Mechanisms of Synaptic Change. MICHELLE KRAMER and PATRICK COX, *The George Washington University,* ALFRED YU, *U.S. Army Combat Capabilities Development Command Army Research Laboratory,* STEPHEN MITROFF and DWIGHT KRAVITZ, *The George Washington University* (Presented by Dwight Kravitz) – Humans have a remarkable ability to leverage prior experience to anticipate subsequent events. Here, we utilize a massive behavioral dataset (Airport Scanner) to examine the precise relationship between prior experience, for both attended and unattended features, and changes in later behavior. Many aspects of this relationship are well predicted by a distributed learning mechanism dependent on local synaptic change. Moreover, the strength of this relationship has a u-shaped temporal profile. With short (<1 hour) or long (>12 hours) delays, prior evidence strongly influenced behavior (R2=0.97, p=6.25*10-5 and R2=0.84, p=0.028, respectively), but with intermediate delays (1 to 12 hours), there was no influence (R2=0.10, p>0.60). The lack of learning with intermediate delays is consistent with physiological mechanisms of synaptic plasticity which can involve short-term electrical (Zucker & Regehr, 2002) and long-term structural changes (Kelleher, Govindarajan & Tonegawa, 2004), however, there is an intermediate period in which neither class of mechanism is strongly active. These results link human behavior and known mechanisms of synaptic plasticity, suggesting a precise form of learning supported by local cortical synaptic changes.
Email: Michelle Kramer, kramerm@gwu.edu

11:20-11:35 AM (67)

Semantic Content Allows Flexible Memory-Partitioning in Hybrid Search. NURIT GRONAU, *The Open University of Israel,* MAKAELA NARTKER, *John Hopkins University & Harvard Medical School,* SHARON YAKIM, *The Open University of Israel,* IGOR UTOCHKIN, *HSE University,* JEREMY WOLFE, *Harvard Medical School* – In "hybrid search" people look for one of several memorized targets among irrelevant distractors, yet sometimes only a subset of these targets are relevant to current task demands. Can we flexibly partition our memory into different target subsets, as a function of visual search demands? Boettcher et al. (2017) demonstrated that participants fail to partition memory on a trial-by-trial basis. Here, we tested subsets that differed by their visual and semantic content. Results showed that whereas surface characteristics (e.g., color) had no effect on performance, partitioning memory into different semantic categories was highly efficient. Still, searching through a categorical subset was slower than through a non-partitioned set of a similar size. To enhance memory-partitioning, follow-up experiments used spatial location as a retrieval cue. Results showed, again, that flexible memory partitioning is possible when using semantically distinct categories. In addition, the partition cost seen previously was eliminated. Further implications will be discussed.
Email: Nurit Gronau, nuritgro@openu.ac.il

11:40-11:55 AM (68)

Inhibition of Return Across Multiple Tasks for Controlled Stimuli. JOSEPH MACINNES, NADEZHDA MURZYAKOVA, and KSENIYA DOBNYUK, *HSE University,* LIYA MERZON, *Aalto University* – Inhibition of return has been proposed to facilitate attentional selection of novel locations while searching a scene. Reaction time to probes are slower at recently fixated locations in visual search, but this may be task specific. Dodd et al. (2009) observed an opposite pattern of facilitation at previous locations for memorisation, free viewing, and rating for pleasantness for real scene images. We tested the role of task in IOR using a controlled search array of "alien road signs" that differed by colour, shape and target symbol and extended the group of tasks to include search, memorisation, foraging, and change blindness. IOR was measured as reaction time to a probe presented at 0, 90 or 180 degrees as compared to the two-back location, and contrary to previous results, we observe IOR in all tasks. Our design also allowed us to test IOR outside scene boundaries as well as during change blindness flicker. Consistent with the idea that IOR is encoded in scene coordinates, we observe IOR inside the scene but not outside the spatial boundaries of the array. We do, however, see IOR during the scene-off phase of change-blindness suggesting that inhibitory tags may be maintained for short duration during scene removal.
Email: Joseph MacInnes, jmacinnes@hse.ru

12:00-12:15 PM (69)

Inhibition of Return: An Information Processing Theory of Its Natures and Significance. RALPH REDDEN, *Dalhousie University,* W. JOSEPH MACINNES, *HSE University,* RAYMOND KLEIN, *Dalhousie University* (Presented by Raymond Klein) – The history of research on inhibition of return (IOR) is briefly summarized and research supporting its functional significance as a foraging facilitator is presented. Discordance in the literature with respect to IOR's underlying effects is highlighted and results from three diagnostics (central arrow targets, locus of slack logic within the Psychological Refractory Period, and performance in speed-accuracy space) supporting our theory that there are two forms of IOR are presented. According to our theory, which form which is manifest depends on the activation state of the reflexive oculomotor system (ROMS): an input form –operating to decrease the salience of inputs– is generated when the ROMS is suppressed, and an output form –operating to bias responding– is generated when the ROMS is not suppressed. Converging evidence from a process model is presented, wherein the effects of the two forms of IOR are best accounted for by different drift diffusion parameters.
Email: Raymond M. Klein, ray.klein@dal.ca

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12:20-12:35 PM (70)

A Novel, Unbiased Method of Evaluating Subsequent Search Misses in Dual Target Search. MARK BECKER and JAN BRASCAMP, *Michigan State University* – Finding one target during a visual search task may result in increased misses for a second target: the Subsequent Search Misses (SSM) effect. We demonstrate that the common method of calculating second target detection performance is biased and could produce spurious SSM effects. We describe the source of the bias and use a modification of Signal Detection Theory to develop a novel, unbiased method of calculating the expected value for dual target performance under the null hypothesis of no SSM effect. We apply our novel method to three SSM datasets (two new and one published) and compare its results to the traditional calculation as well as to an alternative calculation that was recently proposed to account for biases in the traditional method. We find that both the traditional method and the recently proposed alternative substantially overestimate the magnitude of SSM effects in these data. For two datasets, we find that no significant SSM effects remain when applying our unbiased method. We recommend that future studies on the SSM effect use our method to ensure accurate effect size estimates, and suggest that the method be applied to re-analyze published results to rule out the possibility that they were spurious.
Email: Mark W. Becker, becker54@msu.edu

12:40-12:55 PM (71)

Eliminating the Low Prevalence Effect in Visual Search with a Remarkably Simple Strategy. BLAIRE WEIDLER, *Towson University,* ERIC TAYLOR, *Vector Institute for Artificial Intelligence & The University of Guelph,* MATTHEW HILCHEY and JAY PRATT, *University of Toronto* – The low prevalence effect in visual search occurs when rare targets are missed at a disproportionately high rate. This effect has enormous significance in health and public safety and has proven resistant to past interventions. Across two experiments, we document a total erasure of the effect by manipulating search goals. Participants searched through arrays of 16 "T-like" items, in which a "perfect T" target was present on 50% of trials in the high-prevalence condition and 10% in the low-prevalence condition. Some participants identified the presence or absence of the target (the typical scenario for eliciting a low prevalence effect) while other participants identified the element in the array best resembling the target. Search goal and target prevalence interacted: The low prevalence effect was abolished when searching for the most target-like element. This suggests that simple changes to the search goal hold promise for dramatically improving detection of rare targets.
Email: Blaire Weidler, bweidler@towson.edu

1:00-1:15 PM (72)

Shaping Eye Movements During Naturalistic Viewing Using Aversive Conditioning with Near-Real-Time Feedback. BRIAN ANDERSON, LANA MRKONJA, AND MING-RAY LIAO, *Texas A&M University* – Strategically shaping patterns of eye movements through training has manifold promising applications. However, training how a person moves their eyes when viewing an image or scene is notoriously difficult, with typical approaches relying on explicit instruction and strategy, which have notable limitations. I will present evidence supporting the efficacy of a novel approach to eye movement training using aversive conditioning with near-real-time feedback. Participants viewed indoor scenes with the goal of remembering those scenes for a later memory test. During viewing, saccades meeting specific amplitude and direction criteria probabilistically triggered an aversive electric shock, which was felt almost immediately after the eliciting saccade, allowing for a close temporal coupling between an oculomotor behavior and the feedback intended to shape it. Results demonstrate a bias against performing the type of saccade associated with shock, an effect that operates without apparent awareness, persists into extinction, and generalizes to the viewing novel images.
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Emotion and Cognition

Virtual, Friday, 11:00 AM-1:00 PM EST

Chaired by Carolyn Crawford, *University of Guelph*

11:00-11:15 AM (73)

A Large-Sample Individual-Difference Study of the Links between Boredom Proneness, Mindwandering, and Age-Related Hearing Loss. CAROLYN CRAWFORD and KALISHA RAMLACKHAN, *University of Guelph,* GURJIT SINGH, *Phonak Canada, University of Toronto, & Ryerson University,* MARK FENSKE, *University of Guelph* – The tendency to experience the aversive state of boredom is linked with the ability to engage in satisfying tasks. Here we focus on two individual-difference factors that may impact task engagement: perceptual impairment and capacity for maintaining task-focused attention. Through a partnership with Connect Hearing-Canada, we recruited a large sample (N=1,782) of older adults. Audiometric thresholds provided an objective measure of perceptual impairment for each participant, while self-report questionnaires assessed individual differences in the subjective impact of hearing difficulties, boredom proneness, and the tendency to mindwander. Our results show that the subjective impact of hearing loss is more intensely negative for those who are prone to boredom, and that this relationship is mediated by self-reported differences in the ability to maintain task-focused attention. These findings further elucidate the cognitive mechanisms related to boredom, and how cognitive-affective processes such as boredom and attention contribute to the subjective impact of perceptual difficulties.
Email: Mark Fenske, mfenske@uoguelph.ca

11:20-11:35 AM (74)

Preparing for the Worst: Attention Is Enhanced Prior to Any Upcoming Emotional or Neutral Stimulus. TAL MAKOVSKI and ERAN CHAJUT, *The Open University of Israel* – Do people allocate more or less attentional resources when preparing for the presentation of negative emotional stimuli? In three experiments, participants performed a change-detection task while expecting either a neutral, threatening, disgusting, joyful, or no stimulus to appear at a fixed moment. Responses to an infrequent dot-probe were faster when participants were expecting a distracting stimulus. Importantly, while only negative stimuli impaired change-detection performance, there was no difference between the preparation effect for threatening and neutral stimuli (Experiment 1) or disgusting and joyful stimuli (Experiment 3). The preparation effects were also not affected by the observer's anxiety level. Experiment 2 confirmed that the threatening images impacted performance when the dot-probe appeared after the

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image. These results suggest that the visual system increases alertness in the face of any upcoming stimulus and further imply that the effects of emotional stimuli largely occur after, but not before, their appearance.
Email: Tal Makovski, talmak@openu.ac.il

11:40-11:55 AM (75)

The Episodic Flanker Effect: Memory Retrieval as Attention Turned Inward. GORDON LOGAN, GREGORY COX, and JEFFREY ANNIS, *Vanderbilt University,* DAKOTA LINDSEY, *University of Southern Alabama* – We test the conjecture that memory retrieval is attention turned inward in a novel episodic version of the well-known perceptual flanker task. Participants were presented with lists to remember (ABCDEF) followed by probes that cued one letter (##C###). The task was to indicate whether the cued letter matched the letter in the cued position in the memory list. We found classic results from the perceptual flanker task. Response time and accuracy were affected by the distance between the cued letter in the probe and the memory list (##D### was worse than ##E###) and by the compatibility of the uncued letters in the probe and the memory list (ABCDEF was better than STCRVX). There were six experiments. The first four established distance and compatibility effects. The fifth generalized the results to sequential presentation of memory lists. The sixth tested boundary conditions with an item recognition task. We developed models of space-, object-, and template-based attention and fit them to the data. They accounted for distance and compatibility effects, providing measures of the sharpness of the focus of attention on memory and the ability to ignore distraction. These results support the conjecture and encourage further research.
Email: Gordon D Logan, gordon.logan@vanderbilt.edu

12:00-12:15 PM (76)

Hellish Neighbors Are Easier to Spot than Ordinary Neighbors: A New Task to Explore Attention Grabbing Effects in Emotional Words. NICOLAS DUMAY, *University of Exeter & Basque Center on Cognition, Brain and Language (BCBL),* VERITY CROSSLEY, *University of Exeter* – A clear demonstration that emotional Stroop interference reflects attention capture rather than a generic threat-driven slowdown (Algom, 2004) is hard to come by still to this day. Attentional capture predicts facilitation from the moment word identity (i.e., what grabs attention) becomes task-relevant. In our study, participants identified and produced under time pressure alarming and neutral words presented with a misspelled letter (e.g., hatrud/hatred). Stimulus sets were matched on a dozen visual and (sub)lexical variables, and on word reading latencies. In Experiment 1, alarming strings produced identical nonword performance in lexical decision, but the predicted facilitation in "see-through" word identification was found. Experiment 2 reproduced this effect and in the same participants showed interference from alarming words onto subsequent neutral words in color-naming Stroop. Such a flip in the valence of the emotion effect fits nicely with the notion of attention capture, but not so well with that of a generic slowdown.
Email: Nicolas Dumay, n.dumay@exeter.ac.uk

12:20-12:35 PM (77)

Hindsight Bias for Emotional Faces. DANIEL BERNSTEIN, *Kwantlen Polytechnic University,* MEGAN GIROUX, *Simon Fraser University,* MICHELLE HUNSCHE, *University of British Columbia,* RAGAV KUMAR, *University of Victoria,* EDGAR ERDFELDER, *University of Mannheim* – We studied hindsight bias for emotional faces. Participants first identified facial emotions among options (e.g., happy, scared, angry, disgusted, surprised) as faces clarified from blurry to clear (foresight). Next, participants saw clear versions of each face before stopping another clarification at the point at which they identified the facial emotion previously (hindsight). On average, all emotions except for happy faces showed robust hindsight bias; participants stopped the clarifying faces at a blurrier point in hindsight than they had identified the face in foresight. We also tested and refuted a distinctiveness explanation of our data by showing stable hindsight bias for distinctive and non-distinctive facial emotions. A multinomial processing tree model of our data revealed that happy faces elicited little reconstruction bias in hindsight, while disgusted faces elicited the strongest bias of the emotions that we studied. The model also revealed that participants in hindsight were better at recollecting their foresight identification points for non-distinctive faces compared to distinctive faces. In sum, we found virtually no hindsight bias for happy faces and very robust hindsight bias for disgusted faces.
Email: Daniel Bernstein, dbernste@kpu.ca

12:40-12:55 PM (78)

Prediction, Detection, and Memory in the Face of Contagious Threats. D. VAUGHN BECKER, *Arizona State University,* JOSHUA TYBUR, *Vrije Universiteit Amsterdam,* MICHAEL VARNUM and STEVEN NEUBERG, *Arizona State University* – The COVID-19 global pandemic has brought with it a new interest in how social-cognitive factors and pre-existing prejudices can intrude on judgments about who might harbor the disease. Tasks like predicting which social targets pose a significant threat of contagion, detecting symptoms of those threats, and remembering who recently presented with symptoms, all can be profitably explored with methodologies like signal detection. We describe new studies in which participants evaluated faces that vary in race/ethnicity, gender, and social identity; they predicted, and then detected and remembered who showed signs of disease. Even though we counterbalanced symptomaticity across the social target types, reliable biases in prediction and memory emerged. These reflected both the actual threat ecology of the emerging pandemic, as well as more intractable and less-warranted prejudices. The biases observed when participants predicted contagion carried over into memory performance even after actual detection performance was included in the model.
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Decision Making II

Virtual, Friday, 11:00 AM-1:20 PM EST

Chaired by Wandi Bruine de Bruin, *University of Southern California*

11:00-11:15 AM (79)

Approximately Equal Judgments for Mortality and Survival Curves. CHRISTOPHER WOLFE and MITCHELL DANDIGNAC, *Miami University,* VALERIE REYNA, *Cornell University* – Risk of surviving an illness over time is often expressed as survival curves, with the X axis representing time and the Y axis indicating percent surviving. Mortality curves are a symmetrical variant, with the ordinate representing percent dying. We assessed approximately equal judgments, estimates that two

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quantities are roughly the same. Participants (N=340) judged pairs of graphs depicting cancer survival/mortality over 10 years. Verbal framing of dying or living was manipulated between subjects. Within subjects, participants compared graphs expressing mortality or survival (ending at about 50% at 120 months) to various comparison graphs. For quantitatively distant pairs, we found consistent interactions between verbal framing and graph type. Survival verbal framing produced significantly fewer approximately equal judgments with survival curves, whereas mortality verbal framing yielded significantly fewer approximately-equal judgments with mortality curves. The opposite was found with graph pairs designed to be approximately equal. People consistently expressed the appropriate gist with congruent framing.
Email: Christopher Wolfe, wolfecr@miamioh.edu

11:20-11:35 AM (80)

Perceived Analogies of COVID-19 and Relationships with Protective Behaviors: Evidence from a National Survey. WANDI BRUINE DE BRUIN, *University of Southern California,* KATHERINE CARMAN and ANDREW PARKER, *RAND Corporation* – To understand novel diseases such as COVID-19, people may draw analogies with other diseases – but analogies may be harmful if they undermine protective actions. Here, we examined people's self-generated analogies for COVID-19 and associations with protective actions and risk perceptions. In March 2020, 6684 US residents reported up to three analogies for COVID-19, protective actions such as handwashing and avoiding crowds, as well as risk perceptions for getting infected with COVID-19 and dying from it. The most common analogy was seasonal flu (mentioned by 59%), but it was correlated with reporting less protective actions. Mentioning common cold (10%) was also associated with reporting less protective actions. In contrast, mentioning pneumonia (9%) or emerging diseases such as pandemic flu (28%), SARS/MERS (26%), or ebola (14%) was correlated with reporting more protective actions. Emerging (vs. common) diseases often emerged together. Participants mentioning pneumonia or ebola reported the most protective actions independent of other analogies, even after accounting for risk perceptions. Our findings are relevant for COVID-19 risk communications that aim to present analogies that resonate with people and motivate behavior change.
Email: Wandi Bruine de Bruin, wandibdb@usc.edu

11:40-11:55 AM (81)

Ecological Focusers. ELDAD YECHIAM, *Technion – Israel Institute of Technology* – The commonly used "nudge" approach suggests that policy makers need to fight human biases with other biases that lead behavior into advantageous paths. An alternative approach is proposed whereby there are environmental conditions that have an antidotal effect on biases with no need for learning or training. Specifically, ecological focusers are conditions that increase task attention. They include the availability of significant consequences, the possibility of losing, encouraged deliberation, and cooperation with other individuals. The effect of each of these cues on common biases will be reviewed along with a discussion of whether this effect is indeed debiasing or simply counter-biasing: namely, nudging in the reverse direction of biases. It is concluded that focusers reduce a variety of judgment and decision biases that are responsive to better effort, and thus have a debiasing effect. Importantly, focusers do not affect psychophysical biases involving the mapping of objective features to subjective attributes. This implies low intrusiveness potential for focusers as compared to nudges.
Email: Eldad Yechiam, yeldad@tx.technion.ac.il

12:00-12:15 PM (82)

How Do the Experiences with Terminal and Non-Terminal Illness Affect Intertemporal Decisions of the Patients and Their Family Members? X.T. (XIAO-TIAN) WANG, *The Chinese University of Hong Kong, Shenzhen,* PENG WANG, *East China Normal University* – Within a life-history theory framework, we propose that the value of future rewards depends on the expected remaining time until death. We hypothesize that the constraints on expected survival time increase delay discounting when making intertemporal choices between a smaller-and-sooner (SS) reward and a larger-and-later (LL) reward. We predict that a cancer patient and spouse would upregulate their delay discounting more than a non-cancer patient and spouse, as a shared adaptation to the changes in the expected lifespan. We conducted this study in a state-owned large hospital in Shanghai. The participants were naturally assigned to one of the following four groups (cancer or non-terminal illness) and family members of the patient (cancer or non-terminal illness). Each participant completed a series of monetary intertemporal choices. The results showed that cancer patients, when compared with non-cancer patients, had a higher delay-discounting rate and were more present-oriented. This effect remained significant after controlling for the financial burden the family endured. In contrast, family members of the patients shared a similar delay discounting rate when adapted to each specific medical situation.
Email: X.T. (Xiao-Tian) Wang, xtwang@cuhk.edu.cn

12:20-12:35 PM (83)

Modeling Decoy Effects Across Individual Differences and Presentation Constraints. DOUGLAS WEDELL and WILLIAM HAYES, *University of South Carolina* – We modeled diverse patterns of decoy effects to better understand the cognitive processes that may have produced them. In Experiment 1 (n = 66), participants made repeated choices among triads of grocery options described by discrete, numerical attributes (price and quality ratings). Participant clusters that exhibited the strongest attraction, compromise, and reverse similarity effects were best described by models that incorporated sensitivity to dominance and negative weighting of each alternative's distance from the contextual average. Other clusters showed diminished context sensitivity along with strong dimensional biases. In Experiment 2 (n=97), we tested whether the order in which attribute information is presented modulates these effects. Participants viewed attribute values one-at-a-time in either a dimensionwise or alternativewise sequence before choosing. Paralleling effects of spatial formatting manipulations, dimensionwise presentation facilitated the attraction and reverse similarity effects relative to alternativewise presentation.
Email: Douglas H. Wedell, Wedell@sc.edu

12:40-12:55 PM (84)

Using and Misusing Causal Information: How Knowledge and Information Interact. JESSECAE MARSH, *Lehigh University,* SAMANTHA KLEINBERG, *Stevens Institute of Technology* – Machine

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learning advances are making it easier to extract causal information from large datasets, in the hopes of creating decision aides. But would such causal models actually help people make decisions? For many decisions, we have preexisting beliefs about how important elements related to the decision work (like citrus preventing a cold). We explored how such existing beliefs may influence the use of causal models in decision making. Participants provided with causal diagrams that should aid decision making made fewer correct decisions than people who used only their prior knowledge. The detrimental effect of causal diagrams can be mitigated but not completely overcome by participants subjectively assessing their knowledge (Experiment 1). Lower accuracy with diagrams was not explained overall by participants' beliefs about the specific causal diagrams provided (Experiment 2). We discuss what these findings mean for how we can help guide people's decision making in everyday scenarios.
Email: Jessecae Marsh, jessecae.marsh@lehigh.edu

1:00-1:15 PM (85)

Mapping Colors to Concepts: Understanding Assignment Inference as Evidence Accumulation. BRIAN YIN, *University of Wisconsin – Madison* & *University of California, Berkeley*, LAURET LESSARD and KAREN SCHLOSS (2020 Early Career Award Recipient), *University of Wisconsin – Madison* (Presented by Karen Schloss) – When people interpret information visualizations, they use assignment inference to determine how colors map onto concepts (Schloss et al., 2018). We propose that assignment inference is akin to evidence accumulation in decision-making. Within the linear ballistic accumulator (LBA) modeling framework (Brown and Heathcote, 2008), we consider each color in a visualization as having a separate accumulator. As people infer which colors map to a target concept, the color accumulators "race" until one reaches the response threshold. The question is, what determines which color "wins"? In three experiments, we found LBA is effective for modeling responses and response times in a recycling task and a graph reading task. We hypothesized that evidence accumulation of a color for a target concept would be proportional to the association ratio—the association strength between that color and the target concept over the association between that color and the non-target concept. Results supported this prediction, and association ratios captured contextual effects arising from different concepts in the scope of the task. Our study provides a process-level account of how people use assignment inference to interpret information visualizations.
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Symposium III: Age Differences in Episodic Memory Control Processes

Virtual, Friday, 12:00-2:00 PM EST

Chaired by M. Karl Healey, *Michigan State University;* *Karen L. Campbell, Brock University*

12:00-12:15 PM (SYM11)

Adult Age Differences in the Production and Monitoring of Episodic Memories: Evidence from Dual-List Free Recall. CHRISTOPHER WAHLHEIM, *University of North Carolina at Greensboro* – Older adults show impaired episodic memory, especially when control processes are required to reinstate context under conditions of interference. How do age-related control deficits affect response production and context monitoring? We addressed this issue using a dual-list free recall task in which participants study two lists and are cued to retrieve from one or both list(s) just before recall. We leveraged free recall dynamics to make inferences about the operation of pre- and post-retrieval processes. We consistently replicated age-related deficits in memory acuity, as older adults recall fewer correct responses and output more intrusions. We also found that older adults' higher intrusion rate reflects impaired monitoring, but not production. Finally, older adults terminated recall earlier than younger adults, which suggests impaired use of pre-retrieval control to search long-term memory. I will discuss implications for extant theories of age-related episodic memory deficits and the benefits of computational modeling for theory building.

12:20-12:35 PM (SYM12)

Memory Without Intention: Alpha Suppression as a Neural Marker of Task Demands in Voluntary vs. Involuntary Retrieval in Older and Younger Adults. KAREN CAMPBELL (2020 Early Career Award Recipient), *Brock University* – Voluntary memory relies on intentional controlled retrieval, while involuntary memory comes to mind automatically. Recent work suggests that voluntary memory declines with age, while involuntary memory is relatively preserved. In this talk, I will present EEG data from younger and older adults during voluntary and involuntary retrieval. We examined alpha event-related desynchronization (ERD), which has been linked to memory reactivation when observed over occipital sites and top-down control when observed over frontal sites. Older, but not younger, adults showed alpha ERD over occipital sites indicative of successful retrieval regardless of retrieval intention. However, older adults also showed alpha ERD over frontal sites during both voluntary and involuntary retrieval (while young adults only showed it during voluntary retrieval), suggesting that older adults were trying to retrieve even when instructed otherwise. This work highlights the need for more naturalistic conditions that minimize task demands, even though creating those conditions is challenging.

12:40-12:55 PM (SYM13)

Age Differences in the Tendency to Self-Monitor Memory Performance. DAYNA TOURON, *University of North Carolina at Greensboro* – Metacognitive monitoring refers to how people evaluate their cognitive performance. An extensive literature examines how accurately individuals monitor. Older adults (OAs) typically demonstrate spared monitoring abilities. The question of how often individuals engage in metacognition has been largely neglected, although one might expect situational, group, and individual variability in monitoring frequency. Individuals who monitor more often may also monitor more accurately, and age-related increases in spontaneous monitoring could contribute to OAs' intact monitoring abilities. In the current study, younger adults (YAs) and OAs completed a memory task that occasionally probed them for the content of their current thoughts. Participants in an experimental condition also provided judgments of learning (JOLs). OAs engaged in more frequent monitoring than YAs, and OAs who were required to provide JOLs engaged in more frequent monitoring than OAs who were not required to make explicit metacognitive judgements. However, participants who engaged in more frequent monitoring did not have more accurate metacognitive judgments than those who engaged in less frequent monitoring.

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1:00-1:15 PM (SYM14)

Metacognitive Control over Knowledge Updating in Older Age. AYANNA THOMAS, *Tufts University* – Learning new, correct information in the context of strongly held misconceptions presents a challenge for individuals of all ages, yet the evidence is mixed regarding the way age-related cognitive changes impacts the updating process. The present work examined how confidence in misconceptions and control over access to correct information impacted knowledge updating in younger and older adults. In two experiments, young and older adults took a TRUE/FALSE test of 50 misconceptions and reported confidence in responses. In Experiment 1, participants were shown immediate corrective feedback. In Experiment 2, participants selected items for which they wanted to receive more information. Selections were either honored or dishonored. A surprise retest occurred one week later. Results suggest that older and younger adults demonstrated a poor relationship between confidence and initial test performance. However, we did find effective regulation of learning, as updating was greater when choices were honored.

1:20-1:35 PM (SYM15)

Aging-Related Changes to ERP Markers of Episodic Retrieval: Forensic Implications. ZARA BERGSTRÖM, *University of Kent* – Healthy older adults often show reduced or qualitatively different episodic retrieval-related parietal ERP activity compared to young adults, despite accurate memory performance. This may be problematic for forensic memory detection tests, which rely on ERP markers of memory retrieval as indications of criminal guilt. We investigated both standard old/new recognition ERPs and P300-based forensic memory detection in 30 younger (age<30) and 30 older adults (age>65). In line with predictions, memory-related parietal ERP effects were significantly reduced in both tasks in the older group, despite highly similar behavioural performance. The results suggest that ERP-based forensic memory detection is less accurate in older populations, and also have broader implications for EEG research on aging and cognition.

Perception

Virtual, Friday, 12:00-2:00 PM EST

Chaired by Mounia Ziat, *Bentley University*

12:00-12:30 PM (86)

Invited Talk: Bayesian Predictive Perception. MARY PETERSON, *University of Arizona* – Substantial evidence supports contemporary top-down predictive theories whereby perception depends on predictions generated from ongoing experience and conveyed through the visual pathway by feedback connections. At the extreme, it is assumed that the input matches predictions with a little adjustment or that mismatches are large enough to require revising the predictions. The Bayesian, probabilistic, nature of perception exemplified by ambiguous stimuli is ignored. Yet, our research indicates that, even for stimuli that seem unambiguous, multiple potential interpretations are considered outside of awareness before one is consciously perceived. Accordingly, we favor a Bayesian Predictive theory in which multiple interpretations are activated for stimuli and feedback-mediated predictions from these interpretations compete until the best-supported interpretation is perceived. This approach accounts for the perception of both putatively unambiguous and ambiguous stimuli within one framework.

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12:40-12:55 PM (87)

Awareness of Subliminally Presented Objects "Varies" Depending on How It's Measured. DAVID MARCH, *Florida State University* – Insensitivity to the particularities of various awareness measures obscures a nuanced understanding of awareness as on a gradient. I demonstrate how awareness can "vary" depending on the level at which it is measured. Study 1 measured awareness at the simplest level using an object detection task, Study 2 at an intermediate level using m-alternative forced-choice (AFC) tasks, and Study 3 at the highest level of self-reported perception. Within each study, I tested whether awareness varies as a function of masking technique (sandwich vs. backward). This work investigated how distinct measures differentially indicate awareness and, furthermore, how awareness of various types of stimuli changes across measures and masking techniques.

Email: David S. March, march@psy.fsu.edu

1:00-1:15 PM (88)

Reward Rapidly Enhances Visual Perception. MIKE LE PELLEY, *University of New South Wales,* PHILLIP CHENG, *University of New South Wales & Macquarie University,* ANINA RICH, *Macquarie University* – Reward plays a critical role in motivating overt, goal-directed behavior, and can also shape patterns of visual attention, with reward-related stimuli receiving automatic prioritization. In the current study, we demonstrate an "earlier" effect of reward on visual perception. We used a paradigm in which reward information was provided at either encoding or retrieval of a brief, masked stimulus to show that reward can rapidly modulate early neural processing of visual information, prior to consciousness. Experiment 1 showed enhanced response accuracy when a to-be-encoded grating signaled high reward relative to low reward, but only when the grating was presented very briefly (17 ms) and participants reported not being consciously aware of it. Experiment 2 demonstrated that this reward-driven enhancement was not a consequence of greater motivation to retrieve the cue stimulus on high-reward trials: when information about reward availability was provided at retrieval (rather than encoding), no advantage was observed for high-reward trials. Taken together, our findings provide behavioral evidence for a rapid reward-modulation of visual perception, which does not seem to require consciousness.

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1:20-1:35 PM (89)

Cursor Movements Analysed with a Hidden Markov Model Reveal the Dynamics of Perception and Decision. SAMUEL HARDING and RICHARD SHIFFRIN, *Indiana University Bloomington* (Presented by Richard Shiffrin) – The dynamics of perception are assessed with a cursor that the participant moves from screen bottom to one of two targets at upper right and left. Instructions where to move are provided during the movement by the values of two features of a stimulus. These are presented either together or successively at times too rapid to allow deliberate changes in strategy. One feature is 100% diagnostic and the other is 75% diagnostic. Depending on the presentation order, when the partial cue indicates the wrong target, the cursor sometimes starts moving toward that target. A Hidden Markov Model (HMM) is used to analyze

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the cursor trajectories to infer the current state of the decision process at each moment, revealing the dynamics of perception and decision. In particular, perception is not holistic, but is driven moment by moment by ongoing feature perception.
Email: Richard Shiffrin, shiffrin@indiana.edu

1:40-1:55 PM (90)

Emotional Ratings of the Cutaneous Rabbit Illusion: Effects of Visual Locomotion and Tactile Duration. MOUNIA ZIAT and KATHERINE CHIN, *Bentley University,* ROOPE RAISAMO, *University of Tampere* – We assessed the emotional dimensions of the visual-cutaneous rabbit effect that consisted of nine bursts in three equally-distant locations on the left forearm combined with nine visual silhouettes of saltatorial animals projected on the forearm. The duration of each burst was 12, 24, or 48 ms. Additionally, there were two locomotion conditions: taking-off and landing. Twenty-three participants completed 144 trials and were asked to rate the multimodal emotional experience using the self-assessment Manikin Test. The results showed that Valence was only affected by visual stimuli with no effect of the tactile or the locomotion condition. Arousal showed a significant difference for the three tactile conditions with an interaction effect with the locomotion condition. Arousal scores were higher when the taking-off condition was associated with the intermediate duration (24 ms) and when the landing condition was associated with either the shortest (12 ms) or the longest duration (48 ms). There was no effect of the dominance dimension. Valence seems to be highly affected by visual information offsetting any effect of touch, while tactile information can modulate the arousal dimension which can be beneficial for designing multimodal interfaces.
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Attention: Development and Individual Differences

Virtual, Friday, 12:00-2:00 PM EST

Chaired by Claudia von Bastian, *University of Sheffield*

12:00-12:30 PM (91)

Invited Talk: Tracking Developmental Differences in Real-World Social Attention Across Adolescence, Young Adulthood, and Older Adulthood. HEATHER FERGUSON, *University of Kent* – Detecting and responding appropriately to social information in our environment is a vital first step towards social interaction. I will report a series of well-powered, pre-registered experiments that examined how social attention develops across the lifespan, comparing adolescents (10-19 years old), young (20-40 years old) and older (60-80 years old) adults. Participants were immersed in different social interactions– face-to-face conversation and navigating an environment – and their attention to social and non-social content was recorded using eye-tracking glasses. Results revealed that, compared to young adults, adolescents and older adults attended less to social information (i.e., faces) during face-to-face conversation, and to people when navigating the real-world. We also explore how features of the social context (e.g., groups vs. individual, in-group vs. out-group) influence allocation of attention. Thus, we provide novel evidence that real-world social attention undergoes age-related change, and these developmental differences might be a key mechanism that leads to impaired ToM among adolescents and older adults.
Email: Heather Ferguson, H.Ferguson@kent.ac.uk

12:40-12:55 PM (92)

Advancing the Understanding of Individual Differences in Attentional Control: Theoretical, Methodological, and Analytical Considerations. CLAUDIA VON BASTIAN, *University of Sheffield,* CHRIS BLAIS and GENE BREWER, *Arizona State University,* MÁTÉ GYURKOVICS, *University of Illinois at Urbana-Champaign,* CRAIG HEDGE, *Cardiff University,* PATRYCJA KAŁAMAŁA, *Jagiellonian University,* MATT MEIER, *Western Carolina University,* KLAUS OBERAUER, *University of Zurich,* ALODIE REY-MERMET, *Swiss Distance University Institute,* JEFFREY ROUDER, *University of California, Irvine,* ALESSANDRA SOUZA and LEA BARTSCH, *University of Zurich,* ANDREW CONWAY, *Claremont Graduate University,* CHRISTOPHER DRAHEIM and RANDALL ENGLE, *Georgia Institute of Technology,* GIDON FRISCHKORN, *University of Zurich,* NAOMI FRIEDMAN, *University of Colorado, Boulder,* DANIEL GUSTAVSON, *Vanderbilt University Medical Center,* IRING KOCH, *Rheinisch-Westfälische Technische Hochschule Aachen,* THOMAS REDICK, *Purdue University,* BRIDGET SMEEKENS, *University of North Carolina at Greensboro,* ELIZABETH WIEMERS, *Purdue University,* PETER WHITEHEAD, *Duke University* – Attentional control as an ability to regulate information processing during goal-directed behavior is critical to many theories of human cognition and thought to predict a large range of everyday behaviors. However, failures to reliably assess individual differences in attentional control have sparked a debate concerning whether it can be regarded as a valid psychometric construct. In a large collaborative effort, we developed a consensus definition of attentional control and conducted an in-depth literature survey to evaluate how individual differences in attentional control are currently assessed. Studies varied widely in the measures used, with some of the most common paradigms such as the Stroop task often showing only poor psychometric properties. Although recent methodological and analytical approaches can alleviate some of the psychometric concerns, we suggest that it is time to move beyond these traditional measures and rethink how to assess attentional control to better understand it as a psychometric construct.
Email: Claudia von Bastian, c.c.vonbastian@sheffield.ac.uk

1:00-1:15 PM (93)

Using Factor Analysis to Bridge Neuropsychological and Psychonomic Measures of Attention. TODD HOROWITZ and MELISSA TREVIÑO, *National Cancer Institute,* XIAOSHU ZHU, *Westat,* YI YI LU, *Harvard Medical School & Brigham and Women's Hospital,* LUKE SCHEUER, *Harvard Medical School & McLean Hospital,* GRACE HUANG, *Westat*, LAURA GERMINE, *Harvard Medical School & McLean Hospital* – Do neuropsychological attention tests measure the same construct as psychonomic attention paradigms? Previous work (Huang et al., 2012) suggested that many paradigms load on a "general attention factor," a. Adult participants (N=488) completed a 14-item on-line battery (TestMyBrain.org) comprising psychonomic paradigms [Multiple Object Tracking (MOT), Flanker, Visual Change Detection (VCD), Approximate Number Sense (ANS), Visual Search (VS), Gradual Onset Continuous Performance Task (Grad CPT)] and neuropsychological tests [Trail Making Test A & B (TMT), Digit Symbol Substitution (DSS), Digit Span Forward and Backward, Letter Cancellation (LC), Spatial Span

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(SSpan), and Arithmetic]. We did not replicate a. We obtained a five-factor solution: (1) Capacity (MOT, VCD, ANS, SSpan, DSS); (2) Search (VS, TMT, LC); (3) Digit Span; (4) Arithmetic; (5) Sustained attention (GradCPT) Our findings encourage expansion of psychonomic science into the clinic and illustrate the potential to learn about attention from selected neuropsychological measures.
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1:20-1:35 PM (94)

When Cognitive Control Harms Rather than Helps: Individuals with High Working Memory Capacity Are Less Efficient at Infrequent Contraction of Attentional Breadth. STEPHANIE GOODHEW, *The Australian National University* – Different attentional breadths facilitate performance on different perceptual tasks. Therefore, to optimise attention for the dynamic demands of real-world vision, it is necessary to efficiently resize attentional breadth. The present study examined whether individual differences in attentional resizing efficiency were related to working memory capacity. Tasks that gauge the efficiency of attentional contraction (resizing from broad to narrow focus) and attentional expansion (resizing from narrow to broad) were used, in addition to standard working memory measures. Individuals high in working memory capacity experienced a greater cost in attentional contraction. This is likely because the attentional resizing tasks encourage the setting of a particular attentional breadth for the majority of trials in a block, and then gauge efficiency in changing from this breadth on the minority of trials. This means that high-capacity individuals may have more readily adopted the dominant attentional breadth, particularly in the majority-global condition, thereby incurring a greater cost on the infrequent trials requiring resizing to the local level. This shows that sometimes greater cognitive control can be a relative disadvantage.
Email: Stephanie Goodhew, stephanie.goodhew@anu.edu.au

1:40-1:55 PM (95)

Media Multitasking Does Not Interfere with Lab-Based Multitasking. JESUS LOPEZ and JOSEPH ORR, *Texas A&M University* (Presented by Joseph Orr) – Media multitasking has been linked to decreased executive functioning. However, the tasks used to establish this finding do not approximate a real-world volitional multitasking environment. The current study used a novel experimental framework where multitasking was afforded by an occasional "popup" associated with a secondary task. We predicted that an individuals' time spent multitasking would relate to their 1) distraction by the popups, 2) tendency to choose to multitask, and 3) degree of interference from doing the secondary task. We instead found no association of media multitasking frequency on any task performance measures as determined by Bayesian statistics. This is in line with our previous findings suggesting that daily media multitasking is only marginally related, if at all, to lab-based volitional multitasking. Participants also underwent prefrontal tDCS in order to manipulate executive functioning. Although we predicted that tDCS would cause an interactive effect with the amount of media multitasking, no such effect was found. As most studies finding negative effects of media multitasking have relied on extreme groups, these findings suggest that normal level of multitasking do not affect cognitive performance.
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Comparative Cognition and Learning

Virtual, Friday, 12:00-2:00 PM EST

Chaired by Heather Hill, St. Mary's University

12:00-12:15 PM (96)

Hearts, Minds, and Wallets. Music and Narrative Framing Influence Anthropomorphic Beliefs about Killer Whale Emotion and Well-Being, and Subsequent Donation Behavior. HEATHER HILL, *St. Mary's University*, ELENA SVETIEVA, *University of Colorado, Colorado Springs*, SARAH DIETRICH, JENNIFER ZWAHR, ROBERTO CARDOSO, MARIO SALGADO, EMILY GALLEGOS, JEFFERY HUMPHRIES, AND NICOLAS MIRELES, *St. Mary's University* – Animal documentary films use audio-visual rhetorical devices to engage viewers and shape emotional experiences, with anthropomorphic effects as key in this process. Using general US-based samples, a series of three experiments assessed the influence of two devices: music and narrative setting, on viewers' anthropomorphic appraisals of a killer whale's emotional state, and subsequent donation behavior toward killer whales. Results indicated that music and setting information directly impacted participant perceptions of the emotional state of the killer whale. Happy music or being in the wild led to perceptions of a happy whale; sad music or being in captivity led to perceptions of a sad whale. Mediation analyses showed that these perceptions indirectly influence donation behavior, via beliefs about the killer whale's welfare and wellbeing. The highest donation amounts towards killer whales were elicited from footage of a killer whale depicted as being in the wild, with sad background music. These findings highlight the potential power that animal and nature documentaries have over viewers, which, when combined with human tendencies toward anthropomorphism, can have significant influence on conservation attitudes and behavior.
Email: Heather M. Hill, hhill1@stmary.edu

12:20-12:35 PM (97)

Increasing Complexity in Object Play by Developing Beluga Calves in Managed Care. MALIN LILLEY, *Texas A&M University – San Antonio*, JACKSON HAM, *University of Lethbridge*, HEATHER HILL, St. Mary's University – Research suggests that play may be an important indicator of physical strength, cognitive functioning, and the overall welfare of an animal. Observing the consistent development of object play is difficult to do in most circumstances, but when possible, offers a wealth of insight. The purpose of this study was to examine the development of complexity in object play by beluga calves in managed care. Object play by nine beluga calves was examined from birth to 2 years of life. Calves played with human-made objects, natural objects, and aspects of their environment that could be manipulated. Moreover, play behavior became increasingly complex with age for most calves. These developmental changes may be related to physical and cognitive development along with practice. Further, complexity of play may be influenced by individual calf temperament, the availability of similar aged peers, or by the maternal style of mothers.
Email: Malin Lilley, malin.lilley@gmail.com

12:40-12:55 PM (98)

Relative Size Learning in Honeybees (*Apis mellifera*). MAX NAKAMOTO and PATRICIA COUVILLON, *University of Hawai'i at*

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Mānoa (Presented by Patricia Couvillon) – The aim of these experiments was to continue to explore relational learning in an invertebrate species. Honeybees were trained to discriminate relative size, an inherently relational problem, and, in a subsequent experiment, were trained to discriminate the odd size in a three-stimulus oddity problem. The stimuli were wooden blocks of four different lengths. In Experiment 1, bees were trained with pairs of the different-sized blocks, with all 6 possible pairs used across the 16 trials. Half of the bees were rewarded for choosing the longer block, and the others for choosing the shorter block. Both groups learned the relative size discrimination. In Experiment 2, bees were rewarded for choice of the odd-sized block from a set of three blocks, with all 12 possible block combinations used across the 18 trials. On half of the trials, the odd-sized block was longer than the others, and on the other half, it was shorter. The bees learned to choose the odd-sized block. Taken together, the results are not readily accounted for with basic associative principles; furthermore, the performance in the oddity problem suggests that honeybees can use two relational concepts simultaneously, an ability demonstrated in only a few vertebrate species.
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1:00-1:15 PM (99)

Comparative Cognition: Innovation in Two Squirrel and Two Parrot Species. PIZZA CHOW, THIBAULT BOEHLY, ANASTASIA KRASHENINNIKOVA, AND AUGUSTE VON BAYERN, *Max Planck Institute for Ornithology* – In comparative cognition, we aim to reveal the similarities and differences in cognitive abilities and processes shared among taxa. We apply established methods from a species of one taxonomic group to one or more species of another group, ideally without any modification. Here, we used two established novel food-extraction problems (innovation), that varied in their level of difficulty and that had been successfully solved by wild Eastern grey and Eurasian red squirrels, to assess innovative problem-solving ability in two species of parrots (blue-headed macaws and African grey parrots). We recorded solving outcome (success/failed) on the first visit (for the squirrels)/ trial (for the parrots), solving latency to obtain the first success, and the number of trials took to obtain the first success. We found that 1) the grey parrots outperformed the blue-headed macaws when solving the more difficult problem; 2) the level of difficulty of the two tasks reported in the squirrels was reversed for the parrots; and 3) the two squirrels species outperformed both parrot species in innovation by using few number of visits to obtain the first success. We highlight some life-history traits that may explain the results.
Email: Pizza Chow, pizza.chow@orn.mpg.de

1:20-1:35 PM (100)

The Modified Law of Effect and the Partial Reinforcement Extinction Effect. BENJAMIN SEITZ, ALEXANDRA STOLYAROVA, and AARON BLAISDELL, University of California, Los Angeles (Presented by Aaron Blaisdell) – Thorndike's Law of Effect provides a framework for understanding the selection of behaviors given specific environmental reward contingencies. Though a highly influential model, especially given its resurgence in popularity to understand habitual behaviors, it fails to predict several well-documented behavioral phenomena and incorrectly views extinction as the unlearning of a previously acquired association. Blaisdell, Stolyarova, & Stahlman (2016) proposed modifications to Thorndike's original law that addresses these issues and greatly increases the model's explanatory power. This modified model also provides a testable account of the Partial Reinforcement Extinction Effect (PREE). The PREE is the paradoxical finding of more rapid extinction to a continuously reinforced cue than to a partially reinforced cue, and has challenged many theoretical accounts of learning. Simulations of the MLOE confirm these predictions. Two experimental paradigms, one using pigeons and the other using humans, show support for the Modified Law of Effect's explanation of the PREE.
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1:40-1:55 AM (101)

An Inverse Laplace Time-Cell Model of Classical Conditioning. ANDRE LUZARDO and MARC HOWARD, *Boston University* – How to assign credit for a reward to stimuli across time is one of the central problems in classical conditioning and machine learning. One of the main difficulties is finding an adequate internal representation of time. Another is how to connect that representation to a learning mechanism capable of assigning credit appropriately. The information theoretic view of classical conditioning has shed light on how time and learning may be unified but has lacked a mechanistic neural formulation. Here we present a new model of classical conditioning that provides one such formulation. It generates a representation of time based on scalar invariant time cells as per the Inverse Laplace Model. Credit is assigned based on information theoretic principles. We show that the model can adequately account for cue competition phenomena and timescale invariance of acquisition.
Email: André Luzardo, aluzardo@bu.edu

Working Memory II

Virtual, Friday, 12:00-2:00 PM EST

Chaired by Todd Woodward, *University of British Columbia*

12:00-12:15 PM (102)

Task-Based Functional Brain Networks Detectable Using fMRI: More than Just a Pretty Picture. TODD WOODWARD, *University of British Columbia* – Characterization of brain networks using functional magnetic resonance imaging (fMRI) has primarily been advanced by resting-state research; however, using task-based research, functional characterizations can be more robustly determined by observing how the timing of subject-specific network-level evoked hemodynamic responses (HDRs) differ between task conditions. To this end, our laboratory has consistently applied the following principles for analysis of fMRI data: (1) isolation of task-related variance prior to network extraction; (2) network extraction though multidimensional analysis methods; (3) inclusion of all available brain areas; (4) data-driven explorations of HDR shapes. Adherence to these principals has led to the identification of a set of 10 canonical task-based fMRI networks. Newly retrieved networks can be classified into these 9 canonical networks through an automated algorithm. Based on the experimental conditions to which they respond, a general cognitive function can be assigned to each. This methodology allowed clear separation of the brain networks involved in encoding, maintenance and response phases of working memory using a Sternberg paradigm.
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12:20-12:35 PM (103)

WoMAAC: Working Memory Across the Adult Lifespan: Adversarial Collaboration. ROBERT LOGIE, *University of Edinburgh,* NELSON COWAN, *University of Missouri,* VALERIE CAMOS, *Université de Fribourg,* PIERRE BARROUILLET, *University of Geneva,* MOSHE NAVEH-BENJAMIN, *University of Missouri,* JASON DOHERTY, *University of Edinburgh,* CLEMENT BELLETIER, *Université Clermont Auvergne,* AGNIESZKA JAROSLAWSKA, *Queen's University Belfast,* STEPHEN RHODES, *Rotman Research Institute,* ALICIA FORSBERG, *University of Missouri* – WOMAAC is a four-year project that adopted the approach of "adversarial collaboration" (scientists who disagree working together) to test three different theoretical frameworks for working memory: multiple components, embedded processes, and time-based resource sharing. We addressed a common set of research questions, with parallel replications across labs. The focus was on the understanding of how participants perform when asked to hold items in memory while performing some other task compared with performing each task on its own, and how this ability changes across adult aging. This talk will describe the experience of undertaking this kind of project which has now formally ended and will present key experiments and outcomes. In sum, across multiple experiments, no one theory accounted for all of the data, requiring a change in theoretical assumptions, and an exploration of participant strategies demonstrated that participants often changed the way they performed each task under single and dual task conditions. Adversarial collaboration is proposed as an approach to resolving debates that self-perpetuate indefinitely.
Email: Robert Logie, rlogie@ed.ac.uk

12:40-12:55 PM (104)

The Role of Articulatory Planning in Nonword Repetition. ROBERT HUGHES, HANNAH HARVEY, and JENNIFER MILLS, *Royal Holloway, University of London* – It has been argued that auditory nonword repetition constitutes a relatively pure measure of a passive phonological short-term store, uncontaminated by a contribution of articulatory planning. However, we found that articulatory suppression – but not finger tapping – during nonword presentation markedly impairs nonword repetition (Experiment 1). We also established that nonword repetition exhibits a phonological similarity effect, further supporting a role for articulatory planning given the recent reattribution of the phonological similarity effect in serial recall to speech-planning errors (Experiment 2). Experiment 2 also demonstrated a Hebb repetition effect in the context of nonword repetition for the first time, which could provide a new way of studying the existence and direction of a causal arrow in the association between nonword repetition ability and vocabulary acquisition. Our main findings contradict assumptions of the phonological store-based account and highlight the central role of articulatory-planning processes in the reproduction of a novel verbal sequence.
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1:00-1:15 PM (105)

Comparing the Effects of Self-Reported to Instructed Use of WM Control Processes on WM and LTM Performance. LEA BARTSCH, ALESSANDRA SOUZA, and KLAUS OBERAUER, *University of Zurich* – Working memory benefits when people are given more free time between items they need to remember. What processes cause this free time benefit? Candidates are maintenance processes such as Rehearsal, Refreshing, Elaboration, Mental Imagery and Grouping. Past research has compared behavioral outcomes under different experimental conditions in which the respective processes were instructed, leading to inconclusive results or even evidence against the benefit of such control processes. Yet, in individual differences studies, subjects report to engage in some of the processes to different degrees in WM tasks. The goal of our study was to investigate to which degree subjects engage in these different control processes in a verbal WM task, measured by trial-wise self-reports. Further, we compared WM performance in trials in which they report using a process to performance when, in a second session, they were instructed to use that process. Our results replicate the higher WM performance in trials of self-reported use of elaboration and grouping, compared to reading and rehearsal trials. Furthermore, the effects were comparable between self-reported use of the respective processes and trials in which the respective trials were instructed.
Email: Lea Bartsch, l.bartsch@psychologie.uzh.ch

1:20-1:35 PM (106)

What Is Time Good for in Working Memory? EDA MIZRAK and KLAUS OBERAUER, *University of Zurich* – Increasing time to process information in working memory (WM) improves performance. Free time given after an item is often assumed to enable maintenance processes to counteract forgetting of this item, suggesting that time has a retroactive benefit. Two other hypotheses – short-term consolidation, and temporal distinctiveness – entail a local effect of time on immediately preceding and following items. Here, we show instead a novel benefit of time in WM that is global and proactive. In three serial-recall experiments we varied the position and duration of the free time within a seven-item list of consonants. Experiment 1 showed that the effect is global and not local. Experiments 2a and 2b showed increased inter-item time only benefited the subsequent items, implying a proactive benefit. This finding rules out maintenance processes, short-term consolidation, and temporal distinctiveness as explanations of the free-time benefit but is consistent with the proposal of a gradually recovering encoding resource.
Email: Eda Mizrak, edamizrak@gmail.com

1:40-1:55 PM (107)

A Single, Domain-General Resource Explains Temporary Storage in Working Memory. CANDICE MOREY, *Cardiff University,* CLAUDIA VON BASTIAN, *University of Sheffield,* RALITSA KOSTOVA, *Cardiff University,* EVIE VERGAUWE, *University of Geneva* – Multi-tasking has long intrigued psychologists, and an ongoing major debate centers around whether mental activities are supported by multiple specialized systems or by a single-purpose system. In particular, psychologists disagree about whether multi-tasking is supported by domain-specific or by domain-general cognitive resources. The predictions of domain-specific and domain-general views are in conflict with one another when it comes to the cognitive cost associated with concurrent verbal and visuo-spatial working memory tasks, but previous tests of these predictions have not led to straightforward conclusions. To make critical progress in this theoretical debate, we used a novel approach combining Bayesian state-trace analysis with an experimental design fully crossing processing and storage tasks which differed only in the domain of the memory items (verbal vs. visuo-spatial). Across two experiments, we

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show unambiguously that a single, domain-general factor can account for briefly maintaining verbal and visuo-spatial information in a multi-tasking scenario. We conclude that the evident domain-specialization observed in working memory tasks must arise from functions other than short-term storage.
Email: Candice C. Morey, moreyc@cardiff.ac.uk

Judgment: Processes and Data

Virtual, Friday, 12:00-2:00 PM EST

Chaired by David Kellen, *Syracuse University*

12:00-12:15 PM (108)

Normative Accounts of Illusory Correlations. DAVID KELLEN, *Syracuse University* – When learning about the joint occurrence of different variables, individuals often manifest biases in the associations they infer. In some cases, they infer an association when none is present in the observed sample. Other times they infer an association that is contrary to the one that is in fact observed. These illusory correlations are often interpreted as being the byproduct of selective processing or as the outcome of an "illogical" pseudocontingency heuristic. More recently, a normative account of illusory correlations has been proposed, according to which they result from an application of Laplace's Rule of Succession. The present work will discuss the empirical and theoretical limitations associated with this normative account and argue for its dismissal. As an alternative, we propose a normative account that casts illusory correlations as the expected outcome of a Bayesian reasoner relying on marginal frequencies. We show that this account succeeds in capturing the qualitative patterns found in a corpus of published studies.
Email: David Kellen, davekellen@gmail.com

12:20-12:35 PM (109)

The Perception of Dramatic Risks: Biased Media, Biased Minds? THORSTEN PACHUR, *Max Planck Institute for Human Development* – In their classical study on judgments of health risks, Lichtenstein, Slovic, Fischhoff, Layman, and Combs (1978) concluded that people tend to overestimate the frequency of dramatic causes of death (e.g., homicide, tornado) and to underestimate those of nondramatic ones (e.g., diabetes, heart disease). In addition, dramatic risks were found to be overrepresented in the media, suggesting that people's distorted risk perceptions may be driven by distortions in media coverage. These conclusions have become a staple in the social sciences. But how robust and replicable are these patterns, which Lichtenstein et al. did not evaluate statistically? I submitted both Lichtenstein et al.'s data as well as data from two more recent studies to a quantitative analysis. All three studies indicated an overrepresentation of dramatic risks in media coverage. An overestimation of dramatic risk in people's judgments, by contrast, emerged only for Lichtenstein et al., but not for the other two data sets. This suggests that people's risk perceptions are less tied to the media than commonly assumed and that they recruit other, more valid sources as a basis for their judgments of risk.
Email: Thorsten Pachur, pachur@mpib-berlin.mpg.de

12:40-12:55 PM (110)

The Gap Between Numeric and Verbal Risk Attitude Measures. JANA JARECKI, *University of Basel,* ANDREAS WILKE, *Clarkson University* – The reliability of numeric risk propensity measures (e.g., risky lotteries) has recently been called into question as verbal measures (e.g., questionnaires) of risk attitudes have higher reliability (Frey et al., 2019). Questionnaires provide respondents with context, but the cognitive processes those responses are based on are hard to model with formal models. Our newly developed multi-attribute gamified risky choice task spanning across ten life domains with three attributes allows for such modeling. In a re-test design—including a standard lottery task—our results (N=226) show that risk propensities are stable within life domains across time. Parameter estimates based on fitting cumulative prospect theory to the risky lottery task were mostly unrelated to individual risk-taking in the contextualized task. However, participants' subjective benefit perceptions related to risk-taking in the contextualized task corresponds to a view of risk-taking as a risk-return trade-off rather than being solely driven by the weighting of probabilities and outcomes.
Email: Jana B. Jarecki, jana.jarecki@unibas.ch

1:00-1:15 PM (111)

An Investigation of Identity Priming in the Same-Different Task. BRADLEY HARDING, *Université de Moncton,* DENIS COUSINEAU, *Université d'Ottawa* – The Same-Different task is a classic cognitive paradigm which requires participants to decide if two successively presented stimuli are the "Same" or "Different." While the task is deceptively simple for participants, its results are difficult to model due mostly to The Fast-Same Phenomenon, the consistent finding that participants answer "Same" faster than "Different," while the opposite is expected from conventional cognitive architectures. In this presentation, we investigate the role that identity priming might play in four novel variants of the Same-Different task to investigate whether the fast-"Same" effect can be modulated and controlled. Results for RT effect size and slope analyses of all variants show that a visual match between both stimuli is necessary to observe a fast-"Same" and that hampering this relation cancels the Fast-Same Phenomenon altogether. Only "Same" responses were drastically affected by this manipulation; "Different" responses remained relatively unchanged. Preliminary modelling results will also be presented.
Email: Bradley Harding, bradley.harding@umoncton.ca

1:20-1:35 PM (112)

Judging Likelihood of Safety Based on Information from Different Sources. TOBY PRIKE, JAKUB BIJAK, and PHILIP HIGHAM, *University of Southampton* – People regularly make risky decisions and judgements about the safety of a course of action. In a large pre-registered study, we examined how people assess the likelihood of safety and make travel decisions within two contexts: a migrant sea journey and traveling during a deadly pandemic. Within each context, participants received a synthetic piece of information about the safety of traveling from five sources: a news article, a family member, an official organisation, someone with relevant personal experience, and the travel organizer. The sources stated the safety information with varying degrees of verbal likelihood (very likely, likely, unlikely, or very unlikely) which were randomly determined. After receiving the safety information, participants judged the likelihood of traveling safely (0-100) and made a binary decision

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to travel (yes/no). Participants also made overall safety judgments and hypothetical travel decisions based on all the pieces of information. In both contexts, we found that information from official organisations and people with relevant personal experience most strongly influenced the overall safety judgments and decisions to travel, suggesting these may be particularly influential information sources.
Email: Toby Prike, T.M.Prike@soton.ac.uk

1:40-1:55 PM (113)

When Should You Correct Fake News? Comparing Prebunking, Warning Labels, and Debunking. NADIA BRASHIER, *Harvard University,* GORDON PENNYCOOK, *University of Regina,* ADAM BERINSKY and DAVID RAND, *Massachusetts Institute of Technology* – The spread of fake news, especially on social media, is of great societal concern. Countering false statements with corrections changes beliefs in the moment – but the power of such corrections often does not last. Here, we ask whether the impact of corrections can be maximized by varying when we supply corrections. In two preregistered experiments (total N = 2683), participants read actual true and false headlines taken from social media. In the treatment conditions, veracity information in the form of "true" and "false" tags appeared before, during, or after reading each headline. Participants in the control condition, conversely, received no veracity information. One week later, participants rated the same headlines' accuracy. Surprisingly, we found that providing veracity information after reading headlines (debunking) improved subsequent truth discernment significantly more than veracity information provided during (warnings) or before (prebunking) reading headlines. This observation sheds light on the cognitive science of belief formation and revision, and has practical implications for social media platform designers.
Email: Nadia M. Brashier, nbrashier@fas.harvard.edu

Special Symposium IV: Seeing Race in Cognitive Psychology

Virtual, Friday, 2:00-4:00 PM EST

Chaired by Angela Gutchess, *Brandeis University; Sarah E. Gaither, Duke University*

2:00-2:15 PM (SYM16)

The Mental Representation of Race. MAHZARIN BANAJI, *Harvard University* – Although traditional textbooks on cognitive psychology hardly make any mention of the construct of race (leaving it, I suppose, to other areas of psychology to mop up) I will argue that understanding the representation of race is fundamental to understanding human perception and cognition. The construct of race reveals core principles of attention and perception, learning and memory, and decision making and judgment. It makes the study of human cognition come alive for students of cognitive psychology as few issues are able. Psychology will be better served if understanding the human mind can include, as a matter of course, the richness of human social categories, their mental representations and transformation over time.

2:20-2:35 PM (SYM17)

How to Predict Bad Policing: Theory and Evidence. PHILLIP GOFF, *and* JILLIAN SWENCIONIS, *Yale University & Center for Policing Equity,* HILARY RAU, *Center for Policing Equity* – What situations predict terrible police outcomes? We unite a situationist approach from psychology with routine activity theory from criminology to theorize the factors that predict police officers' discrimination and violence. In this framework, when officers who are vulnerable to situational risk factors for bias encounter situations that facilitate bias and are not well regulated by norms or policies, they are more likely to engage in discrimination and violence. As an example, we describe evidence from three U.S. cities showing that white police officers who support social stratification may use physical force to maintain hierarchies. Because police are empowered to use force to maintain social order, and because white officers hold a dominant racial identity, we hypothesized white officers with high Social Dominance Orientation (SDO) would be more likely to use force than low-SDO white officers. This work suggests a need to continue investigating situations as potential opportunities for reform.

2:40-2:50 PM (SYM18)

Visual Dehumanization of Blacks under Economic Stress: ERP and fMRI Evidence and Implications for Biased Behavior. DAVID AMODIO, *New York University* – When the economy declines, racial discrimination typically increases. Previously, we found that perceived economic scarcity leads white Americans people to view Blacks as darker and more "stereotypically Black," which then predicted discriminatory decisions. Here, we demonstrate that scarcity even affects early face processing, selectively impairing configural encoding of Black faces—a form of "perceptual dehumanization." In Study 1, the framing of resources as scarce (vs. neutral) delayed the N170 ERP to Black (relative to white) faces, and this effect predicted anti-Black money allocation decisions. In Study 2, fMRI revealed selective decreases in fusiform and striatal activity to Black faces under scarcity, which together predicted race-biased decisions. Hence, scarcity appears to impede the encoding of Black faces as face-like, which facilitates racial discrimination. This pattern supports a "visual dehumanization" account of scarcity effects on discrimination and suggests a new mechanism through which economic stress can exacerbate racial inequality.

3:00-3:15 PM (SYM19)

Moving Beyond a Hypodescent Framework for Ambiguous Face Categorization. SARAH GAITHER, *Duke University* – Social categorization of some faces is easier than others. In particular, categorizing racially ambiguous faces can be more difficult and cognitively taxing compared to unambiguous faces. Many theorists have argued that people's judgments in racially ambiguous categorization are driven by the one-drop rule, a heuristic whereby one drop of "Black blood" identifies a mixed-race individual as Black (Davis, 1991) also known as "hypodescent" (Ho, Sidanius, Levin, & Banaji, 2011). However, my recent meta-analysis (k=55; Young, Sanchez, Pauker, & Gaither, in press) shows the majority of this work focuses on white and western samples and biracial Black/white and male stimuli, meaning we do not know how generalizable these findings are. Here, I discuss this meta-analysis and two studies testing the role that participant race (white, Black, Asian, biracial; N=515) and cultural group membership (Asian American vs. Taiwanese children; N=139) play in shaping distinct perceptions of racially ambiguous faces.

Symposium V: Emerging Research on Creative Cogni-

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tion and Neuroscience of Insight

Virtual, Saturday, 9:00-11:00 AM EST

Chaired by Carola Salvi, *University of Texas at Austin;*
Steven M. Smith, Texas A&M University;
Jennifer Wiley, University of Illinois at Chicago

9:00-9:15 AM (SYM20)

The Insight Memory Advantage. AMORY DANEK, *Universität Heidelberg,* JENNIFER WILEY, *University of Illinois at Chicago* – The idea that experiencing an insight could contribute to better memory is intuitively appealing and supported by prior research. However, the role of solution correctness as well as the role of solvers' confidence has remained unclear so far. The present study used magic tricks as a problem solving task to test the hypothesis that solution correctness, the strength of the Aha! experience, and feelings of confidence would each independently predict better recall of solutions after one week. As expected, solutions associated with Aha! experiences were remembered better than those without. Correctness and confidence independently predicted better solution memory. None of the two-way interactions between the predictors was significant. The lack of an interaction between ratings of Aha! and correctness suggests that regardless of correctness, the feelings underlying the Aha! experience are associated with stronger memory traces. This leads to the counterintuitive conclusion that at least part of the insight memory advantage is not due to actually having solved a problem correctly but can also occur for incorrect solutions if accompanied by an Aha! experience.

9:20-9:35 AM (SYM21)

The Dark Side of Eureka. RUBEN LAUKKONEN, *Vrije Universiteit,* BENJAMIN KAVELADZE and JOHN PROTZKO, *University of California, Santa Barbara,* JASON TANGEN, *University of Queensland,* JONATHAN SCHOOLER, *University of California, Santa Clara* – Some ideas feel mundane, but others seem immediately profound. I propose that feelings of insight make ideas feel more valuable to aid quick decision-making, akin to a heuristic. Since shortcuts can incur errors, we predicted that facts would appear truer if artificially accompanied by aha moments. In a preregistered experiment, we found that participants (n=300) gave higher truth ratings for statements accompanied by solved anagrams, and the effect was pronounced when participants reported an aha experience. We also replicated the effect showing that aha moments can shift core beliefs such as, "life has purpose" or "free will is an illusion." Although feelings of insight usually accompany correct ideas (Salvi et al., 2016), we found that aha moments can also be overgeneralized and bias how true a belief or fact appears. I discuss the potential dark sides of aha moments, with potential clinical importance.

9:40-9:55 AM (SYM22)

Forgetting as a Mechanism for Overcoming Fixation in Creative Problem Solving. BENJAMIN STORM, *University of California, Santa Cruz* – Research on creative problem solving has shown that prior knowledge and existing ideas and solutions can impede the generation of new ideas and solutions. This phenomenon, known as mental fixation, has been observed in many problem-solving contexts, including in studies using the Remote Associates Test. In the Remote Associates Test, participants are presented with three cue words and asked to try to come up with a fourth word that is related to each of the three words. The task, however, can be made more difficult by exposing participants to unhelpful associates to the three cue words before having them attempt to generate the fourth word. The current talk will describe research on the mechanisms by which people appear to be able to overcome the effects of mental fixation, focusing in particular on research using the Remote Associates Test, and on the potential roles of inhibition and forgetting.

10:00-10:15 AM (SYM23)

Individual Differences that Moderate Fixation, Creative Solutions, and the Insight Experience. JENNIFER WILEY, *University of Illinois at Chicago*, TIM GEORGE, *Union College*, and REBECCA KOPPEL, *University of Illinois at Chicago* – For analytic problem solving, the ability to focus and resist distraction is generally beneficial. Similarly, expertise generally aids in the solution process. In contrast, for creative problem solving, sometimes attentional control and relying on past experience are less helpful. Rather, reaching an insightful solution is thought to require overcoming an impasse, fixation, or mental set imposed by our interpretation of a problem, which may be exacerbated by the problem solving context, the activation of inappropriate prior knowledge, or focusing too much on an incorrect solution. This talk will discuss findings from research exploring the role of individual differences in predicting who is most likely to experience impasse, overcome fixation, generate creative ideas, and experience feelings of insight.

10:20-10:35 AM (SYM24)

Jumping About: The Role of Task-Switching in Facilitating Creative Problem-Solving. PAUL SELI and NICHOLAUS BROSOWSKY, *Duke University,* MADELEINE GROSS and JONATHAN SCHOOLER, *University of California, Santa Barbara* – Research on creativity has long touted the benefits of an incubation interval. One interpretation of such an interval is that it enables task-switching. And, indeed, some evidence is supportive of the value of switching between tasks in enhancing creative performance. Such benefits may be due to at least two possible sources: First, task-switching may enable people to break set in order to identify solutions that were otherwise unavailable. Second, task-switching may encourage the alternation between idea generation and evaluation. In this talk, we consider the available evidence for the benefits of task-switching, for both mental-set breaking and idea-generation/evaluation alternation, and describe new studies that examine these potential sources of benefit of task-switching on creativity.

10:40-10:55 AM (SYM25)

Oculometric Signature of Switch into Awareness? CAROLA SALVI, *University of Texas at Austin* – For the Gestalt theorists, restructuring is an essential component of insight problem-solving, contributing to the "Aha!" experience and similar to the perceptual switch experienced when reinterpreting ambiguous figures. Because these perceptual and conceptual 'representational changes' rely on similar processes, they should present similar behavioral responses. Previous research showed that pupil diameter increases during the perceptual switch, indexing norepinephrine functioning mediated by the locus coeruleus (LC-NA). Similarly, our data on problem-solving shows that pupil diameter increases before an insight, suggesting the involvement of LC-NA, and it is a possible indicator of the switch into awareness of unconscious processes humans depend upon for insight. LC-NA might be involved

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during the interruption of ongoing functional networks at the emergence of a new idea, causing a switch of attention toward novel ideas and thus the Aha! feeling. This result is in line with the idea that insight is a highly accurate off-on discontinuous process.

Memory and Learning

Virtual, Saturday, 9:00-11:00 AM EST

Chaired by Cristina Zepeda, *Washington University in St. Louis*

9:00-9:30 AM (114)

Invited Talk: Individual Differences in Learning and Forgetting. KATHLEEN MCDERMOTT, *Washington University in St. Louis* – Most research on long-term memory uses an experimental approach whereby participants are assigned to different conditions, and condition means are the measures of interest. This approach has demonstrated repeatedly that conditions that slow the rate of learning tend to improve later retention. A neglected question is whether aggregate findings at the level of the group (i.e., slower learning tends to improve retention) translate to the level of individual people. I will show that—across healthy young adults—people who learn more slowly tend to retain less. Further, I will examine whether rate of learning predicts the shape of one's forgetting function. These studies point to the importance of complementing experimental studies of learning and forgetting with individual difference approaches.
Email: Kathleen McDermott, kathleen.mcdermott@wustl.edu

9:40-9:55 AM (115)

Motivational Strategies to Engage Learners in Desirable Difficulties. CRISTINA ZEPEDA, RACHEL MARTIN, and ANDREW BUTLER, *Washington University in St. Louis* (Presented by Andrew Butler) – Learning strategies that create "desirable difficulties" by slowing or hindering improvement during learning often produce superior long-term retention and transfer (Bjork, 1994; 1999). Despite the desirability of difficulties for learning, many learners choose not to use the learning strategies and/or disengage when they are implemented by a teacher. Knowledge of the learning strategies is necessary but insufficient for behavior change – learners must be motivated to embrace (or least cope) with difficulties. Building from the premise that a learner's experience of difficulty represents a problem that must be solved, this paper will briefly review five areas of psychological research on motivation that provide strategies for increasing engagement and persistence: finding value, reducing cost, reframing appraisals and attributions, creating appropriate challenges, and providing choice. Looking to the future, we argue for more empirical work to examine the interplay between motivation and engagement in desirable difficulties with educational materials in authentic classroom settings.
Email: Andrew C. Butler, andrew.butler@wustl.edu

10:00-10:15 AM (116)

The Interactive Benefits of Contextual Variation, Restudying, and Retrieval Practice for Learning. MEGAN IMUNDO, STEVEN PAN, ELIZABETH BJORK, and ROBERT BJORK, *University of California, Los Angeles* (Presented by Robert Bjork) – Students are often advised to study in one good place, but restudying in a new context can enhance subsequent recall (e.g., Smith et al., 1978). We investigated the contextual-variation advantage across multi-day retention intervals and whether benefits for testing also occur. In Experiment 1, undergraduates studied a 36-word list and 48 hours later—when back in the same or a new context – either restudied or recalled the list without feedback. After another 48 hours, all participants free-recalled the list in a new context. Experiment 2 incorporated restudy prior to testing (without feedback) or only a second restudy opportunity in Session 2. Both experiments demonstrated the contextual-variation benefit for restudying and the testing effect for same-context conditions. Testing in a new context, however, significantly reduced recall, which carried over to the final test. These findings reveal critical interactions between contextual-variation and retrieval-practice effects, which we interpret as consistent with a distribution-of-memory-strengths framework.
Email: Robert Bjork, rabjork@psych.ucla.edu

10:20-10:35 AM (117)

Degree of Learning and Linear Forgetting. JERRY FISHER and GABRIEL RADVANSKY, *University of Notre Dame* (Presented by Gabriel Radvansky) – Episodic retention often follows a negatively accelerating pattern (e.g., a power function), following Ebbinghaus's original work. However, recent work in our laboratory, as well as surveys of the literature, suggest that linear forgetting can be reliably observed. One important factor in this observation is the degree of original learning. Two experiments assessing sentence memory explored this factor, one with retrieval practice, and one with only repeated study. The results of Experiment 1 support the prediction that as the level of learning increased, there was a concomitant increase in the linearity of the pattern of retention and forgetting. The results of Experiment 2 suggest that learning by repeated study alone was insufficient to produce linear retention and forgetting. The results revealed that increased learning led to a shift toward linear forgetting. Moreover, linear forgetting emerged when retrieval practice was present during learning, but not when there were simply multiple exposures of the material. Increased levels of learning can produce linear patterns of forgetting, but only when there is increased effort from testing during learning, which may increase the representational complexity of the memory trace.
Email: Jerry Fisher, Jerry.S.Fisher.111@nd.edu

10:40-10:55 AM (118)

Testing (Quizzing) Boosts Classroom Learning: A Meta-Analysis. DAVID SHANKS, *University College London,* CHUNLIANG YANG and LIANG LUO, *Beijing Normal University,* MIGUEL VADILLO, *Universidad Autónoma de Madrid,* RONGJUN YU, *National University of Singapore* – Laboratory and classroom studies have repeatedly demonstrated that testing, by comparison with restudying and many other learning strategies (e.g., concept mapping), can more effectively consolidate long-term retention and facilitate mastery of new information, a phenomenon termed the testing effect. The current review integrated 48,582 students' data, extracted from 223 independent studies, to investigate the magnitude, boundary conditions, and cognitive underpinnings of test-enhanced learning in the classroom. The results showed that overall testing (quizzing) raised student academic achievement to a medium extent (g=0.499). The magnitude of the effect was modulated by a variety of factors, including the learning strategies in the control condition, test format consistency, material matching, provision of corrective feedback, test repetition, test administration location and timepoint, treatment

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duration, and experimental design. The documented findings support additional exposure, transfer-appropriate processing, and motivational theories of the testing effect. In addition to their significance for theory development, these results have practical significance for enhancing teaching practice and guiding education policy.
Email: David Shanks, d.shanks@ucl.ac.uk

Neural Indices of Cognition

Virtual, Saturday, 9:00 AM – 11:20 AM EST

Chaired by Andrea Halpern, *Bucknell University*

9:00-9:30 AM (119)

Invited Talk: Probabilistic Linking Functions for Mind, Brain, and Behavior. BRANDON TURNER, *The Ohio State University* – Scientists who study cognition infer underlying processes either by observing behavior (e.g., response times, percentage correct) or by observing neural activity (e.g., the BOLD response). These two types of observations have traditionally supported two separate lines of study. The first is led by cognitive modelers, who rely on behavior alone to support their computational theories. The second is led by cognitive neuroimagers, who rely on statistical models to link patterns of neural activity to experimental manipulations, often without any attempt to make a direct connection to an explicit computational theory. Recent progress has been made by forming statistical associations between manifest variables of the brain (e.g., EEG, fMRI) and manifest variables of behavior (e.g., response times, accuracy) through hierarchical latent variable models (Turner et al., 2018). Within this framework, one can make inferences about the mind in a statistically principled way, such that complex patterns of brain-behavior associations drive the inference procedure. In this talk, I will highlight the utility of this approach from a methodological perspective as well as summarize a few key applications.
Email: Brandon M. Turner, turner.826@gmail.com

9:40-9:55 AM (120)

Machine Learning Classification of Brain Activity Reveals Unique Effects of Aging Stereotypes on Cognition. IAN MCDONOUGH, *The University of Alabama,* YUNG-TSEN CHEN and DAVID GALLO, *University of Chicago* – Activation of negative aging stereotypes (stereotype threat) can impair memory in older adults but its impact can vary across individuals and even some adults in "control" groups might feel threatened. We developed a new method for investigating stereotype activation using patterns of brain activity to classify each older individual's mental state during two tasks administered during fMRI. We used machine learning to identify task-related brain patterns that differentiated the stereotype activation and control groups (on average). We then categorized untrained older adults as having a stereotype activation-pattern or control-pattern without knowing their actual group. This procedure was done for five brain networks representing different mechanisms underlying stereotype activation: self-reflection (default mode network) and executive interference (cognitive control networks). Stereotype activation signatures in cognitive control networks better predicted cognitive performance than the experimental stereotype activation category. This method provides mechanistic insights into stereotype threat and might better detect it among individuals.
Email: Ian M. McDonough, immcdonough@ua.edu

10:00-10:15 AM (121)

BOLD Activation on the Groundside of Figures: Prediction Error or Competition-induced Inhibition? MARY PETERSON, *University of Arizona,* LAURA CACCIAMANI, *California Polytechnic State University,* RACHEL SKOCYPEC and COLIN FLOWERS, *University of Arizona,* DIANA PEREZ, *Northwestern University* – Previously, BOLD activation in early visual area ROIs corresponding to the apparently shapeless grounds of novel figures was lower when familiar vs novel configurations were suggested on the groundside (N_{FAM} vs N_{NOV} stimuli). No differences were observed in figure ROIs. This finding could manifest greater inhibition because grounds suggesting familiar objects competed more for figural status or lower error for predictions from high-level representations for objects suggested on the groundside of N_{FAM} than N_{NOV} stimuli. To differentiate these accounts, here we compared BOLD activation for grounds of N_{FAM} and N_{NOV} stimuli to straight-edge (SE) stimuli that suggest only SE objects on both sides. On inhibition accounts, activation should be highest for SE grounds because inhibition is low; on prediction error accounts, activation should be lowest for SE grounds because prediction error is low. On both accounts, activation should be lower for N_{FAM} than N_{NOV} grounds, as previously observed. BOLD activation in V2 - V4 favored the prediction error account. Granger causality analysis revealed greater directed connectivity from perirhinal cortex to V2 for N_{FAM} grounds than for other grounds, consistent with backward projections to V2.
Email: Mary A. Peterson, mapeters@arizona.edu

10:20-10:35 AM (122)

Non-Invasive Brain Stimulation of Right Dorso-Lateral Prefrontal Cortex Enhances Cognitive Reflection Performance. VOLKER THOMA, *University of East London* – Transcranial direct current stimulation (tDCS) was used to investigate whether stimulating the left or right dorso-lateral pre-frontal cortex (DLPFC) compared to a sham group modulated performance on a number of judgment and thinking tasks. In Experiment 1 there were three tasks: vignettes assessing heuristic thinking, logic syllogisms, and the cognitive reflection test (CRT). Results showed that anodal tDCS to the right DLPFC was associated with an increase in cognitive reflection performance compared to performance after left DLPFC and to sham (n = 18 in each group) stimulation. Syllogistic thinking performance was reduced compared to sham following anodal tDCS to the left DLPFC. A second experiment focusing on the right DLPFC confirmed the results from Experiment 1, and further showed that once repeated stimulation also increased performance in the CRT (compared to repeated stimulation plus sham). Individual differences in cognitive ability and thinking style cannot account for these findings, which are broadly consistent with a dual process framework of thinking. The results demonstrate the causal involvement of the right DLPFC in cognitive reflection and suggest the possibility of improving judgment performance through tDCS.
Email: Volker Thoma, v.thoma@uel.ac.uk

10:40-10:55 AM (123)

Predicting Imagined from Heard Pitch Class Using fMRI Decoding. ANDREA HALPERN, *Bucknell University,* LLOYD MAY and MICHAEL

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CASEY, *Dartmouth College* – An important high-order relationship in music is the hierarchical scale system: different notes in a given scale (pitch class) convey degrees of stability in a tune. Prior work showed that these relationships can be extracted even during imagined music. We investigated whether the neural pattern associated with pitch class of a heard note could predict the pattern when the note was merely imagined. We presented musicians with the beginning of a scale (key and timbre were varied). The next note in the scale was either heard or imagined. A probe tone task assessed adherence to the tonal hierarchy and state vividness measures were included as predictors. Multivoxel classification yielded significant results in multiple regions, including left pars triangularis for both heard and imagined conditions and right pars triangularis for both imagined and heard-to-imagined cross-decoding conditions, implicating right inferior frontal areas (IFG) in the processing of imagined pitch class. Decoding in IFG was more successful in people reporting more vivid trait auditory imagery and in inferior parietal lobe among people with more differentiated tonal profiles. These results point to the neural specificity of imagined auditory experiences.
Email: Andrea R. Halpern, ahalpern@bucknell.edu

11:00-11:15 AM (124)

Brain Network Reconfiguration at Event Boundaries. MATTHEW BEZDEK, *Washington University in St. Louis,* RICHARD BETZELl and OLAF SPORNS, *Indiana University,* AARON BOBICK and JEFFREY ZACKS (2020 Mid-Career Award Recipient), *Washington University in St. Louis* (Presented by Jeffrey Zacks) – Continuous experiences are segmented into discrete events and cognitive and neurobiological processes happen at the boundaries between events. Co-fluctuations between brain regions show transient spikes—moments at which more brain region pairs are changing activation together—and during movie viewing their timing is entrained across participants (Esfahlani et al., 2020). We reanalyzed an existing fMRI dataset (Kurby & Zacks, 2018) to investigate the relationship between event model updating and edge connectivity. During fMRI scanning, participants watched videos of actors performing everyday activities. Later, they re-watched the videos and marked event boundaries at coarse and fine timescales. Total co-fluctuation amplitude increased around coarse event boundaries, with larger effects for young adults than older adults. These results suggest that event model updating is associated with large-scale reconfiguration of functional brain connectivity. Understanding age differences in these mechanisms may offer new insights into age-related neural and cognitive differences.
Email: Jeffrey M. Zacks, jzacks@wustl.edu

Attention and Cognitive Control

Virtual, Saturday, 9:00-11:00 AM EST

Chaired by Eva Van den Bussche, *KU Leuven*

9:00-9:15 AM (125)

The Effect of Cognitive Effort on the Sense of Agency. EVA VAN DEN BUSSCHE, MARYNA ALVES, and YANNICK MURRAY, *KU Leuven* GETHIN HUGHES, *University of Essex* – While we are performing a demanding cognitive task, not only do we have a sense of cognitive effort, we are also subjectively aware that we are initiating, executing and controlling our thoughts and actions (i.e., sense of agency). Previous studies have shown that cognitive effort can be both detrimental and facilitative for the experienced sense of agency. We hypothesized that the reason for these contradictory findings might lie in the use of differential time windows in which cognitive effort operates. The current study therefore examined the effect of cognitive effort exerted on the current trial, on the previous trial or across a block of trials on sense of agency, using implicit (Experiment 1) and explicit (Experiment 2) measures of sense of agency. We showed that the exertion of more cognitive control on current trials led to a higher explicit sense of agency. This surprising result is contrasted to previous studies to establish potential reasons for this surprising finding and to formulate recommendations for future studies.
Email: Eva Van den Bussche, eva.vandenbussche@kuleuven.be

9:20-9:35 AM (126)

Salient Distractors Can Trigger Early Quitting in Visual Search. JEFF MOHER, *Connecticut College* – Perceptually salient objects can, in some cases, capture attention. The vast majority of research investigating attention capture has employed tasks in which a target is always present. However, sometimes we search for a target that may or may not be there – such as when a doctor looks through a medical image for signs of cancer. Here, we examined the impact of a salient distractor in a visual search task where participants had to indicate whether or not a target was present on each trial. Across three experiments, on target present trials, response times (RTs) were longer when a salient distractor was present than when no distractor was present, replicating the previous literature. However, the opposite pattern emerged on target absent trials: RTs were shorter when a salient distractor was present. Furthermore, miss errors were greater on distractor present trials, likely reflecting a cost associated with the earlier termination of the search process. Together, these results suggest the possibility that salient distractors may produce a novel secondary effect beyond attentional capture – salient distractors may trigger early quitting in visual search.
Email: Jeff Moher, jmoher@conncoll.edu

9:40-9:55 AM (127)

Talking Matters – On the Influence of Habitual and Instructed Inner Speech on the Performance in Conflict Tasks. MARKO PAELECKE, *Julius-Maximilians-Universität Würzburg,* MIRIAM GADE, *Medical School Berlin* – We recently found that habitual use of evaluative and motivational inner speech predicts reduced interference effects in the Simon and the arrow flanker task, over and above working memory capacity as well as intelligence (Gade & Paelecke, 2019). The present study aims to probe the causal relation between instructed inner speech and cognitive control. Following trait questionnaires on inner speech use and autism participants worked through a flanker, a Simon and a switching task as well as IQ tests. Task instructions were varied between participants: In the Simon and flanker task, participants were instructed to silently verbalize the stimuli or the required response or to not verbalize (control condition). In the switching task, participants were instructed to verbalize the cued task or to not verbalize. For elicited inner speech, we found that participants in the task-related verbalization conditions had reduced interference in the flanker task, compared to the control condition.
Email: Marko Paelecke, marko.paelecke@uni-wuerzburg.de

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10:00-10:15 AM (128)

Task Sets Serve as Boundaries for the Congruency Sequence Effect Even in Purely Visual Tasks. LAUREN GRANT and DANIEL WEISSMAN, *University of Michigan* (Presented by Daniel Weissman) – In cross-modal distractor-interference tasks, changing the sensory modality across trials reduces the congruency sequence effect (CSE) – a popular measure of adaptive control – only when the new sensory modality is associated with a different task set. However, it is unclear whether such task set boundaries generalize to the purely visual distractor-interference tasks that researchers typically use to investigate adaptive control. To test this hypothesis, we used a visual task wherein the stimulus format (color word or color patch) of the distractor and target varies across trials. Critically, the task structure allowed (Experiment 1) or did not allow (Experiment 2) participants to create format-specific task sets. Conceptually replicating prior findings from cross-modal tasks, changing the stimulus format reduced the CSE only when the task structure allowed the creation of format-specific task sets. We conclude that task sets serve as boundaries for the CSE even in purely visual tasks.
Email: Lauren D. Grant, ldgran@umich.edu

10:20-10:35 AM (129)

The Association Between Attentional Effort and Frequency-Band Power of Pupillary Oscillations. BENNETT BERTENTHAL, GREGORY LEWIS, ALEX ALEXEEV, and SHAWN FAGAN, *Indiana University Bloomington* – Pupil diameter is a widely studied index of attentional effort and arousal, but it is difficult to reliably measure with naturalistic stimuli because of numerous methodological limitations, especially its sensitivity to luminance differences. As an alternative, we propose a measure derived from small-scale fluctuations in pupil diameter involving both sympathetic excitation and parasympathetic inhibition. These oscillations reflect dynamic CNS changes that underlie human cognition, yet they are rarely measured. In this talk, we demonstrate some of the advantages of measuring pupillary oscillations while viewing naturalistic stimuli in a change detection task using a flicker paradigm. Respiratory sinus arrhythmia (RSA) was recorded as a converging measure. The results reveal significant frequency-dependent (.06 -.10, .12 - .40, and .80 – 1.50 Hz corresponding to blood pressure, RSA, and heart rate) differences in pupillary oscillations as a function of response time while controlling for luminance and stimulus presentation time differences.
Email: Bennett I. Bertenthal, bbertent@indiana.edu

10:40-10:55 AM (130)

Age Doesn't Matter, But Speech Rate Does: A Longitudinal Corpus Study of Disfluencies. ELEONORA BEIER, SUPHASIREE CHANTAVARIN, and FERNANDA FERREIRA, *University of California, Davis* (Presented by Fernanda Ferreira) – Age-related cognitive decline may cause older adults to produce more speech disfluencies than younger adults; however, the evidence is mixed. In this study, we investigated how disfluencies (filled pauses, repeats, and repairs) and other aspects of language production vary with age through a longitudinal corpus study of conversational speech. Analyses from publicly available interviews of 91 individuals showed that disfluency rate did not significantly increase with age, contrary to our hypothesis. However, speech became slower with age, and slower speech was associated with more filled pauses. Additionally, disfluency rate was associated with average content word frequency, sentence length, and lexical diversity. Overall, our findings highlight that disfluency rate is not directly predicted by age, but rather by other relevant characteristics of language production. This work is significant as one of the few "longitudinal" studies of the effects of age on important aspects of language production.
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Psycholinguistics

Virtual, Saturday, 9:00-11:00 AM EST

Chaired by Daniel King, *Northwestern University*

9:00-9:15 AM (131)

How are Verb Metaphors Processed. DANIEL KING, DEDRE GENTNER, and KEN FORBUS, *Northwestern University* (Presented by Dedre Gentner) – How does one understand a sentence like "The wagon pranced"? Unlike noun metaphor, there has been little research on verb metaphor—even though verb metaphor appears more common (Jamrozik et al., 2013). Our research aims to characterize the processes underlying verb metaphor. Study 1 found evidence that verbs' greater propensity to change meaning compared to nouns (verb mutability; Gentner & France, 1988) derives from online meaning adjustment, and not from sense selection, despite their greater polysemy. Study 2 found that verb metaphor follows a pattern of minimal subtraction: verbs extend metaphorically in a graduated manner, with domain-specific aspects being adjusted before abstract relational structure. In Study 3, we modeled these findings as a structure-mapping process between the verb and an event structure saliently associated with the noun. This model produces interpretations that pattern with the above behavioral findings, suggesting that structure-mapping may provide a viable process account of verb metaphor.
Email: Daniel King, DanielKing2022@u.northwestern.edu

9:20-9:35 AM (132)

What Can We Learn about Lexical Ambiguity from Natural Language Processing Models? BENEDETTA CEVOLI, CHRIS WATKINS, YANG GAO, and KATHLEEN RASTLE, *Royal Holloway, University of London* (Presented by Kathleen Rastle) – There has been substantial interest in using natural language processing models to characterise the distribution of word meaning. We investigated whether it is possible to describe lexical ambiguity in a continuous manner using the LSA-based measure of semantic diversity proposed by Hoffman, Lambon Ralph, and Rogers (2013). To our surprise, analyses revealed that ambiguous words are no more diverse on this measure than non-ambiguous words. Further analyses suggested that the reason for this is that LSA-based contextual representations do not appear to capture the multiple meanings of ambiguous words; rather they capture general information about the topics and types of written material in which words occur. We conclude by exploring the representation of word meaning in BERT, a next-generation natural language processing model. We show that it is possible within this model not only to capture the multiple meanings that characterise ambiguous words, but also to observe more fine-grained distinctions present in written language. These analyses offer intriguing new insights

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into our understanding of the phenomenon of lexical ambiguity and its cognitive consequences.
Email: Kathleen Rastle, kathy.rastle@rhul.ac.uk

9:40-9:55 AM (133)

Power Simulations for Linguistic Norm Data Collection. ERIN BUCHANAN, *Harrisburg University of Science and Technology,* K. VALENTINE, *Massachusetts General Hospital,* NICHOLAS MAXWELL, *University of Southern Mississippi,* JACK TAYLOR, *University of Glasgow,* MARIA MONTEFINESE, *University of Padova* – The current focus on replication and reproducibility has driven a need to adequately power studies through appropriate sample size planning. However, estimating power and sample size is usually driven by the choice of hypothesis test and research design. An incredible number of psycholinguistic database norms have been published in the last ten years, and the issues of power and sample size have largely been ignored, as these studies do not use hypothesis testing as a main objective. This presentation will discuss how to use accuracy in parameter estimation (AIPE) and qualitative coverage approaches to determine the appropriate number of participants for data collection in a study with no hypothesis test. Data from English feature production norms, the English Lexicon Project, and participant ratings (i.e., valence, concreteness, etc.) will be used to demonstrate how to estimate variable sample sizes by item for both qualitative (feature production norms) and quantitative (priming, lexical decision tasks, judgment tasks) type data.
Email: Erin M. Buchanan, ebuchanan@harrisburgu.edu

10:00-10:15 AM (134)

Intensive Programming Experience Shapes Linguistic Behaviour. OLESSIA JOURAVLEV, VEGAS HODGINS, and JAY JENNINGS, *Carleton University* – Though programming and natural languages have many attributes in common, there are some features in programming languages that are not found in natural languages. One such feature is the use of variables, wherein a variable can have any single value assigned to it. Due to frequent reassignment of values to variables in a programming language, the link between form and what it refers to at any given moment is loosened. In a natural language, on the other hand, the link between wordform and what it refers to is fixed. We examined whether flexibility of form-value association in a programming language changes how programmers deal with such associations in a natural language. To this end, programmers and non-programmers completed a semantic plausibility task. The critical stimuli were semantically implausible sentences (e.g., "John planted the cat") that could be made plausible if you discard the original meaning and assign a new one to this wordform (e.g., cat = "lettuce"). Programmers were faster in their responses to critical stimuli compared to non-programmers, suggesting that it was easier for them to discard an existing form-meaning connection and assign a new meaning to the wordform. Thus, programming impacts natural language.
Email: Olessia Jouravlev, olessiaj@mit.edu

10:20-10:35 AM (135)

"Where Are the...Fixations?": Listeners Use Grammatical Number Cues to Anticipate Upcoming Referents and Reduce Lexical Search Space. VIOLET BROWN, *Washington University in St. Louis,* NEAL FOX, *Crystal Springs Uplands School,* JULIA STRAND, *Carleton College* (Presented by Julia Strand) – Listeners make use of contextual cues during continuous speech processing that help overcome the limitations of the acoustic input. These contextual cues may be used to predict upcoming words and/or reduce the lexical search space by inhibiting activation of contextually inappropriate cohort competitors. The current eye tracking study used the visual world paradigm to assess how listeners use cues about grammatical number during sentence processing by presenting singular or plural nouns in carrier phrases that were numerically unconstrained ("Click on the…") or constrained ("Where is/are the…"). Results showed that listeners used the numerical context to both anticipate upcoming words and constrain activation of contextually inappropriate cohort competitors, but activation of the competitors remained above the level of the distractors in the constraining context. These results suggest that listeners rapidly and flexibly make use of contextual cues about grammatical number but maintain sensitivity to the bottom-up input.
Email: Julia Strand, jstrand@carleton.edu

10:40-10:55 AM (136)

Towards a Comprehensive Model of Chinese Reading. YANPING LIU, *Sun Yet-sen University,* ERIK REICHLE and LILI YU, *Macquarie University* (Presented by Erik Reichle) – The Chinese writing system is unique in that individual words are comprised of sequences of 1-4 uniformly sized characters, without blank spaces to demarcate word boundaries. These features raise the question of how skilled readers of Chinese are able to efficiently segment continuous strings of characters (located in the parafovea) into words for the purposes of their identification and eye-movement control? Here we present the results of a simulation 'experiment' in which two saccade-targeting assumptions (i.e., default targeting of parafoveally segmented words vs. dynamic adjustment of saccade length) were factorially crossed with two word-segmentation heuristics (i.e., word segmentation-identification vs. familiarity-based segmentation) to determine which combination of assumptions provides the best quantitative account of eye movements during the reading of Chinese. We then integrate the best of these theoretical assumptions to provide a novel, comprehensive account of word segmentation and eye-movement control in Chinese reading.
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Metacognition and Metamemory

Virtual, Saturday, 9:00-11:00 AM EST

Chaired by Janet Metcalfe, *Columbia University*

9:00-9:15 AM (137)

Epistemic Curiosity: A Metacognitive Framework. JANET METCALFE, *Columbia University,* BENNETT SCHWARTZ, *Florida International University,* TEAL EICH, *University of Southern California* – A framework for understanding epistemic curiosity as a metacognitive feeling state related to the individual's Region of Proximal Learning (RPL) is proposed. First, we detail the processes, conditions, and outcomes within the RPL framework that are conjectured to be related to curiosity. Then, we will contrast alternative proposals to the RPL framework. Finally, several lines of evidence will be reviewed that are relevant to distinguishing among models of curiosity. In particular, we will discuss (1) differences in the conditions under which experts and novices mind

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wander, (2) experiments investigating people's choices of whether to study materials for which they have high versus low feelings of knowing, (3) results related to people's engagement with corrections to errors made with high confidence, and (4) curiosity, attention, and learning data related to the tip-of-the-tongue state.
Email: Janet Metcalfe, jm348@columbia.edu

9:20-9:35 AM (138)

Meta-Cognitive Accuracy Is Enhanced in Temporally Controlled (Compared to Free) Decisions. DAVID MITRANI-ROSENBAUM and MOSHE GLICKMAN, *Tel-Aviv University,* STEVE FLEMING, *University College London,* MARIUS USHER, *Tel-Aviv University,* (Presented by Marius Usher) – Integration-to-boundary is an optimal decision algorithm that takes samples of evidence until the posterior reaches a decision boundary, resulting in the fastest decisions for a target accuracy. For example, integration-to-boundary achieves faster mean-RT compared with taking a fixed number of samples that result in the same accuracy. Here we show that this advantage comes at a cost in meta-cognitive accuracy. We show that integration-to-boundary results in less variability of the evidence-integration and is less predictive of choice accuracy (confidence-resolution). We test this in two experiments, in which participants carried out two sessions that manipulated the response-mode: free-response (evidence terminated by the subject response) vs interrogation (fixed number of evidence samples presented, which is the same as in the free-response session). In both sessions the participants observe a sequence of evidence frames (2/sec) and they first enter a choice and then a confidence response. As predicted, the latter enhances meta-cognitive accuracy.
Email: Marius Usher, marius@post.tau.ac.il

9:40-9:55 AM (139)

Mindset Effects on Effort Regulation While Solving Problems. RAKEFET ACKERMAN and LIAT LEVONTIN, *Technion – Israel Institute of Technology* – Meta-reasoning research deals with regulating mental effort investment while facing thinking challenges. We examined whether people's situational mindset, or belief, regarding the potential of solving challenging problems to improve their intelligence affects their solving attempts. We primed online samples from the general public with a growth mindset, believing that intellectual challenges are beneficial for their intelligence, or fixed mindset, believing that intelligence cannot be changed by intellectual challenges. Growth mindset led to longer solving of the easier items in a set of multiple-choice analogies (Experiment 1) and focus on intermediate confidence items when facing open-ended compound remote associates (CRA, Experiment 2). In Experiment 3, we turned to a population of undergraduates, in which participants had a stronger inherent tendency towards a growth mindset relative to the online sample, and manipulated their mindset. Here, participants primed with fixed mindset cut down the time they invested in the most challenging CRAs. Overall, we found the combination of both inherent and situational mindsets to affect effort regulation. We discuss implications on models of effort regulation and their applications.
Email: Rakefet Ackerman, ackerman@ie.technion.ac.il

10:00-10:15 AM (140)

Manipulating Beliefs Can Result in Metacognitive Illusions. AIMEE CALLENDER, *Wheaton College (IL),* ANDREW ROBERTS, *Texas State University* – Metacognitive illusions occur when perceptual factors result in JOLs that are higher than actual performance. This type of illusion has been found when a key term is printed in a bigger or bolded font within a text passage of smaller/non-bolded font, and is judged as more likely to be remembered than other key terms that are not bolded (Roberts & Callender, 2014). One theory suggests that perceptual fluency leads to this illusion, whereas another theory states that beliefs about bolded text result in the inflated JOLs. In this 2 (belief: bold improves understanding vs. bold does not improve understanding) X 2 (font: bold vs. standard) mixed design, 66 participants read 12 passages and made key term judgments about 48 terms. Half of the terms were bolded and half of the terms were in a standard font. Analyses show a crossover interaction between belief and font, with those who were told bold font improves performance producing higher JOLs on the bold terms than those who were told that bold font does not improve performance. When they were told that bold font is not helpful, JOLs were higher for the terms in standard font than bold font. This shows that beliefs may influence JOLs when bolded terms are in text.
Email: Aimee Callender, aimee.callender@wheaton.edu

10:20-10:35 AM (141)

Understanding Judgments of Learning from the Remember-Know Procedure. YOONHEE JANG, *University of Montana* – Using the remember-know procedure, the present study investigated whether both immediate and delayed judgments of learning (JOLs), or either of them, are linked to recollection only, or both recollection and familiarity. Prior research yielded inconclusive results for immediate JOLs, and little has been known about delayed JOLs from the remember-know procedure. A series of experiments revealed three findings of importance. First, in both JOL conditions, high-, medium-, and low-valued JOL ratings were assigned to items that received a remember, know/familiar, and no-memory/guess judgment at test, respectively. However, the effects were smaller for immediate JOLs. Second, both immediate and delayed JOLs were made slowly for items that received a know/familiar response, as compared to items that received a remember response. However, the effect was larger for delayed JOLs. Finally, in both JOL conditions, there was no evidence that the relative accuracy of JOLs increased when memory performance was exclusively defined as recollected items. These findings suggest that immediate and delayed JOLs are linked to both recollection and familiarity, but the contribution of recollection increases for delayed JOLs.
Email: Yoonhee Jang, yoonhee.jang@umontana.edu

10:40-10:55 AM (142)

Old≠Not-New and New≠Not-Old. C. J. BRAINERD, M. CHANG, and D. BIALER, *Cornell University* – Judging that test items are old is logically equivalent to judging that they are not-new, and judging that test items are new is logically equivalent to judging that they are not-old. However, certain theories forecast that neither of these logical equivalences are true empirically. In 6 experiments in which Old? and New? probes were factorially crossed with old and new test items, that prediction proved to be correct; memory never displayed these equivalences. The general rule that emerged was that it is easier to recognize a reality state that an item does not belong to (e.g., "old" for new items) than its actual state.

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This rule always held for new items, regardless of whether Old? and New? probes were varied within or between subjects. For old items, it held when these probes were varied within-subjects. False memory items (new-but-similar-to-old) followed this rule in some experiments but not in others.
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Visual Working Memory

Virtual, Saturday, 10:00 AM-12:00 PM EST

Chaired by Timothy Brady, *University of California, San Diego*

10:00-10:30 AM (143)

Invited Talk: The Role of Meaning in Visual Working Memory Capacity. TIMOTHY BRADY, *University of California, San Diego,* VIOLA STÖRMER, *University of California, San Diego & Dartmouth College* – Most visual working memory studies present many single-feature objects simultaneously for a brief duration. But is there any ecological validity to this approach, or does it promote the use of mechanisms that are of little use in the real-world? Here we show that (1) regardless of encoding strategy, there is a large benefit for meaningful stimuli in visual working memory, showing a major capacity difference between simple features and real-world objects; (2) both real-world objects and perceptually-matched less-meaningful objects benefit from deeper, item-based processing, afforded by sequential attention to each one, but memory for single-featured objects is actively impaired by such an encoding strategy. Our results suggest single feature objects are an outlier in their affordance of feature-based parallel processing, and that in more realistic memory situations, visual working memory relies upon rich representations resulting from in-depth processing of objects (e.g., in higher-level visual areas).
Email: Timothy Brady, timbrady@ucsd.edu

10:40-10:55 AM (144)

Testing the Underlying Processes Leading to Learned Distractor Rejection: Learned Oculomotor Avoidance. BRAD STILWELL and SHAUN VECERA, *University of Iowa* – Visual attention is guided toward behaviorally-relevant objects by target "templates" stored in visual memory. Visual attention also is guided away from nontarget distractors by learned distractor rejection. Further, target template guidance and learned distractor rejection can occur simultaneously to further increase search efficiency. However, the underlying processes guiding learned distractor rejection are unknown. In a series of three visual search experiments employing eye-tracking, we tested between two plausible alternative processes. Participants performed a visual search in two-color, spatially unsegregated displays where we manipulated attentional guidance by both target templates and consistent nontarget distractors. We observed fewer distractor fixations (including the first eye-movement) and shorter distractor dwell times. Observers seem to adopt an attentional control setting to avoid distraction whenever possible and recover from distraction by rapidly disengaging – a pattern we term "learned oculomotor avoidance." Theories of visual attention should incorporate guidance by both target templates and learned nontargets.
Email: Brad T. Stilwell, brad.t.stilwell@gmail.com

11:00-11:15 AM (145)

Spatial Organization in Self-Initiated Visual Working Memory. HAGIT MAGEN, *The Hebrew University of Jerusalem,* TATIANA ALOI EMMANOUIL, *Baruch College, CUNY, & The Graduate Center, CUNY* – In everyday life, people often memorize information they constructed themselves, an aspect of memory we termed self-initiated (SI) working memory (WM). Here we explored the spatial structure of SI visual WM representations, when space was task irrelevant. Participants were presented with an array of 12 visual targets, from which they selected 1-7 targets they wished to memorize. During test, a single probe appeared at the screen center, and therefore the spatial locations of the targets were irrelevant for task performance. The results demonstrated that although space was irrelevant, during encoding participants constructed spatially structured configurations. When asked to construct configurations for a hypothetical competitor in a memory contest, participants disrupted the configurations' spatial structure. Nevertheless, participants' verbal descriptions of the strategies they used to select the visual targets focused on non-spatial strategies. This finding suggests that the spatial structure of the constructed configurations was implicit to some extent. From a broader perspective, SI WM is an aspect of cognitive offloading, showing how individuals actively structure their surroundings to benefit memory performance.
Email: Hagit Magen, msmagen@mail.huji.ac.il

11:20-11:35 AM (146)

The Locus of Proactive Interference in Visual Working Memory. ROY SHOVAL and TAL MAKOVSKI, *The Open University of Israel* – Recent studies showed that Proactive Interference (PI) impairs Visual Working Memory (VWM), as performance is worse when the memory items are repeated rather than unique throughout the experiment. To scrutinize the mechanisms driving this effect, we tested how it affects the memory stages of encoding, retention, and retrieval. Experiment 1 found that, when response time was emphasized, responses were slower in the repeated than the unique condition, suggesting memory source confusion during testing. Experiment 2 showed that a retention interval manipulation did not affect the magnitude of the PI effect. Finally, Experiment 3 found that the PI effect did not increase when the encoding interval was short, rather performance was better in the repeated condition, probably because the increased familiarity with the memory items facilitated consolidation. These results suggest that the locus of PI in VWM is during testing, thereby supporting the involvement of episodic long-term memory in the effect.
Email: Roy Shoval, rshoval@gmail.com

11:40-11:55 AM (147)

No Evidence that Negative Emotion Boosts Visual Working Memory Precision. ALESSANDRA SOUZA, THERESA THALER, and DANIEL SKODA, *University of Zurich,* HEINRICH LIESEFELD, *Ludwig-Maximilians-Universität München,* FLÁVIA SANTOS, *University College Dublin,* DÉBORA PEIXOTO and PEDRO ALBUQUERQUE, *University of Minho* – Two recent studies reported that negative emotion boosted visual working memory precision. Here we attempted and failed to replicate these findings across eight studies conducted in four countries. Emotion was induced by (a) presenting emotional images (negative, neutral, and positive) before each trial of

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a visual working memory task (5 experiments), (b) the images were combined with emotional music during a 3-minute induction phase (1 experiment) or (c) emotional video-clips were shown (2 experiments) prior to the memory task. Participants stored (emotionally neutral) continuously varying colored dots or oriented triangles for a continuous reproduction test. Although self-reported emotion tracked the valence manipulations, seven experiments showed substantial evidence against changes in visual working memory precision (and number) under the negative (and positive) emotion in comparison to the neutral one; whereas one condition, in one study, showed increased precision under both negative and positive emotion compared to neutral. These results challenge the view that emotion modulates visual working memory.
Email: Alessandra S. Souza, a.souza@psychologie.uzh.ch

11:40-11:55 AM (148)

How Visual Working Memory Solves the Binding Problem: Evidence for Simultaneous and Sequential Encoding Stages. KLAUS OBERAUER, University of Zurich, PETER SHEPHERDSON, University of Zurich & University of Akureyri, LORENA HELL, University of Zurich – How does working memory know which features belong to the same object? One way to solve this binding problem, used in some computational models, is by rapid Hebbian association of each object's features. This requires sequential encoding of objects. Yet, there is evidence that arrays of visual objects are encoded in parallel. We propose a two-stage model of encoding arrays into working memory: The first, parallel stage creates spatial feature maps that implicitly assign features in the same location to the same object. The second, sequential stage reads out features from corresponding map locations and binds them through Hebbian learning. We tested a prediction from this model: Feature conjunctions can be encoded in parallel for objects separated in space, but require sequential encoding for spatially overlapping objects. Participants saw two color-orientation conjunctions simultaneously or one by one for 80 ms, in separate or overlapping locations. At test they were given one feature and had to reproduce the other. For overlapping, but not for spatially separate objects, performance was poorer with simultaneous than sequential presentation. This impairment was exclusively due to misbinding errors.
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Long-Term Memory Failures

Virtual, Saturday, 10:00 AM-12:00 PM EST

Chaired by Steve Janssen, *University of Nottingham Malaysia*

10:00-10:30 AM (149)

Invited Talk: Forgetting Across a Hierarchy of Episodic Representations. AIDAN HORNER (2020 Early Career Award Recipient) and NORA ANDERMANE, *University of York,* BARDUR JOENSEN, *University College London* – Rich episodic experiences are represented in a hierarchical manner across a diverse network of brain regions, and as such, the way in which episodes are forgotten is likely to be similarly diverse. Recent research has used measures of "retrieval dependency" to assess whether episodic representations fragment over time or are instead forgotten in a more holistic manner. This research has suggested that item-based representations, such as ones related to the colour and shape of an object, fragment over time, whereas higher-order event-based representations may be forgotten in a more holistic uniform manner. We propose a framework that attempts to reconcile these findings, where complex episodes are represented in a hierarchical manner across different brain regions and forgetting is underpinned by different neural mechanisms at each level in the hierarchy.
Email: Aidan J. Horner, aidan.horner@york.ac.uk

10:40-10:55 AM (150)

Replicating Remembering Remembering. STEVE JANSSEN, KRISTINE ANTHONY, MARYBETH CHANG, E-LUAN CHOONG, and JING YI NEOH, *University of Nottingham Malaysia,* ALFRED LIM, *Nanyang Technological University* – To examine the influence of context on remembering 'remembering', Arnold and Lindsay (2002) designed an experiment in which subjects first learned 108 words given in context sentences. In Test 1, they completed 72 words given either in the same or a different sentence; the remaining 36 words were not tested. In Test 2, subjects completed the 108 words, all given in the original sentences, but also indicated whether they had seen the word in Test 1. Of the words correctly completed in both tests, subjects indicated correctly that they had seen 93% of the words when they were presented in the same context but only 63% of the words when they were presented in a different context. With these results, Arnold and Lindsay showed people have difficulties remembering "remembering" when the memory had previously been recalled in a different context. In the present study, we replicated the results of Arnold and Lindsay using the same neutral context sentences. In addition, we also extended the experimental design by also using positive and negative context sentences. In all conditions, recall of prior remembering was better when the prior context was the same as the current context compared to when the prior context was different.
Email: Steve Janssen, steve.janssen@nottingham.edu.my

11:00-11:15 AM (151)

Comparison of an Individual's Waking-Life and Dream Social Networks. RICHARD SCHWEICKERT and HYE JOO HAN, *Purdue University* – An individual's cognitive social network is the memory of people and their relations. The individual draws on it when deliberately recalling his or her social network and when spontaneously generating people in dreams. We compared social networks produced by a woman in each way. Our participant responded to a questionnaire about relations between the major people in her waking life. A waking-life social was made by linking two people if they knew each other. A dream social network was made from a series of her dream reports by linking two people if they occurred in a dream together. People central in one network tended to be central in the other. A major difference is that two linked people tended to have a similar number of other links in the waking-life network, but not in the dream network. During dreaming remote associations in the cognitive social network are followed.
Email: Richard Schweickert, schweick@purdue.edu

11:20-11:35 AM (152)

Understanding Memory for WHERE using Smartphone Data. SIMON DENNIS, ELIZABETH LALIBERTE, HYUNGWOOK YIM, and BEN STONE, *University of Melbourne* – In 1984, Ronald Cotton was convicted for rape and burglary. He was sentenced to life plus 50 years. In 1995, he was released having served over 10 years in prison. When Cotton was

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interrogated, he provided a false alibi. Rather than report where he had been at the time of the crime, Cotton recalled where he had been the week before. A primary challenge for alibi generation research is establishing the ground truth of the real-world events of interest. We used a smartphone app to record data on participants (N=57) for a month prior to a memory test. The app captured their accelerometry, GPS location, and sound environment every ten minutes. After a week retention interval, we presented participants with a series of trials which asked them to identify where they were at a given time from among four alternatives. Participants were incorrect 36% of the time (SD=16%). The Cotton example suggests that participants might confuse days across weeks, and we found strong evidence of this kind of error. In addition, people often confused weeks in general and also hours across days. Similarity of location induced more errors than similarity of sound environments or movement types.
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11:40-11:55 AM (153)

A Post-Encoding Pre-Production Reinstatement (PEPPR) Model of Dual-List Free Recall. M. KARL HEALEY, *Michigan State University,* CHRISTOPHER WAHLHEIM, *University of North Carolina at Greensboro* – Accessing non-recent events, as is required in list-before-last recall, is a challenge for subjects and many models of episodic memory. Here, we introduce a new model of list-before-last recall that integrates theories of pre-retrieval cue specification from the metacognitive literature with the Context Maintenance and Retrieval model from the modeling literature. The model uses a context cue that provides direct access to the list-before-last (we call this Post-Encoding Pre-Production Reinstatement, or PEPPR). Unlike competing models, this model predicts that few, if any, recent items will be covertly produced before a list-before-last item is output. We tested this prediction against data from an externalized free recall version of a dual-list paradigm in which subjects reported every item that came to mind and endorsed only items from the first list. A series of simulations show that the PEPPR mechanism is required to accurately predict covert and overt recall.
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Attention and Visual Search II

Virtual, Saturday, 10:00 AM-12:00 PM EST

Chaired by Nancy Carlisle, *Lehigh University*

10:00-10:15 AM (154)

Current Views on Templates for Rejection. NANCY CARLISLE, *Lehigh University* – We know that attention can be guided both by the salience of items in our environment, as well as by attentional control related to our current goals. But how flexible is this attentional control system? In this talk, I will review work from my lab using behavior and event-related potentials to examine the flexibility of attentional control to different task demands. This research has demonstrated that we are able to reap behavioral benefits from knowing what NOT to look for during a visual search task by utilizing negative templates or templates for rejection. Overall, this research suggests that there is extreme flexibility in our attentional control system. Given this extreme flexibility, it may be best to conceptualize attentional control like a dial that can be turned up to enhance certain features or turned down to ignore irrelevant features.
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10:20-10:35 AM (155)

Onset Primacy in Visual Change Detection: An ERP Study. JENNIFER VAN PELT and BENJAMIN LOWE, *Queensland University of Technology,* JONATHAN ROBINSON, *Monash University,* MARIA DONALDSON, *Cleveland State University,* PATRICK JOHNSTON and NAOHIDE YAMAMOTO, *Queensland University of Technology* (Presented by Naohide Yamamoto) – Onset primacy is a behavioral phenomenon whereby humans identify the appearance of an object (onset) with greater efficiency than other kinds of visual change, such as the disappearance of an object (offset). The default mode hypothesis explains this phenomenon by postulating that the attentional system is optimized for onset detection in its initial state. The present study extended this hypothesis by measuring the amount of processing resources available to onset and offset detection, which was indexed by the amplitude of the P300 event-related potential (ERP). In an experiment, participants indicated the locations of onsets and offsets under the condition in which they occurred equally often in the same locations across trials. Although there was no reason to prioritize detecting one type of change over the other, onsets were detected more quickly than offsets, and onsets evoked a larger P300 than offsets. These results suggest that processing resources are preferentially allocated to onset detection. This biased allocation may be one of the bases on which the attentional system defaults to the "onset detection" mode.
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10:40-10:55 AM (156)

Memory Effects in Hybrid Foraging Over the Lifespan. BEATRIZ GIL-GÓMEZ DE LIAÑO, *Brigham and Women's Hospital, Harvard Medical School, University of Cambridge, & Universidad Autónoma de Madrid,* JEREMY WOLFE, *Brigham and Women's Hospital & Harvard Medical School* – In Hybrid Foraging (HF) observers must look for multiple instances of multiple targets (e.g. look for yellow and purple perler-beads in the handicrafts box). Memory effects in HF have been tested in older and younger adults, but not in children. Here we compared HF performance with low (2 targets) and high (7 targets) memory loads. Participants were young children (5-6 years old), middle-schoolers (11-12 years old), young adults and older adults. They searched for different moving toys in a videogame-style task. Younger children picked targets in runs (e.g., yellow-yellow) when memory load was low, but switched target types (e.g., yellow-purple) more often at higher memory load. This increase in switches differs from older observers who continue to favor runs. Young children are also slower and more error-prone. Memory is still developing in younger children, while it seems to be roughly preserved for older adults (as in Wiegand et al., 2019).
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11:00-11:15 AM (157)

You Find What You Expect: Initial Expectations Create Self-Reinforcing Biases in Visual Search Without Feedback. PATRICK COX, DWIGHT KRAVITZ, and STEPHEN MITROFF, *The George*

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Washington University (Presented by Stephen Mitroff) – Professions such as radiology and aviation security rely on visual search, often in the absence of immediate feedback, creating situations where performance may be largely driven by searchers' expectations. For example, if searchers do not expect difficult targets, they may find easy targets but systematically quit searching before finding difficult ones. Without feedback searchers can create self-fulfilling prophecies where they incorrectly reinforce initial biases (e.g., concluding difficult targets are rare). Here, two groups of searchers completed an identical multiple-target visual search task. Those in the "high-expectation" condition were told that each trial would have one or two targets present (i.e., suggesting no target-absent trials) and those in the "low-expectation" condition were told that each trial would have up to two targets (i.e., suggesting there could be target-absent trials). The low-expectation group had a lower hit rate and quit trials more quickly, consistent with a lower quitting threshold. The expectation effect was present from the start and remained across the experiment. In sum, initial expectations can have dramatic influences—searchers who do not expect to find a target, are less likely to find a target.
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11:20-11:35 AM (158)

Cue-Based Strategies in Pathology: How Does Disease Prevalence Effect Outcomes? ANN CARRIGAN, *Macquarie University,* AMANDA CHARLTON, *University of Auckland,* ELIOTT FOUCAR, *University of New Mexico,* MARK WIGGINS and ANDREW GEORGIOU, *Macquarie University,* TOM PALMERI, *Vanderbilt University,* KIM CURBY, *Macquarie University* – Histopathologists make diagnostic assessments that are the foundation for critical health care decisions. In clinical settings, most cases have already been classified as abnormal by imaging or surgical teams resulting in pathologists being exposed to high disease prevalence. This study investigated how differences in cue utilization, a likely key contributor to pattern recognition, contribute to diagnostic assessment of high- and low-prevalent cases. Sixty-eight histopathologists completed 1) the pathology edition of the Expert Intensive Skills Evaluation 2.0 (EXPERTise 2.0) to establish behavioral indicators of context-related cue utilization, and 2) a diagnostic task comprising a mixture of malignant, benign and normal breast biopsy slides. Higher cue utilisation was associated with a greater capacity to recognise the non-diseased, or "low prevalent" cases. These findings suggest that structured training, ensuring trainees have the opportunity to acquire implicit patterns and develop cue-based strategies, can aid low prevalent case performance, potentially reducing false positive errors.
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11:40-11:55 AM (159)

Seeing Others Yawn Selectively Enhances Vigilance: An Eye-Tracking Study of Snake Detection. ANDREW GALLUP, *SUNY Polytechnic Institute* – While the origin of yawning appears to be physiologic, yawns may also serve a communicative function. In particular, the arousal-reduction hypothesis states that yawns signal to others that the individual is experiencing a down regulation of arousal and vigilance. If true, the detection of yawns in others might enhance the vigilance of conspecifics in order to compensate for the reduced mental processing of the yawner. This was tested in humans by assessing how exposure to yawning stimuli alters performance on visual search tasks for detecting snakes and frogs. In a repeated-measures design, 38 participants completed these tasks separately following exposure to people yawning and displaying neutral expressions. Replicating previous evolutionary-based research, snakes were detected more rapidly than frogs. Moreover, consistent with a signaling function to yawning, there was a significant interaction, showing that snake detection was selectively enhanced following exposure to yawns. These findings provide the first experimental evidence for a social function of yawning and imply the presence of a previously undescribed psychological adaptation for maintaining group vigilance.
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Cognition and Technology

Virtual, Saturday, 10:00 AM-12:00 PM EST

Chaired by Laura Matzen, *Sandia National Laboratories*

10:00-10:15 AM (160)

Visualizing Algorithmic Outputs to Assist Seismic Analysts. LAURA MATZEN and MICHAEL TRUMBO, *Sandia National Laboratories* – Seismic analysts are tasked with filtering through large amounts of seismic data to pinpoint the onset times of seismic events. Essentially, they are performing a visual search task by looking for changes in amplitude and frequency in complex, messy data. Recently, new data science methods have been applied to seismic data in an attempt to improve automated processing and allow analysts to better focus their efforts. In our study, we applied a compression metric called Sliding Information Distance (SLID) to seismic data and developed different ways for visualizing the output of this metric. The visualizations included a vertical line marking the most likely event onset time (similar to the current state-of-the-art systems used by analysts), a highlighted region indicating the range of times in which the event onset was most likely to occur, a plot showing the scaled output of the SLID algorithm, and combinations of these visual cues. We hypothesized that viewing the SLID output would improve response times and accuracy relative to viewing the seismic waveform alone, that the vertical lines would produce an anchoring effect, and that this anchoring effect would be mitigated by showing the highlighted ranges or the SLID scores.
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10:20-10:35 AM (161)

An Effective Gamification of the Stop-Signal Task: Two Controlled Laboratory Experiments. MAXIMILIAN FRIEHS, *Trier University,* MARTIN DECHANT and SARAH VEDRESS, *University of Saskatchewan,* CHRISTIAN FRINGS, *Trier University,* REGAN MANDRYK, *University of Saskatchewan* – The Stop-Signal Task (SST) is a reliable and established measure of response inhibition. However, the SST is not particularly engaging and places significant stress on participants as the task itself requires concentration and cognitive effort. This can lead to decreased motivation to follow task instructions and poor data quality, which can affect assessment efficacy and might increase drop-out rates. Gamification—the application of game-based elements in non-game settings—has been shown to improve engaged attention to a cognitive task, which can improve participant motivation and data quality. We designed a gamified task version, the Stop-Signal Game (SSG), to solve this problem and validated the task over two studies. Both studies showed that response inhibition was comparable between the

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tasks as evidenced by frequentist and Bayesian analysis. But importantly the subjective experience was rated higher for the SSG as compared to the SST, as evidenced by higher motivation and flow experience. Overall, our findings provide evidence that gamification of the SST is possible and that the SSG is enjoyed more. Thus, when participant engagement is critical, we recommend using the SSG instead of the SST.
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10:40-10:55 AM (162)

Introducing an Innovative Pressure Sensitive Response Pad Used to Measure Reaction Times in Computer-Based Studies of Human Behavior. RICHARD PLANT, *The Black Box Toolkit Ltd UK* – Most researchers will be familiar with the use of button boxes, or response pads, in computer-based psychology experiments. However, cutting-edge researchers are now pushing the envelope and demanding not just an accurate RT, but also a pressure curve to show how hard a response button was pressed in response to a stimulus. It is thought this enriched data can tell us more about the response than a simple button down. For example, is the faster and harder a button is pressed a measure of certainty? Do particular pressure curves show doubt? Is cognitive processing still going on as the button is pressed and response made? Here we outline a new pressure sensitive response pad that can be used to measure both RT and pressure curve for each button press. We show its use in MATLAB and highlight some real-world applications in the lab for this innovative avenue for research.
Email: Richard R. Plant, r.plant@blackboxtoolkit.com

11:00-11:15 AM (163)

Emojis Influence Emotional Communication, Social Perceptions, and Information Processing. ISABELLE BOUTET, MEGAN LEBLANC, JUSTIN CHAMBERLAND, and CHARLES COLLIN, *University of Ottawa* – Despite their popularity, few studies have examined how emojis influence social interactions. The present study addresses this gap by measuring the impact of emojis on emotion communication, social perceptions, and information processing. Participants read messages typical of instant text messaging (IM) accompanied by emojis that mimic negative, positive and neutral facial expressions. Sentence valence and emoji valence pairings were either congruent or incongruent. Perceived emotional state of the sender, perceived warmth, and patterns of eye movements that reflect information processing were measured. A negativity effect was observed whereby the sender's mood was perceived as negative when a negative emoji and/or a negative sentence were presented. Moreover, the presence of a negative emoji intensified the perceived negativity of negative sentences. Adding a positive emoji to a message increased the perceived warmth of the sender. Finally, processing speed and understanding of verbal messages was enhanced by the presence of congruent emojis. Our results therefore support the use of emojis, and in particular positive emojis, to improve communication, express feelings, and make a positive impression during digital interactions.
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11:20-11:35 AM (164)

Covfefe: Donald Trump and the Strategic Distraction of the Media in the Age of Twitter. STEPHAN LEWANDOWSKY, *University of Bristol & University of Western Australia,* MICHAEL JETTER and ULLRICH ECKER, *University of Western Australia* – In democratic societies, political agendas are jointly determined by multiple actors, with mainstream media typically taking a leading role. With the arrival of social media, agenda-setting power has shifted away from mainstream media onto politicians who engage on social media. President Trump's reliance on social media to convey his opinions and feelings is unprecedented, although the implications on agenda setting are poorly understood. We show how President Trump successfully deploys Twitter to distract principal media (The New York Times and ABC News) from topics that are potentially harmful to the president. We find that increased media coverage of the Mueller investigation into Russian election interference is immediately followed by President Trump tweeting increasingly about unrelated issues that represent his political strengths, such as his record on jobs. This increased activity, in turn, is followed by a significant reduction in coverage of the Mueller investigation, suggesting that President Trump successfully distracts the media from topics that he considers threatening.
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11:40-11:55 AM (165)

The Psychology Metasurvey. Who Believes What? GARY LUPYAN, *University of Wisconsin – Madison,* JUSTIN SULIK, *Ludwig Maximilian University of Munich,* ELIZABETH PONTIKES, *University of California, Davis,* JAMES EVANS, *University of Chicago* – In 2017-2018 we surveyed 7973 academics in psychology and related disciplines. Each respondent identified their topics of study and research methods, completed several validated surveys including need for cognition, vividness of visual and spatial imagery, and tolerance of ambiguity, and indicated endorsement of 16 topics, e.g., whether psychological theories should be more grounded in evolution, whether perception is a reliable guide to truth, whether human capacities such as language and reasoning are innate, and whether psychologists should focus on discovering ideal/abstract rules. Results provide empirical support for a number of stereotypes, e.g., that nativists favor idealized rules while disfavoring context effects and the importance of culture, and that people who believe in the importance of social environments think mathematical models hold little explanatory power. They also offer some surprises, e.g., researchers who study adults are more nativist than researchers who study children. Perhaps of most interest, researchers' tolerance for ambiguity, visual imagery, etc. predicted their beliefs on psychology-related topics (e.g., nativism), the topics they studied, the methods they used, and their publication similarity.
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Statistical Inference

Virtual, Saturday, 10:00 AM-12:00 PM EST

Chaired by Corey White, *Missouri Western State University*

10:00-10:15 AM (166)

RT Bank: An Online Repository for Reaction Time Data and Models. COREY WHITE, GAVIN WATERS, and RHIMMON SIMCHY-GROSS, *Missouri Western State University* – Time models are used to analyze data from RT tasks, offering advantages over traditional analyses based on RTs or error rates. Newer versions of these models are also being developed to expand their usage to data from tasks of executive function. To increase use of these models in domains like clinical or developmental

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psychology we need to ensure they are validated and accessible. To that end, we have developed the RT Bank (rtbank.missouriwestern.edu), an online repository for researchers to upload and download RT data for model comparison and validation, and RT models to use for analyzing their own data. The website was purposefully designed to be minimalistic, allowing researchers to upload data and models in various formats along with accompanying detailed readme files. We discuss the framework and capabilities of the RT Bank with focus on improvements to best serve the needs of researchers working with RT models.
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10:20-10:35 AM (167)

Validating the Subtests of the Short-Form CART. MARION TILLEMA, *Avans University of Applied Sciences,* PETER VERKOEIJEN, *Avans University of Applied Sciences & Erasmus University Rotterdam,* SAMANTHA BOUWMEESTER, *Erasmus University Rotterdam,* ANITA HEIJLTJES, *Avans University of Applied Sciences* – Rationality is important for functioning in modern society, as it is necessary for making judgments (Tversky & Kahneman, 1974) and decisions (Evans, 2011). The short-form Comprehensive Assessment of Rational Thinking (Stanovich et al., 2017) intends to measure rationality as an individual characteristic. Stanovich et al. (2017) interpret subtest scores as distinguishable units of measurement, with the subtest scores representing single subconstructs within the concept of rationality. In this study we explored whether the subtests can indeed be interpreted as unidimensional scales. We assessed the subtests' dimensionality by performing a Mokken scale analysis (Mokken, 1971; Sijtsma & Molenaar, 2002) using the performance data of 185 students of higher education on a Dutch translation of the short-form CART. For two subtests, all items loaded into a single ordinal scale. For three subtests, a subset of items form a single scale. For seven subtests, no items, nor any subset of items, form a unidimensional scale. In its current form, then, not all short-form CART subtest sum scores can be meaningfully interpreted as a measure of a constituent part of rationality.
Email: Marion Tillema, m.tillema@avans.nl

10:40-10:55 AM (168)

Doing Post-Hoc Explanation Right. CHRIS DONKIN and ABA SZOLLOSI, *University of New South Wales* – Post-hoc explanations are not inherently bad, but they often turn out to be when they are evaluated with a myopic focus. Here we suggest ways in which we can move towards their non-myopic evaluation. Specifically, good post-hoc explanations introduce a range of new implications to a theory that can be evaluated without (i.e., before) further experimental tests. They should be judged based on the extent to which they are held accountable for all of these implications.
Email: Chris Donkin, christopher.donkin@gmail.com

11:00-11:15 AM (169)

Computational Models Enhance Test-Retest Reliability of Behavioral Measures of Individual Differences. NATHANIEL HAINES, *The Ohio State University,* PETER KVAM, *University of Florida,* BRANDON TURNER, *The Ohio State University* (Presented by Peter Kvam) – A number of behavioral tasks that produce robust experimental effects have recently been criticized for having undesirable psychometric properties, such as poor test-retest reliability. These conclusions arise due to the heuristic methods that researchers use to analyze behavioral data, which systematically ignore critical sources of measurement error. To correct this, we describe generative models and hierarchical Bayesian analyses that allow us to more precisely estimate individual differences from behavioral data. Using both simulations and empirical data collected from the Stroop, Flanker, Posner Cueing, Implicit Association, and Delay Discounting tasks, we show that these generative models result in both: (1) higher test-retest reliability estimates, and (2) more theoretically informative parameter estimates relative to traditional approaches. Our results invoke optimism regarding the ability of behavioral paradigms to reliably assess individual differences, and emphasize the importance of rigorous quantitative (and generative) models for making valid statistical inferences.
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11:20-11:35 AM (170)

How Do We Choose our Giants? Perceptions of Replicability in Psychological Science. TIMOTHY BALLARD, MANIKYA ALISTER, RAINE VICKERS-JONES, and DAVID SEWELL, *The University of Queensland* – Judgments regarding replicability are vital to scientific progress. The metaphor of "standing on the shoulders of giants" highlights that progress is made when new discoveries build on prior findings. This process operates most efficiently when the findings being built on are replicable. In this registered report, we examine how psychological scientists evaluate the replicability of a research finding. We surveyed 700 corresponding authors of recent articles in psychology journals, asking them to consider 76 specific study attributes that might bear upon the replicability of a finding (e.g., preregistration, sample size, statistical methods). Participants were asked to rate the extent to which information regarding each attribute increases or decreases their confidence in the finding replicating. Our results show that certain factors influenced perceptions of replicability in a consistent manner (e.g., higher power increasing perceived replicability), whereas other factors produced inconsistent responses across participants (e.g., preregistration). By shedding light on the perceived efficacy of certain research practices, these findings can inform discussions around how to improve the robustness of psychological research.
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11:40-11:55 AM (171)

Theories are True or False, But Underlying Effect Sizes Are Continuous. BRENT WILSON, CHRISTINE HARRIS, and JOHN WIXTED, *University of California, San Diego* (Presented by John Wixted) – The goal of scientific research is to generate knowledge and publish authentic discoveries (i.e., true positives). A true positive refers to a significant finding for which the underlying effect size (δ) is greater than 0, whereas a false positive refers to a significant finding for which $\delta = 0$, despite the significant outcome. However, the null hypothesis of no difference ($\delta = 0$) is rarely if ever true because of minor (and therefore overlooked) methodological artifacts. Thus, with sufficient power, virtually every experiment would yield a significant result. Yet running studies with higher power to minimize false positives is perhaps the most widely agreed upon reform to address the apparent replication crisis. Despite its intuitive appeal, focusing on reducing scientific false positives at the level of the underlying effect size (i.e., minimizing significant results

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despite $\delta = 0$) will have to the unintended consequence of increasing false positives at the level of theory (i.e., significant results despite false theoretical claims). The appropriate but almost never considered goal is to conduct scientific research in such a way as to maximize the ability to discriminate true theoretical claims from false theoretical claims.
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Symposium VI: Cognitive Off-Loading and Prospective Memory

Virtual, Saturday, 11:00 AM-1:00 PM EST

Chaired by Hunter Ball, *University of Texas at Arlington; Gene A. Brewer, Arizona State University*

11:00-11:15 AM (SYM26)

Symposium Introduction: Offloading Overview. EVAN RISKO, XINYI LU, MEGAN KELLY, and APRIL PEREIRA, *University of Waterloo* – Flexibly deploying both internal and external resources is important in meeting the demands of our day-to-day cognitive lives. For example, storing to-be-remembered information externally – a form of cognitive offloading – allows us to escape the limitations of our internal/biological memory systems. Despite the ubiquity of this type of behavior, it has received comparably little systematic investigation. This has begun to change recently with a number of researchers turning their attention to more distributed aspects of memory. Research examining cognitive offloading in the context of memory has now involved numerous approaches (e.g., experimental, individual differences) and a variety of tasks (e.g., retrospective, prospective) in order to address an array of questions (e.g., how do we decide to offload? How can offloading be used to improve memory performance?). Here, we offer an overview of this emerging research in hopes of providing a backdrop for the following talks about offloading prospective memory.

11:20-11:35 AM (SYM27)

Offloading the Components of a Prospective Memory Task. MELISSA GUYNN, *New Mexico State University* – Prospective memory (PM) requires remembering an intended action and an appropriate opportunity (target) to perform it and recognizing that opportunity (target) when it occurs. This can be demanding, as evidenced by impairment on the ongoing activity in which the PM task is embedded (task interference). The goal of this research is to assess the impact on task interference of each PM component by offloading it. The PM task was to say three intended action stimuli if any of three target stimuli appeared during a lexical decision task (ongoing activity). When the task was focal, interference occurred in the no-offloading condition. Re-presenting stimuli or signaling possible opportunities eliminated task interference. PM was best when either the target or intended action stimuli were re-presented. A planned study uses a nonfocal task to try to increase task interference in the no-offloading condition and to assess the effect of the manipulations on task interference.

11:40-11:55 AM (SYM28)

Individual Differences in Prospective Memory Offloading. HUNTER BALL, PHIL PEPER, DURNA ALAKBAROVA, *University of Texas at Arlington,* GENE BREWER, *Arizona State University* – The current study examined whether offloading eliminates prospective memory (PM) differences typically seen between individuals that have poor or good cognitive ability. Over two laboratory sessions scheduled one week apart, participants (N=275) completed three versions of the intention offloading task with and without the use of reminders, along with a battery of tests and surveys to assess cognitive ability (i.e., working memory, attention, episodic memory). Participants also generated a list of intentions to fulfill between sessions and later indicated which were completed with and without the use of reminders. Consistent with prior research, high ability participants did better in both laboratory and naturalistic settings when having to rely on their own memory. Critically, however, these differences were reduced with the use of reminders. These findings suggest that offloading may be particularly beneficial for those with poor cognitive ability. The theoretical and applied ramifications of these findings are discussed.

12:00-12:15 PM (SYM29)

Age Differences in Cognitive Offloading Strategies. SAM GILBERT, *University College London* – Researchers have sometimes suggested that older adults perform relatively well in real-world prospective memory tasks because they set more external reminders. However, there is little direct evidence for this, and the influence of age on reminder-setting behaviour has not been systematically explored in an experimental setting. This talk will describe two pre-registered experiments (N=176) where younger (<30 years) and older (>65 years) participants freely chose whether to remember intentions with their own memory or set reminders. Although older adults were more likely to use reminders, this did not sufficiently compensate for their impaired performance of the task. In terms of bias relative to optimal behaviour, younger participants showed greater preference for external reminders than the older group. Younger participants were also more pessimistic about their memory abilities than older participants. Therefore, older adults sometimes show reduced preference for cognitive offloading. In part, this may reflect age-differences in metacognitive evaluations.

12:20-12:35 PM (SYM30)

Comparing Smartphone Reminder Technology and Implementation Intention Strategies on Improving Naturalistic Prospective Memory in Mild Cognitive Impairment and Dementia. MICHAEL SCULLIN and WINSTON JONES, *Baylor University,* ANDREW KISELICA, *University of Missouri,* FRANCIS KEEFE, *Duke University,* JARED BENGE, *Baylor Scott & White Health* – Prospective memory is necessary for maintaining independent living, but is severely compromised early in Alzheimer's disease. A potential solution is to leverage technological innovations by training patients to "offload" their intentions onto smartphone devices that can deliver reminders at the correct times and GPS-defined locations. In a randomized controlled trial, 52 patients meeting diagnostic criteria for mild cognitive impairment or mild dementia were enrolled for four weeks (NCT03384043). All participants trained to use a smartphone, with participants randomized to either use the smartphone personal assistant reminder app (off-loading condition) versus the voice recorder app (implementation intention condition). The offloading condition showed better naturalistic event- and time-based prospective memory performance than the implementation intention, but only in the first week. These findings highlight the potential for technology-based off-loading to benefit everyday prospective memory in clinical groups, but

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additional booster training sessions may be required to sustain these benefits over time.

12:40-12:55 PM (SYM31)

Cognitive Offloading: A Tool for Academic Success. JILL SHELTON, BRADEN SANFORD, and JOHN WHITTEMORE, *University of Tennessee at Chattanooga* – College students are expected to remember to complete numerous assignments daily, and developing effective memory strategies likely plays a critical role in their success. We examined academic goal achievement using a naturalistic approach. During the encoding phase, participants listed six academically relevant tasks they needed to complete in the next three days, noting one task per day that was time-based in nature and one per day that was event-based. Photographic evidence of task completion was submitted through Google forms and participants identified any internal or external strategies used to execute their goals. Additionally, half of the participants completed an episodic future thinking protocol during the encoding phase, which did not significantly influence goal execution. Event-based tasks were successfully completed at a higher rate than time-based tasks. Additionally, a strong, positive correlation was observed between external reminder use and goal completion, providing evidence for the benefits of cognitive offloading to academic success.

Development of Knowledge and Language

Virtual, Saturday, 11:00 AM-12:20 PM EST

Chaired by Kirsten Read, *Santa Clara University*

11:00-11:30 AM (172)

Invited Talk: Semantic before Episodic Memory in Development: Constraints on Memory Models. NORA NEWCOMBE (Clifford T. Morgan Distinguished Leadership Award Recipient), *Temple University* – Many memory models assume that semantic memory arises from abstraction over multiple episodic memories. However, developmental findings pose challenges to such models, because semantic memory develops considerably in advance of episodic memory. Children build an impressive vocabulary and learn many facts and concepts during periods when their memory for events is either lacking (infantile amnesia, 0-2 years) or fragile and fragmentary (childhood amnesia, 2-8 years). How is this possible? In this talk, I will present recent behavioral and neural evidence regarding this puzzle and consider what new models and research are needed to resolve it completely.

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11:40-11:55 AM (173)

Children's Anticipatory Lexical Processing While Listening to Rhymes. KIRSTEN READ and VIVIAN VO, *Santa Clara University* – Rhyme awareness is a varied skill emerging consistently only in late preschool, yet children respond to rhythmic and phonological patterns to spontaneously complete rhymes in everyday settings. Our study builds on previous work using a preferential looking task to ask 1) whether preschoolers can efficiently use rhyme to anticipate spoken words, and 2) whether age, vocabulary level, or rhyme awareness are predictors of individual differences in anticipatory behavior. Three- to 4-year-olds (n=30) listened to 24 simple rhymes as we measured the proportion of time during a 3-second anticipatory pause that they looked to an illustration of a word that could complete it relative to two plausible distractors. Children's vocabulary level (DVAP) and rhyme awareness (PALS) were also measured. Children looked more towards the target (M=.42, SD=.08) than the distractors ($p<.001$) indicating that they can use rhyme to anticipate upcoming words. However, neither age, vocabulary size, nor rhyme awareness were significant predictors of variability in children's anticipatory looking. These null findings challenge us to think more deeply about how we measure rhyme awareness, and what mechanisms drive the development of efficient comprehension.

Email: Kirsten Read, kread@scu.edu

12:00-12:15 PM (174)

Predictive Effects of Number-Marked Copula in Sentence Processing of Czech 2-Year-Olds. FILIP SMOLÍK and VERONIKA BLÁHOVÁ, *Institute of Psychology, Czech Academy of Sciences* – Two preferential-looking experiments examined the comprehension and predictive effects of number marking in the comprehension of the Czech copula "být" (to be) in 27- to 30-month-old toddlers. In both experiments, children saw pairs of pictures showing different objects. In the critical trials, one of the objects was shown in a single instance, while the other object was shown in a group of two to four. Children then heard a sentence that described one of the pictures using a copula structure such as: "Podívej, tady je/jsou na obrázku kniha/knihy"; "Look there is/are in the picture book/books." Children's faces were recorded and their gaze direction coded, focusing on the effect of the copula on the proportion of looks towards the target picture. In Experiment 1 and 2 differed in the number of trials (18 vs. 36) and in the setup of thhe control condition. No significant effects were found in Experiment 1, but there was a clear effect of number marking as early as 600 ms after copula in Experiment 2. (see Figure 1). The results show that younger 2-year-olds use their knowledge of grammatical number to anticipate upcoming words, but showing the effect requires sufficiently powered experiment, and the setup of the control condition matters.

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Associative Learning Theory

Virtual, Saturday, 11:00 AM-1:00 PM EST

Chaired by Fabian Soto, *Florida International University*

11:00-11:30 AM (175)

Invited Talk: Learning 2.0: A Functional-Cognitive Agenda for Learning Research. JAN DE HOUWER (2020 Mid-Career Award Recipient), *Ghent University* – From a functional perspective, learning can be defined as the impact of environmental regularities on behavior. Different types of learning can then be distinguished on the basis of the regularities that are involved (e.g., classical conditioning as the impact of stimulus-stimulus pairings on behavior; operant conditioning as the impact of behavior-outcome contingencies). I review a number of new ideas that resulted from this perspective. First, complex learning can be defined as the joint impact of multiple regularities on behavior. Second, relational learning can be defined as the impact of regularities that involve relations. Third, regularities can have different functions, including the function of a symbol that specifies how stimuli are related. Fourth, learning can be conceived of as one instance of a broader class of shared

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features effects, more specifically that subset in which events share spatio-temporal features. Together, these ideas expand the realm of traditional learning research to include complex phenomena such as learning via analogy and symbolic learning. Moreover, it connects learning research to other topics such as impression formation.
Email: Jan De Houwer, jan.dehouwer@ugent.be

11:40-11:55 AM (176)

Visual Search Mimics Configural Processing in Human Causal Learning. FABIAN SOTO, *Florida International University* OMAR PEREZ, *California Institute of Technology* – Theories of associative learning distinguish between elemental and configural stimulus processing, depending on whether stimuli in a compound are processed independently or as distinct entities. Evidence for elemental processing comes from findings of summation, where a compound of two stimuli is judged as more predictive of the outcome than each stimulus alone. Configural processing is supported by failures to find this effect. Contemporary associative learning models hypothesize that component similarity increases configural processing. However, summation in human causal learning is robust and independent of similarity. In three experiments, we show that component similarity can reduce summation in human causal learning, but through a mechanism of visual search process, in which subjects process only some stimuli in a compound, rather than configural representation. We formalize an elemental visual search model that captures our experimental results, and a number of previous results usually interpreted as indicative of configural processing.
Email: Fabian A. Soto, fasoto@fiu.edu

12:00-12:15 PM (177)

Eye Movements Differentiate Intentional Forgetting from Strength-Based Memory Differences. JONATHON WHITLOCK and LILI SAHAKYAN, *University of Illinois at Urbana-Champaign* (Presented by Lili Sahakyan) – Established literature indicates that eye movements are an extremely sensitive marker of associative memory (Hannula et al., 2007). In this program of research, we used an associative memory paradigm to examine how strong and weak associative memories are reflected in viewing behavior. Participants studied object-scene pairs and were subsequently tested for memory for object-scene relationships while their eye movements were being monitored. In different experiments, strong and weak memories were obtained using directed forgetting (DF) procedures, repetition manipulations that did not involve DF, and subjective confidence ratings that did not involve DF. The eye movements differentiated DF from other strength-based differences in memory that did not involve DF. Eye movements also distinguished successful intentional forgetting (F-cued items that are subsequently forgotten) from accidental forgetting (R-cued items that are subsequently forgotten). We discuss the eye movement findings from the perspective of theoretical accounts of DF and other strength-based differences in memory.
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12:20-12:35 PM (178)

Detection of Regularities in a Random Environment. ARNAUD REY, *CNRS & Aix-Marseille University,* LOUISA BOGAERTS, *Hebrew University,* LAURE TOSATTO and GUILLEM BONAFOS, *CNRS & Aix-Marseille University,* ANA FRANCO, *Free University of Brussels,* BENOIT FAVRE, *CNRS & Aix-Marseille University* – Regularity detection, or statistical learning, is regarded as a fundamental component of our cognitive system. To test the ability of human participants to detect regularity in a more ecological situation (i.e., mixed with random information), we used a simple letter-naming paradigm in which participants were instructed to name single letters presented one at a time on a computer screen. The regularity consisted of a triplet of letters that were systematically presented in that order. Participants were not told about the presence of this regularity. A variable number of random letters were presented between two repetitions of the regular triplet making this paradigm similar to a Hebb repetition task. Hence, in this Hebb-naming task, we predicted that if any learning of the triplet occurred, naming times for the predictable letters in the triplet would decrease as the number of triplet repetitions increased. Surprisingly, across four experiments, detection of the regularity only occurred under very specific experimental conditions and was far from a trivial task. Our study provides new evidence regarding the limits of statistical learning and the critical role of contextual information in the detection of repeated patterns.
Email: Arnaud Rey, arnaud.rey@univ-amu.fr

12:40-12:55 PM (179)

Evidence that Previously Retrieved Items Contribute to Memory for Serial Order. DAKOTA LINDSEY, *University of South Alabama,* GORDON LOGAN, *Vanderbilt University* – Many influential models of serial retrieval cue memory with an item-independent representation of position, assuming that previously retrieved items are not incorporated into the retrieval cue. To test this assumption, we conducted 6 experiments (inspired by Ebenholtz, 1963) in which we compared the rate of learning spun lists (e.g., ABCDEF -> FABCDE) – in which relative item order was consistent – to the rate of learning scrambled lists – in which pairwise order consistencies were abolished using a balanced Latin square. Items in spun lists were recalled more accurately than items in scrambled lists with practice (Experiment 1, Experiment 6), practice transferred to previously untrained lists that had the same relative order (Experiments 2-3), and the advantage persisted when the perceptual and motor representations of the letters were altered (Experiments 4-5). Our results implicate a serial memory system that is capable of using previously retrieved abstract item representations to guide retrieval.
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Letter/Word Processing I

Virtual, Saturday, 11:00 AM-12:40 PM EST

Chaired by Rebecca Treiman, *Washington University in St. Louis*

11:00-11:15 AM (180)

Word Class and Spelling in English. REBECCA TREIMAN and REBECCA JEWELL, *Washington University in St. Louis,* KRISTIAN BERG, *Universität Bonn,* MARK ARONOFF, *Stony Brook University* – The spelling of an English word may reflect its part of speech, not just the sounds within it. In two preregistered experiments, we asked whether university students are sensitive to one effect of part of speech that has been observed by linguists: that content words (e.g., the noun inn) must

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be spelled with at least three letters, whereas function words (e.g., the preposition in) may have two letters. Participants heard VC (vowel–consonant) and CVC (consonant–vowel–consonant) nonwords that were used as nouns (content words) or prepositions (function words). They either spelled the items on their own or chose between options with single and double final consonants (e.g., ib vs. ibb). In both tasks, final consonant doubling was more common for VCs that were used as nouns than for VCs that were used as prepositions or for CVCs. The results show that spelling is not just a phonological process.
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11:20-11:35 AM (181)

Emojis Elicit Semantic Parafoveal-on-Foveal (PoF) Effects on Eye Movements During Reading. ELIZA BARACH, *University at Albany, SUNY,* LAURIE FELDMAN, *University at Albany, SUNY* & *Haskins Laboratories,* HEATHER SHERIDAN, *University at Albany, SUNY* (Presented by Heather Sheridan) – In the reading and eye tracking literature, parafoveal-on-foveal (PoF) effects, in which a parafoveal word (n+1) influences processing of the foveal word (n), have previously been interpreted as possible support for parallel instead of serial processing during word recognition. Here, we document the influence of an emoji's meaning on its preceding target. We examined eye movements while participants read sentences containing a target word (e.g., coffee in the sentence "I enjoyed my tall coffee") that was immediately followed either by no emoji, a semantically congruent (e.g., coffee cup) or an incongruent (e.g., beer mug) emoji. First-pass fixation durations were shorter on the foveal target word (n) when the parafoveal emoji (n+1) was semantically congruent rather than incongruent (i.e, an emoji-elicited semantic PoF effect), which suggests that emojis and text can potentially be processed in parallel. We discuss the implications of our results for models of eye movement control during reading.
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11:40-11:55 AM (182)

O Primes Q More than Q Primes O: Priming Asymmetry Between Visually Similar Letters. SACHIKO KINOSHITA and BENJAMIN BASCLAIN, *Macquarie University* – The earliest stage of visual word recognition involves orthographic processing, the encoding of identity and order of letters comprising the word. Unlike other models of orthographic processing, the noisy channel model (Norris & Kinoshita, 2012, Psychological Review) characterizes this "front-end" of word recognition to be no different from processing of other visual objects. In line with this, based on the "search asymmetry" phenomenon (Treisman & Souther, 1985; Treisman & Gormican, 1988), we predicted that masked priming of a letter/word by a visually similar letter distinguished by the presence/absence of a feature (e.g., O-Q; P-R) would be asymmetrical, such that a "feature-absent" prime facilitates the recognition of a feature-present letter more than vice versa (O primes Q more than Q primes O). The prediction was confirmed with the same-case prime and target in letter match (O-Q), as well as lexical decision (e.g., Ouality-Quality), and extended to cross-case prime and target (e.g., O-q; Ouality-quality).
Email: Sachiko Kinoshita, sachiko.kinoshita@mq.edu.au

12:00-12:15 PM (183)

A Tale of Two Lexica: Computational Pressures for the Emergence of Dual Wordform Stores. ENES AVCU and OLIVIA NEWMAN, *Massachusetts General Hospital,* ALISON XIN, *Harvard College,* DAVID GOW, *Massachusetts General Hospital & Salem State University* (Presented by David Gow) – Behavioral and neural evidence point to the existence of dual stores of wordform representation – a dorsal lexicon mediating the mapping between sound and articulatory representation, and a ventral lexicon mediating the mapping between sound and lemma representation. We explored the computational bases of this arrangement using a series of identical deep convolutional neural networks (CNNs) trained on dorsal and ventral categorization tasks using auditory word tokens drawn from the Spoken Wikipedia Corpus. We then used support vector machine classifiers to determine how well the features recovered by different networks supported lexical identification and transfer between dorsal and ventral classification tasks. The results suggest that efficient dorsal and ventral mappings depend on strikingly dissimilar representations of lexical wordform.
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12:20-12:35 PM (184)

A Psycholinguistic Exploration of the Effects of Parkinson's Disease on Spoken Word Production. ANN KOCHUPURACKAL, LINDA TICKLE-DEGNEN, and ARIEL COHEN-GOLDBERG, *Tufts University* (Presented by Ariel Cohen-Goldberg) – Parkinson's disease (PD) is a neurodegenerative disease that affects approximately 60,000 Americans each year, with over 10 million people worldwide currently afflicted (Marras et al., 2018). To date, clinical research has focused primarily on PD's motoric impairments while psycholinguistic research has focused on language comprehension. We analyzed a 3-year longitudinal study of PD patients to determine if the disease affects the cognitive mechanisms involved in language production. Transcribed interviews with PD participants and their care partners (CP) were coded at the word level for various psycholinguistic variables. Mixed effects models revealed that the words PD participants produced varied with disease severity: greater PD severity was correlated with words of higher frequency and greater neighborhood density but no semantic differences. We speculate that PD may impair lexical access, leading to a bias for easily retrieved words. Similar results were found in the CP speech, suggesting they may alter their speech to accommodate PD patients. These preliminary findings suggest there is a distinct effect of PD on spoken word production and that more research is needed to pinpoint the exact effects of the disorder.
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False Memory and Eyewitness Identification

Virtual, Saturday, 11:00 AM-1:00 PM EST

Chaired by Ciara Greene, *University College Dublin*

11:00-11:15 AM (185)

Misremembering Brexit: Partisan Bias and Individual Predictors of False Memories for Fake News Stories Among Brexit Voters. CIARA GREENE, *University College Dublin,* ROBERT NASH, *Aston University,* GILLIAN MURPHY, *University College Cork* – Exposure to "fake news" stories can result in false memories, especially if the fabricated stories align

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with the reader's existing views. We examined susceptibility to partisan fake news about Brexit in 1299 UK voters. Participants were presented with a series of news stories, including two fake stories about political scandals involving either the Leave or Remain campaign. Participants were more likely to recall fake stories that reflected poorly on the opposing side, especially if they had first been exposed to a threat to their identity as a Leave or Remain supporter. Individual differences in a range of measures also predicted susceptibility to fake news. Participants who scored higher on measures of cognitive ability and analytical reasoning were less likely to form a false memory after reading a fabricated story. Individuals with better general knowledge about Brexit were better able to distinguish between true and false stories, while self-reported engagement with the Brexit debate was associated with an increased tendency to claim to remember any given story, regardless of its truth. These results suggest that a combination of social and individual factors contribute to the development of false memories from fake news.
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11:20-11:35 AM (186)

Fast Errors in Recognition Memory Signal Misleading Retrieval. JEFFREY STARNS, *University of Massachusetts Amherst* – Starns, Dube, & Frelinger (2018) tested a paradigm in which people first completed old/new recognition ("was this word on an earlier list?") and then had a chance to correct their errors in two-item forced-choice trials. For example, a non-studied word incorrectly called "old" would be paired with a studied word correctly called old to determine if the participant could correctly indicate which of the two words was actually studied. They found that the old/new response time (RT) for the previous error response predicted forced-choice accuracy such that fast errors were difficult to correct. Voorman et al. (submitted) replicated this finding and tested a condition designed to eliminate the effect if it relied on a strategy of "sticking with" whichever earlier response was made more quickly, and they found a clear effect in both conditions. The current experiments further tested the possibility that the effect relies on response strategies by eliminating the direct comparison of two earlier responses. Results again showed that fast old/new errors were difficult to correct, further supporting the hypothesis that this effect is independent of specific response strategies. I will discuss predictions of various RT models.
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11:40-11:55 AM (187)

Why Do Mistaken Identification Rates Increase When Either Encoding or Retrieval Conditions get Worse? ANDREW SMITH, *Iowa State University* – Why do mistaken identifications increase when either encoding or retrieval conditions are degraded? In two experiments, I assigned witnesses to a strong or weak recognition experience by manipulating either the strength of encoding conditions (Experiment 1, N=633) or the quality of lineup photos (Experiment 2, N=1266). After indicating which lineup member best matched their memory for the culprit, participants indicated on a scale of 0 (not at all) to 100 (perfectly) how well that lineup member matched their memory for the culprit. Degraded conditions led to fewer culprit identifications and more mistaken identifications. Degrading either encoding or retrieval conditions resulted in lower memory ratings for the culprit. More importantly, memory ratings for the best-matching innocent person were statistically equivalent under clear and degraded conditions. These results suggest that mistaken identifications increase when encoding/retrieval conditions are degraded because witnesses lower their criterion for making an affirmative identification.
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12:00-12:15 PM (188)

Testing the Diagnostic Feature-Detection Hypothesis by Removing External Facial Features in Showups and Lineups. CURT CARLSON and JACOB HEMBY, *Texas A&M University – Commerce,* ALEX WOOTEN, *Hollins University,* ALYSSA JONES, ROBERT LOCKAMYEIR, and MARIA CARLSON, *Texas A&M University – Commerce,* JANE WHITTINGTON, *Holy Family University,* JENNIFER DIAS, *Tarleton State University* – Diagnostic Feature-Detection (DFD) theory is based on the presence of facial features in a lineup or showup that are diagnostic versus non-diagnostic of suspect guilt, but it has not been tested through the lens of the face processing literature. We conducted a between-subjects factorial design (N = 19,414) to test DFD predictions by manipulating the presence of external facial features on a target face, followed later by either a target-present or -absent showup or lineup, with or without external facial features. We replicated the superior empirical discriminability of lineups over showups, and more critically eliminated this effect by removing potentially diagnostic external features (e.g., face shape, ears, hair) from the lineup, yielding equivalent discriminability as a full face showup. In sum, empirical discriminability in an eyewitness identification paradigm appears to be driven largely by the presence of facial features diagnostic of suspect guilt.
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12:20-12:35 PM (189)

Inattentional Blindness, Attention Capture, and Eyewitness Memory: Filling in the Gaps. IRA HYMAN, JR., ELLEN CARROLL, MACEY CROOKS, TESS SCHORN, LORI REYNA, and MADISON HANSEN, *Western Washington University* – People do not constantly watch for crimes and accidents. People may fail to notice unusual events (inattentional blindness) or become aware of them (attention capture). Attention capture may also happen after an event has already begun, meaning that a person may fail to have seen critical early aspects of the event. In this research, we have investigated how the timing of awareness affects someone's memory for the event. We present two studies, one with an accident and the second with a theft. We varied attention focus instructions. Attention conditions influenced whether and when people noticed the critical event. Importantly, their ability to correctly answer questions depended on when they become aware, that is when they experienced attention capture. People who became aware of the accident or crime late nonetheless answered questions about aspects of the event that occurred before they noticed it. In doing so, they more often gave incorrect answers than people who became aware sooner. Eyewitnesses may provide incorrect information for aspects of an event to which they did not attend. In these situations, they may fill in the gaps in their memories.
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12:40-12:55 PM (190)

Why Do Eyewitness Lineups Outperform Showups? LAURA SMALARZ, *Arizona State University,* ANDREW SMITH and GARY WELLS, *Iowa State University,* JAMES LAMPINEN, *University of Arkansas* – A "simultaneous showup" procedure was recently developed in an attempt to rule out the filler-siphoning account of the lineup-over-showup advantage in eyewitness identification (Colloff & Wixted, 2019). The simultaneous showup presents the suspect's photo in a red box alongside fillers who witnesses are informed are not suspects. Because witnesses are not permitted to choose a filler, Colloff and Wixted reasoned that any advantage of the simultaneous showup over a standard showup must be attributable to a process other than filler siphoning. We contend that the simultaneous showup precludes the behavioral manifestation of filler siphoning but leaves intact the psychological process underlying filler siphoning. In a large experiment, we demonstrated that the superiority of the simultaneous showup over a standard showup occurs because witnesses who form a preference for a filler shift to a rejection once they cannot identify their preferred filler, not because the presence of fillers improves memory performance.

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Autobiographical Memory

Virtual, Saturday, 11:00 AM-12:40 PM EST

Chaired by Julie Niziurski, *Heinrich Heine University Düsseldorf;* *Carmen Westerberg, Texas State University*

11:00-11:15 AM (191)

Highly Superior Autobiographical Memory Is Associated with Superior Sleep Physiology. CARMEN WESTERBERG, *Texas State University,* KEN PALLER, *Northwestern University,* JAMES MCGAUGH, *University of California, Irvine,* PHYLLIS ZEE, *Northwestern University,* SIMON WARBY and KARINE LACOURSE, *University of Montreal,* SUSAN FLORCZAK and KATHRYN REID, *Northwestern University,* SHAUNA STARK and CRAIG STARK, *University of California, Irvine*– People with highly superior autobiographical memory (HSAM) possess an extraordinary capacity for instantly recalling details from nearly every day of their adult lives. A compelling explanation for this amazing memory ability has remained elusive. One unexplored mechanism that may contribute to memory superiority in HSAM is enhanced sleep-dependent memory consolidation, whereby memory reactivation during sleep leads to selective memory stabilization. Consolidation has been linked to specific aspects of sleep physiology, including short bursts of high-frequency oscillations during non-rapid-eye-movement sleep known as spindles. Accordingly, we analyzed sleep physiology in six HSAM participants who each underwent two nights of full polysomnography. Whereas time spent in each sleep stage was relatively normal, stage-2 spindle density was very high in comparison with normative data. These results support the proposal that superior sleep physiology in HSAM individuals may contribute to their superior memories, and additional testing is underway to further evaluate this idea.

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11:20-11:35 AM (192)

Putting Our Memories in Order: How Age Is Represented in Personal Event Memory. ROBERT KRAFT, SHILAH ALEXANDER, WILLIAM HOVE, and REID WOLLETT, *Otterbein University* – This study focused on the information in memory that specifies our age during remembered events. To identify this information, the study employed a direct approach. One hundred and twenty-six participants described personal event memories, indicated how old they were when the remembered events occurred, elaborated on the ways they remembered their age, and rated their confidence in the age estimates. For nearly all the personal event memories, one's age at the time of the event was not directly represented in the initial memory descriptions. Instead, participants dated their memories by referencing other information: their location, their own capabilities or the capabilities of others at the time of the events, landmark incidents in their lives, the beginnings and endings of extended personal events, perceptual information that existed only in a defined time frame, and external sources. Participants used identifiable strategies to combine different types of information, bracketing and systematically narrowing time frames to determine the chronology of their memories.

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11:40-11:55 AM (193)

Me, Myself, and COVID-19: Personality and Memory During a Pandemic. JULIE NIZIURSKI, *Heinrich Heine University Düsseldorf* – At retrieval, details and emotions of autobiographical memories are influenced by personality traits, in particular, extraversion and openness. However, the situation of the current pandemic may affect the relationship between personality and memory. In an online study, we asked 904 participants to recall their most negative and positive events related to the COVID-19 pandemic. Participants completed a series of questionnaires, including the Mini-IPIP and the Autobiographical Memory Questionnaire. Openness and conscientiousness were negatively correlated with the emotional impact and rehearsal of negative memories. Extraversion was positively correlated with the emotional impact and reliving of positive memories, whereas neuroticism limited the re-experiencing of positive memories. Openness also led to more positive changes in one's daily life whereas neuroticism led to a more negative view of the world. Personality impacted not only how people experience their memories of COVID-19, but also influenced how they view themselves and the world.

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12:00-12:15 PM (194)

Overgeneral Autobiographical Memory Is Selectively Associated with Updating Function of Executive Control. NOBORU MATSUMOTO, *Shinshu University,* HARUKI NISHIMURA, *National Institute of Radiological Sciences,* YUKI NISHIGUCHI, *University of Tokyo,* RIE TABUCHI, *Tokyo Gakugei University,* AKIRA HASEGAWA, *Tokai Gakuin University,* AKIHIRO MASUYAMA, *Iryo Sosei University,* HITOMI OI, *National Center of Neurology and Psychiatry,* HARUNA FUKUI, *University of Tsukuba,* MEGUMI OIKAWA, *Tokyo Gakugei University,* YOSHIHIKO TANNO, *University of Tokyo,* SATOSHI MOCHIZUKI, *Hosei University* – Previous studies evident a link between overgeneral autobiographical memory (OGM) and executive control, but the question which components of executive control are involved in OGM has not yet been fully addressed. In the present study, one-hundred one undergraduate and graduate students completed updating tasks (spatial 2-back task, memory updating task, and running memory

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task), attentional control tasks (Stroop task, antisaccade task, and Eriksen flanker task), and short-term memory tasks (digit span task and dot matrix task) as executive control measures, and they responded to Autobiographical Memory Test (AMT) with minimal instruction (MI) and traditional instruction (TI). Combined updating function score was correlated with the high proportion of specific memories (r=.31) and the low proportion of categoric memories (r=-.26) for positive cues in the AMT-MI. There was no other association between the combined execution control scores and OGM. The results suggest that the ability to eliminate and update irrelevant information that comes to mind during memory retrieval is necessary for specific memory recall. The AMT-MI may be sensitive to individual differences in executive controls needed to recall specific memories.

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12:20-12:35 PM (195)

The Possible Effects of the COVID-19 Pandemic on the Contents and Organization of Autobiographical Memory: A Transition-theory Perspective. NORMAN BROWN, *University of Alberta* – In this presentation, transition theory is used to explicate the mnemonically relevant ways in which the onset of the COVID-19 pandemic differs from other personal and collective transitions and how the pandemic period might differ from other personally-defined and historically-defined autobiographical periods. Transition theory serves as the basis for several predictions. Specifically, it predicts (a) a modest COVID bump (i.e., an increase in availability of event memories at the outset of the pandemic) and (b) a COVID dip (i.e., a decrease in availability of event memories from the pandemic period compared to other stable periods). It also predicts that (c) people will consider the pandemic an important chapter in their life stories only if there is little continuity between their pre-pandemic lives and their post-Pandemic lives, otherwise they will remember it is an isolated extended interlude. The possible effects of the pandemic's near-universal scope on autobiographical memory are also considered.

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Symposium VII: Using Network Science to Understand Language

Virtual, Saturday, 12:00-2:00 PM EST

Chaired by Debra Titone, *McGill University; Michael S.Vitevitch, University of Kansas*

12:00-12:15 PM (SYM32)

The Talk of the Town: A Network Approach to Characterizing Bilingual Conversational Topics in Montreal. MEHRGOL TIV, JASON GULLIFER, RUO FENG, and DEBRA TITONE, *McGill University* – Recent work within bilingualism has sought new methods to characterize how people use language across different communicative contexts. We approach this issue using a novel application of Network Science to map the conversational topics that Montréal bilinguals discuss across communicative contexts, in their dominant vs. non-dominant language. Our results demonstrate that all communicative contexts display a unique pattern in which conversational topics are discussed. We also demonstrate that the dominant language has greater network size, strength, and density than the non-dominant language, suggesting that more topics are used in a wider variety of contexts in this language. Lastly, using community detection to thematically group the topics in each language, we find evidence of greater specificity in the non-dominant language than the dominant language. We contend that Network Science is a valuable tool for representing complex information, such as individual differences in bilingual language use, in a rich and granular manner.

12:20-12:35 PM (SYM33)

Using Network Science to Assess Speech Patterns in Novel Word Learning in Children with Typical and Atypical Language Development. SARA BENHAM, *University of Texas at Dallas* – Preschoolers with developmental language disorder (DLD) produce novel words with low accuracy and high variability. I show, across three studies, how network science approaches provide novel insights into the structure of these children's speech errors. In study 1, we examined syllable connectivity patterns in nonwords, showing that children with DLD were more variable than their peers in the syllables they produced and in the links between syllables. In study 2, we probed the malleability of these networks by associating a visual referent to the novel words. Children with DLD stabilized on a reduced set of nodes and edges when words included a referent, but did not become more accurate. In study 3 (ongoing), we investigate the structure of sound and syllable networks in typical 2-year-olds and preschoolers with DLD to determine whether the speech deficits in DLD are developmental in nature or relate uniquely to their language disorder.

12:40-12:55 PM (SYM34)

Capturing the Aging Lexicon Using Network Science Techniques: Implications for Dementia and Aphasia. NICHOL CASTRO, *University of Washington* – Understanding the impact of cognitive aging on language processes remains a thriving area of cognitive science research. One factor that has received a new vigor of interest in this multi-faceted area is the role of mental lexicon structure (i.e., the way in which words are organized in memory) on language processes, like spreading activation or search strategies. The tools of network science have provided a suite of computational and mathematical tools to quantitatively define large, complex systems (e.g., the mental lexicon) and the role of structure on process. This talk will provide examples of capturing the aging lexicon structure through analysis of phonological associations and verbal fluency data using techniques from network science, and will discuss the implications of considering the dynamical change of lexicon structure across adulthood for the purpose of clinical translation, particularly in the context of identifying and treating significant word retrieval impairments.

1:00-1:15 PM (SYM35)

What Do Phonological Networks do? A Comparison of Simulations to Understand the Process of Spoken Word Recognition. MICHAEL VITEVITCH and GAVIN MULLIN, *University of Kansas* – Cognitive Psychology has traditionally examined how information is represented, and the processes that operate on those representations. Contemporary computational models of spoken word recognition adequately capture the processes involved in recognizing words but fail to account for the influence on processing of the large-scale structure that exists among lexical representations. We compare the ability of a contemporary model of spoken word recognition (jTRACE; Strauss et al, 2007) to the ability

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of a network model with a spreading activation-like process (spreadr; Siew, 2019) to account for the findings from several previously published behavioral studies of language processing. The results suggest that viable models of spoken word recognition must account for the influence on processing of the large-scale structure that exists among lexical representations.

Decision Making and Learning: Reward and Motivation

Virtual, Saturday, 12:00-1:40 PM EST

Chaired by Brian Anderson, Texas A&M University

12:00-12:30 PM (196)

Invited Talk: Overcoming Value-Driven Attentional Capture. BRIAN ANDERSON, LAURENT GREGOIRE, HAENA KIM, ANDY J. KIM, and MING-RAY LIAO, *Texas A&M University* – Previously reward-associated stimuli are involuntarily prioritized by the attention system, capturing attention even when task-irrelevant and no longer rewarded. A series of recent studies demonstrate striking failures to suppress the selection of previously high-value stimuli in situations where the suppression of value-neutral distractors is robust. Such findings suggest that value-driven attentional priority is somehow unaffected by multiple well-established mechanisms of signal suppression, conferring previously high-value stimuli with a sort of "breakthrough" capacity. In this talk, we will highlight three situations in which the priority afforded to learned reward cues can be at least partially suppressed, one resulting from instrumental conditioning of the orienting response, one resulting from selection history of distractor processing, and one resulting from interactions with affective state. Our findings speak to the representational basis of value-driven attentional priority and offer new insights into how value-driven attentional biases can be mitigated.
Email: Brian A Anderson, brian.anderson@tamu.edu

12:40-12:55 PM (197)

Do You Want to Know a Secret? Factors Affecting the Pursuit of Non-Instrumental Information. BEN NEWELL, SHI-XIAN LIEW, and JAKE EMBREY, *University of New South Wales* – Most standard economic and psychological theories posit that information should only be valued to the extent that it informs a decision-maker and facilitates obtaining a desired outcome. Despite this, several recent studies appear to demonstrate that there is an intrinsic value to information even when it cannot be used to guide future behaviour. We investigate participants' preferences to 'find out' or 'keep secret' information about an imminent but predetermined outcome. We examine the impact of outcome-type (primary vs. secondary reinforcers), outcome-valence (positive vs. negative) and the delay between a predictive cue and outcome-receipt on this preference for 'useless' information. We find that the tendency to seek non-instrumental information increases with delay but only for primary reinforcers and irrespective of whether they are positive (e.g., chocolate) or negative (e.g. aversive sounds). We discuss the results in terms of a computational account which incorporates anticipatory utility, temporal discounting and uncertainty aversion.
Email: Ben Newell, ben.newell@unsw.edu.au

1-1:15 PM (198)

Intentions to Report Concussion Symptoms in Nonprofessional Athletes: A Fuzzy-Trace Theory Approach. DAVID GARAVITO, VALERIE REYNA, JOSEPH DETELLO, BAILEY LANDOW, and LINDSEY TARPINIAN, *Cornell University* (Presented by Valerie Reyna) – Reducing concussion risks in athletes depends on self-reporting. Often, athletes decide whether to report concussions or continue playing and risk serious health consequences. Fuzzy-trace theory (FTT) predicts that reliance on gisty, categorical representations of risky decisions, not amounts of risk/reward, encourages risk avoidance and application of bottom-line values, or gist principles, thus promoting healthy decisions. Applying FTT, we test whether intentions to report are predicted by gist-based thinking about risks and values. High-school and college students (N=1366) were assessed for concussion knowledge, social pressures to not report (by coaches/parents/teammates), categorical gist-based thinking, endorsement of gist principles expressing values, and intentions to report. As expected, the older group scored higher on gist measures. For young adults, categorical thinking and gist-principles predicted intentions, controlling for sex, knowledge, and social pressures. For adolescents, categorical thinking again predicted intentions. For both age groups, adding FTT's predictors accounted for significantly more variance than baseline models.
Email: Valerie Reyna, vr53@cornell.edu

1:20-1:35 PM (199)

Are Personal Values Associated with Social Decisions? The Role of Self-Transcendence in Promoting Prosocial Outcomes. RENATA HEILMAN, *Babes-Bolyai University*, KUSEV PETKO, *The University of Huddersfield* – Social situations require people to make complex decisions, sometimes involving different outcomes for the self and others. The aim of this study is to investigate personal values as possible factors associated with a preference for more self-maximizing or cooperative choices. In an adult sample (N = 63), we assessed participants' tendency towards prosocial or proself outcomes and 4 higher-order values, namely openness to change, conservation, self-transcendence, and self-enhancement. We expected self-transcendence to be positively associated with more prosocial orientations. Our result confirmed that self-transcendence was positively correlated with prosociality whereas no other higher-order values were associated with social values. Participants with increased self-transcendence also have an inclination towards more prosocial behaviors. Our data also revealed that inequality aversion was the primary motivation of prosocials, and this result was unrelated to gender effects or the personal values under investigation. Supporting the theory of basic individual values, our results show that the higher-order value of self-transcendence is a significant positive correlate of prosocial behaviors in a resources allocation task.
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Event Cognition

Virtual, Saturday, 12:00-2:00 PM EST

Chaired by Laura Kelly, *United States Naval Research Laboratory*

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12:00-12:30 PM (200)

Invited Talk: Memory and Prediction in Event Comprehension. JEFFREY ZACKS (2020 Mid-Career Award Recipient), W*ashington University in St. Louis* – Memory for recent events allows humans and other animals to perform adaptively in new events, anticipating how activity will unfold based on previous experience. For example, during a first visit to a grocery store you might encode the location of the produce section, and this could guide your steps next time. However, if the store were rearranged, predicting where to go based on memory would lead to an error. Such memory-guided prediction errors can produce short-term costs but also can induce adaptive long-term memory updating. Converging evidence from eye movements, change detection judgments, and neuroimaging establish evidence for associative retrieval of previous event features, which leads to predictions about related new events. Results suggest that when such predictions lead to errors this induces memory updating. Young and older adults show both similarities and differences in behavioral and neural markers of such memory updating, pointing to potential targets for memory improvement.
Email: Jeffrey M. Zacks, jzacks@wustl.edu

12:40-12:55 PM (201)

Directional Biases in Durative Inference. LAURA KELLY and SANGEET KHEMLANI, *United States Naval Research Laboratory* – Descriptions of durational relations can be ambiguous, e.g., the description "two different meetings happened at the same time" could mean that one meeting started before the other ended, or it could mean that the meetings both started and ended simultaneously. A recent theory posits that people mentally simulate events with durations by representing the starts and ends of events along a chronological axis (Khemlani et al., 2015). To draw conclusions from this durational mental model, reasoners consciously scan it in the direction of earlier time points to later time points. The account predicts that people should prefer descriptions that are congruent with a chronological scanning procedure, e.g., descriptions that mention the starts of events before the ends of events. A series of experiments corroborates the prediction and shows that chronological biases in temporal reasoning manifest in cases when reasoners consciously evaluate the durations of events.
Email: Laura Kelly, laura.kelly.ctr@nrl.navy.mil

1:00-1:15 PM (202)

Naïve Physics and Perception of Casualty in the Launching Effect: Evidence for an Impetus Heuristic. TIMOTHY HUBBARD, *Arizona State University & Grand Canyon University* – Michotte's (1963) Launching Effect has been claimed to demonstrate perception of causality. This claim is challenged by findings that representational momentum (RM) of targets in Launching Effect displays is (a) less than RM of nonlaunched targets; (b) lessened with increases in target trajectory length; (c) similar to RM of targets in Tool Effect displays, but only if a visible conduit linked launcher and target; and (d) less than RM for targets in Entraining Effect displays. The RM data are consistent with McCloskey's (1983) Naïve Impetus Theory, which suggests that if a moving object collides with a stationary target, "impetus" is believed to be imparted to the target at the moment of contact and to dissipate with subsequent target motion. As impetus is not a valid physical principle, the RM data suggest participants do not perceive causality in a Launching Effect, but instead use an impetus heuristic to anticipate target behavior.
Email: Timothy L. Hubbard, timothyleehubbard@gmail.com

1:20-1:35 PM (203)

Effects of Distraction on Source Memory for Actions. ALAN KERSTEN, JULIE EARLES, MEGAN SMITHWICK, and CHRISTELLE PETROZ, *Florida Atlantic University* – Kersten et al. (2018; Psychology & Aging) found that young adults' memory for which people performed which actions was related to more general measures of memory functioning rather than measures of executive functioning, in contrast to other source memory findings. This leads to the prediction that distraction manipulations that tax executive abilities should not specifically impact the ability to associate people with their actions above and beyond any effects on memory for those features in isolation. In this research, we presented participants with a series of videos involving actors performing actions and later tested participants on recognition memory for who did what. Some participants received a tone counting distractor task during either encoding or retrieval. As predicted, distraction affected memory for the individual features of the events (i.e., people and actions), but had no specific impact on the ability to associate people with their actions after controlling for feature memory.
Email: Alan Kersten, akersten@fau.edu

1:40-1:55 PM (204)

The Influence of Negated Causal Information on Pronoun Disambiguation. EYAL SAGI, *University of St. Francis* – The disambiguation of pronouns is a complicated process that has been shown to be influenced by both linguistic and cognitive factors. In particular, readers prefer an interpretation that is causally likely. For example, in the sentence pair "John accused Mark of stealing a car. He called the police," readers judge that the antecedent of "he" is more likely to be John than Mark because of the perceived causal link between the accusation and calling the police. I will describe new results that explore how the presence of negation affects such interpretations (e.g., "He did not call the police"). While, as expected, negation disrupts the perceived causal link, this disruption does not affect the choice of antecedent ("John" is still the preferred antecedent). This suggests that readers identify the non-negated causal relationship when interpreting the negated sentence. The implication of this result to models of pronoun disambiguation will be discussed.
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Human Learning and Memory

Virtual, Saturday, 12:00-2:00 PM EST

Chaired by Erica Wohldmann, *California State University, Northridge*

12:00-12:15 PM (205)

Learning and Transfer of Calorie Information. ERICA WOHLDMANN, *California State University, Northridge,* ALICE HEALY, *University of Colorado, Boulder* – The present study compared the relative benefits of generating information to viewing and verbally producing information for learning and transfer. During training, a list of food items was shown, and some participants generated either real calories (Experiment 1) or fabricated prices (Experiment 2) associated with those foods with feedback provided (seeding), some viewed and

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read aloud values provided (viewing), and others read aloud the names of the items with no values provided (control). All participants were tested immediately and 1 week later on both previously seen and novel foods. In both experiments, the seeding and viewing conditions showed more learning than the control condition, and only the experimental conditions showed transfer of learning to novel items, with advantages found for seeding over viewing only in some cases. The results are discussed in terms of the seeding, testing, generation, and production effects, as well as their applications to health and policy.
Email: Erica Wohldmann, erica.wohldmann@csun.edu

12:20-12:35 PM (206)

Investigating Cognitive Transfer Effects through Computational Modeling of Large-Scale Observational Data. MARK STEYVERS, *University of California, Irvine,* ROBERT SCHAFER, NICOLE NG, and ALLEN OSMAN, *Lumos Labs,* MATTHEW GALDO and BRANDON TURNER, *The Ohio State University* – To what degree does training on a cognitive task lead to improved performance on other cognitive tasks? The limited amount of data obtained in previous studies of transfer, along with the absence of computational frameworks that can distinguish between different sources of transfer, have made it difficult to delineate the full scope of transfer within sets of multiple cognitive tasks. We investigate transfer in a large-scale observational data set from Lumosity, an online cognitive training platform. This data set includes over 650,000 users who trained on a variety of cognitive tasks and were assessed on the NeuroCognitive Performance Test (NCPT), which measures performance across several cognitive domains. Through computational modeling, we measure separately improvements on the NCPT due to repeated testing versus transfer effects from cognitive training. Our results suggest that such transfer does occur and that it involves features shared between the NCPT subtests and the practiced cognitive tasks.
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12:40-12:55 PM (207)

When Does Exploring Before Instruction Improve Learning? The Importance of Highlighting Problem Features. MARCI DECARO and CAMPBELL BEGO, *University of Louisville,* PHILLIP NEWMAN, *Vanderbilt University,* LIANDA VELIC, *University of Louisville* – Instructors traditionally lecture on new content before providing practice problems, but learning is often superficial. In exploratory learning, students are given a novel problem to explore before receiving instruction on the concepts and procedures. Research has demonstrated that exploratory learning improves conceptual understanding compared to traditional instruct-then-practice methods—but it does not always. We tested the idea that exploration activities must both increase students' perceived knowledge gaps and highlight important problem features. Participants (N=210) completed a novel activity either before or after direct instruction about statistical variance. The activity either included a rich dataset or contrasting cases, the latter highlighting important problem features. Exploring prior to instruction improved conceptual understanding at posttest, but only for students who received the activity with contrasting cases. Both exploration activities increased students' perceived knowledge gaps. Exploring using contrasting cases likely enabled students to discern the deep structure of the problems, improving knowledge integration.
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1:00-1:15 PM (208)

Generating Mnemonics Boosts Recall of Chemistry Content. JONATHAN TULLIS and JIAHUI QIU, *University of Arizona* – People have generated mnemonics to support the recall of important information since the time of the early Greeks. Self-generated mnemonics may boost memory by connecting novel info to info in learners' long-term memory (Mastropieri, Sweda, & Scruggs, 2000), transforming abstract info into meaningful units (Worthen & Hunt, 2017), and creating long-lasting retrieval routes (Atkinson & Raugh, 1975). Across four experiments, we tested the ability of learners to generate mnemonic cues to bolster recall of chemistry content. Learners saw a chemistry fact, generated their own cue or read someone else's cue, and were tested on their ability to recall the chemistry facts. When learners generated their own cues, they recalled the chemistry information better than if they received a mnemonic from a peer or a chemistry expert. We experimentally boosted recall of the mnemonic cues by assigning cues to reread or retrieval practice conditions; retrieval practice boosted recall of the cues without influencing memory for the chemistry content. We argue that generating a mnemonic cue improves recall because it engenders deeper processing than reading cues; however, self-generated mnemonics do not mediate recall of chemistry info.
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1:20-1:35 PM (209)

Multiple-Attribute Memory: Measuring Event Order. RICHARD CHECHILE and GIULIA PINTEA, *Tufts University* – Underwood (1977; 1983) argued that there are multiple attributes of memory. Consistent with this approach, we advance in this paper, a method for measuring the memory for event order. A processing-tree model is employed to measure four different states of order knowledge for a sequence of events. Experimental evidence is provided that item informational content of an event is rapidly acquired, but more training trials are needed to encode the information about the order of the sequence of events. The experiments thus establish that the information content of events and the temporal/ordinal relationship among the events are dissociable attributes of memory.
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1:40-1:55 PM (210)

Value-Based Routing of Delayed Intentions into Internal and External Memory Stores. SAM GILBERT, QIANMENG ZHU, and DAWA DUPONT, *University College London* – Recent work has shown that prospective memory (memory for delayed intentions) is influenced by the value attached to intended actions. Prior studies have investigated internal memory only, but in everyday life we also have the option to offload intentions to an external store (e.g. a diary or smartphone alert). I will present three experiments (two pre-registered) investigating the causes and consequences of routing intentions to internal vs external stores. Participants preferentially offloaded high- rather than low-value intentions to external memory. Even when only high-value intentions were offloaded, accuracy was improved for both high- and low-value intentions. This suggests that once internal memory is no longer occupied by high-value content, it is reallocated to low-value information.

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Consequently, when the external memory failed, participants had better memory for low- than high-value intentions. These findings demonstrate a value-based selection process for internal vs external memory stores. One corollary of individuals' prioritisation of high-value information for external memory is that they can be left with nothing but low-value information if it fails.
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Language Process

Virtual, Saturday, 12:00-2:00 PM EST

Chaired by Alexia Galati, *University of North Carolina at Charlotte*

12:00-12:15 PM (211)

Task Goals Constrain Interpersonal Coordination: Evidence from the Alignment of Eye-Movements. ALEXIA GALATI, *University of North Carolina at Charlotte,* CAMILA ALVIAR, *University of California, Merced,* RICK DALE, *University of California, Los Angeles,* MORENO COCO, *University of East London* – The benefits of interpersonal alignment on performance are documented in tasks where task partners closely monitor each other's perspective, consistent with the view that partners converge conceptually as they align their behavior. However, it is still underexplored whether these benefits generalize to other tasks: in joint visual search, performance could benefit from a "divide and conquer" strategy. In this study, we evaluate the effect of alignment on performance across tasks. While having their eye-movements tracked and co-registered, dyads planned a route from an origin to a destination (route planning) for five trials and searched for landmarks (visual search) for another five trials. To quantify alignment we subjected time-series of eye-fixations to cross-Recurrence Quantification Analysis (cRQA). Preliminary results (17 dyads) suggest that there is more gaze alignment in route planning than visual search in terms of recurrence rate (RR). Moreover, the interaction between task type and RR was in the predicted direction for trial accuracy and duration, with route planning benefiting more from alignment. Our findings suggest that both alignment and complementarity can be emerging properties of the interaction that serve task goals.
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12:20-12:35 PM (212)

More than Words: Word Predictability, Prosody, Gesture, and Mouth Movements in Natural Language Comprehension. YE ZHANG, *University College London,* DIEGO FRASSINELLI, *University of Kostanz,* JYRKI TUOMAINEN, JEREMY SKIPPER, and GABRIELLA VIGLIOCCO, *University College London* (Presented by Gabriella Vigliocco) – The natural ecology of human language is face-to-face interaction, comprising cues, like co-speech gestures, mouth movements and prosody, tightly synchronized with speech. Yet, this rich multimodal context is usually stripped away in experimental studies as the dominant paradigm focuses on speech alone. We ask how these audio-visual cues impact brain activity during naturalistic language comprehension, how they are dynamically orchestrated and whether they are organized hierarchically. We quantify each cue in video-clips of a speaker and we used a well-established electroencephalographic marker of comprehension difficulties, an event-related potential, peaking around 400ms after word-onset. We found that multimodal cues always modulated brain activity in interaction with speech, that their impact dynamically changes with their informativeness and that there is a hierarchy: prosody shows the strongest effect followed by gestures and mouth movements. Thus, this study provides a first snapshot into how the brain dynamically weights audiovisual cues in real-world language comprehension.
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12:40-12:55 PM (213)

Is Word Lengthening Driven by Phonological Representations or Acoustic Properties? BRETT MYERS, *University of Utah,* CASSANDRA JACOBS and ANDRES BUXO-LUGO, *University of Maryland,* DUANE WATSON, *Vanderbilt University* – Speakers lengthen words that share initial phonological segments with a previously uttered word (e.g., "pencil" and "penny"), possibly because competition between similar sounding words creates interference during the selection of phonemes in the second word. In two experiments, we tested whether phonetic or phonological factors drive lengthening. We tested whether American English speakers with and without a phonological merger (the pin-pen merger) would lengthen a phonologically similar word produced by a talker with the same or different dialect (e.g. "pinny") and found that speakers lengthened equally with phonological overlap but were insensitive to dialect features. The second experiment manipulated the amount of overlap (initial consonant + following vowel) and found equal lengthening for both dialect groups at both levels of overlap. We conclude that the lengthening effect could be driven by phonological representations or a minimal acoustic similarity.
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1:00-1:15 PM (214)

The Influence of Group Membership on Talker Recognition. THOMAS ST. PIERRE and ELIZABETH JOHNSON, *University of Toronto* – Listeners better recognize talkers speaking a familiar language compared to an unfamiliar language (e.g., Thompson, 1987), as well as talkers of more standard varieties (e.g., General American English) compared to nonstandard ones (e.g., AAVE) (e.g., Goldstein et al., 1981; Stevenage et al., 2012). In two experiments, we examined whether group membership may also influence voice recognition, with listeners being better able to recognize in-group voices compared to out-group voices (holding language and accent constant). No differences in listeners' abilities to recognize in-group voices compared to out-group voices were observed in Experiment 1, where recognition was tested directly after exposure. In Experiment 2, however, when listeners were given a break between the exposure phase and testing, preliminary data suggests that listeners were indeed better able to recognize in-group voices over out-group voices. We suggest that in-group voices are encoded by listeners more strongly than out-group voices, and decay more slowly in memory than out-group voices.
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1:20-1:35 PM (215)

Production Learning of Non-Native Speech Contrasts after Training in Perception or Production. MELISSA BAESE-BERK, *University of Oregon & Basque Center on Cognition, Brain and Language (BCBL),* ZOË HAUPT and ZACHARY JAGGERS, *University of Oregon,* ARTHUR

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SAMUEL, *Basque Center on Cognition, Brain and Language (BCBL), Stony Brook University, & Ikerbasque,* TILLENA TREBON, MAGGIE WALLACE, ALLEGRA WESSON, *University of Oregon* – Previous work has found that simultaneous training of a non-native sound distinction in both perception and production can disrupt rather than enhance perceptual learning. In spite of this disruption, subjects trained in both modalities have shown gains in learning to produce the distinction they were trained on, compared to perception-only training. The current study examines the learning of a new sound distinction in production for participants in a variety of training conditions. Spanish native speakers are trained on a novel contrast. Given that learners' productions of the contrast may not be identical to the way native speakers distinguish it, we apply Linear Discriminant Analysis to acoustic measurements of subjects' post-test productions to classify whether and how they do distinguish the categories in a potentially multidimensional space. This classification model is then applied across conditions to compare production learning across training modes and examine how production learning relates to perceptual learning.

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1:40-1:55 PM (216)

Morphemes as Letter Chunks: Discovering Affixes Through Probabilistic Chunking. JAROSŁAW LELONKIEWICZ, MARIA KTORI, and DAVIDE CREPALDI, *International School for Advanced Studies (SISSA)* (Presented by Davide Crepaldi) – During visual word processing, readers appear to be sensitive to probabilistic information (e.g., letter co-occurrence); we assessed whether morpheme identification might rely on similar mechanisms. In Experiments 1-2, we used an artificial script. Participants were exposed to a lexicon of strings composed of a random character sequence that was either followed or preceded by an affix-like chunk. In the absence of any linguistic information, chunks were defined only by the probability with which they occurred in the novel lexicon. In a later testing phase, participants were more likely to attribute a previously unseen string to the novel lexicon if it contained an affix, and if the affix appeared in its typical position. Strikingly, Experiments 3-4 replicated these results with strings composed of real letters. These findings suggest that readers may chunk words using a general, language-independent cognitive mechanism that captures statistical regularities in letter co-occurrence.

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Symposium VIII: Verbal Working Memory: Domain General or Domain Specific?

Virtual, Saturday, 1:00-3:00 PM EST

Chaired by Nazbanou Nozari, *Carnegie Mellon University*

1:00-1:15 PM (SYM36)

Introduction. NAZBANOU NOZARI, *Carnegie Mellon University*

1:20-1:35 PM (SYM37)

Verbal Working Memory: Domain General Sequencing Shaped by Domain Specific Sequences. MARYELLEN MACDONALD, *University of Wisconsin – Madison* – Viewing verbal working memory maintenance as emergent from utterance planning in language production yields testable predictions for how long term linguistic knowledge such as word frequency and co-occurrence affects short term maintenance: The same factors shaping serial ordering in everyday speaking should also affect ordering in verbal working memory tasks, though parallels are sometimes obscured by different task demands. This view appears to be a highly domain-specific approach to verbal working memory. However, these claims must contend with evidence that serial ordering biases in language production are themselves emergent from serial ordering processes in action planning more generally. Together, these claims become a mix of domain generality and specificity: a) language production draws on general serial ordering routines, strongly shaped by task goals and the domain-specific statistics of prior language use, and b) verbal working memory maintenance is emergent from these hybrid specific/general language production processes.

1:40-1:55 PM (SYM38)

Principles of Resource Division in Working Memory: Domain-General or Domain-Specific? NAZBANOU NOZARI and CHRISTOPHER HEPNER, *Carnegie Mellon University* – A key characteristic of working memory is its limited capacity often attributed to "limited resources." The nature of such resources has been studied extensively in the visual domain, with evidence supporting models with flexibly and continuously divisible resources. It remains unclear, however, whether similar mechanisms mediate the division of resources in phonological working memory, given the non-negligible differences between the nature of the representations in the two domains. Adapting continuous reproduction paradigms from visual to phonological domain, I will show that the principles of resource division are indeed similar in visual perception, phonological perception and phonological production. Moreover, I will demonstrate the similarity between the effect of attention on resource division in visual and verbal working memory. Collectively, these results point to domain-general principles of flexible resource allocation in working memory operating on domain-specific representations.

2:00-2:15 PM (SYM39)

Domain-Specific Phonological Working Memory: Evidence from Neuropsychology and Neuroimaging. RANDI MARTIN, *Rice University,* QIUHAI YUE, *Vanderbilt University* – One domain-general account of working memory (WM) is the embedded processes approach, which argues that WM consists of the activated portion of long-term memory, including a limited number of items in the focus of attention. Neuropsychological evidence argues instead for dedicated phonological storage, as brain damaged patients show reduced phonological WM capacity that is independent of: 1) phonological processing ability, 2) WM in other domains (e.g., semantic, graphemic), and 3) general attentional abilities. Recent neuroimaging studies provide converging evidence. Voxel-based lesion-symptom mapping reveals an inferior parietal region (supramarginal gyrus; SMG) supporting phonological WM that is separate from the region involved in graphemic WM and in phoneme processing (superior temporal gyrus; STG). An fMRI study of healthy individuals demonstrates that, using response-similarity analysis (RSA), phonological (but not semantic) codes can be decoded in the SMG but not in the STG during the delay period of a phonological WM task.

2:20-2:35 PM (SYM40)

Domain Generality and Specificity of Verbal Working Memory Training. THOMAS REDICK, *Purdue University* – Research on working

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memory training has proliferated over the past two decades. Multiple studies convincingly show that individuals of all ages and abilities greatly improve on the working memory tasks themselves after practicing for multiple days. However, there are conflicting interpretations about what causes the observed changes on the trained working memory tasks, and whether there is transfer to unpracticed tasks and processes. I review the research (including some from our lab) that has examined how and why verbal working memory training and transfer occurs. Our general conclusion is that such transfer is narrow, and likely reflects strategies that trainees have adapted to the specific verbal memoranda and the tasks used. I discuss the implications for accounts of verbal working memory and reasons why the system would be tuned this way.

2:40-2:55 PM (SYM41)

Q & A. NAZBANOU NOZARI, *Carnegie Mellon University*

Recognition Memory: Forgetting and Confidence

Virtual, Saturday, 1:00-3:00 PM EST

Chaired by Michael Miller, *University of California, Santa Barbara*

1:00-1:30 PM (217)

Invited Talk: Everyday Amnesia: High Confidence Misses in Recognition Memory. HENRY L. ROEDIGER, III (Clifford T. Morgan Distinguished Leadership Award Recipient) and EYLUL TEKIN, *Washington University in St. Louis* – Everyday amnesia, a concept we recently proposed in Neuropsychologia, refers to the phenomenon of a person learning information and then forgetting it with high confidence a short time later. We reported three experiments in which subjects in standard yes/no recognition experiments reported high confidence miss responses, indicating that students could completely forget experiences from about 10 minutes prior to testing. One potential criticism of the phenomenon is that people may have not been paying attention during initial encoding (perhaps they were mind wandering). In two new experiments, we had students read words out loud as they studied them before taking a yes/no recognition test and rating confidence on each decision. In another experiment, students studied each word and decided whether it belonged to one of four categories to ensure deep encoding before taking a similar test. Despite guarantees of word encoding in both experiments, students still judged 15%-20% of miss responses with high confidence. These results provide stronger evidence for the concept of everyday amnesia in intelligent, young college students and, by extension, in other "normal" (non-brain-damaged) adults.

Email: Henry L. Roediger, III, roediger@wustl.edu

1:40-1:55 PM (218)

Who Gives a Criterion Shift? MICHAEL MILLER and EVAN LAYHER, *University of California, Santa Barbara* – Individuals should strategically shift decision criteria when there are disproportionate likelihoods or consequences for falsely identifying versus missing target items. Despite being explicitly aware of the advantages for criterion shifting, some people will shift criteria quite well while others fail to shift entirely. These individual differences in criterion shifting are remarkably stable over time, consistent across decision domains, and cannot be explained by personality characteristics, metacognitive accuracy, motivation, or performance on other cognitive tasks. Criterion shifting tendencies are also unrelated to individual tendencies for reporting confidence to recognition judgments, unless the criterion manipulation specifically asks participants to respond based on confidence levels. Participants who inadequately shift criteria tend to spread out confidence ratings to large degrees suggesting that these individuals are capable of shifting to greater extents but appear unwilling to do so. These findings demonstrate that strategic criterion shifting tendencies are a stable and uniquely individualistic cognitive trait.

Email: Michael B. Miller, miller@psych.ucsb.edu

2:00-2:15 PM (219)

Confidence Judgments Monitor the Replicability of the Response. ASHER KORIAT, *University of Haifa* – Although confidence judgments generally monitor the accuracy of a response, they sometimes fail to do so to the extent of being counterdiagnostic of accuracy. We tested the hypothesis that the distinctive value of confidence judgments is that they are prognostic of the replicability of a response across people and occasions. They do so irrespective of the accuracy of the response, and even when the response does not have a truth-value. In terms of Nelson and Narens' (1990) framework, subjective confidence monitors better same-level than object-level performance: When people indicate their confidence in the accuracy of their choice, their confidence actually monitors the likelihood that others will make the same choice better than the accuracy of that choice. The implications of the results will be discussed.

Email: Asher Koriat, akoriat@univ.haifa.ac.il

2:20-2:35 PM (220)

Forgetting Is Temporary, Practice Persists. ASHLEIGH MAXCEY, *Vanderbilt University,* VICTOR DE LEON, *University of Toledo,* ROSA TORRES, *University of Toronto Mississauga,* SAMANTHA WICK, *Miami University,* KEISUKE FUKUDA, *University of Toronto Mississauga* – When we repeatedly view an object, we build up stronger memory representations of the object, but also forget closely related memories. Here we tested competing explanations for why we appear to forget objects that surround the practiced object in category space. One possibility is that the forgetting of competitors helps us learn the practiced objects. If this induced forgetting is a temporary learning signal, then superior memory for the target item should outlast the forgetting. Alternately, if forgetting is integral to the representation of the improved memory, then superior memory for the target item and poor memory for surrounding items should both return to baseline at the same point after learning. We tested these hypotheses by asking whether the practice benefit and induced forgetting dissipate at the same point in time. We found that induced forgetting persisted after one hour, but not after 24 hours. Yet the boost in memory for the practiced items survived even the longest delay of 24 hours, beyond the persistence of forgetting. These results suggest that the forgetting induced by studying one object is a temporary learning signal, making significant strides toward modeling the relationship between learning and memory.

Email: Ashleigh M. Maxcey, ammaxcey@gmail.com

2:40-2:55 PM (221)

Evidence that Neural Plasticity Underlies Transcranial Direct-Current Stimulation (tDCS) in Humans. CHONG ZHAO and GEOFFREY

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WOODMAN, *Vanderbilt University* (Presented by Geoffrey Woodman) – It is unknown how direct-current stimulation causes its long-lasting effects. Here we tested the hypothesis that the long time course of transcranial direct-current stimulation (tDCS) is due to the electrical fields increasing the plasticity of the brain tissue. We tested this hypothesis by delivering tDCS to the ventral visual stream of human subjects. We found that tDCS improved memory encoding, and the neural correlates thereof, but not retrieval, and did not influence information processing during other tasks that did not require the formation of new connections in the brain. Thus, our findings support the hypothesis that direct-current stimulation modulates brain activity by changing the underlying plasticity of the tissue.
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Reading

Virtual, Saturday, 1:00-2:40 PM EST

Chaired by Bernhard Angele, *Bournemouth University*

1:00-1:15 PM (222)

Is there a Relationship Between Response Inhibition and Eye Movement Control During Reading? BERNHARD ANGELE, *Bournemouth University & Nebrija University,* FRANCISCO ROCABADO and JON ANDONI DUÑABEITIA, *Nebrija University* – Skilled readers are likely to skip short, high-frequency words such as "the" in English. This is the case even when the gaze-contingent display change paradigm (Rayner, 1975) is used to show previews of "the" in positions where they would be infelicitous in the sentence context (Angele & Rayner, 2013). This failure to consider the sentence context when making a skipping decision may stem (1) from an inability to access sentence context information when making the skipping decision or (2) from a problem in selecting the appropriate information for the skipping decision. Previously, response inhibition tasks such as the Flanker task (Eriksen & Eriksen, 1974) and the Simon task (Simon, 1967), have been used to study how participants respond to relevant and ignore irrelevant information. If word skipping and response inhibition depend on the same cognitive processes, a participant's performance on response inhibition tests should be related to their rate of skipping infelicitous "the"-previews. We report an experiment in which we found no evidence for such a relationship, suggesting that infelicitous "the"-skipping is caused by sentence context information being unavailable rather than a lack of inhibition of inappropriate responses.
Email: Bernhard Angele, bangele@bournemouth.ac.uk

1:20-1:35 PM (223)

Incidental Learning of Irrelevant Information During Reading Acquisition. JON ANDONI DUÑABEITIA, *Universidad Nebrija & The Arctic University of Norway,* AURORE ZELAZNY, *Aalborg Universitet,* ELOI PUIG-MAYENCO, *University of Reading,* AINA CASAPONSA, *Lancaster University,* CRISTINA HERRANZ, *Universidad Rey Juan Carlos,* JASON ROTHMAN, *Universidad Nebrija & The Arctic University of Norway* – We investigated if the way in which the alphabet was acquired during childhood determines orthographic processing during adulthood. A series of experiments were conducted with a group of native Spanish young adults who learned the alphabet in a linear fashion (namely, from A to Z), and with a group of native English young adults who learned it via the ABC song. All participants performed a series of letter searching operations requiring highly demanding orthographic/alphabetic processes. The first relevant finding corresponded to the seemingly sequential manner in which the letters are stored in memory, from A to Z, leading to a predictable linear increase in the reaction times and error rates associated with operations performed on the letters as a function of their position in the alphabet. More strikingly, the second effect that we found was a clear-cut mapping between participants' behavior and the manner in which the alphabet had been acquired during childhood. While Spanish participants' responses were correctly accounted for by the position of the letters in the alphabet, English participants' behavior was better accounted for by a distribution of letters in blocks corresponding to the rhythmic bars of the ABC song.
Email: Jon Andoni Duñabeitia, jdunabeitia@nebrija.es

1:40-1:55 PM (224)

How Do Task Demands Influence Predictability Effects during Online Text Reading? SALLY ANDREWS and ROSLYN WONG, *University of Sydney,* LILI YU, *Macquarie University* AARON VELDRE, *University of Sydney,* ERIK REICHLE, *Macquarie University* – It is well established that eye movements during online reading show robust effects of the predictability of words in sentences and texts, but many questions remain about the mechanisms responsible for predictability effects. This study used the Provo Corpus (Luke & Christianson, 2016) to explore these issues. This corpus consists of short passages for which cloze procedures have been applied to every word to assess the predictability of the specific wordform and its semantic and syntactic features. We recorded the eye movements of 44 young adults who read these passages in two counterbalanced conditions: (i) 'reading for meaning' to answer occasional comprehension questions; (ii) 'proof reading' to detect 'transposed letter' lexical errors (e.g., salt instead of slat) in intermixed filler passages. Linear mixed analyses assessed the relative impact of predictability on eye movements as a function of task demands to evaluate different accounts of the source of predictability effects on reading.
Email: Sally Andrews, sally.andrews@sydney.edu.au

2:00-2:15 PM (225)

Nonselective Rereading of Garden-Path Sentences: Online and Offline Data. KIEL CHRISTIANSON, ANNA TSIOLA, SARAH-ELIZABETH DESHAIES, and NAYOUNG KIM, *University of Illinois at Urbana-Champaign* – When people read garden-path sentences ("While Anna dressed the baby that was cute played in the crib"), regressive eye movements are triggered by the error signal (played). Several models of syntactic processing and reading propose readers target regressions to the syntactic choice point (dressed the baby) and then revise syntactic structure and interpretation. This prediction is the same whether hypothesized to be due to syntactic constraints (Selective Reanalysis, Frazier & Rayner, 1982), "noisy-channel" processing (Gibson et al., 2013), or "uncertainty" (Levy et al., 2009). Two eye-tracking experiments (N=154, N=132) tested these assumptions about rereading using a variable backwards-mask technique, in which all, some, or none of the preceding text was masked after reading. In E1, comprehension questions such as "Did Anna dress the baby?" were asked after each sentence. In E2, the same questions were asked both before and after each sentence.

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Both experiments returned large proportions of misinterpretations, no consistent patterns of rereading, and no connection between scanpath analyses (von der Malsburg & Vasishth, 2011) and comprehension. Rereading behaviors were concluded to be basically haphazard in these sentences.
Email: Kiel Christianson, kiel@illinois.edu

2:20-2:24 PM (226)

Algorithms for the Automated Correction of Vertical Drift in Eye Tracking Data. JON CARR, VALENTINA PESCUMA, and DAVIDE CREPALDI, *International School for Advanced Studies (SISSA)* – A common problem in eye tracking research is vertical drift—the progressive displacement of fixation registrations that results from a loss of calibration over time. This is problematic for experiments that involve reading multiline passages, where it is critical that fixations on one line are not erroneously recorded on another. Correction is often performed manually, but this is time-consuming and error-prone. Various methods have previously been proposed for the automated correction of vertical drift, but these have largely been developed in isolation with little attempt to systematically evaluate them, meaning that drift correction techniques are moving forward blindly. We document nine major algorithms, including two that are novel to this paper, and evaluate them using both simulated and natural eye tracking data. Our results show that certain algorithms perform better than others on particular types of drift phenomena, allowing us to offer evidence-based advice on algorithm selection.
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Letter/Word Processing II

Virtual, Saturday, 1:00-3:00 PM EST

Chaired by Pablo Gomez, *Universidad Nebrija*

1:00-1:15 PM (227)

Reading across Two-Lines: Testing Perceptual Uncertainty Accounts of Letter Position Coding. PABLO GOMEZ, *California State University, San Bernardino Palm Desert Campus,* ANA MARCET, *Universitat de València,* ANA BACIERO and MANUEL PEREA, *Universitat de València & Universidad Nebrija* – Pseudowords created by transposing two letters of words (e.g., MOHTER) are highly confusable with their base word; this is known as the transposed-letter similarity effect. A common explanation of this effect is in terms of perceptual uncertainty when encoding the order of letters in a string. We tested the feasibility of a perceptual uncertainty model (Gomez et al.'s, 2008, overlap model) in a lexical decision experiment in which transposed-letter pseudowords and their replacement-letter controls were written in the standard one-line format or in a 2-line format. We extended Gomez et al.'s (2008) overlap model to account for 2-line reading, and the model cannot predict transposed-letter effects that span two lines. While there was some decrease of the transposed-letter effect in the two-line format when compared to the one-line format, the transposed-letter effect in the 2-line format was still substantial. This finding poses a significant challenge to those position uncertainty accounts that assume that the transposed-letter effect is mostly related to limitations of the visual system and add support to the idea that both orthographic and perceptual factors are at play when encoding letter position during word recognition.
Email: Pablo Gomez, Pablo.gomez@csusb.edu

1:20-1:35 PM (228)

The Sentence Superiority Effect in Young Readers. STEPHANIE MASSOL, *Université Lumière Lyon 2 & Laboratoire EMC,* JONATHAN GRAINGER, *Laboratoire de Psychologie Cognitive CNRS, Institute of Language, Communication and the Brain (ILCB), & Aix-Marseille University* – The sentence superiority effect observed with skilled adult readers has been taken to reflect parallel processing of word identities and the rapid construction of a preliminary syntactic structure. Here we examined if such processing is already present in primary school children in Grade 3 (average age 8.9 years). Children saw sequences of 4 horizontally aligned words presented simultaneously for 500 ms and followed by a post-mask and post-cue indicating the position for report of one of the four words. Word identification was more accurate in grammatically correct sequences compared with ungrammatical scrambled sequences of the same words, and this sentence superiority effect did not interact with position. This replicates the pattern found in prior research with adults and suggests that parallel word processing and the associated efficiency in syntactic processing is already in place in Grade 3. We also found that accuracy in identifying words, independently of the surrounding context, correlated with reading age. This points to efficient word-in-sequence identification as one key ingredient of the process of becoming a skilled reader.
Email: Stephanie Massol, stephanie.massol@univ-lyon2.fr

1:40-1:55 PM (229)

On Non-Adjacent Letter Repetition and Orthographic Processing. EMILIA KERR, JONATHAN MIRAULT, and JONATHAN GRAINGER, *CNRS & Aix-Marseille University* (Presented by Jonathan Grainger) – Prior research has revealed that words containing non-adjacent repeated letters are harder to recognize than words without repeated letters. Building on one specific explanation (open-bigram coding) of these letter repetition effects in words, we predicted that nonwords in a lexical decision task should also be sensitive to letter repetitions. We compared performance to two types of nonword generated from the same baseword: 1) nonwords created by repeating one of the letters in the baseword (e.g., silence => silencne); and 2) nonwords created by inserting a letter that is not present in the baseword (e.g., silencre). According to open-bigram coding, nonwords created by repeating a letter are more similar to their baseword than nonwords created by inserting a letter, and therefore it should be harder to reject letter repetition nonwords than letter insertion nonwords. The results of three experiments confirmed this prediction.
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2:00-2:15 PM (230)

Does the Cowl Make the Monk? Detecting Counterfeits in Brand Names vs. Logos. MANUEL PEREA, *Universitat de València,* ANA BACIERO and FRANCISCO ROCABADO, *Universidad Nebrija,* ANA MARCET, *Universitat de València* – Companies and products are identified by their brand names, which are typically written with a specific letter style, color, and design (i.e., logos). This graphical information offers a distinctive image that facilitates their recognition. However, the uniqueness of

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these configuration cues may make brand names more vulnerable to counterfeiting via misspelling. We examined whether the confusability at detecting misspelled brand names is higher when embedded in the full logo than when presented in plain format (Experiment 1) or when removing all graphical information other than typeface from the logo (Experiment 2). Participants had to decide whether the presented item was an original or a misspelled brand name. The misspelled stimuli were created by either transposing or replacing two internal letters of popular brand names (amazon à amzaon vs. amceon), thus allowing us to have a measure of the transposed-letter confusability effect. Results showed a sizeable transposed-letter confusability effect for all types of brand names, but the effect was greatest for the misspelled full logos and smallest for the misspelled plain brand names. Thus, logos are quite vulnerable to counterfeiting via misspelling branding.
Email: Manuel Perea, mperea@uv.es

2:20-2:35 PM (231)

The Nature of Letter Representations: Abstract Letter Identity and Shape Information. ALAIN CONTENT, THOMAS AMIGHI, and FABIENNE CHETAIL, *Université Libre de Bruxelles* – In the field of visual word recognition, it is generally believed that early visual analysis consists in extracting abstract letter identities from the shape of letters and that the resulting orthographic code constitutes the effective representation making contact with the lexical storage system. We present a study demonstrating that the representation extracted from letter strings is richer and includes detailed information about shapes. Two experiments employed the length estimation task (Chetail & Content, 2014) and contrasted strings varying by the width of their letters. Half the items included narrow letters such as "i", "j" or "l", and the other half included wider letters such as "m" or "w". The two sets were matched on number of letters and presented in monospace font, so that the extent of matched strings was identical. Stimuli were presented for 100 msec, with pre- and post- masking. Despite their identical physical length, wider letter strings were estimated longer than narrower ones, indicating that the extracted code contains letter width information. Whether this information is relevant to word recognition is a question for future research.
Email: Alain Content, alain.content@ulb.be

2:40-2:55 PM (232)

The Effect of Foveal Eccentricity on Word Identification: Theory and Data. AARON VELDRE, *The University of Sydney,* LILI YU, *Macquarie University,* SALLY ANDREWS, *The University of Sydney,* ERIK REICHLE, *Macquarie University* – A seminal eye-movement study by Rayner and Morrison (1981) examined lexical-decision latencies and accuracies as a function of both foveal eccentricity and whether or not participants were allowed to move their eyes. Classification accuracy in the no-eye-movement condition was well above chance (~0.65) even when letter strings were displayed 3° from the center of vision, although there were many methodological limitations (e.g., no reported exclusion of trials containing saccades in the no-eye-movement condition). Here we report a new experiment in which a gaze-contingent paradigm was used to ensure that participants in the no-eye-movement condition of a lexical-decision task actually maintained central gaze. As will be reported, performance was markedly poorer than observed by Rayner and Morrison. The theoretical implications of these findings are discussed in relation to models of eye-movement control (e.g., E-Z Reader) and reading (e.g., *Über-Reader*).
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Emotion: Attention, Memory, and Language

Virtual, Saturday, 1:00-3:00 PM EST

Chaired by Michael McBeath, *Arizona State University*

1:00-1:15 PM (233)

F You A Hole! Swear Words Are More Likely to Contain Vowels Low in Harmonicity and Tone-Height. MICHAEL MCBEATH and K. JAKOB PATTEN, *Arizona State University* – We tested English swear words to see if they cluster within regions of the International Phonetic Alphabet (IPA) and related Multidimensional Scaled (MDS) vowel space. First, we analyzed the twelve monopthong North American vowel phonemes and found both IPA and MDS reveal nearly identical mappings, similar to ones based on oral musculature or formants. One dimension, spanning vowels æ (sap) to u (soup), significantly correlates with harmonicity (harmonic overtone alignment) [r(10)=0.62], while the second, spanning vowels i: (seek) to ʌ (suck), significantly correlates with tone-height (spectral centroid) [r(10)=0.90]. Inharmonic sounds, like æ, are generally perceived as less pleasant, as are those with lower tone-height, like ʌ. In the principal experiment, both American and British swear words were found more likely to contain the phonemes æ [Cohen's d=5.5 (American) and 4.9 (British)] and ʌ [Cohen's d=1.2 (American) and 1.0 (British)]. This supports that the emotional valence of swear words are systematically related to the spectral characteristics of vowel phonemes. Swear words favor phonemes generically judged as less pleasant, which provides insight into semantic differences between scatological terms like poop and crap.
Email: Michael K. McBeath, Michael.McBeath@asu.edu

1:20-1:35 PM (234)

Getting a Grip on Emotions - Concreteness, Imageability, and Context Availability Measures for Basic Emotion Terms. HALSZKA BAK, *Adam Mickiewicz University,* JEANETTE ALTARRIBA, *University at Albany, SUNY* – We collected measures of concreteness, imageability, and context availability for words denoting basic emotions in English. The words were all synonyms of the six basic emotion terms (anger, fear, sadness, disgust, surprise, joy) in noun, verb, and adjective forms. Male and female native speakers of English were asked to evaluate the words on concreteness, context availability, and imageability. Analyses indicated significant differences in the evaluations between genders, as well as between individual basic emotions and parts of speech. Women appear to evaluate all basic emotions as more abstract and harder to imagine. Among the basic emotions, anger appears most difficult to imagine and contextualize, and sadness is the least concrete. Among the parts of speech – verbs are the least abstract and easiest to imagine, while nouns score lowest of the three on context availability. The implications of these findings for psycholinguistic research and the embodiment theory of emotions will be discussed.
Email: Halszka Bąk, halszka.bak@gmail.com

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1:40-1:55 PM (235)

Human and Machine Validation of 14 Databases of Dynamic Facial Expressions. EVA KRUMHUBER, *University College London,* DENNIS KÜSTER, *University of Bremen & Jacobs University Bremen,* SHUSHI NAMBA, *Hiroshima University* – We tested 14 databases of dynamic facial expressions (published between 2000 and 2015) in a cross-corpus validation effort. In Study 1, a subset of stimuli from each database (N=162) were presented to human observers and machine analysis. Emotion classification accuracy ranged from 34% to 83% across the databases, with posed expressions being judged more accurately and as intense, but less natural compared to spontaneous ones. Study 2 aimed for a full validation of the 14 databases by subjecting the entire stimulus set (N=3812) to machine analysis. Facial configurations were found to be more prototypical in posed than spontaneous expressions, with the prototypicality of an expression significantly predicting emotion classification accuracy. Together, the findings suggest that existing databases vary in their ability to signal specific emotions, thereby facing a trade-off between realism and ecological validity on the one end, and expression uniformity and comparability on the other.

Email: Eva Krumhuber, e.krumhuber@ucl.ac.uk

2:00-2:15 PM (236)

Exploring the Link Between Self-Rated and Expressed Empathy with Face Identity and Expression Recognition. KAREN LANDER, *University of Manchester* – Previous work has suggested that socio-emotional functioning may be one factor that influences our ability to recognise face identity and facial expressions. In the presented experiment, we explore the role of empathy on face identity and expression recognition ability. Specifically we measured the empathy and social anxiety levels of participants using both a questionnaire (self-rated empathy using Empathy Quotient, EQ; also see work by Bate et al., 2012) and their expressed empathy (cyberball game; Williams & Jarvis, 2006). Our results found a positive correlation between self-rated (EQ) and expressed (cyberball) empathy and confirmed a positive relationship between self-rated empathy (EQ) and both face recognition memory and expression recognition. However, there was no significant correlation between expressed empathy, social anxiety and either face recognition memory or expression recognition. Our findings support the idea that self-rated empathy is related to face identity and expression recognition and we propose that further work is needed to explore this relationship and different measures of empathy – as well as other individual difference measures of socio-emotional functioning.

Email: Karen Lander, karen.lander@manchester.ac.uk

2:20-2:35 PM (237)

Arousal Biases the Temporal Cohesion for a Real-Life, In-Person Haunted House. VISHNU MURTY, *Temple University* – Emotion prioritizes the most salient event features in memory often at the expense of contextual details. Event perception posits that context scaffolds memory as experiences unfold over time. Arousal-mediated disruptions in context could impair the temporal cohesion of memory. In this study, we had 48 participants partake in a real-life haunted house and tested free recall 1 week later. Compared to the control event, there were greater self-reports of fear and increased heart rate, in the haunted house. While participants recalled an equivalent proportion of episodic details across both events ($p=0.76$), memories of the haunted house were directed towards perceptual details and away from action details ($p<0.01$). Finally, individuals were less likely to use temporal context to organize free recall for the haunted house ($p<0.001$). These findings suggest that during an aversive event biases memory encoding towards perceptual details and away from action details, which disrupts the temporal coherence.

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2:40-2:55 PM (238)

Gone for Good: Lack of Priming Suggests Early Perceptual Interference in Emotion-Induced Blindness. SANDERSAN ONIE, *University of New South Wales & Black Dog Institute,* COLIN MACLEOD, *University of Western Australia,* STEVEN MOST, *University of New South Wales* – Emotional stimuli capture attention to such a degree that they can cause people to miss seeing subsequent targets that appear in front of their eyes. It is unclear whether this effect (known as emotion-induced blindness) reflects post-perceptual interference, in which case unseen targets might still impact later responses, as in the seemingly similar "attentional blink." An alternative is that emotional distractors prevent target encoding and leave no residual trace of target processing. In this study, we used a priming task to assess these alternative possibilities. Each emotion-induced blindness trial was immediately followed by a speeded arrow judgment task, in which the arrow's orientation was congruent or incongruent with the orientation of an emotion-induced blindness target. Analyses revealed strong evidence that seen targets primed the arrow judgment, but there was moderate to strong evidence that unseen targets elicited no priming whatsoever. These results lend support to claims that emotion-induced blindness reflects failure to perceptually encode target information, and that it may involve a different mechanism than those thought to underpin the phenomenally similar attentional blink.

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Sensation and Perception

Virtual, Saturday, 1:00-2:40 PM EST

Chaired by David Rosenbaum, *University of California, Riverside*

1:00-1:15 PM (239)

People Work Hard to Maintain Social Distance. DAVID ROSENBAUM, *University of California, Riverside* – How far away from each other people sit or stand reveals much about their social proximity, but merely sitting or standing may not test the limits of social boundaries as much as collaborating on tasks requiring physical coordination. We asked university students to walk two abreast while carrying a single long pipe from one end of a workspace to another. Hurdles in the workspace forced the dyads to decide whether to walk close together without stepping over the hurdles or walk farther apart, stepping over the hurdles. Our subjects mainly chose the latter option, stepping over the 18-inch-high hurdles rather than walking on level ground. The composition of our subject pool did not let us test racism or other forms of xenophobia with this method, but future studies could. The method may provide a training venue for bringing people together using action rather than words.

Email: David A. Rosenbaum, rosenb13@gmail.com

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1:20-1:35 PM (240)

Binding for Action Slips. ROLAND PFISTER (2020 Early Career Award Recipient) and ANNA FOERSTER, *University of Würzburg,* BIRTE MOELLER, *University of Trier,* GREG HUFFMAN, *University of Notre Dame,* WILFRIED KUNDE, *University of Würzburg,* CHRISTIAN FRINGS, *University of Trier* – Humans rely on a powerful mechanism to control their actions – they bind features of their response to stimulus features, which provides seamless access to that response when re-encountering the same situation later on. But how do such bindings come about? Is the success of a response, the mere co-activation of a stimulus and a response, or the intended goal of the action the driving force of binding? We present an approach that disentangles these three accounts by examining binding effects for action slips, i.e., unintended, erroneous responses. Participants provided speeded responses to letters and we assessed binding through sequential analyses of performance as a function of feature overlap between trials. The results support the view that successful and unsuccessful episodes both enter bindings and that these bindings pertain to the intended, correct response rather than to the executed, erroneous response. This finding qualifies binding as an immediate measure to learn from errors.
Email: Roland Pfister, roland.pfister@uni-wuerzburg.de

1:40-1:55 PM (241)

A Neural Habituation Account of the Negative Compatibility Effect. LEN JACOB, KEVIN POTTER, and DAVID HUBER, *University of Massachusetts Amherst* (Presented by David Huber) – The Negative Compatibility Effect (NCE) is slower reaction times (RTs) to report the direction of a target arrow following a prime arrow that points in the same direction as compared to a prime that points in the opposite direction. The cause of the NCE has been debated, with some studies indicating a perceptual locus, while others indicate a response effect. We applied the neural habituation model of Huber and O'Reilly (2003) to the NCE, explaining the varied results as reflecting changes in the timing of events in the display sequence. We developed a novel variant of the NCE task, specifying the perceptual dynamics of orientation priming as measured with threshold accuracy. This revealed a rapid transition from positive to negative priming as a function of prime duration and a second experiment ruled out a response priming account. The perceptual dynamics of the neural habituation model were fit to these results and the resulting parameter values were fixed in applying the model to the NCE literature. Application of the model to RTs necessitated the addition of a response representation. Our experimental and modeling results indicate that the NCE is a mixture of rapid perceptual priming and slower response priming.
Email: David Huber, dehuber@umass.edu

2:00-2:15 PM (242)

What Is the Reference Frame of the Distribution of Attention Along the Depth-Axis? Evidence from a Simulated Driving Task. ALLISON SEKULER, *McMaster University, Rotman Research Institute, Baycrest, & University of Toronto,* JIALI SONG, PATRICK BENNETT, and HONG-JIN SUN, *McMaster University* – Previous research suggests that attention along the depth-axis in peri-personal space is concentrated between the viewer and the fixation, and decreases rapidly beyond. However, little is known about how attention is distributed beyond peri-personal space, as in conditions commonly encountered during driving. We examined the distribution of attention along the depth-axis in a simulated driving context to determine whether attention has a viewer- or fixation-centered reference frame. Participants detected peripheral targets while travelling forward, keeping a constant distance to a lead car. Target distance (9.25, 18.5, 37m) was simulated using linear perspective cues and simulated forward self-motion while keeping retinal characteristics constant. The plane of fixation was manipulated between subjects by varying car-following distance. Reaction time increased with target distance, but targets at 18.5m were detected most accurately. Detection did not vary with car-following distance. Thus, our results are consistent with the idea that attention along the depth-axis has a viewer-centered reference frame.
Email: Jiali Song, songj16@mcmaster.ca

2:20-2:40 PM (243)

Passage of Time, Temporal Estimation, and Time Production during COVID Distancing. EVE ISHAM and SARA LOMAYESVA, *University of Arizona,* KEVIN GRIMM, *Arizona State University,* MATTHEW GRILLI, *University of Arizona* – The pacemaker-accumulator model of time perception posits that arousal and attention play a critical role in temporal cognition. Under circumstances such as during COVID distancing, arousal and attention levels deviate from normal state due to changes in daily activities, mood, and mental health associated with distancing. The current study examined three time measures, time passage, estimation, and production, which are often uncorrelated under laboratory settings. Participants (N=160) rated their experience of time passing before and during distancing, produced a duration of one minute, and estimated how long it took for them to complete the study session without consulting a clock. Preliminary correlation analyses reveal relationships between these three time measures and mental health (e.g., correlations between time passage, time production, and depression). These results may be explained by changes in arousal and attention associated with depression and anxiety during COVID distancing.
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POSTER SESSION I

Thursday

Poster authors will be present for Q&A between 5:30-7:30 PM EST, with posters available for viewing for 6 months, beginning November 6.

Poster Session I

5:30-7:30 PM (1001)

Monkey Strategy Use in Probabilistic Categorization. WILL WHITHAM, MICHAEL BERAN, and DAVID WASHBURN, *Georgia State University* – Humans and nonhuman animals categorize the natural world, and their behaviors can reveal how they use the stimulus information they encounter in service of these categorizations. Probabilistic categorization, in which the relationships among stimulus information and category membership that are observed by an individual are fundamentally probabilistic, presents unique challenges both to the categorizer and to the psychologist attempting to model their behavior. A first experiment probed cognitive strategy use across five variants of the same task in which the probability structure was constant, but the

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appearances and onscreen locations of cues and responses changed. A second experiment presented a series of manipulations of theoretical interest to the animals by changing the probability and reward structures of the task. A third experiment extended the reward rate manipulations of the previous experiment even further. Across all experiments, inferred strategy use was remarkably stable. Those animals that used cue-based strategies often returned to the same specific strategy experiment after experiment, as the cues, responses, probabilities, and contingencies changed around them.
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5:30-7:30 PM (1002)

Pigeon (*Columba livia*) Performance on the Delayed Match to Sample (DMTS) Task as a Function of Age. MARY FLAIM and AARON BLAISDELL, *University of California, Los Angeles* (Sponsored by Angelo Santi) – In a delayed match to sample (DMTS) task, subjects are first shown a sample stimulus, and then are presented with two (or more) comparisons after a delay, with selection of the matching comparison being rewarded. DMTS can be used to measure working memory across a wide variety of ages and in different species. When a small stimulus set is used, the prefrontal cortex (PFC) is implicated in performance. Tasks that rely on the PFC are sensitive to age-related declines, and correspondingly age-related deficits in the DMTS have been found in humans and primates. Pigeons show similar performance to primates, which also relies on equivalent underlying neural mechanisms. Yet age-related changes in DMTS have not been investigated in this species. Pigeons can live 20 years in captivity and cognitive deficits have been shown by age 12, but only hippocampal-dependent tasks have been investigated. We administered the DMTS to pigeons of various ages to study age-related changes in the equivalent brain region.
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5:30-7:30 PM (1003)

Do Belugas Cooperate to Engage in Social Object Play? JACKSON HAM, *University of Lethbridge,* MALIN LILLEY, *Texas A&M University – San Antonio,* HEATHER HILL, *St. Mary's University* (Sponsored by Heather Hill) – Belugas are a gregarious species that congregate in large herds during the summer months, socializing and breeding. Unlike their primary predator the killer whale, belugas are not known to engage in cooperative hunting or other forms of cooperation. The purpose of this study was to examine the presence of cooperative object play in belugas. Specifically, we were interested in the frequency, the partners, the object, and sequence of cooperative actions. Using archived video footage from 2007-2019 of a population of belugas in managed care, we event sampled and coded social object play. The results indicated that cooperative object play occurred but not often. When it occurred, it usually involved immature belugas of similar age and specific objects that elicited joint, reciprocal interactions or play. These observations indicate that belugas are capable of cooperating and coordinating play, which should also be investigated for belugas in their natural habitat.
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5:30-7:30 PM (1004)

Turtles Respond to a Mirror but it is Not Due to Recognition of Self or Another Conspecific in the Mirror. TOHRU TANIUCHI, *Kanazawa University,* TSUKASA HEYA, *Kanazawa University Junior High School*, MIKITA NISHIKAWA, *Japan Foundation for AIDS Prevention* – The present study examined responses to a mirror by eight turtles (Mauremys reevesii and Mauremys japonica). In Experiment 1, a mirror and the same size flat gray board were set next to each other on one of the four walls of a rectangular blue container. Turtles were placed individually in the container during 10-minute trials. It was shown that turtles responded significantly longer to the mirror than the gray board. In Experiment 2, using a bigger gray container, we compared turtles' responses to the mirror with an adjacent transparent wall without any object beyond it, the transparent wall with another conspecific beyond it, and a gray wall during five-minute trials. Turtles responded significantly longer to the mirror than the gray wall, replicating the result in Experiment 1. However, total duration of responses to the mirror was almost equal to the transparent walls with or without another conspecific beyond it. There were not any reliable differences between the transparent walls with or without another conspecific beyond it. The results suggest that turtles respond to the mirror but it is not because they recognize self or another conspecific in the mirror but because they try to go in to the place beyond the mirror.
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5:30-7:30 PM (1005)

Presence and Degree of Contrafreeloading in Grey Parrots (*Psittacus erithacus*). GABRIELLA SMITH, *Hunter College, CUNY & Harvard University,* DIANA GREENE and IRENE PEPPERBERG, *Harvard University* – Contrafreeloading is the choice to perform a physical task to access food over freely available food. This study examined the presence and degree of contrafreeloading in two grey parrots (Psittacus erithacus), Griffin and Athena. In Experiment 1, degrees of contrafreeloading were classified as: calculated contrafreeloading (working to access preferred food over less-preferred freely available food); classic contrafreeloading (working to access food equal in value to freely available food); and super contrafreeloading (working to access a less-preferred food over freely available food). Griffin (male, 24 years old) significantly preferred classic and calculated contrafreeloading; Athena (female, 6 years old) significantly preferred calculated contrafreeloading. Experiment 2 examined more ecologically relevant contrafreeloading, using shelled and unshelled almonds: Athena significantly preferred cracking an almond's shell; Griffin did not. Differences in contrafreeloading between the two grey parrot subjects are considered here as individual differences in the extent to which a task is considered self-reinforcing play.
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5:30-7:30 PM (1006)

Instrumental Basis of a Behavioral Interconnection Model of Insightful Problem-Solving. LUIZ SANTANA, *University of São Paulo & University of California, Los Angeles*, MIRIAM GARCIA-MIJARES, [1]*University of São Paulo*, AARON BLAISDELL, *University of California, Los Angeles* (Sponsored by Aaron P. Blaisdell) – Defining features of insightful problem-solving involves sudden changes in behavior that leads to the solution of a problem. The behavioral interconnection model developed by Epstein and his colleagues frames spontaneity and goal-directedness as dependent upon learning history. This study summarizes findings from rodents on the role played by the instrumental learning

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upon insightful problem-solving that points toward the necessity of these instrumental behaviors to the occurrence of the insightful behavior and changes on operant levels of other instrumental behaviors. These changes include a decrease in the frequency of behaviors not related to the solution and an acceleration in the occurrence of the new behavior that solves the problem. Finally, we propose a new way to explore the extent of how these heuristic strategies may affect this insightful behavior and to test whether behavioral interconnection is dependent upon goal-directedness or due to the shaping contingencies underlying the operant training.
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5:30-7:30 PM (1007)

The Role of Inhibition in the Suboptimal Choice Task. VALERIA GONZÁLEZ, *University of California, Los Angeles & University of Minho,* AARON BLAISDELL, *University of California, Los Angeles* – Given a choice, pigeons prefer an initial-link stimulus that is followed by reliable signals that food will be delivered (S+) or not (S-) after a delay over an alternative initial-link stimulus that is followed by unreliable signals of food, even when the former yields a lower overall probability of food. This suboptimal preference has been attributed to the combination of a biased attraction to the S+ and ignoring the S-. We evaluated the inhibitory properties of the S- in two experiments, investigating its role in the suboptimal preference. In Experiment 1, pigeons were trained in an autoshaping procedure with the four terminal-link stimuli of the suboptimal choice task; S+ was continuously reinforced, S3 and S4 were each partially reinforced on a 50% schedule, and S- was never reinforced. Summation tests showed that S- acquired inhibitory properties during training. Experiment 2 replicated the results of the summation tests after training on the full suboptimal choice procedure. Furthermore, the inhibitory properties of the S- positively correlated with the strength of suboptimal preference. Future models explaining performance in the suboptimal choice task should consider inhibition to the S- as player in suboptimal choice.
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5:30-7:30 PM (1008)

Using an Odor Span Task to Compare Dog and Human Olfactory Working Memory. JORDAN SMITH, SARAH KRICHBAUM, JACOB VAUGHN, EMMA COX, and JEFFREY KATZ, *Auburn University* (Sponsored by Jonathon Crystal) – An incrementing non-match-to-sample task with odors, known as the odor span task (OST), can be used to study working memory. In this study, dogs (n=6) and humans (n=24) were compared on a 72-trial session that consisted of 72 different odors. On every trial, a response to a session new odor but not a previously encountered old odor from the session was marked correct. Dogs' overall performance (79%) was greater than humans' (71%). Within-session performance across 12-trial blocks revealed a similar decrease in accuracy as trial block increased for both species. These results show a qualitative similarity with a quantitative difference between dogs and humans on the OST. The variables that may influence these functional relationships will be discussed.
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5:30-7:30 PM (1009)

Avoiding the Short End of the Stick: Consistent Second-Order Motor Planning by Cotton-Top Tamarins (Saguinus oedipus). NATALIE SCHWOB and DANIEL J WEISS, *The Pennsylvania State University* (Sponsored by Daniel Weiss) – One of the hallmarks of complex motor planning in humans involves grasping objects not only on the basis of their affordances but keeping in mind future intended actions. This ability has an extended developmental trajectory and also appears to be shared with nonhuman primates. Here, we presented seven cotton-top tamarins with a dowel task that has engendered highly variable behaviors for some primate species. Tamarins could either use an efficient grasp to bring food stuck onto the end of a dowel to their mouth (radial grasp) or an inefficient grasp that required repositioning (ulnar grasp). All tamarins consistently and almost entirely used radial grasps (mean P=.93, SD=.09). These data support the morphological constraint hypothesis suggesting that species with limited dexterity (inability to perform precision grasps) may demonstrate second-order motor planning more often than highly dexterous primates due to the greater consequences of inefficient grasping postures.
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5:30-7:30 PM (1010)

Chlordiazepoxide in Young Versus Middle-Aged Rats: Students Experience the Excitement of Research While Conducting a Class Project. ALANA ROSA and PAMELA JACKSON, *Radford University* – During spring of 2020, students in an upper-level psychology class conducted a research project using rats. Thankfully, they collected data before the campus closed due to COVID-19 and, after completing the analyses online, were eager to present virtually at a local conference held on campus. The project involved examining the effects of the anxiolytic drug chlordiazepoxide (a benzodiazepine) on elevated plus-maze and open field performance in female rats: young and naïve, middle-aged and naïve, or middle-aged and experienced. Knowing more about how these drugs affect rats of varying ages may help us to better understand how they may differentially affect human females of varying ages. When comparing the groups, the young drug rats were more active on the tasks than the middle-aged rats, regardless of experience or drug. These results suggest that benzodiazepines may make young females more active compared to older females.
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5:30-7:30 PM (1011)

Decoding Pre-trial Pupil Diameter from EEG Dynamics in an Auditory Oddball Task. BLAKE ELLIOTT, DEANNA STRAYER, MATTHEW ROBISON, CHRIS BLAIS, SAMUEL MCCLURE, and GENE BREWER, *Arizona State University* – The adaptive gain theory posits that the locus coeruleus-norepinephrine (LC-NE) system is crucial in regulating arousal and task engagement. Importantly, this theory hypothesizes that tonic activation of the LC-NE system has an inverted U-shaped relationship with task engagement and performance. The current study is direct replication and extension of Murphy et al. (2011) which investigated two proposed psychophysiological biomarkers of the LC-NE system: pupil diameter and the P3 event-related potential (ERP). Data was collected during a two-stimulus auditory oddball task. We replicate the results from Murphy et al. (2011). Pre-trial pupil diameter exhibited an inverted

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U-shaped relationship with P3 amplitude. Furthermore, decoding methods were used to predict pre-trial pupil diameter from ERP scalp topographies and oscillatory activity. The results provide evidence for the adaptive gain theory, as well extend our understanding of different ERP and oscillatory dynamics that may underlie arousal and task-engagement.
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5:30-7:30 PM (1012)

Real-Time Analysis of Pointing Responses Suggests S-R Associations and Translation Between Memory Codes are Necessary to Explain Stroop and Reverse Stroop Effects. HANSOL RHEEM and CHRIS BLAIS, *Arizona State University* (Sponsored by Chris Blais) – Translation accounts of the Stroop effect posit that one prominent source of interference is the result of translating from one mental representation (e.g., hue) to another (e.g., verbal response). The support for this account comes from card-sorting or mouse-pointing experiments in which Stroop stimuli (e.g., the word BLUE in red ink) are "sorted" into bins labeled with a word or a color patch. There is little/no interference in these tasks as long as the modalities of task-relevant stimuli features and bins match, whereas there is substantial interference when they don't match. The current study explores how interference manifests in these tasks in real time using a mouse-tracking task. Participants performed 4FC variants of Stroop and reverse Stroop tasks making their response by pointing to the color- or word-labelled location (i.e., Durgin, 2000; Blais & Besner 2006). We replicate work showing interference effects in both untranslated Stroop and reverse Stroop tasks, even in the absence of a translation. Several mouse-tracking measures reveal that stimulus-response associations contribute to both the translated and untranslated sources of interference.
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5:30-7:30 PM (1013)

Crossmodal Spatial Congruence and Visual Dominance: Selective Attention to Visual and Auditory Location Words. LINDA TOMKO and ROBERT PROCTOR, *Purdue University* (Sponsored by Robert Proctor) – Visual dominance is commonly found in crossmodal contexts, particularly in tasks using physical spatial stimuli. In such tasks, irrelevant spatially incongruent visual stimuli interfere with attending and responding to auditory spatial stimuli more than when the modalities are reversed. In the current study, rather than physical spatial stimuli, participants were presented with the words "left" or "right" simultaneously centered on a visual display and binaurally. They responded with corresponding button presses to the modality that was cued. In this case, spatial congruence effects were not significantly different between modalities, except for an interaction in the error data. For incongruent trials, errors were fewer when attending to auditory stimuli compared to visual, but only if the prior trial also required auditory attention. The findings suggest visual dominance in spatial contexts may rely on more direct congruence between physical location stimuli and is not apparent with less direct congruence between spatial representations.
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5:30-7:30 PM (1014)

Using Eye Movements to Study a Selection History Effect in Visual Search: The Item-Specific Proportion Congruent Attention Capture Effect. CHAO WANG, *McMaster University & Huzhou University*, MITCHELL LAPOINTE, *McMaster University & Mount Allison University,* HONGJIN SUN and BRUCE MILLIKEN, *McMaster University* (Presented by Hongjin Sun) – Attentional sets can be formed and bound to specific stimuli and contexts. We reexamined this conceptual issue in the item-specific proportion congruency (ISPC) effect on attentional capture. On congruent trials, a singleton shape target was presented amidst distractors that differed from the target in shape and colour. On incongruent trials, a singleton shape target again differed from all distractors in shape, but matched the colour of all distractors except one, the colour singleton distractor. We manipulated the relative proportions of congruent and incongruent trials separately for two distinct item types that were randomly intermixed. We observed a larger congruency effect in RT for the high proportion congruent item type. The accompanying eye movement recordings suggest that this ISPC effect cannot be explained entirely by increased time spent fixating distractors after the capture of attention. The results suggest ISPC effect impacts the activation of goal-related processes that mediate attention capture.
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5:30-7:30 PM (1015)

Task-Irrelevant Food Images Capture Attention in a Rapid Serial Visual Presentation Paradigm. MARC BALLESTERO-ARNAU, MANUEL MORENO-SÁNCHEZ, and TONI CUNILLERA, *Universitat de Barcelona* – Visual attention plays a crucial role in eating behavior. In a first experiment, we asked participants to memorize food or nonfood images, and we used those images as distractors in following single target rapid serial visual presentation (RSVP) task. Results indicated that task-irrelevant food images elicited a larger attentional blink (AB) effect than nonfood images. Moreover, the AB effect was found to be modulated by the memorized items that participants recognized to have appeared during the RSVP task. The AB effect was replicated in a follow-up experiment in which we also manipulated the rewarding components of the food images presented. In this case, participants' frequency of consumption of food stimuli used was also found to modulate the AB, regardless of their rewarding components. Overall, our results showed that food cues can easily capture attention even in circumstances where this information is irrelevant to solve a task.
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5:30-7:30 PM (1016)

Visual Attention of Cyclist and Non-Cyclist Drivers Toward Vulnerable Road Users: An On-Road Study. JOELLE GIRGIS, NAZLI KAYA, BRADEN HANSMA, BIRSEN DONMEZ, and JAY PRATT, *University of Toronto* – Driver attentional errors account for many vehicle collisions with vulnerable road users (VRUs) such as pedestrians and cyclists. Research suggests that experience with actively using other modes of transportation, such as riding a bicycle, may improve a driver's attention allocation toward VRUs due to top-down processes. Using an instrumented vehicle, we examined (a) the rate of drivers' visual attention failures toward VRUs at real intersections and (b) whether there is a moderating effect of cycling experience. Experienced drivers (13 cyclists and 13 non-cyclists) completed 18 different turns at urban Toronto intersections, where gaze data and in-vehicle camera data was used to determine the frequency of drivers' critical attentional failures to

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pre-determined areas of importance related to VRU safety. Results from a logistic mixed effects model showed that, at any given turn, the odds of exhibiting an attentional failure toward a VRU were significantly greater for drivers without cycling experience compared to drivers with cycling experience. These findings support that the top-down modulation of attention (i.e., knowledge, expectations) influences visual scanning toward VRU-related areas in real-world driving.
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5:30-7:30 PM (1017)

Do Concerns About COVID-19 Impair Sustained Attention? JIHYANG JUN, YI NI TOH, CAITLIN SISK, ROGER REMINGTON, and YUHONG JIANG, *University of Minnesota* (Sponsored by Roger Remington) – The novel coronavirus disease 2019 (COVID-19) has considerably heightened health and financial concerns for many individuals. Similar concerns, such as those associated with poverty, impair performance on cognitive tasks. If sustained attention relies on the cognitive resources that ongoing concerns occupy, COVID-related worries could degrade performance on a wide range of critical tasks, leading, for example, to increased traffic accidents, diminished educational achievement, and lower workplace productivity. Here we tested whether young adults' concerns about COVID-19 correlated with their ability to sustain attention. Participants completed a sustained attention to response task over two 4-minute blocks. Their response became faster but less accurate over time. A survey revealed varying levels of COVID-related concerns across individuals. However, despite stable individual differences, performance on the sustained attention task did not correlate with the severity of COVID-related concerns, suggesting that sustained attention is robust in the face of moderate concerns in young adults.
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5:30-7:30 PM (1018)

Modes of Cognitive Control and Mindfulness. NURIA AGUERRE and TERESA BAJO, Mind, Brain, and Behaviour Research Centre, *University of Granada,* CARLOS GOMEZ-ARIZA, *University of Jaén* – The relation between mindfulness and cognitive control is currently a matter of debate. In the present work, we aimed to investigate the relationship between mindfulness and profiles of executive control by overcoming the limitations and concerns of previous studies. Two of the most frequently used mindfulness questionnaires (FFMQ and MAAS) and two well-validated cognitive control tasks (AX-CPT and a cued task-switching) were administered to a large sample of individuals (n=134). Our results replicate previous findings suggesting that mindful individuals tend to use proactive and reactive control in a balanced manner in comparison to low-mindfulness individuals, who tend to rely more on proactive control. In addition, mindful individuals showed greater flexibility when the two processing modes were available. Importantly, these effects were found when considering scores from any of the two questionnaires. Altogether our findings indicate that mindful individuals are less attached to previous contextual information, which might allow them to exhibit more flexible performance.
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5:30-7:30 PM (1019)

The Relationship between Task Difficulty and Intentional and Unintentional Mind Wandering. MARYANN BARRINGTON, LEONIE MILLER, and STEVEN ROODENRYS, *University of Wollongong* – Both easy and hard tasks increase mind-wandering frequency, indicating a U-shaped relationship exists. However, it is unclear whether this relationship generalises to between-task contexts, and whether it is driven by separable rates of intentional and unintentional mind wandering. In the current study, a student sample (n=100) completed a sustained attention task (easy task), as well as a 1-back (moderate task), and 3-back (difficult task), with intermittent thought probes measuring mind-wandering frequency. In addition, participant working memory capacity (WMC), motivation, and perception of task demand was measured to observe how these variables might affect mind-wandering rates. Results confirmed that the tasks perceived to be easy and difficult resulted in more mind-wandering than a moderate task. Additionally, intentional mind wandering was dominant in the easy task and related to motivation, whereas unintentional mind wandering was more common in the difficult task and was related to motivation and WMC. This supports a multi-faceted approach to explaining mind wandering.
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5:30-7:30 PM (1020)

Microsaccade Suppression as a Measure of Oculomotor Inhibition in the Antisaccade Task. SOFIA KRASOVSKAYA, *HSE University,* ÁRNI KRISTJÁNSSON, *HSE University & University of Iceland,* W. JOSEPH MACINNES, *HSE University* (Sponsored by W. Joseph MacInnes) – Microsaccades belong to the category of fixational micromovements, but their functional purpose is still debated. Eye-movement paradigms typically require fixational control, but this does not eliminate all oculomotor activity associated with the preparation of saccades. During the so-called antisaccade task, planning and execution are separate processes. We thus hypothesise that microsaccade rates may be reduced prior to the execution of antisaccades as compared to regular saccades. Our study involves a two-step eye-tracking experiment with 40 participants asked to perform saccades or antisaccades in blocks where saccade type was fixed or mixed within blocks. Each participant contributed to three main blocks: a fixed saccade block, a fixed antisaccade block, and a mixed saccade/antisaccade block. Lower microsaccade rates were found in fixed as opposed to mixed blocks and antisaccade as opposed to saccade blocks. We propose that this could be explained by the top-down control required by the oculomotor system. We additionally compare temporal rates between the different blocks and assess differences between monocular and binocular recordings to determine the reliability of microsaccade detection with monocular tracking.
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5:30-7:30 PM (1021)

Aging Differentiates Reliance on Reactive and Proactive Control of Stroop Interference. SABINE LOHMAR, GEORGIA GILLENWATER, and KATHERINE WHITE, *Rhodes College* (Presented by Katherine White) – The dual mechanisms of control framework proposes two modes of cognitive control that are differentially affected by age: Older adults primarily rely on reactive, or post-conflict, adjustments to interference, instead of proactive, or anticipatory, adjustments. This study

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used a Stroop conflict adaptation task to examine age differences in these two mechanisms. Reactive adjustments to conflict were investigated via the congruency sequence effect (CSE), or reduced interference on incongruent trials that follow incongruent versus congruent trials. Proactive adjustments were investigated by cueing the congruency of upcoming trials in one of two blocks of trials. Whereas younger adults showed a cueing effect regardless of whether cues were presented in the first or second block, older adults benefited from cues only when they were presented in the second block. Independent of cueing, a reliable CSE was found in older but not younger adults. These results indicate an age-related shift from proactive to reactive adjustments to control, as well as selective use of proactive adjustments by older adults. Theoretical implications for understanding age-related changes in cognitive control will be discussed.
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5:30-7:30 PM (1022)

The Long and Short of It: What Volatile Lists Reveal about the Timescale of Control. ABHISHEK DEY and JULIE BUGG, *Washington University in St. Louis* (Sponsored by Julie Bugg) – For over 40 years, list-wide proportion congruence paradigms have been used to study the control of attention. An emerging area of research utilizing these paradigms is focused on understanding how the control system learns about proportion congruence based on trial history. In other words, this area of research is concerned with the timescale of control. A long timescale would mean that the control system uses a long history of trials to calculate proportion congruence, whereas a short timescale would mean that a short history of trials is used to calculate proportion congruence. We investigated the timescale of control by using a novel method to construct lists that not only differed in their proportion congruence but also in how volatile they were. Contrary to predictions assuming a long timescale of control, we found that participants used a short timescale when lists were volatile regardless of the proportion congruence of the list. This finding is particularly striking as some prominent models of control seem to ignore the volatility of lists and assume that the system tracks most if not all previous trials. We discuss how these findings may impact these models and theories of control.
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5:30-7:30 PM (1023)

Examining the Location Specificity of Attentional Flexibility. MAYURI ALBAL, RENATE MA, JULIANNE KEY, and ANTHONY SALI, *Wake Forest University* – Individuals learn to adapt their readiness to shift spatial attention, referred to as attentional flexibility, according to environmental demands (Sali, Anderson, & Yantis, 2015; Sali, Jiang, & Egner, 2020). However, the degree to which this flexibility reflects a readiness to shift attention to a specific, or to any, spatial location remains unknown. Participants made saccadic eye movements among three rapid serial visual presentation (RSVP) streams of alphanumeric characters in response to embedded visual cues while we tracked eye position. Across blocks of trials, we varied the likelihood of shifting attention among two upper RSVP locations, while holding constant the frequency of rare trials that required a saccade to a lower location. Target detection shift costs in response time (RT) and saccadic RTs for shifts among upper locations were smaller in blocks with frequent shifting than in blocks with infrequent shifting. Critically, participants were faster to initiate a saccade to the lower location when the upper location shift likelihood was high than when the upper shift likelihood was low, providing evidence that learned shift readiness speeds shifts to likely, as well as to unlikely, spatial locations.
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5:30-7:30 PM (1024)

Preparing to Select: Preparatory Influences on Selective Attention in a Two-Target Method. BEN SCLODNICK, BRUCE MILLIKEN, DAVID SHORE, and ELLEN MACLELLAN, *McMaster University* (Sponsored by Bruce Milliken) – We examined whether preparatory processes can produce selection history effects in a selective attention task. We used a two-target attentional blink task in which participants identified two rapidly presented target items—a red target word spatially interleaved with a green distractor word (T1), followed by a single white word (T2; MacLellan, Shore, & Milliken, 2015). Prior to T1, a coloured word (T0) was presented. Asking participants to selectively name only red T0 words significantly improved T2 identification performance, whereas having participants name any T0 word did not (even if T0 was red). These results imply that a history of preparing attention in a particular way can modify attentional templates that mediate selective attention efficiency. We discuss our findings in the context of selection history effects and associative learning theories of cognitive control.
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5:30-7:30 PM (1025)

Alertness and Cognitive Control: Interactions in the Simon Task. DARRYL SCHNEIDER and GIA MACIAS, *Purdue University* – Congruency effects in some selective-attention tasks are larger when alertness is increased. One hypothesis about this alerting-congruency interaction is that it depends on spatial information processing of the relevant stimulus feature. We tested this hypothesis in the present study by manipulating alertness in a color version of the Simon task in which the irrelevant stimulus feature (position) directly provided spatial information, whereas the relevant stimulus feature (color) did not. Contrary to the hypothesis, reliable alerting-congruency interactions were found in two experiments, regardless of whether stimulus positions and responses were arranged horizontally or vertically. These results extend past research on alertness in the Simon task and indicate that the relationship between alertness and cognitive control is more complicated than previously thought.
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5:30-7:30 PM (1026)

Color-Word Correlation Is Not What Causes the Stroop Effect. GIACOMO SPINELLI and STEPHEN LUPKER, *University of Western Ontario* – In the Stroop task, the words and the colors used are often correlated. For example, in a design in which four words and four colors are combined to form 16 stimuli, each of the four congruent stimuli is typically repeated three times as often as each of the 12 incongruent stimuli. Input-driven accounts of the Stroop effect suggest that in this type of situation the word dimension receives more attention than it does in a zero-correlation situation in which words and colors are randomly paired. This increased attention would then inflate, or even produce,

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the Stroop effect in high-correlation situations. In four experiments, we examined this idea by contrasting a zero-correlation block with a high-correlation block matched on relevant variables. Both NHST and Bayesian analyses indicated equivalent Stroop effects in the two blocks, suggesting that color-word correlation likely does not affect how attention is allocated in the Stroop task.
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5:30-7:30 PM (1027)

Further Evidence for the Effects of Recent Conflict on Attentional Control. JACKSON COLVETT, EVA JELIAZKOVA, and JULIE BUGG, *Washington University in St. Louis* (Presented by Julie Bugg) – Accumulating evidence suggests a unique effect of recent conflict (i.e., last few trials) in shaping attentional adjustments. We found that several incongruent trials at the end of a mostly congruent (MC) list reduced the Stroop effect on later diagnostic trials relative to an equally MC list with incongruent trials dispersed throughout (and conversely, several congruent trials increased the effect in mostly incongruent [MI] lists). Would a run of consecutive trials of the infrequent type anywhere within a list similarly influence attentional adjustments? We examined this question by presenting runs of the infrequent trial type earlier within MC and MI lists and examining their effect on four subsequent biased trials (i.e., trials whose proportion congruence matched the overall list) and on diagnostic trials at the end of the list. Runs increased the Stroop effect on the biased trials in MI lists only and decreased the Stroop effect on diagnostic trials in MC lists only. Discussion will focus on potential explanations for the differing effects across MC and MI lists and consider how the location of a run of infrequent trials within a list affects the degree to which attentional adjustments are sustained rather than transient.
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5:30-7:30 PM (1028)

Inner Speech for Goal-Directed Actions: Talking Matters. MIRIAM GADE, *Medical School Berlin,* ALODIE REY-MERMET, *Swiss Distance University Institute,* MARKO PAELECKE, Julius-Maximilians-Universität Würzburg – Self-talk and inner speech and its beneficial effects have been investigated in applied sport as well as developmental psychology. In these fields, the role of inner speech in successful goal-directed behaviour has been established in an experimental approach by asking participants to engage in various speech-related activities such as rehearsing instructions or performing articulatory suppression. In the studies presented here, we took an inter-individual differences approach. Participants either performed a Simon task in which they had to ignore the irrelevant location of the stimulus (Study 1) or engaged in paradigms (e.g., Stroop, flanker and task switching, Study 2) measuring cognitive control processes. In addition, questionnaires regarding manner and frequency of inner speech habits were assessed. Using hierarchical linear modeling analysis, we found that engagement in inner speech reduced conflict effects significantly and thereby helped performance. This occurred even when differences in working memory capacity and intelligence were controlled for (Study 2). We argue that evaluative and motivating inner speech helps in maintaining attentional focus and reduces experienced interference.
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5:30-7:30 PM (1029)

The Effect of Interruption Duration and Interruption Position on Primary Task Performance. PATRICIA HIRSCH, LUCA MORETTI, and IRING KOCH, *Rheinisch-Westfälische Technische Hochschule Aachen University* – In this study, subjects performed a predefined subtask sequence. The sequence included two triplets, reflecting two n-2 subtask repetition trials (e.g. ABA CAC) or two n-2 subtask switch trials (e.g. ABC BCA). Task interruptions occurred after the first, second, or third subtask for 2 or 8 seconds. In line with our prediction, primary task performance was worse with long than short interruptions. Moreover, we predicted interruptions within triplets (after the first and second subtask) to be more harmful for primary task performance than interruptions between triplets (after the third subtask). In contrast to our hypothesis, we found that when subjects went "deeper" into the subtask sequence, it became harder to resume the sequence. Moreover, due to the demand to overcome persisting inhibition in n-2 subtask repetition trials, we expected interruptions after the second subtask in n-2 repetition trials to be more harmful for the primary task performance than interruptions after this subtask in n-2 switch trials. However, the effect of interruptions did not differ across these trial types. In sum, this study suggests that task interruptions impair primary task performance and that this cost increases when the interruption duration is prolonged.
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5:30-7:30 PM (1030)

Perceiving Conflict Is Negative But Resolving It Isn't. JINI TAE and REBEKA ALMASI, *George Washington University,* REBECCA WELDON, *SUNY Polytechnic Institute,* YOONHYOUNG LEE, *Yeungnam University,* MYEONG-HO SOHN, *George Washington University* (Presented by Myeong-Ho Sohn) – The current study investigated the effect of task demands on emotional outcome in the presence of conflict-inducing stimuli. We used an affective priming paradigm, presenting a color Stroop stimulus as a prime and an emotional face as a target for an emotion recognition task. When the task was passive viewing of the prime (Experiment 1), incongruent Stroop primes facilitated response to emotionally negative targets. When asked to perform the Stroop task on the prime (Experiment 2) before the emotion recognition task, participants showed no response facilitation at all. When participants simply identified the congruency of the prime (Experiment 3), the facilitation of response to negative stimuli re-emerged. These results suggest that detecting conflict, be it indirect as in Experiment 1 or explicit as in Experiment 3, promotes negative affect. However, resolving conflict, as in Experiment 2, removes the affective priming effect.
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5:30-7:30 PM (1031)

Target Amplification and Distractor Inhibition - Theta Oscillatory Dynamics of Selective Attention in a Flanker Task. CÉLINE HACIAHMET, CHRISTIAN FRINGS, and BERNHARD PASTÖTTER, *University of Trier* – Conflict resolution is typically associated with a synchronization in theta frequency (4-8 Hz) originating from the anterior cingulate cortex (ACC; Nigbur et al., 2012). We expand previous midfrontal theta findings of conflict processing by considering attentional target amplification to be represented in theta frequency as well. The present EEG study (N=41) examined brain oscillatory activities

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associated with stimulus and response conflict in a lateralized flanker task (Eriksen & Eriksen, 1974). Response-locked analysis showed increased synchronization in theta power (6-9 Hz) for response conflict, indexing a robust midfrontal theta effect. Stimulus-locked analysis revealed early clusters with increased parietal theta power for non-conflicting trials, followed by increased synchronization in midfrontal theta power for stimulus (4-7 Hz) and response conflict (4-7 Hz). Results suggest conflict resolution in the flanker task relies on a combination of target enhancement, depicted by parietal theta, and inhibition of distractors, depicted by midfrontal theta. Attentional amplification of sensory target features is discussed with regard to a domain-general conflict monitoring account (Botvinick et al., 2001).

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5:30-7:30 PM (1032)

The Cognitive Control Is Not Instantaneous: The Modulatory Oscillations of Alpha and Beta Band. INUK SONG, YEEUN KIM, and YANG SEOK CHO, *Korea University* – Of the many hypotheses explain the congruency sequence effect (CSE), Lee and Cho (2013) insisted that the CSE is due to inhibitory processing between the task-irrelevant stimulus dimension and response mode. To examine this hypothesis, we conducted a confound-minimized Stroop experiment with an aimed-movement response manner as well as EEG recording. The behavioral data of included 46 participants revealed a statistically significant CSE on the delay between the "release the 'home key'" and the "press a 'target key.'" Furthermore, exploratory bootstrapping analyses on EEG showed that this sequential modulation occurred in various time intervals with regard to the stimulus onset, the release, and the keypress within alpha, lower beta, and high beta bands mainly. The modulatory oscillations primarily derived from pre/postcentral gyrus, anterior cingulate cortex, cuneus, and parietal lobules. Our results suggest that neural underpinnings of the CSE occurred incessantly from the task-irrelevant dimension processing to the finish of response.

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5:30-7:30 PM (1033)

Transcranial Direct Current Stimulation (tDCS) Targeting the Right Dorsolateral Prefrontal Cortex: Effects on Selective Retrieval and Subsequent Analogical Reasoning. TANIA VALLE and TERESA BAJO, *University of Granada,* CARLOS GOMEZ-ARIZA, *University of Jaen* – This study examines the role of the right dorsolateral prefrontal cortex (DLPFC) in reducing the accessibility of information that is later needed for analogical reasoning. To do so, we used an adaptation of the retrieval practice procedure (Anderson et al., 1994) to modulate the accessibility of potential solutions in an upcoming analogical reasoning task. Critically, we delivered either cathodal or sham tDCS over the right DLPFC during the selective retrieval phase, in which inhibitory control is thought to operate. The results showed that whereas the sham group exhibited the expected retrieval-induced impairment in analogical reasoning, this effect was abolished by cathodal tDCS. Importantly, no general effects of stimulation on analogical reasoning showed up. Altogether, these results indicate that activity changes in the right DLPFC causally modulate memory accessibility and, consequently, may influence performance on an unrelated reasoning task.

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5:30-7:30 PM (1034)

Reward Motivation and Perceptual Load Effects on Visual Attention. YAZAN SHAMLI OGHLI, AALIM MAKANI, ARNON WEINBERG, MARGOT SULLIVAN, and JULIA SPANIOL, *Ryerson University* – Reward motivation has been shown to modulate attention, but little is known about the effects of reward on attention under perceptual load. The aim of the current study (N=101) was to examine how incentives modulate perceptual load effects in a visual flanker task. Perceptual load was manipulated in terms of the similarity between target and distractor stimuli. A cue at the beginning of each trial indicated whether a fast and accurate response would result in low reward (1 cent) or high reward (10 cents). Trial-level reaction times, nested within participants, were regressed on reward, load, flanker congruency, and response accuracy. On low-reward trials, flanker congruency effects were more pronounced under low vs. high perceptual load. On high-reward trials, flanker congruency effects were of similar magnitude under low and high perceptual loads. These findings suggest that reward motivation may increase the capacity of visual selective attention.

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5:30-7:30 PM (1035)

The Change of Goals Modulates the Efficiency of Executive Control. A New Experimental Procedure. SOFÍA CASTRO and MARCIN BUKOWSKI, *Institute of Psychology, Jagiellonian University,* JUAN LUPIÁÑEZ, *University of Granada*, ZOFIA WODNIECKA, *Institute of Psychology, Jagiellonian University* (Sponsored by Juan Lupiáñez) – In the present study, we developed a novel procedure to measure the influence of goal maintenance and goal change on the efficiency of executive control. Although there is empirical evidence on the impact of goal maintenance and task-switching on executive control, little is known about the consequences of changing between processing goals (e.g., speed or accuracy goals). We assessed the influence of changing between speed and accuracy goals while performing a task-switching procedure that requires social categorization. Experiment 1 included frequent goal changes, whereas Experiment 2 included one goal change across the experimental session. The results showed that both goals influence general performance and flexibility. A comparison between experiments suggested that frequent goal change (Experiment 1) resulted in worse performance and lower flexibility overall compared to sequential goal change (Experiment 2). Frequent goal change was also associated with increased difficulties in pursuing the accuracy goal.

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5:30-7:30 PM (1036)

Mind Wandering During Encoding and Implementation of One-Shot Episodic Stimulus-Control Associations. PETER WHITEHEAD, YOUNIS MAHMOUD, PAUL SELI, and TOBIAS EGNER, *Duke University* (Sponsored by Tobias Egner) – The one-shot pairing of a stimulus with a specific cognitive control process, such as task switching, can bind the two together in memory. The episodic control-binding hypothesis posits that the formation of temporary stimulus-control bindings, held in episodic memory supported event-files, can guide contextually appropriate application of cognitive control. However, the role of attention in encoding and implementing these bindings remains unknown. Over two experiments, we investigate this using

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mind wandering probes and pupillometry as measures of on-task attention and arousal, respectively. We find that mind wandering during the implementation of stimulus-control bindings does not decrease their efficacy, but on-task attention during encoding of control state associations is crucial for successful deployment later. We further validate these results using trial-by-trial pupillometry to measure arousal, showing that pupil size at encoding, versus retrieval, better predicts subsequent implementation of stimulus-control bindings. These results suggest that encoding stimulus-control bindings into episodic memory requires active attention, but once encoded, these bindings automatically guide behavior when the stimulus reoccurs.

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5:30-7:30 PM (1037)

The Future at Face Value – Anticipatory Saccades Differ Between Social and Neutral Action Effects. SALOME LI KEINTZEL and CHRISTINA U. PFEUFFER, *University of Freiburg* (Sponsored by Andrea Kiesel) – Anticipating our actions' consequences influences action selection and leads to anticipatory saccades towards the future location of our actions' effects (proactive effect monitoring). These anticipations are based on previously learned bi-directional action-effect associations. Prior research mainly focused on inanimate environments. Thus, it remained unclear whether anticipating the reactions of others to our actions (social effects) differs from anticipating neutral effects. Here, we systematically compared anticipatory saccades towards smiley faces (social) and arrows (neutral) at action-compatible/incompatible locations as participants' actions' future effects. Eye/arrow direction systematically varied (right/left/up/down). For social effects as compared to neutral effects, anticipatory saccades were more likely directed towards future effects and saccade gain was larger. Furthermore, we found that eye/arrow direction influenced anticipatory saccades. This is the first clear evidence for a predominant impact of social as compared to neutral effects in action control. Interestingly, this predominant impact is mainly reflected in monitoring instead of action-selection processes.

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5:30-7:30 PM (1038)

Inhibitory Control Mechanisms Underlying the Stroop and Stop-Signal Tasks Interactively Modulate Memory Encoding. HYEJIN LEE, INUK SONG, CHAE EUN LIM, and YANG SEOK CHO, *Korea University* (Sponsored by Yang Seok Cho) – Combining stop-signal with a Stroop task has demonstrated that response inhibition and distractor interference control interact. We measured incidental memory for the stimuli presented during the combined Stroop/stop-signal task to examine how the interaction modulates memory encoding. Stop-signal reaction time was significantly prolonged on incongruent than on congruent trials, indicating that the interaction has occurred. However, whereas prior findings demonstrated that the Stroop conflict during incongruent trials facilitated memory by reinforcing top-down attention to targets, our behavioral and electroencephalographic data did not. Instead, memory was worse for stop-cued than for go-cued stimuli, consistent with inhibition-induced forgetting (Chiu & Egner, 2015). The findings indicate that the interaction influences memory in a way that the global suppression of motor activity overrides selective attention which facilitates memory encoding.

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5:30-7:30 PM (1039)

Removal of Information from Working Memory Is Not Related to Inhibition. ALODIE REY-MERMET, *Swiss Distance University Institute,* KRISHNEIL SINGH and GILLES GIGNAC, *University of Western Australia*, CHRISTOPHER BRYDGES, *University of California, Davis*, ULLRICH ECKER, *University of Western Australia* – Working memory (WM) – a system for maintaining and accessing a limited number of goal-relevant representations – is assumed to require cognitive processes to control interference caused by irrelevant information. Recent research has proposed two conceptually similar interference-control processes performing this housekeeping function: (1) an active, item-wise removal process that removes no-longer relevant information from WM, and (2) an executive inhibitory process that suppresses the activation of distractors against competing, goal-relevant representations. The purpose of this study was to determine the extent to which removal and inhibition represent the same cognitive construct. A structural equation modeling approach identified a reliable latent variable of removal. However, no latent variable of inhibition could be established. Critically, the individual measures of inhibition were unrelated to the removal latent variable. These results provide tentative support for the notion that active, item-wise removal is an executive process independent of inhibition.

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5:30-7:30 PM (1040)

Effects of a Memory Load on the Alerting-Congruency Interaction. LILY PATTERSON and TODD KAHAN, *Bates College* (Presented by Todd Kahan) – The mechanisms underlying attention and distraction have been widely studied, often using the Attention Network Test (ANT). The results of this test consistently show that participants are faster to respond when they are alerted and slower to respond when they must ignore distractors that are incongruent with the target stimulus. Interestingly, in some variations of this task, there is an alerting-congruency interaction where congruency effects are larger when alerted relative to when not alerted. The current study examined the effects of a memory load on this interaction. The load theory of attention proposes that people are more greatly affected by distractors when fewer cognitive resources are available, as will happen with a higher cognitive load, while others have proposed that the alerting-congruency interaction may be reduced when under a high cognitive load. Results from the ANT (N=40) indicate that although a seven-digit memory load affects overall reaction times and accuracy rates, memory load does not moderate the alerting-congruency interaction.

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5:30-7:30 PM (1041)

Effect of Delay Interval in Dichotic Listening with Words and Emotions. DANIEL VOYER and MIKAYLA GOODINE, *University of New Brunswick* – This paper presents the results of three experiment on the effect of delay between stimulus presentation and response in dichotic listening. In all experiments, stimulus presentation was either followed by no delay before response alternatives appeared or a delay of 5, 10, or 15 seconds. Stimuli were the words "bower," "dower," "power," or "dower" pronounced with a neutral, angry, happy, or sad emotional tone.

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Participants counted along as numbers compatible with the stimulus material appeared on the computer screen (words for word stimuli, sign language for emotions). Experiment 1 involved emotion recognition, Experiment 2 required word recognition, and Experiment 3 involved both word and emotion recognition. All three experiments showed auditory asymmetries in the expected direction (left ear advantage for emotions, right ear advantage for words) that was reduced as a function of time interval. Results are discussed in terms of bottom-up and top-down factors involved in perceptual asymmetries.
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5:30-7:30 PM (1042)

Covert Attention Does Not Always Precede Eye Movements During Search. TRAVIS TALCOTT and NICHOLAS GASPELIN, *Binghamton University, SUNY* (Sponsored by Nicholas Gaspelin) – Vision researchers typically distinguish between two mechanisms of selective attention: covert shifts of attention and overt eye movements. A widespread assumption is that covert attention acts as a "scout" during search to inspect possible target locations before saccades are generated. The current study examined this assumption by concurrently measuring covert attention (via EEG) and overt eye movements (via eye tracking). Participants searched displays for a target square of a specific color and were allowed to make eye movements. We then assessed whether there was an N2pc component – indicating covert attentional selection – before the first saccade. Importantly, we found no evidence of a presaccadic N2pc under conditions where participants rapidly generated saccades in service of search. We propose that eye movements can sometimes be directly guided by preattentive feature information, without a preceding covert shift of attention.
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5:30-7:30 PM (1043)

To Be, or Not to Be: Forgotten Objects in Visual Working Memory and the Guidance of Attention. BRYAN BURNHAM, *University of Scranton* – The contents of visual working memory (VWM) have been shown to guide attention during visual search. In a series of studies, Soto and colleagues had observers encode and maintain an object in VWM prior to a visual search task (Soto, Heinke, Humphreys & Blanco, 2005). Although the object in VWM was not useful for locating the visual search target, results showed that responding was faster when the location of the target coincided with the location of the object in VWM and slower when it did not, suggesting VWM-guided attention. Sasin, Morey, and Nieuwenstein (2017) found that VWM attentional guidance was abolished when observers were instructed to "forget" the object encoded in VWM. We replicated the results of Sasin et al. (2017) by showing that objects encoded into VWM do not guide attention when they are "forgotten." We extended this to cases when multiple objects are encoded into VWM and showed that when one of several objects are "forgotten," the forgotten object no longer guides attention, but VWM guidance by a remembered object is pronounced. We also observed that features of objects (i.e., shape, color) held in VWM fail to guide attention when forgotten, indicating separable dimensions of objects in VWM.
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5:30-7:30 PM (1044)

Two Different Colors in Visual Working Memory Can Simultaneously Guide Attention When They Can be Integrated into One Object. LITIAN CHEN, MOWEI SHEN, and HUI CHEN, *Zhejiang University* (Sponsored by Hui Chen) – Although it's widely debated whether multiple items in visual working memory (VWM) could simultaneously guide attention, previous studies consistently found that when two colors from separate items were held in VWM, neither of them could guide attention when there was only one item matching the distractor color in visual search. The present study sought to investigate whether two colors that can be integrated into one object could contribute to the guidance of attention simultaneously. In both experiments, observers needed to remember two color features either from two discrete objects (Experiments 1a & 2a) or one object (Experiments 1b & 2b) while completing a singleton search task. Critically, the color of the singleton distractor either matched one of two colors held in VWM or did not. The two experiments consistently showed that the color-matching distractor could capture attention only when two memorized colors were represented as a single object. These findings suggested that two different color representations could be integrated into an active attentional template in VWM when presented in one object, which has critical implications for understanding the nature of attentional template in VWM.
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5:30-7:30 PM (1045)

Reward Does Not Modulate the Preview Benefit in Visual Search. CHISATO MINE, University of New South Wales & National Institute of Advanced Industrial Science and Technology (AIST), STEVEN MOST and MIKE LE PELLEY, University of New South Wales – Preview benefit refers to faster search for a target when a subset of distractors is previewed. We examined whether reward modulates this preview benefit. Participants were asked to identify a target among non-targets in a search display. On "preview" trials, placeholders occupied half the search array positions prior to the onset of the full array. On "non-preview" trials, no placeholders preceded the full search array. On preview trials, the target could appear at either a placeholder position (oldLocation condition) or a position where no placeholder had been (newLocation condition). Critically, the color of the stimulus array indicated whether participants would earn reward for a correct response. We found a typical preview benefit, but no evidence that reward modulated this effect, despite a manipulation check showing that stimuli in the reward-associated color tended to capture attention on catch trials. The results suggest that reward learning does not modulate the preview benefit.
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5:30-7:30 PM (1046)

Interventions to Improve Low Prevalence Target Detection. ANDREW RODRIGUEZ, MARK BECKER, and CHAD PELTIER, *Michigan State University* (Sponsored by Mark Becker) – In visual search tasks, target detection is dramatically reduced for low prevalence targets – the low prevalence effect. This effect is robust and difficult to mitigate. Wolfe & Van Wert (2010) found that introducing a miniblock of high prevalence target trials with feedback improved target detection in a block of low prevalence targets. We replicate and extend that finding. Participants performed a control block of low prevalence search and a block of

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one of three experimental conditions. One condition replicated the miniblock intervention. A probe condition distributed the miniblock trials throughout the task so there were occasional target present trials with feedback. A hybrid condition had probe trials and poor performance on them would trigger a miniblock of high prevalence trials. All three experimental manipulations significantly improved accuracy when compared to the control condition and did so to a similar extent. Longer target absent reaction times in the experimental conditions than control condition suggest that the interventions produced higher quitting thresholds. While all manipulations were equally effective, the probe method may be ideal.
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5:30-7:30 PM (1047)

The Effects of Interrupting a Visual Search on Oculomotor Adaptation to Target-Defining Features. MARGIT HÖFLER, *Danube University Krems & University of Graz,* ANA ARSENOVIĆ, *University of Graz,* IAIN GILCHRIST, *University of Bristol,* SEBASTIAN BAUCH and CHRISTOF KÖRNER, *University of Graz* – In repeated visual search, oculomotor behavior can adapt immediately to changes in target-defining features (e.g., color), thus making the search more efficient. Here we tested whether interrupting a search affects this adaptation. Participants searched twice repeatedly for different targets in displays consisting of blue and pink letters. The first search was interrupted on half of the trials. Furthermore, the target color of the first search was always different from the target color of the second search such that only a subset of items was search-relevant in the second search. The results showed that the second search was slower after an interrupted compared to a completed first search. This was caused by an increased number of fixations on search-irrelevant items. Further analysis showed that such fixations on search-irrelevant items were prevalent immediately after the interruption. This indicates that interrupting a search delays the adaptation of oculomotor behavior regarding changes in search-relevant item features. (FWF grants: P 28546 and P 33074)
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5:30-7:30 PM (1048)

Does Target Depth Plane or Visibility Play a Role in Occluded Visual Search? RACHEL NGUYEN and MATTHEW PETERSON, *George Mason University* – Previous work (Wolfe et al., 2011) has shown that search is less efficient when targets are partially occluded by an overlapping bar. We examined how various levels of occluder opacity and target depth (in front of or behind the occluder) affected search efficiency. With a 5x2x2 within-subjects design, occluder opacity, location (target above or below the occluder), and 2 visual set sizes were manipulated. Occluder opacity was set at 0% (invisible), 25%, 50%, 75%, and 100% (solid occluder). Targets were 50% opaque, allowing similar levels of visible disruption when the target was above or below the distractor. Participants searched for the presence of a vertical target amongst horizontal distractors. Occluders below the target had no effect on search, but search was less efficient when the target was overlapped by an occluder with an opacity of 50% or higher. This suggest depth plane plays a bigger role than target visibility.
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5:30-7:30 PM (1049)

Ebb and Flow of Visual Search: Variability in Human Visual Search Performance as a Function of Time. ALFRED YU, U.S. Army Combat Capabilities Development Command Army Research Laboratory, PATRICK COX, SAMONI NAG, and MICHELLE KRAMER, The *George Washington University,* DEREK SPANGLER, U.S. Army Combat Capabilities Development Command Army Research Laboratory, DWIGHT KRAVITZ and STEPHEN MITROFF, The *George Washington University* – People choose, or are required, to engage in cognitive tasks in a variety of situations, at any time of day and on any given day. Successful task execution can be critical (e.g., for military operations, aviation security), so it is vital to understand how performance varies as a function of individuals' particular circumstances. The prototypical Monday to Friday work week enforces constraints on individual schedules and circadian rhythms. The massive Airport Scanner (Kedlin Co.) dataset of self-initiated visual search trials was used to examine the relationship between participation timing and search performance. The dataset provides sufficient fidelity to examine and account for a range of potential factors, including time of day, day of the week, occurrence of significant external events, and changes in task difficulty. Sensitivity changes significantly across the work week, peaking early in the week. Players had more false alarms, longer response times, and more frequent attention lapses during nighttime hours, and this performance nadir shifted to later hours across the work week before resetting over the weekend. The findings provide insights for dealing with (and leveraging) variability in human performance.
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5:30-7:30 PM (1050)

Interactions among Bottom-Up, Top-Down, and Agency-Driven Biases in Selective Attention. ADAM VILANOVA-GOLDSTEIN, *University of Notre Dame,* GREG HUFFMAN, *University of Notre Dame* & *Leidos, Inc,* JAMES BROCKMOLE, *University of Notre Dame* (Sponsored by James Brockmole) – A sense of agency arises when our actions cause anticipated or predictable effects in the world. Agency, in turn, biases attention toward that which we control. We examined interactions among agency-driven selection and other drivers of attention. Participants controlled the movement of one circle while three other circles moved randomly. The circles then stopped moving; gaps appeared in them; an attention-directing cue was introduced; and participants searched for the circle with exactly one gap. In Experiment 1, the cue was a word that indicated the likely color of the target. In Experiment 2, the cue was a color singleton. In both cases, cued targets were located more quickly than uncued targets. Prior control over an eventual target further shortened search times when paired with symbolic word cues but not with singletons. The effect of agency on attentional control is therefore additive with other forms of top-down, but not bottom-up, selection.
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5:30-7:30 PM (1051)

Intertrial Priming Is Modulated by Visual Set Size and Memory Set Size in Hybrid Search. CARLY LEONARD, ADAM VILANOVA-GOLDSTEIN, and JORGE CRUZ, *University of Colorado, Denver* – Everyday life often involves searching through numerous distractors for what may be several targets simultaneously. Research on this type

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of hybrid search has found that reaction time increases linearly with increasing visual set size, but logarithmically with increasing numbers of possible targets in memory (e.g., Wolfe, Drew, & Boettcher, 2015). In the current study, we explored the effects of intertrial priming of target identity on reaction time during hybrid search. In two experiments, participants maintained a list of possible target categories, and localized targets in search displays containing different set sizes of complex object images. The results show that as visual set size increases, the benefits of intertrial priming also increase. Additionally, Experiment 2 suggests that priming effects are modulated by the memory set size. This work may provide some insight into the relationship between the memory representations that mediate priming and those that allow for efficient hybrid search.
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5:30-7:30 PM (1052)

Some Assembly Required: Examining Strategy Use During Multi-Modal Search for LEGO Bricks. JESSICA MADRID, MICHAEL HOUT, and BRYAN WHITE, *New Mexico State University,* HAYWARD GODWIN, *University of Southampton, and* COLLIN SCARINCE, Texas *A&M University – Corpus Christi* (Sponsored by Michael Hout) – In many search tasks, observers must find what they are looking for using only visual information. However, numerous other search tasks can only be completed effectively when observers use their hands to aid in search. It is not currently well-understood how observers conduct "multi-modal search," nor what the best strategies might be for doing so. Using a novel approach for the study of multi-modal search that involves having observers seek out LEGO targets in a cluttered tray of assorted bricks, we first validated this approach with exploratory analyses that demonstrated sensible patterns of diminishing returns in response time as targets were removed from the set, as well as hastened search times for larger targets. The current study builds on this prior work by exploring strategy use in visual search, specifically by investigating the extent to which active and passive strategy use impacts performance. In contrast to our prior findings in hybrid visual search, our current findings suggest that during multi-modal search, an active search strategy can be superior to a passive one: Active searchers were faster to locate targets relative to passive and uninstructed searchers and demonstrated better performance overall.
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5:30-7:30 PM (1053)

Quantifying the Impact of Incident Severity, Salience, and Other Factors on Lifeguard Surveillance: An Exploratory Study. LYNDSEY K. LANAGAN-LEITZEL, *Eastern Connecticut State University* – Early identification of dangerous incidents in the water may allow for more thorough monitoring and quicker response times in lifeguards, but they do not always look at incidents they should. It is unknown whether this is due to not knowing what to look for or simply not seeing it while it is occurring in the context of a busy water scene. This exploratory study presented three lifeguards with 40 minutes of video of people swimming while an eye-tracker recorded their eye position. In a second session, each lifeguard rated the severity of 100 isolated incidents that had been presented previously. The target of each fixation in the original video was meticulously coded along with the salience of the fixation and scene, the number of swimmers in the scene, and the length of the incident. Monitoring of the critical incidents was highly variable but yielded several insights to inform lifeguard practice.
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5:30-7:30 PM (1054)

Object Semantics Can Be Accessed by Alzheimer's Disease Patients in Peripheral Vision. FRANCESCO CIMMINELLA, *University of Edinburgh,* GIORGIA D'INNOCENZO, *CICPSI, Universidade de Lisboa*, SERGIO DELLA SALA, *University of Edinburgh,* ALESSANDRO IAVARONE, *AORN Ospedali dei Colli*, CATERINA MUSELLA, *AIMA Campania*, MORENO COCO, *CICPSI, Universidade de Lisboa & University of East London* (Presented by Moreno Coco) – Healthy adults can process information about object semantics in extra-foveal vision almost at stimulus onset. There is evidence that Alzheimer's disease (AD) patients consistently underperform in tasks requiring semantic processing (e.g., picture naming), but it remains to be understood whether a similar impairment would manifest also in non-linguistic tasks, such as visual search. The current study investigates whether rapid extra-foveal processing of visual objects semantics is impaired or preserved in AD. Twenty AD patients and 20 age-matched controls searched for a target object – which could be semantically related or unrelated to other four semantically homogenous distractors (e.g., a car among an array of vehicles or kitchen items). Results showed that both groups of participants looked earlier and for longer at the critical object when this was semantically unrelated than related to the distractors. This occurred both when the critical object was the search target (target-present trials) and when it was the target's semantically related competitor (target-absent trials). Our findings provide additional evidence of extra-foveal processing of object semantics and critically highlight that this mechanism is preserved in AD.
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5:30-7:30 PM (1055)

Can Children Ignore Moving Items? Evidence from the Time-Based Visual Selection Paradigm. ZORANA ZUPAN, ELISABETH BLAGROVE, and DERRICK WATSON, *University of Warwick* – In time-based visual selection, adults can successfully ignore moving items to prioritize newly- arriving stimuli (preview search; Watson & Humphreys, 1998). This ability deteriorates with age (Watson & Maylor, 2002), however, its development has not yet been fully explored. We presented preview search, with baseline conjunction/single feature searches, and executive function tasks to 192 children aged 6, 8, 12 years, and adults. In Experiment 1, to-be-ignored moving items were presented for 1000ms before the new items and for 2000ms in Experiment 2. On average, children of all age groups were able to successfully ignore moving items. However, there were individual differences in this ability across age groups, including their relationships with executive functions (i.e., switching and inhibition). The results are discussed with regards to the development of time-based visual selection mechanisms for items in motion.
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5:30-7:30 PM (1056)

Spatial Coding May Depend on Culture in Location Probability Learning. INJAE HONG and MIN-SHIK KIM, *Yonsei University* – Location probability learning (LPL) refers to a spatial bias toward a

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frequent target region in visual search (Jiang & Sisk, 2019). Location probability is coded in a viewer-centered manner, attentional priority in the retinotopically frequent target location when the search scene rotates during LPL (Jiang, Swallow, & Sun, 2014). We explored cultural evidence on LPL, based on that Eastern and Western cultures convey attention in a different use (William, Scolari, Jeong, Kim, & Awh, 2009). Native Koreans participated to represent Eastern culture. Participants searched for a target (T) among distractors (Ls) which laid on a scene. One of the quadrants in a scene was more likely to contain a target and the scene rotated after (Exp 1) or while (Exp 2) learning. As a result, viewer-centered frequent target quadrant gained higher search priority than environment-centered frequent target quadrant. Infrequent target quadrants gained the least priority. The results are distant from Jiang et al. (2014) where environment-centered spatial coding was not observed. In Eastern culture, it seems that the search environment is coded when learning location probability. A comparative study is needed to further reveal the cultural difference in LPL.
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5:30-7:30 PM (1057)

Visual Environment and Attentional Window Size Can Account for a Cultural Difference in Search Asymmetry: A Saliency Map Model Study. JUN SAIKI, *Kyoto University* – Visual search asymmetry with a line length search is modulated by participants' cultural background, such that Westerners, but not East Asians, show search asymmetry (Ueda, et al., 2018). To explore mechanisms underlying this cultural difference in search asymmetry, the current study conducted a series of simulations using a saliency map model. Attention based on Information Maximization (AIM) model is a saliency map model that can account for search asymmetry (Bruce and Tsotsos, 2009). Using the AIM model, the current study manipulated two components, attentional window size, and feature sets derived from independent component analysis (ICA) of image set. With the default feature set derived from many scene images, higher saliency for the long line becomes weaker when the attentional window is getting smaller, suggesting that smaller attentional window disrupts search asymmetry. With feature sets derived from alphabets, Japanese hiragana, and Kanji characters, features from hiragana showed weaker search asymmetry compared with alphabets and Kanji characters. These results suggest that cultural difference in visual search emerges from long-term experiences with visual environment, and narrower attentional focus in East Asians.
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5:30-7:30 PM (1058)

Semantic Relations Reduce Switch Costs in Visual Search. Y. ISABELLA LIM and JAY PRATT, *University of Toronto* (Sponsored by Jay Pratt) – The process of switching between multiple search target templates often incurs a cost. It has been suggested that reactive control underlies these switch costs, such as having to switch templates when a prioritized target is absent from the environment. Our hypothesis is that reactivity, and therefore switch costs, will be reduced when people switch between semantically related objects compared to semantically unrelated objects. To test how semantics affect switch costs, we asked participants to hold two real-world targets in memory. Then an initial search array would appear, containing one of the targets and three distractors. Participants responded to the target's location, which then led immediately to a second search array (also one target and three distractors), and a second location response was made. We manipulated the semantic relationship between the two targets (related/unrelated) and the second target's location relative to the first target. Our findings show that searching for semantically related targets produced shorter reaction times to the targets in the first search and reduced switch costs to targets in the second search. Thus, searching for semantically related targets can reduce reactive control.
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5:30-7:30 PM (1059)

Relation between Working Memory and Implicit Learning in the Contextual Cueing Paradigm. HONGJIN SUN, CHAO WANG, and BRUCE MILLIKEN, *McMaster University* – We examined whether implicit learning (IL) involves working memory (WM). Visual search performance can be facilitated by implicitly learned spatial associations known as contextual cueing effect (CCE; Chun and Jiang, 1998). In the current study, participants first performed a learning phase with concurrent IL and a spatial WM task followed by a test phase with only visual search task involving the same set of repeated layouts. For half of the participants, articulatory suppression was required to prevent verbalization during WM task. Results showed that the CCE remained relatively intact in both learning phase and test phase for participants requiring no articulatory suppression. However, for participants with articulatory suppression, CCE was minimal during the learning phase but quite evident during the test phase. These results suggest that CCE can be affected by concurrent WM load during learning, but learning can still be established as the expression of learning can be revealed in the later test phase.
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5:30-7:30 PM (1060)

The Surprisingly Fragile Sequence Learning in Visual Search. YI NI TOH, ROGER REMINGTON, and YUHONG JIANG, *University of Minnesota* – Decades of research on the serial reaction time task showed that people are sensitive to regularities in a sequence of locations or responses. But can such learning tolerate environmental noise, such as the addition of randomly placed distractors? Here we tested whether participants could learn a repeated sequence of target locations to facilitate visual search. Participants searched a T target among L distractors and reported the target's screen quadrant, which was chosen randomly over 12 trials. Unbeknownst to participants, this 12-locations-long sequence repeated over 360 trials. Surprisingly, sequence learning was not observed: disrupting the sequence after 30 repetitions did not increase RT in either conjunction or feature search tasks. Sequence learning occurred when the distractors were removed, or when the distractor locations were unvarying across trials. The surprisingly fragile nature of sequence learning in visual search reveals a limit in the ability to extract spatiotemporal regularities in a varying environment.
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5:30-7:30 PM (1061)

An Assessment of Target Cuing Methods on Search Difficulty Effects. NATALIE PAQUETTE and JOSEPH SCHMIDT, *University of Central Florida* (Sponsored by Corey Bohil) – Studies that examine lateralized

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Event-Related-Potentials, often modify behavioral paradigms to present bilateral, (rather than central) visual stimuli. From study to study, these stimuli vary in eccentricity. Numerous authors acknowledge potential performance differences relative to a central cue, yet the effects are rarely assessed. We tested if the number or the eccentricity of target cues, affects the magnitude of target-distractor similarity visual search difficulty manipulations. This work examined search related accuracy, RT, & eye-movements when target Landolt-C's were designated with one or two central cues, or two near, or far bilateral cues, in both easy and difficult visual search conditions. The effect of difficulty interacted with the number of cues (accuracy and RT) and eccentricity (accuracy; all $p < .05$). These interactions suggest that translating findings from behavioral to lateralized stimuli and vice versa, may change the magnitude of some effects and caution should be taken when extrapolating across study designs.
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5:30-7:30 PM (1062)

Can Exploiting Eye-Gaze Dynamics Shift Risk Preferences? MORITZ KRUSCHE, BEN NEWELL, and MIKE LE PELLEY, *University of New South Wales* (Sponsored by Steven Most) – Previous research demonstrated that eye-gaze dynamics can be exploited to manipulate the outcome of ambiguous perceptual decisions (Newell & Le Pelley, 2018). Experiment 1 extended a similar paradigm to consequential decisions in risky choice. Gaze-contingent decision prompts were used in an attempt to nudge participants towards choosing a pre-determined target option: either a safe (100% chance of X points) or a risky (50% chance of Y points, 50% chance of nothing) option. The gaze-contingent procedure ensured that participants' final fixation was on the target option on more than 95% of trials. Critically, the timing of the response prompt induced a small but significant bias in risky choice: certainty equivalents calculated from choices suggested over-weighting of the target option relative to the non-target. Experiment 2 replicated this bias within a mixed 2 x 2 design and with different incentivisation. Our findings suggest a robust causal influence of attention on option-weighting in risky choice.
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5:30-7:30 PM (1063)

A Solution to the Feature Binding Problem for Risky Choice. LISHENG HE, *Shanghai International Studies University & The University of Pennsylvania,* SUDEEP BHATIA, *The University of Pennsylvania* – Sequential sampling models predict attention, choice, and response time in simple preferential choice, but are typically unable to handle more complex settings, such as those involving multi-branch gambles. To make reasonable decisions for such gambles, decision makers need to multiply payoffs against their corresponding probabilities, which cannot be accomplished by models that sample and integrate evidence additively. This is analogous to the feature binding problem in cognitive science, which involves the integration of perceptual properties in object representation. In this paper, we provide a solution to the feature binding problem for risky choice. We propose an interactive sampling mechanism according to which the likelihood of sampling a payoff depends on its associated probability. We show that this mechanism allows sequential sampling models to make utility-maximizing decisions. In six eye-tracking and mouse-tracking experiments, we find that most participants display interactive sampling, and that stronger interactive sampling is associated with more utility-maximizing choices on the participant-level. Overall, our results show how interactive sampling can be used to generate and predict sophisticated risky decisions.
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5:30-7:30 PM (1064)

The Time Course of Gaze Bias in a Perceptual Discrimination Task. SANDRA LAGATOR, MIKE LE PELLEY, and BENJAMIN NEWELL, *University of New South Wales* (Sponsored by Mike Le Pelley) – The 'gaze cascade effect' refers to the finding that, when making a decision, the likelihood of inspecting the to-be-chosen option increases in moments prior to making a choice. Simion and Shimojo (2006) suggest that the bias reflects mutual contribution of two processes: preferential looking and mere exposure effect. We contrast this with the finding that the effect can be observed in simulations of models that treat attention as random (Mullett & Stewart, 2016). We investigated whether the time course of the bias varies with decision difficulty. Participants completed a perceptual discrimination task: on each trial they were presented with two dot patterns and were asked to choose the one with more dots in it. We manipulated decision difficulty by varying the difference in dot-density between the patterns. Our results replicate the gaze bias but fail to find evidence that the time course of the bias varies with decision difficulty.
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5:30-7:30 PM (1065)

Does Mouse-Tracking Give an Extra Advantage? If So, what is it? TAKASHI YAMAUCHI, ANTON LEONTYEV, and MOEIN RAZAVI, *Texas A&M University* – Mouse tracking, new action-based measures of behavior, has emerged as an alternative to traditional response time (RT) and accuracy measures in behavioral research; it provides a real-time window into cognitive processing underlying conflict-driven judgments (Stillman, et a;, 2018). Despite its significance, the utility of this method is not well understood; its psychometric properties, such as internal consistency, have not been studied closely. Here, we devised two versions of the attention network task (ANT)—a standard ANT that measures response times (RT) and accuracy and a mouse-tracking ANT that assess mouse-movements—and compared their capacity, contextual sensitivity, and reliability for flanker, Simon, and Gratton effects. We found that mouse-tracking (MT) measures were highly sensitive to flanker, Simon, and Gratton effects as compared to traditional RT measures. However, this high sensitivity comes with costs. MT measures were susceptible to external factors such as trial order and sex differences. We suggest that MT measures are advantageous to capture conflict-driven decision making; yet extreme care should be taken in interpreting MT data since MT measures are more likely tainted by external variables.
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5:30-7:30 PM (1066)

Information Theory Meets Expected Utility: The Entropic Roots of Probability Weighting Functions. MIKAELA AKRENIUS, *Indiana University Bloomington* (Sponsored by Jerome Busemeyer) – This work proposes that the shape and parameter fits of existing probability weighting functions can be explained with sensitivity to uncertainty (as measured by information entropy) and the utility carried by reductions in

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uncertainty. Building on applications of information theoretic principles to models of perceptual and inferential processes, we suggest that probabilities are evaluated relative to a plausible expectation (the uniform distribution) and that the perceived distance between a probability and uniformity is influenced by the shape (relative entropy) of the distribution that the probability is embedded in. These intuitions are formalized in a novel probability weighting function, VWD(p), which is simpler and has less parameters than existing probability weighting functions. The proposed probability weighting function captures characteristic features of existing probability weighting functions, introduces novel predictions, and provides a parsimonious account of findings in probability and frequency estimation related tasks.
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5:30-7:30 PM (1067)

Comprehension and Communication of Probabilistic Information in Hurricane Forecasts. JINAN ALLAN, JOSEPH RIPBERGER, KUHIKA GUPTA, EDWARD COKELY, CAROL SILVA, and HANK JENKINS-SMITH, *University of Oklahoma* (Sponsored by Edward T. Cokely) – Scientists at the National Weather Service develop new models to produce probabilistic information to help forecasters better communicate uncertainty to partners and the public. However, there remain barriers to effective comprehension and communication. Some barriers are product specific (e.g., changing reference classes; point vs. area probabilities), while other barriers are more basic, such as cognitive differences in how forecasters, partners, and publics interpret probabilities when making decisions (e.g., statistical reasoning skills). The current study aims to assess the extent to which some cognitive factors (e.g., numeracy) and individual differences (e.g., experience) can impact comprehension and communication of commonly used probabilistic information. We provide data from two surveys: (i) a survey of emergency managers, and (ii) a US national survey. Structural models of cognitive processes indicate that differing levels of numeracy and experience can have direct and indirect influences on forecast comprehension. Discussion focuses on implications for training forecasters, emergency managers, and partners to improve comprehension and communication of uncertainty information among diverse individuals.
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5:30-7:30 PM (1068)

NWS Hazard Simplification: Assessing Changes to Advisory Weather Messages. MARK CASTEEL, The Pennsylvania State University, *York* – Recently, the National Weather Service (NWS) implemented a Hazard Simplification Project designed to enhance and simplify the nature of the Watch, Warning, and Advisory messages distributed by the NWS. The most recent impetus in the project is to remove "Advisory" from Advisory weather messages due to the confusion experienced by many members of the public to the term "Advisory." The proposed change is to use simple, straightforward language that communicates the same weather risk information while omitting the "Advisory" label. The research reported here represents an empirical investigation of the effectiveness of removing the legacy "Advisory" headline from wind, wind chill, and winter weather Advisories, while retaining the critical information with more easily understood text. These newly formatted messages will be compared to the same information paired with the legacy "Advisory" labels. Participants read six messages (two winter weather, two wind chill, two wind), in both the legacy and reformatted versions. Following each message, participants made decisions assessing risk and likelihood of taking protective action. Implications of the results will be discussed, and potential next steps will be offered.
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5:30-7:30 PM (1069)

A Dual-Process Approach to Prosocial Behaviour in Situations of Uncertainty Caused by COVID-19. DANIELA COSTA, JOSÉ KEATING, and JOANA ARANTES, *University of Minho* (Sponsored by Leonel Garcia-Marques) – Uncertainty has been shown to reduce the willingness to cooperate in various social dilemmas and to have a negative effect on prosocial behaviour. Nevertheless, some studies show that uncertainty does not always decrease prosocial behaviour, depending on the type of uncertainty. Consistent with past research, Kappes and collaborators (2018) found decreased prosocial behavior under outcome uncertainty – uncertainty about spreading a hypothetical disease carried by the participant. However, prosocial behaviour increased under what they called impact uncertainty – uncertainty about the consequences for others if they become infected by the participant. Applying a dual-process lens to human sociality, some researchers have argued that intuition favors cooperation while deliberation leads to selfish behavior. Our study explored how intuitive (time pressure) or deliberate mental processing, under outcome or impact uncertainty (in the context of the COVID-19 pandemic) affect prosocial behavior. Results suggest that participants are more likely to stay home (prosocial intention) when forced to make their decisions intuitively rather than deliberately. We found no difference in prosocial intention under the different types of uncertainty.
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5:30-7:30 PM (1070)

The Impact of Time Pressure on the Wisdom of Crowds. TAMARA GOMILSEK, *University of Konstanz,* JANINA HOFFMANN, *University of Bath,* HANSJÖRG NETH and WOLFGANG GAISSMAIER, *University of Konstanz* (Sponsored by Ronald Hübner) – Is it better to ask several people for quick judgments or one person for a carefully deliberated judgment? The "wisdom of the crowds" phenomenon implies that aggregating judgments can benefit group performance, but only when individuals provide independent, unbiased judgments. Time pressure, on the other hand, can induce both noise and bias on individual judgments, but it is unclear how these effects translate to aggregated judgments. We explored whether collecting many fast judgments can give rise to more accurate collective performance than collecting fewer, but slower judgments. In a simple perceptual task, we asked 580 online participants to estimate the proportion covered by the colored part of a square in four time pressure conditions (between participants). Next, we simulated nominal groups (N = 1 to 15) and compared the group to individual performance in relation to time pressure. We found that even small groups perform drastically better than separate individuals, regardless of time pressure. Moreover, aggregating fast judgments is more efficient as they achieve slightly better performance in the same amount of overall time compared to smaller, but slower groups.
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5:30-7:30 PM (1071)

The Prevalence Effect in Fingerprint Identification: Match and Non-Match Base-Rates Impact Misses and False Alarms. BETHANY GROWNS, *Arizona State University,* JEFF KUKUCKA, *Towson University* – The prevalence effect is the phenomenon whereby target prevalence impacts performance in visual search (e.g., baggage screening) and visual comparison (e.g., face-matching) tasks. In face-matching studies, for example, people more often 'miss' identity mismatches when such mismatches are infrequent. The current study investigated prevalence effects in another visual comparison domain—fingerprint identification. Participants (N=287) judged 100 fingerprint pairs where either 10% (low), 50% (equal), or 90% (high) were identity mismatches, and half received trial-level feedback on their performance. Low mismatch prevalence increased errors in correctly detecting mismatches but decreased errors in match detection, whereas high prevalence increased errors in match detection but decreased errors in mismatch detection—but only when participants received feedback. These effects were driven by changes in bias (C), rather than sensitivity (d'). These results have important implications for the real-world performance of fingerprint examiners given identity match and mismatches are not equal in their discipline and the 'feedback' they receive from case verdicts. Future research will be important in exploring how these errors can be reduced.
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5:30-7:30 PM (1072)

The Effect of Numeric Uncertainty Information on Complex Decision Making. JEE HOON HAN and SUSAN JOSLYN, *University of Washington* – Previous research suggests that people are able to make better decisions and have higher trust in forecast information with numeric uncertainty estimates (e.g. probabilities) when compared to deterministic forecasts. However, most of the previous studies used a binary decision task, to take protective action at a cost or not, risking a larger loss. However, most real-world situations include intermediate options. The present study aims to determine whether the above-mentioned advantages for probabilistic forecasts are observed in a more complex decision situation with an intermediate option. To investigate this, a school closure decision task with three options (closing, delaying, remaining open) was compared to a binary two option decision task (closing, remaining open). Half of participants received probabilistic, and the other half received deterministic forecasts. Preliminary results suggest that the advantages for probabilistic forecasts hold across task complexity although performance declined with more options. Implications will be discussed.
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5:30-7:30 PM (1073)

Perspective-Taking Accessibility (and Not the Type of Psychological Processing) Informs People's Utilitarian Moral Judgments. ROSE MARTIN and PETKO KUSEV, *The University of Huddersfield* – According to Unconscious Thought Theory (UTT; Dijksterhuis & Nordgren, 2006) complex decisions options should be processed unconsciously (during a distraction period) rather than consciously, if one wants to make the optimal choice. Some authors (e.g., Ham & van den Bos, 2010) have applied this theory to moral decision-making and found that people are more utilitarian in response to the footbridge dilemma when they process the decision-making information unconsciously as opposed to consciously. However, throughout the moral decision-making literature, no authors have considered the importance of full perspective-taking (PT) accessibility (having access to multiple perspectives in moral scenarios) on people's moral choices and judgments. Accordingly, we found that presenting full PT accessibility to participants resulted in consistent utilitarian judgments regardless of the type of psychological processing employed. Therefore, we argue that unbiased and accessible information is more important in producing normative decisions than the way in which people process information.
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5:30-7:30 PM (1074)

The Scaled Target Learning Model: Revisiting Learning in the Balloon Analogue Risk Task. RAN ZHOU, JAY MYUNG, and MARK PITT, *The Ohio State University* – The Balloon Analogue Risk Task (BART) is a sequential decision making paradigm that assesses risk-taking behavior. Several computational models have been proposed for the BART that characterize risk-taking propensity. An aspect of task performance that has proven challenging to model is the learning that develops from experiencing wins and losses across trials, which has the potential to provide further insight into risky decision making. The Scaled Target Learning (STL) model was developed for this purpose. STL describes learning as adjustments to the pumping strategy in reaction to previous outcomes, and the size of adjustments reflects an individual's sensitivity to wins and losses. STL is shown to be sensitive to the learning elicited by experimental manipulations, and further matches or bests the performance of three competing models in terms of parameter recovery and predictive accuracy, thus providing a more complete depiction of the psychological processes underlying sequential risk-taking behavior.
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5:30-7:30 PM (1075)

Default and Alternatives: How Number of Alternatives Change Preference for the Default Option. KUNINORI NAKAMURA, *Seijo University* – Research on default effects (e.g., Johnson & Goldstein, 2003) has demonstrated that people prefer default to non-default options. However, these studies employed experimental situations with only one non-default option. Many studies on judgment and decision making have demonstrated (e.g., Iyengar & Lepper, 2000; Tversky & Koehler, 1994) that the number of options affects people's preference structure. The choice overload hypothesis (Iyengar & Lepper, 2000) predicts that people's preference for the default option would increase with the number of total options because increases in the number of options would entail excessive effort, resulting in a reliance on the default option. Contrariwise, support theory (Tversky & Koehler, 1994) predicts that increasing the number of options weakens attention to the default option, decreasing preference for it. To decide between these contradictory predictions, the current study required participants to choose their favorite option where the default option was settled and the number of options was manipulated. The results demonstrated that participants' preference for the default option decreased as the number of options increased, supporting the prediction of support theory.
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5:30-7:30 PM (1076)

Contextual Information with Regards to Sequentially Increasing, Decreasing and Low-Fluctuating Prices: Judgments of Value and Response Time. MASAYO NODA, *Kinjo Gakuin University,* HIROKI TANABE, *Nagoya University,* MASATO KIMURA, *Konica Minolta, Inc.* – This study tested the influence of sequentially increasing, decreasing, and low-fluctuating prices on judgments of value and response time. Participants were asked to take part in a game purchasing barley and then evaluate their satisfaction. Sequential data (Increasing, Decreasing vs. Low-fluctuating) x Days (5-day vs. 2-day) ANOVA was performed. Value judgment results showed a significant two-way interaction ($F(2,88) = 4.08$, $p < .05$). In the low-fluctuating condition, the participants were less satisfied under the 5-day condition compared to the 2-day condition. With regards to response time, significant main effects were found for Sequential data ($F(2,88) = 5.31$, $p < .01$) and also for Days ($F(1,89) = 3.30$, $p < .05$). The response time was longer under the decreasing condition compared to the low-fluctuating and increasing conditions. These results indicate that when people make a judgement they are less satisfied with, they require a longer time to judge their decisions.
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5:30-7:30 PM (1077)

Complexity Aversion in Risk Preferences. YVONNE OBERHOLZER, *Karlsruhe Institute of Technology* SEBASTIAN OLSCHEWSKI, *University of Basel,* BENJAMIN SCHEIBEHENNE, *Karlsruhe Institute of Technology* (Sponsored by Benjamin Scheibehenne) – Decision environments have become increasingly complex with an ever-increasing amount of information available to inform our decisions. However, it remains unclear if and how complexity alters risk preferences. Previous research investigating this relationship revealed somewhat conflicting results, with some research finding complexity aversion and others finding complexity neutrality. We address these conflicting results by investigating the effect of complexity on risk preferences in two studies (overall $n = 423$). Our results reveal that complexity aversion is format dependent (judgment-choice gap) and most likely stems from an avoidance of cognitive effort. In support of this, cognitive ability was an important moderator of the effect and process measures of participant cognitive effort correlated negatively with the effect. Moreover, the results indicate that complexity increases the noise in the decision process, a mechanism that can seemingly amplify the effect in asymmetric choices designs. These results have important implications for experiment designs in risky choice and judgment and should inform cognitive models and the comparative study of groups differing in cognitive ability (e.g. age effects).
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5:30-7:30 PM (1078)

Do Robo-Advisors Address Less Risk-Averse People? ANDREAS OEHLER and MATTHIAS HORN, *Bamberg University,* STEFAN WENDT, *Reykjavik University* – The purpose of our study is to analyze the influence of retail investors' individual characteristics on the decision to use a robo-advisor. As robo-advisors are still new to most retail investors and do not involve interaction between humans, it seems plausible that retail investors are skeptical about entrusting money to robo-advisors. We therefore hypothesize that retail investors with individual characteristics commonly associated with less risk aversion are more likely to use a robo-advisor. We conducted a questionnaire-based survey among 231 undergraduate business students, which included items to capture participants' risk attitude, cognitive reflection, Big Five personality factors, locus of control, positive and negative affect, trust, financial knowledge, self-assessed knowledge in statistics, and gender. The results support our hypothesis and show that participants with higher willingness to take financial risks, higher self-assessed knowledge in statistics, and lower internal locus of control are more likely to use a robo-advisor.
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5:30-7:30 PM (1079)

Does Looking Mean Liking? Processing Differences Across Perceptual and Preferential Choice. SERGEJ GRUNEVSKI and TIMOTHY PLESKAC, *University of Kansas,* SHULI YU, *Max Planck Institute for Human Development,* TAOSHENG LIU, *Michigan State University* – In perceptual decision making, attention boosts discrimination by enhancing early visual information processing. Yet, in preferential decision making people tend to choose the option they attend to the most implying attention may bias performance. So does selective attention improve decision discrimination, bias choice, or both? To address this question, we compared perceptual and preferential choice with an eye tracking-coupled experience-based paradigm. Participants chose between two rapidly updating "fishing ponds" by either making a preferential choice (identify the pond they would like to fish from) or a perceptual choice (identify the pond with the most fish). Results from two studies show that selective attention tends to bias choice and that this bias is greater for preferential choice. The bias arises because selective attention shapes the accumulated evidence. If people allocate attention more equally, then the bias dissipates for both perceptual and preferential choice.
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5:30-7:30 PM (1080)

A "Pandemic Gap" in Risky Choice. AALIM MAKANI, SADIA CHOWDHURY, and JULIA SPANIOL, *Ryerson University* – Choices between affect-rich options, such as medical side effects, diverge from choices between affect-poor options of equivalent monetary value, a phenomenon referred to as the affect gap in risky choice (Pachur et al., 2014). The current study tested whether experiences associated with the COVID-19 pandemic would produce a similar affect gap. North American MTurk participants (N=154; mean age: 47.9 yrs; range: 21-19; 83 females) indicated how much they would be willing to pay to avoid each of 14 common pandemic-related experiences (e.g., "not being able to gather in groups") over the next year. They then made choices between risky options involving these experiences (pandemic domain) and between risky options involving subjectively equivalent financial losses (monetary domain). Choices were less sensitive to expected value in the pandemic domain than in the monetary domain. The "pandemic gap" was associated with gender (greater in males than in females) but not with age.
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5:30-7:30 PM (1081)

How Decision-Making Monetary Desirability Influences Risk Preferences. JOSEPH TEAL and PETKO KUSEV, *The University of Huddersfield* (Sponsored by Petko Kusev) – The Decision by Sampling

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(DbS) relative rank model predicts that absolute values and their magnitudes do not influence judgement or choice (Stewart et al., 2006). Specifically, DbS assumes that the subjective worth of an attribute value (e.g., a monetary amount) is its relative rank position within the distribution of sampled attribute values. In contrast, we propose that the decision-makers' preferences are also influenced by the desirability of monetary amounts. We tested this proposal using a DbS method, where participants had to choose between a risk-averse and a risk-seeking gamble, after sampling monetary amounts. We found that human decision-makers use relative ranking only when the risk choice options are non-desirable (negligible monetary amounts). However, when the decision-making task includes a risk choice option that is desirable (a large monetary amount), participants chose the desirable risk option regardless of how sampled values were distributed. Accordingly, the results revealed that desirability of absolute values (and not the sampling experience and relative ranking) influenced participants' risk preferences.
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5:30-7:30 PM (1082)

When are People Sensitive to Information Dependency in Judgments Under Uncertainty? BELINDA XIE and BRETT HAYES, *University of New South Wales* (Sponsored by Brett Hayes) – Judgments under uncertainty often rely on advice from multiple social sources. We examined how such judgments are affected by advice from multiple independent sources compared with "dependent" sources, where advice supplied by one source influences others. Ten experiments used a modified-balls-and urns task where participants judged which of two colored urns had been randomly selected, after hearing guesses from several informants. Informants provided independent testimony based solely on their own observations, or sequential testimony, which considered the guesses of previous informants. Participants revised their judgments based on this information, but generally gave equal weight to independent and sequential testimony. A notable exception was when individuals were separated out by their general beliefs in the value of independent over dependent information. Those who saw independent information as more valuable, gave more weight to independent testimony in the judgment task. We discuss the implications for Bayesian models of judgment using social information.
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5:30-7:30 PM (1083)

Risk Literacy & Overconfidence: Numerate People are Less Biased, and They Know It. VINCENT YBARRA, EDWARD COKELY, JINHYO CHO, MADHURI RAMASUBRAMANIAN, and JINAN ALLAN, *University of Oklahoma & National Institute for Risk and Resilience,* ADAM FELTZ, *University of Oklahoma,* ROCIO GARCIA-RETAMERO, *University of Granada* (Sponsored by Edward Cokely) – Research shows that some Individuals are overconfident in their skills and knowledge than they are. One common method of measuring overconfidence in decision making is by asking individuals how much they exhibit various biases and have them make a judgement about other's exhibiting the same biases (e.g., the bias blind spot; overplacement). The state of the science on decision making overconfidence claims that everyone is overconfident despite cognitive abilities, experience, or individual differences. This runs counter to a growing body of work on Skilled Decision Making (Cokely et al., 2018) where people differ in their decision making skill and confidence. To test this notion a global study was conducted that surveyed over 20,000 individuals measuring statistical numeracy, paradigmatic decision tasks with confidence measures, and an overplacement confidence question. Results indicated that numeracy predicted decision making skill which in turn predicted decision making calibration. In addition, results suggested that those who were skilled in decision making were calibrated in their objective decision making performance and their subjective decision making skill. In short, numerate individuals were less biased and knew it.
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5:30-7:30 PM (1084)

Using Systems Factorial Technology to Determine the Fundamental Cognitive Properties of Decision Making. CARA ZINN, *Wright State University,* JOSEPH HOUPT, *University of Texas at San Antonio,* MARIO FIFIC, *Grand Valley State University* (Sponsored by Joseph Houpt) – Most decisions depend on multiple sources of information and a number of models have been posited to explain how people combine those sources as part of the decision-making process. These models range from those based on heuristics, such as a "take-the-best" heuristic, to those based on probabilistic inference, such as those based on naïve Bayesian inferences. Unfortunately, choice probabilities are often not sufficient to distinguish among these models. In the current work, we will describe how systems factorial technology (SFT), a response time based approach used in perception research, can be applied to discriminate among candidate decision-making models. We demonstrate a framework for estimating the SFT statistics and independently manipulating the cue validities, while controlling the conditional probabilities associated with each information source. We present results from a perceptual decision-making study with environments that either encourage using multiple cues or are more neutral and discuss the implications for decision-making models.
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5:30-7:30 PM (1085)

Investigating the Neural Correlates of the Description Experience Gap. ELIZABETH BEARD, JASON CHEIN, and VINOD VENKATRAMAN, *Temple University* (Sponsored by Jason Chein) – The Description-Experience (D-E) Gap demonstrates that risk preferences can change as a function of whether the same information is described or learned from experience. Yet, the mechanisms underlying this effect remain largely unknown. The current study examines the neural processes associated with the D-E Gap. 24 young adults completed a novel, within-subjects paradigm while being scanned with fMRI. Participants encountered the same 36 choices in both description and experience formats. Consistent with previous research, we found increased risk taking in decisions from experience (DFE) than description (DFD). Participants were more likely to overweight rare unfavorable outcomes in DFE. Preliminary fMRI analyses reveal that participants had stronger activation in neural regions associated with working memory in DFE vs. DFD. Consistent with prior work linking risk behavior to neural activity, DFE was associated with increased activation in left ventral striatum relative to DFD, while DFD was associated with greater activation in right anterior insula. Forthcoming analyses will further examine the relationship between neural processes of information acquisition and relative weighting of risks.
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5:30-7:30 PM (1086)

To Comply, or Not Comply? That Is the Question: A Latent Profile Analysis of Behavioural Compliance During the COVID-19 Pandemic. SABINA KLEITMAN, LISA ZHANG, DAYNA FULLERTON, MATTHEW BLANCHARD, and LAZAR STANKOV, *University of Sydney,* JIHYUN LEE, *University of New South Wales,* VALERIE THOMPSON, *University of Saskatchewan* – Compliance with protective behaviors is key in containing COVID-19. Identifying individual & sociocultural factors associated with compliance is critical. To account for heterogeneity in populations, we adopted a person-centred approach, with constructs drawn from cross-cultural, decision & differential psychologies. 1711 participants from Australia, UK, USA & Canada completed a survey assessing COVID-19 related behaviors and opinions, worry, resilience, adaptability, coping styles, personality, political beliefs, & demographics. Factor analyses were conducted, resulting in 3 factors for behavioral compliance (preventive, restrictive, management), 3 factors for opinions (support for- social distancing, self-isolation, herd immunity), and 6 factors for psychosocial characteristics: resilience, adaptive coping, maladaptive coping, COVID-19 coping, conservatism, & societal orientation. These factors were used in Latent Profile Analysis to determine profiles of groups reacting differently to COVID-19. Robust groups emerged: those with compliant with restrictions (3 groups, 2 differ in ages and 1 health conditions), & those non-compliant. The main distinction in compliance between them were differences in opinions.
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5:30-7:30 PM (1087)

Acquired Knowledge Differences Don't Fully Explain Reversal Learning Deficits Under Sleep Deprivation. COURTNEY KURINEC, ANTHONY STENSON, JOHN HINSON, PAUL WHITNEY, and HANS VAN DONGEN, *Washington State University* – During controlled sleep deprivation (SD) subjects show impairment on tasks that assess cognitive flexibility, such as probabilistic reversal learning. However, reversal learning often requires flexible adaptation to changes in contingencies as well as the ability to learn the initial contingencies and develop knowledge-based expectations. Thus, impairment during SD could reflect a deficit in acquired knowledge, difficulty in flexibly adapting to change, or both. We investigated the relationship between acquired knowledge and adaptation to change during SD in two reversal learning tasks: one that required learning contingencies from feedback, and one in which contingencies were explicit and not learned from feedback. Group comparisons were made between SD (no sleep for 24 hours) and Control (normal sleep). SD subjects performed worse than Control subjects both pre- and post-reversal on both tasks. When contingencies had to be learned, knowledge of contingencies predicted performance for both groups, with poorer knowledge for SD subjects. But knowledge differences did not explain SD impairment when task contingencies were explicit. Therefore, although necessary, knowledge does not fully account for reversal learning deficits in SD.
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5:30-7:30 PM (1088)

The Influence of Life Narrative Themes on Resilience and Life Outcomes. MADHURI RAMASUBRAMANIAN, *University of Oklahoma & National Institute for Risk and Resilience,* DIVYA PATEL and MEGAN TURNER, *University of Oklahoma & Center for Applied Social Research,* VINCENT YBARRA and EDWARD COKELY, *University of Oklahoma & National Institute for Risk and Resilience* (Sponsored by Edward Cokely) – Resilience is the process of managing and adapting to significant sources of stress. Previous research has demonstrated that resilience can influence coping behaviors and other life outcomes. However, less research has focused on the role personal life narratives play in the development of resilience and other life outcomes. The current study is one of the first instances to investigate the intersection of these factors. A sample of 183 students from the University of Oklahoma completed assessments relating to resilience, coping and other life outcomes. Participants were asked for their written life narratives, which were then coded by a team of graduate students for the themes of agency (assertion of the individual self), communion (motivations for love and belongingness) and personal growth (intentional development of personality). Using SEM, three models were tested such that life narrative themes positively predict resilience, which then strongly predicts three different life outcomes: (i) life satisfaction, (ii) adaptive coping strategies and (iii) stress, anxiety and depression. Discussion will focus on implications for further research endeavors aimed at designing interventions to help individuals become more resilient.
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5:30-7:30 PM (1089)

Sleep Deprivation Impairs Acquisition and Flexible Adaptation to Choose Contingencies in a Dynamic Risky Decision-Making Task. ANTHONY STENSON, COURTNEY KURINEC, JOHN HINSON, PAUL WHITNEY, and HANS VAN DONGEN, *Washington State University* – Our previous studies show that acquiring knowledge from feedback is impaired by sleep deprivation (SD). The current experiment extends this finding to the more complex case of make decisions in which risk information must be updated regularly in order to make advantageous choices. We introduce a novel task designed to assess Situational Awareness of Risk Dynamics (SARD) in order to investigate the impact of SD on the acquisition of risk information and the flexible adaptation to changes in risks. The SARD requires individuals to learn, through choice outcome feedback, which choice option is most advantageous and to subsequently adapt choices to unannounced changes in choice contingencies. Group comparisons were made between SD, no sleep for 24 hours, and Control, normal sleep. SD subjects performed significantly worse on the SARD, choosing the best option less frequently and the worst option more frequently. Poorer performance for SD subjects was not driven by a tendency to make riskier choices overall. These results indicate that in a dynamic risky decision making environment, SD individuals show a reduced ability to acquire contingency knowledge and adapt to changing contingencies.
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5:30-7:30 PM (1090)

Instructions to Incorporate Music Themes into an American Haiku Task is Necessary for Music Themes to be Included in the Haiku. CYNTHIA SIFONIS, *Oakland University* – Thematic music conveys meaning by activating concepts associated with the music theme. Generating novel exemplars is influenced by activated concepts in memory. Thus, Ps listening to thematic music before writing a haiku

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should incorporate thematic elements into the haiku. This is examined by having Ps a) include thematic elements in the haiku b) were not instructed to include thematic elements or c) writing a haiku before listening to music. 110 undergraduates listened to a 90 second sample of unfamiliar lullaby- or war-themed music. Ps were instructed to write a haiku inspired by the music (Inspire), write a haiku after listening to the music (Neutral) or write a haiku before listening to the music (Control). Revealed was a significant main effect of the Inspire instruction on incorporation of thematic elements into the haiku. Ps in the Inspire condition included significantly more thematic elements of the music into their haiku than Ps in the Neutral condition or Control conditions. Ps in the Inspired condition wrote haikus that were marginally more likely to be rated as more negatively valenced and were more creative than the haikus written in the Neutral and Control conditions.
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5:30-7:30 PM (1091)

Earworm Frequency in Adults With and Without Musical Training. LAUREN GUTHRIDGE and SHELIA KENNISON, *Oklahoma State University* (Presented by Shelia Kennison) – A song that gets stuck in your head has been called an earworm. Earworms can also be described as involuntary musical imagery. Prior research has found that 79 percent of people reported experiencing an earworm more than once a day. Prior research also found that those who spend more time listening to music also experience earworms more frequently than others. We investigated the possibility that those with musical training would experience earworms more often than others, as musical imagery may be useful to musicians during music practice as they attempt to improve their performance. We surveyed 165 adults with prior musical training and 69 individuals without musical training. The amount of musical training varied from 1 year to 8 years to more than 20 years. We examined the relationships among earworm frequency and individual differences in the amount of time spent listening to music, years of musical training, and five types of creativity (everyday, scholarly, performance, mechanical, and artistic). The results showed that earworm frequency was positively related to years of musical training, amount of time spent listening to music in daily life, and the everyday type of creativity.
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5:30-7:30 PM (1092)

Musical Tempo Affects the Experience of Time. MATTHEW JOHNSON and MICHAEL GORDON, *William Paterson University* (Sponsored by Michael Gordon) – This research was designed to examine how music may contribute to the experience of "time flying," and specifically, the interaction between musical tempo with the experience of duration. Participants performed a temporal bisection task in which a standard duration tone stimulus of 6 s was used to evaluate a series of comparison tones (4-8 s). Participants determined whether each comparison tone was shorter or longer in duration than the standard. The test was accompanied with rhythmic musical tracks that varied in the constancy and rate of their tempi. The data suggest that the rate and variability of the tempo may bias the duration judgements. Those with musical training consistently judged the length of the stimuli more accurately than those without training, particularly in the slow tempo condition. These preliminary findings are discussed with implications for music and time perception, and suggest new directions for further research.
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5:30-7:30 PM (1093)

Does Sad Speech Sound Like Sad Music? ANDRÉS BUXÓ-LUGO and L. ROBERT SLEVC, *University of Maryland* – Pitch can convey information about emotion in both spoken language and in music. Given this, is it the case that people communicate emotion in similar ways across both modalities? Previous research has found evidence that they do; for example, Curtis & Bharucha (2010) found evidence that actors conveying sadness in simple 2-syllable utterances (e.g., "okay") produced an abundance of minor third pitch intervals, commonly associated with sad music in the Western tradition. We assessed this claim in a larger corpus of longer utterances spoken by actors conveying a variety of emotions (Livingstone & Russo, 2018). We find no evidence that sad utterances tend to include minor thirds, finding instead that descending major seconds were most common when conveying sadness. We further explore the intonational patterns speakers use in these longer utterances when communicating different emotions.
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5:30-7:30 PM (1094)

Prior Real-World Experience Influences Non-Linguistic Statistical Learning. STEPHEN VAN HEDGER, *University of Western Ontario & Huron University College,* INGRID JOHNSRUDE and LAURA BATTERINK, *University of Western Ontario* – Listeners are adept at extracting regularities from the environment, a process known as statistical learning (SL). SL is assumed to be "context-free," occurring independently of prior knowledge, and SL experiments typically involve exposing participants to presumed novel regularities, such as repeating nonsense words. However, recent work has found that learners' previous language experience influences SL performance. In the present experiment, we tested whether prior knowledge also shapes SL in a non-linguistic domain, using a paradigm that involves extracting regularities over tone sequences. Participants were assigned to one of two groups. The artificial-instrument (AI) group heard tone sequences played in a novel timbre, whereas the familiar-instrument (FI) group heard identical tone sequences played using familiar timbres (piano and violin). Compared to the AI group, participants in the FI group had weaker correlations among test items and inflated confidence in their responses. Overall, the results demonstrate that prior experience influences SL in a non-linguistic domain, supporting the view that SL involves continuously updating existing representations rather than establishing entirely novel ones.
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5:30-7:30 PM (1095)

Timbre Change on Memory for Melodies in Musicians and Nonmusicians. KIETH GRYDER and W. JAY DOWLING, *University of Texas at Dallas* (Sponsored by W. Jay Dowling) – This study investigates the effects of changing timbre from encoding to test on recognition memory for melodies. Highly trained musicians, moderately trained musicians, and nonmusicians were asked to rate 72 melodies in a continuous recognition task. 36 of the melodies were new "to be remembered" different contour melodies (DC), while the other 36 melodies were changed to be either

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exact transpositions, same-contour lures (SC). These three types of test melodies also varied in timbre. They either stayed in the same timbre, shifted to a similar timbre, or shifted to a distinctly different timbre from the original. Results show that changing to a different timbre significantly reduced melody recognition compared to similar timbre change, which was comparable to staying in the same timbre. Although highly trained musicians did better than the other two groups, the pattern of results were similar across experience groups. When discriminating SC lures from old melodies we found highly trained musicians were seemingly unaffected by timbre change, while moderate and nonmusicians actually performed better when the melodies changed to a similar timbre compared to changing to a distinctly different timbre or staying in the same timbre.
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5:30-7:30 PM (1096)

Subvocalization During an Auditory Mental Transformation Task. EMMA GREENSPON, *Monmouth University,* ANNA HONAN and TIM PRUITT, *University at Buffalo, SUNY*, ANDREA HALPERN, *Bucknell University,* PETER PFORDRESHER, *University at Buffalo, SUNY* – The cognitive and motor processes involved in singing were assessed in the current study by having participants produce (i.e. sing) and recognize repetitions and transformations (key change, serial order shift, and reverse ordering) of 3 and 4-note novel melodies. Subvocalization during a maintenance phase of the task was assessed using surface electromyography (sEMG) of muscles involved in articulation and phonation. Results indicated that performance decreased when demands on short-term memory capacity and working memory increased: participants sang and recognized shorter melodies more accurately than longer melodies and sang and recognized exact repetitions more accurately than transformations. In line with the behavioral effects of melody length, we observed an increase in sEMG activity in the maintenance phase for longer melodies not only during preparation for production but also in most cases in preparation for recognition, suggesting that subvocalization is recruited for the maintenance of pitch information regardless of output task.
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5:30-7:30 PM (1097)

Do Lyrics Affect Emotional Perception in Musicians Differently? A Conceptual Replication. YIQING MA, *University of Michigan & Louisiana State University,* DAVID BAKER and KATHERINE VUKOVICS, *Louisiana State University,* CONNOR DAVIS, *Louisiana State University & John Brown University,* EMILY ELLIOTT, *Louisiana State University* – Recent studies have shown that musicians have higher accuracy in their ability to communicate emotions in music, but what about their perception of emotion? Work by Ali and Peynircioğlu (2006) reported that the presence of lyrics only enhanced listener's emotional ratings in sad and angry music. However, the melodies and the lyrics were chosen from different music selections in the original study, and level of musical training of the participants was not recorded. Therefore, we preregistered this replication and extension with new adapted stimuli, and we included the Goldsmiths Musical Sophistication Index (GMSI). Participants were asked to rate the intensity (1-9) of four types of their felt emotions (happy, calm, sad, and angry/stressful) in 16 unfamiliar songs with or without lyrics (N = 108). Overall, the results did not replicate the original study; specifically, the mean rating for calm was significantly higher than the other emotions in the music without lyrics, and was equal to the mean rating for sad in the music with lyrics. Musical sub-scores from the GMSI correlated significantly and positively with mean ratings in angry/stressful and calm. Thus, musical experience did not relate to all four of the felt emotions.
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5:30-7:30 PM (1098)

Interval and Beat-Based Timing Mechanisms in Rhythm Perception. JESSICA SLATER and BRENDA KOBORSY, *McGill University,* SIMONE DALLA BELLA, *Université de Montréal,* CAROLINE PALMER, *McGill University* – Rhythm and timing skills are enhanced in expert musicians and impaired in some clinical populations. Previous research suggests that distinct mechanisms may underlie beat-based timing, modeled by endogenous nonlinear oscillators, and interval-based timing, modeled with clock-counter mechanisms. Although performance in beat-based and interval tasks has been dissociated in clinical populations, it is not known whether performance in these two tasks is correlated in a healthy adult population. We administered a beat alignment test and interval discrimination test to assess beat-based and interval-based timing in a sample of healthy adults. Findings suggest that performance on these two measures is strongly correlated. These outcomes provide a basis for further investigation into the relation between rhythm-related skills and underlying neural systems in healthy and clinical populations.
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5:30-7:30 PM (1099)

Bilingualism and Mild Traumatic Brain Injury: Preliminary Results from Eye-Movements During Reading. ILEANA RATIU, *Midwestern University, Glendale,* TAMIKO AZUMA, *Arizona State University* – Individuals with a history of mild traumatic brain injury (mTBI) can experience persistent deficits in higher-level cognitive abilities. These often subtle deficits can manifest themselves in complex cognitive tasks, such as reading. There is little research on the interaction between mTBI and bilingualism, and studies focused on the relationship between bilingualism and outcomes for other neurological disorders have produced inconsistent findings. Forty-six healthy controls (33 Monolingual; 13 Bilingual) and 37 participants with a history of mTBI (28 Monolingual; 9 Bilingual) completed a reading comprehension task that included both behavioral and eye-tracking measures. Behavioral data did not reveal consistent group differences. However, eye movement data revealed differences between controls and individuals with mTBI as well as bilingual and monolingual participants. The findings suggest that mTBI affects bilinguals differently than monolinguals as reflected in increased cognitive effort during reading.
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5:30-7:30 PM (1100)

The Typical Missing Letter Effect in English No Es Típico en Español. CESAR RIAÑO RINCON (J. Frank Yates Student Travel Award Recipient), GARY RANEY, RANYA NASER, and KELLY MA, *University of Illinois at Chicago* – We used the letter-detection task to examine whether word processing is different in English and Spanish. In this task people read for comprehension while circling a target letter. The typical

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finding is that people miss more letters in function words than in content words, which is called the Missing Letter Effect (MLE). Bovee and Raney (2016) and Riano and Raney (2019) had non-proficient or proficient English-Spanish bilinguals, respectively, perform letter detection with English (target letter = t) and Spanish (target letter = l) passages. They found a large MLE for English and a small, reversed MLE (more letters missed in content than function words) for Spanish passages. Because different target letters can produce different error rates, we repeated their procedure using the target letter E for both English and Spanish. We found a large MLE for English (28%) passages and a very small MLE for Spanish (5%) passages that resulted from fewer errors on function words in Spanish than English passages. Our findings suggest that typical MLE found in English is not typical for Spanish. We suggest that because function words are gender marked in Spanish, they receive more attention, which leads to fewer letter detection errors.
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5:30-7:30 PM (1101)

Lexical Decision in Same-Script vs. Different-Script Cognates. YEN NA YUM and CHUN PONG FAN, *The Education University of Hong Kong* – Cognates in same-script language pairs tend to have both orthographic and phonological similarities, while these overlaps may be separable in different-script language pairs. This study aimed to tease apart the cognate effects using same-script Chinese/Kanji cognates and different-script English/Katakana cognates. Fourteen trilingual Chinese-English-Japanese participants completed lexical decision in Chinese, Kanji, English, and Katakana, while thirty control Chinese-English participants completed the Chinese and English blocks. Linear mixed-effects models of real word RTs showed a main effect of cognate in trilingual group, with cognates processed 19ms more quickly than non-cognates, and a main effect of script (Chinese < Kanji = English < Katakana), but no interaction of cognate and script. Among control participants, Chinese was processed more quickly than English, but no cognate or interaction effect was apparent. The similar cognate facilitation across same-script and different-script cognates suggested that both orthographic and phonological information contributes to the cognate facilitation.
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5:30-7:30 PM (1102)

My Life is a Pencil: Metaphor Familiarity Increases as the Number of Languages Known Increases. GARY RANEY, CESAR RIAÑO, KRISTA MILLER, ANDRIANA CHRISTOFALOS, and FELIX PAMBUCCIAN, *University of Illinois at Chicago,* SPENCER CAMPBELL, *Lewis University* – Raney, Riaño, Miller, Christofalos, Pambuccian, and Campbell (2020) examined how metaphor familiarity ratings differ as a function of language background. They found that Spanish-English bilinguals rated metaphors as more familiar than did English-Spanish bilinguals and English-speaking non-bilinguals. In essence, non-native English speakers rated the English metaphors as more familiar than native-English speakers. Here we extended our prior study by including languages other than Spanish and by examining familiarity ratings as a function of the number of languages known. 590 students rated 60 English metaphors (e.g., a fisherman is a spider) in three ways: (1) how familiar is the metaphor, (2) how related are the two content words, and (3) how many interpretations could they think of. Familiarity ratings increased as the number of languages known increased, and there were no differences between native- and non-native English speaking participants. The number of interpretations was not influenced by the number of languages known. Relatedness ratings increased slightly as the number of languages known increased. We suggest that familiarity ratings increase as variability of language experiences increases.
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5:30-7:30 PM (1103)

The Effect of Language Brokering on the Time Course of Idiom Meaning Activation. KRISTA MILLER, ALYSSA GARCIA, and GARY RANEY, *University of Illinois at Chicago* (Sponsored by Matthew Kelley) – Lopez and Vaid (2017) found that participants with brokering experience (informal translation) were quicker at making semantic judgments for targets related to an English idiom's figurative meaning, regardless of whether the word was presented in English or Spanish. Our study uses a lexical decision task to examine the effect of language brokering on the time course of meaning activation during idiom comprehension. Participants read sentences in English that ended with an idiom (e.g., kick the bucket) and made lexical decisions to subsequent target words that were presented in English or Spanish. Target words were related to the figurative (e.g., die) or literal (e.g., pail) meaning of the idiom, or unrelated to the idiom. At a 0 ms delay, there was no evidence of idiom meaning activation. There was a Brokering x Language interaction, such that extensive brokers reacted equally fast regardless of target language. At a 500 ms delay, idiom meaning was activated (figurative < literal = unrelated). Target language was also significant (English < Spanish), but did not interact with brokering experience. Brokering experience did not affect idiom comprehension, but facilitated initial lexical access to Spanish words.
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5:30-7:30 PM (1104)

Does L2 English Influence the Online Processing of Complex Sentences in L1 Turkish in Proficient Bilinguals? GÖZDE MERCAN, *University of Oslo* – While there is no dearth of research on cross-linguistic influence from one's native (L1) to second language (L2), evidence also suggests that bilinguals' L1 can be affected by L2. This study aims to investigate whether the online processing of complex sentences in L1 Turkish is influenced by L2 English. It focuses on proficient Turkish-English bilinguals living in North America, in comparison to Turkish monolinguals in Turkey. (1) [Ali [Ayşe'nin güldüğünü(laugh] gördü (saw)] "[Ali saw [that Ayşe laughed]]" (2) [Ali [Ayşe'nin sevdiği(pet) kediyi](cat) gördü (saw)] "[Ali saw [the cat that Ayşe petted]]" (3) [Ayşe'nin sevdiği(pet) kedi(cat)] miyavladı (meowed)]] "[The cat [that Ayşe petted] meowed]" As Turkish is canonically SOV, center-embedded complementizer (1) and relative clauses (2) correspond to edge-embedding in English; whereas the English center-embedded sentences with object relative clauses (3) have non-center-embedded Turkish counterparts. If there is an influence of L2 on L1, reading times of bilinguals and monolinguals are predicted to be significantly different. The method will be web-based self-paced reading. Results will be discussed in light of the hypothesis that L2 learning is dynamically regulated through L1.
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5:30-7:30 PM (1105)

Discourse Fluency Modulates Spoken Word Recognition in Monolingual and L2 Speakers. ROXANA BOTEZATU, *University of Missouri*, JUDITH KROLL, *University of California, Irvine,* MORGAN TRACHSEL, *University of Missouri,* TAOMEI GUO, *Beijing Normal University* – We investigated whether fluent discourse production is associated with greater skill in resolving lexical competition during spoken word recognition and ignoring irrelevant information in non-linguistic tasks. Native English monolinguals, native English learners of a structurally-similar L2-Spanish or a structurally-dissimilar L2-Chinese and non-native English speakers, who varied on measures of discourse/verbal fluency and cognitive control, identified spoken English words from dense (e.g., BAG) and sparse (e.g., BALL) phonological neighborhoods in moderate noise. Participants were slower in recognizing spoken words from denser neighborhoods. The inhibitory effect of phonological density was smaller for native English monolinguals and L2 learners with higher speech production fluency and better cognitive control. Converging evidence from within-language effects in monolinguals and L2 learners and cross-language effects in L2 learners suggests that fluent language production involves a competitive selection process that may engage domain-general control mechanisms. Results suggest that language experience may capture individual variation in lexical competition resolution.

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5:30-7:30 PM (1106)

Predictors of Verbal Fluency Performance in Monolinguals and Bilingual Children: The Interactive Role of Vocabulary Knowledge and Fluid Intelligence. DEANNA FRIESEN, KAYLA EDWARDS, and CHASTINE LAMOUREUX, *University of Western Ontario* – Bilinguals tend to perform better on verbal fluency tasks than would be expected based on vocabulary knowledge (Friesen et al., 2015; Zeng et al., 2019). We investigated the linguistic and cognitive components that underlie verbal fluency in bilingual and monolingual children. Participants named members of provided categories (animals, fruits/vegetables, words that start with "F", "A"). Although monolinguals outperformed bilinguals in receptive vocabulary knowledge, there were no differences on verbal fluency. Nonetheless, when vocabulary knowledge served as a covariate, bilinguals generated significantly more items. For monolinguals, only receptive vocabulary knowledge accounted for unique variance in verbal fluency performance. Yet, for bilinguals, receptive vocabulary knowledge and fluid intelligence were significant predictors. Fluid intelligence impacted the strength of the relationship between vocabulary knowledge and letter fluency; the relationship between the two was non-existent for bilinguals with low cognitive ability and was strong for individuals with high cognitive ability. Results suggest that if possible, bilinguals recruit additional cognitive resources to meet the demands imposed by the verbal fluency task.

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5:30-7:30 PM (1107)

Acoustics of Spanish-English Code-Switching in Speech to Toddlers. ERIKA EXTON and ROCHELLE NEWMAN, *University of Maryland, College Park* (Sponsored by Rochelle Newman) – Infants and toddlers growing up in bilingual homes are regularly exposed to code-switching (Bail, Morini, & Newman, 2015; Kremin et al., in press). In order to learn both languages separately, the infant must be able to detect when and where these code-switches (CS) occur. Adult CS speech contains acoustic cues to signal the presence of a CS such as pitch height (Olson, 2012), intonation (Piccinini & Garellek, 2014), and speech rate and VOT (Fricke, Kroll, & Dussias, 2016). Adults can use these acoustic cues to improve their processing of CS speech (Fricke et al., 2016; Shen, Gahl, & Johnson, 2020). However, it is unclear to what extent these cues are present in IDS, which differs acoustically from ADS (e.g. Fernald et al., 1989; Kuhl et al., 1997). Indeed, Spanish-English bilingual mothers have been found to produce exaggerated VOT in IDS as compared to ADS, in both languages (Fish et al., 2017). The present study is an acoustic analysis of previously collected parent-child play sessions (Bail et al., 2015). We will compare syllable rate and VOT in CS and unilingual utterances, in both Spanish and English. The goal of this project is to better understand the acoustic cues to code-switching available to infants in natural speech.

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5:30-7:30 PM (1108)

Bilingual Language Control Beyond Lexical Processing in Picture Naming. KYLE WOLFF, ANDREA SEAÑEZ, and IVA IVANOVA, *University of Texas at El Paso* (Presented by Iva Ivanova) – Bilinguals inhibit the non-target language to avoid wrong-language intrusions (Green, 1998). Inhibition is behaviorally indexed by a naming delay of previously inhibited non-target-language words when it becomes target, attributed to recovery from inhibition. But despite robust effects in picture naming, it is not clear how inhibitory control affects other types of representation, such as structure, or how its effects manifest in connected speech. Study 1 will test if a structure that exists only in English (the double object) is inhibited while speaking Spanish. If so, English-dominant Spanish-English bilinguals should produce fewer double objects after producing (non-dative) sentences in Spanish relative to baseline, while the number of double objects should not be affected for bilinguals in an otherwise identical procedure who will speak only English. Study 2 will test for effects of recovery from inhibition in connected speech. Speech rate, pauses, word frequency and number of unique words in the speech of bilinguals who explain the contents of a video in English after having described the contents of another video in Spanish should be affected relative to those of bilinguals who will explain both videos in English.

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5:30-7:30 PM (1109)

My Way or the Highway: Korean-English Bilinguals Keep Separate Syntax. DANBI AHN, TAMAR GOLLAN, and VICTOR FERREIRA, *University of California, San Diego* (Presented by Victor Ferreira) (Sponsored by Victor Ferreira) – When two languages have different word orders, how does knowing one of those word orders influence the production of the other? Cross-linguistic syntactic priming effects suggest that bilinguals access sentence structures from both languages even when speaking just one. Here, we compared English monolinguals, Korean monolinguals, and Korean-English bilinguals while they produced noun phrases ("the cat above the piano"), which have different word orders in English and Korean (the Korean word order is [piano] [above] [cat]). We examined when speakers plan each noun, using an extended picture-word interference paradigm by measuring articulation times for each

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word in the phrase with either the distractor word "dog" (which slows the planning of "cat") or "guitar" (which slows the planning of "piano"). Contra the syntactic priming literature, results suggest that bilinguals only access the syntactic structure of the one language they are actively speaking at the time, even when switching languages between trials.
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5:30-7:30 PM (1110)

The Role of Language Experience on Morphological Knowledge: A Longitudinal Study of Written Complex Word Production in Second Language Learners. DANIEL SCHMIDTKE, SADAF RAHMANIAN, and ANNA MORO, *McMaster University* – A core issue in psycholinguistics is the formation and stability of morphological representations in the mental lexicon. Previous studies have taken effects of the frequencies of morphemes (e.g., play and -er) and morphological family size (e.g., playful, playlist, playoff) as diagnostics of morphemes as processing units in language comprehension and production. The aim of this study was to assess the development of sensitivity to these distributional, frequency-based characteristics as a result of exposure to language. We conducted a within-participant (n = 316) longitudinal study of written production of English derived words in adult English language learners. Results show (i) a gradual entrenchment of morpho-orthographic units, i.e., the stem and the suffix, as a function of language exposure, and (ii) an increase in the interconnectivity among family members within a word's morphological paradigm. We discuss the implications of these results for theories of morphological development and processing.
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5:30-7:30 PM (1111)

Quantifying Bilingual Language Experience as a Complex and Dynamic Spectrum: Associations with Objective and Subjective Language Proficiency. JASON GULLIFER, SHANNA KOUSAIE, and ANNIE GILBERT, *McGill University & The Centre for Research on Brain, Language and Music,* ANGELA GRANT, *Centre for Research on Brain, Language and Music & Missouri Western State University,* NATHALIE GIROUD, *Centre for Research on Brain, Language and Music & University of Zurich,* KRISTINA COULTER, *Centre for Research on Brain, Language and Music & Concordia University,* DENISE KLEIN and SHARI BAUM, *McGill University & The Centre for Research on Brain, Language and Music,* NATALIE PHILLIPS and DEBRA TITONE, *McGill University & The Centre for Research on Brain, Language and Music* – Bilingualism is a complex life experience comprised of several continuous constructs, including language usage, exposure, and proficiency. Yet bilinguals are often dichotomized into ostensibly homogeneous groups. The age of acquisition (AoA) of a second language (L2) is known to impact linguistic knowledge and neurocognition, but recent work identifies current language exposure as another crucial factor. Critically, these indices are collected through self-report questionnaires, and their validity has been scrutinized in favor measures of objective language ability. Here we show that bilingual experience can be estimated jointly and continuously through L2 AoA, amount of exposure, and language entropy (a measure of balance). We use factor analyses to estimate these constructs, and we assess their relationships with language proficiency (objective and self-report). Results suggest that current exposure exhibits distinct but interrelated patterns depending on the domain of language usage. Counter-intuitively, our participants more accurately self-assess proficiency in the L2 than in the native language. A precise quantification of bilingualism is necessary to enhance future research on language processing, acquisition, and control.
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5:30-7:30 PM (1112)

Differences in Eye Movement Patterns During Reading Sentences Composed of Different Orthographic Systems. JOOHEE AHN, JOONWOO KIM, SOLBIN LEE, SEONGHAK JO, and KICHUN NAM, *Korea University* – Previous eye-tracking studies have explored various characteristics such as saccadic movements, fixation times, and regressions in skilled reading of single orthographic system. However, pattern differences of eye movements during reading monolingual sentences composed of different orthographic systems are yet to be discovered. In this new study, we examine pattern differences of eye movements in the reading of monolingual sentences depending on reading proficiency of Chinese character. The majority of Korean words, especially nouns, stem from Chinese characters (i.e., 'Hanja'), and can be written in both orthographic systems. However, even skilled Korean readers can have difficulties reading Korean words written in Chinese characters, since Chinese characters are deep orthography per se, while Korean language have shallow orthography. Thus, individual differences in reading proficiency of Chinese characters can lead to considerable differences in eye movement patterns during reading the monolingual, Korean sentences. Thus, this new study will provide a window into the characteristics of multiple orthographic systems contained in monolingual text.
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5:30-7:30 PM (1113)

Stimulating the Mind Helps Readers Grasp the Idea: tDCS Evidence for Embodied Simulation in Motor Metaphor Comprehension. FELIX PAMBUCCIAN and GARY RANEY, *University of Illinois at Chicago* (Sponsored by Gary Raney) – Reading descriptions of literal motor actions (e.g., "grasp the pen") leads to activation in corresponding neural motor areas. Theories of embodied cognition (Barsalou, 1999) attribute this activation to embodied simulation of the action referenced in the text – a "partial re-experiencing" of the motor action. If embodied motor simulation facilitates comprehension of literal action descriptions, is simulation also helpful when action words are used nonliterally (e.g. "grasp the idea")? To investigate this question, we used transcranial direct current stimulation (tDCS) to modulate neural activity in participants' (N=55) left primary motor cortex using anodal stimulation, which enhances neural activity. Participants were presented with sentences that used action words literally or figuratively and pressed a response key to indicate whether each sentence made sense. Neurostimulation (tDCS) facilitated processing of both literal and figurative uses of action words. This indicates that embodied simulation of literal motor actions facilitates processing of the figurative meaning, suggesting that the figurative meaning may be grounded in the literal meaning.
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5:30-7:30 PM (1114)

Bouba-Kiki Effect Applies to Meaning as Well as Shape: /i:/ vs /ʌ/ Phonemes Generically Carry Affective Valence. CHRISTINE YU and GREGORY STONE, *Arizona State University* · MICHAEL MCBEATH, *Arizona State University & Max Planck Institute for Empirical Aesthetics,* VIRIDIANA BENITEZ, *Arizona State University* (Sponsored by Michael McBeath) – We have recently established the gleam-glum effect whereby words with the /ʌ/-vowel (like "glum") are perceived as more emotionally negative than words with the /i:/-vowel (like "gleam"). Our current experiment is an extension using the bouba-kiki paradigm. We presented pairs of monosyllabic non-words like "bleem" versus "blum" (i.e., differing only in the vowel being /ʌ/ versus /i:/) alongside meaning pairs with high affective valence (e.g., "good" versus "sick") as determined by Warriner et al. (2013). Participants matched the non-words to their most likely meanings. As predicted, participants paired /ʌ/ non-words with negative meanings and /i:/ non-words with positive meanings at well above chance probability. This was true both when analyzed in terms of non-word pairs and when analyzed in terms of meaning pairs. This bouba-kiki analogue for affect is consistent with the idea that natural sound-meaning correspondences influence language development.
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5:30-7:30 PM (1115)

Predictive Language Comprehension in Parkinson's Disease. KATHARINE AVENI, *Northwestern University,* JUWEIRIYA AHMED, *Western University & University of Toronto,* ARIELLE BOROVSKY, *Purdue University,* KEN MCRAE and MARY JENKINS, *Western University,* KATHERINE SPRENGEL, *Northwestern University,* JOHN FRASER and JOSEPH ORANGE, *Western University,* THEA KNOWLES, *Western University & University at Buffalo, SUNY,* ANGELA ROBERTS, *Northwestern University* (Sponsored by Ken McRae) – Language impairment in Parkinson's disease (PD) may be attributable to motor and action/event knowledge deficits. We predicted cognitively intact PD participants would be impaired in anticipating objects in sentences from event-based thematic fit information. 24 PD and 24 healthy age-matched participants completed comprehensive neuropsychological assessments. We recorded participants' eye movements as they heard predictive (The fisherman rocks the boat) and non-predictive sentences (Look at the bathtub). Predictive sentences contained target, agent-related, verb-related, and unrelated images. Non-predictive sentences used phonologically and semantically unrelated distractors. We tested effects of group (PD/control) and executive function (EF) on gaze using growth curve models. There were no significant differences between PD and control participants in either sentence type. Thus, PD participants anticipated objects using combinatory thematic fit information. Action language deficits may primarily occur in low-context situations. EF predicted gaze only after targets were named explicitly, with lower EF predicting greater looks to the target.
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5:30-7:30 PM (1116)

The Effect of Disfluency on Memory for What was Said. EVGENIIA DIACHEK and SARAH BROWN-SCHMIDT, *Vanderbilt University* (Presented by Sarah Brown-Schmidt) – Evidence from studies of both language production and comprehension show that different types of disfluencies appear in distinct contexts and consequently, serve as a meaningful communicative signal. Complementary work probing recognition memory for words in spoken sentences shows a memory benefit for words preceded by certain disfluency types. Previously, we found a disfluency-memory boost regardless of the disfluency type. We concluded that this effect occurs because disfluency creates a delay or is distinctive. In a follow-up experiment, we examined the longevity of this benefit to further probe the cognitive underpinnings. We found that the memory boost is short-lived, only manifesting when the disfluency immediately preceded the critical memory probe word. Together, our findings reveal a short-lived disfluency boost in memory for words evoked by multiple disfluency types, consistent with the idea that disfluencies bring attentional focus to immediately upcoming material, without necessarily driving predictions about what will be said next.
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5:30-7:30 PM (1117)

Adaptation to Semantic Violations of Varying Strengths within and Across Texts. MICHELLE COLVIN and TESSA WARREN, *University of Pittsburgh* (Sponsored by Tessa Warren) – Comprehenders' disruption to animacy violations attenuates as they encounter more instances of an inanimate agent performing animate activity (Nieuwland & van Berkum, 2006). The current studies investigated the time course over which comprehenders adapt to violations of varying severity within and across texts. Participants read narratives describing human-specific actions (e.g. reading) carried out by inanimate (stronger violation), animal (weaker violation) or human (no violation) agents. In a cumulative cloze task (Exp. 1, n=40), comprehenders showed greater adaptation of expectations for stronger than weaker violations within and across narratives. An eye tracking study (Exp. 2, n=76) revealed faster adaptation to stronger than weaker violations within a narrative and no evidence of across-narrative adaptation. Findings are consistent with an error-based account of comprehension, under which a larger error signal (i.e. disruption to stronger violation) results in faster and greater adaptation than a smaller error signal (i.e. disruption to weaker violation).
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5:30-7:30 PM (1118)

Relationship between Cognitive Functions and Language Performance of People with Aphasia Across Different Linguistic Levels. WINSY WONG and SAM PO LAW, *University of Hong Kong* – People with aphasia (PWA) frequently experience deficits in language processing as well as in cognitive functions (e.g., Bonini & Radanovic, 2015). The current study aimed to delineate their relations by examining the cognitive and multi-level linguistic processing abilities of 53 Cantonese-speaking PWA. A test battery measuring word comprehension and production, sentence comprehension, and discourse production was conducted. Furthermore, PWA's performance on cognitive tests evaluating executive functions (EF), verbal short-term/working memory, and attention was obtained. A rotated principal component analysis resulted in two cognitive factors corresponding respectively to EF, and attention and memory. Multiple regressions with the two cognitive factors as predictors revealed that EF significantly predicted language performance at all levels, whereas attention and memory only contributed to performance at the word level. The results highlight the importance of EF in language processing

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and suggest that performances at different linguistic levels are related to cognitive components in different manners.
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5:30-7:30 PM (1119)

Task-Related and Motivation-Related Variation in Referential Overspecification. CASEY RIEDMANN and WILLIAM S. HORTON, *Northwestern University* (Sponsored by William S. Horton) – In two experiments, we examined referential overspecification (e.g., saying "blue circle" with one circle present) by asking participants to identify shapes in visual displays. Critical shapes were always unique, making color redundant. In Experiment 1, participants either named shapes, or instructed an addressee to select the same shapes. Displays varied by density (4/7/10 shapes) and color pattern (monochrome/dual-colored/uniquely-colored). We found similar rates of color overspecification across densities and across naming and instructing, although individual rates patterned differently by condition: naming was all-or-nothing, while instructing varied widely. In Experiment 2, participants worked with a (sham) partner on a similar shape identification task. After a baseline production phase, participants then received instructions from the partner that were ambiguous 10% of the time. During a subsequent production phase, overspecification decreased. The partner's insufficient descriptions appeared to prompt less overspecification in return. We discuss these results in terms of speaker- vs. listener-oriented processes.
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5:30-7:30 PM (1120)

Does Sound-Shape Correspondence Affect How We Produce an Object's Name? It May Depend on Whether We Intend to Communicate about It. EILING YEE, CHEYENNE HARRIS-STARLING, and NICHOLAS SEMENZA, *University of Connecticut,* MONIKA MOLNAR, *University of Toronto* – During language comprehension, certain labels tend to be associated with certain types of shapes; for instance, "kika" with angular shapes, and "buba" with rounded ones. But do sound-shape correspondences also affect language production? We tested whether labels (e.g., "buba" vs. "kika") are produced differently based on the shapes of the objects they are paired with (e.g., rounded vs. angular). We created conditions where, based on known sound shape correspondences, object labels were either congruent or incongruent with the shapes of their referents. In prior work, we found that in a communicative context (teaching object labels), incongruent labels were produced more slowly than congruent ones. In the current work, we report two experiments in which we explored whether this congruency effect extends to non-communicative contexts wherein: (1) uttering the "label" was incidental to viewing the shape, and (2) uttering the label was intended to support memory, rather than communication. In neither case was a congruency effect observed. Thus, the extent to which an object's shape affects how we produce its name may be shaped by the communicative context.
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5:30-7:30 PM (1121)

Intersubject Variability in Spoken Verb Production: Effects of Hierarchy and Transitivity. EMMA WARD, *Queensland University of Technology,* SONIA BROWNSETT, *The University of Queensland & National Health and Medical Research Council Centre of Research Excellence,* KATIE MCMAHON, *Queensland University of Technology, Institute of Health and Biomedical Innovation, & Herston Imaging Research Facility,* GREIG DE ZUBICARAY, *Queensland University of Technology* (Sponsored by Naohide Yamamoto) – In two experiments employing the picture-word interference (PWI) paradigm, we explored how a verb's hierarchy and transitivity influences it's retrieval during spoken production. Experiment 1 involved transitive (i.e. object-oriented, e.g. eat) action pictures accompanied by a to-be-ignored distractor word that was either a related coordinate ("drink") or troponym ("devour"), while Experiment 2 employed intransitive (e.g. walk) stimuli. Assuming these relationships operate similarly for verbs and object nouns, we expected to observe faster naming times for troponyms, and slower naming times for coordinates. Conventional group-level analyses of the null average hypothesis revealed no significant effects in either experiment. However, analyses of the global null hypothesis revealed significant interindividual variability for troponym distractors in Experiment 1, with a similar trend in Experiment 2. These results indicate verbs may have a different conceptual-lexical organisation to object nouns in the mental lexicon, less constrained by hierarchical categories, with their processing more influenced by subject-specific variables.
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5:30-7:30 PM (1122)

Encoding a Semantic Contrast Requires a Phonological Contrast in English But Not in French. MICHAEL WAGNER, *McGill University* – We present evidence from production experiments that in English, but not in French, prosodically signaling a semantic contrast in the absence of a phonological contrast is avoided by speakers and leads to infelicity when attempted. Participants told short stories involving homophones: "The fear was hard to bear. Joey really did not like that bear." These were compared to sentences with repetitions of the same lexical word: "They were attacked by a bear. Joey really did not like that bear" and a control: "John was very scared. He really did not like that bear." (12 items sets, 16 speakers per group). In English, the target word tends to be reduced in both the repetition and the homophone case. Furthermore, the naturalness of the homophone condition is rated as low no matter how it is pronounced, indicating homophones can't be marked as contrastive because they don't sound differently from the prior homophone, and can't be marked as given because their meaning is not salient. In French, there is no reduction, and no infelicity effect. The significant interactions by language suggests that this is not a low-level production effect but reveals differences in how English and French use prosody to encode contrast and givenness.
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5:30-7:30 PM (1123)

Simpler Languages Are Not Always Easier to Learn. ARTURS SEMENUKS, *University of California, San Diego* (Sponsored by Sarah Creel) – The assumption that morphosyntactically simpler languages are easier to learn is often accepted in psycholinguistic research. While plausible, the assumption nevertheless requires empirical confirmation, and yet currently remains underresearched. To test it, we manipulated (i) form-to-meaning mapping transparency (FtMMT) and (ii) morphophonemic cohesion (MC) of artificial languages in three artificial language learning experiments. The results of the experiments suggest

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that (a) FtMMT affects learnability, but only for some semantic domains (compared to fusional expression, marking noun number in a separate morpheme increases learnability for English speakers, but a similar manipulation for pronoun number does not); (b) MC affects learnability in a similar semantic domain dependent way (expressing subjects and verbs in two words, as opposed to one concatenated word, increases learnability with noun subjects, but not with pronoun subjects), (c) the effects are L1 dependent (the first effect was not present for native Mandarin speakers). Taken together, the results show that languages considered to be morphosyntactically simpler are not always easier to learn.
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5:30-7:30 PM (1124)

Individual Differences in Spelling Proficiency as Reflected by Simultaneous EEG and Eye-Tracking. GAISHA ORALOVA, ROBER BOSHRA, AKI-JUHANI KYRÖLÄINEN, JOHN CONNOLLY, and VICTOR KUPERMAN, *McMaster University* (Sponsored by Victor Kuperman) – Violations of expectations during visual word perception trigger processing conflicts and input reprocessing stages, which are reflected by the P600 component in EEG as explained by the monitoring theory of language (van de Meerendonk et al., 2011). Native speakers of Mandarin, grouped by spelling proficiency, read Chinese sentences naturally at their own pace while their eye movements and electrical brain activity (EEG) were recorded. Correctly spelled and misspelled target words were embedded in experimental sentences. The results for the misspelled words showed that only good spellers exhibited longer reading times and their fixation-related potentials revealed an enhanced P600 component. In contrast, poor spellers did not show any significant increase in amplitudes for the erroneous spellings. These results extend the monitoring theory of word perception by showing that spelling proficiency can modulate the initiation of the input reanalysis stage as evidenced by P600 and reading time.
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5:30-7:30 PM (1125)

Age-of-Acquisition Effects in Lexical Decision and Naming: A Partly Semantic and Partly Arbitrary Mapping Account. LOK-YIU CHERYL CHEUNG, *The University of Hong Kong,* KAI-YAN DUSTIN LAU, *The Hong Kong Polytechnic University,* YEN-NA CHERRY YUM, *The Education University of Hong Kong*, I-FAN SU, *The University of Hong Kong* (Presented by I-Fan Su) – Word age-of-acquisition (AoA) is a strong determinant of lexical processing. However, whether AoA has a single or multiple-loci remains a debate. Behavioural and pupillary responses investigating AoA, semantic transparency and phonological regularity of 2649 Chinese characters were examined in lexical decision and naming tasks using mixed-effects modelling. Characters learned early elicited larger pupil dilations and were more readily and accurately recognized and named than late acquired ones. Furthermore, larger AoA effects were found in naming irregular characters and recognizing semantically opaque characters, supporting both the arbitrary mapping and semantic hypotheses. Importantly, late-acquired semantically opaque irregular characters were responded to less accurately, suggesting multiple AoA loci at both semantic and phonological levels of representation as semantic activation facilitated transparent irregular characters. Lastly, the pupillary AoA effect and absence of phonological or semantic interactions further supports a multiple-loci account whereby AoA effects also exist at the early visual-orthographic stages of lexical processing.
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5:30-7:30 PM (1126)

Sensitivity to the Phonology and Prosody of the English Writing System in Native and Nonnative Speakers. JENNIFER GROSS, KATELIN LEAHY, TANVEER MANGAT, JOSHUA GONZALES, and ANDREA PLOTKOWSKI, *Grand Valley State University* – Skilled readers of English decode its alphabet and read with fluency. Yet, the English writing system has an opaque orthography (phonology) and fails to mark stress and meter (prosody). Sensitivity to the phonology and prosody of the English writing system were evaluated as individual difference variables in adults who were native and nonnative speakers. Participants read at the 12th grade level and were recruited regionally and internationally via crowdsourcing. To predict knowledge of the English writing system, we created individual difference measures of phonological processing (discern the difference in pronunciation between "rough" and "cough"), decoding skills (recognize "rough" rhymes with "stuff, although spelled differently), lexical stress sensitivity (proDUCE widgets; fresh PROduce), rhythm sensitivity (ACTions speak LOUDer than WORDS); reading comprehension; idiom interpretation ("she is off her rocker"). We also administered the poet recognition test (print & poem exposure). The correlational findings were very similar for native and nonnative speakers. Yet, native speakers were better at decoding and rhythm detection, while nonnative speakers were better at detecting lexical stress and heteronym comprehension.
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5:30-7:30 PM (1127)

How Can You Mend a Broken Heart? Awakening Conventional Metaphors. LAURA PISSANI and ROBERTO DE ALMEIDA, *Concordia University* – Conventional metaphors such as broken heart can be interpreted rather efficiently. This is so because they use words that frequently co-occur and are possibly associated with stored representations, akin to idioms and other forms of lexicalized, non-compositional expressions. But are these conventional metaphors indeed "frozen"? And can they be awakened—that is, re-interpreted as new? We investigated whether the mechanisms employed to process a conventional metaphor shift when its literal meaning is triggered. In a maze task, participants read sentences word by word (e.g., A sharp tongue can…) and were presented with a two-word choice. Participants took longer to select the correct word (ruin) when it was paired with an "awakening" (cut) rather than an unrelated word (age). This suggests that the literal meaning of the metaphor may be initially (re-)accessed and that the mechanisms employed to process conventional metaphors might be dynamic, subject to reprocessing contingent on subsequent cues.
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5:30-7:30 PM (1128)

Foveal and Parafoveal Processing of Letter Information in Arabic Reading. MARYAM ALJASSMI, *University of Leicester & Zayed University,* VICTORIA MCGOWAN, SARAH WHITE, and KEVIN PATERSON, *University of Leicester* (Sponsored by Kevin Paterson)

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– Research with Latinate scripts shows that parafoveal letter-shape information can facilitate word recognition in reading. However, whether similar effects are observed in Arabic reading is unclear, especially as letters in this script often are discriminable based only on fine visual distinctions (e.g., dots). Accordingly, we conducted two eye movement experiments to investigate processing of letter information in Arabic reading. In both, participants read sentences containing words spelled correctly (e.g., ظفـح) or misspelled by replacing letters with visually similar (e.g., ظقـح) or visually dissimilar (e.g., ظلـح) letters. These were encountered either normally in reading (Experiment 1), or as parafoveal previews using the boundary paradigm (Experiment 2). Correctly spelled words yielded shorter reading times than misspelled words in both experiments. Moreover, while reading times were shorter for visually similar than visually-dissimilar misspellings in Experiment 1, both produced equally longer reading times in Experiment 2. This suggests sensitivity to the validity of parafoveal previews in Arabic reading.
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5:30-7:30 PM (1129)

Internet Usage Affects Lexical Construction Choices. MICHELLE PERDOMO and DUANE WATSON, *Vanderbilt University* – Here we explore the effect of linguistic experience on language usage. Previous studies have assessed the quantity of language exposure or incorporated training paradigms to explore specific effects of language experience. However, there has been relatively little work on how experience with online text influences language users. To fill this gap, we administered an MTurk study to collect online reading habits and used NLP indices of language complexity to extract principal components based on website text, with the goal of characterizing the complexity of subjects' internet language experience. Constructional preferences (continuous, "take out the trash" v. discontinuous, "take the trash out") for phrasal verbs were also assessed to investigate the effects of online language exposure on these preferences. A logistic regression revealed that phrasal verb constructional preferences were modulated by experience with low-complexity online texts.
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5:30-7:30 PM (1130)

Grammatical Errors: Who Sees them, Who Doesn't, and What It Reveals about the Reader. RACHEL FERNANDES, LAURIE FELDMAN, and HILLARY WIENER, *University at Albany, SUNY* (Sponsored by Laurie Feldman) – On the surface, grammatical errors can affect judgments about the quality of a text and its creator. Less systematically examined is what detection of errors reveals about the reader, her specific concerns, general values, and future behavior. In the present study, we investigated whether the presence of errors in a foreign restaurant menu affected readers' judgments about the restaurant. Participants were presented with a menu that contained errors and were asked to click on errors and report the overall error frequency. We found that participants' sensitivity to grammar (gauged by self-reports of error count) was inversely related to their judgments about aspects of restaurant quality (viz., taste, service, and nutrition), overall liking, and their intent to purchase from the establishment. Interestingly, participants who were more sensitive to errors scored lower on xenophobia than their peers who noticed fewer errors. Interactions with method of detection will be discussed.
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5:30-7:30 PM (1131)

Exploring the Phonological Spaces of the English Lexicon of L1 and L2 Speakers: Insights from Network Analysis. CYNTHIA SIEW, *National University of Singapore,* KIT YING CHAN, *City University of Hong Kong,* NICHOL CASTRO, *University at Buffalo, SUNY* – How do the phonological spaces of L1 and L2 speakers differ? To explore L2 speakers' representation of phonological similarity relations among word-forms, L1 and L2 English speakers completed a phonological association task where participants responded with words that sounded similar to the English cue word presented. Phonological association and edit distance networks for both groups of participants were constructed with over 50,000 responses to 2,303 cue words. L2 networks had lower global clustering coefficients, suggesting "missing" links between potentially phonologically similar words as compared to the L1 lexicon. Lower average shortest path lengths in L2 networks suggest that the L2 phonological lexicon has limited coverage of the possible phonological space. The lower small word index in L2 networks may reflect lower efficiencies in information transmission across the phonological network. These results align with previous findings demonstrating bilinguals have a less well-interconnected lexicon and experience more effortful lexical retrieval.
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5:30-7:30 PM (1132)

Word Association Is Organized by Concreteness and Valence. FRANCISCO BUADES-SITJAR and JON ANDONI DUÑABEITIA, *Nebrija University* (Sponsored by Jon Andoni Duñabeitia) – Given the impact of lexical properties such as valence, arousal and concreteness in language processing, recent computational methods have been designed to extrapolate these values from different sources, such as word cooccurrence or word association corpora. These methods have been proven to be particularly successful approaches to extract lexical features from word association data. Consequently, valence, arousal and concreteness seem to be indeed represented in word association, and in this study, we hypothesized that they would in fact be critical mediating factors for word cooccurrence. We demonstrated that this is the case by showing a significant positive relationship between the values of a given word on each of the dimensions and the corresponding values of each of their associates in different databases from various languages. Furthermore, we also demonstrated that cue words and their associates can be effectively categorized according to valence and concreteness, to a great extent, and to arousal, to a lower extent. Hence, in this study we showed that across different languages, word association in mediated and can be predicted by concreteness and valence.
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5:30-7:30 PM (1133)

Dissociable Effects of Lexical Repetition Within Clauses Versus Across Clause Boundaries. MATTHEW LOWDER, ADRIAN ZHOU, ANTONIO CARDOSO, and MICHAEL PITTMAN, *University of Richmond* – The current eyetracking experiment was designed to examine how effects of lexical repetition during sentence reading are modulated by the structure of the sentence, as previous work has demonstrated that sentence structure influences the depth at which sentential relationships

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are processed. Participants read sentences in which we manipulated whether a target word was new or repeated and whether it appeared as the object of the verb in the main clause of a simple sentence or was embedded in a relative clause (RC). Analysis of skipping rates on the target word revealed robust effects of repetition in both sentence structures with higher skipping for repeated versus new target words. In contrast, later eyetracking measures revealed significant interactions such that the infelicitous nature of the repetition resulted in longer reading times for repeated versus new words, but only for the simple sentence condition. Instead, repetition of the target word in the RC was associated with faster reading times across all eyetracking measures. The results provide important information regarding the cognitive mechanisms involved in word recognition and sentence interpretation and how these processes interact with the structure of the sentence.
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5:30-7:30 PM (1134)

Making Verb Bias Learning Explicit. AMANDA KELLEY and GARY DELL, *University of Illinois at Urbana-Champaign* (Sponsored by Gary Dell) – Speakers implicitly track tendencies for verbs to occur in particular syntactic structures, also known as verb biases. We investigated whether verb biases are implicitly learned because structural relationships are not explicitly accessible. We taught participants new verb biases for familiar verbs using a category task. In this task, a particular dative verb (e.g., give) was always mapped to a particular structure (e.g., "I gave my sister the book") in the first block. Participants learned to choose the correct mapping for verbs and structures. After responding correctly five times in a row, in a second block the mappings between the verbs and structures were reversed, creating a reversal shift. Participants learned the switched mapping more quickly than the original mapping, suggesting an insightful explicit learning process. Verb bias is not inherently inaccessible to explicit processes. Instead, verb biases in production are implicitly learned because the learners acquire them by speaking.
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5:30-7:30 PM (1135)

Reciprocity and Forced Divergence in Instant Messaging. ANDREW GUYDISH and JEAN FOX TREE, *University of California, Santa Cruz* (Sponsored by Travis Seymour) – We tested how the introduction and removal of well-defined roles influenced contribution behaviors across conversations. Pairs of participants worked on a referential communication task via instant messaging, with one participant (the director) possessing more information than the other (the matcher). Next, these roles were removed, and the participants were allowed to communicate freely. The roles of the participants were then switched, and the procedure was repeated. While directors contributed more than the matchers during the referential task, during unstructured chat former-matchers contributed more than former-directors. Data support the hypothesis that forced divergence leads to efforts to redress imbalance, a process we call reciprocity.
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5:30-7:30 PM (1136)

Position-General Radicals Are Involved in Planning Chinese Written Word Production. JIE WANG and LEQI CHENG, *The Education University of Hong Kong,* URS MAURER and HSUAN-CHIH CHEN, *The Chinese University of Hong Kong* – The current study adopted the picture-word interference paradigm to investigate the word-form encoding process during written word production in a non-alphabetic language, i.e., Chinese. Most Chinese characters are composed of radicals. A radical can appear at different positions in different characters (e.g., on the left in Character A, on the right in Character B, and at the bottom in Character C). Whether the representations of radicals carry intrinsic positional information remains largely unexplored in the domain of written word production. Thirty Chinese participants were asked to write down the names of individually presented pictures while ignoring distracting characters superimposed on the pictures. Three types of distractors were included, and significant facilitation effects were found when the distractor shared the same radical with the picture name (relative to unrelated control conditions), no matter the radical appeared at the same or a different position in the distractor. The current finding suggests the involvement of position-general radicals in planning Chinese written word production and provides original evidence to the models of written word production.
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5:30-7:30 PM (1137)

Cascading Activation in Speech Planning and Articulation: Evidence from Naturalistic Speech Errors. JOHN ALDERETE, *Simon Fraser University,* MELISSA BAESE-BERK, *University of Oregon* MATT GOLDRICK, *Northwestern University,* KEITH LEUNG, *Simon Fraser University* – Speaking involves both retrieving the sounds of a word (phonological encoding) and realizing these selected sounds in fluid speech (articulation). Recent phonetic research on speech errors has argued that multiple candidate sounds in phonological encoding can influence articulation because the articulatory properties of mis-selected error sounds tend to be slightly skewed toward unselected target sounds. Yet research to date has only examined these phonetic distortions in experimentally elicited errors, leaving doubt as to whether they reflect tendencies in natural speech. Here, we analyzed the articulations of speech errors occurring in natural speech and compared them with matched correct words to probe for similar phonetic distortions. We found the conjectured distortions in naturalistic speech errors that are similar to those documented in elicited errors. These findings support models incorporating cascading activation from phonological encoding to articulation.
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5:30-7:30 PM (1138)

Mediated Phonological-Semantic Priming in Spoken Word Production: A Demonstration. MATTEO MASCELLONI and KATIE MCMAHON, *Queensland University of Technology*, VITÓRIA PIAI, *Radboud University & Radboud University Medical Centre,* DANIEL KLEINMAN, *Haskins Laboratories,* GREIG DE ZUBICARAY, *Queensland University of Technology* (Sponsored by Renata Meuter) – There is consensus regarding a two-step architecture involving lexical-conceptual and phonological word form levels of processing, but accounts of how activation spreads between them remain contentious together with the locus of selection. This study examined whether mediated phonological-semantic relations (e.g., "fog" is phonologically related to "fox" that is

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semantically related to "cat") influence spoken word production. Two experiments using the Picture-Word Interference (PWI) paradigm were conducted using auditory and written distractors. We hypothesized that a mediated semantic interference effect would be observable in the former with the involvement of both spoken word production and recognition, and in the latter if lexical representations are shared between written and spoken words. We observed mediated semantic interference only from auditory distractors while observing standard semantic interference from both distractor types. This is the first chronometric evidence from spoken word production and recognition supporting mediated semantic priming during production in adults, presenting a significant challenge for a post-lexical selection mechanism based on response-relevant criteria.
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5:30-7:30 PM (1139)

Individual Differences in English Spelling Performance: Language Proficiency, and the Role of Working Memory and Attention. QIAN WEN CHEE, MELVIN YAP, and WINSTON GOH, *National University of Singapore,* REBECCA TREIMAN, *Washington University in St. Louis* (Sponsored by Winston Goh) – This study examined differences in measures of language proficiency, working memory capacity, and attentional control amongst individuals who provided spelling latencies and accuracies for 9,480 English words in a spelling megastudy. Results showed that individuals with higher language proficiency and greater working memory capacity provided faster and more accurate spelling responses. Additionally, the predictive power of standard lexical variables on spelling performance were significantly moderated by individual differences. Individuals with higher language proficiency showed smaller effects of length, neighborhood density, number of morphemes, word frequency, and feedback consistency on spelling latencies and accuracies. Individuals with greater working memory capacity and better attentional control showed smaller effects of length on spelling latencies. These results support the view that skilled readers produce smaller effects of lexical variables, and highlight the important role of working memory and attentional control in maintaining the identity and order of phonemes and letters in the spelling process.
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5:30-7:30 PM (1140)

Attentional Modulation of Structural Priming from Nonnative-Accented Speech. RACHEL WILLIAMS, *University of Texas at El Paso,* KARLY SCHLEICHER, *University of Texas at El Paso & Heritage University,* IVA IVANOVA, *University of Texas at El Paso* (Sponsored by Ana Schwartz) – This study investigates structural priming from nonnative-accented utterances, to examine the role of attentional focus for structural priming. The processing of nonnative-accented speech is cognitively effortful (Gass & Veronis, 1984; Munro & Derwing, 1995), and the effort invested in decoding this speech may detract attention from structural processing, reducing the magnitude of structural priming. Conversely, the effort invested in the processing of nonnative-accented speech may increase overall attention to an utterance, including its structure, increasing structural priming (Chun et al., 2016). One hundred ninety-two participants will listen to recorded prime utterances recorded by a native-accented speaker of American English and a native speaker of Japanese while they either track three moving dots with their eyes to detract attention from language processing (Motion-Object Tracking task, Heyselaar et al., 2017) or look at stationary dots. If processing nonnative-accented speech detracts attention from structural processing, there should be equivalent priming from nonnative- and native-accented utterances when the dots are still but less priming from nonnative- than from native-accented utterances when the dots are moving.
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5:30-7:30 PM (1141)

One Syllable, Two Tones, hen3 ma2 fan (Very Troublesome)! SIN HANG LAU (J. Frank Yates Student Travel Award Recipient), CHUCHU LI, and VICTOR FERREIRA, *University of California, San Diego* – A distinctive feature of tonal languages such as Mandarin Chinese is that the same consonant-vowel (CV) sequence is a different word depending on the tone it is spoken with. "Ma" with Tone 1 (level) means "mother," but with Tone 2 (rising) means "hemp." According to some linguistic theories, these tones "float above" the CV-structure of a word, raising the question of how tones are represented and produced. We measured how quickly speakers produced sequences of CV-tone syllables, independently manipulating the repetition pattern of the C, V, and tone elements. Surprisingly, the number of unique C, V, or tone units in the sequence did not predict speech rate, nor did their repetition pattern. Instead, post-hoc analyses revealed that speech rate was robustly faster when each unique CV was paired with only one tone (speakers produced both ba1 li2 bi2 la1 and ba1 ba1 ba1 ba1 about equally quickly), compared to when a particular CV needed to be produced with more than one tone (speakers produced ba1 ba2 ba1 ba2 slowly). We suggest that Mandarin speakers represent CVs as syllable "chunks," programming each with tone upon phonetic encoding, so that producing the same syllable chunk with more than one tone in a rapid sequence is difficult.
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5:30-7:30 PM (1142)

The Tip-of-the-Mandarin Tongue: The Roles of Phonology and Orthography in TOT Incidence and Resolution. PENGBO HU, KRISTINE CHANG, and LISE ABRAMS, *Pomona College* – The tip-of-the-tongue (TOT) is a failure to recall an infrequently used word. Syllables are relevant to English TOTs: Words with low-frequency first syllables have more TOTs, and encountering a TOT's first syllable helps to resolve it. We explored TOTs in Mandarin, where words consist of one-syllable characters whose visual representation (orthography) is largely independent of its sound (phonology). Participants saw descriptions corresponding to target cheng-yus, 4-character Chinese idioms. If they experienced a TOT, they saw a list of words where one was a phonological (Exp 1) or orthographic (Exp 2) prime. Phonological primes had a first character different from the target's but contained its first phoneme or first syllable (homophone), whereas an orthographic prime contained the target's first radical, which was lower or higher in frequency. Results showed that targets with lower-frequency radicals had more TOTs, and in trying to resolve TOTs, a homophone prime marginally increased TOT resolution relative to an unrelated word. These results suggest interesting parallels between Mandarin and English in terms of syllables resolving TOTs but document a new role for orthography in inducing TOTs that does not involve the syllable.
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5:30-7:30 PM (1143)

The Development of a Taboo Word Fragment Completion Task. ASHLEY SCOLARO, *Central College* – Measures of taboo language production in the literature commonly include self-report, observational (Jay, 1992) and utterance latency data (Grosser & Laczek, 1963). The results of these studies are confounded by social context, which is known to impact taboo language production (Jay, 2009). The current study describes the development of a taboo word-fragment completion task as an implicit measure of taboo language production that is not as sensitive to social pressure. The 46-item word-fragment completion task includes fragments from each taboo language category (scatology, disfavored groups, supernatural, bodily effluvia). Results from three on-line studies of the taboo word-fragment completion task are described. The taboo word-fragment task data was compared to fluency tasks (neutral, taboo) and offensiveness ratings of taboo words. Individual differences such as age, gender, household income, education level, political affiliation and religious affiliation on taboo word-fragment task data are also discussed.
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5:30-7:30 PM (1144)

How the Past Affects the Present: An Examination of Error-Based Learning in Lexical Access. ABHIJEET PATRA and ERICA MIDDLETON, *Moss Rehabilitation Research Institute* – According to Oppenheim et al. (2010), each act of naming alters the mapping from semantics to words. Learning is assumed to be (1) use-dependent – attempting a stage of mapping provides input to the learning algorithm; (2) error-based – competitor words that are more activated when a target word is retrieved receive greater inhibition. To test these assumptions, for each of 25 people with stroke aphasia with disordered lexical access, depicted common objects (e.g., toaster) were randomly divided into two conditions: (1) naming – participant attempts to name the picture; (2) word repetition – word and picture are presented simultaneously; participant repeats the word. If learning is error-based, greater semantic similarity with the preceding trial should increase current trial naming error. If learning is use-dependent, the error-based learning prediction should obtain only when the prior trial involves naming, not word repetition. Both predictions were confirmed. Implications for models of lexical access are discussed.
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5:30-7:30 PM (1145)

Accessing Lexical Representations of Compound Words While Typing. ALEXANDER TAIKH, CHRISTINA GAGNÉ, and THOMAS SPALDING, *University of Alberta* – Modular theories of typing posit that processes responsible for recognizing the to-be-typed word and planning motor movements are separate from processes responsible for executing the keystrokes. Information obtained during word recognition and motor movement planning is thus not continuously accessed during the execution of the keystrokes. We examine whether the orthographic and lexical information made available during word recognition affects typing production. Specifically, we examine the effects of recognition time, frequency, and length on typing latencies at the morpheme boundary of noun-noun compounds (e.g., thumbtack). Participants recognized to-be-typed words and initiated typing production. Latencies of keystrokes for all typed letters were recorded. We found a greater boundary effect, which is the elevated typing time at the morpheme boundary, with longer recognition times and when the second morpheme was longer. Our findings indicate that participants access the information associated with the second morpheme during typing, suggesting that planning of motor movements occurs at the level of morphemes rather than whole words.
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5:30-7:30 PM (1146)

Do Self-Reported Trait Mindfulness and Attentional Control Relate to Word Retrieval Performance? LORI JAMES, JESSICA BAYNARD-MONTAGUE, TYLOR GHAFFARI, JENNY LAGERVALL, and DUET HANNA, *University of Colorado, Colorado Springs* – A brief mindful breathing exercise can improve picture naming performance, but dispositional mindfulness is unrelated to both picture naming and word retrieval in response to definitions of low-frequency words (Silver, James, & Small, under review). We further tested for evidence of this relationship using a different trait mindfulness measure along with a measure of attentional control. Forty-seven college student participants performed a definition-naming task during which they reported their tip-of-the-tongue (TOT) states and completed the Kentucky Inventory of Mindfulness Skills (KIMS; Baer et al., 2004) as well as the Attentional Control Scale (ACS; Derryberry & Reed, 2002). KIMS and ACS scores were positively correlated ($p < .001$; $BF_{10} = 89.15$), but neither correct responses nor TOT rates correlated with either KIMS (ps > .27; BF_{10}s < 0.33) or ACS scores (ps > .45; BF_{10}s < 0.24). We are now running a similar study with a more diverse sample of MTurk workers ages 18-80 who are completing the same measures, along with measures of mindful practices, state and trait anxiety, communication apprehension, and vocabulary, to further explore relationships between mindfulness, individual difference measures, and word retrieval.
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5:30-7:30 PM (1147)

Clear Speech Classification with Convolutional Neural Networks and Naïve Bayes. JONATHAN WRIGHT and MELISSA BAESE-BERK, *University of Oregon* (Sponsored by Melissa Baese-Berk) – Adverse listening conditions create difficulty for talkers in conversations, leading to interlocutor focused speech modulations (e.g., clear speech). Analyses of recently developed clear speech corpora suggest that talkers modulate phonetic features according to interlocutors' needs. In the present research we analyze the effect of adverse listening conditions on the modulation of syntactic structure and paralinguistic information (i.e., pauses) under three adverse conditions (babble noise, vocoder noise, second language interlocutor) and a non-adverse condition. We analyze the talker text in current clear speech corpora by comparing results from the Deep Learning algorithm, Convolutional Neural Network (CNN), which accounts for syntactic detail, with a Naïve Bayes Classifier model, which does not. For paralinguistic information, we compare results with and without paralinguistic annotations, providing insight into the degree of paralinguistic modulation talkers perform under various adverse listening conditions.
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5:30-7:30 PM (1148)

Assessing Proactive Language Control: When Does Predictability of Language Sequences Benefit Language Switching? TANJA ROEMBKE, ANDREA PHILIPP, and IRING KOCH, *Rheinisch-Westfälische Technische Hochschule Aachen University* – Multilinguals often switch between the languages they speak. One open question is to what extent they can use anticipatory—or proactive—language control to reduce interference from non-target languages during language switching. In two experiments, unbalanced German-English bilinguals (N_{1A} = 24; N_{1B} = 35) named pictures in their L1 or L2 in mixed blocks. In all but the penultimate block, the language sequence in which pictures were named was predictable (e.g., L1, L1, L2, L2, etc.), thus allowing participants to prepare for upcoming trials. Performance (RT and error rate) in the non-predictable block was compared to average performance in predictable sequence blocks right before and after. We predicted that language switching would be facilitated during predictable language trials in comparison to non-predictable ones, indicative of proactive language control. However, there was no evidence for a predictability benefit across both experiments. These findings suggest that people are unable to use preparatory processes endogenously to reduce interference during language switching. We discuss the reasons why proactive language control may not be used to reduce interference under these circumstances.
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5:30-7:30 PM (1149)

Overt and Latent Semantic Competition in Word Production. CHANNING HAMBRIC and PADRAIG O'SEAGHDHA, *Lehigh University* – We investigated direct and latent semantic interference in word production by overtly or subliminally promoting semantic competitors during cyclic picture-naming. Labeled sets of 4 taxonomically or thematically related pictures, and unrelated controls, were iteratively named in the presence of overt (visible distractor) or latent (masked prime) extra-set competitors. The competitors were concordant with the taxonomic or thematic relations. Overt primes produced a picture-word interference effect, but this did not interact with set relatedness, indicating distinct competitive processes. Masked taxonomic primes increased latencies, but thematic primes facilitated picture naming. To assess whether competitors incurred downstream consequences, we examined naming of pictures corresponding to prime words and unseen controls after the cyclic procedure. Only masked thematic primes showed downstream costs, suggesting that distinct competition with thematic picture targets had occurred during cyclic naming. Masked priming is a promising tool to reveal the genesis of longterm semantic interference.
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5:30-7:30 PM (1150)

Effects of tDCS on the Scope of Sentence Planning. LOUKAS KONDYLES and BENJAMIN SWETS, *Grand Valley State University* – Previous research suggests that many factors might influence how far in advance speakers plan their sentences. Such factors include time pressure, linguistic content, speaker goals, and working memory (WM). Although correlational research has shown the possible role of WM on the scope of sentence planning, there's little existing evidence to show a causal effect of WM on the scope of sentence planning. In search of such evidence, we administered transcranial direct current stimulation (tDCS) to speakers as they described complex visual arrays to listeners. To target WM, we placed the anode over the dorsolateral prefrontal cortex (DLPFC). Using a double-blind approach, we randomly assigned participants to either a sham (control) or stimulation condition, with stimulation lasting for 20 minutes, beginning with a practice session. Although there was little evidence of tDCS influencing verbal measures of performance and speech planning, the eye movement measures did show a possible influence of DLPFC stimulation on the scope of advance planning.
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5:30-7:30 PM (1151)

Is the Anticipatory Practice Effect Common to Both Motor and Language Production? AMY LEBKUECHER, *The Pennsylvania State University,* MARYELLEN MACDONALD, *University of Wisconsin – Madison,* DANIEL WEISS, *The Pennsylvania State University* (Sponsored by Daniel Weiss) – Speech errors reveal the extent to which a speaker is anticipating upcoming components of an utterance or perseverating on those recently produced. According to the anticipatory practice effect, as a phrase becomes more familiar, it is produced with fewer errors overall, though a greater proportion of those errors are anticipatory. The current study evaluates whether such effects also arise in the production of novel motor sequences and whether there are individual differences in these error patterns across domains. Consequently, 89 participants produced tongue twisters with English words and with nonwords, and also produced finger tapping sequences that mimicked the underlying structure of tongue twisters. Ongoing analyses investigate our participants' proportion of anticipatory errors relative to their overall error rate for all three tasks. Additionally, a comparison of individual differences across domain explores whether a common underlying mechanism could underlie similar anticipatory practice effects.
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5:30-7:30 PM (1152)

Positively Valent Images of Climate Change Solutions Capture Attention. HANNAH KAULL, MASON STEINHAUER, ABBEY ZIGARAC, JACQUELINE CAMMARATA, and JOSHUA CARLSON, *Northern Michigan University* – Three experiments were run to assess the attention grabbing properties of (1) positive vs. negative images of climate change, (2) images of climate change causes, effects, and solutions, and (3) images of causes and effects of climate change. Attentional bias was assessed using a modified dot-probe task. The results suggest people are most attentive to positively valent images of climate change solutions (e.g., windmills and solar panels). Thus, converging evidence across three experiments suggests that positively valenced images of climate change solutions robustly capture attention, while negatively valenced images of potential causes and effects of climate change do not capture attention. On the other hand, negatively valenced images resulted in a general slowing of reaction time consistent with a "freezing response." Environmental disposition correlated with attentional bias such that greater pro-environmental disposition was associated with a lower attentional bias to climate change images. Collectively, our findings are important as they illustrate positive images of climate change solutions capture an individual's attention.
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5:30-7:30 PM (1153)

Visual Stimuli that Are Ignored or from Which a Motor-Response Is Withheld Become Affectively Devalued via Inhibition, Not Conflict. ELIZABETH CLANCY, AMANDA WYMAN, and MARK FENSKE, *University of Guelph* (Sponsored by Mark Fenske) – Stimuli that are ignored or from which a response is withheld subsequently receive more negative evaluations than the targets of attention/response. Leading accounts suggest that this stimulus-devaluation effect is due to negative affect elicited when inhibition is applied to reduce stimulus/response conflict. However, recent evidence suggests that conflict itself triggers negative affect, raising concerns that findings previously attributed to devaluation-by-inhibition actually reflect devaluation-by-conflict. We addressed this using visual-search and Go/No-go tasks that systematically altered whether subsequent ratings of task stimuli could be impacted by inhibition and/or conflict. Across multiple experiments, we found no evidence that stimulus/response conflict produces affective devaluation of associated stimuli. Instead, stimulus ratings were found to critically depend on whether an item had previously been subjected to inhibition (i.e., negative ratings via devaluation-by-inhibition), as well as the total number of times an item had previously been the focus of attention/response (i.e., positive ratings via mere exposure).
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5:30-7:30 PM (1154)

Mindfulness, Anxiety, Mind Wandering, and Self-Reported Cognitive Functioning: A Latent Variable Examination. MATTHEW WELHAF, *University of North Carolina at Greensboro,* AUDREY HOOD and KEITH HUTCHISON, *University of Montana,* JONATHAN BANKS, *Nova Southeastern University,* ADRIEL BOALS, *University of North Texas* – We examined the impact of dispositional mindfulness on self-reported anxiety, mind wandering, and cognitive functioning across multiple samples. Confirmatory factor analyses suggested that the factors had moderate to strong correlations with each other. Specifically, self-reported mindfulness was associated with less anxiety and mind wandering and better cognitive functioning. Mind wandering was also associated with more anxiety and poorer cognitive functioning. Further, structural equation models indicated that while mindfulness has a direct impact on anxiety, mind wandering, and cognitive functioning, the impact of anxiety on cognitive functioning was mediated by self-reported mind wandering. In an MTurk sample collected during the COVID-19 pandemic, mindfulness did not predict anxiety, mind wandering, or cognitive functioning. However, mind wandering mediated the relationship between anxiety and cognitive functioning. The results will be discussed in terms of the impact of dispositional mindfulness on self-reported cognitive functioning.
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5:30-7:30 PM (1155)

The Effect of Anxiety on Spatial Negative Priming Task with Emotional Stimuli. HIDEYA KOSHINO and JASMINE BONSEL, *California State University, San Bernardino* – The attentional Control Theory claims anxiety consumes working memory resources, resulting in impairments in executive functions including inhibition of distractor information (Eysenck et al., 2007). In the present study, we investigated the effect of anxiety on spatial negative priming (NP) using emotional stimuli. If distractor processing is impaired for individuals with high anxiety, they should show greater NP compared to individuals with low anxiety with happy target stimuli compared to sad target stimuli because emotional targets should capture their attention. Results showed low anxious participants exhibited a NP effect for both happy and sad target. Participants in moderate anxiety did not show NP in happy target but did in sad target suggesting that happy distractors captured their attention. Participants with high anxiety showed NP for happy target but not sad target suggesting sad face captured their attention. Interactions between anxiety and emotional stimuli will be discussed.
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5:30-7:30 PM (1156)

The Influence of Individual Difference in Anxiety and Stress on the Arousal Evaluation of Stimuli With or Without Threatening Information. MADELINE VOLTZ, ANALISE OSGOOD, LIN FANG, and JOSH CARLSON, *Northern Michigan University* – This study seeks to examine how individuals with different levels of anxiety and stress evaluate the valence and arousal of threatening and non-threatening stimuli. After the measurement of anxiety and stress levels, participants were asked to evaluate two sets of stimuli in a rating task: threatening vs neutral non-facial and facial images. For non-facial stimuli, there was a significant positive correlation between anxiety and arousal evaluation for neutral images. For facial stimuli, there was a tendency for higher anxiety and stress levels to be associated with higher arousal ratings of neutral faces. We also found a significant positive correlation between stress and arousal ratings of fearful faces. Our findings may indicate that threat cues are perceived similarly arousing to individuals independent of anxiety whereas neutral (facial and non-facial) images are perceived as more threatening by those with higher anxiety.
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5:30-7:30 PM (1157)

Individual Differences in Subjective Ratings of Pictures and Words Is Modulated by Behavioral Inhibition. MEGHAN CAULFIELD and IRENE KAN, *Villanova University* – Behavioral inhibition (BI) is a temperament that is characterized by the tendency to withdraw or avoid unfamiliar situations, people, or environments. Recent research suggests that biases toward threatening faces may be a key feature in those with high BI. Whether such biases extend to negative objects or words is unknown. Here, 149 participants self-reported BI, then rated either neutral images and words or negative images and words for valence (negative to positive) and arousal (exciting/agitating to calming/soothing). We found that high BI participants rated negative images and words as more negative than those with low BI. Furthermore, high BI subjects rated negative images as more arousing than those with low BI, but not for words. Group differences in valence and arousal ratings did not extend to neutral items. These results suggest that individual differences in the subjective experience of encountering negative stimuli in different modalities may contribute to behavioral inhibition.
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5:30-7:30 PM (1158)

Assessing the Time Course of Affective Processing: Representational Similarity Analysis of ERP Responses to Emotional Scenes. JOHN KIAT

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and STEVEN LUCK, *University of California, Davis* – Here we applied representational similarity analysis (RSA) to ERPs to investigate the time course of valence processing for complex emotional scenes. Participants (N=29) viewed a series of 44 emotionally charged scenes from the IAPs database while performing a modified 1-back task. After completing this task, they highlighted spatial regions in each scene containing emotional content using a paint application. We then used RSA to examine how the scalp distribution of voltage at each moment in time was predicted by the spatial distribution of affectively relevant information in the scenes and the overall valence rating for the scenes. We found that the early sensory ERP activity (112-132 ms) was predicted by the spatial distribution of affective information, likely reflecting the image properties associated with affective content. The overall valence level of the scene predicted the ERP activity shortly after that (172-564 ms), potentially representing the rapid extraction of valence from the image information. The spatial distribution of affectively relevant information predicted later activity as well (752-1056 ms), possibly indexing the focusing of attention.
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5:30-7:30 PM (1159)

Warning Screens Do Not Discourage People from Engaging with Negative Social Media Content. MELANIE TAKARANGI, ERIN SIMISTER, and VICTORIA BRIDGLAND, *Flinders University* – In blurring or "muting" sensitive images and providing a warning about image content, Instagram's sensitive screens seek to reduce surprising or unwanted experiences and help vulnerable users decide what content to approach or avoid. However, this policy has no empirical basis. In fact, we know that similar trigger warnings are ineffective or possibly even harmful (e.g., Bridgland et al., 2019). In addition, our recent data suggest that most people—and particularly those with elevated risk markers for psychopathology (e.g., higher depression, low well-being)—opt to uncover a hypothetical negative image "muted" by an Instagram-style warning screen. To examine participants' actual behavior, in the present study we gave participants the option to uncover screened negative images. Participants viewed screened, positive and neutral images at their own pace over 5 minutes. Participants were very likely to uncover muted images, and uncovering behaviour was related to key risk markers. Our findings raise the possibility that warning screens draw attention to sensitive content and that they may encourage self-triggering behaviours (e.g., Bellet et al., 2019). These screens may not protect users' mental health and well-being as intended.
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5:30-7:30 PM (1160)

Using Semantic Network Structure to Understand Repetitive Negative Thinking. AIDAN FLYNN, SARA KURKO, and IRENE KAN, *Villanova University* (Sponsored by Irene Kan) – Repetitive negative thinking (RNT) describes a recursive, unproductive pattern of thought that is most commonly observed in individuals who experience anxiety and depression. Past RNT research has primarily relied on self-report, which fails to capture the potential mechanisms that underlie this maladaptive behavior. Relatively unexplored is how RNT may be maintained by a negatively biased semantic structure. Here, we used a modified free association task to index potential biases in the semantic network. Participants generated chains of free associates in response to "seed" words of different valence and completed two self-report measures that assess RNT and overall negativity. We found that while perseveration of negative responses increases with RNT score, overall negativity is a better predictor of this state. Furthermore, this pattern exists only for positive seed words. These results suggest that one's RNT tendencies may be understood in terms of biases in one's semantic network and assessed without self-report.
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5:30-7:30 PM (1161)

Cognitive Emotion Regulation Strategies Used by Healthy Adults During Compulsory Isolation Due to COVID-19. MARIA JARA, *University of Guayaquil,* JOSE RODAS, *University of Guayaquil & University College Dublin,* CIARA GREENE, *University College Dublin* (Sponsored by Ciara Greene) – In this study, we evaluated the role of Cognitive Emotion Regulation Strategies (CERS) on the psychological effects of the isolation measures taken by governments in a sample of 618 healthy Ecuadorian adults. We evaluated the association between CERS, symptoms of depression, state anxiety and socio-economic variables, and compared differences between men and women, and people with and without school-aged children. Analyses showed that the use of non-adaptive CERS was associated with greater symptoms of depression and anxiety. While the use of adaptive CERS was associated with lower anxiety symptoms and believing that the isolation measures are appropriate to face the pandemic. Women presented greater symptoms of depression, anxiety and greater use of certain non-adaptive CERS. People without school-aged children presented greater symptoms of depression and greater use of certain non-adaptive CERS. These findings suggest the relevance of CERS in well-being during the isolation and the presence of vulnerable groups.
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5:30-7:30 PM (1162)

Conceptual Expansion via Analogical Reasoning Incites Aha Moments. CHRISTINE CHESEBROUGH, EVANGELIA CHRYSIKOU, and JOHN KOUNIOS, *Drexel University* (Sponsored by Evangelia Chrysikou) – Far analogical reasoning and aha moments are both associated with comprehending a novel relationship between disparate ideas or elements of a situation. Analogical reasoning is thus is a potentially valuable method for studying the nature and function of aha moments during reasoning. In this study, participants were asked to reason about three-pair verbal analogies in the form A:B::C:D::E:F. On each trial, the third E:F pair shown was either semantically closely related (conceptually consistent) or semantically distant (conceptually expansive) to the A:B::C:D pairs. On each trial, participants were asked to describe the conceptual relationship exemplified by the analogy both before and after the E:F pair was included, and provided a rating of whether they experienced an aha moment when they understood the full analogy on a scale from 0-10. Trials that included a conceptually expansive E:F pair were given significantly higher aha ratings than trials that included a conceptually consistent E:F pair, suggesting a relationship between aha moments and conceptual expansion. This effect was found in a sample of university undergrads and replicated in a demographically diverse sample of MTurkers.
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5:30-7:30 PM (1163)

Maladaptive Relationship Behaviors and Cognitive Reflection. RACHEL ZUKERMAN, TAMARA DEL VECCHIO, and DANA CHESNEY, *St. John's University* (Sponsored by Dana Chesney) – Research suggests impulse control is linked to individuals' tendency to respond constructively rather than destructively when confronted with interpartner conflict. Here, we investigate whether this tendency toward constructive responses is related to cognitive reflection. Cognitive reflection is the tendency to override intuitive responses and engage in analytic thinking. If cognitive reflection is linked to better impulse control more broadly, it follows that individuals with a greater tendency toward cognitive reflection will also tend to behave more constructively in interpartner conflicts. To test this, we asked young adults to complete Cognitive Reflection Tasks (CRT) and measures of maladaptive relationship behaviors. We predicted participants who made more intuitive, incorrect responses rather than deliberative, correct responses would engage in more maladaptive relationship behaviors. We also investigated the effect of affect on cognitive reflection and behavior. Participants did a second CRT after a randomly assigned neutral or anger mood induction task. We predicted a) the anger induction would negatively affect CRT scores, and b) in the anger condition, CRT change scores would correlate to maladaptive behaviors.

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5:30-7:30 PM (1164)

Sarcasm Detection in Native English and English as Second Language Speakers. CHERYL TECHENTIN and DAVID CANN, *Mount Royal University,* MELISSA LUPTON, *University of Calgary,* DEREK PHUNG, *Mount Royal University* – Understanding sarcasm is highly dependent upon cultural and social contextual factors. Little research has examined the ability of non-native speakers to understand the sarcastic cues of a second language. Native English speakers and ESL speakers were tested in each of three different conditions. Each condition presented a different cue involved in the detection of sarcasm (prosody, context, or facial expression) and participants were asked to identify if the cue indicated sarcasm or sincerity. Participants also indicated their experience with sarcasm through completion of the SSRS, the CID, and the Exposure to Sarcasm in Media Scale. Results indicated that the ESL speakers were less accurate than native English speakers in detecting sarcasm using prosody and context but showed no significant difference in detecting a sarcastic facial expression. Multiple regression analysis indicated that prosody and facial expressions were key factors for both groups in identifying sarcasm when all three cues were combined. Higher ESL performance also positively correlated with scores on the SSRS and the number of years lived in Canada. The role of experience and cultural background in the detection of sarcasm are discussed.

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5:30-7:30 PM (1165)

Relating Tabooness and Humor Ratings: What the F* Is So Funny?** MEREDITH SHAFTO, *University of Cambridge,* LISE ABRAMS, *Pomona College,* LORI JAMES, *University of Colorado, Colorado Springs,* PENGBO HU and GENEVIEVE GRAY, *Pomona College* – The emotional characteristics of words can have powerful effects: On the positive and negative extremes of linguistic emotion, both humorous and taboo language can affect lexical processing. The effects of humor and tabooness may reflect both shared and independent linguistic and emotional factors. Models of emotional processing suggest that while taboo and humorous words may differ in their valence, they may both affect lexical processing by being highly arousing. The current study related tabooness and humor ratings to each other and to ratings of arousal and valence. Results indicated a relationship between taboo and humor ratings, so that words with higher humor ratings tended to be rated as higher in tabooness. Taboo and humor ratings differed, however, in how they were predicted by arousal and valence, suggesting both shared and unique factors underpinning the effects of humor and tabooness. We discuss these relationships in the context of participant characteristics including age and gender. These findings may have methodological consequences for researchers using humorous or taboo stimuli, and have broader implications for our understanding of the cognitive and linguistic nature of highly arousing language.

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5:30-7:30 PM (1166)

Features of Emotion Concepts. ALEXANDRA KELLY and EVANGELIA CHRYSIKOU, *Drexel University* (Sponsored by Evangelia Chryiskou) – A large body of work reports the influence of emotions on attention, decision making, language comprehension, and other cognitive processes; however, the underlying structure of emotion concepts—that allow us to reflect on and communicate about our bodily states—has received considerably less attention. Accounts of the conceptual representation of emotions have almost exclusively highlighted their abstract nature. In contrast, in the present study we hypothesized that differences between the experience of emotions and other abstract concepts (e.g. "equality," "tyranny"), specifically regarding the relative importance of interoceptive states, might drive distinctions in the dimensions along which emotion concepts are represented. Participants performed a property generation task in which they listed features of emotion concepts and a matching number of concrete and abstract, non-emotion concepts. Our results reflect subtle differences between the structure of emotion concepts and the structure of, not only concrete concepts, but also other abstract concepts.

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5:30-7:30 PM (1167)

People's Symptoms of "Pre-Traumatic Stress" about a Negative Future Event Are Associated with their Tendency to Worry and Characteristics of that Imagined Event. MEVAGH SANSON, *University of Waikato,* MELANIE TAKARANGI, *Flinders University,* RACHEL ZAJAC, *University of Otago,* MARYANNE GARRY, *University of Waikato* – After a negative event, people can develop symptoms of Posttraumatic Stress Disorder (PTSD). But they can also develop these symptoms before an anticipated negative event. People tend to be more troubled by PTSD symptoms about a past event when their memory of it has more of certain characteristics. It stands to reason, then, that they would be more troubled by "PreTSD" symptoms about a future event when they imagine it with more of those same characteristics. To test this idea, in early April, 1,013 MTurkers nominated the worst event they had imagined happening to them in the future due to the COVID-19 pandemic, rated characteristics of that future event (how emotionally evocative and frequently rehearsed

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it was, and how personally important or "central" it would be), and reported the PreTSD symptoms they had experienced about it. Subjects' symptoms about their imagined future event were substantively explained by its characteristics, while controlling for subjects' general tendency to worry ($p<.001$, adj $R^2=0.50$). These findings suggest PreTSD symptoms are distinct from worry and support the idea that PTSD symptoms stem from the mental representation of a negative event—which can arise even if the event has not happened.
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5:30-7:30 PM (1168)

The Positivity Principle with Human and Animated Instructors. ALYSSA LAWSON and RICHARD MAYER, *University of California, Santa Barbara* (Sponsored by Richard Mayer) – The Positivity Principle posits that individuals learn better from instructors who display positive emotions (e.g., happy and content) compared to those who display negative emotions (e.g., frustrated and bored). This principle was tested in a series for two studies. Participants were shown a human instructor (Experiment 1) or an animated instructor (Experiment 2) giving a lecture on binomial probability displaying one of four emotions: happy, content, bored, or frustrated, and then were tested on their knowledge of binomial probability a week later. In both experiments, learners rated positive instructors higher on displaying positive emotions; rated positive instructors as better at facilitating learning, more credible, and more engaging; and reported paying more attention to positive instructors. Lastly, positive instructors lead to better performance on a posttest than negative instructors for human instructors (Experiment 1) but not animated instructors (Experiment 2). This indicates that the Positivity Principle may be stronger for emotions portrayed by human instructors than those displayed by animated instructors.
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5:30-7:30 PM (1169)

Effects of Specific Negative Emotions on Recognition Memory: Insight from Accuracy and RT Data. AYCAN KAPUCU, *Ege University,* ASLI KILIÇ, *Middle East Technical University,* ELIF YÜVRÜK and ELIF SIVRI, *Ege University* – Specific negative emotions have different effects on cognition such that anger and disgust are associated with certainty but fear is associated with uncertainty. Yet, only a few studies addressed whether specific emotions have similar effects on recognition memory. We tested this question by analyzing correct and error responses, as well as reaction times (RT). Participants studied three blocks of negative (anger-, fear-, or disgust-related) and neutral words and completed an old/new recognition test. The data revealed that compared to their neutral counterparts, anger- and disgust-related words resulted in more liberal bias but lower accuracy, while fear-related words increased both accuracy and liberal bias. RT analyses showed that participants made faster "old" than "new" judgments for both fear and disgust blocks, whereas no such difference was observed for the anger block. Next, diffusion model analysis will be conducted to provide a better understanding of recognition memory performance by incorporating all of the behavioral data. Present study suggests that specific negative emotions carrying same valence and arousal might have different effects on recognition memory due to appraisal differences.
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5:30-7:30 PM (1170)

Perception of Within- and Cross-Category Emotional Similarity in Static and Dynamic Faces. LAURA MANNO, STEPHANIE ROSSIT, ANDREW BAYLISS, and MINTAO ZHAO, *University of East Anglia* – Emotional facial expressions occur dynamically and can vary categorically and in a fine-grained way. Previous studies, however, have mainly focused on the perception of static and categorically different facial expressions (e.g., happy vs angry). Here we investigated how facial motion affects the recognition of facial expressions and the perception of emotional similarity between facial expressions. Participants first categorized facial expression of two sequentially presented faces—in either static or dynamic format and depicted either similar or different facial emotion—and then made judgments about their similarity. We found a dynamic advantage in emotion recognition, with fewer errors and confusions for dynamic than for static faces. Both static and dynamic faces showed a lower perceptual similarity for cross- than for within-category facial expressions, indicating that facial motion did not affect perceptual similarity. Finally, we found significant correlations between perceived similarity and stimulus similarity in both static and dynamic faces. These results suggest that both semantic and physical similarity of facial expressions contribute to the perception of emotional similarity in both static and dynamic faces.
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5:30-7:30 PM (1171)

Beyond Valence and Arousal: Robust Memory Enhancement for Disgust Over Fear Images. ELLA MOECK, *Monash University & Flinders University,* LUCY MATSON and MELANIE TAKARANGI, *Flinders University* – Our current understanding of how emotion affects memory centers on how highly arousing emotions help (or hinder) memory, rather than on the nuanced effects different types of emotions (e.g., disgust, fear) have. But we know that different types of emotions have unique effects on memory: although both disgust and fear are highly negative and arousing, people show enhanced memory for disgust. Pre-existing experiments (Chapman et al., 2013; Chapman, 2018) suggest superior memory for disgust images occurs after a 45-minute delay, but not after 10 minutes. We replicated and extended these findings with two recall conditions: single (recall after 45-min) and repeated (recall after 10 minutes and 45 minutes). These conditions allowed us to examine the intricacies of the disgust memory enhancement, namely the effect of repeated recall and delay. Although the disgust memory enhancement was larger after 45-minute than 10-minute delay, we found robust enhancement at both timepoints. Repeated recall did not increase the disgust memory enhancement. Attention toward the images during encoding partially mediated the effect of emotion category on recall.
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5:30-7:30 PM (1172)

Out of Fright, Out of Mind: Impaired Memory for Information Corrected Under Threat of Shock. HANNAH YEE, VERA NEWMAN, ADRIAN WALKER, METAXIA TOUMBELEKIS, and STEVEN MOST, *University of New South Wales* – People often need to update representations of information upon discovering them to be incorrect, a process that can be interrupted by competing cognitive demands. Because anxiety and stress can impair cognitive performance, we tested whether

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looming threat can similarly interfere with this process. On each trial, participants saw a face paired with a personality descriptor. Each pairing was followed by a signal indicating whether it was "true" or "false", and this could be followed by a warning of imminent electric shock. As predicted, threat of shock left memory for "true" pairings intact while impairing recognition of corrected information. Contrary to our predictions, the pattern of errors for information corrected under threat suggested that rather than misremembering false information as true, participants were instead more likely to forget having seen the corrected pairings at all. We suggest that looming threat may interfere with executive processes important for resolving competition between mutually suppressive "true" and "false" representations in memory.
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5:30-7:30 PM (1173)

The Effect of Gaze Direction and Facial Expression on Time Estimation. ARGIRO VATAKIS and AGGELIKI NIKOLOPOULOU, *Panteion University of Social and Political Sciences* (Presented by Aggeliki Nikolopoulou) – Subjective timing has been shown to be influenced by gaze or emotion with this influence being attributed either to an arousal-driven faster clock or attentional-driven loss of pulses. Past research, however, has been limited to static facial stimuli with limited interactions between emotion and gaze. We presented dynamic faces with constant gazing (direct, averted) times and variable emotion expression (happy, fear, angry, neutral) times. Twenty-three participants completed a temporal bisection task and the analyses showed an underestimation of directly gazing angry, fearful, and neutral expressions in relation to directly gazing happy faces, while interval underestimation was noted for fearful as compared to happy expressions with averted gaze. The observed effects for directly gazing, happy expressions could be interpreted as a product of attentional mechanisms involving approximate and avoidance behaviors or alternatively to increased arousal levels. These are further supported by the reduced temporal sensitivity obtained for directly as compared to averted gazing happy faces. The results highlight the crucial role of gaze and emotion on timing, and call for further research on the perceived timing of our social interactions.
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5:30-7:30 PM (1174)

The Association of Cognitive Reflection with Emotion Regulation Goals, Meta-Emotions, and the Preferred Cognitive Emotion Regulation Strategies. LUCIA-ELISABETA FAICIUC, *The Romanian Academy* – The relevance of cognitive reflection (as a deliberative style of information processing, without miserliness in spending cognitive resources, implying an ability to surpass prepotent, intuitive answers) for emotion regulation was understudied. To my knowledge, there are no empirical studies through which the measure of Cognitive Reflection Test to be investigated in its relationship with existing measures for emotion regulation, in spite of the fact that one's style of thinking may be important for the way she/he chooses her/his emotion regulation goals, and cognitive emotion regulation strategies, as well as for the way she/he would react emotionally to her/his own emotions (meta-emotions). One reason for which cognitive reflection should be associated with emotion regulation would be its importance in processing the emotional and situational information required in order to decide what emotional regulation goal, strategy, or what meta-emotion would be appropriate in a certain context. Cognitive reflection was measured with a modified Cognitive Reflection Test (CRT; Frederick, 2005), using a correctness score, and, respectively, an intuitiveness score (an inverse measure for cognitive reflection), based on the sum of the prepotent, intuitive answers.
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5:30-7:30 PM (1175)

The Seven Words You Can't Say to Homesick College Students. MARYJANE WRAGA, RACHEL YAN, and SYLVIE LEDNICKY, *Smith University* – Homesickness — emotional distress caused by separation from home — is prevalent on college campuses, particularly in new students who may be living away for the first time (Thurber & Walton, 2012). Homesickness causes known social and emotional difficulties (English et al., 2017). Our lab has been interested in whether it may also influence cognitive processes such as autobiographical memories. When asked to generate memories from word prompts, first-year college students overwhelmingly choose events from home rather than more-recent events on campus, and their tendency to do so is related to personal feelings of homesickness (Wraga et al., 2018). The current study focuses on the cluster of seven words that evoked the strongest homesick feelings in first-years. We use multilevel modeling to examine how the words are influenced by feelings of homesickness, and how they modulate other characteristics of autobiographical memories.
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5:30-7:30 PM (1176)

Differences in Beta Power while Encoding Supra-Second Time Intervals in Low and High State Anxious Individuals. SARA LOMAYESVA, BRIAN LORD, and EVE ISHAM, *University of Arizona* (Sponsored by Eve Isham) – Higher fronto-central beta-band activity has been related to performance in a timing-related task compared to a control task, as well as working memory load (Coull & Droit-Volet, 2018), which has been shown to be reduced in individuals experiencing anxiety. The current study describes differences in beta band power while encoding supra-second intervals between low and high state anxious individuals. Behavioral analysis showed a significant relationship between high state anxiety and under-reproduction of encoded intervals. Preliminary power frequency analysis revealed a trend towards differences in fronto-central beta power between low and high state anxiety groups, where high state anxiety individuals under-reproduce supra-second intervals. The data will be discussed in the context of working memory capacity in individuals experiencing state anxiety.
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5:30-7:30 PM (1177)

Reliability and Validity of the Milestones Scale of Development for Speech-Language Therapists Evaluating Videos of Emotional Speech and Behavior of Children with Autism Spectrum Disorder. MAURA KRESTAR, STEPHEN OLLER, SARAH BAKER, and GABRIELLA SANCHEZ, *Texas A&M University – Kingsville* – Despite the well-documented language differences exhibited by individuals with autism, a fine-grained, accurate assessment of differences in the representation of emotion and emotional experiences in the spectrum does not currently exist. The current project focuses on The Milestones Scale of

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Development, a categorical rating of speech and language development across the lifespan based on the general sign theory of communication that has been applied to the analysis of Autism Spectrum Disorders (ASD). The current study aims to assess the reliability and validity of the scale to accurately measure ability to identify and use emotional language, engage in cognitive emotional activities. Graduate student participants trained in the use of the Milestones will watch short, publicly available videos of children with ASD expressing various levels of emotion and rate them according to one of the 16 levels of the scale. Participants will also provide subjective descriptions of their reasoning for their ratings in addition to their experience with and confidence in using the scale. Ratings will be analyzed for reliability and validity. Results will contribute to accurate measurement of cognitive-emotional expression in ASD.
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5:30-7:30 PM (1178)

Remember More with a Sudden Change: Violation of Expectation Shifts Strategies Toward Information Exploration. JIAHAN YU, RENDE SHUI, and MOWEI SHEN, *Zhejiang University,* BRAD WYBLE, *The Pennsylvania State University,* HUI CHEN, *Zhejiang University* (Sponsored by Hui Chen) – This study addressed how an expectation violation affects the control settings for processing/encoding information with a modified attribute amnesia paradigm (Chen & Wyble, 2015). Experiment 1, as a no-expectation-violation baseline, was a classic attribute amnesia task wherein participants reported the location of a target letter among three distractor digits in several trials and were then unexpectedly asked to report the identity of the target in a surprise test. This was compared with Experiments 2-5 wherein expectation was violated in the surprise trial. The expectation violation was triggered by a sudden change of the target identity or color in Experiments 2 & 3 respectively. The report accuracy of target identity in the surprise trial was significantly better in Experiments 2 & 3 than Experiment 1. To preclude attentional bias to the target because of a sudden change of its attributes, the locations of all stimuli, or the pitch of an accompanying sound stimulus were suddenly changed respectively in Experiments 4 & 5. The results replicated Experiments 2 & 3. These results suggest an adaptive control mechanism that reduces the selectivity of processing/encoding in face of expectation violation by a sudden change.
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5:30-7:30 PM (1179)

We Tallied the Votes: No Survival Advantage in Visual Long-Term Memory. ANNIE TRUUVERT, JAY PRATT, and SUSANNE FERBER, *University of Toronto* (Sponsored by Jim McAuliffe) – A well-established encoding manipulation in the long-term memory (LTM) literature is survival processing, where LTM is enhanced for words that have been rated for relevance in survival scenarios compared to rating words for pleasantness. Would a similar survival advantage be found for visual objects in visual long-term memory (VLTM)? Participants rated coloured real-world object images in one of three conditions: softness, pleasantness, or relevance in a specified survival context. They then completed a surprise colour recall test where they were shown greyscale versions of the objects and indicated each object's previous colour on a colour wheel. Mixture modelling was used to analyze the responses. No survival advantage was found; objects rated for relevance in the survival scenario did not demonstrate greater resolution in comparison to the other conditions. These results suggest that the survival advantage does not extend into the domain of VLTM.
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5:30-7:30 PM (1180)

Conceptual Grouping in Visual Working Memory: The Effects of Perceptual Grouping, Category Structure, and Encoding Time. ANDREW CLEMENT, Y. ISABELLA LIM, and JAY PRATT, *University of Toronto* – A growing body of evidence suggests that semantic and functional relationships among objects can increase the capacity of visual working memory. However, these conceptual grouping effects have largely been observed using perceptually grouped displays, a small set of categories, and relatively short encoding times. Here, we investigated which of these factors contribute to conceptual grouping effects. Participants memorized an array of eight objects. The objects could belong to a semantically related or unrelated categories and could be grouped into pairs or randomly arranged in a circle. In our first experiment, using a small set of categories and relatively long encoding times, we observed a large conceptual grouping effect in both grouped and ungrouped displays. In our next two experiments, using a larger set of categories and relatively short encoding times, we observed a large conceptual grouping effect in grouped displays but a reduced conceptual grouping effect in ungrouped displays. These findings suggest that conceptual grouping effects are robust across a variety of factors, and that manipulating multiple factors can reduce but not eliminate these effects.
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5:30-7:30 PM (1181)

Revealing the Causal Roles of Visual and Frontal Cortex in Recovering Latent Visual Working Memories with Non-Invasive Brain Stimulation. JOSHUA RHILINGER, JORI WANER, ISAIAH METCALF, and NATHAN ROSE, *University of Notre Dame* – Research has traditionally focused on frontal cortex as the key hub for working memory (WM), but recent theories predict that sensory cortex also assists in WM maintenance of unattended memory items (UMIs) via an "activity-silent" mechanism in early visual cortex (V1). However, it is unknown how or where UMIs are stored in the human brain. We apply high (continuous theta burst) and low (alpha) frequency repetitive TMS (rTMS) to dorsolateral prefrontal cortex (dlPFC) or V1 before a two-item, double-retrocue, double-recall task. The task requires participants to swap one of two Gabor orientations into and out of their focus of attention over the delay periods. In our pre-registered hypotheses we predict that, relative to sham rTMS, low-frequency rTMS to dlPFC will increase swap error rates, and high-frequency rTMS to V1 will decrease the precision of orientation recall. Therefore, dlPFC may help prioritize target items, while sensory cortex may maintain feature-specific information.
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5:30-7:30 PM (1182)

Compressing Symmetrical Structures Improves Change Detection. CHUANXIUYUE HE and DANIEL BUONAURO, *University of California, Santa Barbara*, HAUKE MEYERHOFF, *Leibniz-Institut für Wissenmedien,* STEVEN FRANCONERI, *Northwestern University,* MIKE STIEFF, *University of Illinois at Chicago,* MARY HEGARTY,

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University of California, Santa Barbara – People can only maintain 3-4 items in visual working memory. This number drops to 1-2 units when the display rotates. However, real-world STEM experts are able to make judgments about complex visuospatial displays with multiple visual features. We tested a domain-general mechanism that may play a role: compressing information based on symmetrical features. Participants briefly viewed a structure made up of three-dimensional differently colored connected cubes, that was either rotationally symmetrical or asymmetrical, with a concurrent verbal suppression task. After a short delay, participants were asked to detect a change (color-swap) within a test structure (which was always asymmetrical) in a rotated view. Symmetry in the encoding structure improves performance in structure change (color-swap) detection and performance in this task declined with angular disparity of the encoding and test displays. While people with higher spatial ability performed better on the change detection task, after controlling for general intelligence and verbal reasoning, there was no evidence that people with different spatial ability levels are differentially affected by symmetry or angular disparity.
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5:30-7:30 PM (1183)

A Model of Dynamic Resource Reallocation and Redeployment in Visual Working Memory. ROBERT UDALE, SANJAY MANOHAR, VERENA KLAR, and MASUD HUSAIN, *University of Oxford* – Due to its limited capacity, working memory must lose information about existing representations in order to store new task-relevant representations. Participants viewed randomly oriented bars in various sequences and were instructed to report the orientation of one of the bars, cued by its location after a delay. Precision of recall for the final item in the sequence was the same, regardless of whether the preceding items had been presented sequentially or simultaneously. This result indicates that a similar proportion of resources from all representations in memory are reallocated to encode the next item, irrespective of prior history. Greater recall precision for the final item occurred when the delay between stimuli was longer. This finding indicates that resources released by forgetting are re-deployed to encode new items. These findings support a dynamic reallocation memory model. This model assumes that a mnemonic resource is subject to loss over time (forgetting), transfer from existing to new representations (reallocation), or freed up then re-activated to store incoming stimuli (redeployed).
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5:30-7:30 PM (1184)

Efficient Filtering of Sad and Fearful Faces from Working Memory in Dysphoria. CHAOXIONG YE, *University of Jyvaskyla & Sichuan Normal University,* QIANRU XU, XUEQIAO LI, and ELISA RUOHONEN, *University of Jyvaskyla,* QIANG LIU, *Sichuan Normal University,* PIIA ASTIKAINEN, *University of Jyvaskyla* – Previous studies conducted in healthy humans by applying event-related potentials have shown that task-irrelevant fearful faces are difficult to filter from visual working memory (VWM), and anxiety symptoms increase this difficulty. It is not known, however, whether non-threatening faces are also difficult to be filtered and whether depression symptoms affect it. We tested whether task-irrelevant sad and fearful faces are differently stored by dysphoric (elevated amount of depressive symptoms) and control participants. We found that the groups differed in filtering ability as indexed by the contralateral delay activity. Control participants unnecessarily stored fearful faces in memory, but they were able to filter sad faces, suggesting that specifically threatening faces are difficult to filter from VWM in healthy individuals. Dysphoric participants filtered both fearful and sad face distractors efficiently. Thus, depression-related attentional bias toward sad faces, if existing here, seems not to result in unnecessary storage of sad faces. Our results suggest a threat-related filtering difficulty and unexpected lack of this difficulty in negative face filtering in participants with depression symptoms.
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5:30-7:30 PM (1185)

The Role of Perceptual Grouping via Illusory Contours in Visual Working Memory Binding. DWIGHT PETERSON, BENJAMIN SWANSON, LILIANA CANNELLA, and JACOB HANSON, *Concordia College* – Perceptual grouping cues can improve visual working memory (VWM) performance (e.g., similarity: Peterson & Berryhill, 2013; similarity and connectedness: van Lamsweerde, Beck, & Johnson, 2016; connectedness and proximity: Woodman, Vecera, & Luck, 2003, illusory contours: Allon, Vixman, & Luria, 2018; Gao, Gao, Tang, Shui, & Shen, 2016). The current study examined whether these grouping-related benefits might extend to VWM binding processes. During a VWM change detection task, participants viewed three color-orientation conjunctions (i.e., feature bindings) oriented so as to form an illusory object (e.g., Kanizsa triangle) or were randomly oriented, forming no illusory object. Following a brief delay period, a test probe included either an "old" or "new" color, orientation, or color-orientation conjunction. Results revealed no grouping-related benefit for the color test condition but did reveal significant grouping-related benefits to both the orientation and color-orientation conjunction conditions. These findings suggest that task difficulty mediates grouping-related benefits in VWM.
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5:30-7:30 PM (1186)

A Model of Working Memory and Imagery Using a Variational Autoencoder. SHEKOOFEH HEDAYATI and BRAD WYBLE, *The Pennsylvania State University* (Sponsored by Brad Wyble) – To explore mechanisms that support the flexibility of working memory (WM) representations, we created a model that combines a variational autoencoder (VAE; Kingma & Welling, 2013) with the Binding Pool (BP; Swan & Wyble, 2014) and trained it on colorized handwritten digits (i.e., MNIST; LeCun et al.,1998). This generative VAE-BP model could store and reconstruct varying degrees of information about the shape or color of rasterized digits. This neural-network model has separate maps to represent shape and color and the information from these two maps are combined into a single memory trace. The separation of color and shape into different maps allows the model to selectively control the ratio of shape and color information within each memory trace. The generative aspect of the model (i.e., ability to reconstruct the observed image) enables the model to project memories back into image space, and to build memories of novel shapes.
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5:30-7:30 PM (1187)

What Are the Long-Term Consequences of Working Memory Prioritization? STEPHANIE JEANNERET, *University of Geneva,* LEA BARTSCH, *University of Zurich*, EVIE VERGAUWE, *University of Geneva* (Sponsored by Gaën Plancher) – One important aspect of attention in several working memory (WM) tasks is that attention can be guided in order to prioritize certain memories. In studies that look at different ways to prioritize the content of WM, robust effects of prioritization in WM are often seen. However, the consequences in long-term memory (LTM) of WM prioritization are much less clear. Here, our goal was to assess and compare two classical paradigms used for WM prioritization – retro-cueing and rewarding – and test their consequences in LTM. Participants were presented with four objects, followed by a screen indicating which object had to be prioritized in WM through either a retro-cue or a specific reward pattern. The effect of prioritization on WM performance as well as on performance in a surprise LTM test was compared between the two types of prioritization (retro-cue vs. reward) and implications for priority-based resource allocation in WM are discussed.
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5:30-7:30 PM (1188)

From "Pure Guess" to "Absolutely Certain": What Influences Confidence Judgements in Visual Working Memory? JULIA KRASNOFF and KLAUS OBERAUER, *University of Zurich,* HENRIK SINGMANN, *University of Warwick* (Sponsored by Klaus Oberauer) – A long line of research on metacognition in long term memory shows that metacognitive judgements are not a pure reflection of people's memory content but are influenced by several factors, such as general beliefs about one's memory capacity and situational cues. In contrast, a current model of visual working memory (VWM) confidence (van den Berg et al., 2017, Psychol. Rev.) suggests that memory precision is directly mapped to confidence ratings through Fechner's law, implying that there are no other factors besides memory precision affecting confidence judgements. In two experiments we tested this assumption. Participants completed a color reproduction task and rated their confidence on a continuous scale. We manipulated task difficulty by varying set size (2, 4, 8 colors) and used a color reproduction task with high visual interference (experiment 1) and low visual interference (experiment 2) at test. Results of both experiments suggest that task difficulty itself is used as a cue for confidence in VWM. We are currently fitting the model of van den Berg and colleagues to the data of both experiments to test whether it can account for these results.
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5:30-7:30 PM (1189)

Complexity and Compression of Information Effects on Color-Based Boost in Visual Working Memory. HANANE RAMZAOUI and FABIEN MATHY, *BCL, Université Côte d'Azur, & CNRS* – Objects sharing color have been found to boost working memory (WM) capacity. The capacity to encode singletons particularly benefits from the repetition of colors in a visual display. It has been suggested that redundant features encoded as perceptual groups reduce the WM load. We took profit of measures of algorithmic (Kolmogorov) complexity to test whether compressibility offers a general account of the color-boost effect.We examined the influence of set size (2 to 8), number of same-color clusters (2 to 8), number of singletons (1 to 8), and complexity K (5.41 to 27.41). We found that probability of correct recall decreased with an increase for each manipulated variable. No significant difference was found in area under the curves (AUC) between i) complexity K alone and ii) set size + clusters. However, probability of correct recall for the last four items increased with decreased complexity K of the four first items. Overall, our findings indicate that the most convenient account is that more compressed representations in WM can leave room for remembering less compressible information and that algorithmic complexity can be a relevant account of WM online processes.
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5:30-7:30 PM (1190)

Item-Specific Priming Effects of Remember and Forget Cues in the Item-Method of Directed Forgetting. HANNAH DAMES, MARCO RAGNI, ANDREA KIESEL, and CHRISTINA PFEUFFER, *University of Freiburg* (Sponsored by Roland Thomaschke) – Humans can intentionally forget previously learned information as evidenced by the directed forgetting (DF) effect. In the present study, we investigated whether the DF effect extends to the retrieval of associative information, specifically stimulus-action (S-A) associations, combining the DF-item-method and item-specific priming. Participants encountered stimuli four times with the same action mapping (learning phase) and received a remember/forget cue after the last item encounter. In the test phase, S-A mappings either item-specifically repeated or switched. Unexpectedly, test performance indicated that the retrieval of S-A associations did not significantly differ between remembered and forgotten items. However, we found slower test responses for remembered compared to forgotten items. Thus, remember/forget instructions became associated with stimuli during learning and were retrieved at test. We discuss how cognitive control and associative learning contribute to this effect and assess its implications considering sequential influences of the preceding trial´s remember/forget instruction at learning and test.
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5:30-7:30 PM (1191)

Examining the Relation of Item-Based Visual Paired Comparison Performance to Associative Memory in Young and Older Adults. EMMA SIRITZKY and AMY OVERMAN, *Elon University,* JOSEPH STEPHENS, *North Carolina A&T State University,* HANNAH GREENWOOD, *Elon University* – In the visual paired comparison task (VPC), an image is presented next to itself (A-A) prior to substitution of a novel image (A-B). Preferential eye fixation to unfamiliar (B) images has been shown to predict subsequent memory for familiar (A) images, and to correlate with hippocampal integrity (Manns et al., 2000). Reduced novelty preference is also associated with mild cognitive impairment in older adults (Crutcher et al., 2009). The present study investigated whether eye movements in VPC are related to age differences in associative memory, including impairments in associative recognition (Naveh-Benjamin, 2000) and memory updating (Wahlheim, 2014). Participants (33 young, age 18-25; 31 older, age 65+) completed a VPC task with eye tracking, followed by associative recognition (in which participants discriminated intact [A-B] versus rearranged [A-B'] pairs from the VPC task) and cued recall (in which participants named the most recent associate [B or B'] of each cue [A]). Novelty preference in VPC was observed for both age groups, but only predicted associative memory in young adults. The

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findings support the hypothesis that the associative deficit is independent of item memory.
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5:30-7:30 PM (1192)

Retrieval Practice Across the Verbal and Visuospatial Domains in Chemistry: The Alchemy of Transfer. GREGORY HUGHES and AYANNA THOMAS, *Tufts University* – Retrieval practice has been shown to enhance learning and transfer relative to passive study activities. In paired associate paradigms (A-B), retrieval practice of targets (A-?) improves performance on later tests of those targets (A-?). This benefit transfers not only to tests of their respective cues (?-B), but also tests that probe deeper conceptual knowledge (e.g., underlying rules, principles, and concepts). However, these effects have been overwhelmingly demonstrated with purely verbal materials. In the present study, we explored the influence of retrieval practice on paired associates consisting of verbal and visuospatial members (the names of molecules and diagrams of their structures, respectively). Retrieval practice of diagram targets (name-?) and name (?-diagram) targets enhanced performance on later tests of those targets. This benefit transferred not only to tests of their corresponding cues, but also to tests that probed knowledge of the underlying associative rules that interrelated sub-components of names and diagrams.
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5:30-7:30 PM (1193)

Cognitive Processes in Implicit and Explicit Sequence Learning: A Diffusion-Model Analysis. MARIUS BARTH, CHRISTOPH STAHL, and HILDE HAIDER, *University of Cologne* – Implicit sequence learning is frequently considered to be mediated by the formation of simple associations between stimulus or response features that are stored separately from each other in encapsulated modules. In contrast, recent accounts propose that both stimulus and response features are jointly represented. Here, we propose a processing-stages view to investigate the issue: While stimulus encoding and response execution may indeed be affected by simple associations, response selection necessarily relies on information about both stimuli and responses. Therefore, an involvement of response selection in implicit sequence learning provided evidence for joint representations of stimulus and response features. We analyzed two SRTT experiments with a drift-diffusion model and found that learning affected all three processing stages. Importantly, we found a pronounced involvement of response-selection processes in the expression of sequence learning, indicating that the representations acquired necessarily contain information about both stimuli and responses.
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5:30-7:30 PM (1194)

What Is Learned in a Conditioning Procedure with Valent Targets? PHILINE THOMASIUS and CHRISTOPH STAHL, *University of Cologne,* ANTHONY GREENWALD *University of Washington* (Sponsored by Christoph Stahl) – Evidence for unconscious learning was reported by Greenwald and De Houwer (2017) from a speeded learning procedure in which masked letter strings (CSs, 75 ms) were presented as primes before pleasant or unpleasant targets (USs), whose valence had to be categorized. During the learning phase, one CS predicted positive targets (CSpos), and one predicted negative targets (CSneg). In the test phase, CSpos and CSneg preceded both pleasant and unpleasant USs (50 % contingency). Categorization performance was better for CS-US pairs from the learning phase than for new pairs (conditioning effect), while the CSs could not be discriminated above-chance (lack of awareness). Here we report research testing the nature of the conditioning effect. We found that it is not evaluative as the effect did not generalize to an explicit or another implicit measure. The conditioning effect can neither be explained by CSs priming the perceptual processing of the USs nor by priming of a specific motor response. We discuss mappings of CSs to more flexible response categories than simple motor reactions as a possible mechanism.
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5:30-7:30 PM (1195)

Testing the Effects of Transcranial Direct Current Stimulation on Upright Faces and the Composite Face Effect. CIRO CIVILE, R.P. MCLAREN, F.N. MILTON, and I.P.L. MCLAREN, *University of Exeter* – In the two experiments we show that neurostimulation can affect face recognition skills by impairing participants' performance for upright faces. We used the transcranial direct current stimulation (tDCS) procedure we have developed that allows perceptual learning, as indexed by the face inversion effect (better performance for upright vs inverted faces), to be modulated by reducing performance to upright faces (Civile, Verbruggen, et al., 2016; Civile et al., 2018; Civile et al., 2019; Civile, Cooke, et al., 2020). The two experiments used a Face-Matching task traditionally used to study the Composite Face Effect. Experiment 1 (n=48) showed that anodal tDCS (using a double-blind between-subjects design) delivered at Fp3 (10 mins at 1.5mA) affected overall performance for upright faces compared to sham but had no effect on the composite face effect itself. Importantly, Experiment 2 (n=72) replicated the findings from Experiment 1, and, using an active control group, showed that the Fp3 anodal tDCS effects on performance to upright faces are not obtained when a different brain area is targeted. We interpret our results to suggest that different mechanisms are involved in the face inversion effect and the composite face effect.
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5:30-7:30 PM (1196)

Propositional versus Associative Views of Sentence Memory. KEVIN SHABAHANG, HYUNGWOOK YIM, and SIMON DENNIS, *University of Melbourne* – Propositional accounts assume sentences are encoded in terms of a set of arguments bound to role-fillers in a predicate, but they never specify how the role representations form in the first place. Dennis (2005) shows an alternative way to capture role-information based on simple associations derived directly from experience in the Syntagmatic-Paradigmatic (SP) model. We argue that the evidence for the propositional view is not well-founded and explore the possibility for a pure associative encoding of proposition-like information. We differentially manipulate overlap in target and distractor sentences, embedded in narratives, and directly place the propositional account against the SP view. Our first experiment provides some evidence for an SP account. However, the second experiment supports the propositional view. Our final experiment provides results that are difficult to explain with either account. Overall,

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our results support the propositional view and show mixed evidence for the SP account.
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5:30-7:30 PM (1197)

Dishonesty-Based Inhibition Following No-Go Trials. ALICE RICKERT, *Albert-Ludwigs-Universität Freiburg*, ANNA FOERSTER and ROLAND PFISTER, *Julius-Maximilians-Universität Würzburg,* MAXIN SCHMADLAK and CHRISTINA PFEUFFER, *Albert-Ludwigs-Universität Freiburg* (Sponsored by Roland Pfister) – Lying comes with cognitive effort. However, when re-encountering a stimulus we have dishonestly responded to before, a previously-formed stimulus-response (S-R) association and the associated response can be retrieved easily, if the intentional encoding context (prime; honest/dishonest) corresponds to the retrieval context (probe). In two experiments, we presented stimuli with either a task cue or a no-go instruction during their prime(s). We compared S-R associations formed in honest and dishonest contexts during a single versus multiple item-specific prime instances. Crucially, compared to no-go stimuli primed among honest responses, no-go stimuli primed among dishonest responses showed an inhibitory effect (delayed responses) in the probe when primed once. This inhibitory effect dissipated with multiple prime instances. Thus, the presentation of a not-responded-to stimulus in a dishonest context initially binds it with an inhibitory tag. Surprisingly, repeated exposure dissolves this inhibitory effect. This implies that merely observing a stimulus in a dishonest context affects future responding.
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5:30-7:30 PM (1198)

Visual Word Learning: What You See Is NOT All You Get. KAREN AICHER, *Bridgewater State University* – Skilled language users bring knowledge of the regularities of the orthographic and phonological forms of their language, and the associations between those forms. Prior studies have demonstrated that greater typicality of items (based on higher phonotactic and orthotactic probability and larger phonological and orthographic neighborhoods) facilitates work learning in visual word paradigms (Bartolotti & Marian, 2014; Collisson et al., 2010). Theories of reading such as the Triangle Model (Harm & Seidenberg, 2004) assume that activation flows in all directions during word reading, with engagement with the encountered form (orthography) and the latent form (phonology), allowing for differential influences of orthography and phonology. In this set of experiments, I explore the potentially separable contributions of the orthographic and phonological characteristics of nonwords by manipulating the attributes of the encountered and latent forms. Results indicate a facilitative effect of orthographic typicality as well as phonological typicality in learning and during naming.
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5:30-7:30 PM (1199)

Testing Osgood's (1949) Surface Plot: Univariate and Bivariate Effects of Cue and Target Semantic Similarity on Episodic Recall. JAMES ANTONY, *Princeton Neuroscience Institute,* AMERICA ROMERO, CATHERINE PALMER, EMMA WHITWAM, ANTHONY VIERRA, ARUSHI TEWARI, and KELLY BENNION, *California Polytechnic State University, San Luis Obispo* – In 1949, Charles Osgood proposed a surface plot showing how similarity affects memory as a dual function of cue and target similarity between the initial and later information. To test this, subjects initially learned a list of unrelated A-B (e.g., cow-beer) word pairs. Later, they each learned a list of A'-B (moo-beer), A-B' (cow-keg), and A'-B' pairs (moo-keg), where A-A' and B-B' similarity systematically varied over a wide range of global vector (GloVe) cosine similarity values. Subjects were tested on all pairs 48 hours later via cued recall. Memory dependence between memory for the initial and later pairs increased with similarity of A-A' (in the A'-B condition), B-B' (in the A-B' condition), and the dual similarity of A' and B' (in the A'-B' condition). While these effects were significant overall, detailed analyses showed they were minimal below a moderate similarity level (~0.55), after which they became large. Another experiment comprising only the highest related pairs (free association strength > 0.05) replicated these findings. Overall, these experiments strongly suggest that memory integration increases with higher similarity and support Osgood's approach of examining multiple types of similarity in long-term memory.
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5:30-7:30 PM (1200)

Memory for the Order within Associations Is Unaffected by Interactive Imagery. JEREMY THOMAS and JEREMY CAPLAN, *University of Alberta* (Sponsored by Jeremy Caplan) – Performance on associative order recognition (judging PORTAL-WATCH vs. WATCH-PORTAL) is only moderately dependent on cued-recall success (PORTAL-?). This runs counter to mathematical models, most of which predict near-perfect coupling. Because interactive imagery instructions increase association-memory, we asked if this would also increase the coupling between association- and order memory. However, despite interactive imagery increasing cued-recall and associative recognition accuracy compared to control, it had no effect on order recognition, nor on the dependence of order and association memory (all BF<0.3). These findings emphasize the need to modify existing models to explain partial independence and separate modifiability of memory for an association andmemory for constituent-order.
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5:30-7:30 PM (1201)

Outcome-Specific Motivation to Learn Is Affected by Previous Outcome Unpredictability. ANNA THORWART and GENISIUS HARTANTO, *Philipps-University Marburg,* OREN GRIFFITHS, *Flinders University,* EVAN LIVESEY, *University of Sydney* (Presented by Genisius Hartanto) – Outcome predictability (OP) effects in associative learning paradigms describe better learning about outcomes with a history of greater predictability in a similar but unrelated task compared to outcomes with a history of unpredictability. We investigate whether learning about unpredictability decreases outcome-specific motivation to learn. This is related to ideas that uncontrollability in Learned Helplessness paradigms results in a lack of motivation, which is however both task- and outcome-unspecific. Using a modified version of the allergy task, we implemented an active learning method in the second task in which participants could only learn about either the previously predictable or unpredictable outcomes within one trial. At the beginning of each trial, participants had to decide whether they wanted to learn about one outcome category or the other. Participants at the beginning of the second task indeed decided

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to learn about the previously predictable outcomes first, before choosing to learn about the previously less predictable outcomes in later trials. This showed that unpredictability affects the motivation to learn in other circumstances. Interestingly, we did not find any sign of OP effect at the end of second phase.
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5:30-7:30 PM (1202)

Understanding the Determinants of Meal Memories using the Memory of Eating Task (MEaT). BENJAMIN SEITZ, JANET TOMIYAMA, and AARON BLAISDELL, *University of California, Los Angeles* (Sponsored by William Roberts) – Memory of recent eating has been shown to moderate future food consumption. With this established, we created a novel procedure called the Memory of Eating Task (MEaT) to systematically study the determinants of memory of eating. In this task, participants are cued to repeatedly eat a single item of food while watching a film. Participants then complete a distractor task before recalling the number of items consumed and recreating the task context from memory. Using the MEaT, we have completed an arc of studies in which we have learned that eating behavior is better remembered than nearly identical behaviors that do not involve eating (Study 1), that caloric density potentiates a food item's ability to be remembered (Study 2), and that slower eating results in better memory of eating (Study 3). How these findings relate to several existing literatures is discussed as well as future directions using the MEaT.
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5:30-7:30 PM (1203)

Absolute and Relative Judgments Measure Different Aspects of Serial-Order Information. JERWEN JOU, MIKAYLA MARTINEZ, CLAIR GUZMAN, AMANDA HUT, and FRANCISCO SIERRA, *University of Texas at Rio Grande Valley* – Jou et al. (2018, 2020) found that a local distinctiveness created for a serial item in an otherwise homogeneous order significantly sped up the retrieval of the standing-out item in an absolute judgment (pair association recognition), but had no effect on a relative (comparative) judgment task. To explain the difference, Jou et al. suggest that absolute judgment taps item-specific whereas relative judgment taps relational information. The local distinctiveness in Jou et al. was created by repeated learning of a midseries item's serial position or by separating it from its neighbors with a larger-than-regular interval. One possible reason why the relative judgment showed no effect might be the manipulations not strong enough. The present study used 8 names ordered in height, all males except a female name for the rank-4 position, supposedly a very salient target. Indeed, both the absolute and relative judgments showed significant RT reductions involving the female name. However, when data were examined by blocks, the RT functions of the relative judgment showed a gradual re-shaping from a double-bowing to a single-bowing, which still supports the hypothesis of the two judgment tasks measuring different types of information.
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5:30-7:30 PM (1204)

Preliminary Analysis of a Delay Discounting Computer Programme: A Pilot Study. DANIEL UTSUMI, *Universidade Federal de São Paulo,* MÔNICA MIRANDA, *Universidade Ibirapuera*, SABINE POMPÉIA, *Universidade Federal de São Paulo* (Sponsored by Sabine Pompéia) – Delay discounting (DD) describes the depreciation of the subjective value of a reward as its delivery is delayed. Although both hypothetical (where delays and rewards are hypothetical) and real-time (where delays are experienced, and rewards are delivered) tasks are considered equivalent, this is not clear among adolescents. As part of ongoing research, a pilot study with 15 typically developing adolescents aged 9-15 years was conducted using a DD computer programme, with three tasks: hypothetical, real-time and a new type of task called patience task (in which delays occur, but no reward is delivered). The real-time task proved to be equivalent to the hypothetical and patience tasks. However, the hypothetical task led to less discounting than the patience tasks. As both the latter tasks used hypothetical rewards, choices made in the patience task better indicate intolerance to waiting for reward, even if they are hypothetical.
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5:30-7:30 PM (1205)

Aesthetic Appeal Facilitates Learning. IRENE REPPA, *Swansea University* – Previous research has indicated that visual complexity can be detrimental to performance on time-critical tasks, while a high aesthetic appeal may be able to moderate this detriment. In two experiments (N=60), the current study examined the influence of visual appeal on the learning of icon-function pairs. Icons were orthogonally varied in terms of visual complexity in E1 (simple vs. complex) and concreteness in E2 (abstract vs. concrete), as well as rated visual aesthetic appeal (appealing vs. unappealing). Participants viewed a function (e.g., "electrical loop") and clicked on the icon that correctly illustrated that function in a 9-icon array. Visually omplex and abstract icons were slower to learn compared to simple or concrete icons. Yet, aesthetic appeal moderated both the effect of visual complexity and concreteness, with faster learning for appealing icons - especially hard to learn icons, such as those that were visually complex or abstract. The results further showed that rather than a high appeal being beneficial to performance, being unappealing is particularly detrimental to performance for hard to process icons. The findings suggest that appeal or lack thereof significantly influences speeded action and learning.
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5:30-7:30 PM (1206)

The Effect of Monetary and Social Feedback on Reinforcement Learning and Reward Devaluation. KAILEIGH BYRNE and STEPHANIE SIX, *Clemson University* – Reinforcement learning research often relies on monetary feedback as rewards. Previous work suggests that social and monetary feedback elicit similar activation in reward-related brain regions (Izuma et al., 2008; Lin et al., 2011), and, therefore, reinforcement learning may elicit domain-general effects regardless of feedback type. However, it remains unclear how different types of feedback affect reliance on model-based compared to model-free learning strategies and devaluation sensitivity. Participants (N=156) in this study completed a two-stage reinforcement learning task in combination with a devaluation procedure with either monetary or social feedback. Individual differences in depressive symptoms and social anhedonia were also assessed. Results revealed that reliance on model-based or model-free strategies did not differ by feedback type.

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However, preliminary evidence suggests that devaluation sensitivity was higher when reward associations were learned from social compared to monetary feedback. This finding has implications for the strength of reward associations learned from different types of feedback and suggests that reward disengagement, or habit breaking, may be easier for social than monetary associations.
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5:30-7:30 PM (1207)

Learning Asymmetry for Win and Loss Outcome Associations. LILIAN CABRERA-HARO, *University of Michigan,* ZIYONG LIN, *Max Planck Institute for Human Development,* PATRICIA REUTER-LORENZ, *University of Michigan* (Sponsored by Patricia Reuter-Lorenz) – To understand the effects of acquired value on how we perceive, attend to, and act on stimuli, probabilistic learning tasks are used to establish associations between neutral stimuli and outcomes of different valence (wins, losses). Studies have reported differential effects of acquired value on subsequent stimulus processing; however, the question of whether initial learning of win and loss associations is equivalent has been relatively unexplored. We provide meta-analytic evidence that people learn win-associations better than loss-associations. Furthermore, we show that when win and loss outcomes occur in separate blocks, block order affects the presence or absence of a learning asymmetry. Whether or not learning is asymmetrical, a post-learning memory task indicates that explicit memory differs for win- and loss-associated stimuli. These findings have implications for studies using a similar probabilistic learning task to establish value, and they suggest differences in memory representations of stimuli associated with negative versus positive outcomes.
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5:30-7:30 PM (1208)

Common and Distinct Influences of Reward Versus Punishment on Interacting Cognitive Control and Memory Encoding Processes. SLOAN FERRON, LYNEÉ ALVES, and KIMBERLY CHIEW, *University of Denver* (Sponsored by Kimberly Chiew) – Reward and punishment motivation modulate cognition, but their effects may both overlap and diverge. These influences are usually studied within a single cognitive domain (i.e., cognitive control or memory), despite evidence that control and memory processes interact with each other, with higher control associated with improved subsequent memory for task stimuli. We examined reward and punishment influences (monetary and shock incentives, manipulated both contextually and with trial-by-trial cues) on a cognitive control task (the 'Face-word Stroop') and subsequent memory for face stimuli. Both reward and punishment improved control in the Stroop task, specifically decreasing reaction time interference. However, both reward context and cue boosted performance; in punishment, only trial-by-trial cues improved control. Surprisingly, reward did not enhance subsequent memory, while punishment did. This demonstrates both similarities and differences in reward vs. punishment effects on cognition, particularly in the timing of their effects, and potentially dissociable effects on control versus memory.
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5:30-7:30 PM (1209)

Another Glance at the Role of Semantic Processing in Value-Directed Remembering. DONALD SKINNER, REBEKAH SMITH, and REED HUNT, *University of Mississippi* (Sponsored by Rebekah Smith) – People often demonstrate better memory for more important information than less important information. One manner in which this phenomenon is studied in the laboratory is through the value-directed remembering paradigm (VDR). Within VDR people are presented a list of words arbitrarily associated with either a high or low point value. Their task is to maximize their score on an upcoming memory test by remembering as many high value words as possible. The current theoretical explanation for this effect posits that high value information disproportionately benefits from semantic processing, and this additional processing increases the likelihood of high value information being remembered. A recently published study set out to examine the validity of the explanation but did so using methods that are less typical in the VDR paradigm. The current study used methods more typical of the VDR paradigm to test the semantic engagement explanation.
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5:30-7:30 PM (1210)

Selective Memory Disrupted in Intra-Modal Dual-Task Encoding Conditions. ALEXANDER SIEGEL, *University of California, Los Angeles & University of Southern California,* SHAWN SCHWARTZ and ALAN CASTEL, *University of California, Los Angeles* – In the current study, we examined whether tasks requiring overlapping processing resources may impair the ability to selectively encode high-value information in dual-task conditions. Participants in Experiment 1 completed auditory tone distractor tasks that required them to discriminate between tones of different pitches (audio-nonspatial) or auditory channels (audio-spatial), while studying items in different locations in a grid (visual-spatial) differing in reward value. Results indicated that, while reducing overall memory accuracy, neither cross-modal auditory distractor task influenced participants' ability to selectively encode high-value items relative to a full attention condition, suggesting maintained cognitive control. Participants in Experiment 2 completed demanding color (visual-nonspatial) or pattern (visual-spatial) discrimination tasks during study. While the cross-modal visual-nonspatial task did not influence memory selectivity, the intra-modal visual-spatial secondary task eliminated participants' sensitivity to item value. These results suggest that the effectiveness of top-down, selective encoding processes is attenuated when concurrent tasks rely on overlapping processing resources.
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5:30-7:30 PM (1211)

Effect of Reward Motivation on Directed Forgetting in Younger and Older Adults. DIANE CHAO, *Southern Methodist University,* SARA GALLANT, *University of Southern California,* HOLLY BOWEN, *Southern Methodist University* (Sponsored by Holly Bowen) – An important feature of the memory system is the ability to forget, but aging is associated with declines in the ability to intentionally forget. Despite known cognitive deficits, sensitivity to affective manipulations are maintained in older age, for example, reward motivation can improve older adults' memory. Using a directed forgetting paradigm, we tested whether reward motivation could improve intentional forgetting in young and older adults. Participants

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were shown a sequence of words with instructions to remember (TBR) or forget (TBF) to earn a high ($.75) or low ($.01) reward. For older adults, there was no evidence that reward motivation improved cognitive control as high value reward anticipation did not improve directed forgetting. Instead, the findings are in line with hypotheses, that high value reward anticipation leads to better memory regardless of the TBR or TBF cue. Reward may bolster memory in an automatic fashion, overriding cognitive control of encoding processes.
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5:30-7:30 PM (1212)

Sense of Control Results in Positive Emotion. JINI TAE and CHRISTINE AN, *The George Washington University*, YOONHYOUNG LEE, *Yeungnam University,* REBECCA B WELDON, *SUNY Polytechnic Institute,* MYEONG-HO SOHN, *The George Washington University* – The current study examined whether the level of effort invested during cognitive control tasks will elicit positive or negative emotions. The experiments consisted of an association phase and a transfer phase. In Experiment 1, the association phase involved a gender Stroop task, in which a variety of posers' emotionless faces were presented in either a mostly incongruent (MI) or a mostly congruent (MC) condition. In Experiment 2, the association phase involved a task switching paradigm in which the posers' faces were presented in either a mostly switching (MS) condition or a mostly repetition (MR) condition. The same faces were presented in either a positive or negative emotion in the transfer phase. The results showed that, for the MI and MS stimuli, responses to positive faces were faster than responses to negative faces. We conclude that the sense of control in the MI and MS conditions promotes positive emotions.
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5:30-7:30 PM (1213)

Extending the Boundary? Don't Get Too Aroused. JENNA GASKINS, *Columbus State University,* MATTHEW LANGLEY, *Arizona State University,* AISHA ADAMS, *Columbus State University* – Emotional images reduce boundary extension, a memory error in which individuals remember seeing more of an image than what was actually presented (Mathews and Mackintosh, 2004). The current study aimed to replicate and extend this effect using a more traditional boundary extension paradigm and more carefully controlled stimuli that varied across dimensions of valence and arousal. Participants (n=67) viewed 60 emotional images presented either close-up or at a wider-angle. Following each image presentation, the image was presented again, and participants made a judgment. Boundary extension was measured by asking participants to indicate how the second presentation of the image looked compared to the first presentation of the image using a 5-point scale (1-much closer-up; 2- slightly closer-up; 3-the same; 4- slightly wide-angle; 5-much more wide-angle). We found that high arousal images, and not emotionally valenced images, produced less of a boundary extension error. The results of this study support the hypothesis that arousal, and not valence, influence processes necessary for the traditional boundary extension illusion.
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5:30-7:30 PM (1214)

Remembering the UK's 2016 EU Referendum: The Effects of Valence on the Long-Term Measures of a Flashbulb Memory. JASMINE RAW, ALICE RORKE, and JUDI ELLIS, *University of Reading,* KOU MURAYAMA and MICHIKO SAKAKI, *University of Reading & Kochi University of Technology* (Sponsored by Michiko Sakaki) – Emotional public events that are remembered with a greater sense of accuracy, vividness and confidence are referred to as flashbulb memories. Previous research has predominantly focused on negative public events meaning less is known about positive ones. Therefore, we examined an event that yielded both a positive and negative outcome by asking people about their memory for the results of the UK's 2016 EU Referendum. Participants included UK residents who either voted to 'leave' or 'remain' in the EU, while US residents served as controls. Data from 845 participants were assessed over the course of 16 months at four separate time points. Using growth curve modelling, we demonstrated that positive and negative emotion yielded differences in flashbulb memory measures of accuracy and confidence. Remain voters, who reported greater feelings of negative emotion, maintained greater levels of memory consistency. Meanwhile Leave voters, who reported greater feelings of positive emotion, maintained greater confidence. These results suggest that positive and negative public events are remembered differently. While negative valence enhanced memory accuracy, positive valence resulted in overconfidence.
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5:30-7:30 PM (1215)

Investigating the Replicability and Boundary Conditions of the Mnemonic Advantage for Disgust: Evidence for the Importance of Divided Attention at Encoding. JOHN WEST and NEIL MULLIGAN, *University of North Carolina at Chapel Hill* (Sponsored by Neil Mulligan) – Research has demonstrated that people remember emotional information better than neutral information. However, such research has almost exclusively defined emotion in terms of valence and arousal. Discrete emotions may affect memory above and beyond such dimensions, with recent research indicating that disgusting information is better remembered than frightening information. We initially sought to determine whether participants are sensitive to the effects of discrete emotions when predicting their future memory performance. Participants in Experiment 1 were more confident in their memory for emotional (both frightening and disgusting) images relative to neutral images, but confidence did not differ between frightening and disgusting images. However, because we did not replicate the mnemonic advantage of disgust, subsequent experiments were concerned with testing the replicability of this effect. The disgust advantage was ultimately replicated in an experiment where participants completed a concurrent secondary task at encoding. These results suggest that the mnemonic advantage for disgust may be more likely to manifest under divided attention, perhaps because the mechanisms which mediate disgust memory are relatively automatic.
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5:30-7:30 PM (1216)

Mouse-tracking as an Indication of the Impact of Implicit Memory on Approach/Avoidance Decisions. ALLISON SKLENAR, MATTHEW MCCURDY, ANDREA FRANKENSTEIN, PAULINE URBAN LEVY,

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and ERIC LESHIKAR, *University of Illinois at Chicago* (Sponsored by Andrew Mienaltowski) – Prior work has investigated the influence of explicit person memory on approach/avoidance decisions. This study investigated the impact of implicit memory on approach/avoidance decisions using a novel experimental procedure. Participants were presented with a picture of the social target's face along with a behavior sentence that implied a trait and were asked to form positive or negative impressions of each social target. Explicit memory was tested for the impressions formed earlier. Participants then made an explicit approach/avoidance decision using a mouse-click and mouse-tracking, which traced the directness of the path to the selected response and served as our implicit memory measure. Results showed that correctly remembering positive impressions was associated with subsequent approach decisions and correctly remembering negative impressions was associated with avoidance decisions. Mouse-tracking results revealed mixed findings. Results suggest more work is needed to understand implicit and explicit contributions to approach/avoidance decisions.
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5:30-7:30 PM (1217)

Sustained and Transient Reward Influences on Item and Associative Recognition Memory. AVERY GHOLSTON and KIMBERLY CHIEW, *University of Denver* (Sponsored by Kimberly Chiew) – Mesolimbic dopamine activity, associated with reward processing, operates at multiple timescales, including tonic and phasic; while corresponding effects of sustained and transient reward have been examined on cognitive control, sustained and transient reward influences on memory encoding have not been compared. Across four behavioral experiments, we used a Monetary-Incentive Encoding paradigm, manipulating incentive using a mixed block/event design to isolate sustained vs. transient reward effects on subsequent memory recognition. All four experiments tested reward incentive effects on item memory, while associative memory demands and incentives, as well as memory consolidation period, were varied across experiments. Across the four studies, transient but not sustained reward was associated with enhanced memory recognition. Reward-enhanced memory was associated with attention at encoding, and surprisingly, did not change with consolidation. These results suggest a memory benefit associated specifically with transient, not sustained reward, that may be linked to attention at encoding rather than consolidation-based mechanisms.
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5:30-7:30 PM (1218)

Students' Motivational Learning Strategies: Use and Effectiveness. CRISTINA ZEPEDA and ANDREW BUTLER, *Washington University in St. Louis* – Although many studies have examined the learning strategies that students use, relatively few studies have focused on the strategies that students use to motivate themselves to learn. Building on prior research that has identified different types of motivational strategies, this study examined student use of and beliefs about the effectiveness of six motivational strategies through a survey of 23,341 high school students. Students were asked to rate the frequency of their use and the effectiveness of six motivational strategies: mastery-approach self-talk, performance-approach self-talk, utility value self-talk, interest enhancement, self-consequating, and proximal goal setting. For each strategy, the reported frequency of use and effectiveness were highly correlated. On average, performance-approach self-talk had the highest frequency of use and was rated as the most effective strategy, while interest enhancement had the lowest frequency of use and was rated as the least effective strategy. Additional results examining individual differences will also be discussed. Together, these findings have implications for self-regulated learning theory and practical implications for interventions focusing on student learning.
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5:30-7:30 PM (1219)

Diverging Influences of Media Consumption on Emotional Responses to and Memory Representations of the 2016 U.S. Presidential Election. BAILEY HARRIS and KIMBERLY CHIEW, *University of Denver* (Sponsored by Kimberly Chiew) – The 2016 U.S. presidential election was a uniquely divisive, consequential, and heavily publicized event. Given that American media sources vary in political orientation, we investigated how reliving or rehearsing this event through media consumption shaped emotion and memories relating to the 2016 election over time. We investigated relationships between media consumption, emotion, and memories of the election, over 12 months starting in November 2016, in a U.S.-based online sample. As expected, Clinton and Trump supporters strongly differed in emotional response to election outcome: Clinton supporters reported negative affect and Trump supporters reported positive affect; both groups' emotional intensity decreased over time. Additionally, using mediation analyses, we observed that media consumption partially mediated participants' emotion, but not memory consistency or confidence, over time. These findings show that while emotion and memory are intertwined, media coverage-related rehearsal of a consequential event may shape emotional response more than memory experience itself.
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5:30-7:30 PM (1220)

Computational Accounts for Episodic Memory in Reinforcement Learning. JOHN KSANDER, *Brandeis University,* CHRISTOPHER MADAN, *University of Nottingham,* ANGELA GUTCHESS, *Brandeis University* (Sponsored by Robert Sekuler) – Episodic memory involvement in reward learning has become a recent focus in decision-making research, however this topic has proven difficult to study empirically. The existing literature features few studies and inconsistent findings. The current work provides a computational account unifying mixed results from three prior studies. In these studies, participants first learned reward-word associations through two-alternative forced choice (2AFC) tests. Participants then recalled as many words as possible. Crucially, differences in the 2AFC tests produced three qualitatively different results: high-low, U-shaped, and attenuated relationships between reward and memory. The current work explains this pattern by assuming people better remember contextually valuable experiences. That is, memory strength depends on how mnemonic information changes reward expectations. We modeled our hypothesis within a reinforcement learning framework and simulated these experiments. The model successfully reproduced all three reward-memory relationships and yielded new experimental predictions. This shows a coherent mechanism explaining how reward influences memory.
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5:30-7:30 PM (1221)

Cognitive and Metacognitive Correlates of Déjà Vu Experiences. COURTNEY AITKEN, AKIRA O'CONNOR, and INES JENTZSCH, *University of St Andrews* (Sponsored by Akira O'Connor) – Déjà vu is thought to be the result of metacognitive conflict between a subjective evaluation of familiarity and an objective evaluation of novelty. This conflict hypothesis is supported by recent neuroimaging work implicating brain areas associated with conflict monitoring and inhibitory control as underpinning déjà vu. The present study took an individual differences approach to assess the cognitive processes supporting déjà vu experiences. We tested 32 participants on three experimental tasks (an immediate-delayed judgement of learning task, Eriksen-Flanker task, and the mnemonic likelihood-cueing paradigm) to obtain performance-based indices of metacognitive monitoring, inhibitory control, and memory retrieval control. We also asked participants about their tendency to experience déjà vu. Results indicate that participants who can better monitor memory performance, show less distraction to conflict and larger regulation capabilities may experience déjà vu more often. Finally, we suggest ways in which these findings can improve our understanding of déjà vu and related memory experiences.
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5:30-7:30 PM (1222)

The Impact of Sleep Deprivation on Memory: A Meta-Analysis. CHLOE NEWBURY, REBECCA CROWLEY, KATHLEEN RASTLE, and JAKKE TAMMINEN, *Royal Holloway University of London* – A substantial number of studies suggest that sleep deprivation both before and after encoding has a detrimental effect on memory for newly learned material. However, there is no quantitative analysis of the size of these effects. We conducted two meta-analyses of studies published between 1970 and 2020 that investigated effects of sleep deprivation on memory, one for deprivation occurring before encoding and one for deprivation after encoding. We found 43 effect sizes investigating sleep deprivation before encoding, which showed that sleep deprivation impairs encoding with a medium effect size (g=0.63). However, there was evidence of publication bias, with a trim-and-fill procedure yielding an estimated g=0.45. A post-hoc power analysis found a mean power of 58% to detect the meta-analytic effect size. We found 89 studies showing a small effect (g=0.30) of sleep deprivation after encoding impairing memory. No statistically significant evidence of publication bias was found. Mean power to detect the meta-analytic effect was 12%. Our analyses suggest that sleep deprivation impacts memory, but direct replications and better powered conceptual replications are needed to enhance our ability to estimate the true effect size.
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5:30-7:30 PM (1223)

Free Recall of Grouped Lists in Younger and Older Adults. OLGA CLARKE and SIMON FARRELL, *The University of Western Australia* (Sponsored by Simon Farrell) – The present study tested a key assumption in Farrell's (2012) model of episodic memory: that temporal context is hierarchically structured. We also aimed to determine whether a contributing factor to age-related decline in episodic memory is older adults finding it more difficult to differentiate one group context from another, therefore having greater difficulty accessing group-level information (Farrell, 2012). Younger (aged 18-25) and older (aged 60+) participants were asked to complete an immediate free recall task after being presented with lists of 12 words presented as three groups of four words. There was evidence for a hierarchically structured temporal context, with recall initiation more likely from the beginning of a group, and with recall proceeding in a forward serial order. Older adults showed a particular difficulty in accessing unique groups within a list (vs. recalling further items from already accessed groups), consistent with Farrell's model.
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5:30-7:30 PM (1224)

The Effects of Anxiety on Age Differences in Free and Forced Recall. SUMMER WHILLOCK, MICHELLE MEADE, BRANDON SCOTT, and JAMIE WOOLMAN, *Montana State University* – In the present experiment, we examined the influence of anxiety on younger and older adults' memory performance across free and forced recall tasks. Older and younger adults studied categorized word lists and were randomly assigned to complete an initial recall test under free or forced recall instructions, followed by a second recall test under free recall instructions, and a final recognition test. Results show that anxiety and retrieval demands differentially impact young and older adults' memory. Younger adults with higher levels of memory-specific anxiety had lower levels of correct recognition, but only when they initially recalled under free recall instructions. In contrast, older adults with higher levels of trait anxiety had higher levels of correct recall and lower levels of false recognition, but only when they initially recalled under forced recall instructions. Younger and older adults differ in the extent to which anxiety and retrieval demands influence memory.
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5:30-7:30 PM (1225)

Investigating the Effects of Task Switch Rate on Memory Recall. LINDSAY RAIT and SARAH DUBROW, *University of Oregon* (Sponsored by Ulrich Mayr) – Change can profoundly affect memory, and our environment changes at very different rates. This study investigates how switch rate influences memory recall. Rapid switching may impair memory due to interference from previously active task sets, or memory may benefit from increased contextual variability. Here, MTurk participants (n=97) studied words while switching between two encoding tasks. We manipulated the switch frequency between the tasks to generate four switch rates. Participants performed immediate free recall as well as final free recall to assess competition between switch rates. Analysis of encoding response times showed that switch costs were present in all conditions. While there were no condition effects at immediate recall, there was a final recall benefit for words presented at an intermediate switch rate, as compared to lower and higher rates. These results suggest that there may be an optimal switch rate for memory related to our working memory capacity.
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5:30-7:30 PM (1226)

Adaptive Memory and COVID-19: Addressing the Impact of Mental Health on Current Notions of Survival Processing. KATIE-SCARLETT CHASTAIN and STEPHANIE KAZANAS, *Tennessee Technological*

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University (Presented by Stephanie Kazanas) – The survival advantage—facilitated word memory following survival-relevance ratings (Nairne et al., 2007)—replicates across a wide range of scenarios, stimuli, and memory tasks (Kazanas & Altarriba, 2015). Individual differences in these findings reveal the potential roles of age (Stillman et al., 2014) and visual imagery ability (Nouchi, 2011), but not need for cognition (Del Giudice, 2016) or sex (Brown et al., 2016; Nairne et al., 2009). The present study builds upon recent physiological evidence (Fiacconi et al., 2015) implying participants' arousal affects this advantage. We examined participants' mood using both the Beck Depression Inventory and the "state" portion of the State-Trait Anxiety Inventory. These data, collected from undergraduate students in the midst of COVID-19, emphasize a unique interplay between mental health and cognition, specifically with regards to the current salience of what it means to survive. Potential mediators for these findings are discussed.
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5:30-7:30 PM (1227)

Acoustic Short-Term Memory Retrieval: ERP and ICA Evidence for Two Subsystems. AMOUR SIMAL and PIERRE JOLICOEUR, *University of Montreal* (Sponsored by Pierre Jolicoeur) – We aimed to understand better the cognitive processes involved in retrieval from pure acoustic memory. We used an auditory Sternberg task, with three load conditions (2, 4, or 6 tones) and a control condition with no task-relevant tones. ERP results showed a large P3 component elicited by the probe when tones were encoded, but not in the control condition. With an increase in memory load, P3 amplitude decreased, accuracy was lower, and RT longer. P3 was larger when the probe matched the last tone encoded than when it matched any other tone or was absent from the memory set. This larger P3 was accompanied by shorter RT and near perfect accuracy. This difference between retrieval of the last tone encoded and that of any other was further examined by using an ICA on ERPs. We found a parieto-occipital ICA component with larger activations for probes that matched the last serial position than for earlier ones, and an anterior component that had little activation for the last serial position and large activations for all earlier ones. The results suggest that acoustic memory for pure tones is mediated by two subsystems: one encoding the last item with high probability, and another for all other serial positions.
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5:30-7:30 PM (1228)

Prior Knowledge and the Structure of Supernatural Concepts. JOSEPH SOMMER, NICOLE KING, JULIEN MUSOLINO, and PERNILLE HEMMER, *Rutgers University* (Sponsored by Pernille Hemmer) – A prominent theory in the cognitive science of religion proposes that supernatural concepts are ubiquitous in human societies because of their "minimally counterintuitive" (MCI) structure, which allows them to achieve a cognitive optimum for memorability. MCI concepts contain one or a few characteristics that violate intuitive ontological theories, making them salient, but not overly complicated. By contrast, "maximally counterintuitive" (MXCI) concepts are theorized to be less memorable than their MCI counterparts because they contain too many violations of intuitive ontological theories. However, MXCI concepts created by investigators are often inadvertently designed in a way that diminishes participants' abilities to rely on prior semantic knowledge when representing and recalling these concepts. We show that MXCI concepts generated by experimental subjects do not resemble those used in the experimental literature precisely because they are structured by prior semantic knowledge, even in a supernatural domain. We further compare the memorability of MXCI concepts that vary in the extent to which they are structured by prior semantic knowledge. Results are discussed in terms of their implications for MCI theory.
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5:30-7:30 PM (1229)

One for All: Collaborative Remembering in Ethnically Uniform and Diverse Group Settings. NICHOLAS PEPE, *Stony Brook University,* QI WANG, *Cornell University,* SUPARNA RAJARAM, *Stony Brook University* – Despite a prevalence of ethnically diverse versus uniform groups in everyday collaborations, extant research has not addressed the effects of ethnic diversity on collaborative memory. We compared these groups to examine three key phenomena: 1) the counterintuitive effect known as collaborative inhibition, 2) the more intuitive, downstream memory benefits of collaborative recall, and 3) emergence of collective memory. We also examined source memory of former collaborators. Collaborative inhibition and collective memory were found comparable between ethnically Diverse triads (one Asian, Black/African American, white each) and Uniform triads (three white members). At the same time, in diverse groups Black/African American members recalled less during collaboration and did not show post-collaborative recall benefits. Ethnicity differences did not emerge within nominal diverse groups, suggesting for the first time the negative impact of stereotype threat in collaborative remembering. Uniform groups exhibited better source memory, suggesting homophily. Our findings have applied relevance for groups in academic and workplace settings.
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5:30-7:30 PM (1230)

Recall and Word Type Effects Depend on Intentional/Incidental Learning Strategies. SHELBY BREWER, SARAH JONES, MASON QUINN, and STEPHANIE KAZANAS, *Tennessee Technological University* (Presented by Stephanie Kazanas) – Word processing differences according to word type are well-documented, with researchers demonstrating differences across concrete, abstract, and emotion words. These differences replicate across numerous paradigms and tasks. Recent findings suggest an additional word type distinction, between emotion and emotion-laden words. In one example, El-Dakhs and Altarriba (2019) showed how these word type differences affect recall when participants encoded a list of words under intentional learning conditions. The present study extended these findings with an additional manipulation comparing word recall for concrete, abstract, emotion, and emotion-laden words, when participants encoded these words under either incidental or intentional learning conditions. Results were then compared across positive and negative words, taking into account participants' current mood, as measured by both the Beck Depression Inventory and 'state' portion of the State-Trait Anxiety Inventory.
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5:30-7:30 PM (1231)

A Direct Replication of Popp and Serra (2016, Experiment 1): Better Free Recall and Worse Cued Recall of Animal Names than Object Names. ERIC MAH, ALISON CAMPBELL, COLE TAMBURRI, KELLY GRANNON, and STEPHEN LINDSAY, *University of Victoria* (Sponsored by Stephen Lindsay) – Free recall performance tends to be better for animate stimuli (e.g., animals) than inanimate stimuli (e.g., objects; VanArsdall, Nairne, Pandeirada, & Blunt, 2013). Popp and Serra (2016) replicated this "animacy effect" in free recall of individual words but obtained a "reverse animacy effect" when participants studied animate-animate and inanimate-inanimate words pairs and were tested with cued recall. That is, cued recall was better for inanimate targets than animate targets. Using the Popp and Serra materials, we conducted a preregistered direct replication in a sample of N=101 undergraduate students. Like Popp and Serra, we observed an animacy effect for free recall and a reverse animacy effect for cued recall. Unlike Popp and Serra, we found that controlling for interference effects (i.e., same-category commission errors) rendered the reverse animacy effect non-significant. We take this as evidence that characteristics of the stimulus sets (e.g., category structure, within-category similarity) may play a role in animacy and reverse animacy effects. Participants also answered post-test questions about their experience during the memory tests, with responses indicating partial meta-memorial awareness of animacy effects.
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5:30-7:30 PM (1232)

Dynamic Associative Memory in ACT-R: From Short-term to Long-term Memory. JOSEPH GLAVAN, *Wright State University*, JOSEPH HOUPT, *University of Texas at San Antonio* (Sponsored by Joseph Houpt) – We propose extensions to the ACT-R cognitive architecture that generalize the Glavan and Houpt model of working memory to explain long-term memory formation and retention. The model is inspired by models of time-based resource-sharing and context-based retrieval. In the spirit of spreading activation, we allow activation to be shared among items in memory, which increases the efficiency of attentional refreshing and allows groups of memories to be quickly reactivated. Furthermore, we implement associative learning in ACT-R based on a theory of causal induction, which permits the model to learn the connections between items that promote long-term retention. Collectively, the new additions to the architecture allow the model to explain the cognitive load effect and a transition from context-dependent representations to context-invariant associations over the lifetime of memories. We present the results from a simulation study examining recall in a complex span task and subsequent delayed test. We compare the model's performance to archival human data, and discuss the model's predictions for a novel experimental paradigm.
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5:30-7:30 PM (1233)

Odor Serves as a Reliable Cue for Context Reinstatement. DUSTIN FINCH and DEBORAH EAKIN, *Mississippi State University* (Sponsored by Deborah Eakin) – Odor can reliably produce context effects when a recovery method prevented habituation to the studied odor (Isarida et al., 2014). However, Isarida et al., (2014) allowed for other environmental cues to potentially influence context reinstatement. We tested whether odor could reinstate context for a list of words in the absence of other environmental cues. In Experiment 1, same/different odors were presented in separate study/test rooms with sparse environmental context. On a free-recall test, memory for a list of unrelated words was better when the odor matched at study/test than when it did not. In Experiment 2, context reinstatement effects were not obtained when odor was eliminated as a cue. Taken together these results show that odor alone is a reliable cue to reinstate context. Memory was better when the study and test odor context matched than when they were different.
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5:30-7:30 PM (1234)

Enhancing Memory using Enactment: Does Meaning Matter in Action Production? YADURSHANA SIVASHANKAR and MYRA FERNANDES, *University of Waterloo* – Enactment is an encoding strategy in which physically performing an action related to the to-be-remembered item enhances its memory. Precisely how this motor activity aids recall is unclear. We examined whether the motoric representation created during encoding needed to be semantically relevant to the to-be-remembered target item, to confer a memory benefit. In Experiment 1, 30 participants were asked to either a) enact, b) passively read, or c) perform unrelated motoric gestures, to forty-five visually presented action verbs shown sequentially, and intermixed during encoding, in a within-subjects design. On a subsequent free recall test memory for enacted words was significantly higher relative to words read, or encoded with unrelated gestures, during encoding. In Experiment 2, to reduce the onset time for initiating unrelated gestures, participants pretended to write target words in the air on 'unrelated gesture' trials. Results were similar to Experiment 1. In Experiment 3 we replicated these findings again, even when data collection was completed using online video-conferencing. These findings show that motoric action alone is not sufficient to produce an enactment effect; integration with semantics drives the benefit.
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5:30-7:30 PM (1235)

Naturalistic, Memory-Based Active Function Learning. RUSSELL RICHIE, LISHENG HE, and SUDEEP BHATIA, *The University of Pennsylvania* – A popular account of human active learning is the Optimal Experimental Design (OED) hypothesis, according to which people ask questions that will enable them to learn most efficiently. However, much work on OED examines learning about highly artificial stimuli, as representing the entities that people learn about in the real world has traditionally been difficult. To address this, we introduce a naturalistic, memory-based active function learning task, where participants query different lexical items of a category (e.g., foods) and receive feedback on items' scores, which depend on a linear function of the word2vec embedding for an item. We present a query model that combines classic models of free recall with models of optimal search, and can parameterize individual question-asking tendencies in terms of model parameters. Overall, participants' queries were suboptimal and were largely constrained by availability due to semantic similarity and word frequency. However, when participants did generate more optimal queries, they tended to perform better at test. Further, the effect of similarity on query generation seems not to be suppressed or boosted in ways predicted by task demands, which we show in two preregistered studies.

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5:30-7:30 PM (1236)

A Test of Retrieved Context Theory: Dynamics of Recall After Incidental Encoding. ABIGAIL DESTER, LINH LAZARUS, MITCHELL UITVLUGT, and M. KARL HEALEY, *Michigan State University* (Sponsored by M. Karl Healey) – The temporal contiguity effect (TCE) is the tendency for the recall of one event to cue recall of other events originally experienced nearby in time. Retrieved Context Theory proposes the TCE results from fundamental properties of episodic memory: binding of events to a drifting context representation during encoding and the reinstatement of those associations during recall. If these processes are automatic, a TCE should occur regardless of encoding intentionality. Recent findings that the TCE is dramatically reduced under incidental encoding, while memory accuracy is modestly reduced, may challenge this theory. In the present study, subjects intentionally or incidentally encoded a list of 12 words. A TCE was observed in all conditions, although the effect was dramatically reduced in incidental encoding. A series of simulations demonstrated the theory can account for overall recall and temporal contiguity in incidental encoding. Further, context drift and reinstatement are both necessary components of this account.

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5:30-7:30 PM (1237)

The Effect of Spontaneous Reminding on Recall of Sound and Picture Pairs. HEATHER RAWLINSON and COLLEEN KELLEY, *Florida State University* (Sponsored by Colleen Kelley) – Reminding during learning has been found to be an important element in later recall of an item, however, there is still much to learn about what triggers these remindings. Berntsen, Staugaard, and Sorensen (2012) studied spontaneous remindings triggered by sounds in sound-picture pairs, but spontaneous reminding can also occur in a deliberate study task. We extend the paradigm used by Berntsen and colleagues by using sound and picture pairings to test how repeating two cues (a repeated sound paired with five exemplars from the same category) and repeating one cue (the same sound paired with five exemplars from different categories) affect how often participants were reminded of previously seen sound and picture pairs while they were studying compared to control pairs where neither the sound nor the category was repeated, and whether those remindings led to greater subsequent memory for the sound-exemplar pairs. The results showed that having two repeated cues triggered significantly more reminding compared to the control condition and that the occurrence of these remindings was a significant predictor of later recall, suggesting that reminding is important even in situations where cue overload might reduce recall.

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5:30-7:30 PM (1238)

Survival Processing: Are Creative Individuals More Adaptive? MARY AVERY and JEANETTE ALTARRIBA, *University at Albany, SUNY* – The survival processing advantage is a robust mnemonic device in which information processed for its relevance to one's survival is subsequently better remembered (Nairne et al., 2007). Research indicates that divergent thinking and elaborative processing may be key components underlying this memory effect, whereby words with a greater number of uses in a given scenario are better remembered (Wilson, 2016). If this particular function underpins adaptive memory, then individual differences in creativity may play a part in the degree to which people benefit from this advantage. We expected that highly creative individuals who engage more in divergent thinking will benefit to a greater degree. In this between-subjects experiment, participants rated words according to their relevance to the typical grasslands survival scenario or according to their pleasantness (a control common to the survival paradigm and known to enhance memory). While we did find a main effect of both condition (survival vs. pleasantness) and creativity (high vs. low), there was no interaction. This leads to the conclusion that creative individuals may not benefit to a greater degree in survival processing, despite their ability to think divergently.

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5:30-7:30 PM (1239)

Higher Semantic Ambiguity Leads to Better Recall in Addition to Higher Semantic Intensity. MINYU CHANG and CHARLES BRAINERD, *Cornell University* (Sponsored by Valerie Reyna) – According to the emotional ambiguity hypothesis (Brainerd, 2018; Mattek et al., 2017), the memory effects of valence intensity may depend on valence ambiguity (uncertainty of perceived valence intensity). Evidence was recently reported showing that increasing valence intensity (measured as mean valence) and valence ambiguity (measured as SD valence) can both lead to better recall for words. The current study is aimed at investigating whether the ambiguity effect on memory can be generalized to non-emotional semantic attributes. In the first experiment, we factorially manipulated the intensity (mean) and ambiguity (SD) of word concreteness. in the second experiment, we factorially manipulated the intensity (mean) and ambiguity (SD) of word categorizability. In both experiments, we found parallel recall improvements for high-intensity relative to low-intensity words and for high-ambiguity relative to low-ambiguity words. These results suggest that semantic ambiguity is generally good for recall, in contrast with the traditional view of ambiguity as measurement error. Fuzzy-trace theory's dual-retrieval model is used to analyze the recall data and to provide a process account of the semantic ambiguity effect on recall.

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5:30-7:30 PM (1240)

The Effect of Targeted Memory Reactivation on Generalisation in Language Learning. REBECCA CROWLEY, CHLOE NEWBURY, KATHLEEN RASTLE, and JAKKE TAMMINEN, *Royal Holloway, University of London* (Sponsored by Jakke Tamminen) – Targeted memory reactivation (TMR) during sleep strengthens episodic memory, but its role beyond this is less understood. We tested the impact of TMR on learning and generalisation of artificial orthography. Adults (N=24) learned to read fictitious words constituting one new letter that mapped onto two vowel sounds (b#v pronounced /bev/ and n#d pronounced /nid/) during training. Each word was paired with an image. Half of the trained words were cued auditorily during subsequent non-REM sleep. For each new letter, only one of the two letter-to-vowel mappings was cued (b#v but not n#d). Testing occurred immediately and one week after sleep. We predicted that cueing would benefit episodic memory such that

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(1) cued words would be recalled and read more accurately than uncued words, and (2) recognition memory for cued word meanings would be better than for uncued word meanings. We also predicted that if TMR promotes generalisation of letter-to-vowel mappings, participants would use cued letter-to-vowel mappings when reading untrained words (read d#f as /def/ rather than /dif/). No cueing benefits were found in any task. We suggest that cueing one element of a memory (spoken form) may not cue associated elements (spelling or meaning).
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5:30-7:30 PM (1241)

Sleep Reduces the Semantic Coherence of Memory Recall: An Application of Latent Semantic Analysis to Investigate Memory Reconstruction. XUEYING REN and MARC COUTANCHE, *University of Pittsburgh* (Sponsored by Marc Coutanche) – Sleep helps consolidate hippocampus-dependent memories by reactivating previously encoded neural representations, promoting changes in memory representations. However, the qualitative nature of changes induced by sleep remains largely uncharacterized. We investigated how memories are reconstructed by hypothesizing that semantic coherence, defined as conceptual relatedness between statements of free recall texts, will be affected by sleep. Videos featuring six animals were presented to 115 participants randomly assigned to either 12- or 24-hour delay groups featuring sleep or wakefulness. Participants' free recall responses were analyzed using latent semantic analysis to measure two types of semantic coherence: sequential semantic coherence (SSC), which represents the conceptual similarity between adjacent sentences within a free recall text; and topic semantic coherence (TSC), which represents the conceptual similarity between all sentences. Both forms of coherence were significantly reduced in free recall following sleep, compared to following wakefulness. These findings support the notion that sleep-dependent consolidation qualitatively changes the features of reconstructed memory representations by reducing semantic coherence.
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5:30-7:30 PM (1242)

Predicting Memorability with Distributed Semantic Representations. ADA AKA, SUDEEP BHATIA, and JOHN MCCOY, *University of Pennsylvania & The Wharton School, University of Pennsylvania* (Sponsored by Sudeep Bhatia) – What makes something memorable? We develop a model that uses high-dimensional semantic representations, derived from natural language data, to understand and predict word memorability. Specifically, our model predicts how likely people are to recall and recognize different words. Using leave-one-out cross validation on existing data giving participant recall and recognition of 576 words, our model predicts how likely words were to be recalled (r= 0.70, 95% CI = [0.656, 0.739]) and recognized (r= 0.50, 95% CI= [0.43, 0.563]). In two studies, we had new participants predict the recallability and recognizability of these words. Our semantic representation model outperforms both these human predictions and the predictions of an alternative model that uses only psycholinguistic word properties such as concreteness. We analyze the information in the word embeddings used by our model to better understand what determines whether people recall or recognize particular words. Overall, we provide evidence that distributed semantic representations are a powerful tool for predicting word memorability and understanding its psychological underpinnings.
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5:30-7:30 PM (1243)

Better Memory for Symbols than Words: A Role for Visual Imagery. BRADY ROBERTS, COLIN MACLEOD, and MYRA FERNANDES, *University of Waterloo* (Sponsored by Peter Dixon) – Dual-coding theory (Paivio, 1969) proposes that memory encoding can operate via two pathways: verbal and visual imagery. According to dual-coding theory, pictures lead to enhanced memory relative to words because pictures are encoded with both a verbal label and rich visualization, whereas words have only the verbal label. The current research investigated whether common symbols (e.g., !@#$) are processed like words or like pictures. That is, we asked: Are symbols afforded a verbal trace akin to words, or do they also invoke visual imagery like pictures? Participants were asked to remember symbols or their word counterparts (i.e., $ or "dollar"). We hypothesized that if symbols are indeed processed using imagery, then they should be better recalled than words. Across two experiments, memory was better for symbols than words, suggesting that symbols, like pictures, allow for creation of two distinct representations: verbal and non-verbal.
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5:30-7:30 PM (1244)

The Forward Testing Effect: Generalized Effect or a Reduction of Proactive Interference? MONIQUE CARVALHO and HARVEY MARMUREK, *University of Guelph* (Sponsored by Harvey Marmurek) – The forward testing effect is an improvement in the recall of a novel list when initially tested on a prior list compared to re-studying (Cho et al., 2017). In an early example of the forward testing effect, Tulving and Watkins (1974) proposed that prior testing of an A-B list insulated the learning a second A-D list from proactive interference. The present experiment was designed to test whether the forward testing effect is due to an item-specific reduction in proactive interference or to a generalized effect of testing. We compared the effect of testing versus re-study of the first list on immediate recall of the second list where the successive lists bore either a negative transfer relation (A-B, A-D) or no relation (A-B, C-D). We found a significant forward testing effect, $F(1, 100)= 5.819$, $p= .018$. There was no significant effect of list relation, and there was no significant interaction between task following the first list and list relation. Those results are consistent with a generalized benefit of testing
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5:30-7:30 PM (1245)

Mitigating the Testing Effect: The Impact of Reminding During Restudy. PARKER SORENSON and COLLEEN KELLEY, *Florida State University* (Sponsored by Colleen Kelley) – The current experiments explore whether being reminded of an original learning experience is sufficient to mitigate the testing effect by increasing performance in the restudy condition. The testing effect, or the greater recall of information at a final test for tested over restudied information during restudy, is highly robust. However, being reminded of a prior learning experience also results in increased performance on items that are recognized and may induce similar processes as being tested. Across several experiments

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the cues available during restudy are manipulated to determine whether increasing the likelihood of reminding reduces the testing effect to a greater degree than when fewer cues are present during restudy.
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5:30-7:30 PM (1246)

The Influence of the Number of Part-Set Cues on Retention. SARA MARTINEZ GUZMAN, DENIZ AKPINAR, TRACEY NASSUNA, MADISON STEVENS, VAUGHAN BAMFORD, and MATTHEW KELLEY, *Lake Forest College* (Presented by Matthew Kelley) – In the part-set cueing literature, on cued trials, researchers typically have provided half of the to-be-remembered items as cues at test. Until recently, relatively little had been known about the influence of the number of part-set cues on retention. Kelley et al. (2020) explored the effects of the number of cues on order retention. On a reconstruction of order task, part-set cueing facilitation was evident as soon as about 20% of the list was provided as cues and the magnitude of facilitation increased as the number of cues increased. On a serial recall test, part-set cueing facilitation was only evident when 30-50% of the list was provided as cues. On free recall tests, we only have hints from Slamecka's (1968) original study that used 5, 15, 25, or 29 cues (out of 30 words), which seemed to show increasing part-set cueing impairment. In the present study, multiple experiments explored the boundary conditions of part-set cueing in free recall with either very few cues (2, 3, 4) or very many cues (27, 28, 29). Results indicated significant part-set cueing impairment with very many cues, but no influence of part-set cues with very few cues (null effects). Implications will be discussed.
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5:30-7:30 PM (1247)

Does Collaboration Help or Hurt Recall? The Answer Depends on Working Memory Capacity. AUDREY HOOD, SUMMER WHILLOCK, MICHELLE MEADE, and KEITH HUTCHISON, *Montana State University* – We examined the role of working memory capacity (WMC) on collaborative inhibition (reduced recall in collaborative groups vs. nominal groups). Participants completed three shortened span tasks and then recalled categorized word lists alone or with a partner (Test 1), followed by an individual recall (Test 2). For correct recall, collaborative inhibition was greater among lower WMC individuals and they showed no post collaborative benefits. Only higher WMC individuals benefitted from prior collaboration. For false recall, collaboration reduced errors on Test 1 for both lower and higher WMC individuals, but there were no lasting effects of collaboration on Test 2 errors. Furthermore, partner WMC influenced recall. On Test 2, participants had less false recall when their partner was higher in WMC, and greater correct recall when both they and their partner were higher in WMC. Collaboration is relatively more harmful for lower WMC individuals and more beneficial for higher WMC individuals.
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5:30-7:30 PM (1248)

Optimal Behavior in Free Recall. QIONG ZHANG, KENNETH NORMAN, and THOMAS GRIFFITHS, *Princeton University* – There is rich structure in the order in which studied material is recalled in a free recall task (Howard & Kahana, 2002). Much of the work in this area has sought to understand the processes and representations that give rise to these patterns; however, it remains unclear why certain types of recall organization arise in the first place. In the current work, we provide a rational analysis of the free recall task, by deriving the optimal policy under the internal representations and processes of memory search described by the Context Maintenance and Retrieval (CMR) model of memory search (Polyn, Norman, & Kahana, 2009). We show that the optimal behavior in free recall is to start the recall from the beginning of the list and then sequentially recall forwards, providing a rational account of the primacy and forward asymmetry effects typically observed in free recall. Predictions from the rational model are confirmed in human behavioral data: Top human participants demonstrate stronger primacy and forward asymmetry than the rest of the participants, and there is no forward asymmetry in participants with difficulty disengaging from the end-of-list context during recall initiation.
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5:30-7:30 PM (1249)

Deceitful Hints: A Meta-Analytic Review of the Part-Set Cueing Deficit in Recall. NICHOLAS PEPE, ANNE MOYER, TORI PEÑA, and SUPARNA RAJARAM, *Stony Brook University* (Sponsored by Suparna Rajaram) – A large body of research in the study of memory has accumulated on the part-set cueing deficit in recall. This phenomenon refers to lower recall of studied information in the presence of some studied words provided as retrieval cues compared to when no cue is provided. We report a meta-analysis in which we utilized the procedural and statistical information obtained from more than 100 samples. In each experiment, participants studied a list of words and subsequently performed a recall task either in the presence or absence of part-set cues. Results indicate that, in general, the part-set cue deficit is a robust medium-sized deficit that is not significantly sensitive to a vast majority of procedural factors of interest. The analyses also demonstrate that researchers should anticipate an effect size of greater magnitude in between-subjects rather than within-subject designs, and that longer retention periods between study and retrieval reduce the magnitude of the part-set cue deficit in recall. The results of this meta-analysis are discussed in relation to elements of experimental design, the findings of past literature, as well as the underlying theoretical mechanisms proposed to account for this deficit in recall.
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5:30-7:30 PM (1250)

The Effect of Retrieval on Learning New Information: Evidence from Retrieval Mode and Impression Formation. ANA LAPA and LEONEL GARCIA-MARQUES, *Universidade de Lisboa* (Sponsored by Leonel Garcia-Marques) – Our ability to memorize new information is impaired when we retrieve information compared to when we restudy it (Finn & Roediger, 2013). However, when we memorize information, we seem to engage fewer relational processes than when we form impressions about others (Hamilton, Katz, & Leirer, 1980). Thus, we wondered if forming impressions would protect against the impairment retrieval has on the ability to learn new information. Across two experiments, we adapted Finn and Roediger's paradigm and asked participants to form impressions or to memorize a set of stimuli. Later, participants were asked to retrieve or to restudy the material and were presented with new information to

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integrate in their impressions or to memorize. In a final memory test, we found that engaging in retrieval mode – under memory instructions – impaired learning of new information compared to restudy, in line with previous findings. Yet, forming impressions protected against this impairment.
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5:30-7:30 PM (1251)

The Testing Effect: A Test of the Mediator Effectiveness Hypothesis. DONNELLE DIMARCO and HARVEY MARMUREK, *University of Guelph* (Sponsored by Harvey Marmurek) – The testing effect refers to the benefit of a retrieval attempt relative to further studying on a later memory test. Carpenter (2011) proposed that retrieval tests lead to the creation of mediating links between the retrieval cue and the target. In a test of the mediation hypothesis, participants studied weakly associated cue-target pairs (e.g., mother: child) followed by either a cued-recall test (e.g., mother---?) or further re-study. In a final cued-recall test, extra-list cues words strongly associated with the original cue (e.g., father) were compared to cues weakly related to the target (e.g., birth). Two findings supported the mediator hypothesis: (1) the mediator cue led to better recall than target-related cues; and, (2) the testing effect was stronger for the mediator cue. The current study compared the effectiveness of mediator cues with extra-list cues more strongly associated with target words (e.g., baby). Recall for related and mediator cues was equivalent in the test condition, but recall was higher for related cues than for mediator cues in the re-study condition. The results suggest that the testing effect is not dependent on the superior effectiveness of semantic mediators.
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5:30-7:30 PM (1252)

Exploring the Role of Delay in Retrieval-Induced Facilitation. MERCEDES OLIVA and BENJAMIN STORM, *University of California, Santa Cruz* – Under certain conditions, the retrieval of some information can cause the facilitation of other information, a phenomenon known as retrieval-induced facilitation. Chan (2009) proposed two moderating factors to account for why retrieval induces facilitation in some situations and forgetting in others: inter-item integration, and the delay between retrieval practice and final test. Chan found that facilitation occurs when materials are well-integrated and when the final test occurs after a long delay (i.e., 24 hours). In two experiments, we replicated and extended Chan's study by comparing retrieval-induced facilitation following various delays (24 hours, 1 week, and 2 weeks), and by examining the consequences of relearning following retrieval-induced facilitation. Preliminary results suggest that the facilitation effect – though somewhat reduced compared to that observed by Chan – can persist after longer delays and despite relearning via feedback, findings that have important theoretical and applied implications for understanding the mechanisms and consequences of retrieval-induced facilitation.
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5:30-7:30 PM (1253)

Does Testing Potentiate New Learning that is Equal to, or Greater than, Initial Learning? Evidence for Resource Depletion Accounts. SHAUN BOUSTANI and CALEB OWENS, *University of Sydney* (Sponsored by Sally Andrews) – Previous testing can potentiate greater new learning of subsequently presented materials than restudy (TPNL). When using integrated expository texts, earlier research has indicated that learning following testing is greater than original learning (Wissman, Rawson, & Pyc, 2011). This finding is important to resource theories of TPNL which argue that the effect is produced by retrieval practice sustaining initial levels of cognitive resources across trials, whereas restudy expends those resources. However, the expository materials utilised in Wissman, et al (2011) limits the generalisability of the results as those materials would naturally benefit from increased original learning and inter-section integration. The current study aimed to conceptually replicate this research and examined the degree of original and new learning using lists of unrelated words. In two experiments it was found that retrieval did not promote new learning to a greater degree than initial learning and maintained performance across several trials. It was also found that restudy tasks negatively impacted new learning, but this was not due to increased proactive interference. The implications of these results for resource depletion accounts are discussed.
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5:30-7:30 PM (1254)

Post-Error Effect during Errorful Learning: The Benefit of Experiencing Errors Extends to the Next Study-Item. YERAY MERA, MALEN MIGUELES, and EUGENIA MARIN-GARCIA, *University of the Basque Country* – Experimental evidence has shown that making errors during learning, if it is followed by corrective feedback, improves long-term memory. This is referred as "learning from errors" effect. When an error is experienced during learning, the mismatch between the errorful-response and the actual correct answer enhances attention, which improves feedback processing. Our study aimed to explore whether this attentional rise produced by experiencing an error benefited the encoding of the following study-item as well (Post-Error item). The experimental procedure included a study session of word-pairs, an initial cued-recall test followed by feedback, and a final cued-recall test. Results showed that correct recall at final test was significantly higher for Post-Error items at initial test than for Post-Correct items. And this difference was greater for items that were an error during initial test. Thus, there was a cumulative beneficial effect of the Post-Error item and the error experience of the item itself.
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5:30-7:30 PM (1255)

Levels of Retrieval and the Testing Effect. NINGXIN SU, *Beijing Normal University,* ZACHARY BUCHIN and NEIL MULLIGAN, *University of North Carolina at Chapel Hill* (Presented by Zachary Buchin) (Sponsored by Neil Mulligan) – Retrieval can enhance subsequent memory more than restudy (i.e., the testing effect), demonstrating the encoding (or re-encoding) effects of retrieval. It is important to delineate the nature of these effects of retrieval especially in comparison to traditional encoding processes. The current study examined if the level of retrieval, analogously to the level of processing at study, has an effect on later memory. In four experiments, participants learned multiple short lists of words (phase 1) before taking a final free recall test (phase 2). In phase 1, words were studied and then either retrieved or restudied with a semantic or phonemic cue. Level of retrieval (and restudy) was manipulated either between-subjects (Experiment 1) or within-subjects (Experiment 2). Experiment 3

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sought to enhance the levels effect by adding an overt judgment task and Experiment 4 ruled out an alternative account of the absence of a levels-of-retrieval effect by increasing list length. In each experiment, there was a robust testing effect that was not moderated by level of retrieval, a result supported by a small-scale meta-analysis demonstrating an overall effect of levels (semantic > phonemic) and review (retrieval > restudy), but no interaction.

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5:30-7:30 PM (1256)

Comparing How Self-Efficacy and Judgments of Learning Relate to Memory Performance. ANDREA FRANKENSTEIN, LAUREN MOZEN, ALLISON SKLENAR, PAULINE URBAN LEVY, and ERIC LESHIKAR, *University of Illinois at Chicago* (Sponsored by Eric Leshikar) – Our previous work has shown a significant positive relationship between self-efficacy (i.e., a social-cognitive construct of an individual's belief or confidence in their ability to accomplish a task) and memory, where memory performance on a final test is related to self-efficacy reports. Such a relationship may be important for a variety of outcomes, including academic performance. It may be possible, however, that self-efficacy is conceptually related to judgments of learning (JOLs) because both of these measurements (self-efficacy, JOLs) are meta-cognitive in nature and seek to measure the extent to which individuals believe they can accomplish a task or accurately respond to items. To more fully vet the relationship between self-efficacy and memory, and to potentially distinguish the concept of self-efficacy from that of JOLs, we investigated whether self-efficacy and JOL ratings differentially relate to memory performance. Results showed that both self-efficacy and JOL ratings had similar relationships to final memory performance, suggesting potential overlap in processes associated with these social-cognitive (self-efficacy) and cognitive (JOL) constructs.

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5:30-7:30 PM (1257)

Wisdom of the Crowd? Testing Effects for Self-Generated Versus Peer Generated Questions. FELICITAS BIWER, *Maastricht University,* WISNU WIRADHANY, *Binus University,* MIRJAM OUDE EGBRINK and ANIQUE DE BRUIN, *Maastricht University* (Sponsored by Anique de Bruin) – Teachers often recommend using practice testing as an effective learning strategy to improve long-term retention and metacomprehension ability. However, practice questions for students are rarely provided. In two experiments, we test the efficacy of self- and peer-generated questions on expository text retention. In Experiment 1, students either answered self-generated questions (n=46), experimenter-provided questions (n=45) or reread the text passages (n=47). No difference was found between conditions regarding factual and conceptual knowledge retention. However, students in the experimenter-generated question condition increased their metacomprehension accuracy, while both the rereading and self-generated question condition overestimated their performance. In Experiment 2, the self-generated questions condition will be replaced with a peer-generated questions condition, to ensure homogeneity and quality of the questions. Additionally, we will decrease the delay between practice and test to reduce the decay effect of fact retention over time. We expect peer-generated questions to be comparable in retention to experimenter-provided questions.

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5:30-7:30 PM (1258)

Using Flashcards with a Partner: Benefits for Metacognition and Study Efficiency. MEGAN IMUNDO, INEZ ZUNG, and STEVEN PAN, *University of California, Los Angeles* – Undergraduates use flashcards for exam preparation (Wissman et al., 2012), which follows researchers' recommendations to use flashcards (e.g., Smith & Weinstein, 2016) to facilitate beneficial self-testing (e.g., Karpicke & Roediger, 2008). UCLA students (n=152) learned difficult vocabulary-definition pairs using flashcards either individually or with a partner. Immediately afterwards, they answered a survey and took a cued-recall test. Those that used flashcards individually overestimated their future test performance by 20%, whereas that did so with a partner, on average, accurately predicted their future test performance (though overall recall performance was comparable between conditions). Survey responses also revealed that paired learners dropped flashcards less often and gained more memory benefits per learning cycle than individual learners. These results suggest that, though studying alone versus with a partner does not impact immediate test performance, studying with a partner can improve metacognitive accuracy and discourage ineffective study decisions (e.g., prematurely dropping flashcards). These findings have important implications for students that need to self-regulate their learning when preparing for exams.

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5:30-7:30 PM (1259)

How Do Students Learn How to Learn? The Role of Testing and Feedback. MORGAN SHUMAKER, CATHERINE MIDDLEBROOKS, and KATHLEEN ARNOLD, *Radford University* (Sponsored by Kathleen Arnold) – Students, especially with the recent transitions to an online learning environment, are often expected to learn on their own with little direct guidance from their instructors. They also frequently have more to read and study than they have time available and must prioritize their work. How do students learn to study under such time constraints in a way that will maximize their exam scores? Prior research has shown that students can learn to prioritize the most important information (i.e., the items of highest value) when studying multiple word lists and receiving a test with feedback after each list (Middlebrooks, Murayama & Castel, 2016). Our study investigated the unique roles of both testing and feedback on helping students learn to study more strategically. Specifically, we investigated whether multiple tests and/or consistently provided feedback is necessary to facilitate strategic learning, or if task experience is enough.

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5:30-7:30 PM (1260)

Does Generating an Error During Learning Affect Cue-Target Associations? STEPHANIE SORIANO-CRUZ, DANIEL MORRIS, YINING LU, and JASON ARNDT, *Middlebury College* (Presented by Jason Arndt) – Generating a target response from a cue enhances learning of cue-target associations, even when the initial generation attempt produced the wrong target (Kornell, et al 2009). Explanations of this effect have speculated that correct target responses are strengthened following feedback, while competing, but incorrect, responses are inhibited. We

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investigated this hypothesis by having participants either study cue-target pairs or generate a target word from a cue word, after which they were given the correct to-be-learned target. Following encoding, participants were given a free association task in which they were provided with the to-be-learned cue-target pair and were instructed to generate a different target word than the one presented as quickly as possible. The results showed that participants were faster to generate a novel target when they had studied a cue previously, but that generating a target during encoding did not facilitate novel target generation compared to reading cue-target pairs during encoding. This finding contradicts the hypothesis that generating an incorrect guess that is later corrected weaken associations between cues and plausible, but incorrect, target responses.
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5:30-7:30 PM (1261)

Memory Testing Enhances New Learning but Does not Affect Performance in Subsequent Arithmetic Tasks. BERNHARD PASTÖTTER and CHRISTIAN FRINGS, *University of Trier* – The forward testing effect (FTE) refers to the finding that retrieval practice of previously studied information enhances retention of subsequently studied other information. Two experiments were conducted that examined whether benefits of testing also arise for performance in subsequent arithmetic tasks. Participants studied three lists of items in anticipation of a final recall test. In the testing condition, participants were tested on lists 1 and 2 after initial study, whereas in the restudy condition, they restudied lists 1 and 2. In both conditions, after study of list 3, participants did a first block of arithmetic tasks, were tested on list 3, and did a second block of arithmetic tasks. Different arithmetic tasks were used in the two experiments. Participants solved modular arithmetic problems in Experiment 1 and were tested on multiplication tables in Experiment 2. The results of both experiments showed an FTE, with interim testing of lists 1 and 2 enhancing list 3 recall and reducing prior list intrusions. In contrast, no benefits of interim testing on participants' performance in the subsequent arithmetic tasks were observed. The findings suggest restrictions regarding the generalizability of the FTE to other tasks.
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5:30-7:30 PM (1262)

Sleep Moderates the Testing Effect: Evidence for Retrieval as a Rapid Consolidation Event. CARISSA DIPIETRO, JESSICA PAYNE, and JOSHUA KOEN, *University of Notre Dame* – Testing is conventionally understood as a way of assessing learning. However, a great deal of evidence suggests testing also facilitates learning (e.g., "the testing effect"). Students are more likely to remember studied information that is subsequently tested compared to simply re-studying the material, though the mechanism underlying this effect remains unclear. Sleep also benefits memory via consolidation processes for material studied before sleep. In this study, we examined sleep as a moderator of the testing effect. Participants first read 15 passages. Next, across two 10-minute sessions, participants engaged in retrieval practice for five passages using multiple-choice questions or simply re-read the five passages. After a 12-hour delay spanning nocturnal sleep or daytime wakefulness, participants completed a final memory test. Results demonstrated that sleep moderated the testing effect. Sleep benefitted memory for reread but not retrieval practiced material, suggesting that sleep only benefits information that has not yet been solidified in memory. These findings are consistent with the hypothesis that retrieval practice benefits memory via a similar mechanism as sleep, by serving as a "rapid consolidation event."
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5:30-7:30 PM (1263)

Does Testing Enhance Semantic and/or Phonological Mediation in Paired-Associate Learning? DEANA VITRANO, *University at Albany, SUNY* – The testing effect (TE) shows that review testing on previously studied material leads to better long-term retention as compared to restudying that material (Roediger & Karpicke, 2006). Pyc and Rawson (2010) proposed the Mediator Effectiveness Hypothesis (MEH) as an explanation for the TE in paired-associate learning. The MEH states that review testing on cue-target word pairs enhances semantic/associative mediation, which helps participants recall targets to their cues on a later test. Pyc and Rawson found support for the MEH with Swahili-English word pairs and explicit mediation instructions, using the optimal test of the MEH. The current study used Pyc and Rawson's procedure, but with unrelated English word pairs for which semantic mediation and phonological mediation strategies should have been especially beneficial. The MEH was supported only for phonological mediation. The results also supported Pyc and Rawson's (2012) Mediator Shift Hypothesis in that for phonological mediation, the tested group was more likely to shift mediators than the restudy group, and the tested group was more likely to shift mediators after target recall failures on the immediately preceding test than target recall successes.
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5:30-7:30 PM (1264)

True-False Pretests Can Enhance Learning. JORDAN BRABEC, ELIZABETH BJORK, and ROBERT BJORK, *University of California, Los Angeles* – Despite the reputation of true-false testing as a superficial form of testing, one that does not exercise productive retrieval processes, we found recently that true-false items can be structured in ways that do elicit such processes (Brabec et al., in press). In the present research, we examined whether true-false tests can also function as effective pretests. Before reading two educational passages (on Saturn and Yellowstone Park), participants were asked true-false questions with respect to one of the passages. On a final cued-recall test—and relative to control performance—evaluating true items (e.g., True or false? Rhea has its own ring system) enhanced participants' recall of tested information (e.g., Which moon has its own ring system? Answer: Rhea), and evaluating false items (e.g., True or false? The Cassini Division is the area between Saturn's A Ring and F Ring) enhanced participants' recall of related information (e.g., What is the area between Saturn's A Ring and B Ring? Answer: Cassini Division), a pattern consistent with our prior observations of the benefits of conventional true-false tests administered as posttests.
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5:30-7:30 PM (1265)

The Benefits of Competitive True-False Tests Withstand Retention Intervals of Forty-Eight Hours. JORDAN BRABEC, STEVEN PAN, ELIZABETH BJORK, and ROBERT BJORK, *University of California, Los Angeles* (Sponsored by Robert Bjork) – Although true-false tests are

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often regarded as superficial, our recent work revealed that conventional true-false tests can not only enhance later recall but can also be optimized with competitive clauses to promote broader retrieval processes (Brabec et al., in press). The present investigation compared these latter benefits with those of a restudy intervention and examined whether they might withstand more practical retention intervals. With respect to one of two studied passages (on Saturn and Yellowstone Park), participants were asked either to answer competitive true-false items (e.g., True or false? Castle Geyser (not Steamboat Geyser) is the oldest geyser) or to restudy the constituent propositions of the true-false items (e.g., Castle Geyser is the oldest geyser, and Steamboat Geyser is the tallest geyser). Relative to control performance on a final cued-recall test, evaluating the competitive true-false items enhanced recall not only after a retention interval of 5 minutes but also after 48 hours. Furthermore, although these benefits proved comparable to those of the restudy intervention, performance in the true-false condition modestly (although not significantly) exceeded performance in the restudy condition after 48 hours.
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5:30-7:30 PM (1266)

Pre-Writing Increases Semantic Activation But Does Not Enhance Learning. KALIF VAUGHN, *Northern Kentucky University,* TRAVIS HARTIN, *Kennesaw State University* – Across two experiments, we had participants read a text passage on biological cells and complete a final test consisting of multiple-choice and fill-in-the-blank questions. Before reading the passage, we had participants either answer pre-questions, complete a pre-writing activity, or do nothing (control group). The pre-writing activity required participants to write as much as they could on biological cells, without worrying about whether the information was accurate. We hypothesized that the pre-writing activity may improve learning due to activating semantically related content prior to reading the passage. We measured the degree of semantic activation using word count and latent-semantic analysis scores. In both experiments, neither pre-questions nor the pre-writing activity enhanced learning relative to the control group. Additionally, the degree of semantic activation did not correspond to more learning in the pre-writing group.
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5:30-7:30 PM (1267)

Does the Combination of Spacing and Testing Promote Transfer Beyond Either Strategy Alone? OYKU UNER and HENRY L. ROEDIGER, III, *Washington University in St. Louis* (Sponsored by Henry L. Roediger, III) – Testing and spacing improve long-term retention, and their combination boosts retention further. Though researchers recommend studying with spaced tests, the mismatch between assessments used in prior research (verbatim retention) and those often used in the classroom (application of material) challenges this recommendation. We examined whether spaced testing benefits novel application over massed testing and spaced restudy, as it does retention. Students read a textbook chapter, then reviewed some concepts once and others twice back-to-back (massed). One group reviewed concepts by rereading definitions, whereas the other took a definition quiz with feedback. Two days later, students answered definition and application questions on massed concepts, then reviewed—for the second time—concepts reviewed once in session one (spaced). Review type (restudy or test) was consistent across sessions. After two days, students were tested identically on the spaced concepts. Our results will indicate if application performance is improved by spaced testing.
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5:30-7:30 PM (1268)

Effects of Testing, Reading-Highlighting Notes, and Teacher Led-Review at the End of the Class: A Naturalist Study. ROBERTA EKUNI, *Universidade Estadual do Norte do Paraná*, SABINE POMPEIA, *Universidade Federal de São Paulo* – Benefits of testing (retrieval practice) are observed in classroom environments, usually compared with rereading, known to be an inefficient learning technique. Here we investigate students' performance on exams using more efficient control conditions (read/highlighting their notes made during the class [HN] and teacher led-review [TLR]) in a within-participants experiment. Participants were 40 undergraduates (11 males; mean±SD: 19.71±1.53) enrolled in an Educational Psychology course (ethical approval #2.543.960). The 21-course topics were divided into 3 conditions (blocks) of 7 100-min long classes (lecture – 85 min; manipulations - final 15 min) each. At the end of each block, participants took a block exam relating to the 7 studied topics. Three months after each block-exams, participants were retested (longer-term retention). End-of-block percent retention was lower for HN (62.34±17.02) and testing (tendency: 68.69±13.73) than TLR (71.72±15.29), which was higher than HN. Three-month retention was higher for testing (65.90±14.46) and TLR (64.57±13.47) than HN (53.71±14.32). Hence, TLR was as efficient as retrieval practice in a naturalistic environment for long-term retention compared with highlighting notes during class.
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5:30-7:30 PM (1269)

The Benefits of Open-Book vs. Closed-Book Testing. SARAH MYERS and MATTHEW RHODES, *Colorado State University* (Sponsored by Matthew Rhodes) – Although the memorial benefits of testing are well documented, these benefits are presumed to occur via the process of retrieval, which may be less likely to occur during an open-book test. The present study investigated the effects of open-book tests on retrieval-induced facilitation, whereby retrieving information strengthens memory for related material that was not directly retrieved. Participants in three experiments took open-book or closed-book tests over scientific passages. In Experiment 3, participants completed the open-book test by either attempting retrieval or searching for answers. After a delay, participants in all experiments took a final closed-book test including repeated and new questions. Both open- and closed-book tests improved memory for repeated and new items relative to restudying. Furthermore, open-book tests were similarly beneficial regardless of whether participants attempted retrieval or searched for answers. The results of this study suggest that the benefits of open-book testing extend to non-tested material.
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5:30-7:30 PM (1270)

Lexical-inferencing and the Generation Effect of Memory. STEVEN DESSENBERGER and MITCHELL SOMMERS, *Washington University in St. Louis* (Sponsored by Mitchell Sommers) – Prior research suggests that L2 vocabulary learning often takes place through lexical-inferencing

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(translations made using context-clues) but there has been less emphasis on how inferencing compares to traditional learning methods. The present study sought to compare lexical-inferencing to a simply reading word pairs and determine whether any benefit of inferencing are due to the generation effect of memory, a phenomenon wherein generated information (inferencing) is remembered better than obtained information (reading). Across four experiments, participants read English sentences with embedded Swahili words and were asked to inference the meaning of the words using context. We compared memory after inference to a read-only control, wherein participants were given translations prior to reading the sentences. The inference condition resulted in lower rates of retention compared to the control. Based on these findings, we concluded that there was a generation effect for the English words, but not for the Swahili word forms.
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5:30-7:30 PM (1271)

Improving Younger and Older Adults' Memory for Medication Side Effects with a Retrieval Practice Intervention. ROBERT ARIEL, *Virginia Wesleyan University,* SARAH TAUBER, *Texas Christian University* – Retrieval practice is a potent learning tool that when wielded effectively promotes durable learning. Unfortunately, most learners are unaware of the mnemonic benefits that retrieval practice provides, which results in underutilization of this highly effective learning strategy. Younger adults use retrieval exclusively to monitor their learning, while older adults often avoid using memory-based strategies all together. The current experiment examined the efficacy of a brief intervention on younger and older adults use of retrieval practice for learning medication side effects. Younger adults and older adults were allowed to make decisions about when to study, engage in retrieval practice, or drop medication side effects from learning. Some subjects were exposed to a brief instructional intervention prior to learning that alerted them to the mnemonic benefits of retrieval and provided instructions on how to use retrieval to learn medication side effects. This minimal intervention was effective for improving both younger and older adults' memory for this important health related information.
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5:30-7:30 PM (1272)

Recollection and Familiarity Support the Testing Effect in Younger and Older Adults. RUTH SHAFFER, DAVID BALOTA, and KATHLEEN MCDERMOTT, *Washington University in St. Louis* (Sponsored by Kathleen McDermott) – The testing effect is often considered to be a recollection-related phenomenon. However, a number of studies have begun to provide evidence that familiarity may likewise be involved (Shaffer & McDermott, 2020). Although aging populations show marked declines in recollection, older and younger adults often benefit from testing to a similar degree (Meyer & Logan, 2013). Together, these findings suggest that the testing effect in older adults may function via relatively preserved familiarity. To examine this possibility, younger (18-22 years old) and older (65-82 years old) adults studied words, took cued-recall tests on half of the words, and took a final recognition test on all words immediately or 1 day later in which parameter estimates of recollection and familiarity were calculated. At both delays, older and younger adults exhibited a testing effect in both recollection and familiarity, although the magnitude of the testing effect in recollection was smaller for older than for younger adults. Implications for theories of the testing effect, as well as for its application in older adults, are explored.
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5:30-7:30 PM (1273)

Testing Improves Encoding But Studying Examples Refines It. PAULO CARVALHO and KENNETH KOEDINGER, *Carnegie Mellon University* – It has been argued that testing (as opposed to reading) might improve learning outcomes either by delaying forgetting or by improving initial encoding. In a novel test of these hypotheses, we compared learning different types of information from testing or a combination of testing and examples. Participants (N=220) learned either facts ("area of rectangle? LxW") or applied the corresponding skill ("calculate the area of the shape above: 6x4"), either by completing multiple tests or alternating between tests and examples. Memory and transfer were then probed at different retention intervals. We found better learning from testing when learning facts and from alternating between tests and examples when learning skills. However, we found no evidence of a decrease in the rate of forgetting with testing, despite clear differences in forgetting rate between facts and skills. This evidence suggests that the benefit of testing is unlikely to be due only to slowing down forgetting. Instead, our proposal is that testing increases encoding of all information presented (promoting learning of facts), whereas studying examples leads to detailed encoding of only the overlapping features across examples (promoting learning of skills).
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5:30-7:30 PM (1274)

Varied Practice Enhances Vocabulary Learning. CAMI CIESIELSKI (J. Frank Yates Student Travel Award Recipient), *Texas Christian University,* HANNAH HAUSMAN, *University of California, Santa Cruz,* MARY HARGIS, *Texas Christian University,* MATTHEW RHODES, *Colorado State University* (Sponsored by Mary Hargis) – The goal of learning is often to transfer acquired information to new contexts. The present experiment examined whether varied retrieval practice enhanced transfer of vocabulary knowledge. Participants learned GRE vocabulary terms by either studying the vocabulary used in example sentences (study condition) or by selecting which vocabulary word appropriately completed each sentence (retrieval condition). Moreover, each word was either learned in three different sentences or in the same sentence three times. A final test required participants to correctly complete novel sentences with the words. Although being exposed to varied sentences led to worse performance during learning, variation enhanced transfer. However, completing the sentences led to numerically but not statistically higher transfer than studying sentences. Participants also predicted their final test scores more accurately when they studied varied sentences or practiced completing sentences. Therefore, varied practice may be a desirable difficulty that enables learners to accurately assess and transfer their vocabulary knowledge.
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5:30-7:30 PM (1275)

Generating Learning Improvements with Educationally Relevant Material. DURNA ALAKBAROVA, PHILIP PEPER, and HUNTER BALL, *University of Texas at Arlington* – The generation effect refers to

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the finding that self-generated material (e.g., h_rse) is better remembered than material that is passively read (e.g., horse). Moreover, experiencing a generation advantage improves subsequent learning for passively read words in a second study block. In the current study, we examined whether this extends to learning of educationally relevant material (i.e., word definitions). Memory for target words embedded within textual material was tested using either definitions (definition condition) or sentence completion (sentence condition) following passage 1 learning, and with sentence completion for both conditions following passage 2. Supporting our hypothesis, participants in both conditions exhibited a generation advantage for the first passage, but not the second. Notably, these performance improvements were not associated with changes in study time allocation. Future studies are designed to examine whether other variables, such as source monitoring decisions and judgments of learning, can track these changes in performance.
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5:30-7:30 PM (1276)

Student and Teacher Sensitivity to the Benefits of Retrieval Practice. HANNAH MILBURN, TABITHA DIEHL, and GEOFFREY MADDOX, *Rhodes College,* JONATHAN TULLIS, *University of Arizona* (Presented by Geoffrey Maddox) – Past research indicates that retrieval practice, a particularly effective strategy for enhancing learning and memory, is often underappreciated by students and teachers in more applied settings. Here, we surveyed middle and high school students about their use of retrieval practice. Results indicated that a majority of middle and high school students report utilizing at least one form of retrieval practice but still report rereading more frequently. Further, the use of retrieval practice increased from middle to high school, differed as a function of academic content, and related to academic achievement. We also assessed the extent to which primary and secondary school teachers believe retrieval practice and other empirically validated study strategies contribute to student engagement and learning. The data suggest that teachers understand the benefits of retrieval practice over rereading for learning and memory but rate the benefits of spaced practice (i.e., the spacing effect) and rereading similarly. Taken together, our results suggest that students and teachers use retrieval practice more than previously suggested.
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5:30-7:30 PM (1277)

Testing the Strategic Encoding and Episodic Differentiation Model of Error Correction. HANNAH HAUSMAN, *University of California, Santa Cruz,* MATTHEW RHODES, *Colorado State University* (Sponsored by Matthew Rhodes) – Generating errors while learning can enhance memory for correct information. The present studies tested a new theoretical explanation, Strategic Encoding and Episodic Discrimination (SEED). In Experiment 1, participants studied related word pairs (bacon-breakfast) at their own pace (errorless condition); half of participants guessed the answers first (errorful condition). On a final cued-recall test, performance was significantly higher in the errorful than the errorless condition, but contrary to SEED, the results could not be explained by differences in self-regulated study times. In Experiment 2, participants learned related word pairs under errorless or errorful conditions and then took a four-part test that disentangled retrieval processes. Consistent with SEED, errorful learning increased the likelihood that the correct answer was generated as one of the generated candidates and improved participants' ability to differentiate between correct and incorrect answers. The effects of feedback timing and implications for theories of error correction will also be discussed.
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5:30-7:30 PM (1278)

How Generative Practice Influences Transfer in a Statistics Classroom. GRAY THOMAS and JACLYN MAASS, *University of Central Oklahoma* – The purpose of this study was to bring repeated practice and generativity into the classroom. An optimal amount of difficulty or effort, whether it be from the method of retrieval, spacing of practice, or depth of processing, often benefits memory. These topics are traditionally studied in a lab, with results that do not always transfer to more complex materials in an educational setting. The current study investigated how a more generative practice would benefit learning about statistical tests compared to less generative practice. Two sections of an advanced psychological statistics course participated. Through the semester each section practiced identifying when specific statistical tests were appropriate by either generating their own research scenario based on a given statistical test (generative) or naming the appropriate statistical test based on a given research scenario (non-generative). Four exams contained, in part, both question types (generative and non-) to measure how well students performed on the same type of question they practiced with, but also how well their knowledge transferred to the other question type. We predicted that the more generative practice would better prepare students for both types of questions.
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5:30-7:30 PM (1279)

Does Retrieval Potentiate New Learning because it Enhance Organizational Processing? DAHWI AHN, JASON CHAN. and JACOB HEEREN, *Iowa State University* (Presented by Jason Chan) – Taking a test on previously learned material enhances subsequent new learning. Recent research suggests that this forward benefit of testing might be attributable to enhanced relational processing (Chan et al., 2018). We tested this idea by varying the ease of relational processing for the learning task. In six experiments, participants studied several word lists and then took a test after or restudied each list. All participants took a test for the final study list. In Exp 1–5, we manipulated the ease of relational encoding by grouping related words together or not. Presentation order had essentially no effect on the benefits of testing over restudying. In Exp 6, the testing advantage decreased when participants were explicitly instructed to engage in relational processing — because performance improved for participants in the restudy condition. These results support the idea that testing enhances new learning because it promotes active relational processing.
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5:30-7:30 PM (1280)

How Question Type Affects Learning from Prequestions versus Learning Objectives. KYLE ST. HILAIRE and SHANA CARPENTER, *Iowa State University* (Sponsored by Shana Carpenter) – Answering pretest questions before learning their answers (prequestions) enhances learning; however, this benefit is mostly specific to those prequestioned items and

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not non-prequestioned items. The benefits of answering prequestions are robust, but our research suggests that other pre-exposure activities (e.g., reading learning objectives) also enhance learning. Additionally, research is beginning to indicate that question-type (i.e., fact-based versus concept-based) might moderate this prequestion effect, with concept-based prequestions leading to broad learning benefits. In the current study, participants received five fact-based or five concept-based pre-learning items as either prequestions or learning objectives (one of four conditions), or assigned to a no-preview Control Group. All participants completed a 20-item posttest comprised of both prequestioned and non-prequestioned fact- and concept-based items. Results indicate broad benefits only for concept-based prequestions and specific benefits for the two fact-based pre-learning conditions. These findings suggest that prequestions and objectives can enhance learning, but that question-type moderates this effect.
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5:30-7:30 PM (1281)

Timing Matters: The Interplay of the Retrieval Frequency and T Temporal Distance between Retrieving a Prior List and Encoding a New List in Vocabulary Retention. LIN GUO, *Syracuse University* – The act of retrieval yields benefits for memory. However, according to the reconsolidation account, reactivation could render a memory amenable to modifications. The present study investigated how the retrieval frequency of a previously learned vocabulary list and the temporal distance of a subsequently encoded list affected retention of the prior list. Participants learned two unrelated lists of novel words and took cued-recall tests. The results revealed an interaction between the retrieval of list 1 (single vs. repeated) and the encoding of list 2 (close vs. far vs. no). Noteworthy, the repeated-retrievals groups outperformed single-retrieval groups only when list 2 encoding was spaced far apart (i.e., 3-day interval). The memory impairment effect emerged in the presence of list 2 whereas the memory strengthening effect occurred in the absence of list 2. These results suggest that the interplay between repeated retrievals and an extended temporal distance functions in a way that may attenuate memory's susceptibility to new learning rather than abolish it. Situated in the naturalistic classroom setting, these findings have pedagogical significance for instructors.
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5:30-7:30 PM (1282)

Retrieval Practice Consistently Benefits Student Learning: A Systematic Review of Applied Research in Schools and Classrooms. POOJA AGARWAL, *Berklee College of Music,* LUDMILA NUNES, *Association for Psychological Science,* JANELL BLUNT, *Anderson University* – Given the growing interest in retrieval practice among educators, it is valuable to know when retrieval practice does and does not improve student learning—particularly for educators who have limited classroom time and resources. In this literature review, we developed a narrow operational definition for "classroom research" compared to previous reviews of the literature. We screened nearly 2,000 abstracts and systematically coded 50 experiments to establish a clearer picture of benefits from retrieval practice in real world educational settings. Our review yielded 60 effect sizes and a total n=5,374, the majority of which (62%) revealed medium or large benefits from retrieval practice. We found that retrieval practice improved learning for a variety of education levels, content areas, experimental designs, spacing of retrieval practice, final test delays, retrieval and final test formats, and timing of feedback; however, only 10 out of 50 experiments were conducted in non-Western, -educated, -industrialized, -rich and -democratic (WEIRD) countries. Based on our review of the literature, we make eight recommendations for future research and provide educators with a better understanding of the robust benefits of retrieval practice across a range of school and classroom settings.
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5:30-7:30 PM (1283)

Preventing Mind Wandering During Online Lectures Via Pretests. ALEXANDRA SCHMITT, STEVEN PAN, FARIA SANA, and ELIZABETH BJORK, *University of California, Los Angeles* – Although online lectures have become increasingly popular, their effectiveness at promoting learning can be attenuated by mind wandering (shifts in attention away from the task at-hand towards unrelated thoughts). We investigated whether taking tests on to-be-studied information, also known as pretesting, could mitigate this problem and promote learning. In two experiments, participants viewed a 26-min video lecture that was paired with a pretest activity (answering questions about the lecture) or a control activity (solving algebra problems), and with multiple probes to measure attention throughout the lecture. Taking pretests reduced mind wandering and improved performance on a subsequent final test compared to the control condition. This result occurred regardless of whether pretests were interspersed throughout the lecture (Experiment 1) or were administered at the very beginning of the lecture (Experiment 2). These findings demonstrate that video-recorded lectures can be proactively structured to reduce mind wandering and improve learning via the incorporation of pretests.
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5:30-7:30 PM (1284)

Segmenting in Multimedia Learning. SHREYA SHEEL and EMMA GELLER, *University of California, San Diego* – In multimedia learning, segmentation is a technique to reduce cognitive load. Based on the cognitive theory of multimedia learning, cognitive overload occurs when processing demands exceed the learner's available cognitive capacity. Breaking lessons into smaller chunks reduces cognitive demand and increases capacity to process and organize selected information, leading to more learning (Mayer, 2003). Although this effect has been replicated by Mayer (2008), previous work in our lab has failed to find a benefit of segmentation for learning and transfer, suggesting that it may only be beneficial under certain conditions. In this study, we explored the possibility that the segmenting benefit depends on the number of segments in a lesson. Participants were randomly assigned to watch a video lesson split into 1, 5, 12, or 25 segments, and then completed measures of retention and transfer. We also measured participants' self-reported cognitive load in order to assess whether cognitive load is a plausible mechanism by which segmenting benefits learning. We failed to find an effect of segmenting on retention, transfer, or cognitive load, though we did find significant relationships between cognitive load subscales and test performance.
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5:30-7:30 PM (1285)

Sans Forgetica Is Not Desirable for Learning. JASON GELLER, *University of Iowa*, SARA DAVIS and DANIEL PETERSON, *Skidmore College* – Do students learn better with material that is perceptually hard to process? Recent claims suggest that placing materials in Sans Forgetica typeface has positive impacts on student learning. We examined the mnemonic effects of Sans Forgetica more closely in comparison to other learning strategies across three preregistered experiments. In Experiment 1, participants studied weakly related cue-target pairs with targets presented in either Sans Forgetica or with missing letters. Cued recall performance showed a robust effect of generation, but no Sans Forgetica effect. In Experiment 2, participants read an educational passage about ground water with select sentences presented in either Sans Forgetica typeface, yellow pre-highlighting, or unmodified. Cued recall for select words was better for pre-highlighted information than an unmodified pure reading condition. Critically, presenting sentences in Sans Forgetica did not elevate cued recall compared to an unmodified pure reading condition or a pre-highlighted condition. In Experiment 3, individuals did not have better discriminability for Sans Forgetica relative to a fluent condition in an old-new recognition test. Our findings suggest that Sans Forgetica really is forgettable.
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5:30-7:30 PM (1286)

Investigating the Effectiveness of Using Interleaving as a Study Strategy for Key-Term Definitions. ALYSSA MILLER and KATHRYN WISSMAN, *North Dakota State University* (Sponsored by Kathryn Wissman) – Research has shown that having learners use interleaving (a study technique in which two topics are practiced in an alternating fashion) enhances learning and memory. However, one unanswered question is whether interleaving facilitates the learning and retention of key-term definitions. The current research explores whether interleaving benefits emerge when learning key-term definitions across different content-specific domains within a given discipline. Across two days, participants were asked to learn key-term definitions from memory psychology and developmental psychology. During practice, participants were asked to recall the key-term definitions using one of three practice schedules: interleaved versus blocked-spaced versus blocked-massed. After two days, participants completed a final cued recall test; participants were also asked a metacognitive question about using interleaving when preparing for an exam. Outcomes showed that engaging in interleaved practice was less effective for the learning and retention of key-term definitions and more participants reported using interleaving in a real-world context.
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5:30-7:30 PM (1287)

Meta-Analysis of Expanding vs. Uniform Schedules of Study. LISI WANG, *University of Texas at Austin,* COURTNEY CLARK, *University of Iowa,* VERONICA YAN, *University of Texas at Austin* – Spacing out repetitions leads to significantly better learning than massing those repetitions in a single large block of time (e.g., Carpenter, 2017). But should these repetitions be spaced out uniformly or should they be studied at expanding intervals? Despite strong theoretical reasons why expanding intervals should be superior, the literature is surprisingly mixed. In this meta-analysis, we examine not only the overall effect of expanding over uniformly spaced intervals, but also test potentially important moderators that may explain heterogeneity, including study duration (e.g., single session vs. multiple sessions), retention interval, whether repetitions are study trials or practice trials (with or without feedback), and stimuli type.
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5:30-7:30 PM (1288)

Optimally Efficient Spaced Practice Using Logistic Regression and Difficulty Thresholds. LUKE EGLINGTON and PHILIP PAVLIK, *University of Memphis* – Decades of research has shown that spacing practice trials over time can improve memory, but there are few concrete recommendations for how to optimally space practice. We show that existing recommendations are inherently suboptimal due to their insensitivity to time costs and individual- and item-level differences. We introduce an alternative approach that optimally schedules practice with a logistic regression model of spacing in tandem with microeconomic principles. We simulated typical spacing schedules and our adaptive approach. Simulations indicated that practicing according to microeconomic principles of efficiency resulted in substantially better memory retention than alternatives. The simulation results provided quantitative estimates of optimal probability correct during learning that differed markedly from prior recommendations, but still supported a desirable difficulties framework. Our experimental results supported simulation predictions, with 40% more items recalled relative to controls when practice was scheduled according to optimal efficiency. Our approach can be readily implemented in online educational systems and has potential to dramatically improve educational technology.
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5:30-7:30 PM (1289)

Using Video-Based Peer Modeling to Teach Programming in an Introductory Statistics Course. MARY TUCKER, WADI EGHTERAFI, and ICY (YUNYI) ZHANG, *University of California, Los Angeles,* JI SON, *California State University, Los Angeles,* JAMES STIGLER, *University of California, Los Angeles* (Sponsored by James Stigler) – In this study, we investigated the effects of a video-based peer modeling intervention on students' self-efficacy beliefs and learning outcomes. Participants were 246 undergraduate students enrolled in an introductory statistics course who completed an online practice quiz for course credit. The quiz assessed students' understanding of course concepts with open-ended response questions and data analysis activities using the R programming language. After submitting a response to each question, students watched a video of a peer completing the same task. Students were randomly assigned to one of three feedback conditions: a video of a peer modeling the correct answer (correct peer), a video of a peer model making and self-correcting common mistakes (self-correcting peer), or a screenshot of a peer's correct answer (control). Results indicate that students who watched either of the videos rated their self-efficacy higher than did students in the control condition. Furthermore, students who rated their self-efficacy higher scored higher on the subsequent quiz. These findings have implications for the design of feedback during online learning.
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5:30-7:30 PM (1290)

Elucidating the Cognitive Processes Involved in the Note-Taking Effect. LAKSHMI LALCHANDANI, *Facebook via Tek Systems & University of Colorado, Boulder,* ALICE HEALY, *University of Colorado, Boulder* (Presented by Alice Healy) – There are three primary hypotheses of cognitive processing during note taking: generative processing, cognitive effort, and attention. These hypotheses involve three unique cognitive mechanisms: generative processing, summarization, and sustained attention. This investigation compared the separate operation of the three mechanisms in relation to the note-taking effect. Generative processing is the construction of associations between novel information and prior knowledge. Summarization forces the learner to identify the most pertinent information to create a coherent synopsis. Sustained attention is selectively concentrating on novel information while ignoring irrelevant distraction. Two experiments compared generative processing to either sustained attention or summarization. Experiment 1, through the measurement of task-relevant and task-irrelevant distraction, showed that sustained attention is positively related and generative processing negatively related to retention. Experiment 2 showed that generative processing impeded and summarization facilitated retention. Therefore, generative processing cannot account for the note-taking effect. This conclusion was deduced from both internal and external measures.
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5:30-7:30 PM (1291)

Using Video to Highlight the Conceptual Structure of a Domain in an Online Textbook. LAURA FRIES, *University of California, Los Angeles,* JI SON, *California State University, Los Angeles,* JAMES STIGLER, *University of California, Los Angeles* – Students reading an introductory textbook may get lost in the details and miss how the specific content on a page relates to the broader conceptual structure of the domain. In this experimental study, conducted over a 10-week introductory statistics course, students (N=255) were randomly assigned to two groups. Those in the experimental group received access to 24 short videos embedded throughout the online textbook, each designed to connect the content on the page to core concepts of the domain. The control condition did not receive the videos, and across conditions, all other instruction and assessments were identical. Two findings have emerged: first, when placed in the context of an actual course, only 27% of students watched at least half the videos (median=4; mean=7.67 (SD=7.84)), even though they were short and embedded in assignments. Second, students who did watch the videos benefited, scoring higher on a summative in-text assessment, controlling for prior knowledge ($F(1, 121) = 9.037$, $p = .003$). Results support the overall value of connecting course topics to overarching concepts, but also raise the important question of why some students, but not others, see the value of watching supplementary videos.

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5:30-7:30 PM (1292)

Limited Practice Is Sufficient to Improve Empirical Research Comprehension. TRINA KERSHAW, *University of Massachusetts Dartmouth,* LEAMARIE GORDON, *Assumption College* – Empirical research comprehension is important for undergraduate students. Building upon our previous work on instructional scaffolds, students in undergraduate cognition courses were assigned either 3 or 9 structured reading worksheets (RWs) over a semester. We assessed whether these scaffolds improved comprehension of a target journal article. In addition to measuring journal article comprehension (JAC) via multiple choice and written summary tasks, we examined whether assigning RWs impacted learning of lecture content not reinforced by RWs. Both RW groups showed improvement across the semester on both JAC assessments. Regarding course content, while both RW groups improved on questions assessing knowledge reinforced by RW assignments, only students in the 3 RWs group improved on questions targeting non-reinforced content knowledge. Our findings suggest improvement in empirical research comprehension can occur after only a few practice sessions, and that this limited practice may allow for better memory for non-reinforced concepts.
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5:30-7:30 PM (1293)

Examining the Effect of Corrections on the Continued Influence of Neuromyths. MARCUS LITHANDER, MELTEM KARACA, MELISSA DIPANO, LISA GERACI, *University of Massachusetts Lowell* – Often people hold erroneous beliefs about learning and the brain, referred to as neuromyths. Research shows that neuromyths can be corrected using different types of refutations (Lithander, Geraci, Karaca, & Rydberg, in prep). However, even when misconceptions are corrected, people may continue to rely on erroneous information when making judgments, known as the continued influence effect. We investigated whether corrections were effective in changing not only participants' reported beliefs in neuromyths, but also their reasoning. Participants were asked about their beliefs in various statements, including common neuromyths, and then received different types of corrections, or no correction. Later, participants were asked again about their beliefs in the neuromyths, and they were asked to reason about various educational scenarios. Results showed that corrections were effective in changing reported beliefs in neuromyths, but the myths continued to influence participants' reasoning about learning scenarios.
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5:30-7:30 PM (1294)

Direct Comparison of Concept Mapping and Knowledge Mapping for Promoting Learning. AMEDEE MARTELLA and JEFF KARPICKE, *Purdue University* (Sponsored by Jeff Karpicke) – Concept maps and knowledge maps are two popular methods of diagramming the relationships among concepts. When creating a concept map, students establish relationships among concepts using their choice of relational words whereas when creating a knowledge map, students establish relationships among concepts using a pre-specified set of relational words. Despite the popularity of both methods, there have been no direct comparisons of their effectiveness. The purpose of this project was to compare the effectiveness of knowledge maps and concepts maps for promoting learning. In two experiments, students read brief texts and created a concept map or knowledge map. Performance was assessed on a conceptual knowledge and free recall posttest. Results showed no difference in student learning and recall based on the type of map students made. Based on these results, whether students have free choice

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for how they relate concepts does not appear to lead to differential effects on learning.
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5:30-7:30 PM (1295)

When Explanation Helps and When It Does Not: A Distinction between Inference Classifications. TRICIA GUERRERO, THOMAS GRIFFIN, and JENNIFER WILEY, *University of Illinois at Chicago* – Comprehension tests generally use inference-based questions to assess understanding from text. Some inference-based questions require the reader to examine the interconnectedness of the nodes in their mental model, that is, to reason and establish relations between the pieces of information in the text. Other inference-based questions require the reader to go beyond the scope of their current mental model, that is, to reason beyond the information in the text by extending relations into new contexts or by integrating new pieces of information. The current study examined the effectiveness of explanation activities on these distinct inference question types. While writing explanations as a study activity improved comprehension scores on questions that required readers to reason within the text, there was no improvement on questions that required the reader to reason beyond the text. Possible alternative approaches that may help students improve their ability to reason beyond the text will be discussed.
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5:30-7:30 PM (1296)

Spacing of Repetitions and the Formation of Stable Sequential Memory Traces. LAURA ORDONEZ MAGRO, JOËL FAGOT, JONATHAN GRAINGER, and ARNAUD REY, *Aix-Marseille University* – Word-form learning relies on the memorization of sound sequences that are frequently repeated in the speech stream. In this study, we tested such sequence learning mechanisms in non-human primates by using an adaptation of the Hebb repetition paradigm (Hebb, 1961). Results showed that baboons were able to learn word-like sequences even when repetitions where widely spaced. These findings provide evidence for the assumption that word-like sequence learning is based on domain-general associative learning mechanisms. Moreover, they indicate that sequential memory traces that are not maintained by refreshing mechanisms related to language do not vanish rapidly, informing current models of language and statistical learning about the role of decay in the stabilization of sequential memory traces.
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5:30-7:30 PM (1297)

Learning Non-Adjacent Dependencies in a Random Environment. LAURE TOSATTO and ARNAUD REY, *CNRS & Aix-Marseille University* – Implicit learning of adjacent dependencies is a fundamental ability that is shared by human and non-human primates (Rey et al., 2018). The extraction of non-adjacent dependencies has been described as more difficult and it has been observed under specific experimental conditions. Rey et al. (2020) recently studied the conditions under which a regular pattern composed of adjacent elements could be extracted by participants using a single letter naming task in which a hidden recurrent triplet of letters appeared among random letters. In the present study, we used the same paradigm to investigate the extraction of non-adjacent dependencies. Participants were exposed to a single non-adjacent AXB pattern where the item A was followed by a random item X and always by a fixed item B. Random letters were presented between two repetitions of the regular non-adjacent AXB pattern. Our results showed that almost no participant extracted this type of regularity, even when we used a very salient pattern. These data clearly suggest that, even if the extraction of adjacent elements can be observed in numerous learning behaviors, our cognitive system is seriously challenged when the elements of the pattern are not strictly adjacent.
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5:30-7:30 PM (1298)

Effects of Individual Differences in Time Management on Time-Based Visual Statistical Learning. SACHIO OTSUKA, *Kyoto University* – This study examined whether visual statistical learning (VSL) based on time information was influenced by individual differences in time management. In the familiarization phase, participants observed a stream of visual objects that were presented in random order; however, durations of three successive objects were fixed in the same order (e.g., 500 ms, 900 ms, 650 ms; 850 ms, 700 ms, 1,000 ms). In the subsequent forced-choice familiarity test, two sequences were presented: (1) a target made of a triplet with three successive durations presented in the prior phase (e.g., 500 ms, 900 ms, 650 ms); and (2) a foil that was created with time information from different triplets (e.g., 500 ms, 700 ms, 600 ms). After the familiarity test, participants answered the scale to measure time management described by Imura et al. (2016). Results showed that there was a greater chance of familiarity for the triplets that had regularities of durations only for participants who showed higher scores on time management scale. These results suggested that time-based VSL is influenced by individual differences in time management.
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5:30-7:30 PM (1299)

Using Vanishing Cues to Help College Students Learn to Factor Polynomials. ERIN GRAHAM and CHRISTOPHER WAS, *Kent State University* (Sponsored by Christopher Was) – Although explicit declarative instruction doubtlessly plays an important role in mathematics education, it also places a heavy burden on student's working memory. This means that students with limited working memory resources are at a disadvantage when learning foundational math skills in a traditional educational context. However, recent research suggests that implicit learning techniques, which place fewer demands on working memory, can be successfully applied to mathematics education. Specifically, prior work found that a mathematics intervention based on implicit learning techniques (like error-less learning or vanishing cues) was more beneficial than an intervention based on declarative instruction for helping eighth-grade students learn to factor polynomials. The present study sought to replicate and extend this work by comparing the relative efficacy of implicit and declarative factoring interventions for college students. Our findings replicated the prior work, suggesting that implicit learning techniques can be successfully applied to mathematics education.
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5:30-7:30 PM (1300)

Explicit and Implicit Grammatical Learning in Bilinguals' First and Second Language. PAULINE PALMA, *McGill University & The Centre for Research on Brain, Language and Music,* LAURA BATTERINK, *University of Western Ontario,* DEBRA TITONE, *McGill University & The Centre for Research on Brain, Language and Music* (Sponsored by Debra Titone) – The gradual extraction of linguistic regularities is central to grammar learning. However, less clear is how multilingual adults extract such regularities from a highly variable input. Thus, we conducted a two-day pilot study in which we trained English-French bilinguals (n=18, 12 L1 French, 6 L1 English) on an artificial determiner system, where the determiners indicated both distance and animacy of a subsequent noun. Moreover, determiners were paired with English-French cognates (e.g., ri python) or English-unique words (e.g., zo watch). Importantly, some of the trials violated the animacy rule (e.g., *zo python). Half the participants were explicitly taught the distance and the animacy rule, and the other half were only taught the distance rule (implicit vs. explicit condition). For English-unique words, English L1 participants showed evidence of both explicit and implicit rule learning, whereas French L1 participants showed evidence only of explicit rule learning. In contrast, for cognates, both English L1 and French L1 participants showed evidence of explicit and implicit rule learning. These results align with models suggesting that implicit learning is more involved in L1 vs. L2 grammatical processing (Paradis, 2004).

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5:30-7:30 PM (1301)

Processing Speed but not Verbal Short-Term Memory Affects Linguistic Statistical Learning. KRISZTINA SÁRA LUKICS and ÁGNES LUKÁCS, *Budapest University of Technology and Economics & HAS-BME Lendület Language Acquisition Research Group* (Sponsored by Dezső Németh) – Implicit statistical learning (ISL), our ability to unintentionally acquire patterns and regularities from the environment, plays an essential role in shaping human behavior. ISL has been shown to be independent from other cognitive skills by earlier studies employing mainly nonlinguistic ISL tasks. However, testing linguistic ISL is essential as it has a crucial role in language acquisition and use. We tested how two potential background abilities, processing speed and verbal short-term memory contribute to ISL performance measured by a novel word segmentation paradigm, which, besides assessing learning post hoc, is able to track the process of learning online. We found that processing speed showed a positive association with ISL scores, while verbal short-term memory showed no such association with auditory linguistic ISL performance. We conclude that the speed of information processing is a significant factor contribution to the variability of ISL.

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5:30-7:30 PM (1302)

Mechanisms of Predictability and Repetition-Priming Effects on Speech Recognition in Noise. LIAM GLEASON and WENDY FRANCIS, *University of Texas at El Paso* (Sponsored by Wendy Francis) – Predictability and repetition of sentences are both known to facilitate speech recognition in noise and increase recognition accuracy. While both effects have been attributed to top-down processing, they may operate at different processing levels. In the case of semantic constraint, top-down effects could reasonably come from the semantic level, but the repetition effects may be top-down only within the perceptual system. We therefore crossed manipulations of semantic constraint (high/low) and repetition and added a visual repetition condition. Specifically, participants listened to 1/3 of the sentences and read 1/3 of the sentences before beginning a test block in which repeated and new sentences were presented, with varied levels of background noise. After listening to each sentence, participants attempted to report the final word and rated the level of background noise. Constraint and repetition impacted both accuracy and noise ratings, and the effects in accuracy changed across actual noise levels. Reading sentences before the test also increased accuracy, suggesting that the top-down processing comes from the modality-general level of representation outside the perceptual system.

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5:30-7:30 PM (1303)

Reaction Times in a Self-Paced Task Differentiate between the Transitional Probability Approach and Chunking Approach to Statistical Learning. SAMANTHA EMERSON and CHRISTOPHER CONWAY, *Boys Town National Research Hospital* – There are two main theories on how statistical patterns are extracted from sequences: The transitional probability (TP) approach states that statistical learning (SL) occurs through the computation of probabilities between successive items in a sequence. The chunking approach states that SL occurs through the extraction of units from the sequence. Importantly, the chunking approach suggests that representations of subunits should decay as units strengthen while the TP approach suggests that both units and subunits should strengthen with exposure. In a self-paced task, participants viewed sequences of abstract shapes one at a time that were covertly organized into triplets (ABC). However, one triplet in every eight was altered such that the first shape was moved to the last position (BCA) thereby disrupting the full unit while preserving a subunit (BC). Preliminary results (n=14; goal n=70) of a linear mixed model revealed a trend towards quicker reaction times between the first and second shape in both canonical ($p<.001$; 83ms) and altered ($p=.269$; 59ms) triplets. Thus, participants were able to use the transitional probabilities of the subunit to predict the second shape in both triplet types, supporting the TP approach to SL.

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5:30-7:30 PM (1304)

Bayesian Correlation Analysis in the Presence of Measurement Error to Investigate Unconscious Mental Processes. SIMONE MALEJKA, *University College London,* MIGUEL VADILLO, *Universidad Autónoma de Madrid,* ZOLTÁN DIENES, *University of Sussex,* DAVID SHANKS, *University College London* – To investigate the scope of unconscious mental processes, researchers frequently correlate measures of implicit task performance and explicit stimulus awareness, where a non-significant correlation encourages the inference that an unconscious process drives task performance. We highlight the pitfalls of this approach with reference to a study by Salvador et al. (2018) reporting a non-significant correlation between memory suppression by Think/No-Think cues and cue awareness. First, within null hypothesis significance testing, it is inappropriate to interpret failure to reject H0 ($r=0$) as evidence for H0. Instead, a Bayesian approach is needed to compare the evidence for H0 versus H1 ($r>0$). Second, the often low reliabilities of the involved

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measures can attenuate a positive correlation and make it appear to be zero. Hence, correlations must be inferred in a way that disattenuates the effect of measurement (trial) error. We apply two Bayesian models that account for measurement error to the Salvador et al. data. The results provide only anecdotal support for the claimed unconscious nature of memory suppression. Researchers are urged to employ Bayesian methods that account for measurement error when analyzing correlational data.
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5:30-7:30 PM (1305)

Using Eye Movements to Predict Pedestrian Following Behavior in Real World and Immersive Virtual Environments. LUCY DURAND, KRISTEN MACUGA, and ALEXANDER BOONE, *Oregon State University* (Sponsored by Mei-Ching Lien) – Humans shift their gaze to an object they plan on using prior to enacting movement, such that eye movements precede hand movements. To better understand the relationship between eye movements and egress behavior, we examined whether eye movements to neighboring pedestrians can predict following behavior in real world and immersive virtual environments. Fixation frequency and total duration were recorded as participants watched two pedestrians move towards a left or right doorway with varying relative speeds, before exiting the room themselves. Two areas of interest (left and right pedestrians) were predefined. Generalized estimating equation analyses of the real world and virtual reality data indicated that eye fixation frequency and total duration predicted egress behavior such that an increase in the frequency and duration of fixations on the right pedestrian increased the probability of exiting through the right door. These results suggest that we can predict individual following behavior in crowd movements.
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5:30-7:30 PM (1306)

Examining the Relationship between Travel- and Navigation-Related Experiences on Perceptions of Spatial Navigation Ability in an Adult Lifespan Sample. TES SENSIBAUGH, ALEXA MILBRADT-MASSIQUET, and MEREDITH MINEAR, *University of Wyoming* (Presented by Meredith Minear) – Older adults tend to have more negative perceptions surrounding spatial navigation than young adults, with lower confidence in their navigation ability and greater anxiety while navigating. It is possible that differences in navigation-related experience across the lifespan may influence such perceptions in older adults. The current study investigates how the amount and timing of navigation-related experiences relate to perceived spatial navigation across the adult lifespan. 512 participants (aged 18-88) completed an online survey that assessed how frequently they engaged in travel and 52 hobbies involving navigation. They also completed measures related to self-reported navigation ability, spatial anxiety, and what strategies they tend to use when navigating. Results suggest the amount of navigation-related experience negatively predicts spatial anxiety and positively predicts orientation (allocentric) navigation strategy use. Navigation experience during the early parts of the lifespan (childhood and teenage years) appears to predict current spatial anxiety and orientation strategy use more weakly than does navigation-related experience during later/more recent parts of the lifespan (or overall amounts of navigation experience).
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5:30-7:30 PM (1307)

Decision-making Under Uncertainty: Interpretation and Use of Ranges Depicted in Bar Graphs by End Users Versus Test Users. KRISTEN MACUGA, ANDREA CHIOU, and MEGHNA BABBAR-SEBENS, *Oregon State University* – When interpreting graphical data, people are subject to errors and biases that can be influenced by the type of visualization displayed. This study aimed to assess whether individuals could interpret bar graphs with min/max range bars conveying uncertainty, whether they could use this information to make decisions about watershed conservation plans, and whether test users (students) and end users (stakeholders) differed in their abilities to make these decisions. Both end users and test users were presented with a survey and asked to choose the best watershed conservation plan (out of two options) for each question. All users performed significantly above chance when interpreting graphical elements and making decisions in the presence of uncertainty. No significant differences were found between end users and test users. This suggests that users are able to interpret graphs and make optimal decisions using uncertainty information. It also suggests that test users may be sufficient proxies for end users, when end user testing is not feasible for this type of interface evaluation. We have subsequently implemented these visualizations in an interactive, participatory decision support system, and will also test users in this context.
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5:30-7:30 PM (1308)

Correlational Evidence for the Adoption of Egocentric Mental Rotation in Same/Different Comparisons of Human-Like Objects. HIROYUKI MUTO, *Kyoto University* – People can mentally rotate objects likened to human bodies more efficiently than nonsense objects in a same/different mental rotation task. It has been proposed that this human-body advantage is mediated by one's projections of their own body axes onto a human-like object (spatial embodiment), which implies that human-like objects elicit a strategy shift, from an object-based to an egocentric mental rotation. To test this idea, we investigated whether response times (RTs) for same/different comparisons of human-like objects had a stronger association with egocentric mental rotation ability assessed by psychometric tests (the Road Map Test and the Spatial Orientation Test) than RTs for nonsense objects. Results from 43 female participants revealed that RTs were shorter for human-like than for nonsense objects, replicating the human-body advantage. More importantly, egocentric mental rotation ability had a stronger negative correlation with RTs for human-like than for nonsense objects. These findings suggest that human-like stimuli in a same/different mental rotation task induce a strategy shift toward efficient egocentric mental rotation, supporting the spatial embodiment proposition.
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5:30-7:30 PM (1309)

The Emergence of Head Direction Signals in Human Navigation. YOU (LILY) CHENG and ELIZABETH R. CHRASTIL, *University of California, Irvine* (Sponsored by Elizabeth R. Chrastil) – Travel direction is crucial in human wayfinding, but it is unclear whether it can be discriminated using brain signals during active navigation, and how this signal relates to performance. In an fMRI study, we tested over 90 participants in a cardinal-direction-aligned virtual maze. Participants

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explored the maze and then were tested by traveling from one object to another. We conducted an intra-subject multivariate pattern classification for the four directions during exploration and test. We found that it is easier to discriminate directional signal during movement than when stationary. Preliminary analysis found that the classifier was able to discriminate between the four directions during movement. It was relatively easier to discriminate directional BOLD signals in the test phase than in the exploration phase, suggesting that the head direction signal emerges over time during learning. Our findings demonstrate the emergence of head direction signals during active navigation and their relationship with individual navigational performance.
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5:30-7:30 PM (1310)

On Spatial Ability Under Extreme Visual and Gravitational Environments. NAFISEH FAGHIHI, HANNAH PARK, MANISH DIXIT, and JYOTSNA VAID, *Texas A&M University* (Sponsored by Jyotsna Vaid) – Special jobs under extreme conditions (such as astronauts under zero-gravity or scuba divers under minimal visual cues) demand higher spatial ability and effective spatial strategies. We utilized Virtual Reality (VR) to understand how spatial ability is affected in those environments. This study focuses on the zero-gravity condition, where there is a conflict between the visual and body axes creating an extreme visual condition. Results reveal that under VR-simulated zero gravity, in comparison to the normal condition (i.e. Earth gravity), object manipulation is more adversely influenced than spatial orientation. The outcomes of this study can further prove useful in the illumination of prospective workforce training programs for jobs under such extreme conditions.
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5:30-7:30 PM (1311)

Spatial Ability and STEM Achievement. KARLA PERRERA, NELCIDA GARCIA, and SHANNON PRUDEN, *Florida International University* – The ability to think spatially is correlated with success in STEM. The aim of the current study was to determine whether intrinsic (relations within an object) or extrinsic (relations between/among objects) spatial ability predicts achievement in entry-level STEM courses. Eighty-five undergraduate STEM majors (M=20.49, SD=1.76) completed an online questionnaire composed of an intrinsic spatial task (Mental Rotation Test), an extrinsic spatial task (modified Perspective Taking Spatial Orientation Test), self-report of Calculus I and Physics I grades, and demographic questions. Results show that intrinsic spatial ability significantly explained individual differences in Calculus I grades even when controlling for sex, verbal ability, and socioeconomic status (B=.26, p=.03). No associations between extrinsic spatial ability and Calculus I grade and either spatial ability and Physics I grade were found (lowest p-value=.22). These findings could be utilized to develop interventions that target intrinsic spatial ability in order to increase achievement and retention in Calculus classes.
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5:30-7:30 PM (1312)

Connecting Cognition and Perception: How Novices Conceive of and Perceive Single and Two Force. RACHEL MYER and THOMAS SHIPLEY, *Temple University* (Sponsored by Thomas Shipley) – Physics education and psychology research have found consistent alternate force conceptions in novices, and perception research has found that animations of plausible and implausible forces appear causal. This experiment combined these lines of research to explore predictions and perception of one and two force interactions. Participants (N=111) drew the path a ball would take when acted upon by single forces and two forces acting simultaneously or sequentially. Participants rated perceptual animacy and naturalness of animations of correct solutions, paths taking inaccurate angles, and high frequency alternate conceptions. Participants most frequently drew correct paths for forces aligned on a single dimension. For two forces not aligned on one dimension, participants drew correct paths, but also paths that took inaccurate angles, were curved, or were aligned with only one of the two forces. Perception results found that the animacy and naturalness ratings were all highly correlated (|r|>.48), with animations of both the correct solution and high frequency alternate conceptions appearing more natural and inanimate. In contrast, animations that deviated from the correct solution by 180 degrees appeared more unnatural and animate.
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5:30-7:30 PM (1313)

The Devil is in the Details: Exploring the Impact of Graphical Level of Detail on Spatial Orienting with 3D Geo-Visualizations. AARON GARDONY, *U.S. Army Combat Capabilities Development Command Soldier Center & Center for Applied Brain Cognitive Sciences,* CARLENE HORNER and DALIT HENDEL, *Center for Applied Brain Cognitive Sciences,* TAD BRUNYÉ, *U.S. Army Combat Capabilities Development Command Soldier Center, Center for Applied Brain Cognitive Sciences, & Tufts University* – Photogrammetry-based 3D terrain reconstruction and interactive visualization applications have the potential to fundamentally change the way individuals view, manipulate, and reason with large scale environments. However, hardware processing capacities and network bandwidth limitations constrain the quality and quantity of 3D data that users can effectively visualize. In the present study, we examined what graphical level of detail (LOD) is sufficient to support effective spatial orientation when using an interactive 3D geo-visualization application. We developed a desktop split-screen orienting and geo-visualization task using photogrammetrically-derived 3D terrain models at varying LODs. Soldier and civilian participants (n=64) interacted with the geo-visualization in order to localize their ground location and orient and point towards a distant objective. Crucially, on a trial-by-trial basis we manipulated the LOD of the visualized model and tracked geo-visualization behavior and spatial orienting performance. Results demonstrated moderate (rather than maximum) LOD is sufficient for spatial orienting, findings which carry both theoretical and practical implications.
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5:30-7:30 PM (1314)

Language Framing as a Source of Influence in Directional Biases in Representational Drawing. OMAR GARCIA, NAFISEH FAGHIHI, and JYOTSNA VAID, *Texas A&M University* (Sponsored by Roberto Heredia) – The direction in which the front of an object is oriented in representational drawings shows distinct biases attributed to

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biomechanical (ease of movement), cultural (learned habits arising from reading/writing direction), and/or biological factors (attentional asymmetries). Are directional biases also influenced by how a to-be-drawn object is described? Our study examined overall facing direction (rightward or leftward) and relative placement in a graphic frame (inward or outward from the center) of a single object (a fish) among right-handed readers of English. The drawings were elicited under different framing conditions (e.g., a fish swimming forward vs. a fish). Results revealed a rightward facing bias when linguistic framing implied directional movement (e.g., forward). However, in the absence of such cues no directional biases emerged. An inward bias was also noted for rightward facing drawings. Findings are discussed in the context of mental representation of time-progression and linguistic influences on directional biases.
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5:30-7:30 PM (1315)

What Are Elementary Teachers' Attitudes and Beliefs about Spatial Thinking and Math? HEATHER BURTE, *Texas A&M University,* AARON GARDONY, *Tufts University,* ALLYSON HUTTON, *Think3d!,* HOLLY TAYLOR, *Tufts University* – Recent studies have developed and evaluated spatial thinking interventions for elementary students' math learning. If these interventions are to be widely adopted, elementary teachers must lead them in their classrooms. However, teachers' beliefs about math and their math anxiety can impact students' beliefs, anxiety, and performance in math. In order to design interventions with teacher-led administration in mind, it is critical to understand teachers' attitudes and beliefs towards spatial thinking and math. In this work, we investigated teacher attitudes and beliefs in three areas: teaching and learning math, spatial abilities, and spatial thinking in mathematics. We found numerous connections between teachers' attitudes and beliefs about math and spatial thinking. For instance, a factor analysis revealed one factor that connected stereotypical math thinking with both math and spatial anxiety, and another that connected spatial competencies, efficacy in teaching and learning math, and spatial thinking within math. These connections indicated that spatial interventions targeting math should include support for teachers, particularly for teachers with negative perceptions of their spatial skills and/or math-teaching skills.
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5:30-7:30 PM (1316)

Misrepresentation of Sensory Noise as a Source of Sub-Optimality in Bayesian Cue Combination – Evidence from Human Spatial Navigation. XIAOLI CHEN, *Zhejiang University,* HWEE-LING LEE, *German Center for Neurodegenerative Diseases (DZNE),* TIMOTHY MCNAMARA, *Vanderbilt University,* THOMAS WOLBERS, *German Center for Neurodegenerative Diseases (DZNE)* – The Bayesian model of cue integration posits that different types of cues are weighted in terms of cue relative reliability as measured in self-performance. Recently, we reported a novel phenomenon in spatial navigation that cannot be explained by this model -- confidence rating of self-performance uniquely contributes to predicting weights assigned to landmarks vs. self-motion cues, after cue relative reliability has been accounted for (Chen et al., 2017). The current study successfully replicated this finding using a similar paradigm. To account for this finding, we reinterpreted and modified the Bayesian model by dissociating sensory noise and its representation in the cognitive system. We hypothesize that sensory noise can be inaccurately represented, and it is how sensory noise is represented that directly influences cue weighting. We employed computational modeling techniques and found that cue weight was best modeled as a function of confidence rating, with limited contribution of sensory noise. Our findings re-conceptualize the Bayesian model of cue integration by formalizing the critical insight that seemingly sub-optimal cue combination behaviors can stem from misrepresentation of sensory noise inherent in the cues.
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5:30-7:30 PM (1317)

The Role of Working Memory in Direction Giving for Wayfinding. ALYCIA HUND, DARIN ROBERTS, and RACHEL MILLARD, *Illinois State University* – Wayfinding and direction giving are complex processes that rely on working memory (Gras et al., 2013; Hund, 2016; Meilinger, Knauff, & Bülthoff, 2008). The present study investigated the role of working memory in direction giving in an outdoor environment. Ninety-nine participants described the best routes from starting locations to destinations on their university quad. They completed the direction giving on its own and while completing two secondary tasks (verbal word-nonword judgments and visuospatial decisions about analog clock times) across six trials. Participants provided significantly more spatial details on control trials than on verbal or visuospatial trials. They also provided significantly more details when outside standing at the starting location than when imagining the locations from inside. Wayfinding directions were significantly more accurate on control trials than on visuospatial trials. These findings provide important details about the role of verbal and visuospatial working memory in direction giving for wayfinding.
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5:30-7:30 PM (1318)

The Influence of Environmental Structure on Measures of Spatial Navigation. CHUANXIUYUE HE, *University of California, Santa Barbara,* ALEXANDER BOONE, *Oregon State University,* MARY HEGARTY, *University of California, Santa Barbara* – In a complex environment, like a maze, it is essential to understand whether and how environmental structure may shape mental representations of the space, and consequently how people navigate the space (e.g., take shortcuts). In two experiments (Ns = 56, 60) participants learned a route through a virtual maze and were then asked to make direction estimates and travel to maze locations by the shortest route. Results indicated that their spatial knowledge was imprecise such that direction estimates had an average angular error of close to 70 degrees. This imprecise but partially accurate knowledge enabled participants to find novel paths to the targets, which were shorter than the learned route, but not always the shortest paths. Direction estimates were more accurate and paths were more direct if the starting or target locations were near maze boundaries. These results highlight the importance of understanding the testing environment when using task performance to infer spatial knowledge acquisition. They suggest that developing mental representations of an environment depend on its structure and do not encode the details of different parts of environment equally.
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5:30-7:30 PM (1319)

Preferences for Spatial Perspectives: Associations with Objective and Subjective Measures of Spatial Ability. TAD BRUNYE, *Center for Applied Brain Cognitive Sciences, U.S. Army Combat Capabilities Development Command Soldier Center, & Tufts University,* CARLENE HORNER, *Center for Applied Brain Cognitive Sciences,* AARON GARDONY, *Center for Applied Brain Cognitive Sciences & U.S. Army Combat Capabilities Development Command Soldier Center,* HOLLY TAYLOR, *Center for Applied Brain Cognitive Sciences & Tufts University* – Individual differences in spatial perspective and strategy preferences are frequently measured using questionnaires, and are thought to index relative reliance on egocentric, allocentric, and landmark-based cue reliance during real-world navigation. It is largely unknown, however, how these relate to the cognitive processes underlying spatial ability, such as mental rotation and perspective-tasking. The present study assessed relationships between two commonly used spatial perspective and strategy questionnaires and several subjective (self-reported sense of direction, spatial anxiety) and objective (mental rotation, spatial perspective-taking) measures of spatial skill. A large participant sample (N>1000) completed a set of seven subjective and objective measures of spatial preference and ability, and our analyses examined instrument reliability and relationships among measures. Results demonstrated mixed support for the reliability of subjective spatial preference measures, and some unexpected relationships between subjective and objective measures of spatial ability. Theoretical and practical implications of these results are discussed, with an emphasis on guiding the selection of measures for future research.
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5:30-7:30 PM (1320)

A Comparison of Two Measures of Spatial Memory of a Navigable Virtual Building Using Direction Circles: Judgments of Relative Direction and Object-Based Judgments. ZACHARY CARPENTER and HERBERT COLLE, *Wright State University* – Knowledge about the spatial layout of environments is commonly measured using directional pointing. Two common queries were compared: judgments of relative direction (JRDs) and object-based judgments (OBJs). JRDs refer to three objects, a standing at/base object, an object faced from the base position, and a target object pointed at. It was argued that JRDs could be predicted from OBJs (imagine facing the solid front of the base object and to point to a target object). The angular difference between two OBJ pairs, base-facing and base-target, can estimate a JRD for the same three objects. As inventory clerks, students (N = 72) experienced a virtual building environment of four rooms with four objects per room. Following which, three groups completed a JRD task, an OBJ task, or a DualOBJ task (two successive OBJ judgments with the sequential order of the JRD instructions). Estimated JRDs from both OBJ and DualOBJ tasks were comparable to actual JRDs. Manipulating facing object location (same or different room as the base and target objects, holding base to facing angles constant) had a large effect, $F(1, 46) = 48.4$, $\eta_p^2 = 0.51$, $p < .0001$, but the JRD estimates were still comparable. Implications of this commonality are discussed.
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5:30-7:30 PM (1321)

Sleep Deprivation and Placekeeping Deficits: Does It All Come Down to Attention? ELLE WERNETTE, ERIK ALTMANN and KIMBERLY FENN, *Michigan State University* (Sponsored by Kimberly Fenn) – Researchers have suggested that sleep deprivation impairs higher-order cognition via attentional deficits. However, we recently found that attentional deficits did not fully mediate effects of sleep deprivation on placekeeping, a higher-order process that involves executing a sequence of steps in order without repetitions or omissions despite interruptions. This finding was for verbal placekeeping, and we sought to replicate it with a visuospatial placekeeping task, Letterwheel. Participants completed Letterwheel, the Psychomotor Vigilance Task (PVT), and Multiple Object Tracking (MOT) in the evening, were randomly assigned to stay awake for the night or sleep, and completed these tasks again in the morning. Preliminary results show that attentional deficits in PVT or MOT fully mediated effects of sleep deprivation on Letterwheel. The results suggest that the relationship between sleep deprivation, attentional deficits, and criterion task performance depends on overlap in modality of the attention and criterion tasks.
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5:30-7:30 PM (1322)

Multimodal Instruction Enhances Learning of Physical Layouts of Space. ZOSIA ROBERTS and CHRISTOPHER SANCHEZ, *Oregon State University* – The multimodal principle suggests that presenting conceptual information in multiple modalities (e.g., both text and narration) can positively impact learning. While this effect has proven robust for the attainment of conceptual knowledge or science facts, it has not been explored relative to the formation of mental representations of physical spaces or layouts. In this experiment, participants were given a verbal walk-through of a spatial location (an imaginary farm), which contained 13 explicit locations. Participants either read this description, heard a narrated reading of this description, or instead received both text and narration simultaneously. Visuospatial ability was also measured for all participants. How well they learned the layout of the physical space was then evaluated using both a multiple choice relations test and a map identification task. Results indicated that the multimodal presentation led to significantly better learning in both measures, while narration alone was only beneficial for the multiple choice relations test. Text alone was always the worst performer. These results thus replicate and extend previous research on multimodal learning to the learning of navigable space.
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5:30-7:30 PM (1323)

The Dominance of Prior Location Expectancy over Inconsistent Visual Data. CRISTINA SAMPAIO, *Western Washington University,* FRANCES WANG, *University of Illinois at Urbana-Champaign* – People's expectations help them make judgments about the world. In the area of spatial memory, the interaction of existing knowledge with incoming information is best illustrated in the category effect, a bias in positioning a target toward the prototypical location of its region (Huttenlocher, Hedges, and Duncan, 1991). According to Bayesian principles, these biased judgments are weighted averages of a target's metric code (incoming data) and spatial categorical code (prior expectation). While

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previous research in the category effect generally focused on presence and reliability of different sources of information, we examined a scenario in which prior expectation is violated. Specifically, we investigated the role of prior expectations in location memory when these conflict with visual perception. We found that people favored their previous knowledge about where a target ought to be over the visual data on the actual target location. Hence, our work contributes to the literature by demonstrating the dominance of prior expectations over incongruent visual cues, and the data extends the context effect to spatial memory.
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5:30-7:30 PM (1324)

Modeling Judgments of Relative Direction. PHILLIP NEWMAN and TIMOTHY MCNAMARA, *Vanderbilt University* (Sponsored by Timothy McNamara) – Spatial memories are encoded and retrieved relative to spatial frames of reference, causing spatial memories to be more accessible from some viewpoints relative to others. Decades of research has shown that humans making judgments of relative direction are more accurate and take less time when pointing to a target location if the imagined viewpoint is aligned with a familiar perspective or environmentally salient axes. Although the judgments of relative direction task has taught us much about the structure and formation of spatial memories, to our knowledge a computational model of this task has not yet been introduced. Thus, we present our first attempt at modeling this task. The model inputs a set of reference directions and generates a memory representation containing noisily encoded vector relationships between objects in a layout. The model completes each trial by making a pointing response to a target object from a given standing location and heading direction. When the heading direction is aligned with a reference direction, the model computes the angle between the noisy vectors; but, when the facing direction is misaligned, the model must infer the relation between the target and the misaligned facing direction.
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5:30-7:30 PM (1325)

Examining the Influence of High-Functioning Autism and Perceived Cognitive Flexibility on Spatial Discrimination Memory in Young Adults. SARAH WONG-GOODRICH, AMANDA BARTLEY, NATHAN LOWRY, and BARRY JAMES, *Iona College* – Hippocampal pattern separation processes, which allow for the discrimination of similar events in memory, are thought to aid cognitive flexibility. In autism spectrum disorder (ASD), impaired cognitive flexibility is a common associated deficit. In the current study, we examined the influence of high-functioning (HF) ASD and perceived cognitive flexibility in spatial discrimination memory function in young adults. Participants (18-26 years old) completed a self-report Cognitive Flexibility Scale (CFS) and a spatial delayed match-to-sample task. Compared to neurotypical participants (n=73), participants with HF-ASD (n=12) had significantly lower spatial discrimination performance and lower CFS scores. Further analyses revealed that spatial discrimination memory performance was significantly highest for neurotypical participants with above-average CFS scores, followed by neurotypical participants with below-average CFS scores, and finally participants with HF-ASD. These findings suggest that spatial pattern separation is impaired in HF-ASD, which may be linked to decreased cognitive flexibility, and that increased cognitive flexibility in neurotypical young adults may confer an advantage in pattern separation tasks.
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5:30-7:30 PM (1326)

Effects of Students' Self-Regulated Learning Strategies on Math Achievement: with Hierarchical Linear Modeling. CHEYEON HA, *Florida State University* – The purpose of the study is to explain the relationship between self-regulation skills and the math achievement of sixth-grade students compared to successful learners' three self-regulated learning features. This study analyzed the Korean Educational Longitudinal Study (KELS) data, including sixth-grade students (n=7,200) from 457 schools, and investigated students' three self-regulation subfactors (i.e., CS: cognitive learning strategies, BS: behavioral learning strategies, and MB: motivational beliefs). I ran a series of 2-level Hierarchical Linear Modeling (HLM) models to address the research questions on how the subfactor of CS, BS, and MB related to sixth-graders' math achievement. I investigated the level-1 effects with gender, and subfactors of CS, BS, and MB; also explored the level-2 effects with the variables of school type and school location. Students' elaboration and metacognition strategies meaningfully predict math achievement. I found that there was a significant academic achievement gap, depending on gender groups, school types, and locations related to their self-regulation. In addition, the results showed sixth-grade students are still developing self-regulation skills or have yet to use them meaningfully.
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5:30-7:30 PM (1327)

Rules vs. Chunks: What Is Prioritized during Artificial Grammar Learning? SONIA SINGH, *Georgia State University,* CHRISTOPHER CONWAY, *Boys Town National Research Hospital* – The artificial grammar learning (AGL) paradigm has been used to examine the ability to implicitly acquire structured information (Reber, 1967). To investigate the extent to which information such as grammaticality (the extent that sequences are consistent with the rules of the grammar) and chunk strength (a measure of a test item's surface similarity to training sequences) influence learning over time, an AGL task was administered to thirty-five adults. During Training, participants reproduced symbol sequences generated from the grammar; during Test, participants judged whether new sequences followed the pattern or not. Apart from grammatical (G) or nongrammatical (NG), sequences could also have high vs. low chunk strength.Results from a 2 (G vs. NG) x 2 (H chunk vs. L chunk) x 2 (1st half vs. 2nd half) repeated measures ANOVA revealed a statistically significant interaction of condition x time [$F(3,102)=112.601$; $p=<.001$; $h^2=.326$], with grammaticality and chunk information influencing performance most strongly during the first half and second half of testing, respectively. These results reveal that increased exposure to test items differentially influences the expression of grammaticality and chunk strength knowledge during AGL.
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5:30-7:30 PM (1328)

Exploring With Contrasting Cases Prepares Undergraduate Physics Students for Future Learning. CAMPBELL BEGO, RAYMOND CHASTAIN, and MARCI DECARO, *University of Louisville* – In

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exploratory learning, students explore a novel concept by completing an activity immediately before instruction on the topic, reversing the typical instruct-then-practice sequence. Activities can vary widely, and research has focused on invention prompts with either (a) "contrasting cases" that vary around problem features (Schwartz & Martin, 2004), or (b) a "rich dataset" that promotes strategy generation and failure (Kapur, 2014). We assessed the benefits of exploratory learning in an undergraduate physics course by giving students an activity either before or after instruction. In Study 1, students who explored using contrasting cases scored higher on conceptual knowledge and transfer to a related topic than students in an instruct-first condition. In Study 2, students who explored using a rich dataset scored equally to those in an instruct-first condition. Use of contrasting cases during exploration may uniquely improve conceptual understanding and prepare students for future learning.
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5:30-7:30 PM (1329)

Comparison of Astronauts and Undergraduates on Simple Motor and Complex Memory Tasks. JAMES KOLE, *University of Northern Colorado,* IMMANUEL BARSHI, *NASA, Ames Research Center,* ALICE HEALY, VIVIAN SCHNEIDER, and CAROLYN BUCK-GENGLER, *University of Colorado, Boulder* – Astronauts, astronaut-like, and undergraduate students were compared on long-term retention and transfer of both a simple motor task and a complex memory task. For both tasks, subjects completed training followed by two delayed tests, with the first 6 months and the second 8 months after training. The simple task was data entry, which required typing 4-digit numbers using the right hand. For the first delayed test the standard data entry task was followed by a left-hand variant. For the second the standard task was followed by a code variant that required translating letters into digits, then typing the digits with the right hand. The complex memory task involved continuous memory updating, for which subjects studied name-location associations and were tested for the location most recently associated with a given name. For the first delayed test subjects completed the memory-updating task under normal conditions. For the second they completed the task while performing a concurrent secondary task. Both data entry and memory updating tasks were negatively impacted by conditions involving higher cognitive load (code variant, concurrent secondary task), but the undergraduates showed a larger impact than did the other two groups.
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5:30-7:30 PM (1330)

Mnemonic Scaffolds for Serial Recall. FELICITAS KLUGER, JEREMY CAPLAN, DEBBY OLADIMEJI, YUWEI TAN, and NORMAN BROWN, *University of Alberta* (Sponsored by Jeremy B Caplan) – High levels of serial-recall performance can be achieved with so-called associative mnemonic techniques, of which the Method of Loci is the most well known. Here we ask if some "scaffolds" are superior to others. We compared four self-generated mnemonic scaffolds (loci, body parts from foot to head, autobiographical story, and routine activity), and assessed individual differences in visual imagery vividness, visuospatial ability and body perception. All scaffolds except routine activities significantly improved serial-recall accuracy, with loci and body on top. Individual-difference measures did not explain variability in the usefulness of any scaffold. Curious about the success of the Body scaffold, in a follow-up experiment, we asked whether embodiment could be responsible for its effectiveness. However, three groups of participants following procedures varying in the level of attention drawn to one's own body performed equivalently (BF<0.3), suggesting that embodiment does not contribute to the effectiveness of the Body Scaffold Method. In conclusion, the Method of Loci might not be universally superior to other scaffolds, and especially the Body Scaffold Method provides an effective alternative for most learners.
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5:30-7:30 PM (1331)

Chunking of Sequence Memories During High-Stress Sleep Deprivation. KYLE LAFOLLETTE, *University of Arizona & Case Western Reserve University,* BRIEANN SATTERFIELD, *University of Arizona & Washington State University,* MICHAEL LAZAR, SIMON ESBIT, and IAN ANLAP, *University of Arizona,* BROOKE MACNAMARA, *Case Western Reserve University,* WILLIAM KILLGORE, *University of Arizona* (Sponsored by Brooke Macnamara) – Sleep supports the consolidation of memory, yet there is some debate concerning how it supports motor sequence memories. Conflicting reports suggest that sleep bolsters motor sequence recall, merely sustains it, or has no effect at all. We suggest that individual differences in discrete motor chunking and chunk concatenation may explain this schism in the literature. Here, we investigate the continuous developmental trajectory of chunking behavior in discrete motor sequence production (DSP) throughout a night of high-stress sleep deprivation. We utilize a computational model of residual DSP reaction times to estimate individuals' chunking structures and motor variability. Bayesian GLMs are conducted to estimate population-level effects of chunking behavior on DSP accuracy, with sleep and stress covariates.
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5:30-7:30 PM (1332)

Effects of Diversity of Cognitive Training on Transfer: Insights from a Large Observational Dataset. ALLEN OSMAN, NICOLE NG, KELSEY KERLAN, PAUL JAFFE, and ROBERT SCHAFER, *Lumos Labs* – How might transfer from cognitive training depend on the diversity of trained cognitive functions or domains? Does such diversity influence how far or widely cognitive training transfers to other activities in the lab, clinic, or real world? To address these questions, we analyzed a large online observational dataset involving 120,000+ individuals who each played between 1 and 87 different Lumosity games a total of 100 to 5,000+ times. Diversity of gameplay was indexed by Shannon's measure of information (e.g., sixteen games played with equal frequency would equal four bits). Gameplay was preceded and followed by assessment on a battery of eight neuropsychological tests. Changes in performance on the test battery for each individual were examined as a function of the number and diversity of their intervening games. The results have both practical implications for the design of cognitive training and provide insight into the basic mechanisms of transfer of training.
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5:30-7:30 PM (1333)

Effector-Dependent and Effector-Independent Sequence Learning in Mental and Physical Practice. STEPHAN DAHM, *UMIT TIROL*

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Private University, MATTHIAS WEIGELT, *Paderborn University,* MARTINA RIEGER, *UMIT TIROL Private University* – Mental practice (MP) is often less effective than physical practice (PP). In PP effector-dependent representations evolve at later stages of learning than effector-independent representations. We investigated whether different types of representations have a different time course in PP and MP in a sequence learning task. Participants performed MP, PP, or control practice (CP) in four sessions which started with a test each. Additionally, they were tested 3 days after the last practice session. The practiced sequence, a mirrored sequence, and two different sequences were tested with the practiced and unpracticed hand. Results show that in the practiced and in the unpracticed hand, movement times were significantly shorter in the practiced sequence than in the other sequences after MP and PP, but not after CP. Further, movement times in the practiced sequence were significantly shorter in PP than in MP and CP. In conclusion, we observed sequence learning and intermanual transfer in PP and MP. Sequence learning involved mainly effector-independent representations which were learned more effectively in PP than in MP.
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5:30-7:30 PM (1334)

Can Sex Differences in Acquired Performance on an Action Video Game Be Virtually Eliminated by Guiding Participants to Avoid Poor Strategies? BRENDAN CLARK, KYLE HARWELL, K. ANDERS ERICSSON, and WALTER BOOT, *Florida State University* – Men outperform women on certain spatial tasks, and this has been inferred to be due to innate and unmodifiable differences based on analyses of overall performance on those tasks. The current study investigates the detailed series of actions mediating performance on a spatially demanding action video game (Space Fortress). Previous research on sex differences has shown that the male superiority can be accounted for by strategies that are superior to those selected by females. The current study examined whether an experimental condition with a short, targeted intervention (directing females to avoid adopting poor strategies) would improve female performance compared to a control condition as well as dramatically reduce the sex differences in performance on this task. This experimental study is one of the first to show that sex differences in performance on a spatially demanding task can be virtually eliminated with experimental guides toward superior strategies spontaneously adopted by males.
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5:30-7:30 PM (1335)

Investigating How Extensive Action Video Game Experience Is Correlated with Learning a Novel Manual Control Task when Controlling for Strategy and Interface Familiarity. KYLE HARWELL, K. ANDERS ERICSSON, WALTER BOOT, and BRENDAN CLARK, *Florida State University* (Sponsored by K. Anders Ericsson) – The prospect of harnessing leisure-time activities to enhance performance of societally-valued activities has led to interest in studies reporting that individuals who play action video games (gamers) outperform non-gamers in laboratory measures of cognitive abilities. Some influential researchers have proposed that the superior task performance of gamers is the result of enhanced general cognitive abilities acquired through gaming experience, despite the current lack of understanding of the cognitive processes mediating this superiority. The present study will examine the micro-structure of the behaviors defining task performance for gamers and non-gamers learning to play an unfamiliar video game. After examining adoption of differentially successful strategies through machine learning, we will model how much of the individual differences in performance can be attributed to strategy selection when participants play with one of two different physical interfaces. Implications for purported enhancement of general cognitive abilities through video game play will be discussed.
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5:30-7:30 PM (1336)

The Perception of Temporal Order of Abstract and Environmental Sounds. FOTIS FOTIADIS, *Panteion University of Social and Political Sciences,* VERA TSOGLI, *University of Bergen,* ARGIRO VATAKIS, *Panteion University of Social and Political Sciences* (Sponsored by Argiro Vatakis) – People face a striking difficulty when they are asked to report the order of a sequence of artificial sounds, but not of speech sounds, presented in a loop (Warren, Obusek, Farmer & Warren, 1969). This phenomenon was taken to suggest that the perception of order in audition is facilitated when the constituent sounds' verbal encoding is more rapid and easy. We investigated if the difference in report accuracy between hard- and easy-to-name sounds would manifest itself when the sequence of sounds would be presented only once. We also wondered if participants would be able to accurately perceive the number of sounds in such auditory sequences. Participants were, thus, asked to report the number and the temporal order of sequences of abstract sounds (same as those of earlier studies) and of environmental sounds (selected so as to be easily named), presented once. Participants had greater difficulty with reporting the number and the temporal order of abstract sounds compared to environmental ones. There was also a different pattern of behavior when reporting the initial and final sounds of each sequence type, suggesting that processes mediating perception of order are qualitatively different depending on sound type.
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5:30-7:30 PM (1337)

Individual Differences in Multisensory Illusory Perception. JOELLE FLOYD, ALEXANDRA LANG, CASSIA HARRISON, CARMEL LEVITAN, and ALEKSANDRA SHERMAN, *Occidental College* – We present behavioral and electrophysiological data (N=43) examining individual differences in perception of two auditory-visual illusions: the double flash illusion (DFI) where sound alters visual perception and the McGurk illusion where visual information alters auditory perception. We investigated the average prevalence of these multisensory illusions, consistency across time, how illusory experiences relate to each other, and how behavioral responses relate to neural signals both during trials and immediately before trial onset. For both illusions, individual susceptibility was highly variable with some participants almost always (or almost never) experiencing both illusions and most in the middle. Interestingly, perception of one illusion was unrelated to the other, suggesting susceptibility to multisensory illusions stems not from a global property such as size of the temporal binding window. There was also high consistency in susceptibility across sessions occurring on different days suggesting there may be stable person-related factors contributing to individual's illusory perceptions.

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5:30-7:30 PM (1338)

Investigation of Causal Perception Under Crossmodal Conditions. KAYLA SOMA TSUTSUSE, JONAS VIBELL, and SCOTT SINNETT, *University of Hawai'i at Mānoa* (Sponsored by Scott Sinnett) – Humans detect visually presented unnatural collisions that break Newtonian motion constraints faster than natural collisions (Kominsky et al., 2017). The present study included a sound at the collision point to evaluate how this effect is modulated under more natural conditions, as real-world collisions include associated sounds. Participants viewed an array of three videos, each depicting two moving objects. Two videos showed discs moving at the same speed in a horizontal back and forth motion, while an oddball video presented discs that either moved slower after (natural) or slower before (unnatural) the collision. Participants indicated the oddball video via keypress. Results demonstrated that sound improved participant accuracy when responding to the natural target but impeded unnatural target detection. These findings suggest the addition of sound possibly aligned with the multisensory expectations of a realistic collision and improved detection, while the presentation of a more unrealistic multisensory event impedes accuracy rates.
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5:30-7:30 PM (1339)

Crossmodal Object Identification Using Novel Objects – Does Object Complexity Matter? GENEVIEVE DESMARAIS and LAURA SCHNEEBERGER, *Mount Allison University* (Presented by Laura Schneeberger) – Encoding specificity applies to object recognition: individuals perform best when objects learned by sight are identified by sight. However, learning to recognize objects by touch creates a violation of encoding specificity: visual identification and haptic identification are comparable. The objects used in these studies varied in form, and the violation of encoding specificity may have been specific to those stimuli. We developed a set of objects with similar overall form that varied on features and contrasted identification performance across the two object sets. Participants explored objects visually OR haptically and then identified objects visually and haptically. Though the 'feature' objects led to more identification errors than the 'form' objects, we observed a violation of encoding specificity for both types of objects when participants learned to identify objects by touch. The violation of encoding specificity appears to be a more general consequence of haptic object processing independent of stimulus complexity.
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5:30-7:30 PM (1340)

Factors Influencing Longitudinal Consistency of Synesthetic Colors for Graphemes. KAZUHIKO YOKOSAWA and KYUTO UNO, *The University of Tokyo,* MICHIKO ASANO, *Rikkyo University* – Our previous longitudinal study on grapheme-color synesthesia revealed a strong correlation between long- and short-term consistencies in grapheme-color associations, and a tendency for lower long- and short-term consistencies for less familiar graphemes (Yokosawa, Uno, & Asano, VSS 2020). In this study, we elaborated on these findings by examining whether the findings were dependent on the writing system and the quality (chroma and luminance) of a grapheme's synesthetic colors. We analyzed longitudinal data on grapheme-color associations in Japanese-speaking synesthetes for 300 graphemes that consisted of graphemes of five writing systems: Japanese Hiragana, Katakana, Kanji, Arabic numerals, and the English alphabet. The results indicated significant correlations between long- and short-term consistencies, independent of the writing system. A multiple regression analysis revealed that grapheme familiarity and luminance, but not chroma, of the synesthetic color for each grapheme independently predicted the short-term consistency. It is suggested that high grapheme familiarity and bright synesthetic colors are related to the consolidation of grapheme-color associations.
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5:30-7:30 PM (1341)

Auditory Information Can Facilitate Visuo-Motor Sequence Learning. YUKI HAN, *Occidental College,* DANIEL SANCHEZ, Amazon, ALEKSANDRA SHERMAN and CARMEL LEVITAN, *Occidental College* – The Serial Interception Sequence Learning (SISL) task is a visuo-motor paradigm in which participants implicitly learn a sequence embedded in noise. We investigated whether adding auditory information in different ways would enhance sequence learning and subsequent transfer to visual-only testing. Across three experiments, auditory information was used either as feedback on the visuo-motor task (Experiment 1) or was presented synchronously with visual information during learning (Experiments 2,3). Robust learning occurred across conditions and experiments; however auditory information enhanced learning only when it was synchronized with visual information. Participants were significantly more accurate, faster, and more precise with synchronized auditory information. Moreover, synchronous crossmodal learning led to transfer effects such that performance on visual-only sequences was enhanced when the sequences were first learned with auditory information. Notably, task performance and transfer was not affected by whether or not participants were aware of learning a sequence.
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5:30-7:30 PM (1342)

Cross-Modal Masked Priming of the Tritone Paradox. LAURA CACCIAMANI, BAILEY TRANQUADA-TORRES, and LAUREN MACLEOD, *California Polytechnic State University* – The tritone paradox is a musical illusion consisting of pairs of octave-ambiguous tones that could be heard as ascending or descending in pitch (Deutsch, 1986). This study investigated whether perception of the tritone paradox can be unconsciously influenced by a masked visual prime—specifically, a musical notation. Participants were first given a "neutral" masked prime (an image of an empty music staff) to assess baseline perception. Then, they were presented with a "meaningful" masked prime consisting of two music notes arranged in either an ascending or descending configuration, depending on their baseline perception. The results showed that the meaningful prime unconsciously shifted participants' perception of the tritone paradox in the direction indicated by the musical notation. Moreover, this effect was observed for both musicians and non-musicians. Together, the results of this study demonstrate that relevant visual images can unconsciously influence auditory perception under conditions of ambiguity.
Email: Laura Cacciamani, lcacciam@calpoly.edu

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5:30-7:30 PM (1343)

Stimulus-Response Compatibility Between Visual Spatial Position and Vocal Pitch. YUSUKE SUZUKI and MASAYOSHI NAGAI, *Ritsumeikan University* (Sponsored by Masayoshi Nagai) – Previous studies have shown cross-modal correspondences between spatial high/low positions and auditory high/low pitch. Several studies also found that auditory pitch influences spatially defined motor responses, implying that perceptual and motoric information regarding spatial and auditory high/low stimuli are shared (SMARC effect). However, it remains unclear whether spatial position influences auditorily defined motor responses. Therefore, we used vocal response. In Experiment 1, participants vocalized high/low pitch in response to spatially high/low stimuli under compatible and incompatible conditions. The onset of vocalization was shorter under the compatible condition than under the incompatible conditions. Experiment 2 replicated this trend even when the spatial position of the visual stimulus was task-irrelevant. Together with previous studies, these results imply that information regarding spatial high/low position and auditory high/low pitch are bidirectionally and consistently shared across perceptual and motor systems.
Email: Yusuke Suzuki, cp0014kk@ed.ritsumei.ac.jp

5:30-7:30 PM (1344)

Repeated Exposure to Audiovisual Stimuli Without Order Bias Recalibrates Audiovisual Simultaneity. KYUTO UNO and KAZUHIKO YOKOSAWA, *The University of Tokyo* (Sponsored by Kazuhiko Yokosawa) – Previous studies have suggested that the multisensory perceptual process in humans is tuned such that the simultaneity of audiovisual stimuli is perceived maximally when lights reach sense organs before sounds. We examined this possibility by focusing on the recalibration of audiovisual simultaneity after controlling for other factors that influence simultaneity judgments. Observers exposed to pairs of audiovisual stimuli presented in a fixed order tend to perceive audiovisual stimuli presented in that order as being simultaneous. We hypothesized that if there was a visual-lead asymmetry in human multisensory perceptual process, sound-first presentations would be reported as more simultaneous when exposed to repeatedly presented audiovisual stimuli without an order bias. A pair of audiovisual stimuli were presented with a time lag chosen among 11 values between -450 (sound-first) and +450 ms (light-first) that were evenly distributed around 0 ms in each trial of an experiment. Participants judged the simultaneity of these stimuli. Results indicated that the point of subjective simultaneity gradually shifted in the negative direction, which corroborated the hypothesis of this study, and support the visual-lead asymmetry theory.
Email: Kyuto Uno, uno@l.u-tokyo.ac.jp

5:30-7:30 PM (1345)

Cortical Scaling Influence of Distracting Stimuli on Congruency Effects. STEVEN HAASE, *Shippensburg University,* GARY FISK, *Georgia Southwestern State University,* BRENDAN ROSENBERGER, *Shippensburg University* – The present research was motivated by evidence that the visual system is divided into two major streams: dorsal and ventral. Here, we hypothesized that congruency effects would be greater for distracting stimuli that were cortically scaled to adjust for the lower spatial resolution of peripheral vision. The task was to identify the central target shape (solid diamonds or squares) surrounded on four sides (top, bottom, left, and right) by distractors of the same (congruent) or different (incongruent) shape. The distractors were presented either near or far (peripherally) from the target. The first experiment showed a congruency effect that was driven by the near (metacontrast) distractors (Cohen's d=-0.83). In the second experiment with the masks presented first, the traditional congruency effect was greatest with the cortically scaled, peripheral distractors (d=-0.75). The peripheral congruent condition was faster than baseline only in the second experiment (masks preceded target). The stronger priming effect with the advance presentation of distractors is perhaps consistent with faster (dorsal) processing of cortically scaled peripheral stimuli under some display conditions.
Email: Steven J. Haase, sjhaas@ship.edu

5:30-7:30 PM (1346)

Does Stronger=Longer? The Relationship Between Perceptual Strength and Subjective Duration. CORINNA MCFEATERS and DANIEL VOYER, *University of New Brunswick* (Sponsored by Daniel Voyer) – Typically, stimulus repetition reduces perceived duration, but when repetition is expected, this tendency decreases. It has been suggested that perceived duration may be related to the strength of the percept and that expectation expands perceived duration for the repeated stimulus because of its effects on perceptual representation. In the current experiment, expectations of repetition were manipulated by changing the probability of stimulus repetition within a trial block. At the same time, stimulus clarity was degraded to reduce perceptual strength, allowing examination of the relationship between perceived duration and perceptual strength. Results suggest that subjective duration for degraded stimuli was actually higher than for unaltered stimuli, which is inconsistent with the proposed relationship between perceived duration and perceptual strength.
Email: Corinna D. McFeaters, corinna.mcfeaters@unb.ca

5:30-7:30 PM (1347)

Localizing Implied Motion in Touch: The Interplay Between the Fröhlich, Onset-Repulsion and Representational Momentum Effect. SIMON MERZ, PAULA SOBALLA, and CHRISTIAN FRINGS, *University of Trier,* CHARLES SPENCE, *University of Oxford* – The present study is the first to investigate perceived onset location of an implied motion sequence, presented to the left forearm, investigating the existence of a tactile Fröhlich / onset-repulsion effect. To gain a holistic understanding of perceived trajectory of motion, perceived offset location was also assessed. Participants indicated the first (onset) or last (offset) location of a sequence of three stimuli, which either did, or did not, imply motion in a consistent direction toward the elbow/wrist. The results of two experiments (overall N=60) reveal a clear data pattern: For the onset location, an underestimation (onset-repulsion) was evidenced, which turned into an overestimation (Fröhlich effect) with increasing speed. For the offset location, this data pattern was reversed. In particular, an overestimation (representational momentum) in motion direction was evidenced, which decreased with increasing speed, replicating previous evidence. Furthermore, perceived onset and offset location reveal strong interdependencies at the level of the single participant. This study is the first to evidence a tactile Fröhlich and onset-repulsion effect, and emphasizes the importance of stimulus speed as a crucial moderator.

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Email: Simon Merz, merzs@uni-trier.de

5:30-7:30 PM (1348)

The Time Course of Composite Face Processing. CARMEN LYNCH, XUE JUN CHENG, and DANIEL LITTLE, *The University of Melbourne* (Presented by Xue Jun Cheng) (Sponsored by James Townsend) – The composite face task is a widely used tool to infer holistic processing of faces. In this task, recognition of one half of a composite face is shown to be hampered by interference from the other half of the face. Although this effect has been documented numerous times, when used in other paradigms, composite faces do not always exhibit effects consistent with holistic processing. The present study explored these discrepant findings by combining a composite face task with a signal-to-respond paradigm. The amount of time taken to make a face recognition decision was manipulated by introducing a signal to respond (at either 50, 100, 200, 400, or 800 ms), and the resulting changes in accuracy were mapped to each signal time. The time course of holistic processing was assessed from this mapping in addition to the fitting of a speed-accuracy trade-off model. We found that holistic processing emerges after approximately 600 ms of processing time and only for easy-to-detect changes.
Email: Xue Jun Cheng, xjcheng@student.unimelb.edu.au

5:30-7:30 PM (1349)

Eye Movements Reveal Dissociable Strategies during Sensorimotor Learning. JIAYIGN XU, *University of California, San Diego,* JONATHAN TSAY and RICHARD IVR, *University of California, Berkeley* – Sensorimotor learning entails multiple processes, some automatic and implicit, others volitional and explicit. A recent study observed a close correspondence between eye movements and explicit aim reports early in learning. Eye movements late in learning, however, fell short of aim reports. In one account, this undershooting may be attributed to an under-performing mental rotation strategy, manifested as a shift in the entire distribution of eye movements. Alternatively, this may be attributed to the added contribution of a second explicit process, where eye movements are not required. To arbitrate between the two accounts, we tracked eye movements during visuomotor adaptation across six days. Surprisingly, eye movements early in learning were bimodal at the aim and target locations. Overtime, eye movements towards the aim locations decreased, while those at the target locations increased. This profile of eye movements reveals a putative transition from mental rotation to "caching" strategies throughout learning. Notable differences also exist in the eye movements at each target, indicating that the strategies enlisted may vary across the workspace. We will increase the subject number in our study to further test the hypothesis.
Email: Jiaying Xu, jiaying.xu@berkeley.edu

Poster Session II

Friday

Poster authors will be present for Q&A between 4-6 PM EST, with posters available for viewing for 6 months, beginning November 6.

POSTER SESSION II

4:00-6:00 PM (2001)

A Meta-Analysis on Mobile-Assisted Language Applications Reveals Moderate Learning Benefit and Significant Publication Bias. MARIELA MIHAYLOVA, SIMON GORIN, THOMAS REBER, and NICOLAS ROTHEN, *Swiss Distance University Institute* (Sponsored by Nicolas Rothen) – Mobile applications are becoming more dominant for foreign language learning, however the literature into their effectiveness on language outcomes remains scarce. We sought to determine whether experimentally validated mobile applications exist for language learning and if learning principles are used. We conducted a meta-analysis on the current experimental literature assessing learning outcomes while using mobile-based language applications. We found a strong overall effect (g=1.03, k=27) of learning achievement using mobile language learning applications. An adjusted effect size of g=0.71 was discovered after publication bias correction, revealing significant publication bias in the field. We also found insufficient power in over half of included studies. Our results demonstrate that experimentally validated applications exist and provide evidence for mobile applications as a tool for second language enhancement. However, findings should be treated with caution as publication bias, together with low power, are present in the current state of the mobile-assisted language learning corpus and could skew the effects. Future studies should replicate and extend the current observations with adequately powered experiments.
Email: Mariela Mihaylova, mariela.mihaylova@unidistance.ch

4:00-6:00 PM (2002)

Challenges in Estimating Dementia via Verbal Fluency Networks. LARRY ZHANG, *Indiana University Bloomington,* NICHOL CASTRO, *University of Buffalo,* REZA HOSSEINI GHOMI and TREVOR COHEN, *University of Washington* (Sponsored by Michael Vitevitch) – Verbal fluency tasks are commonly used in neuropsychiatric tests to evaluate semantic memory. By encoding verbal fluency task data as a semantic network, cognitive scientists and clinicians alike are able to capture valuable information about semantic relationships in memory to diagnose cognitive decline and dementia. However, the act of estimating dementia via fluency data comes with challenges, including missing semantic concepts and semantic links as a result of out-of-sample fluency data not incorporated during semantic network generation. We assess a variety of methods to overcome missing information in networks such as bridging methods, and non-zero initialization of network parameters. We also measure the effect of data size and availability of longitudinal data to inform relative information gain against the broader semantic space. Finally, we propose alternative approaches to overcome data sparsity which may further assist in augmenting current estimation methods.
Email: Larry Zhang, larzhang@iu.edu

4:00-6:00 PM (2003)

Using Experience Sampling to Investigate Affect at Encoding and Episodic Memory. ADELAIDE MCKENZIE, HYUNGWOOK YIM, BEN STONE, and SIMON DENNIS, *The University of Melbourne* – Intensive longitudinal data was collected through the concurrent use of a passive experience sampling (ES) smartphone application collecting

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objective measures of experience, and an ecological momentary assessment (EMA) app collecting self-reported affect. After a week-long retention interval, participants completed a memory test generated from paired ES and EMA data. Participants were asked to select the GPS location at the time of a paired target event from four alternatives. Correct retrieval was not predicted by self-reports grouped by negative valence/high arousal or negative valence/low arousal. Positive valence/high arousal reported at encoding predicted greater probability of incorrect responses. Conversely, positive valence/low arousal predicted greater probability of correct identification of target. At retrieval, choice was predicted by dissimilarities in discrete emotions between target and distractors, suggesting the use of affect as a contextual mechanism.
Email: Simon J. Dennis, simon.dennis@unimelb.edu.au

4:00-6:00 PM (2004)

Outliers Among us: How to Best Identify Extreme Data Points in Reaction Time Data. LAUREN GRANT and DANIEL WEISSMAN, *University of Michigan* (Sponsored by Daniel Weissman) – Outliers can lead to false positives (Type I errors) or false negatives (Type II errors) that distort a researcher's conclusions about the hypotheses under investigation. Given the adverse effects of publishing erroneous conclusions (e.g., contributing to the replication crisis), many researchers seek to identify and remove outliers before conducting their main statistical analyses. However, it is unclear which outlier removal methods are most effective, especially for skewed reaction time (RT) data. Therefore, in the present study, we used simulated RT data to compare several outlier removal methods. We found that Sn (a robust estimator of scale) was associated with the lowest Type I and Type II error rates followed by Cook's Distance (a regression-based approach). In contrast, popular methods such as standard deviation and IQR were associated with unacceptably high Type I error rates. These findings demonstrate that Sn is a highly effective method for identifying outliers in RT data.
Email: Lauren Danielle Grant, ldgran@umich.edu

4:00-6:00 PM (2005)

Simulating Statistical Power Changes in Extended Replications. BENJAMIN TAMBER-ROSENAU and HARUN YÖRÜK, *University of Houston* – Psychology increasingly emphasizes both a priori power calculations and replications. Many non-exact replications increase cognitive demands on participants via added task complexity. If this complexity increases within-condition, within-participant (WCWP) response variability, it could reduce power compared to expectations from previously reported effect sizes. Traditional power analysis does not consider the effects of WCWP variance changes. Here, we report simulations of t-tests to estimate power reduction from changes in WCWP standard deviation (SD) over a fivefold range. Though we held the expected group effect size constant, individual participant (and thus, individual experiment) simulated effect size varied stochastically. Average power reduction grew with WCWP SD and with diminishing sample sizes. Unsurprisingly, to recover lost power, it was far more efficient to add participants than to add trials. Future replication/extension studies that increase task complexity compared to the original studies should explicitly consider WCWP variability and not rely exclusively on reported effect sizes.
Email: Benjamin J. Tamber-Rosenau, bjtamber-rosenau@uh.edu

4:00-6:00 PM (2006)

Validation of Brief Measures of Anger and Sleep Quality. KENNEDY ANDERSON and JOE ETHERTON, *Texas State University* (Sponsored by Kristen Tooley) – Several instruments measuring anger and sleep quality exist, but many are lengthy or narrowly focused. This study compared a new 19-item Brief Anger Scale using the Novaco Anger Scale (NAS) as criterion standard; and a 12-item Brief Sleep Scale using the Athens Insomnia Scale (AIS) and the Bergen Insomnia Scale (BIS) as criterion standards. Undergraduate volunteers (n=254) completed all measures. The Brief Anger Scale correlated strongly with the NAS r(250)=.78, with excellent internal consistency (Cronbach's α=.90). The Brief Sleep Scale correlated well (r=.61 with the AIS and r=.58 with BIS), with good internal reliability (Cronbach's α=.78). Both measures demonstrated strong convergent validity with existing methods, and good internal reliability, supporting their use as brief screening measures.
Email: Dr. Joe Etherton, je27@txstate.edu

4:00-6:00 PM (2007)

Evaluating Research Practices in Psychological Science in Indonesia. FARAH DJALAL, YOSEF DEDY PRADIPTO, and WISNU WIRADHANY, *Bina Nusantara University* – The local government leans towards "publish or perish" attitudes, while having no "scientific police" to make sure that Indonesian researchers commit to ideal research practices. At the same time, it has been almost a decade since Diederik Stapel has been suspended for fabricating and manipulating data. In this study we contrast how often Indonesian scientists commit to questionable research practices (QRP) or commit to ideal research practices. Using two versions of QRP questionnaires, Indonesian scientists were either asked to self-evaluate their commissions to questionable research practices (malicious versions; e.g., "How often do you fail to report all of a study's conditions that are relevant for a finding?"), or to ideal research practices (oblivious versions; e.g., "How often do you completely report all of a study's conditions that are relevant for a finding?"). To measure the level of awareness, a set of questions consisted of knowledge about ideal practices were also asked. The results would give us insight whether Indonesian scientists were unaware of the ethical research practices or they were committing QRP with malicious intent.
Email: Farah Mutiasari Djalal, farah.mutiasari@binus.edu

4:00-6:00 PM (2008)

Easy Online Experimentation with Lab.js. FELIX HENNINGER, *University of Mannheim,* YURY SHEVCHENKO, *University of Konstanz,* ULF MERTENS, *University of Heidelberg,* PASCAL KIESLICH, *University of Mannheim,* BENJAMIN HILBIG, *University of Landau* – Browser-based research enables flexible, location-independent data collection, with access to larger, more representative samples. With lab.js, a free and open-source experiment builder, stimuli can be designed and combined into studies using a graphical interface, without writing code. Experiments constructed with lab.js can be run both online and in-laboratory, hosted via multiple public data collection services as well as on researchers' own web servers. Through empirical validation studies, we show that lab.js keeps and measures presentation and response times with high accuracy and precision across platforms. The software is also built to facilitate open, cumulative science: Studies can be shared in an editable format, archived, adapted and re-used, enabling effortless,

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transparent replications. The software is provided free of charge under an open-source license; further information, extensive documentation and teaching materials are available from https://lab.js.org.
Email: Felix Henninger, mailbox@felixhenninger.com

4:00-6:00 PM (2009)

Counterfactual Reasoning over Large-Scale Human Performance Optimization Experiments. ION JUVINA, *Wright State University* WILLIAM AUE, *Wright State Research Institute,* BRANDON MINNERY, *Kairos Research,* PASCAL HITZLER, *Kansas State University,* SRIKANTH NADELLA, *Kairos Research,* MD SARKER, *Kansas State University* – Human performance optimization (HPO) interventions often show promising effects in the lab but weaker or insignificant effects in real-world settings. This may be due to contextual factors that increase variability among subjects or tasks and mask the intervention effect. We use counterfactual (CF) reasoning over large-scale HPO experiments to predict what would the intervention effect have been for specific subject-level or task-level contextual features. Contextual features are taken directly from the data (e.g., demographics, personality traits, choice history) or extracted from linguistic input (e.g., task descriptions, user generated rationales). Out-of-sample subjects or tasks are matched with their in-sample counterparts based on contextual features. A causal model that integrates independent, dependent, and contextual variables is developed for each dataset and model parameters (e.g., factor scores, path coefficients) are used to make CF predictions. Results suggest that the magnitude of the observed treatment effect can be increased by applying contextual filters either before or during an HPO intervention. Work in progress includes contextual reasoning with knowledge graphs and generalizing to large-scale biological data.
Email: Ion Juvina, ion.juvina@wright.edu

4:00-6:00 PM (2010)

The Contribution of Temporal Analysis of Pupillometry to Deciphering Cognitive Conflicts. RONEN HERSHMAN, DALIT MILSHTEIN, and AVISHAI HENIK, *Ben-Gurion University of the Negev* (Sponsored by Avishai Henik) – Reaction time (RT) is one of the most frequently used measures to detect cognitive processes. When tasks require more cognitive processes / resources, reaction is slower. However, RTs may provide only restricted information regarding the temporal characteristics of cognitive processes. Pupils respond reflexively to light but also to cognitive activation. The more cognitive resources a task requires, the more the pupil dilates. However, despite being able to use temporal changes in pupil size (advanced devices measure changes in pupil diameter with sampling rates of above 1,000 samples per second), most past studies using pupil dilation have not investigated temporal changes in pupil response. This led us to develop a novel approach to analyze pupil changes. This approach enables detection as well as temporal characterization of cognitive processes. Our analysis detects differences in pupil size caused by different conditions and, based on the time frames of the differences, can determine the location of a cognitive process in time.
Email: Avishai Henik, henik@bgu.ac.il

4:00-6:00 PM (2011)

Don't Cram Questions! Mobile Devices and the Matrix Format Will Impair Data Quality in Online Study. YOSHIMASA MAJIMA, *Hokusei Gakuen University* – Participants in online studies usually completed Web-based questionnaires using various devices. The present study investigated whether the type of device, specifically mobile one, and the matrix presentation format impair qualities of data obtained in online study. A total of 1,005 participants (520 mobile and 485 PC users) assigned to either single or matrix format and completed questionnaires including attentional checks, and personality scales, such as Rosenberg's self-esteem scale and Ten-item Personality Inventory. Our results showed that participants using mobile device tended to fail the instructional manipulation check and show lower internal consistencies of self-esteem items and inter-item correlations of TIPI than PC users. Furthermore, it was also shown that data quality was relatively lower when participants were presented with questions in matrix form than single (one item per page) form. The present study recommends that researchers should unpack question materials to a manageable size.
Email: Yoshimasa Majima, majima.y@hokusei.ac.jp

4:00-6:00 PM (2012)

Comparison of Author Recognition Test Online Formats. ARIEL JAMES, *Macalester College* – The Author Recognition Test (ART; Acheson, Wells, & MacDonald, 2008; Stanovich & West, 1989) is a frequently-used measure of print exposure. The original version of the ART is administered as a paper-and-pencil test. Participants select the names of authors that they recognize from a list that includes real authors and an equal number of foils. James and colleagues (2018) created a computerized version in which names were presented one at a time; they found that scores had promising internal consistency and predictive power. Still, it is not clear that this novel administration is as robust as the original version, and whether it is well-suited for online studies. The current study compares two computerized versions for administration online via the Qualtrics survey platform: one with all names on a single page, and one with one name at a time. Results from 200 participants suggest that the all-at-once version results in better compliance and fewer false alarms.
Email: Ariel N. James, ajames2@macalester.edu

4:00-6:00 PM (2013)

Use Median d' When Comparing Across Conditions. HEATHER DALY, MARK PITT, and TRISHA VAN ZANDT, *The Ohio State University* (Sponsored by Mark Pitt) – Evaluation of perceptual performance depends on the computation of response accuracy or, almost equivalently, some measure of discriminability such as d'. While there are other measures (e.g., A'), d' is by far the most popular and widely used across fields investigating human performance. Mathematically, the relationship between accuracy (proportion correct responses) and d' is given, in the simplest case, by the function [d' = 2\Phi^{-1}(a)]. There is a problem, however, in how inferential statistics are to be performed on either accuracy or d'. In conditions where performance is quite high, so accuracy is close or equal to 1, the transformation to d' results in infinity. Infinite values of d' in a sample result in infinite means for that sample. For this reason, a number of corrections have been proposed. In this presentation, we demonstrate that the best measure of central tendency

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to use for statistical inference is the median and that corrections to perfect performance that permit the use of the mean result in statistical artifacts that inflate the Type I error rate.
Email: Heather R. Daly, daly.134@osu.edu

4:00-6:00 PM (2014)

Beyond Ideomotor Compatibility: Response Selection Is Automatic for Semantic Associates. MORGAN LYPHOUT-SPITZ, *Université Bourgogne Franche-Comté,* FRANÇOIS MAQUESTIAUX, *Université Bourgogne Franche-Comté & Institut Universitaire de France,* ERIC RUTHRUFF, *University of New Mexico,* MAHÉ AREXIS-LAGES, *Université Bourgogne Franche-Comté* (Sponsored by François MAQUESTIAUX) – Dual-task interference is often ascribed to a bottleneck preventing response selection from operating on more than one task at once. However, minimal dual-task interference and bottleneck bypassing have been reported for ideomotor-compatible tasks (for which the response closely resembles the stimulus). Here, we examined whether bypassing could also occur for tasks that are not ideomotor-compatible but whose stimulus and response are semantically linked (e.g., hear "ping" say "pong"). Using a PRP paradigm, we presented a semantically-compatible Task 2 along with an arbitrary Task 1. We found negligible dual-task costs on both Task 1 (-32 ms) and Task 2 (34 ms). Furthermore, there was high overlap between the observed distribution of inter-response intervals on dual-task trials and a "capacity-free bypassing" distribution derived from single-task trials. We conclude that perceiving the stimulus automatically activates the semantically-associated response code, thereby bypassing the central bottleneck. Hence ideomotor compatibility is not the only solution to bottlenecking.
Email: Morgan Lyphout-Spitz, morgan.lyphout-spitz@edu.univ-fcomte.fr

4:00-6:00 PM (2015)

Contextual Learning of Multiple Target Locations in Visual Search: ERP Evidence. ARTYOM ZINCHENKO, MARKUS CONCI, THOMAS TÖLLNER, HERMANN MÜLLER, and THOMAS GEYER, *Ludwig-Maximilians-Universität München (LMU)* – Visual search becomes more efficient (speeded reaction times, fewer errors) if the target item is consistently encountered within a stable spatial arrangement of distractors, a phenomenon known as contextual cueing. Additionally, the learned contexts seem to only be beneficial for one specific target location, while having the target appear in one of multiple possible locations during learning results in weakened contextual learning. In this study, we recorded event-related potentials and examined whether contextual cueing is limited to a single target position and what are the neural correlates of this process. We showed that that dual- relative to a single-target condition results in significantly reduced contextual cueing effect. Additionally, the behavioral facilitation in the single-target condition was accompanied by improvements in the two lateralized ERP waveforms: N1pc and N2PC. The N2PC reflects attentional modulation by repeated contexts, while the early N1pc indexes the automatic detection of the target. Importantly, in the dual-target condition, we found no early N1pc and a reduced N2PC. These findings suggest that dual-target contexts lead to inefficient attentional guidance and, consequently, hindered visual search.
Email: Artyom Zinchenko, artyom.zinchenko@psy.lmu.de

4:00-6:00 PM (2016)

The Cheerleader Effect: Replication and Extension. RYAN SMITH, *Depaul University,* WILLIAM KRENZER, *Duke University,* PABLO GOMEZ, *California State University, San Bernardino,* KIMBERLY QUINN, *Depaul University* – The cheerleader effect (Walker & Vul, 2013) is a phenomenon whereby individuals are perceived as more attractive in a group than in isolation. To test the robustness of this phenomenon, we conducted five experiments (N=375; n=59–88). In a direct replication of the original study (E1), participants rated the attractiveness of female or male faces (between-subjects); faces appeared in group photographs and in isolated portraits cropped from the group photos (within-subjects). We then changed one parameter in each follow-up study: intermixing male and female stimuli (E2); presenting each face only once, to minimize the impact of exposure (E3); removing the preview time from group photos, to limit processing time (E4); and keeping the image onscreen until the participant responded, to eliminate the memory component. Results supported the robustness of the cheerleader effect: In every case, faces were rated as more attractive in a group than alone, all $p<.001$, all $BF_{10}>13$.
Email: Ryan Smith, rsmith0914@gmail.com

4:00-6:00 PM (2017)

Evaluating the Repetition Priming Account of the Sequential Foreperiod Effect. TIANFANG HAN and ROBERT PROCTOR, *Purdue University* – Responses are faster when a warning signal precedes an imperative stimulus by a foreperiod. Moreover, this effect is modulated by the foreperiod in the previous trial (sequential foreperiod effect, SPE). With a non-aging foreperiod distribution the conditional probability of the imperative stimulus's appearance stays constant over time. In that case, Capizzi et al. (2015) proposed that responses benefit from the automatic priming of the previous trial when the current foreperiod repeats the previous one. We conducted two experiments to test this repetition priming account. Experiment 1 replicated the symmetric SPE as in Capizzi et al. in a choice-reaction-task scenario. Moreover, reaction times (RT) increased as the current foreperiod increased. Experiment 2 replicated the symmetric SPE in a short-foreperiod context. However, RT decreased as the current foreperiod increased, indicating that the foreperiod-RT function was the same as that in fixed-foreperiod context, instead of following the proportion of each foreperiod.
Email: Tianfang Han, han451@purdue.edu

4:00-6:00 PM (2018)

Clarity Matters: Automatic Processing of Strong Facial Expressions of Emotion. JOSHUA MAXWELL and ERIC RUTHRUFF, *University of New Mexico* (Sponsored by Eric Ruthruff) – Facial expressions of emotion often signify a highly relevant event, which makes them likely candidates for automatic processing. However, some authors have not found that to be the case (Tomasik et al., 2009). Here we utilized the backward correspondence effect – an indicator of capacity-free processing – to test whether facial expressions of emotion are processed automatically. In Experiment 1, participants first performed a noise discrimination task (Task 1), then located a target facial expression of emotion (Task 2). We observed a positive backward correspondence effect, indicating that angry and happy expressions bypassed the central attentional bottleneck. Tomasik et al.'s morphing process – averaging images of neutral and emotional expressions – obscured the mouth region of their face stimuli,

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which is an especially important region for emotional expression identification (Chen et al., 2018; Horstmann et al., 2012). Using the same morphed images as Tomasik et al., Experiment 2 showed that these images were not processed in a capacity-free manner. We conclude that facial expressions of emotion are indeed highly prioritized objects capable of being processed in a capacity-free manner, when sufficiently clear.
Email: Joshua W. Maxwell, maxwellj@unm.edu

4:00-6:00 PM (2019)

Is There Calorie-SNARC Effect? EMRE GURBUZ, *Saarland University,* AHU GOKCE, *Kadir Has University* (Presented by Ahu Gokce) – The SNARC effect reflects the association between numbers and space. Smaller numbers are represented by the left hemispace and the larger numbers are represented by right hemispace in accordance with the mental number line. Such representation has been also found on non-numerical domains such as time, size and luminance. The current study focuses on whether SNARC effect exists within the calorie domain. By locating the low and high calorie food stimuli on left and right sides, space-calorie association was created. In Experiment 1, locations of low and high calorie food stimuli were (in)congruent in terms of space-calorie association. In Experiment 2, endogenous spatial cues were used to investigate if spatial bias contributes to the formation of space-calorie association. In Experiment 3, green and red colors were used to evoke approach or avoidance behaviors respectively. Aim was to see if approach/avoidance behavior prevents formation of space-calorie association. Across all experiments, participants did not associate low-calorie food with left and high calorie stimuli with right side, suggesting that the SNARC effect is not present within the calorie domain.
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4:00-6:00 PM (2020)

Contribution of Bottom-up Processes to Auditory Spatial Attention Gradients. ALEX LAWRIW, JEFFREY MOCK, and EDWARD GOLOB, *University of Texas at San Antonio* – Behavioral and modeling studies suggest that auditory attention gradients jointly reflect top-down and bottom-up processes, and have a left-right asymmetry. We used EEG to test for bottom-up contributions by mapping-out potentials that reflect change detection (MMN) and attention capture (P3a) as a function of distance from a standard location. White noise was presented from five locations in the frontal plane, separated in 45° increments. In each block, most sounds were presented from a standard location (p=.84), with occasional shifts to the other locations (p=.04/location). There were significant spatial MMN (75-150 ms) and P3a (150-250 ms) amplitude gradients centered on each standard location (p's<.05). For left vs. right standards, MMN amplitudes were more negative, and more linear, across locations (p<.001). P3a amplitude also increased with distance from standards (p's<.05), with similar results among lateral standards. Controls showed that ERPs reflected sensory memory rather than just spatial location codes. The findings suggest that MMN and P3a spatial gradients reflect bottom-up contributions to auditory spatial attention gradients.
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4:00-6:00 PM (2021)

Slow Attentional Response and Faulty Emotion Perception May Predict Depression Vulnerability among College Students. NIDHI SINHA, *Indian Institute of Technology* – Individuals have a complex affective and attention system, and they significantly differ in the way they perceive and attend to stimuli of different emotional content. Individuals with depression tend to have a negativity effect bias and have trouble disengaging from negative stimuli. Understanding individuals' attentional responses and perceptual biases in identifying emotional content may help us unearth their vulnerability to depression. Here we test the hypothesis that college students with vulnerability to depression perform poorly in a novel attention-perception task owing to these faulty attention and perceptual systems. In this study, we initially subjected participants to two standardized inventories (BDI II and DAS-SF 1) and later asked them to view images of three different valences (positive, negative, and neutral) in a 3*3 grid with three images of each valence randomly distributed around the grid. The participants were then instructed to arrange the images in one of the four orders: [positive, neutral, negative], [negative, neutral, positive], and [positive, negative, neutral] and [negative, positive, neutral] in a randomized order. For instance, for the order [negative, positive neutral], the participants had to first select all the images they perceived as negative, followed by selecting all the images perceived as positive and neutral. It was found that participants who have scored higher BDI II and DAS- SF 1 tend to perform poorly in this attention-perception task with more error rates in perceiving neutral images as negative. Moreover, participants with higher scores on BDI II also displayed comparatively slower RT in completing the individual blocks and overall task. Likewise, when the trial order was [negative, neutral, positive], the majority of the participants, regardless of their scores on BDI II or DAS SF1, were less accurate in their identification of the positive stimuli. This study, therefore, finds its implications in creating a biomarker to tap propensity to develop depression among this population later in life.
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4:00-6:00 PM (2022)

Reward Learning Biases Competition in the Auditory System. ANDY KIM and BRIAN ANDERSON, *Texas A&M University* (Sponsored by Brian Anderson) – Previously reward-associated stimuli have consistently been shown to involuntarily capture attention in the visual domain. Although previously reward-associated sounds have also been shown to interfere with visual processing, it remains unclear whether learned value can bias competition specifically in the auditory system. To address this question, we modified a dichotic listening task to measure interference from task-irrelevant but previously reward-associated sounds. In the training phase, participants were simultaneously presented with a spoken letter and number in different auditory streams and learned to associate the correct identification of each of three letters with high, low, and no monetary reward, respectively. In the subsequent test phase, participants were again presented with the same auditory stimuli but were instead instructed to report the number while ignoring spoken letters. In both the training and test phases, response time measures demonstrated that attention was biased in favor of the auditory stimulus associated with high value.
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4:00-6:00 PM (2023)

The Perceptual Effects of Looming and Receding Motion. PAUL SKARRATT, *University of Hull,* GEOFF COLE, *University of Essex* – In

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visual search, a stimulus is said to summon attention automatically when it yields a shallower search function than that of a competing stimulus. This is because salient features are typically visited first in an array, so search efficiency is relatively immune to increases in array size. Previously we have shown that targets seen to "loom" toward or "recede" away from the observer are equally salient: Both yield slopes that are shallower than those for static targets, but which are identical to one another. A further effect, shown on the intercept, is that looming targets elicit overall shorter response times (RT). As attentional prioritization is expressed only by slope, we interpreted the intercept difference as a motor priming effect of looming motion. This hypothesis was tested in three experiments designed to minimise motor involvement and isolate perceptual performance. To that end, we used search tasks reliant on high perceptual acuity and accuracy measures. Surprisingly, the slope/intercept functions observed with RT were maintained. We discuss this unexpected finding in relation to common interpretations of visual search data and consider the implications for models such as Guided Search (e.g., Wolfe, 2007).
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4:00-6:00 PM (2024)

Meta-Analysis of Dual-Target Search Suggests No Object-File Updating in Spatial Cueing. CLAIRE BRADLEY and ANTHONY HARRIS, *The University of Queensland,* JASON MATTINGLEY, *The University of Queensland & Canadian Institute for Advanced Research* – Visual perception and attention are influenced by our current goals. When exploring these processes using a spatial cueing paradigm, cueing with an item that has target features produces a same-location benefit (SLB) when the target appears at the cued location - conversely responses to targets appearing at a location that previously possessed a distractor feature show a "same-location cost" (SLC). One current account proposes that the SLC is due to updating of object-files. This object-file updating cost should apply to any cue-target feature mismatch, even if both items possess goal-relevant features (such as in the case of dual-feature search). We test this assumption by re-analysing published behavioural data from several laboratories that used dual-feature search. A meta-analysis shows that color-switch costs exist only when the task encourages feature-search mode, rather than singleton-detection mode. These results do not support object-file updating. We discuss alternative accounts of the SLC.
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4:00-6:00 PM (2025)

Selection History Is Relative. MING-RAY LIAO, MARK BRITTON, and BRIAN ANDERSON, *Texas A&M University* (Sponsored by Steven Smith) – Visual attention can be tuned to specific features to aid in visual search. The way in which these search strategies are established and maintained is flexible, reflecting goal-directed attentional control, but can exert a persistent effect on selection that remains even when these strategies are no longer advantageous, reflecting an attentional bias driven by selection history. Apart from feature-specific search, recent studies have shown that attention can be tuned to target–nontarget relationships. Here we tested whether a relational search strategy continues to bias attention in a subsequent task, where the relationally better color and former target color both serve as distractors (Experiment 1) or as potential targets (Experiment 2). We demonstrate that a relational bias can persist in a subsequent task in which color serves as a task-irrelevant feature, both impairing and facilitating visual search performance. Our findings extend our understanding of the relational account of attentional control and the nature of selection history effects on attention.
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4:00-6:00 PM (2026)

Learned Suppression Reduces Attentional Capture by Stimuli Associated with Reward and Threat. HAENA KIM, MATTESON HANSEN, and BRIAN ANDERSON, *Texas A&M University* (Sponsored by Brian Anderson) – Selection history exerts a powerful influence on the control of attention. Reward- and threat-associated stimuli capture attention even when physically non-salient and task-irrelevant. Repeated presentation of a salient distractor at a particular location generates learned suppression, resulting in reduced attentional processing of both targets and distractors appearing at that location. We examined whether reward- and threat-signaling stimuli can overcome such learned suppression. Participants were trained to suppress a particular location (high-probability distractor location) and associate colours with reward or no outcome (neutral). In a subsequent task, reward and neutral distractors appeared in all locations equally-often. In a separate experiment, we replaced reward with electric shocks. Reward and threat distractors captured attention more strongly than neutral distractors irrespective of their location. Distractors appearing in the high probability location showed reduced capture irrespective of their type. The results imply that learned suppression and reward/punishment learning have independent influences on the attentional system.
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4:00-6:00 PM (2027)

Tracking the Temporal Dynamics of Distraction in the Context of Continuous Task Performance. MICHELLE BLUMBERG, GEOFFREY HARRISON, and DARYL WILSON, *Queen's University* – Paradigms used to examine attentional capture are limited by the presentation of stimuli that are not entirely task irrelevant. Moreover, attentional capture has rarely been studied in the context of continuous task performance. Thus, we implemented a methodology based on a paradigm designed by Forster and Lavie (2011). Participants worked through a 12-item circular array making consecutive forced-choice responses as to whether the identity of an item was a letter or a digit. On thirty percent of the trials, a distractor was presented. Importantly, we tracked their eye movements throughout the task. Differences in response times (RTs) between distractor-present and distractor-absent trials served as the index of distractor interference. Moreover, we compared eye movements on distractor-present and distractor-absent trials. RTs for responses on distractor-present trials were significantly slower than RTs for responses on distractor-absent trials. There was also evidence that eye movements deviated towards the center on distractor-present trials; however, the effect seems to dissipate after several encounters with the distractor. These results provide evidence for lasting attentional capture by entirely irrelevant distractors.
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4:00-6:00 PM (2028)

Symbolic Attention Causes Distortions in the Subjective Perception of Space. REBECCA LAWRENCE, LUCAS SCHNEIDER, and JAY PRATT, *University of Toronto* – Most research testing the visual consequences of

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spatial attention study changes in processing using accuracy and reaction time measures. Nonetheless, the effects of attention on the subjective perception of space can also be measured using an attentional repulsion task. Specifically, when focusing on one location in the visual field, stimuli that are close by the focus of attention appear as though they are shifted away from that location. In this research, we examine if shifts of attention generated by symbolic cues produce similar spatial repulsion effects. We did this by comparing the effect of non-predictive arrows to peripherally presented exogenous cues on the magnitude of the repulsion effect using a Vernier line task. Both exogenous and symbolic cues caused distortions in spatial perception, where the Vernier stimuli appeared shifted away from cued locations in the visual field. The repulsive effect of the symbolic cues was, however, smaller than that of the exogenous cues, likely due to differences in sensory stimulation for the two cue types.
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4:00-6:00 PM (2029)

Top-Down Suppression in Real World Search: Properties and Mechanisms of the 'Attentional White Bear' Effect. ALEXANDER MUHL-RICHARDSON, MAXIMILLIAN PARKER, and GREG DAVIS, *University of Cambridge* (Presented by Greg Davis) – Top-down, suppressive mechanisms in visual search do not operate as we might expect. Instructions to ignore a distractor often drive an observer's attention toward it, a puzzling behaviour termed the "Attentional White Bear" effect (AWB; Tsal & Makovski, 2006). Previous work has begun to describe the conditions for, and likely mechanisms of, the AWB, though a narrow focus on colour/shape singleton stimuli and dual-task conditions may have obscured some of its characteristics. Here, searching photographs of everyday objects against naturalistic backgrounds, observers knew only the distractor's category, not the target's, minimising dual-task requirements. We indexed a robust AWB in initial saccades, examining its time-course and its extinction by a variety of task-irrelevant stimuli presented prior to search. These findings suggest that the AWB and effective distractor suppression reflect two, independent mechanisms, contrary to reactive-suppression, "search-and-destroy" accounts. Findings from a computational model (adapted from Adeli, Vitu, Zelinsky, 2017) are briefly discussed.
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4:00-6:00 PM (2030)

Attentional Suppression Elicited by Switching a New Task-Set. HA EUN CHOI and YANG SEOK CHO, *Korea University* – To investigate whether attentional modulation based on statistical learning can occur in a shape dimension, two experiments were conducted. On search trials, participants were to search for the color defined target while ignoring a different color distractor. On probe trials, participants were to find one of two prespecified orientations regardless of shapes. In Experiment 1, statistical regularities of shape were modulated on search trials, so particular shapes were associated with target and distractor, respectively. On probe trials, attentional suppression was found for the shapes which were highly associated with the target and distractor on search trials. Although the statistical regularities of shape on search trials were increased to 100% in Experiment 2, the same pattern of attentional suppression was obtained. These findings suggest that all stimulus features associated with the task set for the search trials were inhibited to perform a different task on the probe trials efficiently.
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4:00-6:00 PM (2031)

Introspective Awareness of Oculomotor Attentional Capture. OWEN ADAMS and NICHOLAS GASPELIN, *Binghamton University, SUNY* (Sponsored by Nicholas Gaspelin) – Recent evidence suggests that individuals can learn to avoid attentional capture by physically salient stimuli. But it is unclear how individuals learn to do this, especially with no direct feedback about attentional performance. One possibility is that observers have introspective awareness of capture when it occurs, and this is used to adjust performance strategies to prevent future attentional capture. In the current study, we directly tested whether participants had introspective awareness of oculomotor capture. Participants searched for a target of a specific shape and attempted to ignore a color singleton distractor. On a subset of trials, participants then classified whether or not the singleton captured the eyes. Critically, first eye movements were more likely to be directed to singleton locations on "capture" report trials than "no capture" report trials. These results indicate that observers can detect oculomotor capture, at least under certain circumstances.
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4:00-6:00 PM (2032)

Attentional Prioritisation of Reward-Related Stimuli May Be 'Habit-Like.' JENNY LE, POPPY WATSON, and MIKE LE PELLEY, *University of New South Wales* (Sponsored by Mike Le Pelley) – Stimuli associated with rewards (e.g., money, drugs, high-calorie foods) can become more likely to capture our attention. Recent work has shown that the 'attention-grabbing' properties of reward-related cues can operate independently of our goals and intentions. Here, we examined whether this process is 'habit-like' – namely, whether attentional prioritisation of reward-related cues is insensitive to changes in the value of the reward itself. We incorporated an instructed value-switch (Experiment 1) and devaluation (Experiment 2) into a visual search task, using eye-tracking to examine attentional prioritisation of stimuli signalling high- and low-value outcomes. In Experiment 1, attentional prioritisation of a previously-high-value stimulus could only be overcome when provided with further experience of receiving revalued outcomes. In Experiment 2, attentional prioritisation of the high-value stimulus was insensitive to devaluation, even when provided with further experience of receiving outcomes. Our findings suggest that attentional prioritisation of reward-signalling stimuli may fit the definition of a 'habit-like' response, providing a foundation for future work to potentially resolve issues in the field of habits.
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4:00-6:00 PM (2033)

The Effect of Eccentricity on the Independence of Attentional Networks. JONATHAN WILBIKS and CATHERINE HALL, *University of New Brunswick Saint John* – The attentional network consists of three independent networks: alerting, orienting, and executive control. While research using the Attention Network Test (ANT) has previously examined effects of eccentricity on some of the underlying components, we are not aware of research that has examined the effect of eccentricity on the totality of the network. We conducted a version of the ANT-R

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wherein the cues, targets, and distractor stimuli could occur at three different eccentricities: 4.69° (which replicated the conditions in the original ANT-R), 9.38°, and 14.07° to the left and right of the fixation cross. We found that attentional networks are largely independent of one another, regardless of eccentricity. We also found minimal systematic differences in each network, with the exception of the orienting network where the widest eccentricity led to significantly slower responding than the narrowest. These results suggest that visual attention performance is independent of the effects of eccentricity.
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4:00-6:00 PM (2034)

Flexibility of Fear-Conditioned Capture Effects. GRETA MINOR and DEBORAH HANNULA, *University of Wisconsin – Milwaukee* (Sponsored by Deborah Hannula) – Past work suggests that fear-conditioned stimuli (CS) capture attention. We examined whether fear-conditioned capture effects were able to transfer to the associate of a CS. Participants encoded scene-object pairs. Then, scenes were presented alone during a conditioning phase. Scenes co-terminated with shock 100% (CS100), 50% (CS50), or 0% (CS0) of the time, depending on the object that they had been paired with during encoding. Finally, participants performed a visual search task; search displays occasionally contained one of the encoded objects (i.e., CS associates) as a distractor. Eye movements were recorded. Results indicated that, during search, erroneous eye movements were made more often and target-directed saccades were slower when CS associates were present in the search display. No differences in capture effects were observed across the three CS conditions, suggesting that capture effects to a CS may not transfer to novel associates learned in the context of an experiment.
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4:00-6:00 PM (2035)

Does Threat-Based Attentional Capture Generalize Across Contexts? LAURENT GREGOIRE, KIM HAENA, KIM ANDY, and BRIAN ANDERSON, *Texas A&M University* – Attention prioritizes stimuli associated with punishment. Despite the importance of this process for survival and adaptation, the potential generalization of threat-related attentional biases has been largely ignored in the literature. This study aimed to determine whether stimulus-threat associations learned in a specific context bias attention in another context (in which the stimulus was never paired with punishment). We examined this issue using an antisaccade task in which participants had to shift their gaze in the opposite direction of a colored square. Two contexts and three colors were employed. One color was associated with the threat of shock in one context and never paired with shock in the other context. For a second color, the punishment-context relationship was reversed. A third color never paired with shock in either context (neutral) was included in Experiment 1 but absent in Experiment 2. Participants then performed search for a shape-defined target in an extinction phase (in which no shock was delivered). A bias to orient toward the color associated with punishment in the current context was consistently observed in the two experiments, suggesting that threat-modulated attentional priority is context specific.
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4:00-6:00 PM (2036)

"Reach Out, Eye'll be there": The Action Capability of the Model Influences How Gaze Cues Affect Spatial Prioritization and Sensorimotor Processing. APRIL KARLINSKY, EMMA YOXON, and MAGGIE CHEN, *University of Toronto,* SAMANTHA GREGORY, *Aston University,* TIMOTHY WELSH, *University of Toronto* – A recent paper reported that shifts in a model's eye gaze towards potential target locations affected observers' response initiation times, but not trajectories of subsequent aiming responses. However, only the model's head was displayed and, thus, there was no perceived ability for the model to manually interact with the target. The present study was conducted to examine how the model's potential for manual interaction with the targets shaped the observer's prioritization and manual movement execution. Participants (n=20) executed aiming movements to a target after the model's non-predictive gaze shift towards a potential target location. Results revealed that the model's eye gaze impacted observers' response initiation and execution (movement trajectory) when the model's upper limbs were depicted as being prepared to interact with the targets (ps<.05). These findings suggest that the action context (the model's potential for action) influences how gaze cues are processed in an integrated sensorimotor system.
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4:00-6:00 PM (2037)

Deep Saliency Models: Understanding the Contributions of High- and Low-level Features in Scenes. TAYLOR R. HAYES and JOHN M. HENDERSON, *University of California, Davis* – Deep saliency models represent the current state-of-art for predicting where humans look in scenes. However, it remains unclear what features deep saliency models are actually capturing. Here we examined two different deep saliency models: Deep Gaze 2 and MSI-Net. We used a general linear mixed effects model to examine how well each deep saliency model predicted scene eye movement behavior (N=100) controlling for center bias. In addition, we examined how well low-level features (contrasts in luminance, color, and orientation) and high-level features (overall semantic density based on human ratings of isolated scene regions, N=408) could predict the fixated Deep Gaze 2 and MSI-Net model values. The results showed that overall both Deep Gaze 2 and MSI-Net captured where viewers looked well. More importantly, the feature prediction showed that high-level semantic density explained 95% more variance than low-level features in fixated Deep Gaze 2 values and 55% more variance in fixated MSI-Net values. These findings suggest that deep saliency models predict attention using features that are more closely related to high-level semantic density than to contrasts in low-level, pre-semantic image features.
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4:00-6:00 PM (2038)

Hemifield Effects on Divided Attention in Visual Object Recognition. DINA POPOVKINA and JOHN PALMER, *University of Washington,* CATHLEEN MOORE, *University of Iowa,* GEOFFREY BOYNTON, *University of Washington* – There is little or no divided attention effect for some simple feature detection tasks, but there are large divided attention effects for word recognition tasks. Imaging studies support the hypothesis that the two cortical hemispheres in the early visual system can support parallel processing of simple features, but lateralization makes parallel

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processing of words impossible. We examined divided attention effects for objects, which have less lateralized processing than words. Participants categorized nameable objects presented either above/below fixation or left/right of fixation. For above/below, we observed the hallmarks of serial processing: a large dual-task deficit (11.8±1.0%) and a negative response correlation (−2.1±1.2%; measured as difference in conditional accuracy). For left/right, there was a smaller deficit (8.4±0.9%), but the negative response correlation remained (−1.8±0.8%). We hypothesize that the ability to process stimuli in different cortical hemispheres provides an advantage for judging objects during divided attention, but it does not eliminate serial processing.
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4:00-6:00 PM (2039)

Salient Object Groupings in the Neglected Visual Field Draw Visual Attention. LEONIE NOWACK, *Ludwig-Maximilians-University,* KATHRIN FINKE, *Ludwig-Maximilians-University & University Hospital Jena,* ANNA LENA BIEL, *Ludwig-Maximilians-University,* INGO KELLER, *Medical-Park Bad Feilnbach,* HERMANN J. MÜLLER and MARKUS CONCI, *Ludwig-Maximilians-University* (Sponsored by Adrian von Mühlelen) – The integration of fragmentary parts into whole objects has either been suggested to rely on the availability of attentional resources, or it may arise prior to the engagement of selective attention. The present study tested these potential accounts by presenting Kanizsa figures to patients with visual extinction behavior. Extinction manifests in a failure to detect contralesional stimuli when presented together with ipsilesional stimuli. However, when bilateral stimuli can be grouped to form a coherent object, then extinction is usually reduced, suggesting that object integration is achieved automatically. Here, we replicate these findings in grouped and ungrouped variants of Kanizsa figures. Moreover, we found that a salient, grouped Kanizsa triangle presented solely in the unattended hemifield can substantially improve contralesional target detection performance. However, the very same triangle configuration does not improve detection when presented together with an ipsilesional non-salient target. This shows that attention is only captured by grouped objects in the impaired hemifield when attention is available, indicating that both object integration and guidance by salient, integrated objects requires attentional resources.
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4:00-6:00 PM (2040)

Location-Form-Response Binding in Inhibition of Return. HSUAN-FU CHAO and FEI-SHAN HSIAO, *Chung Yuan Christian University* – Inhibition of return (IOR) refers to delayed responses to a target presented at a previously cued location. In the present study, we investigated the effect of location-form-response binding by manipulating location, form, and response in each trial in a target-target paradigm of IOR. The participants were instructed to discriminate the form of the target. The results suggest that locations, forms, and responses are bound to each other. While both shape and response were repeated, location repetition led to a repetition benefit. On the other hand, while the shape was repeated and the response was altered, location repetition resulted in a repetition cost.
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4:00-6:00 PM (2041)

Peripheral Cues Can Repulse Unbound Features Closer to Fixation. CRISTINA CEJA and STEVEN FRANCONERI, *Northwestern University* – Previous work has shown that, in the absence of focal attention, simple features (e.g., colors) can be misbound to incorrect locations. Here we show that attention-demanding cues in the periphery can repulse these features to be incorrectly seen at locations closer to fixation. Participants were cued with a shape (circle or square) either in the left or right periphery before seeing a horizontal array of diamonds in the center of the screen (a pair of diamonds on each side of fixation, each with one gray and one colored diamond). Participants reported the shape of the cue, and which two colors appeared at which of the four diamond locations. When the cue was absent or at fixation, participants were accurate in reporting the locations of both colored diamonds. But attending to peripheral cues created a perceptual repulsion, where colors on that side of fixation were consistently misperceived closer to fixation (and farther away from the cue). This illusion was found to be even stronger when the cue was presented in the right hemifield compared to the left hemifield, revealing an attentional hemifield asymmetry for the binding of simple features.
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4:00-6:00 PM (2042)

Frontal Plane Distance Judgments Are Made on a Salience Map. LINGYU GAN, PENG SUN, and GEORGE SPERLING, *University of California, Irvine* (Sponsored by George Sperling) – A salience map is a representation of the relative importance of the locations of visual space assumed to guide attention and eye movements; the map records only salience, not the features and events that produced it. We studied judgments of the distance between 2 disks that differed from a background of 142 disks only by salience, no common feature. Background disks had varying shades of gray, target disks were either black or white, various colors, or gratings of different orientations. Stimuli were exposed for 1/5 sec followed by a post-exposure masking field. Subjects had training and then 1500 trials in which they judged the distance between 2 targets in cm (1.52 to 20.83 cm, 1.49 to 20.21 deg) with complete feedback after each trial. Targets were either identical, randomly different, or identical black disks on a plain background (easiest possible condition). Overall, the accuracy of distance judgments was surprisingly similar across all conditions. For two different targets, a,b, the accuracy of ab always fell between aa and bb. The results demonstrate that these distance judgments were computed independently of the feature-composition of items, which is a defining property of a salience map.
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4:00-6:00 PM (2043)

The Role of Ensemble Feature Distributions in Rapid Visual Categorization of Individual Objects. HEE YEON IM, *Boston Children's Hospital & Harvard Medical School,* NATALIA TIURINA and IGOR UTOCHKIN, *HSE University* (Presented by Igor Utochkin) – Multiple objects can be efficiently represented as ensemble statistics (e.g., mean size and size variance). Here we investigated the roles of ensemble information extracted from multiple items supporting the rapid categorization of the items (e.g., apples and leaves on a tree). After a brief presentation of sets of objects, we instructed participants to categorize individual set members based on the median of size distribution of the whole set. We varied the

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width (narrow or fat) and the shape (smooth or two-peaked) of feature distributions of the objects. We found that observers unintentionally relied on the grand mean as a natural categorical boundary, and categorization accuracy increased as a function of the size differences among individual items and their separation from the grand mean. Our results suggest that the two-peaked feature distributions support the "segmentability" of spatially intermixed sets of objects. Our results emphasize the important roles of ensemble statistics in rapid visual categorization. Funding: RSCF (grant 18-18-00334)
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4:00-6:00 PM (2044)

The Effect of Search Role and Category Labels in Visual Long-Term Memory. SYDNEY SCHABACKER and CARRICK WILLIAMS, *California State University San Marcos* – Objects sharing category labels can interfere in memory. We examined how object memory would be affected by changes to the category labels while maintaining the object's role in a task. Participants searched for a critical object using a category-color label, e.g., Red Apple. They then searched for six interfering category objects matching either the critical object's color or not, using only the category label as a search target, e.g., Apple (a no interference control was also included). Memory for the critical object was best in the no interference control; memory was worst when the interfering objects matched the color and category of the critical object. Interestingly, memory for the interfering objects matching the category, but not the color, fell in between those extremes. These results indicate that an object's category label may also be affected by the role that the object plays when encountered.
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4:00-6:00 PM (2045)

A New Prediction-based Approach to Study Visual Search and Attention. ZOE JING XU, ALEJANDRO LLERAS, and SIMONA BUETTI, *University of Illinois at Urbana-Champaign* (Sponsored by Alejandro Lleras) – We review a new prediction-based approach to study visual search and attention that may serve as an alternative to NHST in visual cognition studies. We used this method to address two questions: 1) Why search slows down when multiple types of distractors are intermixed in the same display (distractor heterogeneity effect)? 2) How do visual features combine to guide attention? The approach consists of first evaluating search performance under simple conditions and use the parameters measured to predict performance under more complex search situations. The second step is to measure performance in the more complex conditions and compare the observed performance to the predicted one. Either modeling or theoretical considerations can guide the development of formulas used in the predictive models. Using this approach, we showed that heterogeneity effects arise from localized inter-item interactions that facilitate performance when nearby objects are similar to one another, and we were able to quantify the strength of these interactions. We also showed that color and shape distinctiveness combine linearly to determine the overall distinctiveness of a target defined by color and shape. Supported by NSF Grant BCS-1921735 to SB.
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4:00-6:00 PM (2046)

Tracking Shifts in Gaze Patterns to Novel Stimuli Used in a Goal-Directed Task. SETH CHIN-PARKER and ERIC GERLACH, *Denison University* – We examined how history-driven allocation (Theeuwes, 2019) contributes to the development of goal-directed categories (Chin-Parker & Birdwhistell, 2017). Participants engaged in an initial block of a same-different task with novel stimuli as their eye movements to the attributes of the stimuli were tracked. Participants then interacted with physical copies of the stimuli to complete a goal-directed task. Participants had to place these stimuli onto one of two task boards, and the shape of a particular attribute of the stimuli, either the head or interior, determined the placement onto the board. The goal-relevance of these stimulus attributes was manipulated between participants. After completing the goal-directed task trials, the participants completed a second block of the same-different task while their eye movements again were tracked. We found the predicted three-way interaction – during the second block of the same-different task, participants shifted their gaze patterns, measured in dwell time and number of fixations, to the attribute that had been relevant during the goal-directed task. These findings support the notion that goal-directed interactions help us to differentiate items and organize conceptual knowledge.
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4:00-6:00 PM (2047)

The Effect of Distractors and Bilateral Presentation on Processing Architecture in Categorization Decisions. SARAH MONEER, ELEANORE WILLIAMS, and DANIEL LITTLE, *University of Melbourne* (Sponsored by Daniel Little) – Object-based attention can be deployed to target features as a function of feature location; however, it is unclear how distractors presented between two targets affect this deployment. We presented two separable features (saturation and line orientation) as part of schematic rockets and varied the presence of distractors in three conditions: no distractors, fixed distractors across trials, or varying distractors from trial to trial. We also varied between subjects whether the rockets were presented vertically or horizontally to determine whether there was a bilateral advantage conferred to categorization as has been shown in other spatial attention tasks. We characterized selective attention by using Systems Factorial Technology and parametric model fitting to diagnose the processing architecture and stopping rule from response time data. Our results indicated a difference between alignments that was more pronounced in the presence of distractors, suggesting that a bilateral presentation advantage in categorization.
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4:00-6:00 PM (2048)

Are Event Files Due to a Long-Term or Short-Term Memory Process? BRETT COCHRANE, SERENA GU, and JAY PRATT, *University of Toronto* – The Theory of Event Coding (TEC) proposes that when an action is made in response to a perceptual event, action and perceptual codes are bound together into an event file. This result is supported by a phenomenon known as the partial repetition cost—slowed responses to a current event when stimulus-response bindings need to be updated. TEC has been used to describe complex behaviors guided by long-term memory (LTM) processes, however supporting evidence has been sparse. Accordingly, we investigated the involvement of LTM using an event file procedure where participants responded to a color (red/green) with an

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arbitrary keypress (left/right) prior to performing a color discrimination task with the same colors/responses. At the beginning of a short block of trials (0, 1, 3), participants made a different arbitrary keypress (up/down) to a different color (purple/yellow), and ended the block with a color discrimination task with the same colors/responses. We found that partial repetition costs only occurred when the direction and color discrimination tasks were immediately adjacent to each other even when controlling for temporal duration, suggesting that event files are due to a short-term rather than a long-term memory process.
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4:00-6:00 PM (2049)

Object-Based Storage Benefits Reveal an Item-Based Capacity Limit in Visual Working Memory. WILLIAM NGIAM, KRYSTIAN LOETSCHER, EDWARD VOGEL, and EDWARD AWH, *University of Chicago* – When tasked with remembering the color and orientation of multiple items, observers store more features in visual working memory (VWM) compared to when only one feature dimension is relevant. Studies observing this object-based benefit probed memory of a single item on each trial, leaving it unclear how this benefit is distributed across the memoranda. If each feature has an independent probability of being encoded for each item, then observers should retain information from a larger number of items when both features are relevant. By contrast, if the same item limit constrains performance in single and multi-feature conditions, then any additional information stored in the multi-feature condition would come from the same number of items as the single-feature condition. Using a whole-report procedure, we found evidence for the latter – accurate recall was contained to approximately three items in both single and multi-feature conditions. This finding supports item-based storage limits in VWM.
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4:00-6:00 PM (2050)

The Role of Scene Context on Perceived Object Clarity. YIFAN DING, MEREDITH GREER, and TODD KAHAN, *Bates College* (Presented by Todd Kahan) – This study sought to determine whether object-scene semantic congruence affects attention and perception. Specifically, we investigated whether incongruent objects (i.e., objects that do not fit the semantic context of a scene) will be seen more or less clearly than congruent objects. Participants completed an image matching task where they indicated whether two objects had the same or different levels of clarity. People (N=23) indicated that very briefly shown congruent objects had the same level of blur as incongruent objects when the congruent objects were less blurry, indicating that the incongruent objects looked clearer. In addition, people indicated that briefly shown incongruent objects had the same level of blur as congruent objects when the incongruent objects were blurrier, again indicating that the incongruent objects looked clearer. These results are consistent with position that incongruent object capture attention which in turn enhances object clarity.
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4:00-6:00 PM (2051)

Covert and Overt Social Attention is Differentially Affected by a Reintroduction of Face Novelty, Context, and Attractiveness. EFFIE PEREIRA (J. Frank Yates Student Travel Award Recipient), *McGill University,* ELINA BIRMINGHAM, *Simon Fraser University,* JELENA RISTIC, *McGill University* (Sponsored by Jelena Ristic) – Humans spontaneously attend to faces. Recent work however shows that this behavior is diminished when visual content, stimulus context, and task settings are controlled. Furthermore, the effects are not reinstated when factors are reintroduced individually. Here, we investigated whether reintroducing multiple factors – novelty, context, and attractiveness – would reinstate typical attentional effects. Participants viewed 32 novel contextually situated face-object cue pairs of varying attractiveness, followed by a target appearing at the previous location of the eyes or mouth of the face or the top or bottom of the object. Experiment 1 measured covert attention; manual responses indicated no evidence of attentional biasing towards faces. Experiment 2 additionally measured overt eye movements; manual results of Experiment 1 were replicated, while further indicating a reliable overt bias towards the eyes. Thus, the addition of multiple extraneous factors differentially impacts covert and overt biasing towards social cues and does not appear to re-instantiate the typical effects in manual responses.
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4:00-6:00 PM (2052)

Using Mouse Tracking to Investigate Cross-Linguistic Pseudohomophones in Bilingual Children from Spain and USA. INES ELENA-MARTIN, *Eastern Kentucky University,* CARMEN HEVIA-TUERO, *Universidad de Oviedo,* SARA INCERA, *Eastern Kentucky University,* PAZ SUAREZ-COALLA, *Universidad de Oviedo* – We used a lexical decision task to investigate cross-linguistic interference in children attending Spanish-English bilingual schools in Oviedo (Spain) and Lexington (USA). The task was in English and included real words (e.g. blue), pseudohomophones nonwords following Spanish (e.g. blu) or English (e.g. bloo) phonological rules, and nonwords that did not follow any rules (e.g. uebl). Given that the task was in English, it is not surprising that children from USA outperformed Spanish children. Interestingly, Spanish children responded less efficiently to the English than the Spanish pseudohomophones, indicating that the language of the task had a larger impact than the dominant language of the children. In the mouse trajectories children distinguished between words and non-words relatively early (~ 250 ms), while the difference between the English and Spanish pseudohomophones emerged later on (~ 500 ms). Performance in trajectories point to early excitatory and late inhibitory processes emerging (see the BIA model).
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4:00-6:00 PM (2053)

Bidirectional Biliteracy: Separate Representations Mean Less Facilitation. JACQUELYN BERRY, *American University in Cairo* – There is ample evidence that bidirectional biliteracy can influence non-linguistic cognitive function. Here we tested whether this would be the case when Arabic-English biliterates returned to executing a task in its original orientation after three sessions of training with an alternate (upside-down) task orientation. Rather than reduced performance (i.e. TetLag) when switching back to the original orientation, subjects in both language groups exhibited facilitation though this was substantially higher for the English-only subjects. Considering the pattern of data across all sessions, and other similar findings, we believe this was because

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the Arabic-English biliterates treated the two task orientations as separate mental representations, improving at both simultaneously. English-only subjects, however, appeared to behave as though the two orientations were the same task and improved at both in unison. This outcome has implications for designing training across different interfaces that will be used by bilingual and biliterate users.
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4:00-6:00 PM (2054)

What Cognates Tell Us About How Bilinguals Select a Default-Language in Speech Production. CHUCHU LI, TAMAR GOLLAN, *University of California, San Diego* – When producing connected speech, bilinguals often select a default language as the primary force driving the utterance. The present study investigated the cognitive mechanisms underlying default language selection. In three experiments, Spanish-English bilinguals named pictures out of context or read aloud sentences with a single word replaced by a picture to be named with cognate (e.g., lemon-limón) or noncognate names (e.g., grapes-uvas). Cognates speeded naming and significantly reduced switching costs in and out of context, and critically, cognate effects were the same size in vs. out of sentence context. However, in sentence context there were significant language dominance effects, and switch costs were asymmetrical and relatively large when compared to bare picture naming which exhibited no language dominance effects, and symmetrical and smaller switch costs. These results suggest that default-language selection is driven primarily by boosting activation of the default language, not by proactive inhibition of the nondefault language. However, when proactive inhibition is relaxed in sentence production this leads to greater reliance on reactive control to plan and produce language switches relative to out-of-context speech.
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4:00-6:00 PM (2055)

Evaluating Theories of Bilingual Language Control Using Computational Models. MARK LOWRY, CHAD DUBÉ, and ELIZABETH SCHOTTER, *University of South Florida* – Bilingual language control refers to a bilingual's ability to speak exclusively in one language without the unintended language intruding. It has been debated in the literature whether bilinguals need an inhibitory mechanism to control language output or whether a non-inhibitory mechanism can be used. This poster presents mathematical models instantiating the two accounts and an experiment that empirically tests those predictions. The models explain how participants' reaction times in language production are impacted by across-trial semantic relatedness and consistency of language. The models' predictions were compared to data from an experiment in which participants named semantically-related and -unrelated pictures in their first and second language. Results indicate that within-language facilitation effects are abolished after a language switch, supporting the predictions of the Inhibitory Model. However, within-language facilitation was observed over the course of `stay' trials in which no language switch was required, contrary to the predictions of both models. The modeling and data suggest that language switching abolishes spreading activation effects.
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4:00-6:00 PM (2056)

Working-Memory Capacity, Not Bilingualism, Determines How Individuals Engage and Disengage Attention: Evidence from Conflict-Frequency Manipulations in the Stroop Task. GIACOMO SPINELLI, SAMANTHA GOLDSMITH, and J. BRUCE MORTON, *University of Western Ontario* (Presented by J. Bruce Morton) – A recent version of the bilingual-advantage hypothesis is that bilinguals, compared to monolinguals, would be more efficient at disengaging attention from information available in the task. In interference tasks such as Stroop, this superior attention disengagement would result in reduced conflict-adaptation effects, i.e., a reduced difference between congruency effects (CEs) in high-conflict situations (where CEs are typically small) vs. low-conflict situations (where CEs are typically large). In the control literature, a similar reduction in conflict-adaptation effects has been observed for high vs. low Working-Memory-Capacity (WMC) individuals in manipulations of conflict frequency. We used two of these conflict-frequency manipulations in the Stroop task to examine the idea that bilinguals are advantaged in attention disengagement. Although neither continuous indices of WMC nor bilingualism were associated with reduced conflict-adaptation effects, WMC reduced CEs but bilingualism did not. Thus, WMC but not bilingualism is related to individual differences in attention engagement.
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4:00-6:00 PM (2057)

On the Existence of Asymmetrical Switch Costs and Reversed Language Dominance Effects – a Meta-Analysis. MIRIAM GADE, *Medical School Berlin & Katholische Universität Eichstätt,* MATHIEU DECLERCK, *Vrije Universiteit Brussel,* ANDREA PHILIPP, *Rheinisch-Westfälische Technische Hochschule Aachen University,* ALODIE REY-MERMET, *Katholische Universität Eichstätt,* IRING KOCH, *Rheinisch-Westfälische Technische Hochschule Aachen University* (Presented by Mathieu Declerck) – How do people in a bilingual context select the appropriate language, and what is the role of language dominance in this selection process? Two phenomena prove to be particularly controversial in this literature: 1) asymmetrical language switch costs, which entails a larger cost for switching to the more dominant language, relative to staying in the same language, than for switching to the less dominant language, and 2) the reversed language dominance effect, which refers to shorter reaction times when answering in the less dominant of the two languages in mixed-language blocks. Whereas the asymmetrical language switch cost is commonly taken as an index for processes of transient language control, the reversed language dominance effect is taken as an index for sustained language control. In the present meta-analysis, we set out to establish the empirical evidence of these seemingly counterintuitive outcomes using Bayesian linear regressions (i.e., mixed effects model). We obtained little evidence for either effect, questioning these measures as indexes of bilingual language control that have to be explained by theoretical accounts.
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4:00-6:00 PM (2058)

Examining Executive Function and Language Control in Bilinguals with a History of Mild Traumatic Brain Injury. HALAH ALATEEQ and TAMIKO AZUMA, *Arizona State University* – Mild traumatic brain

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injury (mTBI) has been associated with subtle executive function (EF) and cognitive-communication deficits. In bilinguals, unique cognitive demands are required to control and process their two languages effectively. There is limited research on the impact of mTBI on EF and language control in bilinguals. This study examined EF and language control in young adults with mTBI history and explored the relationship between language control impairments and domain-general EF abilities. One-hundred and sixty-four participants (80 monolinguals, and 84 bilingual) completed experimental and clinical EF and language control tasks. The results revealed an interaction between mTBI history and language group (monolinguals vs. bilinguals) in how participants performed on a clinical measure of EF and a verbal fluency task. Only bilinguals with mTBI scored significantly lower on these tasks. In addition, there was a significant correlation between errors on a language switching task and performance on non-verbal EF tasks.
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4:00-6:00 PM (2059)

Can You Code-Switch Your Way Out of the Foreign Language Effect? RITA GROSS and JEANETTE ALTARRIBA, *University at Albany, SUNY* (Sponsored by Dana Basnight-Brown) – A foreign language effect (FLE) occurs when the language in which a problem is presented influences the decision making processes that lead to an outcome (Keysar et al., 2012). Thus far, however, the conditions moderating these effects remain unclear. The current study aims to add to this mounting body of research by asking German-English bilinguals to respond to the Trolley dilemma and the Footbridge dilemma while examining their language habits, language-switching abilities, and levels of acculturation. Individuals who frequently switch between languages might not be influenced by the language a moral dilemma is presented in. On the other hand, individuals who rarely switch between languages might often judge a moral dilemma differently depending on language of presentation. Practical applications of the current findings can be found in the evaluation of bilinguals in standardized testing in both educational settings and in the workplace.
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4:00-6:00 PM (2060)

Bilingual Language Control: Bottom-Up Versus Top-Down. JEAN BODET, III and ARTURO HERNANDEZ, *University of Houston* (Sponsored by Arturo Hernandez) – Bilinguals constantly face the potential of language conflict—for example, trying to speak in one language while in the presence of another. Such conflict sometimes even leads to the individual accidentally switching languages. Why does this occur? We posit that the various "top-down" (control) mechanisms that maintain use of the desired language may be overcome by "bottom-up" (contextual) influence. While most research in the past focuses on bilinguals' abilities to consciously control, this experiment focuses on the effect of environment on control efforts. Here, bilinguals will be cued to name long sets of images in a number of language contexts (in this case, voice audio played over speakers or into headphones) ranging in complexity and congruence with the target language. Using these contexts, we will investigate the role of bottom-up influence in language control by measuring changes in accidental language switching and response times during picture-naming. Further, we will re-evaluate major theories of language control through the lens of bottom-up influence, rather than solely through top-down control.
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4:00-6:00 PM (2061)

The Bilingual Advantage in Children's Inhibitory Control: Is it Really about Language Status? ISU CHO, *Brandeis University,* HYUN-JOO SONG and JEWAN PARK, *Yonsei University,* J. BRUCE MORTON, *University of Western Ontario* – Bilingual children from East Asia make fewer errors on response inhibition tasks compared to monolingual children from North America, which has been attributed to a bilingual advantage in cognitive control (Bialystok, 1999). However, given that children from East Asia outperform Caucasian children from North America on response inhibition tasks (Sabbagh et al., 2006; Oh & Lewis, 2008), here, we tested whether performance differences previously attributed to language status effects actually result from country-of-origin effects. To that end, Korean-English bilingual and Caucasian English monolingual children were compared on a response inhibition task. The results replicated evidence of bilingual advantage. However, when comparing these children with Korean monolinguals to disentangle the effects of confounded language status and country of origin, we found that Korean children, regardless of language status, made fewer errors than Caucasian English monolinguals. Differences in inhibitory control between East Asian bilinguals and Caucasian monolinguals are not related to children's language status, but to their and their family's country of origin.
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4:00-6:00 PM (2062)

Auditory Working Memory in Spanish-English Bilingual Children With and Without Developmental Language Disorders. JULIANA RONDEROS, ANNY CASTILLA-EARLS, FERENC BUNTA, and ARTURO HERNANDEZ, *University of Houston* (Sponsored by Arturo Hernandez) – As a group, children with developmental language disorder (DLD) exhibit difficulties in language learning but also demonstrate subtle deficits in nonverbal IQ and cognitive processing tasks (Leonard, 2014). This study examined the contribution of auditory working memory to language morphosyntactic abilities in Spanish-English bilingual children. One hundred and six Spanish-English bilingual children ages 4;0-8;2 were administered two auditory serial memory tasks to index auditory working memory using tone sequences and novel words composed of foreign speech sounds. To explore the contribution of auditory working memory, we conducted a regression analysis using accuracy and mean response time for both auditory serial memory tasks and age to predict morphosyntax scores. Results revealed these factors explained 37% of the variability in morphosyntactic abilities. Our findings suggest that auditory working memory is a significant contributor to morphosyntactic abilities in bilingual children. These results align with theories such as Neuroemergentism which suggests that complex cognitive processing emerges from the organization and reorganization of simpler forms of information across development (Hernandez et al., 2019).
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4:00-6:00 PM (2063)

The Effects of Presentation Modality and Language Proficiency on Digit Span Performance in Bilinguals. LAUREN GREEN, HALAH ALATEEQ, and TAMIKO AZUMA, *Arizona State University* – It is

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crucial to understand the potential impact of assessing bilinguals in their non-native language. The aim of this study was to examine the effect of presentation modality on the Digit Span performance in bilinguals based on the level of proficiency in the testing language. Ninety-four young adults participated in this study and were classified as 47 monolinguals, 23 simultaneous bilinguals (learned English and another language at an early age), and 24 sequential bilinguals (learned one language and then another). All participants completed visual & audio-visual Digit Span tasks and measures of language proficiency. Sequential bilinguals had significantly lower digit spans when the stimuli were presented bimodally (i.e., audio-visual condition). Also, bilinguals with lower English proficiency showed the greatest discrepancies between the two presentation conditions with the visual-only presentation yielding better performance. The results indicate that the auditory presentation of L2 stimuli can detrimentally affect Digit Span's performance, likely due to dominant language interference in the rehearsal mechanism. The clinical implications of these findings will be discussed.

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4:00-6:00 PM (2064)

Strategies and Motivation: The Keys to Language Learning Success. JENNIFER MARTIN and JEANETTE ALTARRIBA, *University at Albany, SUNY* (Sponsored by Ludmila Isurin) – This study investigated the strategy use and motivations of adult learners of second and foreign languages, and the degree to which specific strategies, motivations, and participant characteristics are associated with successful learning outcomes. Normative data were collected via a battery of self-report measures assessing affective, (meta)cognitive, motivational, and demographic characteristics. U.S. university student participants of varying previous foreign language experience were recruited with the goal of examining key factors across a range of skill and experience within this population. Among the variables examined, gender revealed the finding that female participants reported greater strategy use of all types examined as well as greater overall motivation to learn a new language. Controlling for the effect of gender, performance measures (self-reported performance/abilities and foreign language course grades) were associated with greater reported use of compensatory strategies specifically (e.g., using context clues). Results provide empirical support for promising approaches that may be fostered within the critical field of language learning and instruction.

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4:00-6:00 PM (2065)

Age Differences in Cognitive Control: Which Cue Manipulations Matter? CASSANDRA SKROTZKI, *Ryerson University,* LINDA TRUONG, *Rotman Research Institute, Baycrest Health Sciences,* LIXIA YANG, *Ryerson University,* (Sponsored by Lixia Yang) – According to the Dual Mechanisms of Control framework, there are two distinct cognitive control modes: proactive control requires actively maintaining goal-relevant information, whereas reactive control reactivates goal-relevant information only when needed. Cognitive control use shifts away from proactive and towards reactive control with aging. Three experiments examined the effects of different cue manipulations for promoting proactive control use in older adults by modifying the standard AX-Continuous Performance Task (AX-CPT). Experiment 1 adopted dichotomized cues (O vs. Z valid cues), Experiment 2 implemented distinct color-coded cues (red cues vs. blue probes), and Experiment 3 applied dichotomized female-male face cues. Experiments 1 and 2 did not produce a proactive control preference, but Experiment 3 enhanced proactive control use in older adults relative to their performance on the standard AX-CPT. To conclude, cue dichotomization or cue distinctiveness alone were insufficient for improving older adults' proactive control use. The enhanced proactive control use observed in Experiment 3 might be driven by the visual and social meaningfulness of the dichotomized face cues.

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4:00-6:00 PM (2066)

Blast from the Past…Stroop Interference & Aging. JESSICA NICOSIA, EMILY COHEN-SHIKORA, and DAVID BALOTA, *Washington University in St. Louis* – The Stroop task is regarded as the "gold standard" for assessing attentional control, however, processing speed differences between age groups complicates age by congruency interactions. Several Brinley meta-analyses (based on group means) have indicated that there is no effect of age on Stroop interference above and beyond general slowing. In the present study, we investigated the Stroop effect in younger and older adults using data from 29 experiments from different labs, and Universities. All datasets came from computerized, color-naming Stroop tasks with trial-level data for congruent and incongruent trials. We examined age differences in the Stroop effect by controlling for general slowing in several ways. First, trial-level response latencies were z-scored based on each individual's mean response latency and standard deviation. Second, we calculated a proportion score dividing each participant's Stroop effect by their mean incongruent response time. Third, we performed a linear mixed-effect analysis allowing the intercept to vary randomly for each participant. All three approaches yielded a highly reliable disproportionate Stroop effect in older adults compared to younger adults, after controlling for general slowing.

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4:00-6:00 PM (2067)

Comparing Random Versus Alternating-Runs Switch Costs in Younger and Older Adults Using the CV/OE Switch Task. JACOB NAMIAS, NICHOLAS MAXWELL, and MARK HUFF, *The University of Southern Mississippi,* RONALD SCHWARTZ, *Hattiesburg Clinic* (Sponsored by Mark Huff) – The Consonant-Vowel/Odd-Even task (CV/OE) is a task-switching paradigm that allows measurement of both local and global task-switching costs. Participants are shown a bivalent stimulus (e.g., D42) and are asked to classify the letter (consonant/vowel) or number (odd/even). Previous work (Huff et al., 2015) has showed that global switch costs (i.e., greater RTs for switch vs. pure trials) increased as a function of age. However, older adults showed reduced local switch costs (i.e., greater RTs for switch vs. non-switch trials) versus younger adults. Prior research has primarily investigated switch costs using a predictive alternating-runs sequence of trials (CV, CV, OE, OE, CV, CV). The present study compared an alternating-runs sequence to a separate switch block containing an unpredictable random trial sequence (CV, OE, OE, OE, CV, OE) in younger and healthy older adults. Both age groups showed reduced global costs for random switching versus alternating runs, but older adults showed greater global costs for both sequences. No differences were found in local costs.

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These results suggest that although both groups improve task maintenance in response to unpredictable task switching, older adults show an age-related deficit.
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4:00-6:00 PM (2068)

When I'm 64: Effects of Age on Memory and Attention in Over 40,000 Online Participants. ANNALISE D'SOUZA, NICOLE ANDERSON, LARISSA MCKETTON, and BRIAN LEVINE, *Rotman Research Institute, Baycrest Health Sciences, & University of Toronto,* ANGELA TROYER, *University of Toronto & Baycrest Health Services* – Recent advances in digital technologies and statistical modelling enable researchers to examine age-related changes in cognition far more precisely than previously. The current study investigates age-related changes in interference control, processing speed, spatial working memory, associative recognition memory, and executive attention, using a psychometrically validated web-based assessment (Cogniciti Brain Health Assessment; Troyer et al., 2014). Segmented regression was used in an online sample of over 40,000 individuals (ages 18-90) to identify whether cognitive change is continuous, the ages at which any shifts occur, and the rate of change across ages. Mean performance on most abilities showed gradual decline over adulthood, shifting to more rapid decline after the early sixties. The shift was accompanied by increases in interindividual (between-person) variability and intraindividual (within-person) variability across tasks. A considerable amount of the effects of age was explained by shared variance across measures (a domain-general influence) rather than individual measures (domain-specific influences).
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4:00-6:00 PM (2069)

Make Me Adaptive: The Case of Inhibition. MARINA MARTINČEVIĆ and ANDREA VRANIĆ, *University of Zagreb* (Sponsored by Andrea Vranić) – Inhibition is one of the main executive function showing an age-related decline. It is often hypothesized as a major factor in cognitive ageing, and as a result a number of interventions aimed at inhibition in aging has been proposed. Adaptive nature of interventions usually results in its greater efficacy. Still, adaptive trainings are typically found in working memory domain, and less for other cognitive functions. This study was aimed to design an adaptive inhibition task to be used in cognitive training for older adults. A total of N=90 older adults (60 and older) completed the picture-word inhibition task – a main inhibition measure, in which objects are shown with either a congruent or an incongruent word inscribed. The task is to ignore the word and react to the object. Three versions of task, differing in the ratio of congruent and non-congruent stimuli (75:25; 50:50; 25:75) were used, together with a Simon task, n-back task, memory updating numerical task and Raven's Progressive Matrices. The accuracy and speed of response were used as dependent variables at each task level. The results show that picture-word task can be used as an adaptive inhibition task. The MTMM correlation analysis shows good convergent validity.
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4:00-6:00 PM (2070)

The Effects of Age and Political Beliefs on COVID-19 Pandemic Memory. CHRISTIE CHUNG, SHAYNA BERKOWITZ, and MARIE SCHULTE-BISPING, *Mills College*, ANNE CORMIA, *Claremont Graduate University* (Presented by Shayna Berkowitz) – Several recent studies have demonstrated the influence of political beliefs on people's behaviors and compliance with safety recommendations during the COVID-19 pandemic. In the present study, we examined the effects of age and political beliefs on participants' memory for events related to COVID-19 in a sample of 189 MTurk participants, aged 18 to 67. Our results showed that adults aged 50 and above rated their memory for the shelter-in-place order with higher clarity than middle (aged 30 to 49) and young adults (aged 18 to 29). Multiple regression analysis showed that for adults aged 30-49, self-reported importance of masks significantly predicted memory clarity rating. However, memory clarity of participants older than 50 was significantly driven by perceived realness and danger of COVID-19. Older adults were also more politically conservative than their younger counterparts. Our results, therefore, suggest that memory processes may be driven by different motivational factors based on age and political beliefs.
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4:00-6:00 PM (2071)

Effects of Valence on the ERP Subsequent Memory Effect in Younger and Older Adults. ERIC FIELDS, *Boston College & Brandeis University,* HOLLY BOWEN, *Boston College & Southern Methodist University,* RYAN DALEY, *Boston College,* KATELYN PARISI, *Boston College & Brandeis University,* ANGELA GUTCHESS, *Brandeis University,* ELIZABETH KENSINGER, *Boston College* – Young adults (YA) tend to show a negativity bias in memory, while older adults (OA) often show a greater advantage for positive information, a pattern known as the "positivity effect". We used event-related potentials (ERP) to examine the contribution of initial encoding to the positivity effect. ERPs were recorded to two-sentence scenarios with a neutral, positive, or negative critical word in the second sentence. Memory for the critical word was later assessed via a cued recall task. Recall rates showed the expected positivity effect: YAs remembered negative words better than positive or neutral, while OAs showed equally enhanced memory for positive and negative. Both groups showed ERP subsequent memory effects (SME), but there were differences in scalp distribution. For YAs the SME was frontally distributed for neutral stimuli with a posterior component for emotional stimuli. For OAs, the SME had a central distribution for all three valences. In contrast to the behavioral memory results, the SME was slightly (but not significantly) larger for negative words than positive words for both age groups. This suggests that the positivity effect in memory may be primarily due to processes that take place after initial encoding.
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4:00-6:00 PM (2072)

The Effect of the COVID-19 Pandemic on Cognitive Functioning and Wellbeing in Older Adults. SARAH DE PUE and CÉLINE GILLEBERT, *KU Leuven,* EVA DIERCKX, *Vrije Universiteit Brussel & Alexianen Zorggroep Tienen,* MARIE-ANNE VANDERHASSELT, *University Hospital Ghent & Ghent University,* RUDI DE RAEDT, *Ghent University,* EVA VAN DEN BUSSCHE, *KU Leuven* (Sponsored by Eva Van den Bussche) – The COVID-19 pandemic took a heavy toll on older adults. In Belgium, approximately 50% of the cases were aged 60 or older, but 93% of deaths due to COVID-19 were aged 65 or older. Similar trends were observed in other countries. As a consequence, older adults were

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identified as a group at risk, and strict governmental restrictions were imposed for them (e.g., no contact with [grand]children, no visitors in residential care facilities, home confinement). This has caused concerns about the mental health of older adults. The aim of this study was to establish how adults aged 65 years or older are doing. Using self-report measures in an online survey, the impact of the COVID-19 period on cognitive functioning, activity, sleep and wellbeing was studied. We observed that participants reported a significant decrease in activity level, sleep quality and wellbeing during the COVID-19 period as compared to before COVID-19. We also found that these changes were especially related to depression. Our study shows that the COVID-19 period had a severe impact on the mental health of older adults.
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4:00-6:00 PM (2073)

Directing Attention to Event Changes Improves Memory Updating for Older Adults. SYDNEY GARLITCH and CHRISTOPHER WAHLHEIM, *University of North Carolina at Greensboro* (Sponsored by Christopher Wahlheim) – Older adults process event changes less effectively than younger adults, and this is associated with impaired memory updating. Here, we examined the role of controlled attention to event features this deficit. Older and younger adults watched movies of an actor performing everyday activities on two fictive "days" in her life. Some activities included a feature that changed across movies (e.g., eating a banana and then a granola bar for breakfast). Audio-visual cues pointed out changed features during both movies. One week later, participants recalled features from the second movie, indicated which changed, and recalled features from the first movie when change was indicated. Directing attention to changed features improved memory for changed activities from both movies and the fact that those activities changed. These results suggest that age-related differences in event memory updating partly reflect deficits in controlled allocation of attention that can be improved with exogenous cues. The results also extend previous research to suggest that event memory updating is another area where older adults can strategically allocate attentional resources to important features, which results in benefits to later memory.
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4:00-6:00 PM (2074)

Age-Related Differences in Relationships Between fMRI-Measured Baseline Cerebral Blood Flow and Processing Speed. YUGUANG ZHAO, DEMA ABDELKARIM, TURNER MONROE, KATHRYN WEST, JOANNA HUTCHISON, and DINESH SIVAKOLUNDU, *University of Texas at Dallas,* BINU THOMAS, *University of Texas Southwestern Medical Center,* PEIYING LIU, *Johns Hopkins University,* JEFFREY SPENCE, *University of Texas at Dallas,* HANZHANG LU, *Johns Hopkins University,* RYPMA BART, *University of Texas at Dallas* (Sponsored by Bart Rypma) – Age-related decline in task-demand modulation of neural activity has been observed in studies using blood-oxygen-level-dependent (BOLD) signal. We measured age-changes in demand-related neural modulation while participants performed a blocked-designed digit-symbol-verification task (DSVT), with independent task and baseline blocks. In task blocks, participants were presented with a key of digit-symbol pairings above a digit-symbol probe pair. They judged if the probe pair matched one of the key-pairings and responded by button-press. The key digit-symbol pairings varied between 1-, 3-, and 9 items. In baseline blocks, participants passively viewed a fixation cross. Utilizing a dual-echo fMRI sequence, participants' BOLD signal and cerebral blood flow (CBF) were simultaneously measured. During task, reaction time (RT) was positively correlated with BOLD and CBF. During baseline, RT was negatively correlated with CBF. The baseline CBF-RT relationship differed by group. Younger demonstrated a negative correlation while older demonstrated a positive correlation. These results suggest that, age-related changes in baseline blood flow limit older adults' ability to modulate neural resources in response to cognitive demand.
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4:00-6:00 PM (2075)

Age Differences in Strategic Reminder Setting: Optimality, Metacognition and Cognitive Offloading. PEI-CHUN TSAI and SAM GILBERT, *University College London* (Sponsored by Sam Gilbert) – The ability to execute delayed intentions is vital for older people to maintain independence in their daily activities. Efficiently using cognitive offloading strategies like a note in the diary or smartphone alert can help older people maintain the quality of life. In this study, we evaluated how optimal older adults were in their cognitive offloading strategies, using a previously-validated task (Gilbert et al, 2020, JEP:General). Participants chose between earning maximum points for each remembered item using unaided memory, or a smaller amount (which varied from trial to trial) using reminders. This allowed us to calculate whether participants were biased towards using reminders or their own memory, compared with the optimal choice. Older participants set numerically more reminders than younger. However, in terms of bias, younger adults showed greater preference for external reminders than the older group. Younger adults were particularly underconfident (relative to actual accuracy) about their internal memory, while the older group was particularly underconfident about the offloading strategy. Thus, metacognitive interventions might improve the optimality of older adults' strategic reminder setting behaviour.
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4:00-6:00 PM (2076)

Cognitive Function Affects Self-Rated Computer Skills Less Than Demographics. YIFENG GAO, *University of Edinburgh,* MARIA WOLTERS, *University of Edinburgh & Alan Turing Institute* (Presented by Maria Wolters) – Due to COVID-19, most public and private services have gone digital to facilitate social distancing. While some older people struggle to use technology such as smartphones and laptops, others are enthusiastic adopters. The reasons for this are complex, and cognitive ageing is only part of it. We examined the effect of cognitive function on computer self-efficacy, as measured by self-rated computing skills, using the Survey of the Health, Ageing and Retirement in Europe (SHARE). Using ordinal logit regression on the Wave 6 SHARE data, we controlled for factors including age, gender, ability to make ends meet, IT experience, urban/rural location, and self-reported health. Cognitive measures used were memory (word list recall) and category fluency (animals). The strongest predictor of computer self-efficacy was IT experience (OR=10.0), followed by gender (OR=1.45, higher for males). The only predictors with OR<1.1 were fluency (OR=1.09), memory (OR=1.06),

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and age (OR=0.95). While effect sizes varied substantially between countries, the overall pattern remained the same. We conclude that we need to address stereotype threats and the digital divide in addition to accommodating cognitive ageing effects.
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4:00-6:00 PM (2077)

Multidomain Training in Healthy Older Adults Revisited: A Three-Level Meta-Analysis. JENNIFER RIEKER and JOSÉ REALES, *Universidad Nacional de Educación a Distancia,* MÓNICA MUIÑOS, *Universidad Internacional de Valencia,* SOLEDAD BALLESTEROS, *Universidad Nacional de Educación a Distancia* – The effectiveness of multidomain training compared to cognitive or physical training alone has been controversial with some studies suggesting that combined interventions might produce synergetic effects. We conducted a three-level meta-analysis on the transfer effects of multidomain interventions versus cognitive and physical training alone. We obtained 1,070 effect sizes from 54 studies, involving 5.547 healthy older adults. Our results revealed a synergetic effect of multidomain training on executive functions, and larger effects on attention and memory than cognitive and physical training. Multidomain and single cognitive training produced similar effects on memory in comparison to physical training. We did not find differences in processing speed, verbal functions, and global cognition. Moderator analyses showed a complex pattern. In general, age, publication year, and study quality were not significant. We conclude that the combination of cognitive training with physical exercise could be a promising strategy to prevent cognitive and physical declines with aging.
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4:00-6:00 PM (2078)

Longitudinal Change in Letter and Category Fluency: An Analysis of the Seattle Longitudinal Study. NICHOL CASTRO, *University of Washington & University at Buffalo, SUNY,* PAUL ROBINSON, K. WARNER SCHAIE, THOMAS GRABOWSKI, and SHERRY WILLIS, *University of Washington* – Verbal fluency tasks are commonly given in neuropsychological testing. Many reports show cross-sectional differences between younger and older adults, as well as cognitively normal adults and adults with dementia. To extend prior research, this project examined longitudinal change in two verbal fluency tasks (letter and category) using data from the Seattle Longitudinal Study, a multi-decade, cohort sequential study of community-dwelling adults. There were 854 adults who completed both tasks across several testing occasions. We used multilevel modeling to predict number of unique productions on each task from predictors of time, age, and dementia status, as well as risk factors for dementia, namely high blood pressure and APOE e4. We found a significant interaction of dementia status by time^2 but no effect of APOE e4 for both tasks, with diverging results regarding high blood pressure and age. We discuss the implications of these results for assessment of verbal fluency performance.
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4:00-6:00 PM (2079)

Before and Beyond the N400: Confirmed and Disconfirmed Lexical Predictions in Aging. SPYRIDOULA CHEIMARIOU, *University of Alabama,* THOMAS FARMER, *California State University,* JEAN GORDON, *University of Iowa* – Older adults exhibit attenuated N400 ERP effects, indicating less efficient use of context than younger adults. Early (N250) and late (P600) ERP components are also sensitive to manipulations of predictability, reflecting early visual effects and prediction cost, respectively. Here, we examined patterns of early- and later-occurring ERP effects to determine the relative time-course of predictive processing effects in older relative to younger adults. We re-analyzed an existing dataset in which we observed N400 effects in older and younger adults (picture-word matching task), after crossing predictiveness with congruency. Younger adults exhibited N250 effects of predictiveness and congruency whereas these effects were absent in older adults, suggesting that effects associated with the violation of early visual expectations are mitigated in older adults. The P600 effect, however, was larger for older than younger adults, indicating larger misprediction cost for the older group. Our results support findings in the eye-tracking literature demonstrating stronger contextual effects in older adults in later reading measures (e.g., regression-path duration), and may thus reconcile two (often contradictory) lines of experimental research.
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4:00-6:00 PM (2080)

Age Differences in Memory for Socially Important Associations: The Effects of Assigned and Self-Perceived Social Importance and Schematic Support. JULIA SCARINGI, LINGQIAN LI, and LIXIA YANG, *Ryerson University* – Recent study showed that age-related associative memory deficits can be minimized for information depicted as socially important (e.g., Hargis & Castel, 2017). This study aimed to further assess the effects of both arbitrarily assigned and the self-perceived social importance in young and older adults' memory for low-schematic face-name and high-schematic face-occupation associations. Young and older adults studied and recalled 16 face-name-occupation triplets (with neutral expressions) in four blocks, followed by a cued recall of names and occupations at the end. The faces were arbitrarily cued as socially important (i.e., future personal interactions, with an orange frame) or unimportant (i.e., no future personal interaction, without a frame). Finally, they rated all the triplets for their self-perceived social importance on a 10-point Likert Scale. The resulted showed that the self-perceived, but not the arbitrarily assigned, social importance reduced older adults' associative memory deficits, specifically for the high-schematic face-occupation pairs. This suggests that the combination of schematic support and self-perceived social value can effectively mitigate older adults' associative memory deficit.
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4:00-6:00 PM (2081)

Gender Differences in Thematic Content Analysis of Autobiographical Memory in Life Review from the Perspective of Cognitive Aging. AYA HOSOKAWA, *Aino University* – Life review consists of autobiographical memory including momentous self-related memory across the lifespan. Our previous study examining effects of group reminiscence on cognitive aging found that regular participation in group life review improved performances on memory and cognition. The purpose of the current study was to focus on thematic content analysis of life narratives to explore how autobiographical memories were represented in life review. Forty old adults including 20 females shared autobiographical narrative

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in each life stage during life review group sessions. Depictions in each transcript from voice data recognized as non-autobiographical memory were in advance eliminated from analysis. Each unit of autobiographical narrative was labeled according to topic sentence to categorize into two dimensional table of life stage and topic. Female participants were more likely to focus on family-related events while male participants were more likely to emphasize on career-related events. Both gender groups represented personal interpretations including feelings, acceptance, learning lessons, awareness, meaning-making, identity, personality development, spirituality, self-control, and goals in adulthood.
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4:00-6:00 PM (2082)

Age Differences in Navigation and Item Recognition on Hierarchical Menu: Effects of Contents Familiarity. ETSUKO HARADA and KANAU ISHII, *University of Tsukuba* – Hierarchical menus of information system have advantages to present many information in a limited space, however, they often cause troubles to use, especially with older adults. To know reasons why hierarchical menus are so difficult to use, we executed an experiment to use information-display systems with high and low familiarity of contents, comparing two age groups. There were four tasks; information searching task, explanation task how to use the system, card sorting task of menu items, and recognition tests of items on the display. Results revealed that when contents familiarity was low, both age groups spent more time on searching targets, showed less learning of the menu structure, and more correct memory for task-irrelevant information on display, which were more prominent in older adults. Although contents familiarity was a crucial factor to use hierarchical menus, it was interesting that only younger adults could use them with less semantic relatedness.
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4:00-6:00 PM (2083)

A Database of General Knowledge Question Performance in Older Adults. JEN COANE, *Colby College,* SHARDA UMANATH, *Claremont McKenna College* – General knowledge (GK) questions are commonly used in experimental and clinical settings. GK increases over the lifespan, with older adults out-performing younger adults on measures of GK (e.g., Salthouse, 2004). This makes it challenging to identify GK questions that are matched in difficulty across age groups. A popular source for GK questions are Nelson and Narens' (1980) norms for 300 items, which were recently updated by Tauber et al. (2013). However, both of these sets were normed with younger adults. Thus, such norms provide insufficient information to yield similar rates of performance across age groups. We report performance by older adults on over 400 questions ranging in difficulty on both open-ended and multiple-choice questions. These norms will be of use to researchers who are interested in selecting GK questions for older participants to meet specific criteria.
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4:00-6:00 PM (2084)

What's My Age Again? Analyzing the Relationship Between Subjective Age and Self-Reported Memory Function. KRISTEN HARDIN-SIGLER, MARK STERN, ALYSE FINCH, ABIGAIL GORE, KRISTA HOWARD, and REBECCA DEASON, *Texas State University* (Sponsored by Rebecca Deason) – Subjective age is defined by how old an individual feels at a particular moment in time and is often implicated in memory function in older adults. This study investigated the relationship between self-reported subjective memory, memory functioning, and subjective age. Participants (N=256) completed a subjective age measure from which chronological age was subtracted, as well as self-report measures of memory functioning. Participants were classified into groups based on their chronological age and their subjective age difference scores. Results from a 2 (Age: young adult, older adult) x 3 (Subjective Age: younger, same, older) ANCOVA indicated a significant interaction in that older adults who report feeling younger than their chronological age also report poorer memory as compared to others their age. These results are somewhat contradictory to previous subjective aging literature and suggest that there may not be a straightforward relationship between subjective age ratings and different measures of memory functioning.
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4:00-6:00 PM (2085)

Everyday Memory Errors and the Use of Memory Strategies in Young and Older Adults: A Diary Study. BRIGITA BRAZAUSKIENE, IOANNA MARKOSTAMOU, KUNLE ASHAYE, and LIA KVAVILASHVILI, *University of Hertfordshire* (Sponsored by Lia Kvavilashvili) – Negative age effects, consistently obtained in laboratory research on memory, imply that older adults also experience more everyday memory failures (EMFs) than younger adults. It is however possible that, in everyday life, older adults compensate for their impaired memory functioning by increased use of memory strategies. To test this hypothesis, we investigated the nature and frequency of EMFs and the use of memory strategies in healthy younger (n=35) and older adults (n=34). Participants kept two 3-day diaries, one for EMFs and another for memory strategies, and recorded both as and when they occurred in daily life. No age effect was found in the total number of EMFs, but younger adults recorded significantly more prospective memory failures, while older adults recorded more retrospective memory failures. Importantly, no significant age effects were obtained either in the total number of strategies recorded or strategies specific to prospective or retrospective memory tasks.
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4:00-6:00 PM (2086)

How Does Aging, Schematic Knowledge, and Orthographic Similarity Affect Reconstructive Memory Strategies? JACK KUHNS and DAYNA TOURON, *University of North Carolina at Greensboro* (Sponsored by Dayna Touron) – Cued recall requires the recovery of both relational and item information when given a memory cue. Memory for pairs of items is often enhanced when participants can interpret those items in familiar ways, guided by pre-existing schemas, scripts, or other knowledge structures. While prior knowledge has been shown to increase memory for related or similar pairs, merely demonstrating an increase in the proportion of remembered pairs does not necessarily reveal how that prior knowledge is used to reconstruct existing memories. The present research investigated how knowledge for grocery prices affected young and older adults' episodic memory with prices that were either consistent (market-priced) or inconsistent (overpriced) with prior knowledge across two experiments. The condition consistent with prior knowledge showed that participants' incorrect responses were more distinctive, being closer to the studied value whereas incorrect responses in the inconsistent

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condition were less distinctive, resembling random guessing. Prior knowledge facilitated memory for both age groups, and despite age-related differences in the inconsistent condition, older adults' guessing behavior was mostly indistinguishable from young adults' guesses.
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4:00-6:00 PM (2087)

Semantic Knowledge and Memory Performance Across Adulthood. LISA EMERY and CELIA WHISMAN, *Appalachian State University* – The Wechsler Memory Scale - Fourth Edition (WMS-IV) includes two tests of auditory memory: Logical Memory (LM; memory for elements of a story) and Verbal Paired Associates (VPA; memory for learning related and unrelated word pairs over four repeated trials). We examined patterns of age differences on these tests using the WMS-IV normative data and data collected from our laboratory. In the normative sample (N=1200; ages 20-90), LM and VPA showed different patterns of age-related decline. LM performance remained stable up until age 69 and declined sharply thereafter. In contrast, VPA performance declined linearly from age 20. We then used VPA data collected from older and younger adults in our laboratory (N=248; ages 20-85) to compare age differences in learning of the related (N=4) vs. unrelated (N=10) word pairs. Consistent with prior research, overall age differences were large for unrelated pairs, $F(1,242)=25.59$, $p<.001$, $\eta_p^2=.10$, but not for related pairs, $F(1,242)=1.55$, $p=.215$, $\eta_p^2=.006$. Taken together, these results suggest that age differences in learning new associations start early in adulthood, but immediate recall in a semantic context is largely spared until older ages.
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4:00-6:00 PM (2088)

Preserved Memory for Decisions Across Adulthood. MORGAN TAYLOR, ELIZABETH MARSH, and GREGORY SAMANEZ-LARKIN, *Duke University* (Sponsored by Elizabeth Marsh) – Emerging research has examined the role memory plays in decision-making, but how well one remembers their decisions has been mostly ignored, especially in aging. In three studies, we examined whether both decision accuracy and memory for previously made decisions differed across adulthood. As age-related declines in memory are expected throughout the lifetime, we predicted a negative correlation with age, such that older adults would not remember their earlier choices as well as younger adults. Across the studies, participants completed a modified consumer choice task. In the task, participants learned the star rating of pairs of products in a shopping-like task (Study 1: shopping framing) or circle count of pairs of objects in a comparison task (Studies 2 & 3: neutral framing) and chose the higher rated item of the pair. Items were shown sequentially, with delays between the presentation of the first and second items of a pair. Later, participants were asked to remember their prior choices. Across studies, we found little to no effect of age on decision accuracy or remembering one's decisions in the two contexts. These results suggest that older adults are as equally able to remember their earlier decisions as younger adults.
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4:00-6:00 PM (2089)

Familiarity for Words and Objects Is Impaired in Amnestic Mild Cognitive Impairment in a Context Minimizing the Role of Recollection. BRAHM SANGER, *Rotman Research Institute, Baycrest Health Sciences & McMaster University,* NICOLE ANDERSON, *Rotman Research Institute, Baycrest Health Sciences & University of Toronto* (Sponsored by Nicole Anderson) – While healthy aging has relatively little effect on familiarity, deficits would be expected in amnestic mild cognitive impairment (aMCI): Tau pathology appears first in medial perirhinal and lateral entorhinal cortices, regions showing cell loss and cortical thinning in aMCI, and lesions to perirhinal cortex (PrC) impair familiarity. Results from dual-process paradigms are mixed, however, on if familiarity is impaired in aMCI. We hypothesized that familiarity deficits will be evident in aMCI but not healthy aging when recollection is minimized, more for objects given PrC supports object recognition. Healthy younger and older adults and individuals with aMCI saw a series of words and objects 1, 2, 4, or 7 times in an incidental encoding task. At test, participants judged the absolute frequency of each word and object. For both item types, frequency judgments increased with actual frequency less in individuals with aMCI compared to healthy groups. These results confirmed familiarity deficits in aMCI, but not greater object familiarity deficits. In a subsequent study, we will examine familiarity for highly confusable objects (e.g., one cup shown 1 time, another 4 times), in which we expect greater object familiarity deficits in aMCI.
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4:00-6:00 PM (2090)

Age Differences in Working Memory Dual Task Costs: Exploring the Impact of Trial Timing Manipulations. AGNIESZKA JAROSLAWSKA, *Queen's University Belfast,* STEPHEN RHODES, *Rotman Research Institute, Baycrest Health Sciences,* ALICIA FORSBERG, *University of Missouri,* JASON DOHERTY, *University of Edinburgh,* CLEMENT BELLETIER, *Clermont Auvergne,* MOSHE NAVEH-BENJAMIN and NELSON COWAN, *University of Missouri,* VALERIE CAMOS, *University of Fribourg,* PIERRE BARROUILLET, *University of Geneva,* ROBERT LOGIE, *University of Edinburgh* – We report three experiments assessing different aspects of trial timing that may modulate age differences in managing simultaneous storage and processing demands in a working memory task. Informed by the broader literature on working memory, we identified three aspects of trial timing that could serve to reduce or amplify differences in dual task performance between younger and older adults: 1) setting a delay prior to processing activities to facilitate switching between storage and processing demands, 2) separating the presentation of the memoranda in time to allow for the creation of more distinct representations, and 3) varying the pace of processing activities during the retention interval to allow for maintenance activities to be performed during free time. We found that none of these manipulations modulated the magnitude of age differences in dual task costs, suggesting that these differences are not due to limitations in speed of processing.
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4:00-6:00 PM (2091)

Predicting Lexico-Semantic Development from Co-Occurrence Regularities in Linguistic Input. OLIVERA SAVIC and ALEXANDRIA BARKHIMER, *The Ohio State University,* HYUNGWOOK YIM, *The University of Melbourne,* LAYLA UNGER, *The Ohio State University,* SIMON DE DEYNE and SIMON DENNIS, *The University of Melbourne,* VLADIMIR SLOUTSKY, *The Ohio State University* (Presented by

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Alexandria Barkhimer) – Words occur in language in predictable ways. Words that can be combined to express meaningful ideas reliably co-occur (e.g. juicy-apple), while words similar in meaning reliably share patterns of co-occurrence (e.g. apple and pear both reliably co-occur within juicy). Computational work suggests that these types of co-occurrence regularities are abundant in the linguistic input and that they capture much of the semantic links in adult lexico-semantic networks (e.g., Jones, Willits, & Dennis, 2015; Landauer & Dumais, 1997). In the current work we investigate the role of the co-occurrence regularities in shaping lexico-semantic development. Guided by assumptions of the recently proposed associative account (Sloutsky, Yim, Yao, & Dennis, 2017), we (1) examine the development of the ability to form novel lexico-semantic links from empirically manipulated input rich in co-occurrence regularities and (2) characterize changes in lexico-semantic links between familiar words based on a large sample of developmental free association data.
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4:00-6:00 PM (2092)

A Developmental fMRI Study of Working Memory in Children and Adolescents: Data from Moscow Schools. ANDREI FABER, *HSE University,* MARIE ARSALIDOU, *HSE University & York University* – Neural correlates of working memory are well established in numerous fMRI studies with adults, but there is no consensus on when and how working memory develops in children and adolescents. In this study we investigated neural correlates of working memory development with a measure of mental attention with 6 levels of difficulty using fMRI. Mental attention is considered as the maturational component of working memory, and mental attention capacity corresponds to the amount of information that a child can simultaneously hold and process. We examined brain correlates of mental attention in children (9-12 years old) and adolescents (13-16 years old) using Color Matching Task. This cognitive task was previously validated with school-aged children and integrated with fMRI. Results showed significant activation in frontoparietal brain regions, which is consistent with findings from studies with adults. Interestingly, we found a right lateralization effect in adolescents comparing with children in the insular cortex. These findings can inform theories of cognitive development and understanding of neurobiological mechanisms underlying development of working memory. The research is supported by the Russian Science Foundation (#17-18-01047).
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4:00-6:00 PM (2093)

Developmental Changes in the Neural Prediction of Auditory Statistics. YI-LUN WENG, JULIE SCHNEIDER, and ZHENGHAN QI, *University of Delaware* (Presented by Zhenghan Qi) – Prediction coding framework has lent an explanation for the dissociations between MMN and P3, the two neural indices for violations of auditory expectations. MMN represents automatic detection of the prediction error from information locally distributed during a recent auditory experience, while P3 represents the attentional shift to the prediction errors from information globally distributed over an extended period of time. Previous research in adults suggests that conscious awareness of the prediction error is related to learning of global statistical regularities. Our study aims to investigate the developmental changes in the neural prediction of both the local and global auditory statistics. 45 adults and 22 children passively listened to /ba/ and /da/ syllables that varied in the frequency of occurrence both locally and globally. MMN in adults was sensitive to local probability, but P3 was sensitive to global probability only in a locally salient context. In contrast, MMN in children was sensitive to local probability and late negativity was sensitive to global probability. There was no evidence of P3. These findings suggest children engage a more automatic process to detect prediction errors of global auditory statistics.
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4:00-6:00 PM (2094)

Students' Social and Emotional Development and Academic Achievement Trajectories: 3-Year Longitudinal Study. CHEYEON HA, *Florida State University* – Scholars have paid attention to identify how human social and emotional development can be related to meaningful personal outcomes, such as academic success in schools. This study aims to explore the middle students' social and emotional development and their academic achievement trajectories. The national data of the Korean Educational Longitudinal Study tracked students' achievement changes with relevant social and emotional factors for 3 years. The national data includes annual surveys and tests from fifth-grade to seventh-grade students with the same cohort group (n=7324). In particular, I analyzed students' social and emotional variables of self-awareness, social-awareness, self-management, stress levels, learning attitudes, and relationships with teachers. Using a longitudinal mediation model, I will analyze the complex relationships among the variables and predict the students' literacy and math achievement. Moreover, this study will consider demographic information, such as gender, school locations, and gap between public and private schools. Analyzing students' growth curves will potentially provide insight into how their social and emotional abilities can predict cognitive development and academic success.
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4:00-6:00 PM (2095)

Infants' Gaze Following for Native and Non-Native Speakers. JINGLEI REN and KATHERINE WHITE, *University of Waterloo* – Infants' preferences for native speakers over foreign-accented speakers guide their choices among social partners, but whether these preferences also guide their learning is unknown. We examined whether 7-10-month-old infants (N=36) were more likely to follow the gaze of a native English speaker than that of a Chinese-accented speaker. Infants were familiarized with a speaker whose eye gaze predicted the appearance of a target half the time. During the test phase, no target appeared. Infants reliably followed the gaze of the native speaker in test, looking 71% of the time at the cued location ($p < .01$). In contrast, they spent 39% of the time looking at the location cued by the non-native speaker. The difference between speakers was significant, $t(31) = 3.34$, $p < .005$. These findings suggest that infants attend more to information provided by native speakers, likely because of the greater potential for learning relevant information.
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4:00-6:00 PM (2096)

Chronological Age Versus Pubertal Development in the Improvement of Working Memory Capacity in Early Adolescents. ISIS SEGURA and SABINE POMPEIA, *Universidade Federal de São Paulo* – The

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functionality in the frontal and intraparietal brain areas play an important role in determining people's working memory capacity. Because there is ample evidence that these areas mature in response to pubertal changes in adolescence, we investigated whether sexual maturity (self-assessed pubertal status using the Pubertal Development Scale), compared with age, was a better predictor of improvement in performance in a working memory capacity task that does not allow strategy use: running memory span, in which a list of stimuli with an unpredictable length, presented very quickly, must be recalled from the end of the list after the presentation terminates. The study (ethical approval# 56284216.7.0000.5505) involved 9-15-year-olds from Brazil (N=280), an age when puberty occurs. In analyses controlled for sex and socioeconomic status (mean parental schooling), we found that chronological age, in parallel with improvement in performance in Block Design Intelligence test, better explained increases in performance than pubertal development. We conclude that pubertal brain changes are not the main drivers of the growth of available working memory space and/or increased efficiency in the use of this space in early adolescents.

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4:00-6:00 PM (2097)

Training Social and Cognitive Abilities Across the Lifespan. MARTINA DE LILLO, REBECCA FOLEY, and CAMILLA WOODROW-HILL, *University of Kent,* ELIZABETH BRADFORD, *University of Dundee,* HEATHER FERGUSON, *University of Kent* (Sponsored by Heather Ferguson) – Research has revealed a strong link between Theory of Mind (ToM) and Executive Functions (EFs; Apperly et al. 2009), however the nature of this relationship remains under debate. ToM can be improved through cognitive training in children (Kloo & Perner, 2003) and clinical populations (Happé & Frith, 1996), but less is known about whether and how these effects are manifest across the healthy lifespan. In a sample of 232 participants (aged 10-19, 20-40, and 60-80 years), we tested whether a 21-day adaptive training program that targets Working Memory, Inhibitory Control, or Cognitive Flexibility (versus an active control group) leads to improvements in cognitive and social abilities. Employing a large battery of tasks that included behavioural, EEG, and real-world measures our results showed clear effects of direct training (i.e., improvements in the trained tasks), but these effects did not generalise to other EF components or measures of ToM.

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4:00-6:00 PM (2098)

Bigger Is Better? Or Is Less More? Lower Price Heuristics Bias Shopping Decision, Regardless of Math Anxiety. ANDIE STOROZUK and ERIN MALONEY, *University of Ottawa* (Sponsored by Erin Maloney) – Most consumers base shopping decisions on price comparisons. Interestingly, many people experience math anxiety (MA), an adverse reaction to engaging with math that relates to suboptimal purchasing choices. We investigated whether a size heuristic ("bigger is better") negatively influences shopping behaviours of consumers with MA. Participants (n=186) were asked to select the better deal between two identical products differing in size and price. Higher-MA consumers made more purchasing errors compared to lower-MA consumers. Counter to our hypothesis, consumers selected the smaller product more often when committing errors, suggesting the use of a price heuristic ("when in doubt, spend less") rather than a size heuristic. Increasing task difficulty heightened the activation of this heuristic; consumers picked the smaller product more often when the price difference was small (harder) compared to when it was large (easier). Though higher-MA participants made more errors overall, they relied on the price heuristic to the same degree as their lower-MA peers.

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4:00-6:00 PM (2099)

The Role of Emotions in Probability Evaluations. LARA BERTRAM and JONATHAN NELSON, *University of Surrey & Max Planck Institute for Human Development,* ERIC SCHULZ, *Max Planck Institute for Biological Cybernetics* (Sponsored by Jonathan D. Nelson) – Information about the probability of an event is a fundamental component of our everyday life and affects how certain we feel when making a decision or predicting the future. Often, probabilistic uncertainty is communicated as risk, for example when a tracking app tells us about our risk of being infected with COVID-19. Previous research has demonstrated that risk perceptions are affected by emotional states: emotion-specific appraisal patterns, among them uncertainty appraisals, influence evaluations of risk and modulate risk reducing behaviour. At the core of risks are probabilities and evaluating probability distributions is fundamental to assessing risks. Yet, how emotions affect people's basic evaluations of probabilities is an open question. I present research on a) the relationship between anxiety, subjective evaluations of uncertainty and quantitative estimates of neutral probabilistic events during the Coronavirus-pandemic and b) people's evaluations of probabilistic uncertainty (entropy) in different experimentally induced emotional states (anxiety, pride and anger).

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4:00-6:00 PM (2100)

Factors Affecting Bilingual Number Representation: A Meta-Analytic Review. OMAR GARCIA (J. Frank Yates Student Travel Award Recipient), NAFISEH FAGHIHI, AKASH RAOLA, JYOTSNA VAID, *Texas A&M University* (Sponsored by Jyotsna Vaid) – We conducted a meta-analytic study of factors influencing the difference across bilinguals' languages in speed and accuracy of number judgment or computations. The factors considered were type of task (i.e., naming, arithmetic), language proficiency (low, medium, high), the stated preferred language for mental arithmetic (L1 or L2), the language of early schooling (L1 vs. L2), and writing system similarity (same or different script). Thirty-two studies testing performance in both languages yielded 46 independent effect sizes for reaction time and 15 for accuracy. Overall results suggested faster performance in the first language across bilingual types. However, certain bilingual subgroups (i.e., high proficient) showed comparable speed across languages. The type of number task also affected the size of the difference in performance across languages. The findings are discussed in terms of their bearing on models of number cognition as applied to bilinguals.

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4:00-6:00 PM (2101)

Intuitive Understanding of Geometric and Topological Concepts. VIJAY MARUPUDI and SASHANK VARMA, *University of Minnesota* (Sponsored by Sashank Varma) – Dehaene et al. (2006) found that, when

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Americans and the Mundurucu were shown five images that exemplify a geometrical or topological (GT) concept and one image that does not, and are asked to identify the deviant image, they do so at above-chance levels. They interpreted this as evidence for intuitive understanding of GT concepts. An alternate explanation is that people relied on general cognitive abilities such as induction and visuospatial reasoning. We are testing these competing explanations using a more difficult two-alternative forced choice version of the task where people are shown a standard image exemplifying a GT concept and asked to choose which of two images is "most similar" or "most different" to the standard. One of the choices is an image that exemplifies the GT concept, and the other is a distractor. A pilot study of 15 participants found above-chance performance on this task. We are currently replicating this study and also collecting measures of induction, visuospatial reasoning, and academic achievement (SAT/ACT scores) to evaluate the role of general cognitive abilities.

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4:00-6:00 PM (2102)

Response Time Modeling for the Size Congruity Effect: Early vs. Late Interaction. KRISTEN BOWMAN and THOMAS FAULKENBERRY, *Tarleton State University* (Sponsored by Thomas Faulkenberry) – The size-congruity effect (SCE) occurs when numerical magnitude interferes with judgments of physical size. This interference is either occurs in the encoding-related or decision-related stages. To discriminate between these accounts, we used a class of mathematical models (ex-Wald, shifted Wald & EZ-Diffusion) to index the underlying cognitive processes via estimates of drift rate, response threshold, and nondecision time. We manipulated congruity in a single-digit physical comparison task and measured RTs. First, we found that congruent trials were processed faster than incongruent trials, which is indicative of the SCE. Next, via the mathematical models, we found that the drift rate for incongruent trials was smaller than for congruent trials, indicating that incongruent trials had a faster rate of information uptake. The response threshold for incongruent trials was larger than for congruent trials, indicating that for incongruent trials more information needed to be accumulated before responding. Critically, there was no difference for nondecision time between trial type. This combination of results provide support for a late interaction account of the SCE, which sheds light onto decision-related models of number processing.

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4:00-6:00 PM (2103)

Which Factors Promote Over- or Underweighting of Extreme Numerical Values in Decisions from Sequential Samples? VERENA CLARMANN VON CLARENAU, STEFAN APPELHOFF, BERNHARD SPITZER, and THORSTEN PACHUR, *Max Planck Institute for Human Development* (Sponsored by Thorsten Pachur) – Humans routinely make decisions based on sequential samples of numerical values, for instance, when deciding which of two online shops is cheaper. A common conclusion from computational modeling analyses in behavioral economics is that numerical values are subjectively compressed in their internal representation (i.e., extreme values are underweighted). However, recent psychophysical studies of sequential number comparison have found evidence for the opposite pattern, namely anti-compression (i.e., an overweighting of the extreme values). Here we examine possible causes for this apparent discrepancy between studies. In reanalyses of existing data sets with both economic and psychometric models, we obtained new evidence for distinct compression/anti-compression patterns across studies, regardless of the analysis framework used. This suggests that the divergent types of distortions stem from differences in the task features. Next, we try to identify these task features by experimentally manipulating selected features such as the magnitude range of the to-be-judged values and the cognitive demands of the task.

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4:00-6:00 PM (2104)

Central Tendency Effects in Children's and Adults' Magnitude Estimates. LINDSEY HILDEBRAND, *Boston College,* HILARY BARTH and ANDREA PATALANO, *Wesleyan University,* SARA CORDES, *Boston College* (Sponsored by Sara Cordes) – Adults' temporal estimates reveal a central tendency effect (CTE), such that larger durations are typically underestimated, smaller durations are overestimated, and estimates are generally biased towards the mean of the range of durations presented (i.e., the temporal context; also referred to as context effects). Here we extend this work to investigate: 1) whether children also show a temporal CTE; 2) whether CTEs are observed for estimates in a related quantitative domain, number; 3) how CTEs compare between numerical and temporal estimates; and 4) how CTEs change over development. In two studies, adults and children (aged 7-12) completed either a numerical or a temporal reproduction task across two contexts (i.e., ranges of values). CTEs were observed for both number and timing tasks (p values $< .01$). Critically, however, numerical and temporal estimates were biased in opposite directions, such that numerical estimates were larger when presented amongst smaller values. This appears inconsistent with some common theories of CTEs. Importantly, these results suggest that children aged 7-12 years show patterns of bias on magnitude estimates similar to those observed in adulthood.

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4:00-6:00 PM (2105)

The Left Digit Effect in a Complex Judgment Task: Evaluating Hypothetical College Applicants. GILLIAN WEEKS, KATHERINE WILLIAMS, HILARY BARTH, and ANDREA PATALANO, *Wesleyan University* (Presented by Katherine Williams) – Left digit effects (LDE) have been observed across contexts ranging from pricing judgments to number line estimation. For example, $3.00 is judged to be a much greater cost than $2.99, and "801" is estimated too far to the right of "798" on a number line. We tested whether the size of the LDE is related across tasks. In Experiment 1 (n=134) and Experiment 2 (n=157), adults completed a multiattribute judgment task in which they rated the strength of hypothetical applicants for college admission, and a self-paced number line estimation task. A small LDE was found in the judgment task and a large effect in number line estimation. There was no correlation between participants' LDEs across tasks. These findings provide evidence that the LDE, while smaller, extends to multiattribute judgment, but offer no evidence that such performance can be predicted from a number skills task such as number line estimation.

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4:00-6:00 PM (2106)

Effect of Visualization on Students' Understanding of Probability Concepts in an Innovative Learning Module. JOHN VARGAS, JEFFREY STARNS, and ANDREW COHEN, *University of Massachusetts Amherst* (Sponsored by Jeffrey Starns) – Statistical reasoning is a critical component of both STEM education and everyday decision-making. Bayesian inference – the process of updating a hypothesis or belief based on the presentation of new information – is a growing part of statistics education but is unintuitive to many people. We created a learning module for teaching Bayesian reasoning and related probability concepts. Previous research on teaching Bayesian reasoning has shown a substantial benefit of using visual aids to assist learning but has done little to integrate these learning aids into a classroom curriculum. This project tests the efficacy of a unique bar visualization designed to both facilitate correct Bayesian reasoning and teach foundational probability concepts within a university statistics course. Students were divided into two groups and were taught probability concepts either with or without a bar visualization. Results showed that the bar visualization helped participants solve Bayesian inference problems before direct instruction, but the visualization group was no better able to explicitly list the mathematical steps involved in finding a solution.

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4:00-6:00 PM (2107)

Summary Accuracy Feedback Does Not Reduce the Left Digit Effect in Number Line Estimation. CLAUDIA STENBAEK, KATHERINE WILLIAMS, HILARY BARTH, and ANDREA PATALANO, *Wesleyan University* (Presented by Katherine Williams) – A robust left digit effect (LDE) arises in number line estimation (NLE) such that adults' estimates for numerals with different hundreds place digits but nearly identical magnitudes are systematically different from one another (e.g., 299 is placed too far to the left of 302; Lai, Zax, et al., 2018). We tested whether the LDE is influenced by summary feedback. Participants were assigned to either a feedback (n= 80) or no-feedback (n= 80) condition and completed three 120-trial blocks of a self-paced 0-1000 NLE task. In the middle block of the feedback condition only, summary accuracy feedback was given after each set of 20 trials. Preregistered analyses revealed an LDE in all blocks in both conditions, and accuracy improved from the first to the third block. However, feedback did not lead to a reduction in the LDE. We conclude that there are no changes in the left digit effect resulting from summary feedback.

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4:00-6:00 PM (2108)

Comparing Benefits of Visual Aids in Bayesian Probability Calculations. ROGELIO CARRILLO and ROMAN TARABAN, *Texas Tech University* – Visual aids (Vas) facilitate understanding of probabilities. On Bayesian problems, Vas increase accuracy (Binder et al., 2015). One difficulty with solving Bayesian probabilities is representational (understanding how problem components relate to each other). A second difficulty is computational (extracting and computing values needed for the solution). One-hundred-and-sixty first-year college students solved five Bayesian problems. The first problem had no VA. Remaining problems included one of four Vas drawn from the literature. Problems were presented in parts, requiring calculation of base rates and conditional probabilities associated with Bayes Theorem, and combining these to obtain the Bayesian probability. This parsing of problems into parts allowed a test of whether difficulties were representational or computational. Results showed participants struggled with Bayes solutions but not component values. Difficulties were not primarily computational; rather, they appear to be representational. Additionally, two of the Vas led to more Bayesian solutions suggesting Vas may aid representational difficulties.

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4:00-6:00 PM (2109)

Perceived Numerosity in Crowded and Uncrowded Displays. MIAO LI, *Université de Lille, CNRS UMR9193 & KU Leuven,* BERT REYNVOET, *KU Leuven,* BILGE SAYIM, *Université de Lille, CNRS UMR9193 & University of Bern* (Sponsored by Bilge Sayim) – Crowding refers to the inability to identify targets when they are surrounded by neighboring flankers. One of the key characteristics of crowding is its radial-tangential anisotropy (RTA): flankers interfere less with target identification when positioned tangentially compared to radially around the target. To explore the role of crowding in numerosity estimation, we used the RTA to create displays with varying crowding levels while keeping other stimulus properties, such as inter-item spacing and convex hull, the same across stimuli. Displays consisted of different numbers of "base" and "crowding" discs. In the crowded condition, a crowding disc was added inside the (radial) crowding region of each base disc. In the uncrowded condition, all crowding discs were (tangentially) added outside the crowding region of – but at the same distance to – the base discs. Additionally, the number of crowding discs per base disc was varied. Observers estimated the number of discs. Numerosity estimates were lower in the crowded compared to the uncrowded condition. The effect of crowding was maximal when each base disc was paired with a crowding disc. Our results show that crowding modulates perceived numerosity.

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4:00-6:00 PM (2110)

The Role of Numerical Processing and Working Memory Capacity on the Relationship Between Math Anxiety and Math Performance. PILAR OLID and HIDEYA KOSHINO, *California State University, San Bernardino* (Sponsored by Hideya Koshino) – According to Attentional Control Theory (Eysenck et al., 2007), anxiety impairs executive functions via depletion of working memory (WM) resources. Math anxiety, a negative emotional response to math-related stimuli, has been found to affect math performance by consuming WM resources. Additionally, poor math performance has been attributed to poor numerical processing (NP). Recent research suggested that math anxiety affects arithmetic indirectly through working memory capacity (WMC) and NP (Skagerlund, Ostergren, Vastjall, & Traff, 2019). Therefore, the present study aimed to investigated whether the relationship between math anxiety and arithmetic might be mediated by WMC and NP. We found that WMC and NP do mediate this relationship. Furthermore, WMC was found to fully mediate the relationship between math anxiety and arithmetic. These results suggest that WMC may play a greater role in arithmetic than NP.

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4:00-6:00 PM (2111)

Belief Updating and Misinformation: Can Fabricated Data Be Ignored? ADAM RAMSEY and JENNIFER TRUEBLOOD, *Vanderbilt University* (Sponsored by Jennifer Trueblood) – This study investigated how encountering fabricated data influenced individuals' belief updating and information seeking behaviors. A novel research protocol was developed to examine these effects. Participants sequentially sampled information regarding the side effect prevalence for fictional medications to form a belief about the true prevalence rate underlying the information samples. These pieces of information were comprised of samples from a Gaussian distribution with a given mean and SD. Participants were instructed to ignore any information samples that seemed too high or too low to be legitimate information. Results showed the presence of an outlier greater than two standard deviations from the underlying mean had a strong negative effect on estimate accuracy. Participants underestimated the underlying prevalence rates when they encountered a low outlier and overestimated when they encountered a high outlier. We examine the reasons for this decrease in accuracy, including outlier-detection ability and number of pieces of information viewed.
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4:00-6:00 PM (2112)

Modeling Strategy Use for Multiple-Cue Judgment in Groups. ANNA THOMA, CHRISTIN SCHULZE, DRIES TRIPPAS, RALF KURVERS, and THORSTEN PACHUR, *Max Planck Institute for Human Development* (Sponsored by Benjamin Scheibehenne) – In a fundamentally social world, many decisions are made in groups rather than in social isolation. Yet the cognitive processes underlying multiple-cue judgment have mainly been studied with individual decision makers. As a consequence, relatively little is known about how groups select strategies for these judgments. In two experiments (N=80; N=240), we examined the influence of three factors on strategy selection in multiple-cue judgment: a) group setting (dyads vs. individuals), b) type of learning task (direct criterion learning vs. learning by comparison), and c) verbal communication (discussion vs. no discussion). Computational modeling of the judgments showed that dyads and individuals did not differ in their strategy use, irrespective of whether or not groups were allowed to communicate verbally during the task. In line with previous research on individual judgments, we found that groups trained with learning by comparison generalized better and relied more on rule-based strategies than groups trained with direct criterion learning. These results suggest that the structure of the learning environment plays a greater role in shaping the cognitive processes underlying multiple-cue judgment than does social interaction.
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4:00-6:00 PM (2113)

Personality Factors and News Consumption Predict Susceptibility to Fake News. DUSTIN CALVILLO, *California State University San Marcos,* RYAN GARCIA, *Naval Postgraduate School,* TOMMI MAYERS and KIANA BERTRAND, *California State University San Marcos* – The prevalence of fake news on social media is likely to influence important issues such as elections, attitudes toward public policy, and health care decisions. Studies have shown that individual level characteristics predict participants' ability to discern real and fake news. The present study examined how personality factors and news consumption predict political news discernment. Participants (N=353) judged the accuracy of real and fake political news headlines, completed a big five inventory, and reported how many hours they obtained political news from 45 sources in a typical week. Regression analyses revealed that greater levels of agreeableness, conscientiousness, open-mindedness, lower levels of extraversion, and fewer hours of news consumption predicted better news discernment. Participants also showed a bias toward ideologically consistent headlines, and this bias was predicted by participants' ideology and consumption of ideologically biased news sources. These results extend those that have identified individual differences in news discernment.
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4:00-6:00 PM (2114)

Numeracy Predicts Accurate Knowledge: The Case of Global Warming Perception. JINHYO CHO, MADHURI RAMASUBRAMANIAN, and JINAN ALLAN, *National Institute for Risk & Resilience & University of Oklahoma,* ADAM FELTZ, *University of Oklahoma & Center for Applied Social Research,* ROCIO GARCIA-RETAMERO, *Max Planck Institute for Human Development & University of Granada* EDWARD COKELY, *National Institute for Risk & Resilience, University of Oklahoma, & Max Planck Institute for Human Development* (Sponsored by Edward Cokely) – Social-psychological factors and attitudes (e.g., cultural worldviews) have been found to predict differences in beliefs and knowledge about polarized issues such as global warming. However, investigations have yet to conduct integrated tests of the relations among these social-psychological factors and influential decision making skills (e.g., risk literacy, as measured by statistical numeracy tests). Results of two studies on beliefs, attitudes, and skills of diverse U.S. adults suggest that risk literacy (as measured by numeracy) is generally associated with more accurate knowledge about global warming (i.e., expert consensus), which in turn predicts differences in climate change beliefs and attitudes independent of all other factors. Findings highlight the benefits of integrative modeling and the robust influences of general skills and accurate knowledge on judgment quality.
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4:00-6:00 PM (2115)

The Effects of Context Type and Pre-exposed Context on Perceived Truth. KARINA CARLSON and YOONHEE JANG, *University of Montana* (Sponsored by Yoonhee Jang) – Judgments on whether a statement is true are influenced by various factors, including context and statement repetition. Specifically, a statement is often judged as true if it has been presented with a related photo even if the photo provides no evidence that the statement is true, and if the statement has been presented before the judgment is made. The present study investigated whether perceived truth is influenced by photos which were presented as context for statements and pre-experimentally exposed. We used related/unrelated photos for statements in one condition, which was compared to the condition of no photos. Half of the photos were pre-exposed for each condition. Participants judged statements as more truthful when they were presented with related photos (vs. with no photos). However, the truthiness effect disappeared when the photo was pre-exposed. In addition, although unrelated photos presented during the judgment trial did not affect perceived truth, there was a slight tendency that the truthiness effect appeared when the photo was pre-exposed. These

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findings suggest that familiarity through pre-exposure of a photo makes things more believable even if the statement is indeed false.
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4:00-6:00 PM (2116)

Intentional Use of Logically Irrelevant Neuroscience Information. LIM LEONG and CRAIG MCKENZIE, *University of California, San Diego* (Sponsored by Craig McKenzie) – Previous research has found that adding superfluous neuroscience details to otherwise circular explanations led non-experts to judge the explanations as higher quality. What remains unexplored, however, is whether the inclusion of logically irrelevant neuroscience information supports additional inferences, and whether people intentionally incorporate this neuroscience information in their judgments. In Study 1, we found that people inferred that the speaker is more confident when her explanations contained neuroscience or statistical information compared to when the explanations contained neither. In Study 2, we discovered that rather than failing to ignore the neuroscience information, the majority of participants explicitly endorsed using it in their judgments. Interestingly, the original effect was replicated only for this subgroup, and those who chose to ignore the neuroscience details were successful in doing so. Together, our results suggest that people assume that the information included in explanations is relevant and useful, and that their judgements of explanation quality depend not only on its logical content but also the additional inferences they may draw such as the speaker's confidence.
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4:00-6:00 PM (2117)

Judgments of Effort Depend on Evaluation Mode. MICHELLE ASHBURNER and EVAN RISKO, *University of Waterloo* (Sponsored by Evan Risko) – Our understanding of effort perception is limited. Performance (e.g., response time; accuracy) is typically used as one way to assess effort in cognitive tasks; however, performance can be readily dissociated from judgments of effort. One potential factor that could lead to such dissociations is the judgment context. Across four experiments, we tested this notion using a recently reported dissociation between performance and effort judgments in combination with a manipulation of evaluation mode (i.e., joint vs. separate). Participants were asked to judge the effort associated with a reading task, in which the words and the display frame were presented as either upright or rotated, resulting in four stimulus types. While participants in the joint evaluation condition judged all four stimulus types, those in the separate evaluation condition judged only one. Results demonstrate that evaluation mode can have a marked effect on judgments of effort, such that individuals' sensitivity to rotated stimuli was reduced when in the separate evaluation condition. Implications are discussed.
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4:00-6:00 PM (2118)

Selective Influence of Conceptual Fluency in a Multinomial Model of the Illusory Truth Effect. OLIVER SCHMIDT and DANIEL HECK, *Philipps-University Marburg* (Sponsored by Daniel Heck) – The illusory truth effect states that repeated statements are more likely to be considered true than new statements. Fazio, Brashier, Payne, & Marsh (2015) developed a multinomial processing tree (MPT) model, the fluency-conditional model, to distinguish between the cognitive processes of relying on knowledge, fluency or guessing in truth judgements. Besides replicating the basic illusory truth effect, people showed knowledge neglect, a failure to rely on existing knowledge. This indicates that in some cases fluency is more influential to truth judgements than actual knowledge. However, the model parameter representing processing fluency has not yet been validated empirically by testing whether it can be selectively influenced by experimental manipulations. This is an important requirement for the interpretation of MPT models. In an online experiment, we validate the fluency parameter by manipulating the conceptual fluency of statements operationalized by simple and complex versions of each statement. An extension of the fluency-conditional model allows to test whether the fluency parameter is selectively influenced by this manipulation, thus validating the MPT model.
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4:00-6:00 PM (2119)

When Alternative Hypotheses Shape Your Beliefs: Context Effects in Probability Judgments. XIAOHONG CAI and TIMOTHY PLESKAC, *University of Kansas* (Sponsored by Timothy Pleskac) – People often provide different probability judgments for different descriptions of the same event. This implies the support people recruit to make probability judgments is based on the descriptions (i.e., hypotheses) instead of the events, as captured by support theory. Across the two studies (N=192), we show that the support people recruit about the target hypothesis also depends on the alternative hypotheses. The first study shows that a dud hypothesis—a hypothesis that is objectively dominated by the target—boosts the support recruited for the target compared to when no dud is present. The second study shows that when the consideration set contains a similar hypothesis to the target it detracts from the support people recruit for the target. These context effects invalidate the independence assumptions of support theory and suggest a similar process that drives the construction of preference also may do the same for belief.
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4:00-6:00 PM (2120)

The Emotional Face of the Truth: The Limits of the Illusory Truth Effect. CLAUDIA POCH and JON ANDONI DUÑABEITIA, *Universidad Antonio de Nebrija - Madrid* – Repetition can enhance the processing ease of an ambiguous statement, leading to the increase of its perceived truthfulness, leading to the so-called illusory truth effect. Different externally induced factors like mood have been found to influence the reliance on fluency cues when facing truth judgments, but little is known about internal statement-related factors. In this study, the impact of affect on veracity decisions was examined by focusing on the emotional arousal dimension. Participants rated the truthfulness of repeated and non-repeated claims that varied in their elicited emotional arousal while their eye movements were being recorded together with their behavioral responses. The illusory truth effect only emerged for the low-arousal statements, and not for the highly arousing claims. Eye-movement data revealed that highly arousing claims recruited more attentional resources that could have led to more elaborative thinking that prevented the use of fluency heuristic cues. Our results confirm that emotion impacts truth judgements, counteracting the cognitive bias elicited by repetition-induced processing fluency.

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4:00-6:00 PM (2121)

Detecting Blurred Facial Expressions of Anger and Happiness. CHRISTINA LEWIS and D. VAUGHN BECKER, *Arizona State University* (Sponsored by D. Vaughn Becker) – Signal detection tasks were used to assess individual differences in the ability to discriminate between angry and happy faces with varying levels of uncertainty. An equal number of female and male faces, happy and angry, each with three levels of increasing pixel blur, were presented to subjects. Across several studies, we observed expected main effects of blur level for d-prime. Signal detection bias parameters proved more interesting, with face gender affecting biases, especially at moderate levels of blur. Extending earlier findings, male faces showed relatively greater biases to be seen as angry, and female faces showed biases to be seen as happy. Complementary effects were observed when facial gender was detected. There was very little moderation by individual difference variables like visual processing speed or participant gender, consistent with a structural confound underlying the way that facial gender and expression are perceived.
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4:00-6:00 PM (2122)

Hindsight Bias and Depression during the COVID-19 Pandemic. LARISSA DUFFEK, UTE J. BAYEN, MARIE LUISA SCHAPER, and JULIE NIZIURSKI, *Heinrich-Heine-Universität Düsseldorf* – Two important components of hindsight bias are increased impressions of foreseeability and inevitability after an event occurred. Depressive symptoms were shown to be associated with increased foreseeability and inevitability after imaginary negative events (Groß, Blank, & Bayen, 2017). The likelihood of real-life negative events increases during a pandemic. In the current study, we therefore investigated the relationship of depressive symptoms and impressions of foreseeability and inevitability regarding participants' most negative and positive events during the COVID-19 pandemic. 904 participants from the U.S.A. and Germany completed an online questionnaire in April of 2020. Depressive symptoms were more prevalent than in pre-pandemic norming studies (Bibi et al., 2020; Sinclair et al., 2012). Multi-level regression modeling showed that increased depressive symptoms were associated with reduced impressions of foreseeability and inevitability for positive events only. Results support findings demonstrating the absence of a positivity bias with increased depressive symptoms (Marsh et al., 2019).
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4:00-6:00 PM (2123)

Investigation of Numeracy Priming on Intertemporal and Risky Choice. DANA CHESNEY, *St. John's University,* MICHAEL BIXTER, *Montclair State University* – Individuals' numeracy - their ability to understand and process numeric information – predicts performance in many judgment domains. This makes intuitive sense as many decisions involve numbers (e.g., $3.99, 20% off, 2 chances in 3). Two domains that often rely heavily on numeric information are intertemporal choice and risky choice. Intertemporal choice tasks evaluate willingness to forgo smaller-immediate rewards for larger-delayed rewards. Risky choice tasks evaluate willingness to forgo smaller-certain rewards for a chance at larger-probabilistic rewards. Numeracy effects are typically investigated in correlational studies, with numeracy treated as an individual difference variable. However, recent research has demonstrated that just priming numerical concepts can affect judgments. Here we experimentally investigate effects of such numeracy priming on intertemporal and risky choice. Participants were randomly assigned to complete a numeracy prime or a control task before completing monetary intertemporal and risky choice tasks. Many consequential outcomes (e.g., addiction) involve delay and risk tolerance, thus tasks shown to positively influence choice behavior may benefit the development of future interventions.
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4:00-6:00 PM (2124)

Numerical Information and its Impact on Decision Making: An Eye-Tracking Study. MORGAN SCHALL, KAY NIKIFOROVA, and DANA CHESNEY, *St. John's University* (Sponsored by Dana Chesney) – People often ignore base rate information. For example, when reading "In a study, 1000 people were tested. Among the participants there were 3 doctors and 997 nurses. Paul is 34 years old. He lives in a beautiful home in a posh suburb. He is well spoken and very interested in politics. He invests a lot of time in his career," people typically say that Paul is a doctor, ignoring the base rate information (3 doctors, 997 nurses) in favor of the stereotype information (Paul sounds like a doctor). Previous research shows that people make more use of numbers when they have been primed by first completing math problems. We used an eye-tracking paradigm to investigate why this priming effect occurs. Participants were randomly assigned to one of two groups: those who were primed with mathematical questions (experimental) and those who were not (control). We recorded where the participant was looking when making these judgments. We expected to replicate the prior finding that primed participants would make greater use of numerical information when compared to controls. Eye gaze information should indicate whether this effect is due to greater focus on numerical information specifically or to a more general focus on information.
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4:00-6:00 PM (2125)

Increased Semantic Context Falsely Boosts People's Self-Reported Ability to Understand Danish. KAYLA JORDAN and MARYANNE GARRY, *The University of Waikato* (Sponsored by Maryanne Garry) – When people are presented with information, the meaning of that information and how it relates to prior knowledge—or the semantic context—helps them to comprehend it. Increased semantic context of sentences, claims, or concepts can increase unrelated judgements such as prior experience, quality, and knowledge. But semantic context can also be a feature of events. To what extent would increased semantic context lead to misplaced confidence in language ability? We investigated this question by showing subjects Danish videos that varied context along two dimensions: [1] they appeared with or without English subtitles, and [2] depicted a structured or unstructured event (a school tour or a chaotic political debate). Subtitles falsely boosted subjects' self-reported ability to understand Danish in a variety of settings—but did so more when the event was unstructured. These findings suggest that increasing the semantic context of events can distort people's metacognitive judgements.
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4:00-6:00 PM (2126)

On the Objectivity of Moral Rules. NATALIE OBRECHT and YOMARY COLLAZO, *William Paterson University* – Goodwin and Darley (2008) argue that people view morals rules as less objective than facts. We replicated their study in a more diverse sample and also examined individual moral and factual statements. Subjects read moral and factual statements (e.g., "Consciously discriminating against someone on the basis of race is morally wrong," "Boston (Massachusetts) is further north than Los Angeles (California)") and rated the extent to which they thought another person was wrong if (s)he disagreed with the participant's viewpoint (1-Neither of us need be mistaken to 4-the other person is clearly mistaken). A paired samples t-test confirmed that participants viewed the most objective moral statement (M=3.78) to be more objective than the most objective factual statement (M=3.28, t(85)=6.12, p<.001, d=.66). Subjects also judged whether there could be a correct answer regarding the provided statements (yes, no). A Bayesian binomial test overwhelming supported the hypothesis that people treat the most objective moral statement to be as objective as the most objective factual statement (BF=2.1e+90). Thus, our results suggest that in a more diverse sample, people view some moral rules to be just as objective as factual statements.
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4:00-6:00 PM (2127)

Outliers in Scatterplots Lead to Greater Endorsement of Causality. BURCU AVCI, EMRE ORAL, and AYSECAN BODUROGLU, *Bogazici University* – A common reasoning error is inferring causality from correlational data. Also, viewers rate relationships between two variables as more causal when the data is depicted in a bar graph as opposed to a scatterplot (e.g., Xiong et al., 2019). What happens to causality inferences when there is an outlier in a scatterplot? We investigated how people's endorsement for correlational (X and Y change together) and causal (X causes changes in Y) statements changed upon viewing scatterplots with and without outliers. Participants provided ratings for correlational and causal statements, upon viewing identical scatterplots. Even though our sample had high scientific reasoning and graphical literacy abilities, their judgments were impacted by the presence of outliers. Participants gave higher causal ratings for scatterplots that had outliers, especially when there was a negative relationship depicted between the variables. This was the case even though the magnitude of the correlations was matched across conditions.
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4:00-6:00 PM (2128)

Boosting the Detection of Microtargeted Advertising. PHILIPP LORENZ-SPREEN, MICHAEL GEERS[1], THORSTEN PACHUR, and RALPH HERTWIG, *Max Planck Institute for Human Development,* STEPHAN LEWANDOWSKY, *University of Bristol,* STEFAN HERZOG, *Max Planck Institute for Human Development* (Presented by Michael Geers) (Sponsored by Stefan Herzog) – Online microtargeting of potentially manipulative commercial and political messages is facilitated by a growing information imbalance between human decision makers and corporate algorithms. However, little is known about how to boost people's abilities to detect and resist microtargeting. We investigated whether an intervention based on the notion of psychological inoculation is an effective strategy to improve people's detection of microtargeting tailored to their personality with respect to extraversion vs. introversion. In two online studies (total N=931), we found that self-reflection about the personality trait being targeted significantly boosted participants' competence to correctly identify ads that were tailored towards them on the basis of their actual extraversion-introversion personality score. Equipping participants with feedback about their extraversion score or merely having them fill out the extraversion scale (without feedback) resulted in up to 21 percentage points higher correct detection of tailored ads. Our results suggest that simple interventions could increase awareness towards microtargeting, thereby reclaiming individual autonomy online.
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4:00-6:00 PM (2129)

The Role of Risk Perceptions in Judgments of Frequency for News Headlines. MARK LACOUR and MICHAEL SERRA, *Texas Tech University* (Sponsored by Michael Serra) – People decide whether to purchase insurance or vaccinate based on perceptions of risk, which in turn are based largely on how people encode, and later estimate, event frequency information (e.g., "there have been lots of floods lately," "I haven't gotten the flu in years"). Because much of this information is conveyed through news media, we examined how accurately people process news headline frequency information. We showed participants headlines from various categories (e.g., shootings, hurricanes) at varying frequencies and asked them to estimate these frequencies and to form judgments of risk for each headline category. Greater perceptions of risk were associated with inflated judgments of frequency for news headline types. This result has implications for how people form risk perceptions depending on their media diet. Future research should determine whether this effect is due to encoding, retrieval processes, or both.
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4:00-6:00 PM (2130)

Criminality Stigma Influences the Perception of Others' Pain. EVE GALLOWAY, ARIANE GAUTHIER, CAROLINE BLAIS, DANIEL FISET, and ISABELLE BOUTET, *University of Ottawa* (Sponsored by Isabelle Boutet) – Racial stereotypes can reduce helping behaviours and produce disparities in healthcare. We examined whether these biases extend to other stigmatized groups. First, one group of participants saw faces of individuals with a description of crimes they allegedly committed; the other group saw the same faces but with descriptions of pro-social behaviours. Second, participants saw the same faces expressing varying levels of pain. For each face, participants judged the level of pain intensity and unpleasantness. Finally, participants rated each individual on valence, willingness to help, and suspicion of deception. Perceived pain intensity was reduced for individuals portrayed as criminals. Individuals portrayed as criminals were also rated less positively and were less likely to be helped. These results suggest that biases in response to pain are not limited to racial minorities but extend to criminality. This implies that individuals in the criminal justice system are at risk of receiving inadequate health care.
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4:00-6:00 PM (2131)

Misjudgment of Time Series Graphs Due to Serial Dependence. ANTHONY BISHARA, CRAIG TANTON, and ETHAN GUTHRIE,

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College of Charleston – Did the COVID-19 infection rate increase after loosening social distancing guidelines? Such judgments may be challenging due to a special feature of times series data: serial dependence. Previous research has examined positive serial dependence, where high scores tend to be followed by high scores, and low by low. Positive serial dependence led to misjudgment of time-series graphs, making them appear to show a change following an intervention even when there was none. That is, positive serial dependence increased Type I visual errors. If people neglect the dependence of time-series data, they might misattribute the smoothness of positive serial dependence to low noise. This dependence-neglect account predicts that negative dependence, which features choppy time series lines (high followed by low, and vice-versa), should be misattributed to high noise, biasing viewers toward Type II visual errors (misses). In an experiment, we tested this account by manipulating the autoregressive coefficient to include positive and negative values. Both positive and negative serial dependence biased viewers toward Type I but not Type II errors, suggesting that dependence-neglect cannot fully account for misjudgment of time series graphs.
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4:00-6:00 PM (2132)

Relationships of Face-Based Trait Inference with Face Emotion Recognition Ability and Stereotype Endorsement. ATSUNOBU SUZUKI, *The University of Tokyo,* SAORI TSUKAMOTO, *Aichi Gakuin University,* YUSUKE TAKAHASHI, *Kyoto University* – People tend to infer others' personality and ability from their faces. Drawing extreme conclusions from such "face reading" is considered problematic as it can have unwarranted impacts on interpersonal decisions. We therefore explored individual differences in the extremity of face-based trait judgments and investigated its psychological correlates. An online survey was conducted, in which participants rated unfamiliar faces on seven trait impressions (e.g., trustworthiness, dominance). They also engaged in a series of tasks that measured their ability to recognize basic emotions (e.g., happiness, anger) from faces, endorsement of stereotypes (e.g., "Females are more submissive than males"), and cognitive miserliness (e.g., Cognitive Reflection Test). Results showed that a single factor model best fit to the data on the extremity of the trait ratings. The overall extremity of face-based trait inference had significant positive correlations with face emotion recognition ability and stereotype endorsement, but not with cognitive miserliness. The findings support the theoretical views that detection of subtle expressive cues in the face and overly generalized reasoning from those cues underlie trait inferences from faces.
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4:00-6:00 PM (2133)

Effects of Skewed Probe Distributions in Temporal Bisection in Rats: Evidence for Within-Session Shifts in Responding. TANYA GUPTA and FEDERICO SANABRIA, *Arizona State University* (Sponsored by Federico Sanabria) – Temporal bisection is a common procedure for the study of time perception in humans and non-human animals, in which participants are trained to discriminate between a "short"and a "long" interval of time. Following accurate discrimination, unreinforced probe intervals between the two values are tested. Probe intervals are typically arithmetically-or geometrically-spaced, yielding a point of subjective equality at the arithmetic or geometric mean of the anchor intervals. Brown et al. (2005) suggest that judgement of an interval, even when not reinforced, is influenced by its subjective length in comparison to that of other intervals. This predicts that skewing the distribution of probe intervals shifts the psychophysical function relating interval length to the probability of reporting categorizing that interval as "long." Data from the present temporal bisection study, using rats, suggest that there may be within-session shifts in temporal bisection responding which account for observed shifts in the psychophysical functions as a results of skewed probe testing, and that this may also influence how rats categorize ambiguous intervals. These effects were also modeled using simulations of a state-based model of interval timing.
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4:00-6:00 PM (2134)

The Effect of Cognitive Demand on Group Incubation Effect. QICHEN ZHAO and BEVERLY ROSKOS, *The University of Alabama* (Sponsored by Beverly Roskos) – The phenomenon of leaving a creativity task for a while to boost later performance is called the incubation effect. Wallas (1926) proposed the concept in his 4-stage creativity model, and only the mechanism(s) for the incubation keeps unclear. We would like to explore the effect in group context compared to previous research focusing on individual participants, as teamwork increases importance in modern society. The literature shows a possible effect of the incubation task cognitive demand on the incubation effect magnitude. Low cognitive demand is associated with higher mind wondering, which might further associate with more spreading activation. Thus, in current study, we examined four cognitive demand levels: low, high, rest and no incubation. Dyads were employed as participants and 3 different divergent thinking tasks, the alternative uses task (AU), the instances task and the consequences task, were used. The purpose of the current study is to examine: 1) the incubation effect in group context (dyads in current study), 2) the effect of cognitive demand on the group incubation effect and 3) the consistency of this effect across various divergent thinking tasks.
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4:00-6:00 PM (2135)

The Role of Personal Experience in Reducing Belief in the Ability to Detect Stares. WILLIAM LANGSTON, *Middle Tennessee State University* – A large portion of the population believe that they have the ability to detect when an unseen person is staring at them. The widespread nature of this belief makes it a good candidate for belief change manipulations. Participants either read about research showing that people cannot detect stares, or they participated in a stare detection demonstration and saw from personal experience that they cannot detect stares. Their belief was measured before and after reading the information or the demonstration. Participants in the demonstration condition showed a larger decrease in stare detection belief. We also measured a number of personality variables that have been associated with belief formation and belief change, and the results allow us to evaluate the role of personality and experience in the development of stare detection belief and to predict who will experience belief change.
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4:00-6:00 PM (2136)

Limited Imagination: Constraints Facilitate Creative Idea Generation by Reducing Working Memory Demands. TIM GEORGE, *Union College* – Previous research has yielded inconsistent effects of individual differences in working memory (WM) capacity on creativity. Recent evidence also suggests that constraints can positively impact creativity by altering the search space. The present study tested whether constraints result in more creative ideas in an idea generation task, while also investigating whether the relationship between WM and creativity depends on the level of task constraint. Participants generated original four-word sentences, wherein the words comprising the sentences must start with specific letters (high-constraint) or without this requirement (low-constraint), followed by a WM measure. Competing predictions can be made regarding how constraints affect the WM-creativity relationship. Constraints may require controlled selection of information that is constraint-consistent, which may depend on WM. On the other hand, by limiting an otherwise broad search space, constraints may reduce the WM burden, enabling more effective exploration of nonobvious ideas. The results support the latter prediction. Overall, ideas were more creative under high constraints, and WM positively predicted creativity under low constraints, but had no effect under high constraints.
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4:00-6:00 PM (2137)

In Search of the Executive and Content-Specific Cognitive Processes Propagated by Process-Overlap Theory. GIDON FRISCHKORN, *University of Zurich,* CLAUDIA VON BASTIAN, *University of Sheffield* – Process-Overlap Theory (POT) suggests that intelligence tests sample a unique set of independent executive and content-specific cognitive processes, with the hierarchical intelligence structure arising from a multiplicative association of these processes. Hence, according to POT, executive processes shared across content-domains should be related to content-transcending intelligence differences, whereas content-specific processes should be related to intelligence differences tapping the same content domain. We tested this by re-analyzing data (N=233) from De Simoni and von Bastian (2018) assessing executive processes and fluid intelligence across four content domains. Using structural-equation modeling, we investigated whether executive processes across content domains are independent and show unique correlations to different intelligence measures, and whether variance common to cognitive processing tasks tapping each content domain is uniquely related to intelligence measures within the same content domain. Based on the results, we discuss how the experimental conceptualization and measurement of executive and content-specific cognitive processes empirically matches the theoretical propositions of POT.
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4:00-6:00 PM (2138)

When Are Sampling Assumptions Incorporated into Inductive Generalisation? SAOIRSE CONNOR DESAI and BRETT HAYES, *University of New South Wales* – A growing body of research suggests that people's inductive inferences are guided by their understanding of how observations are sampled. In line with Bayesian models of induction, people generalise a novel property more narrowly when told that sample instances were selected because they share a common property (property sampling) than when instances were selected because they belong to the same category (category sampling). However, current Bayesian models do not specify when sampling frames information is incorporated into generalisation judgments. Two experiments examined this issue by varying whether sampling information appeared before or after training with instances that shared a novel property. After training, participants rated the likelihood that the property generalized to novel items. An effect of sampling information on property generalization was only found when this appeared before training. Results suggest that learning about sample bias after the fact may not be sufficient to correct the bias.
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4:00-6:00 PM (2139)

The Costs and Benefits of Semantic Memory Structure in Generating Original Ideas. YOED KENETT, *Technion – Israel Institute of Technology,* ROGER BEATY, The *Pennsylvania State University,* RICHARD HASS, *Thomas Jefferson University,* DANIEL SCHACTER, *Harvard University* – Creative thinking has long been associated with spreading of activation through concepts within semantic memory. Despite its theoretical importance, little is yet known about how semantic memory structure facilitates and constrains idea production. Across four studies, we examine whether increasing knowledge about a concept has both benefits and costs to idea production. We tested whether cue association size—a semantic richness index reflecting the average number of elements associated with a given concept—impacts the quantity (fluency) and quality (originality) of responses generated during the alternate uses task (AUT). We find that low-association AUT cues benefit originality at the cost of fluency because such cues are embedded within a semantic network with fewer conceptual elements, thus yielding lesser interference from closely related concepts. Furthermore, we found an interaction with individual differences in fluid intelligence in low-association AUT cues, suggesting that constraints of sparse semantic knowledge can be overcome with top-down intervention.
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4:00-6:00 PM (2140)

Aha! Solutions Not Bound by the Limits of Working Memory. HANS STUYCK, *KU Leuven & Université Libre de Bruxelles,* AXEL CLEEREMANS, *Université Libre de Bruxelles,* EVA VAN DEN BUSSCHE, *KU Leuven* (Sponsored by Marc Brysbaert) – Aha-like solutions (i.e., insight), popping into consciousness after a period of unsuccessful solution-search, are considered to elicit a distinct subjective experience than solutions found by a conscious, step-by-step solution-search (i.e., non-insight). However, the (un)conscious nature of the processes leading up to insight are still a matter of debate. One way to address this is to study insight under cognitive load. If insight is the result of the same explicit process that we use to solve everyday problems, it should be similarly influenced by cognitive load. However, if it constitutes a different, more implicit process, cognitive load might not affect it at all. Using a dual-task paradigm where participants solved pictorial problems under different memory loads, we found that pictorial problems solved with insight were found faster and were more accurate. More importantly, as memory load increased, the number of correctly solved problems increased for insight, whereas it decreased for non-insight. Although memory load hampered

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non-insight, it was beneficial for insight, which might imply that insight relies on processes that do not compete for limited cognitive resources.
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4:00-6:00 PM (2141)

Training Correct Intuitive Responding on Bat-and-Ball Problems. ESTHER BOISSIN and MATTHIEU RAOELISON, *Université de Paris, LaPsyDÉ & CNRS,* SERGE CAPAROS, *Université Paris 8,* WIM DE NEYS, *Université de Paris, LaPsyDÉ & CNRS* (Sponsored by Wim De Neys) – Decades of research have established that reasoners are often biased when they try to solve bat-and-ball problems. Several recent studies have shown that a short explanation about the correct answer can boost participant's performance. However, the nature of this training effect is not clear. Does training help participants to deliberately correct erroneous intuitions or does it help people to develop more correct intuitions? The present study addressed this issue. A two-response paradigm in which participants were required to give an initial response under time-pressure and cognitive load allowed us to identify the presumed intuitive response that preceded the final response given after deliberation. Results showed that up to half of participants that were biased before training, managed to solve the bat-and-ball-like problems correctly after training. Moreover, a direction-of-change-analysis showed that after training, participants were more likely to solve the problem correctly from the outset than after correction of an initial incorrect answer. This shows that a short training can help people to produce correct intuitive responses. We discuss several implications for ongoing debates in the dual process field.
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4:00-6:00 PM (2142)

Think Slow, Then Fast: Does Repeated Deliberation Boost Correct Intuitive Responding? MATTHIEU RAOELISON, *Université de Paris, LaPsyDÉ & CNRS,* MARINE KEIME, *University of Glasgow,* WIM DE NEYS, *Université de Paris, LaPsyDÉ & CNRS* (Sponsored by Wim De Neys) – Controversial studies on human thinking with the popular two-response paradigm typically ask participants to continuously alternate between intuitive ("fast") and deliberate ("slow") responding. One concern is that repeated deliberation in these studies will artificially boost the intuitive, "fast" reasoning performance. A recent alternative two-block paradigm therefore advised to present all fast trials in one block before the slow trials were presented. Here we tested directly whether allowing people to repeatedly deliberate will boost their intuitive reasoning performance by manipulating the order of the fast and slow blocks, using variants of the bat-and-ball problem. One group solved the fast trials before the slow trials, a second group solved the slow trials first, and a third mixed group alternated between slow and fast trials. Results showed that the order factor did not affect accuracy on the fast trials. This indicates that repeated deliberation does not boost people's intuitive reasoning performance.

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4:00-6:00 PM (2143)

Analytical Thinking and Complexity of Inference in Conditional Reasoning. ROBERT RICCO, JASMINE BONSEL, JAY VON MONTEZA, DA'NAE OWENS, ANTHONY SIERRA, and HIDEYA KOSHINO, *California State University, San Bernardino* (Presented by Jay Von Montez)– Hybrid dual process models of reasoning maintain that both basic (e.g., modus ponens [MP]) and more complex (e.g., modus tollens [MT]) forms of conditional inference result from intuitive, type 1 processes. The present study examines this claim by considering whether analytical (type 2) thinking is more closely related to performance on MT than to performance on MP. Adult participants were given a conditional reasoning task on which instructional set (belief or logic), congruency, and complexity of inference (MP or MT) were manipulated. Differences in performance between low and high levels of analytical thinking proclivity (AOT), ability (CRT), and capacity (working memory span) were greater for MT problems than for MP problems suggesting that the extent to which MT is intuitive for an individual is a function of analytical thinking level and that, in general, MT is not as intuitive an inference form as MP.
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4:00-6:00 PM (2144)

Hands Off! How Physical Interaction Affects Creative Thinking. ACACIA OVEROYE, *Utah Valley University,* ANNIE DITTA, *University of California, Riverside,* BENJAMIN STORM, *University of California, Santa Cruz* – Thinking creatively is difficult because it requires bypassing old ideas in favor of novel ones. When trying to think of new uses for a common object, for example, people may think of the traditional uses of the object, rather than more unique uses. Physical interactions with objects may focus people on the possible affordances of each object, fixating them on less creative uses. We tested this idea experimentally by asking participants to either interact with objects or think about how they would use the objects before completing an Alternative Uses Task for those objects. Results were scored for creativity and fluency and demonstrated that participants who physically interacted with the objects generated fewer creative ideas than participants who imagined interacting with the objects. This finding suggests that under certain conditions, physical interaction can serve as a mechanism for inducing mental fixation.
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4:00-6:00 PM (2145)

Taking a Break: The Effect of Mindfulness vs. Social Media on the Remote Associates Test. EMILY DAROWSKI, TIFFANY LOTULELEI, and DAVID EREKSON, *Brigham Young University* – Rest breaks increase feelings of vigor and decrease feelings of fatigue during cognitively demanding tasks (Blasche et al., 2018). In contrast, media multitasking during homework increases feelings of lower productivity and interference (David, et al., 2015). It is less known whether break type impacts performance. The current study compared the effect of three different breaks—using social media, practicing mindfulness meditation, or sitting (control)—on performance of the remote associates test (RAT). The 236 participants also completed pre/post break measures of state mindfulness, affect, and anxiety. Although results indicated significant changes in the state measures—generally favoring the mindfulness group—RAT performance was not affected. The latter finding may represent a floor effect. Additional research should examine whether different breaks can impact performance on cognitively demanding tasks of varying difficulty. Mechanistic comparisons to the attention restoration theory are also warranted.

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4:00-6:00 PM (2146)

Influences of Evidence and Emotion in Argument Appraisal. GIOVANNI QUARTARARO and VALERIE THOMPSON, *University of Saskatchewan* (Sponsored by Valerie Thompson) – We examined and contrasted predictions from motivated reasoning theory (MRT) and dual process theories (DPT) regarding the impact of emotional relevance and previous beliefs on people's ability to assess argument strength. MRT posits that arguments that reference emotional material are not appraised based on the strength of the argument; rather information is recruited to justify previously held beliefs regarding the material. Similar to MRT, DPTs posit that fast, initial (Type 1) processes should be sensitive to previous beliefs. However, DPTs also contrast MRT by predicting that slower, more analytical (Type 2) processes should account for argument strength above and beyond previous beliefs. In a series of three experiments, participants read conversation transcripts whose content varied on believability, evidence strength, and emotional content. Participants gave fast, initial answers followed by a slower, more reflective second answer. Consistent with DPTs, participants were sensitive to emotional content but were still able to discern between strong and weak evidence. It is suggested that previous beliefs can influence argument appraisal, but not to the extent suggested by MRT.
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4:00-6:00 PM (2147)

Belief Bias in Causal Learning. LEO GUGERTY, *Clemson University,* MICHAEL SHREEVES, *Arizona State University at Lake Havasu City* – We investigated how political ideology influences causal learning. Participants saw the results of fictional studies—the number of people who had and had not committed crimes in a city while concealed carry of handguns was allowed and after it was banned. Eight problems (each showing results for a different city) varied in the causal strength of the ban and whether it prevented or generated crime. Participants judged whether the cause was preventive or generative, its strength, and their confidence in these judgments. We categorized participants' ideology into liberal, moderate or conservative. On the assumption that conservatives see banning concealed carry as increasing crime and liberals see it as preventing crime, we expected that conservatives would overestimate the causal strength of generative causes and liberals would overestimate the strength of preventive causes. Results supported this prediction. Participants' strength judgments were also influenced by the evidence in the studies; e.g., judgments increased with actual strength. We also investigated how individual differences in numeracy correlated with making normative strength estimates and assessed differences between liberals and conservatives in this correlation.
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4:00-6:00 PM (2148)

Linguistic Alignment and Collaborative Problem-Solving in Online and Team-Based Interactions. AMIE PAIGE, *Arizona State University,* ANGELA STEWART, *University of Colorado, Boulder,* CHEN SUN and VALERIE SHUTE, *Florida State University,* SIDNEY D'MELLO, *University of Colorado, Boulder,* NICHOLAS DURAN, *Arizona State University* (Sponsored by Nicholas Duran) – Collaborative problem solving (CPS) within online and team-based environments has become an essential component to educational and organizational practices. Success often depends on team members being able to engage in observable behaviors that allow for the construction of shared knowledge and negotiated outcomes. While many behaviors are directly related to CPS (e.g., "proposing specific solutions, "builds on others' ideas"), we are interested in the low-level, subtle, and (mostly) unintentional conversational strategies that might support them. In particular, we evaluate the degree to which people re-use, i.e., "align to," the lexical, syntactic, and semantic forms of others' utterances. Previous research suggests that linguistic alignment is an important strategy that promotes mutual understanding in conversation. We used data from 96 triads who interacted via videoconferencing in a 30-minute CPS task. The results revealed a positive relationship between linguistic alignment and certain types of CPS behaviors, suggesting a targeted and adaptive link.
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4:00-6:00 PM (2149)

Inter- & Intra-Individual Differences in Associative Distance Predicts Problem Solving Success. DEREK ELLIS and GENE BREWER, *Arizona State University* (Sponsored by Gene Brewer) – The compound remote associates (CRA) is a verbal memory task used to measure problem solving. However, little research has examined the relation between knowledge and CRA performance. Participants (n=69) completed a free association task that used the cues of CRA problems as prompts in order to quantify each participants' specific knowledge of CRA components. Our goal was to assess inter- and intra-individual differences in associative strength and related these measures to accuracy in the CRA task. When the participant elicited the solution of a CRA problem earlier in the fluency task they were more likely to solve that CRA problem than when it was elicited later in the fluency task (intra-individual differences). Additionally, participants who on average elicited solutions earlier across the totality of the fluency task solved more CRA problems (inter-individual differences). These findings provide evidence that the structure of semantic memory affects problem solving ability.
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4:00-6:00 PM (2150)

How the Availability of Alternative Causes Affects Illusory Causation. DAVID NG, JESSICA LEE, and PETER LOVIBOND, *University of New South Wales* (Sponsored by Geoffrey Hall) – Illusory causation is the misattribution of causality to a cue that is non-contingent to an outcome. Illusory causation paradigms designed through 2 x 2 contingency tables are often used as an in-lab analogue of how pseudoscientific beliefs are acquired (e.g. alternative medicines). Contingency tables, however, constrain causal learning scenarios to pairings between a single target cue and a specific outcome. This oversimplification is problematic as causal learning in real-world instances often occurs in a stimuli-rich environment that contains many potential causes. Over three experiments, we investigated how the availability and specificity of alternative causes affects learning in illusory causation paradigms. Results will be related to both associative and reasoning-based accounts of illusory causation.
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4:00-6:00 PM (2151)

Modeling Adaptive Reasoning in Rock, Paper, Scissors. ERIK BROCKBANK and ED VUL, *University of California, San Diego* (Sponsored by Edward Vul) – Human conflict and coordination relies on our ability to predict the behavior of others across a range of settings. We investigate how people adapt to their opponents in repeated adversarial interactions through iterated play of Rock, Paper, Scissors (RPS). Participants (N=217) played 300 rounds of RPS against bots employing seven stable strategies that parametrically varied the source and complexity of their behavioral regularities. We show that both the time course and the extent to which people detect patterned opponent behavior varies with the complexity of the bot's strategy. We model participants' learning trajectories as maximizing the expected value of chosen moves subject to different possible opponent strategies. We find that our experimental data cannot be accounted for by learning over any single representational schema. Instead, our results suggest that participants aggregate multiple models differing in their representations of opponent decision making. These results provide novel insights into the precise means by which people detect patterns in others' behavior over repeated interactions, an ability that is key to predicting what people will do next in cooperative and competitive environments.
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4:00-6:00 PM (2152)

Predictors of Success in Mathematical Olympiad Problem Solving. YURI BOGOMOLOV, NATALIA LAZAREVA, IGOR MAKAROV, and ANASTASIYA SMIRNITSKAYA, *P.G. Demidov Yaroslavl State University,* ILYA VLADIMIROV, *P.G. Demidov Yaroslavl State University & Institute of Psychology of Russian Academy of Sciences* – This study is implemented at the intersection of the psychology of creativity and the pedagogical support of the gifted youth. One of the work forms with the gifted children is Olympiads on academic subjects. One of the most common subject areas of Olympiads is mathematics. Mathematical Olympiad problems are creative and have non-standard conditions and an original solve approach (Romanova, 2014). According to the recommendations of the All-Russian School Mathematical Olympiad commission, the tasks must be of varying complexity in order to provide each participant with the opportunity to perform the simplest of them and to determine the most capable participants (Agakhanov, Podlipsky, 2013). The main goal of this work is to analyze the impact of the participating in mathematical Olympiads experience on solving tasks of varying complexity. According to the results, both experience and initial abilities significantly affect the tasks solution of varying complexity. This work was supported by RFBR (grant No. 19-29-14189).
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4:00-6:00 PM (2153)

The Collector: A Novel Task for Investigating Restructuring in Problem Solving. KRISTIN SANDERS and JESSICA PAYNE, *University of Notre Dame* – Solving a problem with an "Aha!" experience is hypothesized to result from a sudden restructuring of the problem representation so that the solution becomes clear. However, measuring restructuring as a cognitive process is challenging. To address this problem, we adapted a category learning paradigm to measure both problem solving and restructuring in a novel task. Participants judged whether items were in or out of a collection, received feedback on their choices, and periodically reported their best guess of the collection's organizing rule. We found that participants could solve the task both analytically and with sudden insight. In addition, we present relations between the type of collection rules, solution experience, reaction time and accuracy across the task, memory organization in a surprise free recall test, and metacognitive feeling of closeness to the solution. Future research can employ this task to study the role of restructuring in incubation-facilitated problem solving.
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4:00-6:00 PM (2154)

Ambiguous Analogies: Creative Processes During Reasoning. MEGAN RADEN, SARAH DYGERT, and ANDREW JAROSZ, *Mississippi State University* – Creative problem solving may require revisions of ambiguous information (Ohlsson, 1992); if so, these creative processes may manifest on reasoning tasks under specific circumstances, such as when a solver's constructed solution is not a response option. The present study manipulated a figural-analogies (FA) task to contain two problem types in a blocked design: standard problems (where the rules clearly point to one response option), and ambiguous problems (whose complete response could not be fully induced from the problem, thus requiring revision after seeing the response bank). Participants also completed measures of creative and analytic problem solving and working memory. Analytic problem-solving performance predicted standard, but not ambiguous, FA performance. In contrast, creative problem-solving performance predicted success on both FA types, but only when ambiguous items were completed first. Results suggest that after solving ambiguous items, solvers may shift to using revision processes that are integral to creative problem solving.
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4:00-6:00 PM (2155)

Interleave It Alone? Effects of Presentation and Practice Schedule on Performance and Metacognition in Math Problem Solving. MARTA MIELICKI and CLARISSA THOMPSON, *Kent State University* – The sequence in which topics or concepts are presented can impact learning outcomes in various domains. Specifically, mixing different topics (interleaving) is thought to be more effective than blocking topics during learning (Brunmair & Richter, 2019). Simultaneous presentation of two problems at the same time can provide opportunities for relational mapping across the problems (Gentner & Hoyos, 2017), and thus may be more effective than sequential presentation of a single problem at a time. However, the benefits of simultaneous presentation may depend on similarities between the problems being presented. The present study explored the joint effects of practice schedule (blocked vs. interleaved) and presentation (sequential vs. simultaneous) on immediate and delayed test performance as well as on the accuracy of metacognitive assessments (predictions of performance) for a set of mathematical word problems. Results suggest that delayed test performance and the accuracy of metacognitive assessments are impacted by presentation and practice schedule. These findings have important implications for education, since sequential blocked practice continues to be common in many textbooks (Rohrer et al., 2015).
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4:00-6:00 PM (2156)

The Role of Metacognitive Hints in Insight Problem Solving. SERGEI KOROVKIN, ANNA SAVINOVA, IGOR MAKAROV, and EKATERINA SOSEDKO, *Yaroslavl State University* – It is well known that insight problems are not affected by verbal hints (Weisberg, Alba, 1981), but are influenced by metacognitive training (Patrick et al., 2015). We decided to combine these factors and test the effectiveness of metacognitive hints in the insight. We supposed that metacognitive hints would have a positive effect on solution rate in comparison with supportive statements. The hint may help in the progress monitoring and in the conflict analysis. In our experiments, participants were divided into two groups, where they solved the problem and received 1 per min: 1) metacognitive hint or 2) supportive statement (control). We compared the number of solvers in each group. In Experiment 1, the group with metacognitive hints showed a significantly larger number of solvers compared to the control group. In Experiment 2, we did not replicate the result. It can be due to either the lack of effect or the influence of confound variables (natural / computer problem version; sound / text hint type, etc.). Supported by RSF 18-78-10103.

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4:00-6:00 PM (2157)

Bullshit Receptivity and Creative Problem Solving: Simply the BS, Not Better than All the Rest. MARTA MIELICKI, *Kent State University,* TIM GEORGE, *Union College* (Presented by Tim George) – Pseudo-profound bullshit (BS) receptivity, the tendency to perceive meaningless statements as profound/significant, relates to multiple individual difference measures (Pennycook et al., 2015). This study tested whether BS receptivity is related to overconfidence and performance in a creative problem-solving task, the remote associates test (RAT). Participants rated multiple statements for profundity: half meaningful motivational statements (e.g., a wet person does not fear the rain) and half BS statements (e.g., wholeness quiets infinite phenomena). They then completed solvable (e.g., print berry bird) and unsolvable (e.g., cane safe fly) RAT problems. Prior to attempting the RAT problems, participants rated their likelihood of solving each problem. Higher BS receptivity (but not motivational ratings) was related to higher solution confidence for unsolvable problems and lower solution rates for solvable problems. These results suggest that factors underlying BS receptivity (e.g., seeing meaning and connections when none are present) may inflate confidence in problem solving success.

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4:00-6:00 PM (2158)

The Stroop Facilitation and Reverse Facilitation in Manual Responses. YUKI ASHITAKA, *West Japan Railway Company,* HIROYUKI SHIMADA, *Kobe University* – Previous studies have observed faster response in the Stroop task for congruent trials than for neutral trials (facilitation), whereas other studies have reported the reverse facilitation or interference from congruent distractors in the task. We investigated whether differences between vocal and manual responses caused this discrepancy because it has been indicated that phonological encoding was involved in vocal but not manual responses (e.g., Kinoshita & Mills, 2020). We manipulated phonological demand for manual responses by conducting the Stroop matching task with manual responses using Japanese syllabic Kana and logographic Kanji scripts for congruent trials because relatively strong phonological processing is required for Kana compared to Kanji scripts. The result indicated reverse facilitation for Kana, but facilitation for Kanji scripts, suggesting that phonological processing might induce a task conflict.

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4:00-6:00 PM (2159)

Why Does the Presence of a Rule Suppress Learning of Correlated Information-Integration Structures: The Role of Selective Attention. ANDRES SANCHEZ and BARBARA CHURCH, *Georgia State University,* JOSEPH BOOMER, *Missouri Southern State University,* ALEXANDRIA ZAKRZEWSKI, *Kansas State University,* J. SMITH, *Georgia State University* (Sponsored by Barbara Church) – Evidence suggests that category learning can occur at either implicit or explicit levels (e.g., Ashby & Maddox, 2011; Smith et al., 2014). Zeithamova et al. (2006) found these levels interfere with one other. The nature of this interference is unclear. We produced interference by initially giving participants redundant cues to categorization. Participants categorized boxes varying along three dimensions—one dimension instantiated a simple rule and two dimensions contributed information-integration (II) information. The early presence of the rule suppressed learning about the task's II structure even after the rule was no longer informative. To determine whether this suppression resulted from attentional inhibition of other dimensions or strategy perseveration, we explored how attentional versus strategy instructions impacted categorization. Participants with instructions to pay attention to all dimensions learned significantly better than those with standard instructions. Strategy instructions had no impact. The results suggest that selective attention may inhibit dimensions suppressing implicit learning.

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4:00-6:00 PM (2160)

Performance Feedback Enhances the Binding of Stimulus-Control Associations. CHRISTINA BEJJANI and TOBIAS EGNER, *Duke University* (Sponsored by Tobias Egner) – Cognitive control describes how people use internal goals to guide how we process and respond to our environment. Memory can guide our control strategies such that people approach a new situation with a heightened sense of attention, because similar environments have proven difficult in the past. However, the underlying processes for this type of control-learning are not well understood. Here, we manipulated proportion congruency in a Stroop task over blocks of trials and provided task-relevant word and task-irrelevant, trial-unique image performance feedback. We hypothesized that if performance feedback enhanced the binding of stimulus-control associations, we would observe context-dependent differences in episodic memory of reinforcement events. If feedback enhanced motivation, we would observe an increase in memory for reinforcement events after incongruent trials. Moreover, we aimed to quantify how individual differences in trait reward sensitivity impacted control-learning. We found little evidence for the impact of individual differences in reward sensitivity on control-learning. Memory results primarily supported the context-binding account, with greater encoding of reinforcement events in early and easier contexts.

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4:00-6:00 PM (2161)

Do Delta Plots Provide a Clean Measure of Conflict Processing? WHITNEY DAVIDSON, KIAH KITCHEN, DANNY WALSH, and COREY WHITE, *Missouri Western State University* – Plots are used to assess interference effects from conflict tasks like the Simon. They are constructed by plotting the interference effect in RTs against the average RT for different quantiles to measure how conflict changes over time. For example, Simon tasks generally show negative-going delta slopes, indicating that interference is strongest early in the trial. However, delta plots are based on RTs which are affected by multiple processes. To assess whether Delta plots are sensitive to extraneous decision factors, we conducted within-subject manipulations of response caution, stimulus discriminability, response bias, and location bias in the Simon Task. The resulting Delta plots show differences in magnitude, shape and slope as a function of changes to the decision components, even though the stimuli and conflict remained constant. This suggests that just like the RTs upon which they are based, Delta plots do not provide clean measures of conflict processing.

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4:00-6:00 PM (2162)

Individual Differences in the Dynamic Upregulation of Cognitive Control. ANUM MALLICK, ALEXANDRA NIETO, and ALYSSA PARISI, *Nova Southeastern University*, JOANNA WITKIN and AMISHI JHA, *University of Miami,* JONATHAN BANKS, *Nova Southeastern University* (Presented by Alyssa Parisi) – Cognitive control can fluctuate on a moment-by-moment basis. The dynamic upregulation of cognitive control occurs as a result of increases in task demand including higher mnemonic load and affective interference (Witkins, Zanesco, Denkova, & Jha, 2020). Specifically, performance on trials following high load or negative interference trials is improved. The impact of individual differences in depression symptomology, dispositional mindfulness, trait anxiety, or affect on these upregulation effects remains unknown. The current study examined the impact of these factors on upregulation effects cued by mnemonic load and affective interference in a delayed recognition working memory task. The results replicate prior findings indicating better performance following trials with high mnemonic load or negatively valenced affective interference. Dispositional mindfulness, positive and negative affect moderated the upregulation effects, but no effect was observed from Depression symptomatology or trait anxiety. When examining dynamic upregulation, it is important to consider some individual difference factors.

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4:00-6:00 PM (2163)

Nice Guys Check Twice – Accounting for No-Signal Processing in the Capacity Coefficient. PAUL GARRETT, *The University of Melbourne,* ZACHARY HOWARD, *The University of Newcastle,* DANIEL LITTLE, *The University of Melbourne,* AMI EIDELS, *The University of Newcastle,* JAMES TOWNSEND, *Indiana University Bloomington* (Sponsored by Ami Eidels) – Systems Factorial Technology (SFT) is a methodological framework that has been used to investigate workload capacity in many psychological domains. Until now, it has been assumed that cognitive resources are not expended on locations that could contain a signal, but do not on a given trial (a no-signal location) and that response-times are driven purely by the 'signal-containing' locations(s). This assumption is foundational to the current capacity coefficient measures of SFT. We show that no-signal processing does influence response-times and that this processing may change the interpretation of processing capacity under the SFT framework, particularly for the conjunctive 'AND' task where all signal-locations must be processed. We present a modified AND task requiring participants to fully identify all target locations on every trial and derive a new capacity coefficient that accounts for no-signal processing times. In so doing, we resolve a previously reported empirical paradox, where capacity was observed as limited in an OR task - where only one target needs identification - yet super in an AND task, implying that previously reported differences in capacity between OR and AND task designs were likely to have been spurious.

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4:00-6:00 PM (2164)

The Effects of Presence of Others in Cognition: The Role of Executive Functions. ALEXANDRE FERNANDES and TERESA GARCIA-MARQUES, *Instituto Superior de Psicologia Aplicada (ISPA) William James Center for Research* (Presented by Teresa Garcia-Marques) – Performance on the Stroop task showed a reliable difference between alone and social presence (SP) conditions, which are attributed to general executive functions (EF). However, EF include a number of different constituent abilities, and SP may affect only some of these. The purpose of the present nine experiments is to identify more precisely the EF that are influenced by SP. We address these effects trough a set of tasks that are known to map different cognitive processes related with EF: inhibition (Anti-saccade, Stroop, and Stop-Signal tasks), updating (Keep-track, Letter-memory, and Spatial n-back tasks, and switching (Color-Shape, Number-Letter, and Local-Global tasks). Results show differences in how the SP impacts performance in these tasks, at the level of reaction times, correct responses and the temporal dynamics of responses. This study in general challenges the notion of a uniform latent variable, i.e., the executive-control function, assumed dominantly in the literature, in the way that the SP modulates these functions.

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4:00-6:00 PM (2165)

Exploring Task Switch Costs in a Color-Shape Decision Task via a Mousetracking Paradigm. WENTING YE and MARKUS DAMIAN, *University of Bristol* – A classic finding in the literature on cognitive control is the "task switch cost": in experimental studies, switching from one task to another incurs a cost, relative to a condition in which the same task was repeated. Several decades of cognitive research have explored the processes and mechanisms which underlie task switching. Here we report an experiment in which young adult participants were presented with colored shapes and were randomly cued to categorize them according to color, or to shape. Responses were made via dynamic movements of the computer mouse ("mouse tracking"), which allows a window into how the decision-making processing unfolds. The results showed that the classic findings (mix cost; switch cost; task congruency effects, etc.) emerged very strongly in average movement trajectories. Detailed analysis of various aspects of the mouse responses are taken to suggest that task switch costs emerge as a combination of task set reconfiguration, and stimulus-driven sensory-motor mappings.

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4:00-6:00 PM (2166)

Stay or Switch? Using Pupillometry to Monitor Task Engagement and Task Switching. WISNU WIRADHANY, *Bina Nusantara University & University of Groningen,* ANIQUE DE BRUIN, *Maastricht University* – Pupil size has been shown to be correlated with Locus Coeruleus-Norepinephrine (LC-NE) activities, which modulate task engagement and task switches, in experiments in which participants can track trial-by-trial rewards and costs. Here, in two experiments in which participants choose to perform two types of a change-detection task on each trial, we investigated the pupil-LC correlates in absence of explicit trial-by-trial rewards and costs. In Experiment 1, pupil dilations were larger in accurate trials regardless of the task type, but pupil size during baseline was only reliably larger preceding switches for participants who switch more frequently. We replicated these findings in Experiment 2 and additionally showed these effects did not change in a condition in which task switches are more encouraged. Together, pupillometry might be a useful tool for monitoring one's metacognitive states, i.e., to predict whether someone is engaged in a task or ready to switch to alternative ones.
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4:00-6:00 PM (2167)

The Role of Executive Function in Impulsive Consumer Decision Making. HOLLY ADAMS, *Kennesaw State University,* DAVID WASHBURN, *Georgia State University & Covenant College* – This study was designed to show whether executive function influences consumer decision making. Three datasets were analyzed. In Study 1A, 6,122 participants completed self-report measures including the Executive Function Index (EFI), impulsiveness, personality, and consumer behavior. In Study 1B, a second data set (N=6,000) of self-report measures was collected and analyzed to validate the results from Study 1A. In Study 2, 253 participants were tested on behavioral measures of inhibitory control, cognitive flexibility, and working memory capacity, and completed a laboratory test of consumer behavior. These participants also completed the EFI. Results for these studies demonstrated that components of executive function—particularly inhibitory control and working memory capacity—are related to impulsive consumer decision making. Further, these data illuminate the relation between a self-report measure of executive function and performance-based assessments. It appears that the EFI may be more closely related to self-reported personality than to task-based inhibition, working memory, or cognitive flexibility.
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4:00-6:00 PM (2168)

Eye-Tracking Investigation of Cross-Race Effect in Relational and Item Recognition. HUIYU DING, JONATHON WHITLOCK, YIPEI LO, and LILI SAHAKYAN, *University of Illinois at Urbana-Champaign* (Sponsored by Lili Sahakyan) – Cross-Race Effect (CRE) suggests that own-race faces are better recognized compared to other-race faces. The current investigation assessed whether CRE is observed in associative memory, and how it is expressed in eye movements. Participants completed an item-memory block and an associative-memory block. In the associative block, Caucasian and Asian faces were individually superimposed on a unique background scene, and participants were instructed to think about the face-scene pairing. In the item block, all faces were superimposed on the same uniform scene, and item-focused processing was encouraged. The test presented three faces superimposed on a previously studied background scene, and participants had to select the face that was previously paired with that scene (associative recognition) or selecting the studied face from unstudied faces (item recognition). Eye movements were recorded at test. Recognition accuracy revealed a significant CRE in item recognition, along with substantially reduced CRE in associative recognition. Eye-movement analyses revealed a new marker of CRE, with preferential viewing directed towards own-race faces in both memory blocks, suggesting that eye movements are an implicit marker for CRE.
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4:00-6:00 PM (2169)

Switch Rates Change During Voluntary Task Switching Performance. MICHAEL IMBURGIO and JOSEPH ORR, *Texas A&M University* – Cognitive flexibility is often measured using voluntary task switching paradigms. In these paradigms, participants are asked to perform two different tasks, choosing which task to perform on each trial randomly. One measure of flexibility in these paradigms is the rate at which participants choose to switch to the task that was not performed on the previous trial (switch rate). Switch rate is often assumed to be consistent within a participant throughout the task. However, in two independent datasets, we found that the probability of a switch declines throughout the experiment when every trial involves a task choice. In two more separate datasets, we found that including some trials which instruct the participant on which task to perform eliminates significant changes in switch rates over time during voluntary trials. Finally, individual differences in switch rate changes over time were correlated with BIS/BAS scores. Higher scores on the BIS subscale negatively correlated with change in switch probability while the opposite was true for the BAS fun-seeking subscale. The results suggest that changes in switch rates might help inform the effects of choice frequency manipulations and individual differences among participants.
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4:00-6:00 PM (2170)

Motor-Clustering as a Guide to Creating Task Structure: Important But Not All-Powerful. TOBIN DYKSTRA and ELIOT HAZELTINE, *University of Iowa* (Sponsored by Eliot Hazeltine) – The task-set, a unified representation of the current environment, has proven powerful in understanding human behavior. Yet, how these representations are formed remains understudied. One possibility is that structure is adopted to maximize motor similarity within a task. While existing evidence comes from one-hand responses, we directly compare the role of motor demands in 1-hand versus 2-hand paradigms. We manipulate the response associated with each stimulus to vary motor similarity. To determine which structure participants adopted, we calculate the motor-clustering cost defined as high-adjacency switch-cost minus low-adjacency switch-cost. We replicate previous work by observing a preference for high-adjacency structures in one-hand responses. However, for two-hand responses, we observe no preference for motor adjacency. In this condition, motor similarity does not appear to constrain task-set, compared to one-hand responding. While motor similarity appears powerful in one-handed

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experiments, other factors remain crucially important in situations where responses occur across both hands.
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4:00-6:00 PM (2171)

Cognitive Control in Children: Evidence from the Proportion Congruency Effect in Number Comparison and Flanker Tasks. ANNE-MEREL MEIJER and EVA VAN DEN BUSSCHE, *KU Leuven* (Sponsored by Gert Storms) – Cognitive control is crucial to resolve conflict in the Flanker task. Reactive control is used when the majority of trials is congruent, while proactive control is more efficient in situations with mostly incongruent trials. Macizo & Herrera (2012) found that the same concept applies in two-digit number comparison with congruent (34 vs 69) and incongruent trials (34 vs. 62), and state that adults use cognitive control to adapt to numerical conflict. In the present study is we assess whether this finding also applies to children (second, fourth, and sixth grade). Participants performed Flanker and number comparison tasks, where the proportion of congruent trials was manipulated (80 vs. 20%). Results from the Flanker task showed a proportion congruency effect in the RTs, but only for the second-grade children and adults. In the number comparison task we found proportion congruency effects in both RTs and error rates, but no interaction with age. Our findings support the assumption that children as young as 7 years old can effectively use pro- and reactive control mechanisms. We show that this effect is not limited to standardized lab tasks, but also applies in daily life tasks such as the processing of Arabic numbers.
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4:00-6:00 PM (2172)

A Frontal Account of False Alarms. SARA FESTINI, *University of Tampa,* BENJAMIN KATZ, *Virginia Tech* – Performance deficits in many executive functioning tasks are often quantified as the number of false alarms per the total number of non-target trials. However, most studies of frontal lobe function focus on individual task performance and do not discuss commonalities of errors committed across different tasks. Here we explore the link between deficient frontal lobe function and increased false alarm rates across a large array of experimental tasks. We review evidence for heightened false alarms associated with frontal deficits in episodic long-term memory, working memory, attentional, interference control, inhibitory control, and set shifting tasks. We examine this relationship via neuroimaging studies, lesion studies, and across age groups and prefrontal-linked pathologies. Finally, we propose ten issues in cognitive processing that may result in false alarms, and we find that evidence supports the fractionation and localization of frontal processes related to the commission of false alarms across a diverse range of tasks.
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4:00-6:00 PM (2173)

Do Learning Preferences Capture Individual Differences in Cognitive Flexibility? HAYLEY O'DONNELL and EVANGELIA G. CHRYSIKOU, *Drexel University* (Sponsored by Evangelia G. Chrysikou) – When solving problems involving cognitive flexibility (CF), individuals who approach a learning task using exploration, outperform those who approach the task using exploitation. Thus, CF might be a function of individual differences in learning preference and task demands. In Study 1, participants were administered three CF tasks. Participants' response selection history on a reward-based learning task, which could be approached either through exploitation or exploration, was used to determine each participant's learning style and predict CF performance. In Study 2, we used a similar paradigm to examine whether modulation of left prefrontal cortex (PFC) with high-definition transcranial direct current stimulation would produce measurable effects on CF that would be mitigated by individual learning preferences. Different CF task components interacted with participants' learning preferences as measured by the independent learning task; these effects were altered by modulation of PFC activity. We discuss how learning preferences might capture individual differences in CF.
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4:00-6:00 PM (2174)

Cognitive Control When There's Something in It for Me: Item Specific Switch Conditioning. COREY NACK and YU-CHIN CHIU, *Purdue University* (Sponsored by Yu-Chin Chiu) – Task-set control is susceptible to rewards, similar to instrumental conditioning, via a stimulus-response-outcome associative chain. Braem (2017) showed that participants who had been preferentially rewarded on switch trials chose to switch tasks more often than those who had been preferentially rewarded on repeat trials. However, this effect was demonstrated between subjects and focused on voluntary switch rate. Here in Experiment 1, we tested whether task-set control can be conditioned by rewards in an item-specific manner within subjects. We found smaller switch costs for items that were frequently rewarded on switch trials compared to those that were rewarded rarely, i.e., an item-specific switch conditioning (ISSC) effect. Experiment 2 further tested whether the ISSC effect can transfer to non-rewarded items included in the same list. We replicated the ISSC effect but observed no transfer to non-rewarded items. Our findings reiterate that control is reinforceable, likely via a stimulus-control-outcome associative chain.
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4:00-6:00 PM (2175)

Carrot or Stick: Cognitive Flexibility Increases with Increasing Loss or Reward Prospect. KERSTIN FRÖBER and GESINE DREISBACH, *University of Regensburg* – Both prospect of loss avoidance and prospect of reward are used as motivators. Reward studies found that the same high reward promotes either cognitive stability or flexibility depending on the immediate reward history: Remaining high reward prospect (high following high) increased stability in voluntary task switching in terms of reduced voluntary switch rates (VSRs). In contrast, increasing reward prospect (high following low) increased flexibility in terms of increased VSRs. Here, we tested whether the same effects are found when prospect of loss avoidance is used as a motivator. In three voluntary task switching experiments (n=30 each), loss prospect varied between low and high. Results showed reduced VSRs when loss prospect remained high, and increased VSRs when loss prospect increased. That is, we found a sequential loss effect resembling the sequential reward effect, suggesting that the modulation of cognitive stability versus flexibility is due to the salience (low or high) and not the valence of a motivator. Flexibility is increased whenever more than before is at stake (increasing

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loss or reward), while stability is increased whenever high stakes repeat (remaining high loss or reward).
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4:00-6:00 PM (2176)

Task-Conflict Biases Decision Making. STEFANIE SCHUCH, *Rheinisch-Westfälische Technische Hochschule Aachen University,* DAVID DIGNATH, *Rheinisch-Westfälische Technische Hochschule & University of Freiburg* – Exploring decision making in multitasking, we investigate how people make optimal decisions between tasks. Empirical evidence suggests that difficulties in task performance (i.e., response-conflict within a task) can bias decision making. Here we investigate whether also conflict between task representations can tune choices away from conflict-associated tasks. Using a combined forced/free-choice task-switching design, we tested whether task-conflict that arises due to proactive interference of previously activated tasks biases task choice. We compared free-choice decisions between three tasks after forced-choice sequences that instigated either high task-conflict (task sequences of type ABA, in which persisting inhibition needs to be overcome because one switches back to a just-abandoned task) or low task conflict (task sequences of type CBA). Experiments 1 and 2 (N=16; N=32, pre-registered) showed that participants were more likely to switch away from the previously performed task after high than after low task-conflict. Experiment 3 (N=32) confirmed that this bias in task selection could not be explained in terms of randomness heuristics. The results suggest a close link between decision making and performance in multitasking.
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4:00-6:00 PM (2177)

Learning American Sign Language Improves Visual-Spatial Executive Functioning Efficiency: Heart Rate Measured Executive Mental Effort During Corsi Blocks and Tower of London Tasks. DANA BYRD, *Texas A&M University – Kingsville* – College student bimodals (English-ASL, with 1-2 years of college ASL instruction) and monomodals (Spoken Languages only, English speaking with 1-2 years of college non-English spoken language instruction) completed easy, medium, and hard difficulties of the Corsi Blocks task and the Tower of London task. Behavioral performance on both visual-spatial tasks was statistically equivalent between bimodal and monomodal groups. However, evidence from the High-Frequency Heart Rate Variability (HF-HRV) suggested that the bimodal participants expended less prefrontal-lobe-mediated (executive function) mental effort in order to perform equally as well as the monomodal participants on both visual-spatial tasks. The bimodals expended less mental effort during the medium difficulty condition of the Corsi Blocks task ($p = .05$) and the medium and hard difficulty conditions of the Tower of London task ($p = .03$, $p = .01$, respectively). Past neuroscience-psychophysiology studies have found HF-HRV to correlate with extent of prefrontal lobe activation/recruitment.
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4:00-6:00 PM (2178)

Modality Compatibility in Task Switching Depends on Processing Codes and Task Demands. ERIK FRIEDGEN, IRING KOCH, and DENISE STEPHAN, *Rheinisch-Westfälische Technische Hochschule Aachen University* (Sponsored by Iring Koch) – Modality compatibility denotes the match between sensory stimulus modality and the sensory modality of the anticipated response effect. In task switching studies, it has been found that switching between two modality-incompatible mappings (auditory-manual & visual-vocal) resulted in higher switch costs than switching between two modality-compatible mappings (auditory-vocal & visual-manual). This suggests that with modality-incompatible mappings, the anticipation of the effect of each response primes the stimulus modality linked to the competing task, creating task confusion. In Experiment 1, we examined whether modality-compatibility effects in task switching are increased by strengthening the auditory-vocal coupling by using spatial-verbal stimuli relative to spatial-location stimuli. In Experiment 2, we aimed at achieving the same goal by requiring temporal stimulus discrimination relative to spatial stimulus localisation. Results suggest both spatial-verbal stimuli and temporal discrimination can increase modality-specific task interference through a variation of the strength of anticipation in the response-effect coupling. This provides further support for modality-specificity of cognitive control processes in task switching.
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4:00-6:00 PM (2179)

Performance-Effect Coupling: Can We Learn to Anticipate Action Consequences on the Basis of Our Own Reaction Time? CHRISTINA U. PFEUFFER and ANDREA KIESEL, *University of Freiburg* – When our actions predictably cause effects, we form bi-directional action-effect associations to select future actions by anticipating desired effects. Here, we assessed whether we can associate performance features (reaction time, RT) with specific effects. Participants frequently encountered new target stimuli and were tasked to respond fast and accurately based on trial-and-error learning. Unbeknownst to them, initial mean RTs were used as reference for determining effect positions. Saccades before effect onset (towards/away from the future effect) indicated whether participants correctly anticipated upcoming effects based on their RT. Participants saccaded more often to future effects than elsewhere. Saccades towards future effects increased with the current RT´s difference from the reference RT. Strategies, proportions, and trial sequences only partly accounted for this finding. Thus, humans are able to learn RT-effect contingencies, to adapt effect anticipations based on their own performance, and to anticipatorily saccade towards their actions´ performance-based future effects to monitor them.
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4:00-6:00 PM (2180)

Item-Specific and List-Wide Effects of Control Learning. MOON SUN KANG and YU-CHIN CHIU, *Purdue University* (Sponsored by Yu-Chin Chiu) – Recent studies showed that cognitive control for task-sets can be triggered by various contextual cues bottom up to modulate task switching efficiency. However, the effects of different cues have been shown in separate studies. Here, we devise a single task-switching paradigm to examine both the effects of list-based (i.e., a "list" of trials) and item-based cues within subjects. In two experiments, we found reduced switch costs in lists associated with a high probability of switching compared to those in lists with a low probability of switching (i.e., list-wide switch probability effect). Similarly, we found an analogous effect with item-based cues (i.e., item-specific switch probability effect).

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Interestingly, the two effects were uncorrelated. In line with the dual mechanisms of control framework (Braver, 2012), these findings suggest that there are two distinct mechanisms of control, which may be engaged in a context-sensitive manner independently in order to adapt to specific cognitive demands.
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4:00-6:00 PM (2181)

Perceptual Disfluency and Incongruence Promotes Additive Control Adjustments. GONÇALO OLIVEIRA, *Instituto Superior de Psicologia Aplicada (ISPA) William James Center for Research & Instituto de Medicina Molecular,* MIGUEL REMONDES, *Instituto de Medicina Molecular,* TERESA GARCIA-MARQUES, *Instituto Superior de Psicologia Aplicada (ISPA) William James Center for Research* – Recent research has highlighted the role of negative affect in the initiation of cognitive control. Here we take an integrative approach and propose that perceptual disfluency and incongruence are experienced as a general feeling of disfluent information processing, activating additive control mechanisms. This hypothesis was tested using a Stroop-like interference task that mixed trials varying in perceptual fluency and/or congruence. The proportion of congruent trials within the task was also manipulated. Our results showed a linear decrease of the interference of incongruent fluent trials, as the processing disfluency increases in the previous trial. This additive linear effect was significant for all proportions of congruence conditions, although lower when incongruent trials were more frequent. These results suggest that the monitoring system of control could also be using changes in information processing fluency as a signal of need for control.
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4:00-6:00 PM (2182)

Partial Repetition Costs Are Robust But Reduced After Extensive Stimulus-Response Practice. BENJAMIN RICHARDSON and LISA FOURNIER, *Washington State University* (Sponsored by Lisa Fournier) – Immediate actions can be delayed while retaining another action plan in working memory, if the two action plans partly overlap (partial repetition cost, PRC). We examined whether PRCs are eliminated and partial repetition benefits (PRBs) occur for stimuli that are consistently mapped and are extensively practiced. Participants performed a partial repetition task (PRT), in which they retained an action to one visual event (A) and then immediately executed an action to a second visual event (B) that partly overlapped or did not overlap with a retained action. The PRT was performed after different amounts of practice responding to event (A) and (B) stimuli. Results showed PRCs were reduced but not eliminated after training, even for participants showing asymptotic RT performance. Thus, PRCs appear to occur for immediate actions generated offline, regardless of whether these action plans are directly retrieved from long-term memory or are maintained and retrieved from working memory.
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4:00-6:00 PM (2183)

Pre-Crastination in Cognitive Tasks. RAINA ISAACS, KRISTINA WEIMER, and DAWN MCBRIDE, *Illinois State University* (Sponsored by Jeffrey Wagman) –Precrastination is defined as the tendency to complete or begin tasks as soon as possible (Rosenbaum et al., 2014). Previous research has documented that participants precrastinate to reduce their cognitive load (Fournier et al., 2019; Rosenbaum et al., 2014; VonderHaar et al., 2019). However, most of these studies have only explored perceptual-motor tasks; thus, the purpose of the current study was to further investigate precrastination of cognitive tasks. Participants chose whether to complete a category item generation task before or after moving numbered boxes on a computer screen. The majority of participants (70%) were inconsistent in their choices across trials, and on the majority of trials (68%), participants chose to complete the generation task after moving the boxes. Further, inconsistent with results found in past studies, box moving times were similar across trials when generation occurred before and after box moving. Thus, task order choices may depend on the task at hand, and precrastination may only occur under some conditions.
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4:00-6:00 PM (2184)

Procrastination and Precrastination: What Determines What We Do? SELENA VILLARREAL and DAWN MCBRIDE, *Illinois State University* – Self-regulation has been suggested as one of the most significant predictors of procrastination. Precrastination, however, is a fairly new topic and is defined as the tendency to complete a task early even at the expense of extra effort (Rosenbaum et al., 2014). VonderHaar et al. (2019) found that people structure their behavior this way to free up cognitive resources, particularly when given simple task choices, known as the CLEAR hypothesis. The purpose of the current study was to investigate: (1) Does task type affect task order choices? (2) Do tasks suffer from errors when one precrastinates? and (3) Does self-regulation also play a role in precrastination? Participants completed a computerized box-moving task while also solving simple math problems or generating a list of items from a category at a time of their choosing. Participants' level of self-regulation was also assessed. Although we found high levels of precrastination for both tasks, the tasks did not differ in precrastination rates, nor did precrastinating lead to more errors. There were also no correlations between self-regulation and precrastination or task errors. This result suggests that precrastination and procrastination may be driven by different processes.
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4:00-6:00 PM (2185)

Crossmodal Effects in Task Switching: Modality Compatibility with Vocal and Pedal Responses. DENISE STEPHAN, JOHANNA JOSTEN, ERIK FRIEDGEN, and IRING KOCH, *Rheinisch-Westfälische Technische Hochschule Aachen University* – Modality compatibility (MC) refers to the similarity between the stimulus modality and the modality of response-related sensory consequences. The present study explored the generality of MC by examining a new response modality (pedal responses). Experiment 1 showed that the effect of MC generalizes to pedal responses. However, in single-task conditions there was no influence of MC. Therefore, Experiment 2 was designed to examine whether MC depends on the frequency of task switches. To this end, one task occurred very frequently, overall decreasing the task switching frequency. Importantly, the results showed a robust task-switching benefit of modality-compatible mappings even for a highly frequent task, suggesting that the sustained representation of potentially competing response modalities affects task-

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switching performance independent from the actual frequency of the tasks. Together, the data suggest that MC is an emergent phenomenon arising in task-switching situations based on the necessity to maintain and separate competing modality mappings, which are characterized by ideomotor backward linkages between anticipated response effects and the imperative stimuli.
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4:00-6:00 PM (2186)

Common and Dissociable Attentional Mechanisms Triggered by Gaze and Arrows. Evidence from a Spatial Interference Paradigm. RAFAEL ROMÁN-CABALLERO, ANDREA MAROTTA, and JUAN LUPIÁÑEZ, *University of Granada* (Sponsored by Juan Lupiáñez) – Non-social directional stimuli (e.g., arrows) and gaze are equally effective as orienting signals in cueing paradigms. However, recent research from our laboratory has shown that eye gaze and arrows yield opposite congruency effects in a spatial Stroop paradigm, arrows eliciting faster responses when their direction is congruent with their position (standard congruency effect), and gaze producing faster responses for incongruent conditions (reversed congruency effect). Using more complex stimuli (whole faces and arrows embedded in a geometric background), the current series of three experiments replicated the reversed congruency effect with gaze, whereas the standard effect with arrows was only present when they appeared without or after the geometric background. Convergently with previous electrophysiological evidence, our results suggest the coexistence of shared attentional components between gaze and arrows, a spatial orienting/interference dimension, and a social-specific dimension exclusively involved in gaze processing producing the reversion of the observed effect.
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4:00-6:00 PM (2187)

Assessing Human Stress with Behavioral, Physiological and Spontaneous Head Motion Measures: Effects of Drone Speed. CHRISTOPHER WIDDOWSON and KIRK BALLEW, *University of Illinois at Urbana-Champaign,* HYUNG-JIN YOON, *Massachusetts Institute of Technology,* CAMERON MERRILL, NAIRA HOVAKIMYAN, and RANXIAO FRANCES WANG, *University of Illinois at Urbana-Champaign,* (Presented by Kirk Ballew) – As autonomous drones become ubiquitous in densely populated urban areas, it is crucial that their flight trajectories do not induce stress in the humans they serve. To better understand the stress response, we used virtual reality to simulate the experience of receiving packages delivered via drones at a range of speeds. We indexed stress in participants by collecting behavioral and physiological data, including the preferred stopping distance, head acceleration away from the drone, and GSR. Results showed that participants prefer for the drone to stop further away when it is traveling at faster speeds. Participants also tend to move away from the drone with greater acceleration when the drone is moving more quickly. Finally, participants tend to have larger GSR to faster drone speeds. These data show that participants experience greater stress as drone speed increases. The relationship between different measures/indices of stress will be explored.
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4:00-6:00 PM (2188)

Predicting Spanish Lexical-Affective Values by Distributional Word Vectors. JORGE VIVAS and MATÍAS YERRO AVINCETTO, *Instituto de Psicología Básica, Aplicada y Tecnología (CONICET-UNMDP),* ISABEL PASSONI and MARIELA GONZÁLEZ, *Instituto de Investigaciones Científicas y Tecnológicas en Electrónica (CONICET-UNMDP),* SOFÍA ROMANELLI, *Instituto de Psicología Básica, Aplicada y Tecnología (CONICET-UNMDP)* (Presented by Matías Yerro Avincetto) – The study of variables associated with semantic concepts is an arduous process. This fact is usually translated into databases that are limited in their extension. Based on Recchia and Louwerse (2015), this work explores the possibility of inferring two highly studied variables in lexical-affective norms, valence and activation (arousal), from word vectors enriched with subword information (Bojanowski et al., 2017) trained on Spanish corpora.Using lexical-affective values obtained from the Spanish adaptation of ANEW (Redondo et al., 2007), and word vectors from fastText's Spanish pre-trained model (Grave et al., 2018), we trained a neural network with 85% of the words available, and held the remaining 15% as a test set. The correlation values found between the predicted and the real values of the test set (valence r~.85; arousal r~.66) are equivalent to those found between different norms, whose residual variance is commonly associated with sampling differences. The use of this method is proposed to approximate affective values when no data norms are available for the treated set. Finally, we provide the predicted values for the 400 nouns of the Spanish semantic feature production norms (Vivas et al., 2017).
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4:00-6:00 PM (2189)

Human Versus Machine Emotion Recognition from Spontaneous and Posed Expressions. SHUSHI NAMBA, *Hiroshima University,* EVA KRUMHUBER, *University College London,* DENNIS KÜSTER, *Jacobs University* – How good are humans in recognizing emotions from spontaneous and posed expressions? And do machines achieve similar levels of recognition performance as humans? To answer these questions, dynamic facial stimuli portraying the six basic emotions were sampled from a broad range of different databases, and then presented to human observers and a machine classifier. Results showed that posed expressions were generally better recognized than spontaneous ones. Interestingly, classification by the machine was highly successful, as it outperformed humans for the majority of posed datasets. Although performance dropped when the stimuli were spontaneous, accuracy was similar for humans and machine. This finding is an important addition to the literature by showing that machines can be equally sensitive to subtle and lifelike expressions. Implications for cognitive science and affective computing are discussed.
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4:00-6:00 PM (2190)

Is Children's Social Networking Site Usage Linked to Executive Function Skills? ATHANASIA KOTSIOU, RUPERT WEGERIF, and MICHELLE ELLEFSON, *University of Cambridge* (Sponsored by Michelle Ellefson) – Given the protracted nature of the development of executive function skills, there have been a number of studies exploring the role various environmental factors play in children's inhibitory, switching and working memory skills. Although there are some studies exploring

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how social networking site usage impacts adult and adolescent executive function skills, little is known about younger children. In a large sample of 9- to 11-year-old children from England (N=709), we explore the links between self-reported social networking site use and performance on executive function measures: the continuous performance task, task switching and spatial working memory. Initial analyses indicate small, but statistically significant negative correlations between self-reported social networking site usage and performance on various measures of performance in these three executive functions tasks. Further work including various metrics of social networking site usage is needed to better understand its influence on executive function skill development.
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4:00-6:00 PM (2191)

Surgical Face Masks Impair Face Matching Performance in Human Observers and Face Recognition Systems. DANIEL CARRAGHER and PETER HANCOCK, *University of Stirling* – In response to the COVID-19 pandemic, many people now cover the lower half of their face in public. We investigated whether surgical face masks affected the performance of human observers, and a naive face recognition system, on tasks of perceptual face matching. Participants judged whether two simultaneously presented images showed the same person or two different people. Surgical masks were superimposed over the faces, creating three mask conditions: control (no masks), mixed (one face wearing a mask), and masked (both faces wearing masks). Surgical masks had a large detrimental effect on human face matching performance, for both familiar and unfamiliar faces. The degree of impairment was the same whether one or both faces in the pair were masked. Observers tended to reject masked unfamiliar faces as mismatches and accept masked familiar faces as matches. The face recognition system showed very high classification accuracy for control and masked stimuli, even though it had not been trained to identify masked faces. However, accuracy fell markedly when only one face was masked. Our findings demonstrate that surgical face masks impair the performance of humans, and naive face recognition systems, on perceptual face matching tasks.
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4:00-6:00 PM (2192)

How Theory of Mind May Help and Hurt Dynamic Multimedia Learning. ANNA WRIGHT, MADISON LEE, and DANIEL LEVIN, *Vanderbilt University* (Presented by Madison Lee) (Sponsored by Daniel Levin) – New media such as screen-captured instructional videos constitute a complex social stimulus that viewers must process in real time. These videos can dynamically depict targets of the author's attention via points and even gaze cues. As such, theory of mind (ToM), the ability to attribute mental states to oneself and to others, may help learners benefit from these materials. However, little work has investigated the utility of ToM in multimedia learning. We tested the role both of general ToM skills and of more explicit situation-specific cognitions (e.g. inferring why the author looked where they did) in supporting learning. Participants viewed screen-capture instructional videos that also depicted a circular overlay of the author's gaze. Participants were tested on the content of each video. They also completed general measures of ToM and indicated if they generated explicit inferences about the author's goals and looking behavior. General ToM skills predicted increased post-test scores while explicit situation-specific inferences predicted lower post-test scores. Our results suggest that general ToM contributes to improved learning while more explicit cognitions can interfere with learning in a multimedia setting.
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4:00-6:00 PM (2193)

Look It Up: How Online Searching Affects Learning. EMMALINE DREW ELISEEV and ELIZABETH MARSH, *Duke University* (Sponsored by Elizabeth Marsh) – The internet offers quick, easy access to the largest repository of human knowledge in existence. Previous work has shown that online searching inflates estimates of general knowledge (Fisher et al., 2015) and that recent internet searching increases the likelihood of future internet searching (Storm et al., 2017). The present study investigates how looking up information online affects metacognitive judgments of learning and later memory. In this study, participants learned English translations of foreign vocabulary words (e.g., wingu – cloud). Participants in the search condition looked up the English translations online using Google Translate, while participants in the control condition were simply given the same translations. After completing the learning phase, participants predicted how many translations they would recall at test. While participants who searched for translations expected to recall fewer words than participants who were given the translations, they performed equally well on a cued-recall test.
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4:00-6:00 PM (2194)

Photo-Takers Predict Item-Level Costs, but Global Benefits, to Memory as a Consequence of Taking Photos. JULIA SOARES, *Mississippi State University,* BENJAMIN STORM, *University of California, Santa Cruz* – The photo-taking-impairment effect is observed when photographed objects are recalled less well than non-photographed objects. Little is known, however, about participants' awareness of this effect. In Experiment 1, participants viewed pictures of paintings and were instructed to photograph some paintings, but not others, and predict how well they would remember each painting. They then completed a multiple-choice test on the visual details of each painting. Participants demonstrated the photo-taking-impairment effect, which was consistent with their metacognitive judgments. Experiment 2 replicated the design of Experiment 1 but also included a condition in which participants made global judgments about their performance on the final test. At the global level, participants anticipated a reversal of the photo-taking-impairment effect. These findings indicate that participants might be aware of the attentional effects of taking photos at the item level, but still report an overall belief that taking photos benefits memory.
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4:00-6:00 PM (2195)

Leaders Appear More Likeable When They Use Emojis—As Long as the Emoji Use is Appropriate. MONICA RIORDAN, *Chatham University,* ELLA GLIKSON, *Bar-Ilan University* – As workplaces are becoming increasingly virtual, the means to communicate clearly and effectively are becoming more important. Many text-based platforms lack nuance and nonverbal cues, often leading to ambiguity about the message that can in turn affect perceptions of the sender, which may be particularly

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consequential in a workplace setting. Emojis have been suggested as cues that can overcome this ambiguity and create more positive communication that reflects well on a sender. In the current research, the effect of emojis in workplace emails is assessed from the perspective of a subordinate reading an email from a manager that either included or did not include an emoji. Across two studies, emails with emojis were perceived to have higher positivity, but lower appropriateness. Furthermore, use of emojis led to higher likeability of the manager, but only when the emojis were perceived as appropriate—which itself was a function of the informality of the workplace communication climate. The gender of the manager had no effect on these variables. These results are presented in relationship to the social identity theory of leadership and role congruity theory.
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4:00-6:00 PM (2196)

Comparing Using Provided Outline, Free Note, and No Notes on Learning. ASHLEIGH WELLS and RICHARD MAYER, *University of California, Santa Barbara* (Sponsored by Richard Mayer) – This study aimed to determine the effect of taking notes using an instructor-provided skeletal outline compared to free-form notes and taking no notes on learning performance in an astronomy lesson. Twenty-six undergraduates were included in preliminary analyses. A one-way ANOVA found no significant differences between the groups' post-test scores [$F(2, 25)=.44$, $p=.65$], however the power for this analysis is below 25% and data collection is on-going. There was a significant difference between self-reported effort scores [$F(2, 25)=6.22$, $p=.007$], with those in the free notes ($n=6$; $M=4.0$, $SD=.89$, $p=.006$) and outline notes ($n=8$; $M=3.78$, $SD=.83$, $p=.009$) conditions rating more effort than those in the no notes condition ($n=12$; $M=2.64$, $SD=.92$), indicating that taking notes is more effortful without affecting outcome performance.
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4:00-6:00 PM (2197)

Numeric and Spatial Analogs of a Simple Rule Learning Task. DANIEL CZARNOWSKI, *Lehigh University,* DENIZ UNAL and ERIN WALKER, *University of Pittsburgh,* ERIN SOLOVEY, *Worcester Polytechnic Institute*, CATHERINE ARRINGTON, *Lehigh University* – Understanding complex learning occurring during use of intelligent tutoring systems (ITS) may help development of these widely-used systems to better support student outcomes. A challenge for researchers seeking to use simple tasks from cognitive psychology to explore cognition in these complex environments is the mapping of similar cognitive states across environments. Here, we consider two analogs of a simple rule learning task where performance on sequential trials defines stages of rule search, rule discovery, and rule following. Easy (+2) and hard (-1,+2) rules appeared in numeric (0 to 99) or spatial (i.e. target movement through circular array of locations) displays in short runs with non-rule events between. Participants searched for rules. Both proportion of rules discovered and time to discovery were better for numeric compared to spatial displays and the effect of difficulty was larger for numeric displays. Response speed did not differ across tasks. Comparison to ITS learning environments is considered.
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4:00-6:00 PM (2198)

Knowledge Repair: An Automated System to Promote Individualized Student Conceptual Mastery in Courses Using Multiple-Choice Assessments. SEAN SNODDY and KENNETH KURTZ, *Binghamton University SUNY* (Sponsored by Kenneth Kurtz) – A challenge in large lecture courses using multiple-choice assessments is to offer individualized support to encourage conceptual mastery with limited instructional resources. To address this challenge, we created an automated system for Knowledge Repair (KR) that monitors performance on multiple-choice assessments to create individualized knowledge profiles and recommend optimal review tasks: 1) a refutation-based task to spur conceptual change for knowledge identified as a misconception, and 2) self-explanation to highlight gaps in and promote the solidification of conceptual knowledge for instances of incomplete knowledge. We tested the efficacy of KR in an upper-level psychology course. Students were randomly assigned to complete KR or independent review after each exam. After completion of the review tasks, a quiz based on the most challenging concepts from the exam was administered. The results demonstrated that KR improved conceptual understanding in students—completing KR was associated with larger improvements on the quiz than independent review.
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4:00-6:00 PM (2199)

The Relationship Between Theory of Mind and Intelligence: A Formative *g* Approach. ESTER NAVARRO, SARA GORING, and ANDREW CONWAY, *Claremont Graduate University* – Theory of Mind (ToM) is the ability to understand that other people's mental states differ from one's own. Individual differences in ToM have been attributed to general intelligence (g; Coyle et al., 2018). Psychometric models typically specify g as a reflective latent variable (i.e., a cause of cognitive abilities) and characterize associations between ToM and intelligence using the reflective-g approach. However, g could also be specified as a formative latent variable (i.e., an index of cognitive ability, not an attribute; Kovacs & Conway, 2016). SEMs were conducted with either a reflective- or formative-g, assessing whether the relationship between ToM and intelligence is mostly accounted for by a general ability or language ability (Study 1). Next, a psychometric network analysis was conducted to examine associations among ToM and intelligence measures (Study 2). Results suggest that the relationship between ToM and intelligence is predominantly explained by verbal ability, not by general cognitive ability.
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4:00-6:00 PM (2200)

Improvement in Executive Functions of People with Aphasia Induced by Conversation Therapy and Its Relation to Gains in Treatment Outcome Measures. WINSY WING-SZE WONG and SAM PO LAW, *The University of Hong Kong* – Executive functions (EF) have been recognized to predict outcomes of language therapy for people with aphasia (PWA; Simic et al., 2019). The present study aimed to explore the effect of cognitive stimulation on cognitive functioning of PWA, and its potential benefits to language therapy. Forty-seven PWA received either conversation therapy (CT) or in combination with cognitive stimulation in a 12-session program. Their abilities in discourse production, EF, and attention/working memory were measured before, immediately after, and 8 weeks after treatment. Contrary to expectation, comparable degrees of

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improvements in cognitive functioning and discourse production were observed in both treatment groups. Moreover, maintenance of treatment gains was seen only in EF and discourse measures. The main finding of positive change in EF as a consequence of CT, regardless of cognitive stimulation, is discussed in relation to the mechanisms and cognitive processes presumably involved in the CT protocol (Spitzer et al., 2020).
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4:00-6:00 PM (2201)

What Predicts Intention to Receive a Future COVID-19 Vaccine? The Role of Knowledge, Attitudes, and Behavior. JASMINE KIM, ELLEN ORCUTT, REESE BUTTERFUSS, DAHEEN CHOI, RINA HARSCH, KELSEY WILL, VICTORIA JOHNSON, and PANAYIOTA KENDEOU, *University of Minnesota* – The ongoing fight against COVID-19 highlights the importance of developing and administering vaccines to control the spread of infectious diseases. Unfortunately, many people have misconceptions about vaccinations and may choose not to get the COVID-19 vaccine even if it becomes available. Using MTurk, we examined the proportion of participants' who would choose to get the COVID-19 vaccine. Out of 842 participants, 7.1% responded that they would not get the vaccine, 28.5% would consider getting the vaccine, and 64.4% would get the vaccine. We also assessed whether individuals' vaccination history, attitudes towards vaccinations, and knowledge about COVID-19 would predict their intention to vaccinate. Results indicate that higher confidence in vaccinations increases the likelihood that participants will get the COVID-19 vaccine. Higher confidence in and lower hesitancy towards vaccinations also increases the likelihood that people will consider getting the COVID-19 vaccine. Finally, individuals' vaccination history, as indicated by getting the flu shot this year, does not predict whether they intend to get the COVID-19 vaccine in the future.
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4:00-6:00 PM (2202)

Ramadan Mubarak! The Atmosphere of a Story Happens in the Reader's Mind. ANGELA BRUNSTEIN, JOERG BRUNSTEIN and MARTIN ROSENSTOCK, *Gulf University for Science and Technology* – Atmosphere of a story is difficult to conceptualize in terms of a situation model created by readers during discourse comprehension. This study investigated how readers from different cultural backgrounds evaluate a story's atmosphere depending on their exposure to described events. Readers with Western or Arabic cultural backgrounds read very short stories that either described a matching or mismatching cultural setting, like Christmas or Ramadan, or general settings, like birthday celebrations, and evaluated stories' atmosphere. Both groups of readers rated general, but not culturally specific stories similar in perceived atmosphere, even for same ease of understanding. It seems that the atmosphere of a story is truly in the eye of the beholder. Different from spatial or temporal aspects of the narrative, emotional engagement depends on the reader's experience with the described situation.
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4:00-6:00 PM (2203)

Role of Intention in Moral Judgements of Language: Evidence from Autism and Facial EMG. MAHSA BARZY, DAVID WILLIAMS, MARTA PONARI, and HEATHER FERGUSON, *University of Kent* – Using facial EMG, it has been shown that people evaluate the emotional valence of language online using their facial muscles (Hart et al., 2018). Considering that autism is associated with theory of mind (ToM) impairments, this pre-registered study aimed to investigate how autistic adults keep track of the emotional processes in stories, by manipulating characters' intentions in moral scenarios. Participants listened to short stories in which the main character hurt or did not hurt another person/animal, and we manipulated the character's intentions (neutral belief vs. negative belief), thus setting up moral scenarios. Participants (N=52) rated the consequence of the characters' actions in terms of severity, and EMG recorded muscle activity over the corrugator and frontalis muscles (used for frowning/surprise). Explicit ratings showed that participants integrated the character's intentions when judging the severity of the outcome; group did not modulate this effect. Analysis of EMG revealed greater corrugator activity while reading the immoral actions, and this effect was modulated by the negative prior belief of the character. Importantly, there were differences in the strength of belief influences between autistic and TD groups.
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4:00-6:00 PM (2204)

Facilitating Right Hemisphere Integration Processes: A Preliminary tDCS Study. ANDRIANA CHRISTOFALOS and GARY RANEY, *University of Illinois at Chicago* (Sponsored by Jennifer Wiley) – The right anterior temporal lobe is essential for integrating information across sentences in a text to form a coherent thematic meaning. We evaluated right hemisphere semantic integration processes by directly manipulating the activity in the anterior temporal lobe of the left hemisphere (LH) or right hemisphere (RH) using transcranial direct current stimulation (tDCS) while participants read passages and completed a lexical decision task. Lexical decision target words were either related to the local (word-level) or global (thematic) context of each passage. RH-anodal (i.e., active) stimulation was predicted to facilitate response times to both local and global targets compared to sham (i.e., inactive) stimulation. Whereas LH-anodal stimulation was predicted to only facilitate response times to local targets compared to sham stimulation. Preliminary data show that RH-anodal stimulation facilitated response times to both local and global targets. However, LH-anodal stimulation resulted in no differences in local or global response times compared to sham stimulation. These findings support the conclusion that the right hemisphere is important for integrating semantic information while reading.
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4:00-6:00 PM (2205)

Do Our Storytelling Abilities Differ Across the Lifespan? Exploring the Underlying Neural Mechanisms Related to Discourse Production. ABIGAIL COSGROVE, HAOYUN ZHANG, and MICHELE DIAZ, *The Pennsylvania State University* (Sponsored by Michele Diaz) – Although it is challenging to quantify what makes a "good" story, one method that has been proposed is story coherence. While the relationship between aging and storytelling has been studied extensively using behavioral methods, less is known about the neural underpinnings of spoken communication. Applying graph theory metrics to multiple brain networks during resting-state is one way to examine the connections between regions that are closely tied to storytelling coherence. We used a whole-brain network

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approach to investigate the effect of age on functional connectivity, specifically focusing on how network science can provide greater insight to the optimal organization of these brain networks. Behaviorally, story coherence ratings were stable across the lifespan. In neural networks increasing age was associated with lower clustering coefficient and degree values within regions of frontoparietal control and salience networks. Decreases in local graph theory metrics could reflect reduced within network connectivity consistent with previous literature.
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4:00-6:00 PM (2206)

Short and Extreme: Signaling Sarcasm Online. ALEX JOHNSON, ANDREW OLNEY, and ROGER KREUZ, *University of Memphis* – Sarcasm presents an obstacle for sentiment analysis and other domains of computational linguistics. As such, it has received increased attention, which has afforded traditional linguists insight into patterns of sarcasm use online—an impoverished pragmatic environment, relative to face-to-face communication. However, many state-of-the-art models employ black box techniques which, despite their efficacy, make it challenging to discern patterns. The current project employed simpler, theoretically-driven features from existing packages (e.g., Evaluative Lexicon 2.0), custom dictionaries (e.g., jocular terms, like "ace"), and regular expressions (e.g., emoticons) to identify sarcasm in a challenging subset of the Internet Argument Corpus. Accuracy (~68%) was comparable to contemporary approaches (~73%). While accuracy was lower, interpretability was retained. Sarcastic responses were shorter, contained more positive emotion words, and were often signaled by various typographic signals (e.g., emoticons). Feature categories can also be improved in future work, while promoting the exchange of ideas between computational and traditional linguistics.
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4:00-6:00 PM (2207)

These Words Kinda Matter: Certainty and Correction in Words of Negotiation. ALLISON NGUYEN and JEAN FOX TREE, *University of California, Santa Cruz* (Sponsored by Jean Fox Tree) – Words commonly used to hedge, like kinda and I don't know, fall on one end of a continuum of certainty, with words like absolutely and obviously on the other. We propose that these words of negotiation also vary on the amount they suggest correction. Raters assessed the extent to which a word indicated certainty by assessing the amount of negotiation versus telling the word implied. They assessed the extent of correction by assessing the amount of negotiation versus correction. While kinda and absolutely vary on certainty, they have similar corrective qualities. I don't know is as certain as kinda, but less corrective. Obviously is as certain as absolutely, but more corrective. The choice of words signals how open communicators are to negotiating with addressees.
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4:00-6:00 PM (2208)

Incremental Processes in Text Comprehension: Word-to-Text Integration and Structure Building Captured by Event Related Potentials. ANNE HELDER, *Leiden University,* REGINA CALLOWAY, *University of Maryland,* CHARLES PERFETTI, *University of Pittsburgh* – The study of word-to-text integration provides a window on incremental processes that link the meaning of words at sentence beginnings to the preceding text and/or require the reader to build a new structure. In an ERP experiment, we examine integration and structure building by controlling integration opportunities. We compared the N400 on sentence-initial nouns, where structure building is the default operation across three conditions: 1) first sentence of passage (integration impossible); 2) second sentence without first-sentence antecedent (integration unlikely); 3) second sentence with first-sentence antecedent (integration possible). The initial NP produced a more negative N400 in the first sentence of a passage than the second sentence (1 vs 2); the N400 was reduced when the second sentence had an antecedent (3 vs 2). Results suggest the initial NP of a passage requires more effortful structure building than subsequent sentences and that integration and structure building occur together at sentence beginnings.
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4:00-6:00 PM (2209)

Structural Priming and Memory for Surface Form. KATHERINE CHIA and MICHAEL KASCHAK, *Florida State University* (Sponsored by Michael Kaschak) – We present an experiment that examines structural priming in the context of question answering. Experimenters called businesses and asked either At what time do you close? or What time do you close? Participants were more likely to produce a prepositional response (At 6) when presented with the prepositional question, and were more likely to produce a non-prepositional response (6) when presented with the non-prepositional question. Participants were then informed that the call was part of an experiment and were asked whether they wanted to answer more questions. Upon consenting, we assessed their memory for the wording of the question we asked. Our data show that that there is no relationship between the participants' ability to correctly remember the wording of the question that was asked and the observed structural priming effect.
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4:00-6:00 PM (2210)

What You Read Vs. What You Know: The Influence of Readers' Background Knowledge on Processing and Acquiring False Information.. MARLOES VAN MOORT and ANNE HELDER, *Leiden University & Leiden Institute for Brain and Cognition,* CHARLES PERFETTI, *University of Pittsburgh* (Sponsored by Charles Perfetti) – We examined whether the biphasic framework of prior knowledge effects on learning new meanings for known words (Fang et al., 2017) applies to learning factual knowledge from texts. The experimental texts varied the correctness of text "facts" and whether the facts were familiar ("the Eiffel tower is made of iron/wood") or unfamiliar ("the Tashkent tower is made of wood/iron"). Participants read texts containing such "facts" and were tested over two days. Behavioral and ERP measures show strong memory for the text (the "fact" as presented) for both familiar and unfamiliar facts, but memory was better for familiar facts. Reaction times and ERPs were sensitive to the conflict between an incorrect "fact" and the familiarity of the corresponding true fact. Consistent with the biphasic framework, the conflict between a familiar fact and its incorrect expression in a text was reduced on the second day compared with the first day.
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4:00-6:00 PM (2211)

Structural Priming in a Single-Trial Paradigm. MICHAEL LONG and MICHAEL KASCHAK, *Florida State University* (Sponsored by Michael Kaschak) – Studies of structural priming demonstrate that encountering a sentence structure increases the likelihood of later producing that structure (e.g., Mahowald et al., 2016). However, more remains to be learned about the factors that lead to stronger or weaker priming. A classic experiment (Levelt & Kelter, 1982) found through a telephone question-answering paradigm that structural priming can be observed in a single-trial experimental paradigm. Chia et al. (2020) suggest that the priming observed in the single-trial paradigm is comparatively weak relative to other priming effects. To assess whether the weak priming was due to the single-trial paradigm or to the nature of the target construction used in those experiments, we conducted a set of single-trial experiments using constructions that are broadly used in studies of structural priming. The data suggest that robust structural priming effects can be observed in the single-trial paradigm, and that these effects are comparable in magnitude to the effects observed in multiple-trial experiments.
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4:00-6:00 PM (2212)

Phonetic Adaptation to Perceived Spoken Feedback. TIFANI BIRO, ANNIE OLMSTEAD, NAVIN VISWANATHAN, and GEHRIG SCHUSTER, The *Pennsylvania State University* (Sponsored by Navin Viswanathan) – Talkers adapt their speech in different ways during conversation. Talkers may take on the speech characteristics of an interlocutor (i.e., phonetic convergence) or may hyperarticulate characteristics of their speech to aid in listener comprehension (i.e., clear speech). These distinct adaptive processes can look acoustically similar. Our project evaluated how talkers adjust their speech according to a perceived interaction. Participants said English words with word-initial stops to a faux speech recognition program, which provided artificial feedback in the form of a spoken item. In experimental conditions, the feedback either matched the target word or differed from the target word on voicing of the initial stop. Feedback items were produced with or without extended voice onset time or vowel length. After feedback, participants repeated the correct word. Feedback characteristics set up conditions to elicit opposite acoustic patterns for convergence and clear speech. Produced word length, voice onset time, and vowel length were measured. Preliminary results suggest subjects produced durationally longer words, vowels, and voice onset times following errors indicating that speakers employ clear speech rather than convergence.
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4:00-6:00 PM (2213)

Text Versus Videochat: Effects on Confidence and Performance. VANESSA OVIEDO and JEAN FOX TREE, *University of California, Santa Cruz* – Nowadays, people can meet each other over text before they meet in person. How does the way people first interact affect communicative effectiveness? In our study, participants first met via either video chat or text chat, and then switched to the other modality. Dyads who met first via text performed worse on an anagram task than those who met first via video. However, those who met first via text were more confident in their performance. How people first get to know each other impacts how they feel about their conversations and how effectively they work together.
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4:00-6:00 PM (2214)

Noticing Syntactic Ambiguity on the Garden Path. ANGELIKI GLENI and JENNIFER WILEY, *University of Illinois at Chicago* – Garden-path theory predicts shorter RTs (reading times) for sentences conforming the principle of late closure than for those which violate it (Frazier & Rayner, 1982). Although reading time (RT) has been the primary method used to assess the cognitive processes underlying ambiguity processing, the current study combines it with self-reports of noticing ambiguity (Ferreira & Dell, 2000). Participants completed a self-paced reading task including sentences with early and late closure ambiguity and took a survey which assessed their level of awareness of the ambiguity. RTs of readers who spontaneously noticed the ambiguity were increased on ambiguous regions compared to those who failed to notice any ambiguity. These results suggest individual differences in who notices and resolves syntactic ambiguity. Further assessment of individual differences and manipulation of reader's awareness will shed light on the cognitive processes underlying complex constructions.
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4:00-6:00 PM (2215)

The Role of Reader Knowledge on Comprehension. ALLISON SONIA and SARAH CREER, *University of New Hampshire,* KATHRYN MCCARTHY, *Georgia State University,* LAURA ALLEN, *University of New Hampshire* – Readers' prior knowledge is a critical component of successful comprehension. It assists in the generation of inferences and connects information (Kintsch & Vipond, 1979). Prior knowledge encompasses various levels: basic vocabulary knowledge, general world knowledge, and domain-specific knowledge for a given text. While each has a demonstrated impact on comprehension (Ozuru, Dempsey, & McNamara, 2009; Rizzella & O'Brien, 2002; Stahl & Fairbanks, 1986), the goal of the current study is to disentangle the differential influence on comprehension. Participants (n=153) were instructed to think-aloud while reading a text about cell division. They then completed a reading comprehension test and three tests of prior knowledge: vocabulary knowledge, domain-general prior knowledge, and domain-specific prior knowledge (i.e., biology). Results indicate that while each measure of prior knowledge is positively correlated with comprehension, domain-specific prior knowledge is the strongest overall predictor of comprehension when modeled together.
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4:00-6:00 PM (2216)

Bridging Inference Generation in Pictures Stories: The Interaction of Narrative Constraints and Literacy Individual Differences. JOHN HUTSON, DANIEL FELLER, KATHRYN MCCARTHY, DAPHNE GREENBERG, and ELIZABETH TIGHE, *Georgia State University,* LESTER LOSCHKY, *Kansas State University,* MI'KAYLA NEWELL and JOSEPH MAGLIANO, *Georgia State University* – In written narrative texts, the likelihood of generating an inference is influenced by the sufficiency of narrative constraints to generate the inference (O'Brien et al., 1988). Are inference generation processes in narrative picture stories

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similar to those for text? Do individual differences in language proficiency predict the likelihood of generating inferences? In this study, participants read picture stories presented one picture at a time and thought aloud after each picture. In each story, the presence of bridging events was manipulated within participants. Missing bridging events required a bridging inference for readers to maintain narrative coherence. Consistent with Magliano et al. (2016), when participants did not see the bridging event, they were more likely to state the event in their think-aloud (46%) on the next image than when participants saw the event (23%). The extent to which readers reading comprehension, picture recognition, and oral comprehension influence inference generation are also explored.
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4:00-6:00 PM (2217)

Not All Minds Think Alike: Individual Differences in Thought Patterns during Reading. PÜREN ÖNCEL, SARAH CREER, KENNIS BARKER, CAITLIN MILLS, and LAURA ALLEN, *University of New Hampshire* – Considerable research has focused on identifying the cognitive processes underlying reading comprehension. However, considerably less work has focused on individuals' phenomenological experiences during reading. The current study examined participants' experiences of visual imagery during reading, as well as the role of individual differences in these processes. In two sessions (separated by 3-7 days), participants (n=85) engaged in a focused-attention meditation and a reading task. Throughout each, they were asked to provide reports on their thoughts (degree of visualizations, verbalizations, etc.). Results suggest that readers tended to engage in visualization more while reading compared to meditation. Additionally, there was a strong, negative correlation between reports of visual and verbal thoughts, suggesting that at any given time individuals' thoughts tended to be either predominantly visual or verbal. Finally, individual differences such as the ability to form vivid visual imagery and motivation to engage other people's perspectives shared differential relations with these reports.
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4:00-6:00 PM (2218)

Knowledge Revision with Multiple Documents and Sources. REESE BUTTERFUSS and PANAYIOTA KENDEOU, *University of Minnesota* – Readers frequently encounter information from multiple sources that reactivates inaccurate prior knowledge. Thus, it is critical to understand how knowledge revision unfolds in reading contexts that involve multiple sources. We examined the extent to which source credibility and intertextual integration influenced knowledge revision when readers engaged with multiple refutation texts from either high-credibility or low-credibility sources. Overall, readers demonstrated superior knowledge revision when they constructed highly integrated mental representations of information from high-credibility sources.
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4:00-6:00 PM (2219)

Informativeness of Multimodal Cues: The Amount of Information Gestures and Mouth Movements Add to Language Comprehension. ANNA KRASON, REBECCA FENTON, and GABRIELLA VIGLIOCCO, *University College London* (Sponsored by Gabriella Vigliocco) – Human face-to-face communication is multimodal: it comprises speech, as well as articulatory and limb gestures. Yet, studies investigating language comprehension have mainly focused on the auditory signal, ignoring the presence of other visual channels available during a conversation. Here we present the first study assessing whether and to what extent iconic gestures and mouth movements that differ in their informativeness, i.e., the amount of information provided by a particular cue, influence word comprehension. We manipulated listening conditions (clear vs. degraded speech) to mimic the ecology of language use, and congruency of the iconic gestures to establish whether processing of speech and gestures is automatic despite the interference effect. Overall, our results suggest that the auditory, semantic, and sensory systems dynamically interact with each other during language comprehension, and the degree to which they do so depends not only on the presence but also on the informativeness of the visual cues.
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4:00-6:00 PM (2220)

Probing the Framing Effects of Subject-Complement Syntax on Socially Charged Inferences. KEVIN HOLMES, *Reed College,* EVAN DOHERTY, *Colorado College,* STEPHEN FLUSBERG, *Purchase College, SUNY* – Although subject-complement statements like "girls are as good as boys at math" appear to express gender equality, people infer a gender difference: the group in the complement position (boys) is judged superior. Across four experiments, we investigated whether this syntactic framing effect generalizes to other socially charged inferences and whether people are aware of the bias transmitted by the syntax. Our results showed that (a) subject-complement statements of equality yield reliable framing effects on inferences about both math ability and terrorist behavior, and (b) the majority of people recognize these statements as influential in their judgments, yet framing effects are found only in those who fail to recognize this influence. Those who do cite the statements as influential often show a reverse framing effect and are more likely to explicitly judge the syntax as biased, suggesting that these statements perpetuate stereotypes only when people are not mindful of their implications.
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4:00-6:00 PM (2221)

Language Style Matching and the Need to Belong: An Examination of Linguistic and Social Markers of Depression and Perceived Stress. TALEEN NALABANDIAN and MOLLY IRELAND, *Texas Tech University* (Sponsored by Tyler Davis) – Language style matching (LSM)—a linguistic metric of conversational engagement that measures function word similarity between two individuals or texts—has been implicated in past depression research. For example, depressed individuals show less linguistic coordination with email correspondents during depressive episodes, theoretically reflecting social withdrawal. The present study tested whether decreased need to belong, a social construct associated with increased depression and disengagement, moderated the LSM-depression association in recalled conversations. We asked participants to write dialogue between themselves and a significant other during a recent interaction and calculated language style matching between both sides of the conversation. Results confirmed that people with greater depressive symptoms and more perceived stress had lower LSM in their recalled conversations; these patterns were strongest for individuals reporting lower need to belong, or greater social withdrawal. Results illuminate how

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social cognitive processes, such as language coordination and memory, relate to depression and negative affective states.
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4:00-6:00 PM (2222)

A Systematic Analysis of Semantic Transparency Measures in English Compound Words. LEAH AUCH, CHRISTINA GAGNE, and THOMAS SPALDING, *University of Alberta* – Semantic transparency in compound words refers to the extent to which the meaning of the compound can be determined from its constituents. There are multiple operational definitions for this construct, including both human ratings of transparency and values from distributed semantic models. Perhaps related to this, research has produced conflicting results concerning the effect of semantic transparency on processing. The current project aimed to systematically analyze the measures used to represent this complex concept and uncover whether the multiplicity of measures could explain, at least in part, the mixed results in the literature. We used exploratory factor analysis to investigate whether common measures of semantic transparency inform the same underlying construct and found four factors represented by eleven common semantic transparency variables. Additionally, we found the various aspects represented by the different measures appear to interact when predicting lexical decision and naming response times from the English Lexicon Project and British Lexicon Project. Different measures of semantic transparency reflect distinct aspects of this construct, and this should be considered when investigating semantic transparency.
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4:00-6:00 PM (2223)

Intangible Feature Extraction in the Semantic Processing of Abstract Concepts. DOUNIA LAKHZOUM, MARIE IZAUTE, and LUDOVIC FERRAND, *Université Clermont Auvergne* (Sponsored by Ludovic Ferrand) – Many hypotheses have been formulated to account for the representation of abstract concepts. The embodiment hypothesis relies on two criteria: necessity, meaning grounding mechanisms are necessary for conceptual representation, and sufficiency, meaning grounding mechanisms are enough without the need to rely on linguistic or symbolic content. We present two semantic priming experiments to test for these criteria. The first showed that participants were able to extract meaning from abstract images devoid of tangible features. This result suggests the debate on semantic processing needs to be broadened beyond the current discussion on linguistic vs. modality-specific features. In the second experiment, we presented abstract and concrete images providing situational information to illustrate target abstract concepts. Results showed that even when faced with the possibility for grounding in situational information, the extraction of meaning still occurred for abstract images. Additional Bayesian analyses were used to confirm the robustness of these results. We discuss the implications of this with respect to the necessity and sufficiency criteria and, more broadly, for the processing of abstract concepts.
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4:00-6:00 PM (2224)

Do Two Hearts Perceive the Same Meaning? Cross-Linguistic Semantic Parafoveal Processing in Basque-Spanish Bilinguals. MARTÍN ANTÚNEZ, *Universidad de La Laguna,* SIMONA MANCINI, *Basque Center on Cognition, Brain and Language (BCBL),* JUAN ANDRÉS HERNÁNDEZ-CABRERA, *Universidad de La Laguna & Basque Center on Cognition, Brain and Language (BCBL),* LIV HOVERSTEN, *Basque Center on Cognition, Brain and Language (BCBL),* HORACIO A. BARBER, *Universidad de La Laguna, Basque Center on Cognition, Brain and Language, & Institute for Biomedical Technologies (ITB),* MANUEL CARREIRAS, *Basque Center on Cognition, Brain and Language (BCBL), Ikerbasque – Basque Foundation for Science, & University of the Basque Country (UPV/EHU)* – During reading, we simultaneously process and integrate information that is presented both in foveal and parafoveal visual regions, but in which circumstances and how we can extract semantic parafoveal information is still under debate. To explore this, we used the co-registration of eye movements and EEG measures to obtain Fixated Related Potentials (FRP) during a Spanish reading task. With the boundary paradigm, we presented Basque non-cognate translations or unrelated Basque words in the parafoveal visual field. We found evidence of cross-linguistic preview benefit effects, reflected in modulations in the N400 component. This would suggest that the meaning of parafoveal words is activated and shared across languages in bilingual readers and that semantic parafoveal information is processed and integrated during reading.
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4:00-6:00 PM (2225)

Pronoun Resolution Does Not Depend on Antecedent Semantics. TIANA SIMOVIC and CRAIG CHAMBERS, *University of Toronto* (Sponsored by Craig Chambers) – Pronouns (e.g., "she", "they") are intriguing because their meaning is radically underspecified, requiring listeners to invoke contextual knowledge. One proposal, inspired by memory-reinstatement models, is this occurs by "reactivating" the semantics of a pronoun's linguistic antecedent. We evaluate this account using novel Visual World tasks where antecedents' semantics may become irrelevant due to performed actions ("Move the house on the left to area 3" entails that ANOTHER house is now the leftmost one). If memory for antecedent semantics is used when processing a subsequent pronoun ("Now put it…"), listeners should experience confusion given the updated visual scene. However, measures of the object selected, mouse-click reaction times, and eye-movements to candidate referents all show pronouns are effortlessly linked to the previously mentioned object, even when antecedent semantics have become inaccurate. This demonstrates that pronouns have indexical meaning, denoting a focused referent directly, and are not mediated by activating antecedent semantics in memory representations.
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4:00-6:00 PM (2226)

Learning Novel Word Meanings With or Without Images: EEG Time Frequency Analyses. YUSHUANG LIU, DAISY LEI, and JANET VAN HELL, *The Pennsylvania State University* (Sponsored by Janet van Hell) – Testing the Complementary Learning Systems Theory, we examined consolidation and semantic integration of novel words learned with definitions and pictures (definition-image condition) or with definitions only (definition-only condition), and tested immediately or 24-hours after learning, and one-week after learning, using EEG. Sixty-four participants

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learned novel words with meanings on Day 1, and another set on Day 2. Immediately after learning on Day 2, they completed an EEG semantic decision task, including words learned on both days. Definition-only condition showed that only after 24-hours offline consolidation, novel words elicited strong beta desynchronization similar to existing words, indicating retrieval of semantic memory traces. In comparison, words learned shortly before testing elicited weaker beta desynchronization, similar to untrained words. Tested one-week after learning, all novel words showed strong beta desynchronization, as existing words. Definition-image condition data have been collected and will be analyzed and compared with definition-only data once the lab reopens (Fall) after COVID-19 closure.
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4:00-6:00 PM (2227)

Can Young Children Adapt to Violations of Syntax? Evidence from 15-Month-Olds. AVERY MALONE and MARIEKE VAN HEUGTEN, *University at Buffalo, SUNY* (Sponsored by Marieke van Heugten) – In order to successfully understand spoken language, children must accommodate a high degree of variability at various levels of linguistic processing. Here we ask how infants begin to develop the capacity to do so at the syntactic level by employing their early-learned sensitivity to determiner-noun order. 15-month-olds were presented with correct (determiner-noun, e.g., the ball) and incorrect (noun-determiner, e.g., ball the) items in a preferential listening paradigm. Prior to this test phase, infants heard the speaker utter either grammatical sentences (e.g, Sally spread the blanket) or sentences with a consistent reversal of the determiner-noun order (e.g., Sally spread blanket the). Only infants presented with the reversed noun phrases during exposure listened longer to incorrect than correct items, suggesting that the ungrammatical input had become more acceptable. These findings tentatively demonstrate that as early as 15 months of age, children can flexibly adjust their word order processing.
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4:00-6:00 PM (2228)

Self-Pacing Tasks are Not Sensitive to Trial-to-Trial Structural Priming. DOUGLAS GETTY and SCOTT FRAUNDORF, *University of Pittsburgh & Learning Research and Development Center* (Sponsored by Scott Fraundorf) – Researchers have begun using structural priming in language comprehension (not just language production) to examine language processing and representation. We tested whether self-paced listening (SPL, Experiments 1A-1B) and reading (SPR, Experiment 2) tasks can capture this phenomenon. We tested temporary modifier-goal ambiguities of the form "The librarian set the book on the shelf on the cushion," for which comprehension priming has been demonstrated using eye-tracking (Traxler, 2008). In Experiment 1A, we found that SPL is sensitive to priming, but only under certain RT exclusion criteria. In a pre-registered replication (Experiment 1B), we used the same exclusion criteria but found no priming effect. In an SPR task (Experiment 2) using the same construction, we again found no priming effect. Bayes factors suggest moderate to strong support for the null hypothesis in each experiment; we suggest that self-pacing tasks may not be sensitive to trial-to-trial priming effects. Additionally, these findings demonstrate one risk of using post-hoc exclusion criteria, an issue which pre-registration is well-suited to address.
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4:00-6:00 PM (2229)

Effects of Reading Goals on Processing of Syntactic Ambiguity and Semantic Plausibility. FAWZIAH QAHTANI, KAYLEIGH WARRINGTON, KEVIN PATERSON, and SARAH WHITE, *University of Leicester* (Sponsored by Sarah J. White) – While many studies have examined mechanisms underlying skilled reading, relatively few have directly examined effects of reading goal (Masson, 1982) or task demands (Weiss et al., 2018). We investigated this issue in two eye-tracking experiments, examining how different goals (reading for comprehension versus scanning for a topic [Experiment 1], skimming for gist versus scanning for a topic [Experiment 2]), modulate effects of syntactic ambiguity (Experiment 1) and semantic plausibility (Experiment 2). Reading times were overall longer during both reading and skimming compared to scanning. Crucially, the results showed that effects of ambiguity/plausibility were similar during the initial processing of critical words across all reading goals. However, for measures sensitive to rereading, effects were larger for reading compared with scanning and for skimming compared with scanning, suggesting that text integration processes can be modulated by reading goals. We discuss the implications for theories of reading and models of eye movement control.
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4:00-6:00 PM (2230)

Comparative Illusion Processing – Evidence Against Depth of Processing and Syntax-Focused Processing. MARIA GOLDSHTEIN and KIEL CHRISTIANSON, *University of Illinois at Urbana-Champaign* (Sponsored by Kiel Christianson) – Comparative Illusions (CI) (e.g. More people have been to Russia than I have) are judged as grammatical despite being uninterpretable. Previous work relying on offline data proposes that the mechanisms involved in processing CI items in a meaningful way are syntactic in nature and that individual differences in processing and interpretation are negligible. This study asks: Does processing CIs rely on comparisons to similar structures? Are other factors involved? Do interpretations vary? 182 participants took part in an experiment with a 3x2x2 design on MTurk, combining three types of stimuli (CI, interpretable pair, filler), in/direct speech conditions (quotation marks vs. reported speech), and open-ended vs. yes/no responses and response times (for reading and for responding). Results suggest that multiple cues influence CI processing. Significant differences between identical CIs in the direct vs. indirect speech contradict claims that the interpretation of CIs is driven purely by syntax. Overall, CIs do not appear to be treated uniformly across individuals or within items. Qualitative data, detailing interpretations and reasoning behind them, support the quantitative results.
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4:00-6:00 PM (2231)

Do Familiar Sounds Aid Language Learning? Support for Exemplar-based Memory Models for Spoken Language Processing. ALLISON WILCK and JEANETTE ALTARRIBA, *University at Albany, SUNY* (Sponsored by Jeanette Altarriba) – Familiarity with the sound of a newly learned language (L2) can influence memory for spoken words in L2. Models outlining memory for words are often classified into

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one of two theoretical frameworks. Exemplar-based models propose that the context in which a word is learned (e.g., accent) is stored in conjunction with semantic meaning. Abstract generalization models indicate a separation between phonological details and meaning. In the present study, the influence of accent familiarity was explored using acquisition of translation pairs. Participants heard nouns spoken aloud in an unfamiliar language in their region's dominant accent (American-English) and other words in an unfamiliar accent. The unfamiliar accents were produced by either a native L2 speaker (Marathi) or not (Irish). In a recall test, participants correctly translated more words that were learned in an unfamiliar accent (Marathi and Irish) than in the dominant accent (American-English). Because accent presentation differentiated learning ability, findings support an exemplar-based memory model for spoken word processing. The roles of phonetic distinctiveness and encoding effort will be discussed, along with implications for effective teaching of a second language.
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4:00-6:00 PM (2232)

The Role of Phonetic Variability in Appropriate Generalization During Adult Word Learning. LISA COX and MATT GOLDRICK, *Northwestern University* (Sponsored by Matt Goldrick) – What phonetic information allows adult learners to distinguish correct vs. highly similar forms? In a pre-registered (https://osf.io/7vxpd) partial replication of White, Yee, Blumstein, & Morgan (2013), we find a lack of phonetic variability leads adults to treat mispronunciations as correct. Learners were trained on English-like labels for objects, hearing the same recording at each exposure. At test, learners saw one trained object and one novel object and heard either the trained label, a mispronunciation of the trained label, or a novel, phonetically-dissimilar label. Replicating White et al., learners selected the trained object when given the trained label, and the novel object when given the novel label. In contrast, when given a mispronunciation, learners did not just exhibit a weak bias, but overwhelmingly selected the trained object – suggesting a failure to distinguish correct vs. highly similar forms. Additional phonetic variability during training may provide necessary cues to promote appropriate generalizations.
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4:00-6:00 PM (2233)

Recognition and Representation of Cantonese Sound Change Variants in the Lexicon. RACHEL SOO and MOLLY BABEL, *University of British Columbia* – Changes in Cantonese pronunciation of /n/ and /l/ have created homophones for many speakers (To et al., 2015; Zee, 1999; e.g., historically /laam4/blue and /naam4/ boy, now /laam4/ blue or boy). While there are descriptions of these changes in production (Wong, 1941; Yeung, 1980), there is less work on how the phonetic variation affects word recognition (Cheng, 2017; Law et al. 2001). Dialect pronunciation variants are represented in the lexicon (Sumner & Samuel, 2009), but the representational consequences are unclear for sound changes in progress. We investigate how the historical /n/ and innovative /l/ are processed by Cantonese listeners in a priming task. Twenty /l/-initial target words (e.g. /laam4/ blue or boy) are preceded by one of four prime types counterbalanced with word/nonword fillers across lists: identity (ID; /laam4/ blue or boy), historical (/naam4/ boy), rhyme (/taam4/ phlegm), unrelated (/tyn5/ broken). If both /l/ and /n/ forms are represented in the sound structure of these lexical items, no significant difference in reaction time to the ID and historical conditions are predicted. These data broaden our understanding of phonological representation in the lexicon in a lesser studied language.
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4:00-6:00 PM (2234)

Cognitive Control and the Resolution of Lexical Competition in Cochlear Implant Users. SARAH COLBY, FRANCIS SMITH, KRISTIN ROOFF, and BOB MCMURRAY, *University of Iowa* – A challenge for cochlear implant users is the reduced quality of input received through their hearing device. Consequently, they must learn to cope with increased ambiguity in speech. This degraded input changes how competition is resolved during word recognition (e.g., Farris-Trimble et al., 2014). While competition is usually thought to be language specific, we asked whether domain-general cognitive control may help suppress competing lexical candidates to cope with signal degradation. We asked if the timecourse of lexical access in cochlear implant patients (N=40) measured with the Visual World Paradigm relates to non-linguistic cognitive control (spatial Stroop task). Those who performed well on Stroop (low interference) showed larger delays in committing to the target word than those performing poorly. This suggests that listeners with better domain-general cognitive control may strategically delay commitment under conditions of signal degradation. We also discuss the relationship with listening effort, as measured with a pupillometry task.
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4:00-6:00 PM (2235)

Behavioural and Electrophysiological Markers of Integration in Novel Word Learning. MARIA KOROCHKINA, *Macquarie University, University of Potsdam, & International Doctorate IDEALAB,* LYNDSEY NICKELS, *Macquarie University,* AUDREY BÜRKI, *University of Potsdam* (Sponsored by Sachiko Kinoshita) – According to the Complementary Learning Systems model, successful learning requires integration of new episodic representations into semantic memory. Applied to word learning, only integrated newly learned words can compete with familiar words during lexical selection, which is often tracked with priming tasks. The present study is the first to examine electrophysiology of behavioural effects commonly interpreted as markers of integration in a paradigm that taps into automatic semantic processing. Young healthy adults learn novel names for two sets of novel concepts, one set on each of two consecutive days. Learning is followed by a continuous primed lexical decision task with EEG measures, where newly trained words are targets, and familiar (semantically related or unrelated) words are primes. We predict that response speed, N400 and LPC amplitude in response to the newly trained words will be modulated by prime-target relationship and time after exposure (24h vs. 0h), indexing differences in integration.
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4:00-6:00 PM (2236)

The Influence of Spelling-Sound Consistency on Incidental Vocabulary Learning. MEGAN DEIBEL and JOCELYN FOLK, *Kent State University* – Most vocabulary is learned incidentally during reading, but possible influences on this process are not well understood. Research has found

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that skilled readers automatically activate phonology when reading silently and that phonology can influence word learning while reading. One way to manipulate phonology is through spelling-sound consistency. Word pronunciations that are inconsistent with their spelling ("PINT" is not pronounced to rhyme with the consistent "MINT") can influence learning word spelling (Kim et al., 2016). We investigated if spelling-sound consistency also influences learning a word's meaning. Participants studied 21 picture-written word associations while either hearing the pronunciation or not; spellings for the picture-word associations were either consistent with the pronunciation or not. Learning of the spellings was tested with a recognition post-test. Participants were also asked to identify which word was associated with the picture during the learning phase to assess learning the meaning of the novel words. Implications for learning spellings and meanings of novel words with inconsistent spellings will be discussed.
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4:00-6:00 PM (2237)

We Learn Words During Reading—But Do We Remember Them? SHAUNA DE LONG and JOCELYN FOLK, *Kent State University* (Sponsored by Jocelyn Folk) – Research on incidental vocabulary learning during reading has found links between the development of orthographic (spelling) and semantic (meaning) knowledge (e.g., Brusnighan, 2015). The current study investigated the effect of orthographic knowledge on semantic incidental learning and the retention of incidental word knowledge across a time delay. Participants studied the spellings of 10 novel words. Participants were then asked to read 20 sentences presented individually. Each sentence contained a different novel word embedded in informative semantic context; 10 of these words had been studied earlier and 10 had not. Learning was assessed using immediate and delayed (2 days) orthographic and semantic recognition posttests. Analyses show higher orthographic learning rates for studied than unstudied words across time; studied words also had numerically higher semantic accuracy rates for the immediate posttest but not the delayed posttest. Both posttests showed very little decay between sessions. These findings indicate that prior exposure to words' spellings may not provide a strong benefit to learning words' meanings. These findings also indicate that partial word knowledge is durable.
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4:00-6:00 PM (2238)

Sensitivity to Sign Ionicity During Short-Term Language Learning. NATALIA REYNOSO and JENNIE PYERS, *Wellesley College,* KAREN EMMOREY, *San Diego State University* – Most words and signs have arbitrary relationships between form and meaning, but some have more direct, iconic relationships where elements of the form are related to the meaning. The lexicons of sign languages include many iconic signs: about 30% of the American Sign Language (ASL) lexicon is highly iconic. Adult learners of ASL report learning iconic signs better than arbitrary ones. Our goal was to empirically demonstrate that novice learners detect sign iconicity and leverage it for short-term retention. We presented 63 nonsigners with 32 high-iconic and 32 low-iconic ASL signs; we paired half with their real meaning and half with their antonym. If participants are sensitive to iconicity, then they should remember high-iconic signs better than low-iconic signs, and remember iconic signs paired with their actual meaning better than those paired with their antonym. Moreover, we should observe no effect of meaning pairing on the retention of low-iconic signs. A mixed-effects regression analysis supported all of our hypotheses. The pattern of our findings parallels results found with ideophone learning in spoken language and indicates that learners have difficulty extracting meaning from the form of low-iconic signs.
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4:00-6:00 PM (2239)

Semantic Working Memory Supports a Phrasal Scope of Planning in Language Production: Evidence from Acute Stroke. RACHEL ZAHN, *Rice University,* HEATHER DIAL, *University of Texas at Austin,* TATIANA SCHNUR, *Baylor College of Medicine,* RANDI MARTIN, *Rice University* (Sponsored by Randi Martin) – Demands on working memory (WM) during language production depend on planning scope. Martin and Freedman (2001) provided evidence that planning at the lexical-semantic level encompasses a phrase and relies on semantic WM. They showed that, in picture description, individuals with semantic WM deficits struggled to produce adjective-noun phrases (e.g., "short blonde hair") but did better on sentences conveying the same information, with fewer content words per phrase (e.g., "the hair is short and blonde"). Here we extended these findings to a large sample of individuals (N=34) at the acute stage of stroke. Results showed that, after controlling for single word processing abilities, semantic WM predicted production accuracy for phrases with two adjectives but not for phrases with one adjective or sentences with one or two adjectives. Phonological WM capacity was unrelated to accuracy for any condition. Thus, semantic WM supports phrasal planning, whereas phonological planning may have a smaller scope.
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4:00-6:00 PM (2240)

Sentence Frequency Norms for Psycholinguistic Studies. STEPHANE DUFAU, MARJORIE ARMANDO, and JONATHAN GRAINGER, *CNRS & Aix-Marseille University* – Capitalizing on the Google's Ngram corpus, we examined the possibility to establish frequency norms for sentences in a format suitable for psycholinguistics. Ngram corpus is based on over 8 million digitized books and reflects how often sequences of (N-)words are used in a particular language (8 languages available to date). Even though publicly available, raw data is presented in a form that is difficult to use as is. Frequency is split by year and corpus split into multiple files. In addition, sequences tagged with part-of-speech are mixed with non-tagged ones. Here, we propose a simplified and curated version of the Ngram frequency norms that will help in stimulus selection for psycholinguistic studies. Such curated norms are used in a pilot study to assess whether or not sentence frequency plays a role in sentence recognition.
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4:00-6:00 PM (2241)

Does Familiarity or Repair Drive Syntactic Adaptation? JACK DEMPSEY and KIEL CHRISTIANSON, *University of Illinois at Urbana-Champaign* (Sponsored by Kiel Christianson) – Syntactic adaptation occurs when readers are repeatedly exposed to an infrequent ambiguity resolution like in: The horse (that was) raced past the barn

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fell. These sentences typically elicit ambiguity effects which, in the case of adaptation, decrease over subsequent trials. It is unknown whether syntactic adaptation is driven by familiarity with the repeated structure or error-based learning from syntactic repair. Self-paced reading was used to compare adaptation effects from exposure to different types of stimuli. In Block 1, the control group were only exposed to fillers, the structural group to sentences like above, and the repair group to those same sentences but instead containing an unambiguous, irregular reduced relative verb (e.g. ridden). In Block 2, all participants read sentences like above. If syntactic repair drives adaptation, the repair group would show a smaller ambiguity effect than the structural group in Block 2. If structural familiarity drives adaptation, both groups would show similar ambiguity effects in Block 2. The control group allows for more nuanced, combinatorial possibilities to be addressed.
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4:00-6:00 PM (2242)

Cognitive-Control Engagement Helps Listeners Use Reliable Cues to Sentence Interpretation. ZOE OVANS, YI TING HUANG, and JARED NOVICK, *University of Maryland* (Sponsored by Jared Novick) – Incremental language processing means that listeners confront temporary ambiguity, which can generate misinterpretations. Cognitive-control may assist revision by biasing processing toward relevant over irrelevant cues. But real-time manipulations of cognitive-control show that its relative engagement (e.g., via Stroop-incongruent trials) improves revision for adults but hinders revision for children. Why this discrepancy? Prior work used verb-initial sentences, so verbs generated incorrect predictions. Since verbs ordinarily predict sentence structure consistently, children may rely on them. Cognitive-control engagement then increases their reliance on verbs at the expense of subsequent evidence, while adults successfully focus on revision cues. In five eye-gaze-during-listening experiments, adults and children completed (in)congruent Stroop-like trials before active/passive sentences where, instead of misleading, verbs cued revision from active to passive structure. Cognitive-control engagement helped 5-year-olds use verb morphology to reach passive interpretations, like adults. Thus, cognitive-control may act similarly across development: it regulates commitments to reliable over unreliable cues to interpretation.
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4:00-6:00 PM (2243)

Language of Outgroup Prejudice: Revealing Perceptions Towards 60 U.S Immigrant Groups from Language Patterns. YING LI, *Planck Institute for Human Development,* THOMAS HILLS, *The University of Warwick* – Migration is a central activity of human cultural history and brings diverse groups into contact with one another. Whether these interactions result in harmonious mutual understanding or toxic outgroup prejudice depends in part on psychological tendencies to perceive outgroup members differently from ingroup members. In the present study, we analyzed patterns of language associated with 60 ethnic and religious groups in a corpus of 1.8 million newspaper articles published over a 20-year period. Based on construal level theory, we first operationalize perceived social distance towards outgroups as language concreteness and sentiment as language valence. We validate our operationalization using empirical survey data on perceived social distance towards 30 U.S minority groups. Next, our findings show that concrete language, as an indicator of close social contact, is strongly associated with positive sentiment. To examine how language differs across social groups in the context of immigration, we used Latent Dirichlet Allocation to identify 15 topics (e.g., crime, politics, food, arts, and education) reflecting cultural representations of immigrant identity that may drive positive and negative sentiment.
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4:00-6:00 PM (2244)

Acquiring Meaning in a Second Language: Are Input Variables Key? BARBARA MALT, XINGJIAN YANG, and JESSICA JOSEPH, *Lehigh University* – Word meanings are not always parallel across languages, and second language (L2) learners use often words in non-native ways. Is the problem inherent in maintaining conflicting word-to-meaning mappings or due to insufficient attention to and input for acquiring L2 mappings? We gave English speakers repeated exposures to five L2 word meanings cross-cutting English meanings. Forty videos illustrated "carrying" and "holding" events named in L2 according to the manner of contact with the object. Participants were told either to learn labels or figure out meanings that may differ from English. The Meanings group completed the study faster and made generalization choices faster than the Learn Labels group. They were also more likely to produce definitions that referred to contact with the body and slightly more likely to capture the specific intended meaning. Both groups performed well above chance in generalizing words (although, surprisingly, the Learn Labels group did better). High levels of choice performance for both groups point to input conditions as a critical limiting factor in more typical L2 word learning contexts. Speed and definition performance suggest some advantage to explicit attention in sorting out L1-L2 differences.
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4:00-6:00 PM (2245)

A Computational Model of Binary Semantic Classification. EVGENIIA DIACHEK, SARAH BROWN-SCHMIDT, and SEAN POLYN, *Vanderbilt University* (Sponsored by Sean Polyn) – Semantic memory encompasses one's knowledge about the world. Distributional semantic models (DSMs), which construct vector spaces with embedded words, are a proposed framework for understanding the representational structure of human semantic knowledge. Unlike classic semantic models, DSMs lack labeled links specifying the properties of concepts, which raises questions regarding their utility for a general theory of semantic knowledge. Here, we develop a computational model of a binary semantic classification task, in which participants judged target words for the referent's size or animacy. We created a family of models, evaluating multiple DSMs and mechanisms for performing the classification. The most successful model constructed two composite representations for each extreme of the decision axis (e.g., by averaging together representations of big things, and small things). Next, the target item was compared to each composite representation, allowing the model to classify more than 1500 words with human-range performance and to predict response times.
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4:00-6:00 PM (2246)

Are Individual Differences in Motor Imagery Related to Sensorimotor Effects in Language Processing? EMIKO MURAKI and PENNY PEXMAN, *University of Calgary* (Sponsored by Penny Pexman) – In

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embodied theories of semantic representation, the mechanisms of modal simulations have been under-specified. We investigated if motor imagery may be a mechanism of simulation, using an individual differences approach. We assessed motor imagery with implicit and explicit measures (n = 161) and identified two latent factors that represent motor imagery ability. We then examined whether those factors account for significant variations in sensorimotor effects during a syntactic classification task. There were no significant relationships between imagery factor scores and sensorimotor effects, however, there was a body-object interaction (BOI) effect, with words higher in BOI (i.e. associated with more sensorimotor information) processed more quickly than words low in BOI. A follow-up analysis using scores from each motor imagery measure revealed a significant interaction between BOI and hand movement imagery, with those higher in this imagery ability showing a larger BOI effect. The results suggest that specific types of motor imagery are related to sensorimotor effects in semantic processing. Our findings support the possibility that motor imagery is an underlying mechanism of sensorimotor simulation during language processing.

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4:00-6:00 PM (2247)

Turkish Semantic Verbal Fluency Performance in Native Speakers: A Systematic Review. RABIA YASA KOSTAS, SARAH MACPHERSON, and MARIA WOLTERS, *University of Edinburgh* – The semantic verbal fluency test is widely used to examine executive function and semantic abilities. Sematic verbal fluency performance is influenced by many factors, ranging from using a second language to cognitive impairment. Since the test is relatively short, it is a popular candidate for brief semi-automated screening tools. However, for clinical use, separate norms should be established for each language. We conducted a systematic review of studies that report verbal fluency performance for native Turkish speakers. Web of Science, Medline, Psycinfo, Embase, and Turkish scholarly databases were searched, in addition to the grey literature. Studies were not limited to specific disorders or demographics. We analysed study designs, scoring methods, and results reported. We only found one study that contained normative data, and the remaining relevant studies were too diverse to establish metanorms. We discuss the implications for deploying verbal fluency tasks in semi-automated cognitive screening tests for Turkish.

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4:00-6:00 PM (2248)

The Limits of Cross-Domain Mappings: Why Is Philosophy Purple? ELLA LIU and GARY LUPYAN, *University of Wisconsin – Madison* – When asked to map a concept from one domain to another, people often behave in strikingly similar ways. For example, asked "if philosophy were a color, what color would it be?" a plurality (41%) respond with "purple". We measured convergence for mapping between disparate domains (e.g., musical instrument to jobs, fruits to sports). Some instances of high convergence are caused by salient mediators (e.g., people map "Boston" to "red" because of the Red Sox). Other cases, however, appear to stem from the source and target domains aligning along common salient dimensions of meaning, e.g., people's mapping of cats to librarians (25% convergence) is predicted by both words closely aligning on dimensions of dryness, softness, and strength (as assessed using semantic differentials). Our results highlight the surprising ease with which people align disparate semantic domains and suggest that the sometimes uncanny convergence between people can be understood by semantic similarities revealed when source and target domains are projected onto more basic dimensions of meaning.

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4:00-6:00 PM (2249) WITHDRAWN BY AUTHOR

Comparing Distributional Models and Human Performance on Map Reconstruction from Text. JOHNATHAN AVERY, ROBERT GOLDSTONE, and MICHAEL JONES, *Indiana University* (Sponsored by Michael Jones) – In previous work, Distributional Semantic Models (DSMs) have demonstrated a capacity of reconstructing maps from news corpora (Louwerse & Zwaan, 2009). Moreover, human-constructed maps based on linguistic descriptions are better captured by DSMs than by the original map (Louwerse & Benesh, 2012), suggesting a strong correspondence between the linguistic statistical structures humans learn and the computational processes posited in DSMs. Recently, researchers have examined DSM performance with regard to the first order co-occurrence of cities in randomly generated maps, concluding that most DSMs rely on first order statistics to recreate maps and that only an exemplar account could recreate the map independent of first order co-occurrence statistics (Avery, Goldstone, Jones, 2020). We extend this work by comparing human performance at reconstructing randomly generated maps from linguistic descriptions to maps produced by DSMs. While the task proves to be significantly more challenging for humans than computational models, the divergence of human behavior from model predictions implicate qualitative limitations of DSMs.

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4:00-6:00 PM (2250)

Semantic Interference without Explicit Context Processing – Evidence on (Impaired) Language Production from a Combined Eye Tracking and Multi-Word Interference Paradigm. CORNELIA VAN SCHERPENBERG, *MPI Human Cognitive and Brain Sciences, Humboldt-Universität zu Berlin, & University Clinic Leipzig,* RASHA ABDEL RAHMAN, *Humboldt-Universität zu Berlin,* FRANK REGENBRECHT, *University Clinic Leipzig,* HELLMUTH OBRIG, *MPI Human Cognitive and Brain Sciences, Humboldt-Universität zu Berlin, & University Clinic Leipzig* (Sponsored by Thomas Hills) – Categorically related semantic context with single distractor words can inhibit picture naming as shown repeatedly in the Picture-Word-Interference paradigm (e.g., Costa, Alario, & Caramazza, 2005). Evidence on the interplay of semantic context and language production in people with stroke-induced aphasia (pwa) is still sparse, however. We applied a novel variant of the PWI paradigm with multiple distractor words (van Scherpenberg, Abdel Rahman, & Obrig, 2020), which consisted of members and non-members of semantic categories, and consecutive naming of related vs. unrelated pictures. Using eye tracking we investigated how participants process the context words and whether explicit recognition of the category is necessary to induce semantic interference (SI). Twenty-eight pwa completed the study. We found a contrast to neurotypical participants (van Scherpenberg et al., 2020), whereby pwa did not fixate significantly longer on category-members vs non-members. Nevertheless, a strong SI effect at ~35ms was

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found. This indicates that SI can be induced by multiple distractor words without explicitly recognizing the semantic relationship between them.
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4:00-6:00 PM (2251)

Examining the Agreement of Alternative Estimates of Category Exemplar Typicality. TAYLOR CURLEY, *Georgia Institute of Technology,* NICHOL CASTRO, *University of Washington,* CHRISTOPHER HERTZOG, *Georgia Institute of Technology* – Semantic categories (e.g., ANIMAL) are composed of exemplars (e.g., dog). The typicality of a given exemplar indicates how prototypical or representative that item is of its superordinate category (e.g., dog is a more typical animal than whale) which can influence item processing and subsequent memory. Typicality estimates in published category norms (e.g, Battig & Montague, 1969; Castro, Curley, & Hertzog, in press) are the mean frequency of a word being generated when cued by the category name. They may underestimate typicality at the low end of the scale. Thus, we assessed alternative methods of obtaining exemplar typicality with a cross-sectional sample of 447 adults (age 18-96) who completed two typicality estimation tasks: 1) rank ordering category exemplars from most to least typical, and 2) rating provided exemplar typicality using a 1-10 (least to most) Likert scale. Typicality patterns were relatively consistent between free-response and ranking methods with two exceptions: abstract categories (e.g., "things that are green") and low-typicality exemplars. We interpret these new scalings of typicality with respect to existing category norms and argue they are better suited for item-selection in memory and language studies.
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4:00-6:00 PM (2252)

Searching Semantic Memory for Conceptual Associates. ABHILASHA KUMAR and DAVID BALOTA, *Washington University in St. Louis* (Sponsored by David Balota) – Across two experiments, participants were presented with a word pair (e.g., candle-wick) and asked to generate a conceptual associate that was related to both words (e.g., flame). In Experiment 1, we manipulated the type of semantic relationship between the word pairs, whereas in Experiment 2, we manipulated the distance between the word pairs. Across both experiments, distances in network models derived from associative norms and distributional semantic models (DSMs) derived from natural language corpora significantly predicted response times (RTs) to generate associates, and the specific associate produced by participants. Overall, associative network models were better at predicting RTs and associates than DSMs, particularly for word pairs that were closer and/or shared a coordinate relationship. These findings indicate that network models may be particularly suited towards capturing hierarchical/coordinate relationships due to overlap in the retrieval processes between free association norms and this search task, whereas DSMs trained on purely linguistic corpora may instead prioritize other types of semantic relationships in their representations and may lack mechanisms for inferring hierarchical conceptual associations.
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4:00-6:00 PM (2253)

Listeners Miss Semantic Errors More in Nonnative than in Native Speech. LEIGH GRANT, JANET GEIPEL, and BOAZ KEYSAR, *University of Chicago* (Sponsored by Boaz Keysar) – When asked how many animals of each kind Moses took on the Ark, most people answer "two" although it was Noah not Moses. In three experiments, we examine how the nativeness of accent influences the detection of such semantic distortions, both when the distortion is semantically close (e.g., Moses) or distant (e.g., Adam) to the correct word (e.g., Noah). We measured error detection as the proportion of times participants indicated that the very question was "wrong" rather than provided an answer. In all three studies we found that native listeners were more likely to miss semantic distortions when the question was spoken with nonnative than a native accent. Surprisingly, we found that while overall error detection improved with semantic distance, this was independent of accent. These findings provide an important insight into how the nativeness of accent influences error detection in speech as well as language processing more broadly.
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4:00-6:00 PM (2254)

The Effects of Semantic Space on Interpretive Diversity for Literary and Non-Literary Metaphors. NICK REID and ALBERT KATZ, *Western University,* HAMAD AL-AZARY, *University of Alberta* (Sponsored by Albert Katz) – A metaphor involves framing one concept (the "topic") in terms of another (the "vehicle"). Relative to examining the topic and vehicle concepts separately, the juxtaposition of the two in a metaphor sometimes highlights more features of the topic (increased interpretive diversity) or narrows the focus to a few relevant features (decreased interpretive diversity). We examined whether the semantic space of the topic and vehicle concepts could be used to predict changes in diversity. For non-literary metaphors, topics from high-density space were associated with decreased diversity, suggesting the vehicle constrained meaning. For literary metaphors, the change in diversity was best predicted by an interactive model including both topic and vehicle density. After controlling for semantic space effects, literary metaphors also evoked more diversity than non-literary metaphors overall. These data suggest that both the type of metaphor, and the semantic space of its concepts, can be used to predict changes in diversity.
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4:00-6:00 PM (2255)

Age-Related Changes in Sensitivity to Semantic Satiation. SHEILA BLACK, *The University of Alabama,* MEGEAN WOOD, *Valdosta University,* JAIMIE CHOI, BARBARA-SHAE JACKSON, and TEAIRRA EVANS, *The University of Alabama* – Age-related changes in sensitivity to semantic satiation were examined within the context of a word judgment task. A prime or to-be-satiated word (e.g., ANIMAL) was presented repeatedly for an average of 2.5, 12.5, or 22.5 times. Afterward, a word triad comprised of two related words (e.g., PURPLE, YELLOW) and one unrelated word (e.g., DOG) was presented. The two related words were designated as nontargets or context words in the display and the unrelated word was the target. Participants were instructed to indicate as quickly and as accurately as possible which of the words in the triad was the unrelated word by pressing a key which was spatially compatible to the position of the stimulus on the CRT. For young but not older adults, there was an attenuation of priming effects in the response latency data as repetition of the prime increased. These results were interpreted as evidence that

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older adults are less sensitive to the semantic satiation phenomenon than young adults.
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4:00-6:00 PM (2256)

The Role of Context in the Processing of Semantic Ambiguities: Eye-Tracking Evidence from Younger and Older Adults. TAMI KALSI, *University of Nottingham,* KEVIN PATERSON, *University of Leicester,* RUTH FILIK, *University of Nottingham* (Sponsored by Kevin Paterson) – Doubly quantified sentences, such as "Every kid climbed a tree" are ambiguous regarding whether there is one tree or multiple trees. Previously, grammatical factors (e.g., linear order of quantifiers) have showed little influence on on-line processing of subsequent singular or plural reference (e.g., "The tree was/The trees were…"). The influence of contextual information, especially in older adulthood, has received little attention. An eye-tracking experiment with 48 younger (18-30) and 48 older adults (65+) was conducted where the context biased the reader towards singular (e.g. "Every student in the class is listed on a register.") or plural entities (e.g. "Every school pupil in the country has their attendance marked on a register."). A singular ("This register…") or plural continuation ("These registers…") followed. Results showed that unlike grammatical factors, contextual factors do affect on-line processing. Furthermore, results suggest age differences in the use of contextual information during on-line sentence processing.
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4:00-6:00 PM (2257)

When Linguistic Uncertainty Cues Spread: Confusing Facts in the News with Speculations. ANN-KATHRIN BRAND, ANNIKA SCHOLL, and HAUKE MEYERHOFF, *Leibniz-Institut für Wissensmedien* – Modern media enable an incredibly fast reporting on any type of information, even such pieces that are (still) speculative and eventually might turn out to be wrong. We report a set of experiments investigating how an intermingled presentation of speculative (indexed with linguistic cues such as "might") and confirmed news affects memory for the certainty of the presented explanations. Our participants read headlines with exclusively speculative formulations, exclusively factual formulations, or a mixture of both. We observed that the uncertainty cues present in speculations did not diminish but actually spilled over to the remembrance of unrelated headlines, letting the latter retrospectively appear more questionable than initially communicated. This tendency to remember factual news as merely speculative persists even when both types of news were presented sequentially (i.e., confirmed news first). Given the wide-spread dissemination of speculative news, this bias poses a challenge in effectively getting confirmed news across to recipients.
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4:00-6:00 PM (2258)

Generation of Signs and Verbal Words Within Semantic and Phonological Categories: Data from Deaf Children who Responded with Sign and Oral Languages. LUCIE VAN BOGAERT and NOEMI ARNAUD, *Université Libre de Bruxelles – The Center for Research in Cognition & Neurosciences (CRCN),* CATHY VAN VLIERBERGHE and BÉNÉDICTE POCHET, *Centre Comprendre et Parler,* JACQUELINE LEYBAERT, *Université Libre de Bruxelles - The Center for Research in Cognition & Neurosciences (CRCN)* (Sponsored by Fabienne Chetail) – Semantic and phonological knowledge, two keys areas of language, are usually assessed by verbal fluency tasks. We administered 10 one-minute fluency tasks to 34 deaf children (aged 8 to 13) who responded with signs or verbal words. The tasks focused on semantic fluency, phonological fluency tasks in sign language (SL, configuration and location) and phonological fluency tasks in oral language (OL, initial phoneme and rhyme). Scores were better in the semantic than in the phonological tasks and the two tasks were correlated. Scores were also better for initial phoneme than for rhyme, and for configuration than for location. Fluency scores in semantic and phonological tasks were correlated. Chronological age and good decoding skills of French Cued-Speech positively influenced the phonological tasks in OL. We also investigated the influence of the mother tongue on task performance: in signing children, French Belgian Sign Language and in oralists children, French. No significant differences were observed between the two groups. The data suggests a language network common to oral and sign languages. Metaphonological skills in sign and in oral languages should be included in clinical assessment of deaf children.
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4:00-6:00 PM (2259)

Relationship Between Self-Reported Deceptive Behavior and Autobiographical Memory Retrieval. SCOTT MEEK, *University of South Carolina Upstate,* MICHELLE PHILLIPS-MEEK, *Limestone University,* MIRSADA POWELL, *University of South Carolina Upstate* – This experiment focused on finding the relationship between people's self-reported deceptive behaviors and specific aspects of their autobiographic memory. Previous studies have found a distinction between the four dimensions of autobiographic memory, as well as two major categories of deception. Autobiographical memory was assessed using the Survey of Autobiographical Memory (Palombo, Williams, Abdi, & Levine, 2013), while deception was assessed using a self-report deception scale (Phillips, Meek, & Vendemia, 2011). Episodic and semantic recall showed significant negative correlations with regulation of disclosure and self-gain/impression-manipulation. However, further analysis of the data revealed that all SAM categories specifically associated with memory of past events (episodic, semantic, and spatial) were significantly negatively correlated with self-reported deceptions for avoidance and concealment of information (disclosure). One potential interpretation of this finding is that deception is not associated with specific aspects of autobiographical recall, but instead that patterns of overall weaker autobiographical memory lead to more instances of self-reported avoidance and concealment deceptions.
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4:00-6:00 PM (2260)

Emotional Content in Overgeneral Autobiographical Memory across Cultures. JESSIE CHIEN, ADDAM ANTUNEZ, and ANGELA GUTCHESS, *Brandeis University* (Sponsored by Angela Gutchess) – Studies show a relationship between Overgeneral Autobiographical Memory (OGM) and depression such that depressed individuals often have difficulty recalling episodic (internal) details. However, the contribution of the emotional content of the memories to memory specificity is underexplored, especially in healthy populations. In the

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present study, we examined the positive and negative emotional content of the retrieved memories. We also extended the investigation across cultures, as much of the work on OGM has focused on Westerners; both memory specificity and expression of emotion can differ across cultures. Thus, this study explores whether emotion predicts memory specificity across cultures and whether emotion mediates the association between culture and memory specificity. Results show that although Americans produced more emotional details in their memories than did East Asians, this did not mediate the association between culture and memory specificity, nor were there other significant cross-cultural differences in the relationship between emotion and memory specificity.
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4:00-6:00 PM (2261)

Vicarious Traumatization in Health-Care Workers throughout the COVID-19 Pandemic. SEZIN ÖNER, *Kadir Has University,* EZGI BILGIN and ZEYNEP ADIGÜZEL, *Koç University* – COVID-19 pandemic created fear and worry at a global level but health workers are one of the most affected groups as they were in close contact with COVID-19 patients and actively involved in managing their experiences. In the present study, we examined the factors that predict vicarious traumatization in health-care workers in Turkey. Health-care workers (e.g., medical doctors, nurses) working actively in pandemic hospitals indicated the events that impacted them the most since the onset of the pandemic in Turkey. They also completed measures of rumination, vicarious traumatization and coping. Time 1 data indicated that severity of the cases exposed, workload and low stress-coping skills predicted the intensity and vividness of the memories. Time 2 data collection is in progress, however, in line with the Time 1 data, we expect high workload and coping skills moderated the increases in the intensity of negative memories and the degree of vicarious traumatization. Findings will be discussed in line with the factors contributing the change or consistency in the memory processes over time.
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4:00-6:00 PM (2262)

Effects of COVID-19 on Retrieval and Phenomenology of Voluntary and Involuntary Memories. DERYA KARADEMIR and ALI TEKCAN, *Bogazici University* – It has been argued that major public events affect the organization and retrieval of autobiographical memories. In the current study, we investigated whether and how the lockdown/isolation practices in response to COVID-19 pandemic affected voluntary and involuntary autobiographical memories. For involuntary memories, we used the diary method where participants recorded any involuntary memories they remembered in one day. The same participants were also asked to remember autobiographical memories in response to cue words. Participants provided ratings of phenomenology for both sets of memories. Results showed that involuntary memories caused more mood change and were rehearsed more than voluntary memories. There was also an interaction between concern for COVID-19 and memory type for mood change; participants with high concern for COVID-19 reported stronger mood change for involuntary memories compared to involuntary memories.
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4:00-6:00 PM (2263)

Alternative Assessments of Memory: Ecphoric Confidence Versus Anchored Confidence. DANIELLA CASH, *Sam Houston State University,* MEGAN PAPESH, *New Mexico State University* (Sponsored by Megan Papesh) – Although old/new decisions have been the standard assessment method in decades of memory research, some evidence suggests that forcing such binary distinctions is detrimental to memory accuracy (Sauer et al., 2008; 2012). Specifically, forcing participants to adopt and adapt decision criteria impairs diagnosticity, relative to conditions that emphasize confidence (or "ecphory") without mentioning the old/new distinctions. Across several experiments, we examined the diagnostic utility of standard and ecphoric memory judgments for typical and distinct faces and objects. For face stimuli, discriminability was better for distinctive rather than typical items. Moreover, discriminability was higher for participants who provided ecphoric, rather than binary, judgments. These patterns were not observed for item stimuli, as there were no differences as a function of test type or item distinctiveness. These data provide insight into how people approach old/new decisions, and may have implications for applied settings, such as eyewitness memory.
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4:00-6:00 PM (2264)

Recognizing Pictures of the US Presidents. ADAM PUTNAM, MADISON DRAKE, and SERENE WANG, *Furman University,* ANDY DESOTO, *Association for Psychological Science* – How well do Americans know the US presidents? Past collective memory studies show that Americans can recall about half and recognize about 88% of the presidents. However, in all prior studies people have remembered the presidents by name; how well do people remember the faces of the US presidents? In Experiment 1, an online sample completed a recognition test where the stimuli were the official portraits of the US presidents and portraits of non-presidents, such as vice presidents. The recognition rate for faces was lower than in past research (around 60%) but some nonpresidents, such as Hamilton, were still falsely identified as presidents at high rates. In Experiment 2, a college sample completed a recognition test directly comparing the recognition rates for faces and names. As predicted, the students recognized the names of the presidents more than their faces. Some presidents were easily identifiable by their name but not their face (John Quincy Adams) while others were easily identifiable by their face but not their name (Coolidge). Together, these studies show that Americans have reasonably good memory for the faces of past presidents, but that memory for the faces is not perfectly correlated with memory for their names.
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4:00-6:00 PM (2265)

Factors Affecting Retrieval Order of Autobiographical Memories. ARIF KAVDIR and ALI TEKCAN, *Bogazici University* (Sponsored by Ali Izzet Tekcan) – While an abundance of studies addressed contextual and the chronological characteristics of autobiographical memory retrieval, potential order effects received relatively less attention. We carried out three studies to address relative impact of chronology and importance on retrieval of specific autobiographical memories associated with a major life event. College students were asked to write down nine memories that a cue event reminded them ("entrance to university" in Study I, "university

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admission exam" in Study II, and "entrance to high school" in study III). For each study, the retrieval order was recorded, and participants were asked to report the importance and chronological order of each of nine memories. Results across studies consistently showed a forward bias such that participants started remembering earlier memories related to the cue event and proceeded to the later ones. On the other hand, importance of memories was not in any way associated with retrieval order.
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4:00-6:00 PM (2266)

Intergenerational Transmission of Autobiographical Memories and Immigrant Identity: Balkan Immigrants in Turkey. SALIHA ERMAN and ALI TEKCAN, *Bogazici University* (Sponsored by Ali Tekcan) – This study investigated first-hand and vicarious immigration experiences of Balkan immigrant family members. Thirty-three pairs of a Balkan-born parent (first-generation immigrant) and an adult child born in Turkey (second-generation immigrant) participated. Both groups reported two personal self-defining immigration memories and the second-generation participants additionally reported two vicarious immigration memories from their parents' lives. Results indicated that both generations strongly identified with Balkan immigrant identity and narrated their memories with strong phenomenological experience (e.g., vividness, accessibility). Interestingly, second-generation participants reported more generic, integrative, and positive memories compared to the first generation. Content analysis supported this finding: the prominent themes were challenges of immigration for the first generation and embracing of national/immigrant identity for the second generation. Lastly, the second generation reported personal memories with comparable or stronger phenomenology compared to parent memories. Findings are discussed considering self-memory relationship and identity formation.
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4:00-6:00 PM (2267)

Confidence in When a Remembered Event Occurred Is Related to Knowing Where It Occurred. SAMANTHA DEFFLER, *York College of Pennsylvania,* SHARDA UMANATH, *Claremont McKenna College* – Spatial characteristics of event memories allow for re-living past experiences (mental time travel; Suddendorf & Corballis, 1997) and play a privileged role in participants' experiences of vividness and re-living during remembering (Rubin, Deffler, & Umanath, 2019). Does spatial context also scaffold our understanding of when a given event took place? Prior work has investigated the dating of personal memories (Ben Malek, Berna, & D'Argembeau, 2017; Friedman & Janssen, 2010), but has not directly examined the contribution of spatial context. In Study 1, participants recalled and rated four autobiographical memories using the Autobiographical Memory Questionnaire, dated the memory, and rated their confidence in their proposed date. Regression analyses revealed that spatial context predicts variance in confidence in date above and beyond other predictors. This finding was confirmed a priori in Study 2, which replicated this work and had participants explain how they decided when the event occurred. We coded these explanations for references to spatial information and other content previously found to affect the dating of memories (e.g., temporal landmarks, conventional time patterns; Ben Malek et al., 2017).
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4:00-6:00 PM (2268)

Combining Natural Language and Machine Learning to Predict Aspects of Episodic Event Descriptions. NATHAN ANDERSON, IAN DOBBINS, ETHAN ELLIS, and KATHLEEN MCDERMOTT, *Washington University in St. Louis* (Sponsored by Ian Dobbins) – When analyzing descriptions of an autobiographical memory or episodic future thought, existing approaches can be both time-intensive and ultimately reliant on subjective human opinion. Machine learning techniques provide an alternative that allow for the quantification of natural language to predict aspects of described experiences. Across two experiments, participants (E1: N=56, E2: N=36) performed a modified Galton-Crovitz cueing task in which they described a specific event either from the past (autobiographical memory) or the future (episodic future thought) from a one-week or one-year time period. A regularized logistic regression model was trained on the features (i.e. words) used during each response and then evaluated on its ability to predict temporal orientation (Past vs. Future) or temporal distance (1 Week vs. 1 Year) for each response. After eliminating verb tense as a predictive feature, the model was successful at discriminating both categories of responses within each dataset and was able to generalize between the datasets. This demonstrates that natural language descriptions of episodic events show reliable differences in their content as a function of temporal orientation and distance from the present.
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4:00-6:00 PM (2269)

Semi-Automated Transcription and Scoring of Autobiographical Memory Narratives. VICTORIA WARDELL and CHRISTIAN ESPOSITO, *The University of British Columbia,* CHRISTOPHER MADAN, *University of Nottingham,* DANIELA PALOMBO, *The University of British Columbia* (Sponsored by Christopher Madan) – Narrative methods have become a staple approach in autobiographical memory (AM) research. Despite their importance, narrative methods currently require significant resources in time and labour. We created a semi-automated process that streamlines autobiographical transcribing and scoring. Although the procedure presented is tailored for use with the Autobiographical Interview, a widely used semi-structured AM interview protocol, it can be adapted for other protocols. Here we lay out an autobiographical narrative pipeline with four phases: (1) data collection, (2) transcribing, (3) scoring, and (4) analysis. First, we provide recommendations for incorporating transcription software to augment human transcribing. We then introduce an electronic scoring procedure that marks transcripts with tags indicating scored text, per the traditional scoring method, with keyboard shortcuts in MS Word. Finally, we provide Python code that automatically counts tags identified in the scored transcripts. This method accelerates the time it takes to conduct a narrative study and reduces potential error in narrative quantification. Available openly: https://github.com/cMadan/scoreAI; our pipeline makes narrative methods more accessible.
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4:00-6:00 PM (2270)

Are Involuntary Memories Nostalgia or Neuroses? Investigating the Roles of Emotion and Aging. RYAN YEUNG and MYRA FERNANDES, *University of Waterloo* (Sponsored by Myra Fernandes) – Recent work has

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shown that recurrent involuntary autobiographical memories (IAMs), or memories that spring to mind unintentionally and repetitively, are commonly experienced and mostly rated as emotionally negative (Yeung & Fernandes, 2020). Given that older adults typically show enhanced emotion regulation (Carstensen, 1995), we investigated whether their IAMs would be less negative than in young adults, and whether they reflect mental health status across age groups. Undergraduate students (n = 95, M_{age} = 19.6) and community-dwelling older adults (n = 95, M_{age} = 75.6) completed an online battery of scales assessing recurrent IAMs and mental health status. Young adults' recurrent IAMs were disproportionately negative, whereas older adults' were disproportionately positive, suggesting that enhanced emotion regulation in aging influences valence of recurrent IAMs. In both age groups, frequently re-experiencing an IAM, especially a negative one, predicted worse mental health (e.g., symptoms of depression, anxiety, posttraumatic stress). Automated content analysis showed that latent topic clusters varied across IAMs of different valence. The emotionality of an IAM is a key factor modulating the link between IAMs and mental health.

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4:00-6:00 PM (2271)

The Role of Context Memory in Eyewitness Identification in Younger and Older Adults. WILLIAM ERICKSON, MIGUEL CORONA, and MAXINE PATTON, *Texas A&M University – San Antonio* – Older adults tend to choose from lineups more often but less accurately than younger adults regardless of perpetrator presence. One explanation stems from older adults' poorer contextual memory compared to younger adults, whereas memory for individual details remains relatively equitable. Current study investigates the potential for older adults to misidentify bystanders seen temporally proximal or distal to perpetrators. This study employed a 2 (Age Group) x 2 (Scenario: Crime vs. Neutral) x 2 (Lineup: Perp vs. Bystander) x 2 (Proximity: 6 vs. 40sec) between-subjects design. Ps viewed interactive first-person slideshows containing "perpetrator" and "bystander" in separate slides. Participants selected from perpetrator-present or bystander-present lineups. Younger adults showed greater discriminability compared to older adults, who tended to reject lineups. Older adults were more likely to make a lineup choice when the bystander is temporally proximal to the perpetrator regardless of scenario or lineup. Confidence among older adults is unrelated to lineup accuracy. A second experiment interrupted by the COVID-19 lockdown compares traditional lineup performance against a novel ID technique that may work around older adult choosing bias.

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4:00-6:00 PM (2272)

Eyewitness Recall and Identification: Effects of Stress in an Extreme Haunt and a Haunted House. WILLIAM RIDGWAY, ELAINE AQUINO, BRIANNA MANN, JACKSON PELZNER, COLLEEN PARKS, and DAVID COPELAND, *University of Nevada, Las Vegas* (Sponsored by David Copeland) – The impact of stress on eyewitness recall and identification accuracy has been studied extensively but with somewhat inconsistent results. Understanding the effects of stress are important if they are to be generalized to victims or witnesses of real crimes. This study consisted of two experiments that used an extreme haunt and a haunted house to examine attendees' ability to recall details of and identify actors encountered, as a function of state anxiety and in the context of Deffenbacher's (1994) catastrophe model of memory performance under anxiety. The results showed that physiological (i.e., heart rate) and psychological (i.e., State Anxiety Inventory) measures of arousal were associated for extreme haunt attendees but not haunted house attendees. In contrast to previous research conducted by Valentine and Mesout (2009), the current research suggests that reported levels of stress can sometimes have minimal or no effect on eyewitness recall or identification accuracy.

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4:00-6:00 PM (2273)

Examining the Role of Absolute and Relative Judgments in Identifications from Repeated Lineups. DANIEL BIALER and CHARLES BRAINERD, *Cornell University* (Sponsored by Charles Brainerd) – Wixted and Wells (2017) proposed that to improve the confidence-accuracy relationship in eyewitness identification, the confidence rating should be collected at the initial identification. Research has demonstrated that previous exposure to an innocent suspect increases false identifications of that suspect in subsequent lineups and affects eyewitness confidence. Fuzzy-trace theory predicts that eyewitnesses may use absolute judgments more in initial identifications, leading to a stronger confidence-accuracy relationship, and use relative judgments more in repeated identifications. The aim of the current study was to test this by comparing initial and repeated identifications using simultaneous and sequential lineups. We predicted that because sequential lineups are thought to promote absolute judgments, the difference in the confidence-accuracy relationship between initial and repeated lineups would be greater for simultaneous than for sequential lineups. An additional aim was to examine whether individual differences in suggestibility and working memory capacity would affect eyewitness confidence and accuracy.

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4:00-6:00 PM (2274)

Theories of Mind and the Pilot Study of the Social Effect on Memory Conformity. IN-KYEONG KIM and ENOCH KWON, *La Sierra University,* STEPHEN CECI, *Cornell University* – Kim, Kwon, and Ceci (2017) studied memory conformity and showed higher conformity among adults than children. Participants in groups of four children or four adults (one minority and three majority) had public (and later private) recollections about an image projected differently unbeknownst to the participants (iKIM procedure). The present study examined how this developmental reversal effect was related with theories of mind and other social factors. The iKIM procedure was used for children (minority) with unfamiliar adults only or parents and other adults within a group. Wellman and Liu (2004)'s ToM scale was used for testing ToM. Children (4½ to 6½ years old), parents, and five young adults (confederates) participated. The results showed children's conformity did not differ between the group with children's parents (with strangers) and the strangers only group. Children with higher ToM scores (in comparison to those with lower scores) displayed more conformity than adults in the previous study.

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4:00-6:00 PM (2275)

Making the Case! Novel Proactive Experimental Inquiry of Wrongful Convictions. OLIVIA ALFANO, *Iowa State University,* MICHAEL TOGLIA, *Cornell University,* GARRETT BERMAN, *Roger Williams University,* KRISTINA TODOROVIC, *University of Toledo* – Best practices for collection and preservation of eyewitness evidence have traditionally been informed by laboratory and field studies. This reactive approach was developed in the 1990s, responding to the Innocence Project's first 40 DNA exoneration cases. Presently, we explored a proactive approach leveraging archival datasets to inform further archival and experimental investigations. Our earliest work content analyzed Innocence Project cases for factors contributing to erroneous convictions, launching an extensive archival analysis of injustices traced to lineup misidentification. This initial examination produced several to be noted postdictions and studies including further archival exploration (i.e., archival analysis of juvenile conviction cases based only on eyewitness misidentification) and experimental inquiry (i.e., effects of eyewitness expert testimony and cross examination type of the lead detective on juror decisions). We argue that this systematic approach to advance innovative Innocence Research may robustly inform experimental methodologies and ultimately strengthen our hand in implementing best practice recommendations.
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4:00-6:00 PM (2276)

The Protective Effects of Warning on Eyewitness Suggestibility and Retrieval-Enhanced Suggestibility Diminish with a Delay. RACHEL O'DONNELL, JASON CHAN, and KRISTA MANLEY, *Iowa State University* (Sponsored by Jason Chan) – Although retrieval practice can produce robust memory benefits, it can also increase eyewitness' susceptibility to misinformation, a finding known as Retrieval-Enhanced Suggestibility (RES). Prior research has demonstrated that witnesses can be inoculated against RES with the administration of a warning following misinformation exposure (Thomas, Bulevich, & Chan, 2010). In the current experiments, we examined whether this warning benefit changes with delay. In real life situations, it is unlikely that witnesses would be warned about misinformation immediately after its presentation (i.e., immediate warning), but it is feasible to warn witnesses just before an interview (i.e., a delayed warning). In two experiments, we showed that presenting a warning immediately after misinformation exposure can eliminate the RES effect, even if the final test occurred 48 hours after the warning. In Experiment 3, the warning was delivered 48 hours after misinformation exposure, and this delayed warning failed to reduce the RES effect.
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4:00-6:00 PM (2277)

Impact of Face Memory, Response Latency, and Confidence on Eyewitness Accuracy. KELLY REYES and W. MATTHEW COLLINS, *Nova Southeastern University* (Presented by W. Matthew Collins) – Dunning and Perretta's (2002) 10-second rule suggests that identifications made faster than 10 seconds have a 90% probability of being accurate. Although, these findings have not been fully supported by the literature, other research has found that a combination of confidence and the 10-second time boundary can predict accuracy (Wells, Weber & Brewer, 2004). In this experiment, we investigated whether face identification abilities, response latency, and confidence level would predict eyewitness accuracy. Participants watched a video of a crime and 30 minutes later completed a lineup identification task with either a simultaneous or sequential lineup. We also measured face memory using the Cambridge Face Memory Test (CFMT). Preliminary results indicate that correct decisions are made faster than incorrect ones for a sequential lineup. Limitations and recommendations for future research are discussed.
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4:00-6:00 PM (2278)

Enhancing Eyewitness Memory with Category Clustering Recall and the Cognitive Interview. AHMAD SHAHVAROUGHI, HADI EHSAN, JAVAD HATAMI, and ARASH MONAJEM, *Tehran University,* RUI PAULO, *Bath Spa University* (Presented by Rui Paulo) – The Cognitive Interview (CI) has been an effective method for interviewing eyewitnesses often leading to changes in legislation/ practice in many countries. This study was the first to employ the CI in Iran and test whether Category Clustering Recall (CCR) was superior to a free recall when incorporated within a CI. A between-subjects design assigned 66 participants to one of three interview conditions after they watched a mock robbery. The participants were interviewed 48 hours later using either a Structured Interview (SI), the CI, or a Modified Cognitive Interview (MCI) that replaced free recall with CCR. The CI group recalled more information than the SI group, replicating the CI superiority effect. CCR (MCI condition) enhanced recall in comparison with a free recall (SI and CI groups). These findings support that CCR and the CI can enhance eyewitness memory and should be considered by law enforcement in Iran and Worldwide.
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4:00-6:00 PM (2279)

The Number of Fillers May Not Matter as Long as They All Match the Description: The Effect of Simultaneous Lineup Size on Eyewitness Identification. ALEX WOOTEN, *Hollins University,* ROBERT LOCKAMYEIR, CURT CARLSON, MARIA CARLSON, and ALYSSA JONES, *Texas A&M University – Commerce,* JENNIFER GIBSON, *Tarleton State University,* JACOB HEMBY, *Texas A&M University – Commerce* – According to the Diagnostic Feature-Detection (DFD) hypothesis, the presence of fillers that match the eyewitness's description of the perpetrator will boost discriminability beyond a showup, and very few fillers may suffice to produce the advantage. We tested this hypothesis by comparing showups with simultaneous lineups of size 3, 6, 9, and 12. Participants (N=10,433) were randomly assigned to one of these conditions, as well as target-present (TP) versus target-absent (TA) lineup. As predicted by the DFD hypothesis, lineups were superior to showups, and there was no advantage with increased lineup size beyond a 3-member lineup. The confidence-accuracy (CA) relationship held a similar pattern. The only effect of increased lineup size was a lower likelihood of choosing a suspect (guilty or innocent). We conclude that police should focus more on the quality rather than quantity of fillers.
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4:00-6:00 PM (2280)

"All I Remember Is the Black Eye." A Distinctive Facial Feature Harms Eyewitness Identification. ALYSSA JONES, CURT CARLSON,

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ROBERT LOCKAMYEIR, JACOB HEMBY, MARIA CARLSON, and ALEX WOOTEN, *Texas A&M University – Commerce* (Sponsored by Curt Carlson) – Many crimes occur in which a perpetrator has a distinctive facial feature, such as a tattoo or black eye, but few eyewitness identification studies have involved such a feature. We conducted an experiment to determine how eyewitness identification performance is impacted by a distinctive facial feature, and how police could deal with this issue. Participants (N=4218) studied a target face with or without a black eye, and later viewed a simultaneous photo lineup either containing the target or not. For those who saw a target with a black eye, this feature was either replicated among all lineup members or was removed. We based our predictions on the Hybrid-similarity model (Nosofsky & Zaki, 2003) of face recognition, which predicts that replicating the feature will produce better identification performance compared to removal of the feature. The black eye harmed empirical discriminability regardless of replication or removal, which did not differ. However, participants responded more conservatively when the black eye was removed, compared to replication. Lastly, immediate confidence was consistently indicative of accuracy.
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4:00-6:00 PM (2281)

The Effect of Rate-Them-All Lineup on Diagnostic Accuracy. ANNE YILMAZ, BRENT WILSON, JOHN WIXTED, *University of California, San Diego* (Sponsored by John Wixted) – A typical police lineup involves the simultaneous or sequential presentation of six photographs, and a witness either identifies one of the photographs as the person in memory or rejects the lineup completely. Recent research suggests that a rate-them-all lineup might be better than these standard lineup procedures. In this rate-them-all approach, witnesses watch a mock crime video and then individually evaluate each lineup photograph by providing a confidence rating that the person is the criminal from the video. Performance in the rate-them-all lineup condition was compared to the standard simultaneous lineup using ROC analysis. The results showed that the rate-them-all lineup is diagnostically inferior to the standard simultaneous lineup. Theoretically, this result may indicate that the rate-them-all procedure induces participants to evaluate faces based on the absolute familiarity signals they generate. The simultaneous lineup, by contrast, encourages participants to evaluate faces relative to the other faces in the lineup, enhancing discriminability.
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4:00-6:00 PM (2282)

Enhancing Evidence of Innocence from Police Lineups. ANNE YILMAZ, BRENT WILSON, and JOHN WIXTED, *University of California, San Diego* (Sponsored by John Wixted) – Recent work has established that high-confidence identifications from a police lineup can provide compelling evidence of guilt. By contrast, when a witness rejects the lineup, it offers only limited evidence of innocence. Moreover, confidence in a lineup rejection provides little additional information beyond the rejection itself. Thus, although lineups are useful for incriminating the guilty, they are not particularly useful for exonerating the innocent. Here, we test predictions from a signal-detection-based model of eyewitness memory to improve upon that state of affairs. The model predicts that lineups would accurately exonerate many more innocent suspects if, when a lineup is rejected—but before asking for confidence—the suspect is revealed to the witness along with this question: "How sure are you that this person is not the perpetrator?" The results of two mock-crime experiments (conducted on MTurk) suggest that this procedure increases both the accuracy and the frequency of high-confidence exonerations.
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4:00-6:00 PM (2283)

Coherently Creating Full Receiver Operating Characteristic Curves of Police Lineups. BRENT WILSON, *University of California, San Diego*, MELISSA COLLOFF, *University of Birmingham* – The receiver operating characteristic (ROC) plots achievable hit rates associated with a range of false-alarm rates. In recent years, ROC analysis has been applied to eyewitness identification. After initial opposition, some eyewitness memory researchers who now embrace ROC analysis maintain that it is informative only if the full range of false-alarm rates (all the way up to 1.0) is included in the analysis, as if no rate of mistaken eyewitness identification could be too high. A medical analogy illustrates the problem with this idea. Some medical tests that yield a positive diagnosis lead to potentially harmful follow-up examinations. For such tests, the aim is to maximize true positives while minimizing false positives. We describe why newly proposed approaches are fundamentally at odds with the longstanding consensus in forensic psychology that false-alarm rates should be kept low because the potential harm to innocent suspects is so great. Moreover, these new approaches are untethered to signal detection theory and are thus unable to coherently create full ROC curves. As such, they repeat the same mistake that has long compromised eyewitness identification research, which is to divorce applied science from basic science.
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4:00-6:00 PM (2284)

Comparing Max Confidence to Rank Order Lineups. MARIO BALDASSARI and DAWN WEATHERFORD, *Texas A&M University – San Antonio* – Countless eyewitness researchers have tested new lineup administration methods. Recent investigations have revealed two theoretically guided lineup variants that improve discriminability and confidence-accuracy calibration: Max Confidence and Rank Order (Brewer, Weber, & Guerin, 2019; Carlson et al., 2019). For Max Confidence, participants only offer a confidence rating each face's match to the culprit, a unique maximum is considered a selection. For Rank Order, participants rank all lineup members before making a final selection/rejection. Although both variants seem promising, they have not been directly compared. In our preregistered study, 250 participants completed either four Max Confidence or four Rank Order lineups, with perpetrator presence or absence randomized within subjects. Data collection is ongoing, but preliminary statistics show variation in performance across participants and across materials. If the two lineup methods cause differential responding, we will encourage their additional consideration within the eyewitness identification community to support empirically driven policy recommendations. Next steps for the eyewitness identification field will also be discussed.
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4:00-6:00 PM (2285)

Using Formal Models to Understand How Eyewitnesses Make a Decision from a Lineup. MELISSA COLLOFF, *University of Birmingham,* BRENT WILSON, *University of California, San Diego,* TRAVIS SEALE-CARLISLE, *Duke University,* JOHN WIXTED, *University of California, San Diego* – Research has identified two viable signal-detection-based models of how eyewitnesses contend with the multiple memory signals generated by the faces in a lineup—the Independent Observations model and the Ensemble model. It has not yet been possible to unanimously support one model, because both fit well to empirical data, and make similar predictions about experimental manipulations. The two models, however, make qualitatively different predictions about how manipulating suspect-filler similarity influences the distribution of memory-match signals. We fit the models to empirical (N=10,559) and simulated (N=4,000) data in which we manipulated suspect-filler similarity. The fitted parameters were consistent with the predictions of the Ensemble model, not the Independent Observations model. This suggests that witnesses use the difference between the memory-match signal generated by a given face and the average of the memory-match signals generated by all of the faces in the lineup to decide whether to identify that face.

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4:00-6:00 PM (2286)

The Influence of Suspect and Filler Positioning on Identification Decisions in Simultaneous Lineups. PRESTON MOTE, *University of California, Riverside,* MOLLY MORELAND, *Hood College,* STEVEN CLARK, *University of California, Riverside* (Sponsored by Steven Clark) – Two experiments examined position effects in simultaneous eyewitness lineups. Experiment 1 compared discriminability between lineups in which the suspect was surrounded by highly similar fillers and lineups in which the suspect was surrounded by dissimilar fillers. Although the similarity of surrounding fillers did not influence discriminability between guilty and innocent suspects, highly similar fillers did lead to higher identifications of both suspect types. Additionally, suspect position moderated this relationship. Experiment 2 examined suspect position and the left-to-right ordering of the suspect and a highly competitive filler. The results showed the highest discriminability when the suspect was located at the beginning of the lineup and the lowest discriminability when located at the end of the lineup. Overall, the findings suggest that the position of members in a simultaneous lineup can affect eyewitnesses' identifications and discriminability.

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4:00-6:00 PM (2287)

The Effect of Multiple Perpetrators and their Similarity on Eyewitness Identification. ROBERT LOCKAMYEIR, CURT CARLSON, and ALYSSA JONES, *Texas A&M University – Commerce,* ALEX WOOTEN, *Hollins University,* MARIA CARLSON and JACOB HEMBY, *Texas A&M University – Commerce* (Sponsored by Curt Carlson) – Most eyewitness identification research simulates single-perpetrator crimes, but real-world crimes often transpire at the hands of multiple perpetrators. It is not clear how multiple perpetrators might impact the ability of eyewitnesses to discriminate between the guilty and the innocent. To address this issue, we conducted an experiment in which a nationwide sample of participants (N=3973) read a vignette about a crime being committed, and then viewed 1-2 target faces. If there were two targets, they were either similar or dissimilar, and presented either simultaneously or sequentially. Participants later viewed a target-present or -absent lineup for each target. As predicted, two simultaneously presented targets yielded worse discriminability than a single target, and discriminability was better for dissimilar compared to similar target pairs. Surprisingly, discriminability was better for the second sequentially presented target compared to a single target. Lastly, confidence-accuracy characteristic analysis revealed that high confidence reliably indicated high accuracy across all conditions.

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4:00-6:00 PM (2288)

Increasing Simulated Viewing Distance Decreases the Confidence-Accuracy Relationship in Face Recognition. SARA DAVIS and DANIEL PETERSON, *Skidmore College* – There is an increasing need in eyewitness identification research to identify factors that not only influence identification accuracy, but also may impact the confidence-accuracy (CA) relationship. One such variable that has a notable negative impact on memory for faces is viewing distance, with faces encoded from a longer distance often remembered more poorly than faces encoded at shorter differences (Loftus & Harley, 2004). In three experiments, using both laboratory and Mechanical Turk samples, we compared faces viewed at a simulated viewing distance at two different levels (medium and far) to faces that were viewed at no simulated distance. Distance was simulated using a Gaussian blur function (see Lampinen et al., 2015). We found that both medium and far simulated distances impaired memory performance overall relative to faces encoded at no simulated distance, but only far distances impaired the CA relationship. In a fourth experiment, we found that a pre-test warning ameliorated this impairment of the CA relationship for faces viewed at a far simulated distance, but not completely. These findings suggest that even high-confidence identifications made for faces viewed from long distances should be disregarded.

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4:00-6:00 PM (2289)

Instructions Designed to Increase Conservative Responding Can Affect Discriminability. TRAVIS SEALE-CARLISLE, *Duke University,* BRENT WILSON, *University of California, San Diego,* CAROLYN SEMMLER, *University of Adelaide,* LAURA MICKES, *University of Bristol* – Various instructions for identification procedures have been recommended to reduce the likelihood that eyewitnesses will make an identification (i.e., induce conservative responding). The basic signal-detection model assumes criterion placement is a noise-free process. Under this assumption, conservative instructions should induce conservative responding without affecting discriminability (the ability to distinguish innocent from guilty suspects). Yet, in previous research, while two types of instructions did make participants respond more conservatively, one type of instruction decreased discriminability and another increased discriminability. In three replication attempts, we found instructions induced conservative responding, but decreased, rather than increased, discriminability. Participants likely complied with instructions to different degrees and that additional source of criterion/instructional variance decreased discriminability. In line with this view, a signal-detection model designed to capture this variance provided

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a better fit to the data than the basic signal-detection model. Thus, if conservative responding is preferred, instructions should be designed to minimize criterion/instructional variance.
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4:00-6:00 PM (2290)

Face Recognition Ability Moderates the Predictive Value of Judgments of Learning for Eyewitness Identifications. JESSICA GETTLEMAN and CHAD DODSON, *University of Virginia* (Sponsored by Chad Dodson) – Judgments of learning (JOLs) assess the likelihood that presented information will be remembered in the future. Recent work has used JOLs in eyewitness identification paradigms, examining the predictive ability of JOLs and comparing the value of JOLs (predictive) and confidence judgments (postdictive) for assessing lineup identification accuracy (e.g., Nguyen et al., 2018; Whittington et al., 2019). Moreover, our lab has recently shown that confidence judgments made by stronger face recognizers are more informative of their identification accuracy than those made by weaker face recognizers (Gettleman et al., in press). We extend this work by investigating the effect of face recognition ability on the predictive value of JOLs for eyewitness identifications. Using a paradigm in which participants provide immediate JOLs for target faces and then respond to lineups associated with these faces after a short delay, we find that stronger face recognizers make JOLs that are more predictive of their identification accuracy than those made by weaker face recognizers. This indicates that, compared to stronger face recognizers, weaker face recognizers are more overconfident in their ability to successfully identify a face on a later test.
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4:00-6:00 PM (2291)

Revisiting the Darkside of Context: Extending the Context Illusion on Memory to Older Adults. CHRISTINA YU, NICOLE MILLER, TAYLOR CHAMBERLAIN, and DAVID GALLO, *University of Chicago* (Presented by Nicole Miller) (Sponsored by David Gallo) – Context reinstatement is widely regarded as an adaptive memory process. However, Doss et al. (2018) recently discovered a context illusion, whereby reinstating the same context from encoding at retrieval may distort object memory. Here, we investigate the extent to which this effect is obtained in cognitively normal older adults. Participants viewed pictures of everyday objects superimposed on background scenes. During retrieval, objects were presented with either a reinstated or switched context from encoding. Participants were tested on their ability to discriminate studied objects from similar but new objects. Results show context reinstatement significantly improved hit rates to studied objects, but also increased false alarm rates to similar objects, thereby replicating the context memory illusion. Critically, these effects were obtained in both younger and older adults, demonstrating that the context illusion is intact with aging. We also investigate the extent to which levels of processing influences context-item binding. Altogether, our results demonstrate that older adults are susceptible to context-induced memory illusions, even though age was associated with significant reductions in both object and context memory.
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4:00-6:00 PM (2292)

Harder to Read but Harder to Deceive: Effects of Perceptually Disfluent Text on the Processing of Misleading Information. ALEXANDER JOHNSON, *The University of Memphis,* QUIN CHROBAK, *University of Wisconsin – Oshkosh* (Sponsored by Quin Chrobak) – The current study examined the impact of perceptually difficult-to-read (i.e., disfluent) text on susceptibility to misleading information. Participants watched an event and then read a summary narrative containing several misleading details. This text was presented sentence-by-sentence to collect reading times used for comparing processing of accurate and inaccurate information. Both the post-event narrative and final test questions were randomly presented in either a standard or disfluent font. Participants performed worse on the questions they received misleading information about, consistent with past research on the misinformation effect. Presenting the text in a disfluent font led to marginally increased performance on misled items (i.e., a reduction of the misinformation effect), though it had no effect on control performance, nor were there any significant effects of test question fluency. These results, in conjunction with insight from timing data, add to the literature on both disfluency and misinformation.
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4:00-6:00 PM (2293)

Production Increases Both True and False Memory. XINYI LU and COLIN MACLEOD, *University of Waterloo* (Sponsored by Colin MacLeod) – Relative to reading information silently, reading information aloud enhances memory, a phenomenon termed the production effect. Does reading aloud also influence false memory? According to a distinctiveness account, words that are read aloud become more distinctive, which should decrease false memory for related words. According to an activation account, words that are read aloud become more active in memory, which should increase false memory for related words. We examined the effect of reading aloud on false memory across two pre-registered experiments. In Experiment 1, reading aloud was compared to reading silently. In Experiment 2, reading aloud was compared to reading while hearing the words spoken by another voice. In both experiments, reading aloud increased both true and false recognition rates, suggesting that reading aloud increases the activation of information in memory.
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4:00-6:00 PM (2294)

Imagination Facilitates Memory using Pragmatic Inference Sentences. MARÍA J. MARAVER, ANA LAPA, ANA RAPOSO, and LEONEL GARCIA-MARQUES, *CICPSI, Lisbon University* – Instructing participants to generate images of to-be-recalled items has been shown to reduce false memories in the DRM paradigm. Here we explored this imagination-facilitating effect with pragmatic inferences, a way to study false memories for everyday actions. Across two experiments, imagination facilitation was studied manipulating the instructions and the after-item filler task (none vs. math operations) at the encoding phase. In Experiment 1, participants were either assigned to the condition of imagine + no filler; pay attention + math; or memorize + math. In Experiment 2, the encoding instructions (imagine vs. memorize) and the filler task (none vs. math) were compared across four separate conditions. Results from both experiments showed that imagination instructions lead to better memory performance independently of the filler task - showing

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a higher proportion of correct responses and less pragmatic inference errors. The findings suggest that imagery encoding enhances memory and protects against pragmatic inferences errors.
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4:00-6:00 PM (2295)

The Timing of Misinformation Matters: Sleep Both Increases Memory Distortion and Protects Against It. ALISON DAY and KIMBERLY FENN, *Michigan State University* (Sponsored by Kimberly Fenn) – Work investigating sleep and false memory using the Deese-Roediger-McDermott paradigm has yielded equivocal results. We sought to elucidate the effect of sleep on false memory using the misinformation paradigm. Participants watched a film of a mock robbery, received post-event misinformation, and completed a recognition test. The test was given after a 12-hour retention interval including either waking or sleep and we manipulated when misinformation was given: either before or after the retention interval. We found an interaction between sleep and timing of misinformation; in the sleep group, participants who received misinformation before the retention interval showed higher false memory than those who received misinformation after the interval. Timing of misinformation did not affect false memory in the wake condition. These results suggest that consolidation processes can have both positive and negative effects on false memory and that consolidation may integrate memories available at the time of sleep, regardless of source.
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4:00-6:00 PM (2296)

Can Enlightenment Post-Warnings Eliminate Memory Conformity? DELFINA FERNANDES, *University of Minho,* KARLOS LUNA, *Universidad Nacional de Colombia,* PEDRO ALBUQUERQUE, *University of Minho* (Sponsored by Ángel Fernández) – After discussing with another witness about an event, a person can incorporate new and false information in their own memories. That false information may appear in later accounts of the event, a phenomenon called memory conformity. The present study aimed to understand how witnesses can be protected from this false information using enlightenment post-warnings and the MORI technique. In pairs, each participant saw a different video that contained inconsistent information. Then, members of the pair discussed details of the video and sometimes spontaneously introduced false information. Finally, half of the participants received an enlightenment post-warning and then all participants completed a recognition test. The results showed that the discussion between witnesses impaired memory accuracy, showing the memory conformity effect. However, the enlightenment post-warnings did not reduce that effect. We conclude that the misleading information introduced by discussing with another witness has a strong influence on the memory of the event. This way, the accounts of witnesses may contain false information difficult to get rid of, which is particularly worrying to the legal system.
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4:00-6:00 PM (2297)

Susceptibility and Reduction of Naturally Occurring and Suggestion-Dependent Memory Distortions: Comparison of Three Paradigms. JOANNA ULATOWSKA, *Nicolaus Copernicus University,* JUSTYNA OLSZEWSKA, *University of Wisconsin – Oshkosh* – The goal of the study was to investigate correlations between three different types of false memories: associative memory errors, schema-based memory errors, and suggestion-dependent memory errors. Furthermore, it was tested whether enlightenment post-warnings could decrease levels of all these types memory distortions. Participants completed the Deese–Roediger–McDermott (DRM) paradigm, missing aspects of a script procedure (Gerrie, Belcher, & Garry, 2006), and misinformation procedure. Before each memory test, half of participants were warned against possible distortions and enlightened about the scientific motivation and logic of each manipulation. The results revealed that enlightenment post-warning effectively reduced all three types of memory distortions. Moreover, a significant correlation was observed between false alarms rate in the DRM paradigm and false alarms rate for unseen information from the scripts. This correlation was, however, observed only in the warned group. Misinformation false memories were not associated with any other type of memory distortions. The results support the suggestion that naturally occurring and suggestion-dependent errors may involve different memory mechanisms.
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4:00-6:00 PM (2298)

Effects of Source Similarity and Reporting Demands on Inadvertent Plagiarism. ALYSSA POYER and JOEL QUAMME, *Grand Valley State University* (Presented by Joel Quamme) – Several prior studies of inadvertent plagiarism (false recall of another person's idea or response as one's own) have investigated whether, as predicted by the Source Monitoring Framework, plagiarism is affected by source similarity (e.g., operationalized as plagiarism from same-sex vs. opposite-sex others). However, source similarity effects have not always been found and studies have varied according to whether subjects must make a fixed number of recall responses or are free to report only those of which they are sure. We expanded on this work by manipulating both source similarity and reporting demands using a novel manipulation of similarity as "team identity". Subjects in same-sex pairs took turns performing a generation task under instructions to collaborate as members of the same team or to compete as members of different teams. They later had to recall their own previous responses under fixed or free reporting instructions. Plagiarism errors were greater in the same-team condition than the different-team condition, but only when subjects had to make a fixed number of recalls. The results suggest the influence of source similarity on plagiarism errors is limited to when task demands require low-confidence responses.
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4:00-6:00 PM (2299)

Participants Confabulate a Missing Critical Scene in Line with Character Background Valence and Event Outcome Valence. SHASHIDHAR SASTRY and MICHAEL SERRA, *Texas Tech University* – Three experiments examined how the description of the protagonist and the conclusion of the story affects the nature of a confabulated missing scene in the middle of the story. In the story, a high school student is conflicted on whether to attend a party the night before the SAT exam. We manipulated whether the story described the student as conscientious or lazy (or neutral) and whether the student earned a good score or poor score (or neutral) on the exam. Critically, the scene detailing what the student did the night before the exam was missing,

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and participants either confabulated that scene in full (Experiment 1) or answered binary (Experiment 2) or likelihood (Experiment 3) questions about what they imagined occurred in the missing scene. Overall, the valence of the character description and the outcome of the story exerted concordant, independent main effects on the valence of the participants' confabulation.
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4:00-6:00 PM (2300)

Examining the Effect of Phrasing on Memory for Negated Messages. RAUNAK PILLAI, SARAH BROWN-SCHMIDT, and LISA FAZIO, *Vanderbilt University* (Sponsored by Lisa Fazio) – Prior work has shown that negated messages (e.g. "I am not cold") may result in dissociation errors in memory, wherein individuals remember the core affirmative supposition (e.g. "I am cold") while forgetting the negative label. However, it remains unclear if and how the phrasing of the original negated message affects the likelihood of such errors. To address this, we conducted a two-session study spanning one-week in which participants read fact-checking tweets generated by journalists and researchers that affirmed true claims or negated false ones. Critically, we compared memory for tweets constructed with one of two commonly occurring phrasings: with an evaluation before the claim (e.g. "No, X did not do Y, as A claims") and with an evaluation after the claim (e.g. "A claims X did Y. No, this is false). We found that participants were successfully able to distinguish true from false claims, and that this ability remained stable over the week-long delay. Contrary to our prediction, this ability was unaffected by the original tweet's phrasing.
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4:00-6:00 PM (2301)

Creating False Memories: Norms for Survival-Related Word Lists. I-AN SU and CHARLES BRAINERD, *Cornell University* (Sponsored by Qi Wang) – The past three decades have seen a trend in the application of the Deese-Roediger-McDermott (DRM) paradigm (Deese, 1959; Roediger & McDermott, 1995) across a variety of false memory studies, with recent attention on the effects of survival processing on both the recall and recognition performances in the DRM paradigm (Otgaar & Smeets, 2010; Parker et al., 2019). Whilst existent studies have investigated survival processing effects by using neutral-themed word lists retrieved from published norms as stimuli, less is known regarding the effects of survival processing on survival-related materials. The present study created a series of everyday words that trigger a sense of threat to human beings' survival. Referencing to published norms (Toglia & Battig, 1978; Bradley & Lang, 1999; Warriner, Kuperman, & Brysbaert, 2013; Scott, Keitel, Becirspahic, Yao, & Sereno, 2019) and by way of norming studies on gist strength and relevance to the survival, the authors developed a series of four-item survival-related DRM word lists. Variability amongst semantic characteristics of the word lists will be discussed. These norms can be suited to examine the effects of survival processing in both ancestral and modern scenarios in the DRM paradigm.
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4:00-6:00 PM (2302)

Lying Frequency and False Memory. ERIC RINDAL, KYLE THATCHER, and MADELYN BAKER, *Georgia College and State University* – Available research suggests that lying can have adverse effects on memory (e.g., Pickel, 2004). There is also evidence that an increase in the frequency of lying makes the act of lying easier (Verschuere 2012). At present, it is unclear if the frequency of lying impacts memory for those lies. The present study investigates the effect of the number of lies told on memory for those lies. Participants viewed a movie clip and were then asked a series of questions about the video. On some of these questions, participants were instructed to fabricate believable lies about details that were not witnessed in the clip. Participants were either asked to lie on two (low frequency) or eight (high frequency) items about details or events that were not witnessed. Participants returned four weeks later, and their memory for the video was assessed with free recall and yes/no recognition tests. On the recognition test, questions asked about the false details that participants had fabricated as well as about false details provided by yoked partners. The results demonstrated that memory accuracy depended on test format, whether the question was true or false, as well as whether participants had previously lied.
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4:00-6:00 PM (2303)

Misinformation Modality Affects Misinformation Acceptance. KARA MOORE, *Oklahoma State University* – Misinformation is transmitted via many modalities. Two important modalities, interviews and narratives, have been used interchangeably in the literature. These modalities vary in several ways (e.g., presence of interpersonal interaction and pressure to accept misinformation) and the goal of the current research was to assess the effect of these differences on misinformation acceptance. The misinformation paradigm was used: participants saw an event, received post-event information, and took a recognition test featuring forced choice questions, confidence scales, and open-ended response questions. We manipulated misinformation modality (narrative, direct interview, indirect interview) and misinformation type (contradictory, additive) to measure how these variables affected misinformation acceptance. Direct interviews and narratives caused more additive misinformation to be reported than indirect interviews. We investigated how misinformation modality and misinformation type affected the use of meta-cognitive processes that combat false memories, including discrepancy detection and recollection rejection.
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4:00-6:00 PM (2304)

The Impact of Semantic Versus Perceptual Attention on Memory Integration. SAGANA VIJAYARAJAH, EILIDH MCALISTER, and MARGARET SCHLICHTING, *University of Toronto* (Sponsored by Michael Mack) – Encoding new information in relation to prior knowledge benefits learning; however, integration into existing knowledge may also lead to false memories for similar information. Here, we asked whether semantic attention promotes the integration of new information into prior knowledge, thereby simultaneously enhancing memory and elevating false alarms. We manipulated participants' attention to semantic versus perceptual features of storybook-style illustrations by cueing them to make judgments about either story (semantic) or artistic style (perceptual). After, they performed an old/new recognition test—which included new illustrations depicting studied stories or artistic styles (lures)—to assess whether story attention increased false alarms

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to story lures, representing integration into story knowledge. We found that semantic attention benefited memory. However, integration into prior semantic knowledge was not impacted by attention. These findings suggest that semantic attention does not benefit memory by boosting integration of new memories into existing knowledge.
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4:00-6:00 PM (2305)

Item-Specific Encoding Reduces Associative False Memory by Restricting Associative Activation, Not Gist Extraction: Evidence from Homograph and Mediated Lists. KENDAL SMITH, LAURA PAZOS, JOSEPH SMITH, and MARK HUFF, *The University of Southern Mississippi* – We evaluated the effects of item-specific and relational encoding instructions on false recognition for critical lures that originated from homograph and mediated study lists. Homograph lists contained list items that were taken from two meanings of the same critical lure (e.g., autumn, trip, harvest, stumble; for fall) which disrupted thematic/gist consistency of the list. Mediated lists contained unrelated list items (e.g., slippery, spicy, vent, sleigh) that were indirectly related to a critical lure (e.g., cold), through a set of non-presented mediators (e.g., wet, hot, air, snow), and had no thematic/gist consistency. In two experiments, both item-specific and relational encoding improved correct recognition of list items relative to a read-only control task, but only item-specific encoding reduced false recognition of critical lures. Signal-detection analyses indicated that the item-specific reduction increased test-based monitoring. Our data suggest that item-specific encoding operates to reduce spreading activation of the critical lure given homograph/mediated are thematically inconsistent which precludes the formation of a consistent gist memory trace.
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4:00-6:00 PM (2306)

The Effects of Matched Picture Presentation on False Memory for Related and Unrelated Distractors. PAUL LOPRINZI, REBEKAH SMITH, and REED HUNT, *University of Mississippi* – Some studies have shown that presenting pictures at study that match unrelated study list words (hear the word cat and see a picture of a cat) can reduce false alarms while other studies have failed to find this effect on recognition of categorically related lists. The present study directly compared the two situations in a single experiment. At study, participants heard a list of categorically related words and unrelated words accompanied by visual presentation of either a matching picture or word. Distractors on the recognition test were new items from studied categories, new items from new categories, and new unrelated items. The results replicate the previous findings in the same study and may indicate that distractors that were likely activated at study (new items from studied categories) behave differently from distractors whose origin differs from the study experience (new category and unrelated items).
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4:00-6:00 PM (2307)

Negative Emotion Increases Susceptibility to False Memories: An Investigation Using the Deese-Roediger-McDermott Paradigm. CAROLINE STIVER, NANCY LAGUNAS, ANNIKA ASP, and KELLY BENNION, *California Polytechnic State University, San Luis Obispo* – Although research consistently shows that both emotion and sleep enhance veridical memory, the effects of these variables and their interaction on false memory have been debated. To investigate this, the present study used the DRM paradigm: Participants studied a series of 9 negative and 9 neutral word lists, either in the morning or evening. Every word on each list (e.g., rage, mad, fury; rye, loaf, butter) was related to a critical 'lure' word that was not shown (e.g., angry; bread). Twelve hours later, after a day awake or a night of sleep, participants took a recognition test on all 18 studied word lists and lures, as well as 18 new word lists and lures (counterbalanced across participants). Results showed a main effect of emotion on false memory, such that false alarms were significantly greater for negative (vs. neutral) critical lures ($p=0.002$) and unseen associates ($p<0.001$). Significant emotion by condition interactions showed that sleep reduced false alarms for neutral more than negative stimuli, both regarding lures ($p=0.040$) and unseen associates ($p=0.044$). While sleep seems to protect against neutral false memories, results show strong support for the false endorsement of having seen negative stimuli.
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4:00-6:00 PM (2308)

An Investigation into Pre-Narrative Warnings Within a Repeated Testing Paradigm. ALIA WULFF, MATTHEW AGURCIA, and ARYAN PANDEY, *Tufts University,* JESSICA KARANIAN, *Fairfield University,* ELIZABETH RACE and AYANNA THOMAS, *Tufts University* (Sponsored by Ayanna Thomas) – The misinformation effect occurs when inconsistent post-event information impairs original event memory. A test given prior to the post-event information further exacerbates misinformation susceptibility, potentially by impacting how the post-event information is encoded. This effect has been termed retrieval enhanced suggestibility (RES). In the present study, we investigated how warning participants about the veracity of misleading post-event information may influence misinformation susceptibility in a repeated testing paradigm. Experiments 1 and 2 tested the effects of a general warning. Experiment 3 instructed participants to highlight information in the narrative that was inconsistent with their own memory, thereby directing attention to inconsistent information. We found that a pre-narrative warning reduced misinformation susceptibility. Further, having participants actively look for inconsistencies between the original and post-event information impacted the misinformation effect. These data suggest that pre-narrative warnings may impact the encoding of post-event information.
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4:00-6:00 PM (2309)

Examining the Relationship Between Working Memory and False Memories. MARIA BEATO and MAR SUAREZ, *University of Salamanca* (Presented by Mar Suarez) – We investigated whether false recognition is related to working memory. To examine false recognition, we employed the Deese/Roediger-McDermott (DRM) paradigm in which words associated to a non-presented critical lure are studied and, subsequently, critical lures are often falsely remembered/recognized. To measure working memory, we used an Alphabet Recoding task that required participants to apply an operation (+1 or -1) to three-letter strings. Fifty participants studied seven DRM lists. Afterwards, they performed the working memory task, followed by the recognition memory test. The results showed similar

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high true and false recognition levels. Furthermore, a significant negative correlation was found between false recognition and working memory (r=-.314). In other words, participants with lower working memory scores were more likely to falsely recognize critical lures. Findings are discussed in terms of the dual-process theories. More specifically, higher working memory individuals seem to be engaging error-editing processes more efficiently, leading to a reduction of false memories.
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4:00-6:00 PM (2310)

How Retrieval Strategies Are Related to Memory Accuracy in an Eyewitness Memory Paradigm: Behavioral and Neural Evidence. MCKINZEY TORRANCE, ELIZABETH RACE, and AYANNA THOMAS, *Tufts University,* JESSICA KARANIAN, *Fairfield University* – Prior research demonstrates that warning eyewitnesses before or after encountering misleading post-event information reduces errors on a later memory test. In a recent study, we employed a misinformation paradigm (Crime Video > Initial Memory Test -> Audio Narrative with Misleading Information -> Final Memory Test) and found that warning affected self-reported memory retrieval strategies. Here, we assess the relationship between self-reported strategy and memory performance and neural activity during the final memory test. Reports of thinking back to the audio narrative during the final test were positively associated with memory errors on misleading test questions, but not on consistent or neutral questions. This supports our hypothesis that retrieval of the audio narrative during the final memory test specifically impairs performance on misleading questions. We also found that reports of thinking back to the crime video during the final test positively correlated the magnitude of visual activity, which likely reflects sensory reinstatement of the original crime video. Together, these findings suggest that participants may have accurate metacognitive awareness about the retrieval processes.
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4:00-6:00 PM (2311)

Studying Reconsolidation of Episodic Memories on Virtual Settings: A Variant of Hupbach's Object-Learning Paradigm. INÉS BOTÍA and SARA CADAVID, *Universidad del Rosario* – Animal research has shown that when a consolidated memory is reactivated, it enters in a state of vulnerability similar to that seen in newly formed memories. This finding has been interpreted as evidence of reconsolidation processes. To explore these processes in humans, Hupbach and collaborators (2007) developed a 3-day object-learning paradigm (two encoding and one retrieval session separated by 48 h). In the second encoding session, memory for the first session is reactivated or not. In the third session, memory for Day-1 material is tested. Hupbach's results showed that episodic memory is highly susceptible to interfering material presented after its reactivation. More studies on this paradigm have identified components that elicit memory reactivation. A virtual variant of this paradigm seems crucial to explore potential reconsolidation phenomena further, especially in an increasingly digital world. In the present experiments, Hupbach's object-learning paradigm was adapted to a virtual setting.
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4:00-6:00 PM (2312)

Incidental Word Learning in Preschool Children: Offline Learning and (No) Effect of Auditory Context. YAEL KAPPEL-LARIAN and KAREN BANAI, *University of Haifa* (Presented by Karen Banai) – For new words to be consolidated in memory, an 'offline' process continues after the initial acquisition phase. Here we studied the effects of auditory context on word learning at two time points, immediately after exposure and a week later. New pseudowords were built based on the morphophonological principles of Hebrew and used to name animated cartoon characters. Each character had a unique appearance and was animated with one of two manners-of-motion (skipping or flipping). In the context condition, manner-of-motion was marked by the animation and by a vowel pattern shared across the names of all skipping or flipping characters. In the no-context condition manner-of-motion was encoded by the animation only. Learning of character names, their manner-of-motion and the generalization of manner-of-motion to novel characters were tested. Both names and manners-of-motion were immediately learned and generalized, but performance on all tests was better at the delayed test. In contrast with previous findings, auditory context had no effect on learning. It appears that with the current exposure paradigm, auditory information about manner-of-motion was not used for either learning or consolidation.
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4:00-6:00 PM (2313)

Mindfulness vs. Relaxation Benefits on Third-Graders' Executive Functions and Literacy Skills. TERESA LIMPO, SOFIA MAGALHÃES, CAROLINA CORDEIRO, and RENATA ROCHA, *University of Porto,* THIERRY OLIVE, *University of Poitiers & CNRS,* SÃO LUÍS CASTRO, *University of Porto* – Research has been showing the added value of mindfulness training on adult's mental health. Still, evidence on the cognitive and academic benefits of mindfulness training in children is scarce. This was the goal of the current study, in which 66 Portuguese third-graders (age 8) were randomly allocated to mindfulness (n=29) or relaxation (n=37) training programs, implemented by psychologists in groups of children (max. 8) for 8 weeks, in two 30-min weekly sessions. Before and after the programs, we assessed students' executive functions (inhibition, working memory, cognitive flexibility) via behavioral tasks and teacher-rated scales; and their literacy skills via writing tasks (handwriting fluency, text quality) and teacher-rated grades in Portuguese. Results showed advantages of the mindfulness training on a composite score considering performance on all executive functions tasks among children with higher scores at pretest, and on teacher-rated cognitive flexibility, also among children with higher pretest scores. In comparison to relaxation, mindfulness training resulted in higher handwriting fluency and Portuguese grades. This study provided preliminary evidence on the benefits of mindfulness training on educational settings.
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4:00-6:00 PM (2314)

Characterizing the Impact of a Dynamic Attentional Cue: The Effect of Author Gaze on Eye Movements and Learning. ANNA WRIGHT, DANIEL LEVIN, JORGE SALAS, and KELLY CARTER, *Vanderbilt University* (Sponsored by Daniel Levin) – Recent research has tested whether author gaze is an effective dynamic attentional cue. More

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specifically, Eye Movement Modeling Examples (EMMEs) are being investigated for their ability to improve learning. However, the effects of EMMEs are variable, and the degree to which viewers follow these cues remains unclear. In the current paper, we compared screen-capture instructional videos that depicted author gaze as a moving circular overlay with identical videos that lacked this cue. We observed that EMMEs drove viewer saccades to cued locations and resulted in shorter distances between author and participant gaze, but they did not affect viewer fixation durations, saccade amplitudes, or learning. Also, viewers reported small but significant increases in cognitive load and borderline-significant reductions in preference for EMME videos. We argue that EMMEs can be an effective means of guiding viewer attention, but the range of circumstances under which they improve learning remains unclear.
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4:00-6:00 PM (2315)

The Effects of Study Schedule and Sleep on Inductive Learning. ABIGAIL KERN and CAROLE YUE, *Covenant College* – This study examined the potential interaction between study schedule and sleep over a period of 12 hours, and used a 2 (study schedule: blocked or interleaved) x 2 (interim activity: daily routine or nocturnal sleep) mixed-subjects design. Participants (n=68) viewed five exemplars of each of ten butterfly species, half of which were interleaved and half of which were blocked. Then participants were instructed to go about their daily routine or follow their normal sleep schedule and return after 12 hours. Upon returning to the lab, participants were asked to categorize novel exemplars of each species and judge which study schedule resulted in better learning. A two-way ANOVA on quiz scores revealed no interaction, but nocturnal sleep resulted in higher scores than following a daily routine, and an interleaved study schedule produced higher scores than the blocked schedule. Consistent with prior research, participants were unaware of the benefits of interleaving.
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4:00-6:00 PM (2316)

Can Instruction Improve Decision-Making Skills? MARIA TSAPALI and MICHELLE ELLEFSON, *University of Cambridge* – Many theories of learning and cognitive development distinguish between conceptual and procedural knowledge. However, these two types of knowledge are not easily separated because understanding content (conceptual knowledge) is important for skills (procedural knowledge). This study uses an experimental design with three randomly assigned instructional conditions representing different levels of instructional guidance (explicit instruction, guided discovery, unguided discovery) to explore their effects on procedural (decision-making competence) and conceptual knowledge (vegetarianism) of socio-scientific decision-making in 11-year-olds (N=190). A three-way factorial MANCOVA tested the effect of instructional condition, achievement level and gender (independent variables) along with family affluence, previous decision-making competence and previous content knowledge (covariates) on decision-making competence and content knowledge. Briefly, the results indicate that explicit instruction promotes decision-making competence, while unguided discovery promotes conceptual knowledge, suggesting that different types of instruction are needed for developing a range of student skills associated with socio-scientific decision-making.
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4:00-6:00 PM (2317)

Feedback and Instruction Improve Cognitive Reflection, But Improvement Does Not Transfer to Other Tasks. THOMAS SMELTER, JONATHAN BRATTON, VICTORIA VELAZQUEZ, DANIELLE CRUM, and DUSTIN CALVILLO, *California State University, San Marcos* (Sponsored by Dustin Calvillo) – Cognitive reflection is the ability to inhibit intuitive, incorrect responses in favor of deliberative and correct responses. Cognitive reflection predicts performance on a variety of cognitive tasks. The goal of the present study was to examine interventions that may improve cognitive reflection. College students (N=238) completed a 10-item cognitive reflection test (CRT), were assigned to one of three conditions, completed another 10-item CRT, and then completed 10 heuristics-and-biases problems. Between the two CRTs, some participants were provided with corrective feedback, others were instructed to consider-the-opposite of their initial responses, and the final group was a control. Scores significantly increased between the first and second CRT in the feedback and consider-the-opposite groups, but not in the control group. Performance on heuristics-and-biases problems, however, did not differ between the groups. These results suggest that cognitive reflection can be improved but this improvement may not transfer to other tasks.
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4:00-6:00 PM (2318)

Online and Doing It Wrong: The Impact of Presentation Style on Learning in an Online Lecture. JACLYNN SULLIVAN, *Mount Mercy University* – This study examined if presentation style, online video lecture versus online PowerPoint with voiceover, impacted one's memory and ability to apply information from the Linnaeus Taxonomy. Ninety-seven participants from a Midwestern University were taught a basic 11-minute lecture on the Linnaeus Taxonomy and then asked recall, recognition, and application questions. The video lecture was taught by a professor who wrote out all terminology on a white board. The PowerPoint lecture was voiced by the same professor, but terminology appeared on the screen when being discussed. There were 46 participants in the video lecture and 51 in the PowerPoint lecture conditions. An independent samples t test revealed significantly better performance for those in the video lecture condition ($t(95)=2.39$, $p<.05$, $d=.49$). Those in the video lecture condition scored $M=25.78$, $sd=4.78$ out of 34 possible points whereas those in the PowerPoint condition scored $M=23.18$, $sd=5.84$. Evidence suggests that even when presented online, students learn more from a lecture where the presentation style is embodied over a presentation style that is static.
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4:00-6:00 PM (2319)

Two Wrongs Don't Make a Right (Answer): Disfluent Font Harms Word Problem Solving Performance. NAHAL HEYDARI, *St. John's University,* ANDREW JAROSZ, *Mississippi State University,* ALLISON JAEGER, *St. John's University* – Accurate comprehension of math word problems requires understanding semantic and operational cues of the text. Previous work has shown that semantic misalignments can lead

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students to use the wrong operation during problem solving and that disfluent fonts can improve problem solving, slow down reading, and impact JOLs. This study investigated whether changing font fluency in word problems could improve accuracy. We hypothesized that semantically misaligned problems would result in greater accuracy when presented in disfluent font as compared to fluent font. Participants completed 28 math problems presented in Arial font (fluent) or Mistral font (disfluent) that were either semantically aligned or misaligned with the required operation. Aligned problems were solved faster and with greater accuracy than misaligned problems. Fluent problems were solved faster than disfluent problems. Accuracy was lowest when problems were presented in a disfluent font and were semantically misaligned. Overall, although font disfluency slowed reading, it did not improve performance on semantically misaligned problems. Follow up studies assessing why disfluency harmed problem solving and how disfluency impacts students' JOLs will also be discussed.
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4:00-6:00 PM (2320)

Weight-of-Evidence Reporting May Protect Against the Harmful Effects of False Balance. MEGAN IMUNDO, *University of California, Los Angeles,* DAVID RAPP, *Northwestern University* – False balance occurs when equal platform is given to both sides of an issue despite one side having greater evidentiary support. This can reduce perceived expert consensus on and belief in the discussed issues, as documented in climate change debates. Communication researchers have instead encouraged weight-of-evidence reporting, presenting both sides of an issue while foregrounding the broader scientific evidence. We examined the effects of false balance and weight-of-evidence reminders on people's beliefs about climate change and perceived scientific consensus. Participants read texts on climate change that included a consensus view (provided by a climate science expert) and a contrarian view (provided by a climate science expert or an automotive plant manager), or unrelated science texts (as a control). Texts potentially concluded with a reminder that the majority of scientists endorse climate change. Contrarian claims from relevant experts reduced belief in scientific consensus, but weight-of-evidence reminders overcame this falsely balanced influence.
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4:00-6:00 PM (2321)

Causal Illusions in the Classroom: How the Distribution of Student Outcomes Can Promote False Instructional Beliefs. KIT DOUBLE, *University of Oxford,* JULIE CHOW *and* EVAN LIVESEY, *University of Sydney,* THERESE HOPFENBECK, *University of Oxford* – Teachers sometimes believe in the efficacy of instructional practices that have little empirical support. These beliefs have proven difficult to efface despite strong challenges to their evidentiary basis. Here, we evaluate whether causal inferences about instructional practices are susceptible to an outcome density effect using a contingency learning task. In a series of six experiments, participants were ostensibly presented with students' assessment outcomes, some of whom had supposedly received teaching via a novel technique and some of whom supposedly received ordinary instruction. The distributions of the assessment outcomes were manipulated to either have frequent positive outcomes (high outcome density condition) or infrequent positive outcomes (low outcome density condition). For both continuous and categorial assessment outcomes, the high outcome density condition rated the novel instructional technique as effective, despite the fact that it either had no effect or had a negative effect on outcomes, while the participants in the low outcome density condition did not. These results suggest that when base rates are frequent, participants may be susceptible to drawing inaccurate inferences instructional practices.
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4:00-6:00 PM (2322)

Bilingual Learning of Foreign Vocabulary as a Function of Proficiency in Known Languages. OSCAR NÁJERA, NAOKO TSUBOI, and WENDY FRANCIS, *University of Texas at El Paso* (Presented by Naoko Tsuboi) (Sponsored by Wendy Francis) – Spanish-English bilinguals learned Swahili vocabulary through Swahili-Spanish and Swahili-English paired associates. For each language, three study-cued recall cycles were completed in which the Swahili word was presented as a cue. A fourth cued recall test reversed the direction so that the Swahili word had to be recalled, and an associative recognition test followed. Objectively assessed English proficiency was associated with accuracy on Swahili-English and English-Swahili cued recall tests but not associative recognition. Similarly, proficiency in Spanish was associated with accuracy on Swahili-Spanish and Spanish-Swahili cued recall tests but not associative recognition. Differences in cued recall accuracy for dominant and nondominant language increased across study-test cycles, with the largest differences observed when the Swahili word had to be recalled. Self-reported associative encoding strategies and other possible mechanisms for the proficiency effects are discussed. Supported by NSF Grant BCS-1632283.
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4:00-6:00 PM (2323)

The Impact of Multi-Media Presentation Format: Student Perceptions and Learning Outcomes. KATHERINE MOEN, *University of Nebraska Kearney* – Previous research suggests that lectures accompanied with picture-based presentations more effectively convey information and improve learning compared to traditional, text-based presentations. General psychology lectures were separated by chapter and presented with either picture-based (only pictures on the slides) or text-based (pictures and words on slides). One chapter from each exam unit was presented with the picture-based format and the remaining chapters were presented with the traditional text-based format. Students were asked about their perceptions of the presentation format at the end of each lecture, and exam scores were used to assess learning for each chapter. Results revealed higher exam scores for material presented with picture-based format compared to text-based format. Students rated both presentation types similarly when asked about their level of interest and engagement in the lectures. However, students rated picture-based presentations lower than text-based presentations when asked if the presentation style helped them learn. Overall, these results suggest that students believe they learn more from text-based presentations, but exam scores are higher for content taught with picture-based presentations.
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4:00-6:00 PM (2324)

Learning by Drawing: Is it Worth the Time and Effort? QIAN ZHANG and LOGAN FIORELLA, *University of Georgia* – Two experiments compared the effects of drawing to studying instructor-provided visuals on learning outcomes (comprehension and transfer) and learning efficiency (based on learning time and cognitive load). Undergraduates read a scientific text about the human circulatory system. In Experiment 1 (N=107), students studied provided visuals or generated drawings with or without support. Results showed no differences across groups in learning outcomes but studying provided visuals was significantly more efficient than drawing. In Experiment 2 (N=85), students generated drawings with a stronger support. The supported drawing group outperformed the provided visuals group on comprehension, but not on transfer. Furthermore, studying provided visuals was significantly more efficient on transfer, but not on comprehension. These findings suggest that learning by drawing—even with strong instructional support—may not be worth the added time and effort to achieve similar learning outcomes as studying instructor-provided visuals.
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4:00-6:00 PM (2325)

The Effectiveness of Cognitive and Metacognitive Prompts During an Online STEM Lecture. DEREK MCCLELLAN, RAYMOND CHASTAIN, and MARCI DECARO, *University of Louisville* – Students watching online lectures often struggle with active attention, processing information superficially and leading to shallower learning. This study tested the effectiveness of different types of prompts in online STEM learning. Students (N=73) in an introductory physics course watched a video lecture on simple harmonic motion. During the lecture, students were provided with either (a) cognitive prompts to facilitate elaboration and organization, (b) metacognitive prompts to facilitate monitoring and self-regulation, or (c) no prompts. Students were asked to write a response to each prompt. Students then completed an online quiz on simple harmonic motion. Students who received cognitive prompts scored significantly higher than students who received no prompts. Students who received metacognitive prompts did not score significantly better than students in other conditions. These findings suggest that prompts promoting organization and elaboration may improve online learning.
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4:00-6:00 PM (2326)

Spaced Mathematics Practice Improves Test Scores and Reduces Overconfidence. WILLIAM EMENY, *Wyvern College,* MARISSA HARTWIG and DOUG ROHRER, *University of South Florida* (Presented by Marissa Hartwig) – The practice assignments in a mathematics textbook or course can be arranged so that most of the problems relating to any particular concept are massed together in a single assignment, or these same problems can be distributed across many assignments – a strategy known as spaced practice. Several recent studies have examined whether spacing improves long-term mathematics learning, and the findings have been equivocal. We conducted two classroom-based randomized experiments in which mathematics students (ages 11-12) massed their practice in one session or spaced their practice across three sessions one week apart, and spacing produced higher scores on a test given one month later. We conclude that previously observed null effects of mathematics spacing reflect a boundary condition. The second aim of our studies was to assess whether spacing affects students' predictions of their test scores, and we found that massed practice, but not spaced practice, led to gross overconfidence.
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4:00-6:00 PM (2327)

Effects of Strategy Support on Self-Regulated Use of Retrieval Practice in Higher Education. MARLOES BROEREN, *Avans University of Applied Sciences,* PETER VERKOEIJEN, *Erasmus University Rotterdam,* ANITA HEIJLTJES, *Avans University of Applied Sciences,* GUUS SMEETS and LIDIA ARENDS, *Erasmus University Rotterdam & Avans University of Applied Sciences* (Sponsored by Peter Verkoeijen) – Research shows that strategy instructions can support students in their self-regulated use of retrieval practice in a lab-setting (Ariel & Karpicke, 2017). Embedded in a higher education classroom, the effects of instructions persist, albeit in a moderate way (Broeren et al, in preparation). The question remains whether strategy instructions can influence the use of retrieval practice during independent self-study, outside the lab/classroom. Consequently, we conducted a field experiment embedded in a higher education course in which we compared two types of strategy support and its effects on the self-regulated use of retrieval practice during independent self-study. One group of students (RP++ condition, n=33) received strategy instructions and metacognitive support through email. A second group (RP condition, n=31) received strategy instructions and a control condition (n=32) received mock instructions. Preliminary data analyses show that – following our hypotheses – the RP++ condition displayed a larger number of retrieval practice self-study choices than the control condition. No differences were found between RP++ and RP conditions and RP and control conditions; no effects were found on delayed test performance.
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4:00-6:00 PM (2328)

Metacognitive Reactivity and the Correction of Misconceptions Related to Psychological Knowledge. RENÉE DECARO and AYANNA THOMAS, *Tufts University* – The present research tested whether eliciting confidence judgments would change participants' learning goals (e.g., time spent processing corrective feedback) in a feedback procedure targeting misconceptions related to psychological knowledge. 150 participants recruited and tested online took a TRUE/FALSE test of 50 misconceptions and made either confidence judgments, random number selections (e.g., control), or self-relevance judgments (e.g., control-rating). Following judgments, participants were shown corrective feedback and an explanation for the correct answer. One week later, participants completed a retest and several individual differences measures. Differences in time spent reading corrective feedback were minimal between the three experimental groups. Further, gains from Test 1 to Test 2 were large ($\eta_p^2 = .72$) and equivalent between groups. Greater flexible thinking and vocabulary were significantly and positively related to gains in performance. Results are discussed in terms of feedback and participant characteristics important in knowledge updating.
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4:00-6:00 PM (2329)

The Effect of Self-Regulated Study Time Allocation on Learning. EYLUL TEKIN and HENRY L. ROEDIGER, III, *Washington University in St. Louis* (Sponsored by Jonathan Peelle) – To be efficient in self-regulated study time allocation, people should accurately monitor their current learning and adjust their study behavior accordingly. Although people study difficult items longer than easy items under self-paced study, whether this self-regulation benefits learning is still unknown. We examined whether self-regulated study time allocation led to improved compensation for item difficulty and enhanced overall learning in relation to a control condition in which people did not self-regulate. In two cued-recall experiments, participants studied word pairs either with self-paced study or fixed-rate study (time was yoked to time for self-paced study). In Experiment 1, subjects studied related and unrelated pairs to ensure metacognitive accuracy. In Experiment 2, subjects studied forward and backward pairs to induce a metacognitive illusion. Our results show that people benefitted from self-regulating their study, and this self-regulation permitted attenuation of item difficulty effects though not full compensation.
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4:00-6:00 PM (2330)

The Effects of Instructor Gender and Fluency on Student Learning and Evaluations. JESSICA LAPAGLIA, KATELYN MILLER, and SAMANTHA PROTEXTER, *Morningside College* – Previous research indicates that students show lower judgments of learning (JOL) when an instructor is disfluent (e.g., disorganized, very little eye contact) compared to when an instructor is fluent (Carpenter et al., 2016). However, instructor fluency has no effect on actual learning. It is also well established that there is a gender bias in student evaluations of instructors (e.g., Mitchell & Martin, 2018). Male instructors tend to be rated higher than female instructors, even in identical courses. In the current study, we examined how instructor gender and fluency influence instructor evaluations, student learning, and JOLs. Participants watched a short lecture video. The speaker was either male or female and was either fluent in their speech or disfluent (i.e., disorganized, made mistakes). Following the video, participants answered questions about the speaker and took a quiz over the lecture. Results indicated that participants rated the female speaker significantly lower than the male speaker. Furthermore, they rated the disfluent speaker lower than the fluent speaker. Disfluency negatively affected quiz scores, but instructor gender did not.
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4:00-6:00 PM (2331)

Instructor Gender and Fluency Bias Students' Perceived, But Not Actual, Learning. KELLY KANE, KYLE ST. HILAIRE, and SHANA CARPENTER, *Iowa State University* – This study (N=211) explored the role of instructors' gender and verbal fluency in students' judgments of learning (JOLs) and memory for lecture material. In this 2(fluent vs. disfluent) x 2(male vs. female) between-subjects study, participants saw one instructor of either gender deliver the same lecture script using the same slides. Fluency was varied through having the instructor speak smoothly and confidently (fluent condition) or through having the instructor read directly from a set of notes in a monotone voice (disfluent condition). We found that participants' JOLs were higher for the male than the female instructor, and that JOLs were higher for fluent than disfluent instructors. However, actual performance on a memory test did not differ across conditions of instructor gender or fluency. These findings indicate that students' perceptions of learning are biased in favor of male instructors and more fluent instructors, when in reality these qualities do not promote learning.
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4:00-6:00 PM (2332)

Do Peer Evaluations of an Instructor Impact the Effects of Lecture Fluency on Students' Judgments of their Learning and Instructor Evaluations? PAIGE NORTHERN and SARAH "UMA" TAUBER, *Texas Christian University* – Disfluently delivered lectures (e.g., monotone voice, minimal eye contact) are typically associated with higher judgments of learning (JOLs) and instructor evaluations than are fluently delivered lectures (e.g., speaking confidently with eye-contact, appropriate body language). To expand on this literature, we considered that students may have pre-existing beliefs about the quality of an instructor before experiencing class, which may impact these relationships. To evaluate this issue, students read instructor evaluations given by their peers and that were either positive or negative. Students then saw a fluent or a disfluent lecture, and they gave a JOL, rated the instructor, and completed a test. Replicating prior work, students who watched a fluent lecture gave higher JOLs and instructor evaluations compared to those who watched a disfluent lecture. Moreover, peer evaluations impacted students' ratings of the instructor. Pre-existing beliefs and experiences during lectures can impact students' assessments of their learning and of their instructor.
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4:00-6:00 PM (2333)

Cerebellar-Parahippocampal Connectivity Is Critical for Verbal Learning and Memory: Multiple Sclerosis as a Model for Verbal Memory Impairment. MARK ZUPPICHINI and JESSICA MA, *University of Texas at Dallas,* DARIN OKUDA, *University of Texas Southwestern Medical Center,* BART RYPMA, *University of Texas at Dallas & University of Texas Southwestern Medical Center* (Sponsored by Bart Rypma) – The cerebellum is known to be involved in verbal learning and memory. How the cerebellum interacts with other cortical regions involved in verbal memory is not yet known. The present study sought to use multiple sclerosis (MS) as a model of verbal memory impairment to investigate cerebellar involvement in verbal learning and memory ability. The cerebellum is adversely affected in MS, an autoimmune disease of the central nervous system, and MS patients experience verbal memory impairment. Structural and functional cerebellar-parahippocampal connectivity was assessed in healthy control (HC) and MS groups using magnetic resonance imaging. Participants were assessed on verbal learning and memory using the Selective Reminding Test (SRT). The MS group performed worse on the SRT. Scores were associated with cerebellar-parahippocampal connectivity and axonal diameter of middle cerebellar peduncle in the MS group. These results show that verbal memory performance depends on cortico-cerebellar connectivity.
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4:00-6:00 PM (2334)

Food Visual Cues Are Less Affected by Size-Contrast Illusions than Non-Food Cues in Individuals with Obesity and Normal Weight. IRUNE FERNANDEZ-PRIETO, *University of Trento,* FEDERICA SCARPINA, *San Giuseppe Hospital & University of Turin,* LARA FONTANA, *University of Trento,* MASSIMO SCACCHI, *San Giuseppe Hospital & University of Milan,* ALESSANDRO MAURO, *San Giuseppe Hospital & University of Turin,* FRANCESCA GIORDANO and SIMONA BUDUI, *Solatrix Hospital,* MASSIMILIANO ZAMPINI, *University of Trento* – Previous research has identified different visual processing of food cues in individuals with obesity and normal-weight. In individuals with obesity, attention bias for food seems to be higher than in individuals with normal weight. In this study, forty-two volunteers with obesity (high body mass index, BMI > 35) and with normal weight (BMI < 25) participated in a visual-size discrimination task. We assessed the participants' susceptibility to the Delboeuf illusion, which biases the perceived size object (food and non-food) when it is in the context of another object (e.g. in a plate). The results showed less illusory bias in food than in non-food stimuli; however, no differences were observed between groups. Independently of the individuals' weight, the smaller illusory effect in food stimuli indicates a possible analytic processing style due to the salient properties of food as a primary reward.
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4:00-6:00 PM (2335)

Does the Salience of Pixel-, Object-, or Semantic-Level Image Features Predict Personality Differences? MADELEINE GROSS, NICOLE HAN, and JONATHAN SCHOOLER, *University of California, Santa Barbara* – Modern theories in personality neuroscience suggest that creativity and curiosity may be driven by salience-coding dopamine processes. These same processes are central to guiding eye movements. Based on this intersection, we ran a large eye tracking study (N=197), examining the degree to which differences in naturalistic eye movement behavior predicts differences in creativity and curiosity. Creativity was measured with a figural drawing task, a divergent thinking task, and two self-report scales. Epistemic and perceptual curiosity were measured using self-reports. In a previous study, we found systematic differences in salience maps as a function of these personality types. In this study, we employed an image set that is comprehensively annotated for pixel-, object-, and semantic-level features in order to determine whether the differences in viewing behavior previously observed could be explained by differential assignment of salience to particular image-based features. Using SVM classification methods, we quantified the salience weights across these different features for each individual. We find evidence for differences in salience assignment of particular image features as a function of these personality characteristics.
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4:00-6:00 PM (2336)

Familiarity-Based Compression of Within-Face Variation is Enhanced in Super-Recognisers. DAVID WHITE and TANYA WAYNE, *University of New South Wales* – Super-recognisers are people with extreme superior ability in face recognition, but the cognitive basis of their skill is not understood. We examined representation of image variation in typical viewers and super-recognisers by asking participants to rate the similarity of individual faces to statistical averages representing population norms (between-identity variation), or images of individual faces to the average appearance of that same face (within-identity variation). Contrary to dominant theory in this field, we found that familiarity-based transformation was characterised by compression of within-face variation towards the average appearance of a familiar face, rather than by changes in the representation of between-face variation. Super-recognisers rated images of faces as being more similar to the average facial appearance than typical viewers for both unfamiliar and familiar faces, but the compression attributable to familiarity was enhanced in super-recognisers. These results provide new mechanistic insight into perceptual processes involved in face learning, and also show that these mechanisms can account for individual differences in face recognition ability.
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4:00-6:00 PM (2337)

The Serial Dependence Effect Is both Attraction to the Previous Response and Repulsion from the Previous Stimulus. PATRICK SADIL, ROSEMARY COWELL, and DAVID HUBER, *University of Massachusetts Amherst* (Sponsored by David Huber) – Visual perception can be strongly altered by recent experience. A classic example is the tilt aftereffect, in which perceived orientation is biased away (i.e., repelled) from a recently viewed orientation. In contradiction to this, the "serial dependence" effect is (usually) a bias towards (i.e., attraction to) the last trial's orientation. We performed a meta-analysis of the serial dependence literature, finding that effect sizes range from weakly repulsive to strongly attractive. We present two new analysis techniques that make sense of this variability, revealing that performance for a particular condition reflects both attraction to the previous response and repulsion from the previous stimulus, with these two factors canceling each other out to different degrees for different experiments. We reanalyzed prior results using a split-half accuracy analysis; for low accuracy on the previous trial, which decouples the stimulus from the response on the previous trial, there was attraction to the previous response, but repulsion from the previous stimulus. Next, we used hierarchical Bayesian modeling and model comparison; the winning model included both attraction to the previous response and repulsion from the previous stimulus.
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4:00-6:00 PM (2338)

The Differential Impacts of Emotionally Enhanced Vividness on Memory and Perception. LOGAN DOYLE and SUSANNE FERBER, *University of Toronto* (Sponsored by Susanne Ferber) – Alongside contentious findings that emotional scenes are better remembered, more recent research has identified that emotional scenes are perceived as more vivid than neutral counterparts (emotionally enhanced vividness: EEV). Initial explanations for EEV posit attention as the cause of enhancement, however the role of a participant's memory bias in subsequent reporting was not sufficiently ruled out. To investigate the contribution of perception and memory to tasks examining EEV, participants viewed emotionally salient images of negative valence or neutral greyscale images, each with a different level of applied noise as stimuli. In experiments one and two the task was to remember and match the stimuli's level of vividness on a subsequent image using a slider. The subsequent image being the same

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or different image. Contrary to previous research, participants in this experiment applied significantly more noise to emotional images at test when compared to neutral images. This effect was thought to be driven by EEV during the testing phase outweighing the memory of the image. To elucidate this effect a psychophysical staircase experiment was conducted using the same stimuli, finding the enhancements present at perception.
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4:00-6:00 PM (2339)

Studying Independence of Facial Identity and Expression Processing with Highly Controlled Stimuli and Decisional Factors. S. SANAZ HOSSEINI (J. Frank Yates Student Travel Award Recipient) and FABIAN SOTO, *Florida International University* (Sponsored by Fabian Soto) – Independent processing of facial identity and expression has been studied extensively and no definitive conclusion has been obtained. This could be caused by insufficient control for stimulus and decisional factors. In this study, we identify confounds in the literature and present the results of our study with 3D realistic computer-based identity and expression models. This enabled us to control for low-level features, expression intensity, and discriminability of the identities and expressions. Two identification experiments with different identities per emotional expression were conducted. All six basic emotional expressions were tested against the neutral expression. Data was modeled with General Recognition Theory, to dissociate decisional factors from perceptual effects. Models showed robust violations of perceptual independence of identity and expression for all stimuli. Violations of decisional separability were frequently observed across tests. Except for happiness and anger, the results for perceptual separability were inconsistent for other expressions. For anger, expressions and identities were perceptually separable. For happiness, expressions were perceptually separable from identities but not vice-versa.
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4:00-6:00 PM (2340)

High-Definition Transcranial Direct Current Stimulation of the Lateral Occipital Cortex Influences Figure-Ground Perception. BROOKE SASIA and LAURA CACCIAMANI, *California Polytechnic State University* – Prior work has shown that the lateral occipital cortex (LOC) is involved in object recognition, but few studies have examined how its function is influenced by brain stimulation. The present study tested whether high-definition transcranial direct current stimulation (HD-tDCS) to the right LOC influences the effects of familiarity on figure-ground perception. Following 20 minutes of stimulation, participants viewed masked stimuli consisting of two regions separated by a vertical border and were asked to report which region they perceived as figure. One region was the "critical" region, which either depicted a familiar object ("Familiar"), or a familiar object with its parts rearranged into a novel configuration ("Part-rearranged"). The results of the current study showed that HD-tDCS to the right LOC significantly influenced this typical behavioral pattern. Specifically, stimulation increased reports of the critical region as figure for Part-rearranged stimuli. We interpret this as evidence that stimulation of the right LOC increased participants' reliance on the familiarity of the parts in their figure-ground judgements—a finding consistent with and extending previous research showing that the LOC is sensitive to object parts.
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4:00-6:00 PM (2341)

Psychophysical Study of Dependence of the Filled-Space Illusion on the Location of Contextual Distractor. VILIUS MARMA, ALEKSANDR BULATOV, NATALIJA BULATOVA, and LINA MICKIENĖ, *Lithuanian University of Health Sciences* (Sponsored by Aleksandr Bulatov) – The aim of the study was to further develop a quantitative model of the filled-space illusion and test it to account for the effects caused by stimuli containing distracting line-segments of various lengths and positions. Illusion was studied as a function of the distance between the distracting lines and the lateral terminator of the reference spatial interval of the three-dot stimulus. Data obtained in three different series were fitted with relevant functions of the model. It was shown that the model satisfactorily describes all changes in the illusion magnitude for stimuli with a distracting line located either outside or inside the interval, as well as for a stimulus with two lines located symmetrically relative to the lateral terminator. In addition, the model was successfully applied to fit the experimental data previously obtained for conventional Oppel-Kundt stimuli. A good correspondence between the experimental and theoretical results supports the suggestion that the context-evoked augmentation of neural excitation can determine the occurrence of the filled-space illusion.
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4:00-6:00 PM (2342)

Limitations on Animacy Categorization in Ensemble Perception. VLADISLAV KHVOSTOV and YURI MARKOV, *HSE University,* TIMOTHY BRADY, *University of California, San Diego,* IGOR UTOCHKIN, *HSE University* (Sponsored by Timothy Brady) – People can rapidly categorize the animacy of objects and scenes. Does this imply an unlimited capacity for processing animacy across the entire visual field? We generated a set of morphed "animacy continua" between animate and inanimate silhouettes. Observers judged the relative numerosity of animate/inanimate items in briefly presented sets. The distribution of items was either "segmentable" (including only definitely animate and inanimate items) or "non-segmentable" (middle-value, ambiguous morphs were also presented). Observers failed to integrate animacy from multiple items, as they showed very poor performance and were not sensitive to the distribution type despite ~100% individual objects categorization rate. The same manipulation with color as a category-defining dimension elicited both good individual and ensemble categorization performance and a strong segmentability effect. We conclude that good individual categorization does not necessarily allow people to build ensemble animacy representations, showing the limited capacity of animacy perception. Funding: RSCF (18-18-00334).
Email: Vladislav Khvostov, khvostov.vladislav@gmail.com

4:00-6:00 PM (2343)

Canonicality and Anthropomorphism of Cacti in Imagery and Comics. MATTHEW LANGLEY, MICHAEL MCBEATH, and SUZANNE KHALIL, *Arizona State University* (Sponsored by Arthur Glenberg) – We examined extent of stereotyping and imposition of canonical orientations and vertical symmetry for drawings, web images, and comic strips of cacti. Experiment 1 participants were instructed to draw a cactus (type

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unspecified) and these were compared to web-based control images. Figures were examined for commonality of type of cactus, and occurrence/degree of aspects of canonicality, and symmetry. Findings replicated work showing that participants exhibited an overwhelming tendency to draw 2-armed saguaros that are more symmetric than control images from both the real-world and the web. Drawn images were generally vertically symmetric, with arms oriented within the picture plane, apparently an archetypical, possibly anthropomorphic canonical representation. Experiment 2 examined stereotyping in 50 cacti comic strips, and found the majority represented them anthropomorphically, either physically or implied. Results confirm that drawn depictions favor simple, canonical views oriented flatly within the picture plane. The comic strip analysis also confirms a strong tendency to anthropomorphize either directly or abstractly. Natural regularities of 3-D bilateral symmetry and human form are imposed and the depth dimension minimized.
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4:00-6:00 PM (2344)

An Immersive Contour-Drawing of a Real 3D Scene. MADDEX FARSHCHI, ALEXANDRA KIBA, and TADAMASA SAWADA, *HSE University* – People can see the 3D shape of an object reliably from its contour drawing. Three D perception based on drawings has been tested in many studies, but it is not clear how useful this kind of contour information actually is in a real dynamical scene in which people interact with objects. To address this issue, we developed an augmented reality (AR) device that can show an observer a contour-drawing of a real dynamical scene in real time. The device can be worn as a head-mounted display and the observer can see the real scene "out there" in an immersive manner. We conducted three behavioral experiments using this AR device to test human performance in a variety of run-of-the-mill tasks seen with contour-drawings. We found that contour information, alone, is sufficient to perform these tasks effectively. This result suggests that contour information may be sufficient to provide a basis for the human visual system to obtain all of the 3D information needed for successful visuomotor interactions in our everyday life.
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4:00-6:00 PM (2345)

Understanding Peripheral Vision Using Mental Maze Solving. YELDA SEMIZER, *New Jersey Institute of Technology,* DIAN YU and RUTH ROSENHOLTZ, *Massachusetts Institute of Technology* – Peripheral vision likely plays a significant role in piecing together multiple views and producing a stable percept of the visual world. The current study investigated peripheral vision by measuring maze solving performance as a function of maze appearance. In Experiment 1, observers solved a series of mazes while their maze solving time and eye-movements were recorded and compared to a peripheral vision model (The Texture Tiling Model; TTM). The perceptual features of mazes were manipulated to alter the level of complexity. Observers were slower and made a larger number of eye-movements while solving crowded mazes, as predicted by TTM, although TTM underpredicted the number of fixations. To examine this underestimation tendency, Experiment 2 tested whether observers could detect targets placed on/off the maze paths near the model fixation locations. Preliminary data suggest that observers seem to perceive further along the path than their choice of fixation locations.
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4:00-6:00 PM (2346)

Probability Cueing Reveals Asymmetry of Attentional Limits in Crowding. KOEN RUMMENS, *University of Bern,* BILGE SAYIM, *University of Bern & Université de Lille* (Sponsored by Bilge Sayim) – Crowding occurs when surrounding objects impair target identification. Typically, crowding is demonstrated with attention focused on a single, task-relevant item. Here, we investigated crowded letter recognition under different levels of focused attention, varying the number of task-relevant items. Observers reported either the inward, central, or outward letter of a letter trigram, indicated by a pre-cue (Experiment 1) or post-cue (Experiment 2). Target letter positions varied in probability (100, 80, 50, or 33 percent). Both experiments revealed worse performance for the central compared to both inward and outward letters. In Experiment 1, increasing target probability improved accuracy at all letter positions. In Experiment 2, higher target probability did not affect central letter accuracy, yet improved outward and, to some extent, inward letter accuracy. Overall, the effect of probability cueing strongly depended on task relevance and target locations. Our results suggest an asymmetry of attentional limits in crowding.
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4:00-6:00 PM (2347)

Spatially Intermixed Objects of Different Categories Are Parsed Automatically. ANTON LUKASHEVICH, VLADISLAV KHVOSTOV, and IGOR UTOCHKIN, *HSE University* – Recent evidence suggests that people can rapidly categorize spatially intermixed objects based on the shape of a feature distribution. A distribution with several peaks favors the perception of several categories of objects (e.g. apples among leaves). Here, we asked whether rapid categorisation is automatic. We tested it using visual mismatch negativity (vMMN), an ERP component related to automatic change detection. Our observers were engaged in a central task diverting attention from sequentially presented background textures with different combinations of length and orientation, which could have two-peaked or uniform distributions. The oddball event was the change in the sign of length-orientation correlation. We found evidence of vMMN in response to oddballs when both length and orientations had two-peaked distributions, which, as previous behavioral data show, support categorical segmentation of different object types. This allows us to consider rapid categorization an automatic, "pre-attentive" process.
Funding: RSCF (18-18-00334).
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4:00-6:00 PM (2348)

Response Bias in Numerosity Perception at Early Judgments and Systematic Underestimation. ASLI KILIC, *Middle East Technical University,* ASLI BAHAR INAN, *Cankaya University* – Mental number representation relies on mapping numerosity based on non-symbolic stimuli to symbolic magnitudes. It is known that mental number representation builds on a logarithmic scale, and thus numerosity decisions result in underestimation. In the current study, we investigated the temporal dynamics of numerosity perception in four experiments by employing the response-deadline SAT procedure. We presented random number of dots and required participants to make a numerosity

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judgment by comparing the perceived number of dots to 50. Using temporal dynamics in numerosity perception allowed us to observe a response bias at early decisions and a systematic underestimation at late decisions. In all three experiments, providing feedback diminished the magnitude of underestimation, whereas in Experiment 3 the absence of feedback resulted in greater underestimation errors. These results were in accordance with the findings suggesting feedback is necessary for the calibration of mental number representation.
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4:00-6:00 PM (2349)

The Effect of the Perspective on the Spatial Interpretation of Pointing Gestures. LISA-MARIE KRAUSE and OLIVER HERBORT, *Julius-Maximilians-Universität Würzburg* – Although pointing is ubiquitous in daily communication, observers often fail in interpreting pointing gestures correctly. Here, we examined whether the observer's perspective decisively influences the interpretation and, therefore, leads to systematic biases in pointing perception. To test this hypothesis, we asked participants to guess where a virtual pointer was pointing in a VR environment and manipulated the observer's position and height of view as well as the pointer's arm orientation. As expected, identical pointing gestures were interpreted differently from different viewpoints. More specifically, the more the observer moved from a viewpoint behind the pointer to a position on the pointer's right side, the more pointing gestures were perceived as directed at a left- and upward location. Interestingly, observers' interpretations were biased from all included positions indicating that there is no perfect perspective that allows the unbiased perception of pointing gestures.
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4:00-6:00 PM (2350)

Figure-Ground Reversibility of Abstract Stimulus Configurations Influenced by Watercolor Illusion. RALPH HALE, *University of North Georgia,* BENJAMIN MCDUNN, *University of Idaho* – The watercolor illusion (WCI) is a color spreading illusion induced by a contrasting outer border and inner colored fringe. The resulting perception is a pale illusory diffusion of a hue similar to the fringe. Previous research has demonstrated the WCI can bias a reversible faces-vase stimulus (Hale, 2019). Because only the faces-vase image was tested, one possibility is that this effect is unique to the faces-vase image or other images with strong semantic content. To test this, the current study used a set of images without semantic information. Several stimuli were used that consisted of a centrally located white square on a gray background, with squares divided into two parts by a wavy vertical contour. Each image had three WCI conditions (no WCI, WCI left, WCI right). Results showed a main effect of WCI with significant pairwise comparisons between all three WCI conditions. This study supports previous work by Hale and others suggesting the WCI acts as a strong figural cue and is able to bias reversible stimuli, with or without semantic content.
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4:00-6:00 PM (2351)

Manipulating the Appearance of Stairs to Increase Perceived Step Height. SMRUTHI VENKATESHAN, *McMaster University,* ALLISON SEKULER, *Rotman Research Institute, University of Toronto, Baycrest Health Sciences & McMaster University,* PATRICK BENNETT, *McMaster University* (Sponsored by Allison Sekuler) – Falls on stairs are a leading cause of injury among older adults. Perceived step height may be increased with appropriately placed high-contrast gratings, which may cause people to lift their foot higher than the minimum required to clear steps (Elliot et al., 2015). In two experiments, we measured perceived step height with high contrast (98.8 %) gratings that varied in spatial frequency and low contrast (12.5%) with fixed spatial frequency. On each trial, participants saw line drawings of two staircases, one with a textured bottom step and another without, and judged which one was taller. Reference height varied across trials, and the Point of Subjective Equality was derived from psychometric functions. High-contrast textures increased perceived step height by approximately 5% at all spatial frequencies, and the magnitude of the effect was greater (15%) with low contrast textures. These results suggest a simple visual illusion might lead to a safer stepping strategy.
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4:00-6:00 PM (2352)

Vertical Anisotropy in Lightness Perception: An Inversion Effect of Lightness Not Caused by Lighting Prior. YUKI KOBAYASHI, *Ritsumeikan University,* KAZUNORI MORIKAWA, *Osaka University* – Kobayashi and Morikawa (2019) showed an illusory effect where an image of an upward-facing gray panel appears darker than a 180-degree inversion of the same image. This inversion effect was attributed to the visual system's prior assumption about lighting direction. However, a possibility that a low-level feature in the image (existence and luminance of the panel's edge) contributed to the effect remained unexamined. In the present study, we measured magnitudes of the inversion effect by manipulating the edge's position, contrast polarity, and existence. The results suggested that the inversion effect occurs even without an edge but also showed that the edge's position and contrast polarity influence the inversion effect independently of lighting prior. The present results not only support the previous study's interpretation that lighting prior causes the inversion effect but also suggested the contribution of the panel's edge to the effect.
Email: Yuki Kobayashi, y-koba@gst.ritsumeikan.ac.jp

4:00-6:00 PM (2353)

Drawings of Cubes by Blind Adults: Inverse Perspective and Parallel Perspective? SELENE CARBONI, MARTA WNUCZKO, and JOHN KENNEDY, *University of Toronto* – Linear perspective governs vision and touch. With distance, azimuth size foreshortens at a linear rate and elevation at a quadratic. But other forms of perspective appear in drawings by the sighted and blind at several phases of drawing development. Before they use 3D foreshortening, drawings by the sighted follow principles that result in inverse perspective and parallel perspective. Drawings by blind people may do so, too. Here we show drawings with inverse perspective and parallel perspective. One is in a drawing by a blind woman and the other in a drawing by a blind man.
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Poster Session III

Saturday
Poster authors will be present for Q&A

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between 4-6 PM EST, with posters available for viewing for 6 months, beginning November 6.

POSTER SESSION III

4:00-6:00 PM (3001)

The Effect of Gaze-Oriented Attention on Handle-Response Compatibility Effects. ELISA SCERRATI, SANDRO RUBICHI, and CRISTINA IANI, *University of Modena and Reggio Emília* – This study tested the effect of gaze-oriented attention on the handle-response compatibility effect that refers to faster performance when the responding hand is aligned with the graspable part of an object compared to when they lay on opposite sides. Specifically, we manipulated the direction of gaze in a cueing face and used a photograph of a graspable object (i.e., a cup) as the target stimulus. Participants were required to judge, as fast as possible, whether the target object was upright or inverted ignoring the orientation of its handle. Provisional results show that gaze direction affected response speed on the graspable target. That is, responses were faster when the handle and the response key were on the same side (handle-response compatible trials) as compared to when they were on different sides (handle-response incompatible trials), provided that the cuing face looked away from the handle. This preliminary finding suggests a complex interplay between gaze-oriented attention, its social function and motor control, such that acting on an object is facilitated when the object is not the focus of attention of someone else.
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4:00-6:00 PM (3002)

Graded Modulation of Stimulus-Response Bindings by Intervening Events. RYAN WILLIAMS, JAY PRATT, and SUSANNE FERBER, *University of Toronto* (Sponsored by Timothy Welsh) – Do stimulus-response bindings survive updating of attentional control settings? Are such effects influenced by intervening events associated with the previous response? To answer these questions, we employed a contingent capture task with trial-by-trial updating of a target-defining feature (i.e., color). Non-predictive pre-cues matched the current target color, the previous target color, or neither (neutral color). While we found that attentional capture was selective to the current target color, we nonetheless observed a persistent influence of the previous target at the response level as evidenced by a partial repetition cost. The magnitude of this cost was moderated by cue color such that the effect was largest when the cue matched the current target color, weakest following neutral colored cues, and intermediate for cues matching the previous target color. We conclude that stimulus-response bindings do survive updating of attentional sets. Further, whether an intervening event disrupts such bindings depends on its relationship to the current and previous target features rather than that of the current and previous responses.
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4:00-6:00 PM (3003)

Does Visually Guided Touch Interfere with Multiple-Object Tracking (MOT)? MALLORY TERRY and LANA TRICK, *University of Guelph* (Sponsored by Lana Trick) – Many tasks in everyday life require individuals to keep track of the positions of several moving items among others, as occurs while playing team sports or pointing out some friends in a crowded shopping centre. This ability is referred to as multiple-object tracking (MOT), and it has been proposed to involve cognitive mechanisms that overlap with the requirements for coordinated action

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(Pylyshyn, 2001). While theoretically proposed, the nature of the relationship between visually guided touch and MOT has yet to be determined. Therefore, we investigated this in a series of experiments using a standard MOT task with 1-4 targets in a 10-item display. In some conditions, participants were instructed to touch items that changed colour, either a target or distractor item (depending on the condition). Overall, the requirement to touch items decreased tracking performance relative to conditions without touch. Similarly, we found decrements in the touch task when participants completed both tasks concurrently. As predicted, touching distractors was consistently more detrimental to performance than targets. We conclude that visually guided touch interferes with tracking performance with the degree of interference differing based on the item.
Email: Mallory E. Terry, terry@uoguelph.ca

4:00-6:00 PM (3004)

Simon Effects with Two Targets: Do Multiple Concurrent Spatial Codes Influence Response Selection at the Same Time? JAMES MILES, *California State University, Long Beach* – Stimulus locations elicit spatially corresponding responses, even when their locations are irrelevant for response selection (the Simon effect). Researchers commonly attribute this bias to spatial codes shared between perception and action. The current work investigates whether spatial codes from multiple spatial targets concurrently contribute to response performance. We report several experiments using a modified Simon task, in which two target boxes simultaneously appeared at the top and bottom of a display and either to the left or right side. Participants made a left or right response based on the color of either target (Experiment 1), only one of the targets (Experiment 2), or both targets (Experiment 3). Results show that concurrent spatial targets additively affect response selection and their spatial codes are weighted differently based on target location and the focus of attention. Time course analyses further found that the spatial influence of multiple targets is concurrent rather than sequential.
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4:00-6:00 PM (3005)

Effects of Distractor Modality on the Inhibition of Irrelevant Spatial Information: Insights from Mouse Movement Trajectories in an Accessory Simon Task. MALTE MÖLLER and SUSANNE MAYR, *University of Passau* – Lateralized responses to central targets are slowed-down when a distractor is presented contralaterally (incongruent trial) as compared with ipsilaterally (congruent trial) to the response side. This so-called accessory Simon effect decreases and even reverses with increasing distractor-target intervals, indicating the inhibiton of irrelevant spatial codes. Current findings propose that the strength of inhibition is affected by matching target-distractor modalities. In the present study, participants responded to the shape of a central target by moving the mouse cursor from a central position to the upper left or right corner of the screen. A lateralized visual (Exp. 1) or auditory (Exp. 2) distractor occurred prior to or simultaneously with a visual target. Response times, error rates, and mouse trajectories were analyzed. The Simon effect decreased with increasing intervals, but only reversed in Experiment 1. Mouse movements generally veered towards the distractor location with short intervals but veered away from the distractor location with longer intervals only in Experiment 1. The results indicate that spatial distractors (1) affect response execution and (2) are more strongly inhibited when presented in the target modality.
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4:00-6:00 PM (3006)

Perceived Reachable Distance in Adults with Autism Spectrum Disorder Without Intellectual Disabilities. AYAKO SANEYOSHI, HIMIKO TOYAMA, and NAOKO INADA, *Teikyo University,* MASAKI TSUJITA, *The University of Tokyo,* TOMOE HAYAKAWA, *Teikyo University,* SHIN'ICHIRO KUMAGAYA, *The University of Tokyo* – We investigated the accuracy of the perceived reachable distance of adults with autism spectrum disorder (ASD, n=15) without intellectual disabilities and typically developing (TD, n=24) that matched IQ and age to ASD adults. Participants were asked to press the designated keys to move the horizontally presented line to the distance they thought they could reach on the table. In the distant condition, the line was initially presented far from participants and they should move the line closer to their body. In the near condition, the line was initially presented close to the participants, so that they should move the line away. Although the estimated distance was almost accurate, the perceived reachable distance was overestimated in the distant condition than the near condition only in ASD group. These results suggested that the perceived reachable space would be changed in ASD depending on whether the stimulus approached or moved away.
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4:00-6:00 PM (3007)

Multidimensional Recurrence Quantification Analysis of Human-Metronome Phasing Performance. CAITRÍN HALL, JI CHUL KIM, EDWARD LARGE, and ALEXANDRA PAXTON, *University of Connecticut* – Sensorimotor synchronization (SMS), the rhythmic coordination of perception and action, is often studied as motor responses to auditory stimuli. The current study assesses phasing—a compositional technique in which two people tap the same rhythm at varying phases by adjusting tempi—to explore how SMS is impacted by music and language experience. Participants were introduced to the concept of phasing via various demonstrations, completed two practice sessions, and then engaged in the experimental phasing task with a metronome at tempi ranging from 80 to 140 beats per minute. Multidimensional recurrence quantification analysis was used to compare the nonlinear dynamics of phasing performance across tempi and individual factors, including musical experience and multilingualism. Our findings shed light on the way that musical and linguistic factors shape coupling between motor behavior and auditory stimulus.
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4:00-6:00 PM (3008)

Vocal Production as a Measure of Linguistic Associations between Space and Pitch. JAMES MANTELL and RACHEL STEELMAN, *St. Mary's College of Maryland* – People associate linguistic labels with perceptual experiences and these associations might influence psychological processing. For example, Dolscheid et al. (2013) found that spatial-pitch associations affected performance within a nonlinguistic task. We replicated Dolscheid et al.'s procedure with an appropriately powered sample. Participants vocally imitated nine pure tones that were

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presented once each with nine height-varying horizontal lines displayed on a computer monitor. We predicted that participants' imitations would positively relate to the height of both auditory and visual stimuli. The results revealed a very strong, significant main effect of auditory height, as expected. The effect of visual height was in the predicted direction, but it was very weak and only marginally significant. This result offers modest support for the influence of spatial-pitch associations on pitch production. We plan to expand this work with fine-grained analyses of produced pitch and additional data collection studies that assess other putative linguistic-pitch associations.
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4:00-6:00 PM (3009)

Do We Make Good Partners? Individuals Adapt their Rates More to a Faster Partner than a Slower Partner in Turn-Taking Contexts. VALENTIN BÉGEL, *McGill University,* ALEXANDER DEMOS, *University of Illinois at Chicago,* SASHA SORGERBROCK and CAROLINE PALMER, *McGill University* – Previous studies have shown large individual differences in how people synchronize their movements with sound. Yet little is known of how social turn-taking contexts influence these individual differences. We asked participant pairs to first produce melodies at their spontaneous (uncued) rate. Then they synchronized their productions with a metronome whose rate was set to match their spontaneous rate or their partner's rate, both in solo (alone) and turn-taking (together) conditions. In the turn-taking condition, partners showed greater synchrony when the metronome was set to their rate than to their partner's rate. Partners' asynchronies were larger (more anticipatory) in the turn-taking condition when the disparity in partners' spontaneous rates was greater, and when the metronome cue was set to the slower partner's rate. Overall, individuals' synchronization with a metronome that was cued at their partner's rate was influenced by the social turn-taking context; partners could speed up to match the faster partner's rate but could not slow down to the slower partner's rate.
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4:00-6:00 PM (3010)

Action Effect Consistency and Body Ownership in the Avatar-Simon Task. CHRISTIAN BÖFFEL and JOCHEN MÜSSELER, *Rheinisch-Westfälische Technische Hochschule Aachen University* (Sponsored by Jochen Müsseler) – In this study, we address the role of action effect consistency for spontaneous perspective taking and body ownership when a person interacts with an avatar. We manipulated the participants' sense of agency over a task-irrelevant avatar in a Simon task by providing either corresponding or random action effects. These effects could be either embodied and therefore linked to the avatar (Experiment 1) or independent of it (Experiment 2). We used stimulus-response compatibility effects from the avatar's point of view as a measure for spontaneous visual perspective taking and a questionnaire to measure the perceived body ownership of the avatar. The results showed that corresponding action effects lead to increased spontaneous perspective taking, regardless of whether the effect was linked to the avatar. However, the avatar compatibility effects were overall more pronounced in the embodied action effect condition. Significant differences in perceived body ownership were only observed with linked action effects.
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4:00-6:00 PM (3011)

You See It and You Do it: Perceived and One's Own Motion in Response Priming. CHRISTINA BERMEITINGER and RYAN HACKLÄNDER, *University of Hildesheim* – By use of the response priming paradigm with moving primes, the interaction of perceived and one's own motion can be investigated. In response priming, motor pre-activations from a prime to the response to the target can be measured. Either prime and target call for the same response (i.e., compatible) or prime and target call for different responses (i.e., incompatible). With moving primes, the results strongly depend on the SOA between prime and target: with short SOAs, there were faster responses to compatible than incompatible targets, with longer SOAs, a reversed effect occurs. This reversal was not found with biological motions. In the current study, subjects performed a response priming task while in motion themselves. Across 3 experiments, we used two different own motions (walking on a treadmill; rotating in a human gyroscope) and two different perceived prime types (moving rows-of-dots vs. static; point light displays). Compatibility effects depended on the prime type, the velocity of one's own motion, and several interactions of perceived and own motion. We discuss our findings with respect to previous findings as well as theories on response priming and perception-motion interaction.
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4:00-6:00 PM (3012)

The Effect of Viewing Distance and Two Types of Feedback on Passing Through an Augmented Reality Aperture. HOLLY GAGNON, *University of Utah,* DUN NA, *Vanderbilt University,* KEITH HEINER, JEANINE STEFANUCCI, and SARAH CREEM-REGEHR, *University of Utah,* BOBBY BODENHEIMER, *Vanderbilt University* (Sponsored by Sarah Creem-Regehr) – Augmented reality (AR) devices severely restrict field of view (FOV), which limits the amount of visual information available for perceiving action capabilities. In two experiments, we presented an AR aperture via the Microsoft HoloLens and manipulated visual information for aperture extent in the FOV by having observers view from two distances (0.85m, 3.2m). We assessed whether feedback given over trials could calibrate judgments. In Experiment 1, verbal feedback was provided from a static viewpoint. In Experiment 2, viewers physically walked through the apertures, receiving perceptual-motor feedback. In both experiments, feedback altered passing through judgments. Verbal feedback influenced judgments at 3.2m, by calibrating judgments to be closer to shoulder width. Perceptual-motor feedback also calibrated judgments but resulted in increased overestimation at both distances. Estimations at 0.85m matched previously found real world judgments. These results suggest that action capability judgments in AR are influenced by viewing distance and calibrated differently by different forms of feedback.
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4:00-6:00 PM (3013)

Lose Yourself? Suppression of Interfering Body-Internal and – External Signals When Preparing and Carrying Out an Action. MARVIN LIESNER and WILFRIED KUNDE, *Julius-Maximilians-Universität Würzburg* (Sponsored by Wilfried Kunde) – When controlling an external object through one's body movements, performance (e.g., reaction times) is usually superior when body and object move in similar rather than

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dissimilar directions. However, participants' conscious experience usually does not mirror this performance effect, possibly because participants suppress potentially interfering information from their body ("haptic neglect") and/or the object movement. In two experiments, we found evidence for the suppression of both, body-internal and –external action components when the two were spatially discrepant. In Experiment 1, participants compared intensities of tactile stimulations, which were experienced as weaker on the body effector when participants were planning a hand movement causing an object moving in the opposite rather than the same direction. Experiment 2 demonstrated suppression of conflicting action effects during the movement itself and furthermore showed that the "decision" which component (body-internal vs. –external) is suppressed depends on their relative task relevance.
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4:00-6:00 PM (3014)

Practice and Transfer of Incompatible and Compatible Mappings of Spoon Tip and Handle to Responses. YAQI XU, *Purdue University,* AIPING XIONG, *The Pennsylvania State University,* ROBERT PROCTOR, *Purdue University* – The tip and handle of a horizontal spoon image are on opposite sides. When left-right spoon orientation varies, instructions can map left-right keypresses to the salient tip or handle location. In Experiment 1, participants received 80 practice trials with incompatible-tip mapping in session 1 and performed 80 test trials with that mapping or compatible-tip, compatible-handle, or incompatible-handle mapping in session 2. In session 2, responses were 65-ms faster with compatible-tip than incompatible-tip and 30-ms faster with handle-incompatible than handle-compatible, suggesting that some participants responded compatibly to the salient tip under handle-incompatible instructions. In Experiment 2, participants responded with handle-incompatible mapping in both sessions but received instructions prior to session 2 to adopt a strategy to speed responses. 86% reported adopting the tip-compatible strategy spontaneously in session 1. For the remaining participants, reaction-time and percent-error showed poor performance in the first half of session 2 but not in the last half.
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4:00-6:00 PM (3015)

The Transfer of Perceptual-Motor Recalibration between Virtual and Naturalistic Environments. KEI YOSHIDA and BENJAMIN CHIHAK, *Coe College* (Presented by Benjamin Chihak) – Informal observation indicates humans adjust their actions to adapt to changes in the environment. The perceptual-motor system's ability to recalibrate to novel circumstances has been studied in both naturalistic contexts (e.g., Pick et al., 1999; Rieser et al., 1995) and virtual environments (e.g., Kuhl, 2004; Kuhl et al., 2008; Mohler et al., 2004; Ziemer et al., 2013). The current study investigated whether recalibration effects generated in one context (naturalistic or virtual) would transfer to the other. A pre-test, recalibration, post-test paradigm was employed. In the test phases participants were asked to turn to face a previously seen visual target in the absence of vision. In the recalibration phase, participants side-stepped on a circular treadmill at twice the speed of their actual rate of rotation through the world. This mismatch between the participants' rate of stepping and rate of visual rotation created an overshooting effect at post-test. Participants experienced the testing and recalibration conditions either naturalistically or virtually through an HMD. Results showed that recalibration effects generated in the virtual environment carried over into testing in the naturalistic environment, and vice-versa.
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4:00-6:00 PM (3016)

Foot Placement Depending Upon Intended Direction of Object Displacement. DYLAN LOUTH and DAVID ROSENBAUM, *University of California, Riverside* (Sponsored by David Rosenbaum) – Preparing for forthcoming actions is often measured by studying neural activity, muscle activity, and subtle variations in posture. But large-scale postural variations occur as well, though they may occur without awareness and have scarcely been noticed by Psychonomic scientists and other researchers. We identified such a class of postural variations here. We asked people to walk up to a box when they knew they would pick and carry the box to the left or to the right, or when they did not know which way they would have to go with the box. Consistent with our expectations, we found that foot placements and whole-body turns depended on participants' knowledge. Our findings suggest that coordination between hands and feet is task specific and that whole-body positions can be used to reveal knowledge of future states.
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4:00-6:00 PM (3017)

Does Adding a Short Home Video with a Silver Alert of a Missing Couple Increase Face Recognition Accuracy? VICKI GIER, *Mississippi State University Meridian,* DAVID KREINER, *Mississippi State University Meridian & University of Central Missouri* – In the present research, we extend research on recognizing a missing person in a Silver Alert to missing couples. Participants (N=85) saw a Silver Alert, watched a video, and then attempted to identify photos of the two individuals in the alert. Participants were more likely to recognize the man than the woman. Participants with more negative attitudes toward the elderly were less likely to recognize the missing woman, but the difference was not significant for the man. In a second study (N = 1,654), we manipulated whether the couple appeared together, separately, or not at all in the video. Participants were more likely to recognize the missing man when the couple was shown in the video compared to a control video. Showing a video in addition to a Silver Alert may aid in recognition, but we cannot assume that recognition will be equal for both members of a couple.
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4:00-6:00 PM (3018)

Determining the Locus of Divided Attention's Disruption on Encoding and Retrieval Processes. REED DECKER and MOSHE NAVEH-BENJAMIN, *University of Missouri* (Sponsored by Moshe Naveh-Benjamin) – Craik et al. (1996) demonstrated that concurrent choice reaction time tasks have an adverse effect on encoding of memoranda, but less so on retrieval processes. However, it is unclear if this disruption is caused by distraction, attending to multiple stimuli at once, processing these stimuli to make a decision, making a motor response to these stimuli, or some combination of these effects. In this series of experiments, we compared cued-recall performance under full and divided attention during encoding or during retrieval to memory performance during a distraction task, a motor response task, or a stimuli

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detection task. We found that while only the concurrent motor response and detection requirements, but not distraction, had a detrimental effects especially on encoding processes, the combination of these effects was not sufficient to explain prior results regarding the effects of divided attention on encoding processes. We conclude that the effect of divided attention on encoding, but not on retrieval, is based on the combined detrimental effects of decision making, detection, and motor response.
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4:00-6:00 PM (3019)

Robust Bias in Memory for the Source of News Stories. KAREN MITCHELL, JACLYN FERRARO, and NOAH LESSNER, *West Chester University of Pennsylvania* – Stereotypes about news sources bias memory for the source of news stories (Mitchell et al., 2017; 2018). Participants were given news headlines with a brief clip from the story, along with a source for each (The New York Times or Buzzfeed). Stories varied on how typical they were of the given source. A source memory test followed. Between groups: (1) We emphasized the source-story pairing at encoding by repeating the name of the source within the text of the story. This should reinforce the source-item pairing (e.g., Kuhlmann et al., 2012). (2) The source test was incidental or intentional. Consistent with our previous findings, participants showed significant rates of stereotype consistent source memory errors. These findings highlight the idea that stereotypes create strong biases in source memory that can be difficult to overcome (e.g., Marsh et al., 2006).
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4:00-6:00 PM (3020)

Ironic Effects of Stereotype Threat on Strategy Use in the Noun-Pair Lookup Task. MATTHEW HUGHES and DAYNA TOURON, *University of North Carolina at Greensboro* – Older adults often avoid using their memory even when they have memorized the necessary information. Stereotype threat may influence this memory avoidance. In two studies, we compared memory strategy use in the noun-pair lookup task. Study 1 showed no difference in older adults' retrieval use between a threat relief condition and control, but the relief condition had lower accuracy and faster reaction time, suggesting a less conservative speed-accuracy tradeoff. In study 2, an additional condition under stereotype threat used retrieval more often than the relief and the control conditions. Both the relief and the threat conditions responded faster than control, and both conditions were significantly more accurate than control. The ironic effects of stereotype threat obtained here are consistent with research showing that stereotype threat may improve metacognitive monitoring, which is linked to better performance in some tasks and may affect speed-accuracy tradeoffs in older adults.
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4:00-6:00 PM (3021)

Contextual Influences on Monitoring and Control Strategies in Self-Regulated Learning. SKYLAR LAURSEN and CHRIS FIACCONI, *University of Guelph* (Sponsored by Chris Fiacconi) – Across three experiments we provide support for the view that judgments of learning (JOLs) are sensitive to relative differences between items, and extend this principle by examining the impact of such relative differences on metacognitive control strategies, including re-study selection and study-time (ST) allocation. Consistent with previous findings, we demonstrated that items of equal difficulty are judged to be more or less memorable depending on whether they are presented mixed together with items of lesser or greater difficulty. Moreover, with respect to metacognitive control strategies, we found that relative differences between items influenced re-study selection and moderated the link between ST and JOLs, but did not impact the overall amount of ST allocated to a given item. Together, these findings highlight the importance of relative differences among items in both the monitoring and control of learning and may inform guidance on how to engage in effective self-regulated learning strategies.
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4:00-6:00 PM (3022)

Individual Criterion Shifting Is Associated with Measures of Metacognition. SARA LESLIE, EVAN LAYHER, COURTNEY DURDLE, TYLER SANTANDER, and MICHAEL MILLER, *University of California, Santa Barbara* (Sponsored by Michael Miller) – High inter-individual variability and high intra-individual stability have been observed in the extent to which people shift their decision criterion during recognition memory tasks. We systematically assessed whether the extent to which individuals shift their criterion is associated with metacognitive measures. Participants completed tests of recognition memory involving three different response conditions; participants either reported confidence simultaneously with an old/new judgment, reported confidence retrospectively following an old/new judgment, or reported an old/new judgment with no confidence assessment. Criterion shifting was induced using a payoff manipulation. Examining data from 126 individuals, we found a strong positive relationship between metacognitive efficiency and the extent of criterion shifting, regardless of the difficulty level or whether confidence was reported simultaneously or retrospectively, and when criterion shifting was calculated from trials with no confidence report. Metacognitive bias showed a modest negative relationship with the extent of criterion shifting. Aspects of metacognition may be related to observed individual differences in criterion shifting.
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4:00-6:00 PM (3023)

Investigating the Illusory Truth Effect Under Polarized Beliefs in Climate Change. YANGXUEQING JIANG and ERYN NEWMAN, *The Australian National University,* NORBERT SCHWARZ, *University of Southern California* (Sponsored by Eryn Newman) – A large literature on the illusory truth effect (ITE) has shown that repetition can increase perceived validity of a claim. The present experiments examine the ITE in the context of more polarizing personal beliefs (ie, belief in climate change/climate science). In the experiments presented here, we assessed people's beliefs and attitudes towards climate change and then used a standard ITE paradigm to measure susceptibility to illusory truth for climate change-related claims (claims about weather). Across two experiments, even with varying beliefs, we found little variation in susceptibility to ITE. Drawing on these preliminary findings we consider the role of belief measurement in understanding the role of familiarity in assessments of truth for more polarizing topics.
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4:00-6:00 PM (3024)

Does Perception of Attitude Change Following Persuasion Depend on Handedness? SARAH FRENCH and KEITH LYLE, *University of Louisville* – Superior episodic memory has been linked to weak or inconsistent hand preference (e.g., writing with one hand but eating with the other). This superiority is not universal, but rather occurs selectively on tests of memory that require self-initiated retrieval and evaluation of episodic information. This requirement is seemingly met when people attempt to judge the magnitude of their own attitude change following a persuasive message, since accurate perception depends on successfully retrieving and evaluating one's pre-message attitude. We therefore theorized that inconsistently handed individuals, compared to individuals with highly consistent hand preference, would more accurately perceive the magnitude of their own attitude change following persuasion. In two studies, some evidence for this hypothesis was obtained. Future research is warranted, since accurately perceiving attitude change may have important implications for self-knowledge.
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4:00-6:00 PM (3025)

Metacognitive Judgments of Anagram Difficulty and Solvability Are Biased by Misleading Surface Cues. IAN NEWMAN and VALERIE THOMPSON, *University of Saskatchewan* (Sponsored by Valerie Thompson) – Solving an anagram begins with a cursory assessment, where the features of the anagram cue metacognitive judgments about its difficulty. The goal of the present research was to identify the cues that problem solvers rely on for their judgments of the difficulty and solvability of anagrams. The cues available to a problem solver regarding difficulty (or whether the anagram is solvable at all) can be reliable (e.g., letter frequency) or misleading (e.g., anagram pronounceability). We found that the structural features of the anagram solutions influence solution success, but metacognitive judgments are only sensitive to the surface features of the anagrams. These results suggest that people are not intuiting the solution to the anagrams (and using those intuitions to inform their metacognitive judgments), but rather, are basing their judgments of solvability and difficulty on anagram surface cues that may be confounded with solvability, difficulty, and structural features.
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4:00-6:00 PM (3026)

Metacognition and the Productive Failure Effect in Verbal Reasoning. YAEL SIDI and INA BLAU, *Open University of Israel* – The productive failure design is intended to facilitate long-term learning and transfer in novel complex problems by allowing learners to engage in the solving process with little guidance or facilitation. While productive failure is well-established in mathematical domains, other content domains have received much less empirical attention. Moreover, the effect of productive failure on associated metacognitive processes, including monitoring reliability and efficiency, has yet to be examined. Thus, the present study aimed to fill this gap by comparing solving novel analogy problems in a well-structured versus an ill-structured condition in an adult population. Two experiments revealed boundary conditions for the productive failure effect on performance, depending on guidance level and training difficulty, in verbal reasoning. Importantly, metacognitive monitoring was insensitive to the productive failure manipulation. Theoretical and practical implications for instructional design are discussed.
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4:00-6:00 PM (3027)

Metacognitive Monitoring in Environment Learning: On the Role of Reactivity and Transfer. LAUREN MASON and AYANNA THOMAS, *Tufts University,* TAD BRUNYE, *US Army Combat Capabilities Development Command Soldier Center & Center for Applied Brain Cognitive Sciences,* HOLLY TAYLOR, *Tufts University & Center for Applied Brain Cognitive Sciences* (Sponsored by Holly Taylor) – Environment Learning (EL) can be understood as developing spatial knowledge about one's surroundings. This study uses a Judgment of Learning (JOL) methodology to examine the role of explicit metacognitive monitoring judgments during EL. A JOL is a metacognitive monitoring prediction of future retrievability. Previous JOL-reactivity work using word pairs suggests the act of making JOLs may affect control processes by altering learning goals. In the present study, participants learned a virtual environment by navigating between twelve (study 1) or six (study 2) landmark pairs. Half of the participants made trial-level JOLs. The other half picked a random number. Participants completed a recognition task of landmark pairs and constructed a map of the environment from memory. We found the act of making JOLs influenced learners' ability to recognize subsequent landmark destinations. Performance on map construction did not differ between groups. This research provides insight into how metacognitive processes influence EL.
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4:00-6:00 PM (3028)

Metacognitive Measures as Predictors of Accuracy in Children. MELISSA COLLOFF and MADELEINE INGHAM, *University of Birmingham* (Presented by Madeleine Ingham) (Sponsored by Jane Raymond) – Children often witness or are victims of crime and so are required to provide memory evidence in court. Legal decision makers treat testimonies from young children as unreliable, resulting in many miscarriages of justice. Across two experiments, we investigated how implicit metacognition measures (e.g., gestures, response time) can be used to better predict the memory accuracy of children between the ages of 4 and 8, compared to explicit measures (e.g., confidence). Children encoded complex episodic events and completed a two alternative forced choice task. Implicit measures were better predictors of accuracy than explicit measures in children younger than 6. Children from age 6 had a strong confidence-accuracy relationship. These findings suggest that children as young as 4 have good metacognitive ability on complex memory tasks when appropriate measures are used.
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4:00-6:00 PM (3029)

An Investigation of First-Year College Students' Metacognitive Awareness. AMANDA LIPKO-SPEED, BAILEY WAGAMAN, ADEOLA AKINYEMI, and CLAIRE WOLF, *College at Brockport, SUNY* – First-year college students arrive to campus with varied learning experiences. Understanding their metacognitive awareness can help institutions create programming which can ultimately impact institutions' retention rates. We investigated the relationship among first-

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year students' level of metacognitive awareness, their perceived academic success in college, and their reported study behaviors. Five hundred sixty-five first-year college students enrolled in a required semester-long orientation course completed a Qualtrics survey that included a revised 19-item version of the Metacognitive Awareness Inventory. Participants also answered questions about their perceived academic success in college and study strategies they have found to be successful and unsuccessful. The survey was completed right after the midpoint of the semester. Participants' metacognitive awareness significantly correlated with their metacognitive regulatory behaviors. The most commonly reported successful regulatory behavior was rehearsal of study material and the most commonly reported unsuccessful behavior was passive rereading. Participants' metacognitive awareness significantly correlated with participants' reported feelings of academic success.
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4:00-6:00 PM (3030)

Examining the Effects of Test Anxiety on Metacognitive Performance. SHAWN SCHWARTZ (J. Frank Yates Student Travel Award Recipient), KATIE SILAJ, ALEXANDER SIEGEL, and ALAN CASTEL, *University of California, Los Angeles* (Sponsored by Alan Castel) – Test anxiety is a context-specific academic anxiety which can result in poorer academic and metacognitive performance. We assessed how the quantity and relative-weight of assessments contribute to the effects of test anxiety on performance and metacognitive accuracy in a smaller (Study 1) and a larger (Study 2) psychology course. Students took six low-stakes quizzes in Study 1 and two high-stakes exams in Study 2. All students provided their state anxiety and predicted their scores before and after each assessment and their trait (overall) anxiety after the final assessment. In both studies, students' higher post-state anxiety appeared to be associated with worse assessment performance; however, students with higher trait anxiety in Study 1 seemed to be metacognitively underconfident in their scoring predictions. Thus, students' metacognitive accuracy appears to be influenced by trait anxiety, while performance is related to post-assessment state anxiety.
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4:00-6:00 PM (3031)

Excessive Use of Reminders: Metacognition and Effort-Minimisation in Cognitive Offloading. CHHAVI SACHDEVA and SAM GILBERT, *University College London* (Sponsored by Sam Gilbert) – Individuals frequently use external reminders such as diaries or smartphone alerts to help remember delayed intentions. This is an example of 'cognitive offloading'. Previous research has investigated reminder-setting behaviour with a task in which participants choose between earning maximum points for each remembered item using their own memory, or a smaller amount using reminders. This results in a bias whereby people offload more often than would be optimal (Gilbert et al., 2020; JEP:General). The bias towards offloading can be explained in part by participants' erroneous underconfidence in their memory abilities. However, an additional factor that may contribute to offloading bias is a preference to avoid the cognitive effort associated with internal memory. This study examined evidence for effort-avoidance by manipulating compensation received by two groups of participants. One group of participants received payment based on task performance, while another group received a fixed payment. Participants in the performance-based pay group were more optimal in their offloading strategy, with a ~40% reduction in bias. This suggests that excessive reminder use is caused by a preference to avoid cognitive effort.
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4:00-6:00 PM (3032)

Differences in Relative Metacognitive Accuracy Across Physical and Cognitive Tasks. LENA HILDENBRAND, *University of Illinois at Chicago*, CHRISTOPHER SANCHEZ, *Oregon State University* – Previous research has suggested that users have a reasonable level of relative prospective metacognitive accuracy for cognitive tasks (rs~.40). However, is metacognitive accuracy consistent across different types of tasks, specifically for tasks that require the coordination of skilled physical movement? To investigate the consistency of metacognitive judgments across different task types, participants first completed word and number recall tasks, and made metacognitive judgments about their performance. Participants then also completed 3 simple physical skill tasks (e.g., catching a ball in a cup), and also made metacognitive judgments about their task performance. Results indicated that participants demonstrated normal levels of relative metacognitive accuracy in cognitive tasks, however participants were significantly more accurate in their judgments for physical skill tasks ($t(54)=2.55$, $p=.01$). While it is unclear what might be driving this increased metacognitive accuracy, it is possible that haptic or proprioceptive cues might serve as an additional cue to guide such metacognitive judgments.
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4:00-6:00 PM (3033)

Does Interest Influence the Cues Learners Use to Make Metacognitive Judgments? DEREK HANSON, KATHERINE MUENKS, and VERONICA YAN, *University of Texas at Austin* – We know that learners use a variety of different cues to guide their metacognitive judgments, but not all cues are equally informative (Koriat, 1997; Undorf, 2018) and some are more closely aligned with effective learning (e.g., "deep cues" such as whether one can explain content vs. "shallow" cues such as experienced fluency, Thiede et al., 2010). In the present study, we examine a contextual, motivational factor that may predict when people rely on deeper cues—interest. We manipulate interest level by presenting participants with a list of video options, asking them to rate their interest level for each, and then randomly present them with either their top choice or their bottom choice. Participants were asked to make a metacognitive judgment and then to report the cues they used to make this judgment. We explore how interest influences the nature of engagement and metacognitive cues participants attend to and use latent profile analysis to identify different profiles of cue usage.
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4:00-6:00 PM (3034)

Illusory First Letter Partial Recollection During Tip of the Tongue States. ANDREW HUEBERT, KATHERINE WHITE, and ANNE CLEARY, *Colorado State University* (Sponsored by Anne Cleary) – The Tip of the Tongue (TOT) state is a feeling as though a word is on the verge of recall but is currently inaccessible. A long-held assumption is that partial recollection of the target, such as the first letter, forms a

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major underlying basis of the TOT state. However, prior research has not considered whether people might tend to experience illusory partial recollection during TOT states. That is, might people feel as if they have access to the target's first letter during a TOT state when, in fact, they do not? In two experiments we required participants to guess the first letter on every trial (TOT or not). We additionally asked participants to either rate their feeling of knowing the target word's first letter (Experiment 1) or indicate via a yes-no response whether they felt that they knew the first letter (Experiment 2). Even when only considering instances in which incorrect first letter guesses were given, participants reported much stronger (Experiment 1) and more frequent (Experiment 2) feelings of knowing the first letter during TOT states than non-TOT states.
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4:00-6:00 PM (3035)

Are Test-Expectancy Effects Better Explained by Changes in Encoding Strategies or Differential Test Experience? MICHELLE RIVERS and JOHN DUNLOSKY, *Kent State University* (Sponsored by John Dunlosky) – Prior research has investigated whether learners spontaneously adapt their encoding strategies in anticipation of particular test formats (i.e., the encoding strategy adaptation hypothesis; Finley & Benjamin, 2012). However, the strongest evidence supporting this hypothesis is confounded with test experience (Cho & Neely, 2017). When learners gain equal experience with each test format, do they adapt their encoding strategies? Participants studied lists of cue-target pairs and after each list completed either a cued-recall (recall targets given cues) or a free-recall (recall targets only) test. Participants received equal experience with each test format. On a final test, participants either received a test in a format they expected or one that violated their expectations. On this final test, participants who received a test they expected outperformed those who did not, and this was true for both cued and free recall. Also, a manipulation of cue-target associative strength had a greater effect on cued-recall tests than free-recall tests, whereas a manipulation of target-target associative strength had the opposite effect. These findings support the encoding strategy adaptation hypothesis.
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4:00-6:00 PM (3036)

Do Students Effectively Regulate Their Use of Self-Testing as a Function of Item Difficulty? SABRINA BADALI, KATHERINE RAWSON, and JOHN DUNLOSKY, *Kent State University* – Retrieval practice benefits learning for both normatively easy and difficult items. However, difficult items require more successful retrieval attempts than easy items to achieve similar retention benefits (Vaughn, Rawson, & Pyc, 2013). The current study investigated whether students differentially regulate their learning of easy and difficult items. A self-regulated learning group chose what to do with each item (restudy, take a practice test, or drop the item from practice). A criterion group completed practice tests until all items were correctly recalled a predetermined number of times (1, 3, or 5). Students in the self-regulated learning group chose to test items repeatedly during their learning, but they did not differentially regulate the number of successful retrievals achieved for easy and difficult items. Consequently, final test performance two days later was lower for difficult versus easy items, and performance was lower in the self-regulated learning group than in the criterion group.
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4:00-6:00 PM (3037)

Cheaters Claim They Knew the Answers All Along. ALEXANDRIA STONE, MATTHEW STANLEY, and ELIZABETH MARSH, *Duke University* (Sponsored by Elizabeth Marsh) – Cheating has become commonplace in academia and beyond. Yet, almost everyone views themselves favorably, believing that they are honest, trustworthy, and of high integrity. We investigate one possible explanation for this apparent discrepancy between people's actions and their favorable self-concepts: People who cheat on tests claim that they just knew the answers all along. We found consistent correlational evidence across three studies that, for those particular cases in which participants likely cheated, they were more likely to report that they knew the answers all along. Experimentally, we then found that participants were more likely to later claim that they knew the answers all along after having the opportunity to cheat to find the correct answers—relative to exposure to the correct answers without the opportunity to cheat. These findings provide new insights into relationships between memory, metacognition, and the self-concept.
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4:00-6:00 PM (3038)

Metacognitive Errors in Poor Performers: The Role of Variability of Past Performance. NAYANNTARA KURPAD and LISA GERACI, *University of Massachusetts Lowell,* ROBERT TIRSO and KATHRYN GRAY, *Texas A&M University* (Sponsored by Miko Wilford) – Often, students make incorrect predictions about their exam performance. It is common for lowest-performing students to be the most inaccurate, usually predicting that they will perform much better than they do (Tirso, Geraci, & Saenz, 2019). In two studies, we tested the hypothesis that low-performing students erroneously predict their exam performance, in part, because they rely on variable past performance when making their predictions. In contrast, high-performing students tend to have consistently high past performance to rely on to make more accurate predictions. Results showed that across different course exams (Study 1) and different courses (Study 2), low-performing students had more variable past performance than high-performing students. Further, the more variable their past performance was, the more erroneous their future exam and class predictions were. Results suggest that variability in past performance may be one factor that contributes to the erroneous performance predictions observed in low-performing students.
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4:00-6:00 PM (3039)

The Effects of Observability and Evaluativeness on Metacognitive Self- and Other-Judgments. ROBERT TIRSO, *Texas A&M University* LISA GERACI, *University of Massachusetts Lowell*, HEATHER LENCH, *Texas A&M University* (Sponsored by Lisa Geraci) – Research on metacognition—awareness of and beliefs about one's own cognitive processes and abilities—suggests that the accuracy of metacognitive self- and other-judgments is largely determined by two broad factors: the information available to judges and motivational biases. The goal of the current studies is to test whether the Self-Other Knowledge Asymmetry model (Vazire, 2010), which deals with the information available to judges (i.e., observability) and motivational biases (i.e., evaluativeness),

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can explain differences in the accuracy of self- and other-judgments of cognitive abilities. The observability and evaluativeness of several cognitive abilities were established (Studies 1A and 1B). The accuracy of self- and informant-reported metacognitive judgments across a variety of cognitive abilities (working and prospective memory; mental rotation; creativity) was then assessed using a multilevel model (Study 2). Judgment accuracy did not covary with observability or evaluativeness contrary to the existing literature. Implications and future directions are discussed.
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4:00-6:00 PM (3040)

Exploring the Impact of Acute Aerobic Exercise on Memory and Metacognition as a Function of Intensity and Individual Fitness Levels. KRYSTLE ZUNIGA, *University of Texas at Austin,* MACKENZIE MUELLER, ANDREW SANTANA, and WILLIAM KELEMEN, *Texas State University* (Presented by William Kelemen) – The benefits of an acute bout of exercise (e.g., 10 min of walking) on subsequent memory has been demonstrated in previous research by Salas, Minakata, and Kelemen (2011). The present studies extended that work by examining the impact of exercise intensity and aerobic fitness on free recall, judgments of learning (JOLs), and metacognitive accuracy. In Experiment 1, 30 college students engaged in either (1) no exercise, (2) light exercise (55% of predicted maximal heart rate), or (3) moderate exercise (75% of predicted maximal heart rate) on three different days. In Experiment 2, 29 high-fit students (VO_2 max ≥ 70th percentile) and 28 low-fit students (VO_2 max ≤ 50th percentile) completed sedentary and light exercise conditions. In both experiments, free recall scores significantly increased in the exercise conditions compared with the sedentary condition, but JOL magnitude and metacognitive accuracy were largely unaffected. These results demonstrate that exercise can improve recall at both light and high intensities, and that the benefit can be obtained by individuals regardless of their fitness level.
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4:00-6:00 PM (3041)

Trait- and Experience-Based Metacognition: The Relationship Between Metacognitive Ability and Metacognitive Accuracy. YOONHEE JANG, *University of Montana,* HEUNGCHUL LEE, *Net Intelligence & Research,* YOUNGJUN KIM and KYONGCHEON MIN, *Ajou University* (Presented by Heungchul Lee) (Sponsored by Yoonhee Jang) – Judgments of learning (JOLs), as one type of metacognitive judgments, are assessments that people make about how well they have learned material. The effective use of JOLs depends on various factors, including task-specific variables and the learner's own metacognitive resources. The present study investigated the relationship between the absolute accuracy of JOLs and the metacognitive awareness inventory (MAI), using concrete and abstract word pairs through three study-test cycles. We found that participants who scored high on the MAI, also produced a high level of absolute accuracy on each study-test cycle. In addition, the impact of the MAI on absolute accuracy on cycle 3 was completely mediated by absolute accuracy on the first two cycles for both concrete and abstract word pairs. These indicate that trait-based metacognitive abilities can well explain the correspondence between JOLs and recall performance on the first test. However, their impact is reduced after study-test practice, suggesting that experience-based factors become critical to improving metacognitive accuracy.
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4:00-6:00 PM (3042)

Validation of a Questionnaire of Beliefs About Caffeine's Effects on Cognition. ERIKA FULTON, DANIEL GRAY, BECCA HUBER, ERIN MADISON, and GAVIN CRUM, *Idaho State University* – Expectancies about a drug's effects can alter one's cognitive performance through a placebo-like effect or by altering one's strategic behavior. Although caffeine is the most widely used stimulant worldwide, little is known about people's beliefs about its effects on cognition, and therefore little is known about expectancy effects on objective performance. A few studies have shown that expecting a caffeinated drink can improve objective alertness and inhibitory control, but there is no existing questionnaire of beliefs about caffeine's effects on cognition. We constructed such a survey and administered it to 358 American participants from Mturk. An exploratory factor analysis suggested a reduced-item survey with a 4-factor solution: executive functioning, memory and reasoning, verbal abilities, and divergent thinking. We then administered the modified survey to an independent sample of 311 Americans from Mturk. Confirmatory factor analysis revealed acceptable model fit and that caffeine is believed to slightly enhance a variety of cognitive processes. Next steps are to explore how beliefs about caffeine's effect on cognition might interact with an actual caffeine dose to affect metacognitive accuracy.
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4:00-6:00 PM (3043)

Age Deficits in Metamemory Accuracy for Emotional Words May Be Explained by Age Differences in Multiple-Cue Use in the Presence of a Salient Cue. ETHAN FLURRY and DEBORAH EAKIN, *Mississippi State University* – Equivalent metamemory accuracy between younger and older adults suggests aging spares metamemory (Eakin & Hertzog, 2006; 2012). However, age differences in metamemory accuracy for emotional words indicate age-related metamemory deficits (Tauber & Dunlosky, 2012). Cue overshadowing effects may explain these age differences if older adults primarily used the salient cue—emotional valence—and overlooked additional diagnostic cues. We hypothesized that providing a second salient and diagnostic cue to inform JOLs may eliminate age differences in metamemory for emotional words. We manipulated multiple cues—emotional valence and endorsement—using a category inclusion task. Participants responded yes or no to endorse positive words (e.g., "champion") or neutral words (e.g., "sphere") as category members (e.g., "is an achievement"). Preliminary JOL accuracy results suggest that providing a second salient cue eliminated the previously reported age differences. Age differences in metamemory for emotional words may be attributed to diminished multiple cue use by older adults.
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4:00-6:00 PM (3044)

Age-Related Reduction of the Confidence-Accuracy Relationship in Episodic Memory. TAYLOR CHAMBERLAIN, GABRIELLA HIRSCH, and DAVID GALLO, *University of Chicago* (Sponsored by David Gallo) – The ability to accurately assess confidence during memory retrieval is critical, particularly for avoiding memory illusions. Here, we examined

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the effect of aging on this kind of metamemory using a forced-choice recollection test for previously encoded words and pictures. Replicating Wong, Cramer, and Gallo (Psychology and Aging, 2012), we found that older adults exhibited worse metamemory compared to younger adults. This impairment persisted even when the groups were matched on recollection accuracy. We also examined the effect of stimulus type on metamemory accuracy and used a within-stimulus manipulation of recollection difficulty (encoding repetitions). We did not consistently find that pictures yielded superior metamemory than words when these formats were matched on recollection accuracy. These findings suggest that prior results demonstrating a picture superiority effect on metamemory may have been confounded with picture effects on recollection difficulty. In conclusion, we found that aging impairs metamemory independent from recollection difficulty and stimulus format.
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4:00-6:00 PM (3045)

Conversational Pragmatics: Reporting Strategies in Different Social Contexts. BEATRIZ MARTIN LUENGO, *HSE University,* KARLOS LUNA, *National University of Colombia,* YURY SHTYROV, *HSE University & Aarhus University* – Under uncertainty participants report more answers in informal than formal settings. However, in formal contexts like testifying in a trial reporting is a requirement, and in informal such as dating, we may decide not to hide information. We investigated the effect of formal (trial, job interview) and informal contexts (talking with friends, date) in the participants' willingness to share information. Participants completed a multiple-choice test about general knowledge that covered all levels of difficulty. After each selection, one of the social contexts was presented and participants indicated whether they would report their selected answer. We replicated previous results with more reported answers in the informal-friends than for the formal-job interview context. We also found differences in memory reporting depending on the difficulty of the questions: the more difficult the questions are, the influence of the social context in memory reporting increases. These results highlight the relevance of the social contexts in memory reporting under the moderatory effect of the difficulty of the questions and highlight the influence of the definition of the contexts in conversational pragmatics research. Funded by the RSF 19-18-00534
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4:00-6:00 PM (3046)

The Influence of Prior Knowledge on Learning and Metacognitive Monitoring. AMBER WITHERBY and SHANA CARPENTER, *Iowa State University* – Prior knowledge is an important individual difference variable that can influence learning. One potential explanation for this effect is that students use prior knowledge as a cue when monitoring their learning, which could influence how they regulate their learning. In the present research, we evaluated this possibility by exploring the relationship between prior knowledge and the magnitude of students' monitoring judgments, the accuracy of those judgments, and students' learning. Students completed a prior knowledge test over two domains. Students then learned new information from those domains. After studying each item, students made a judgment of learning (JOL) predicting the likelihood that they would remember it on a later test. Students then completed a final test. Students' prior knowledge was related to their JOLs (magnitude and accuracy) and to their learning. Thus, prior knowledge appears to influence learning in part because of how students monitor and regulate their learning.
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4:00-6:00 PM (3047)

Repeated Checking and Memory Confidence: Implications for OCD. CLAUDIA DALTERIO and DANIEL BURNS, *Union College,* SARAH BURNS, *Prince William County Community Services* – Repetitive checking, one of the most frequently reported compulsive behaviors associated with obsessive-compulsive disorder (OCD), may, at least in part, result from a lack of confidence that actions have been performed properly (e.g., locking the door or turning off the stove). Surprisingly, however, numerous laboratory studies have shown that when participants are asked to perform an action and check that they performed it correctly on each of 20 trials, memory confidence decreases across trials. This finding has been the cornerstone of theories that propose that repeated checking in individuals with OCD produces memory distrust, which in turn, causes more checking. We attempted to disentangle the effects of repeated checks from the effects of repeated trials. Across several trials, subjects turned on and off the burners of a virtual stove. We assessed memory confidence for these actions both in the presence and in the absence of checking. Our results show that whereas repeated checking does not affect confidence, repeating the trials increases memory distrust. It is suggested that the build-up of proactive interference across repeated trials causes the memory distrust. The relevance of the findings to OCD is discussed.
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4:00-6:00 PM (3048)

A Delay in Metamemory Judgments Corrects the Expectancy Illusion in Source Monitoring. MARIE LUISA SCHAPER and UTE BAYEN, *Heinrich Heine University Duesseldorf* – People mistakenly predict an expectancy effect on source memory (better for expected information, e.g., oven – kitchen), whereas actual source memory shows an inconsistency effect (better for unexpected information, e.g., hairdryer – kitchen, Schaper et al. 2019). Delayed metamemory judgments show better accuracy, because after delay, participants base judgments on the fluency of attempted retrieval, which is indicative of memory (Benjamin & Bjork, 1996). We tested whether a delay in judgments corrected the expectancy effect on metamemory. In two source-monitoring experiments (n=180 each), participants provided judgments either during study or after delay. Participants made delayed judgments either on the source–item pair (eliciting no source retrieval) or the item only (eliciting source retrieval). A delay in judgments improved metamemory more so after (covert and overt) source retrieval. After delayed source retrieval, participants accurately predicted inconsistency effects on source memory. Thus, a delay in judgments can remedy even strong metamemory illusions.
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4:00-6:00 PM (3049)

Should I Keep Studying? Consequences of a Decision to Stop Learning in Young and Older Adults. ALEKSANDRA KROGULSKA, *Warwick University,* KAROLINA GOLIK and KRYSTIAN BARZYKOWSKI, *Jagiellonian University,* ELIZABETH MAYLOR, *Warwick University*

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(Sponsored by Katarzyna Zawadzka) – We investigated how young and older adults decide to stop receiving new information during learning as a strategy for maximizing memory performance. In Experiment 1, participants studied three lists of 50 words. The majority of young and older adults stopped learning in conditions where they were allowed to do so. This decision, counterintuitively, led to a decrease in the number of recalled words. Importantly, young and older adults chose a similar learning strategy: they stopped the presentation of to-be-remembered material at a similar point and suffered comparable consequences as reflected in their memory performance. In Experiment 2, participants read only the description of the task and then decided what they would do in a comparable situation. Even though numerically more older than young adults declared that they would have chosen to stop learning, the point at which they said they would do so was similar across age groups, and comparable to that observed in Experiment 1. Importantly, participants' forecasted performance did not reflect the negative influence of this decision. Regardless of their age, people made a suboptimal decision to stop learning with little awareness of its negative consequences.
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4:00-6:00 PM (3050)

Metacognition and Fluid Intelligence in Value-Directed Remembering. DILLON MURPHY, KARINA AGADZHANYAN, MARY WHATLEY, and ALAN CASTEL, *University of California, Los Angeles* (Sponsored by Alan Castel) – The ability to selectively focus on and remember important information, referred to as value-directed remembering, may be crucial for effective memory functioning. We investigated the relationship between memory capacity, selectivity for valuable information, metacognitive accuracy, and strategy use with fluid intelligence and memory self-efficacy. Whether study time was fixed or self-paced, selectivity, the accuracy of metacognitive monitoring and control, and fluid intelligence were positively related to task performance (the sum of point values associated with recalled words). Additionally, task performance, selectivity, metacognitive accuracy, and participants' metacognitive awareness of selectivity increased with task experience, indicating that participants learn to use cognitive resources more effectively. Overall, participants were metacognitively accurate and aware of their selectivity, and task performance was positively related to fluid intelligence. Thus, people may be aware of the need to be selective and engaging in value-directed remembering may be related to higher-level cognitive skills associated with problem-solving and reasoning.
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4:00-6:00 PM (3051)

Does Allowing Self-Regulation of Study Time Reduce Sex Differences in Multitrial Verbal Learning Performance? LACY KRUEGER, *Texas A&M University – Commerce* – Females typically remember more items than males in multitrial verbal memory tests. Researchers usually time the presentation of the items; therefore, it is unclear whether allowing individuals to self-regulate their study time would reduce sex differences in memory performance, and whether patterns would change across trials. A dataset comprised of 80 females and 80 males was reanalyzed in this research study. Participants completed a multitrial verbal learning task in which they self-regulated their study of Swahili-English translations, took cued-recall tests over these translations, and provided retrospective confidence judgments across three study-test cycles. Females spent more time studying, and they showed a memory superiority effect on the second and third test trials. Controlling for study time allocation minimized sex differences in verbal learning performance. Further, study time allocation predicted the status of items across trials (i.e., gained or lost). Overall, the results from this study show the contribution of study time allocation on multitrial verbal memory performance and suggests self-regulation as a potential factor to reduce sex differences in verbal memory performance.
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4:00-6:00 PM (3052)

The Effects of Associative Direction on Judgment of Learning Reactivity. NICHOLAS MAXWELL and MARK HUFF, *University of Southern Mississippi* (Sponsored by Mark Huff) – Research indicates that judgments of learning (JOLs) produce a reactive effect on learning in which recall differs between participants who provide JOLs at study versus those who do not. The effects of providing JOLs on memory have been mixed: Some studies report a memory benefit (positive reactivity) while others report a memory cost (negative reactivity). Importantly, little work has evaluated the interaction between the direction of the associative relationship in cue-target pairs (i.e., credit-card vs. card-credit) and reactivity. Across three experiments, we found that (1) compared to a no-JOL control, providing JOLs produced positive reactivity for paired associates regardless of pair direction but no reactivity for unrelated pairs, (2) recall of paired associates was highest when participants were asked to make JOLs at study relative to deep encoding regardless of pair direction, and (3) frequency judgments produced a reactivity pattern that mimicked JOL reactivity. Our findings suggest that JOLs largely benefit recall and that reactivity effects may be driven by the processes involved when making pair ratings rather than predictions about future performance.
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4:00-6:00 PM (3053)

Exploring the Impact of Collaboration on Consistency and Accuracy of Recall. JESSICA BECERRA and SCOTT GRONLUND, *University of Oklahoma* – When asked to recall an event on multiple occasions, discrepancies will occur. In particular, there may be information that is reminisced during later recalls. Because we often remember memories with others, the current experiment examined how collaboration affects recall consistency and output-bound accuracy. After a study phase and brief delay, participants completed four recall tests, completing all four recall tests individually or recalling once individually, collaborating once, and then completing the last two tests individually. The individual condition reminisced more and forgot less on test 3. Output-bound accuracy for consistent objects did not differ between tests or conditions. On test 3, reminisced objects had a greater output-bound accuracy for the individual condition, but not on test 4. Although participants reminisced regardless of condition, collaboration inhibited the reminisce process and decreased the accuracy of reminisced items on test 3. A follow-up study is underway using a video event.
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4:00-6:00 PM (3054)

Metacognitive Sensitivity to Recognition Memory Performance: A Role for Spontaneous Monitoring During Test. EVAN MITTON and

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CHRIS FIACCONI, *University of Guelph* – Although extensive research has examined how individuals monitor learning during encoding, relatively less research has examined how monitoring performance during test can inform metacognitive judgments. Here, we examined how test experience in the absence of explicit feedback can shape judgments of learning (JOLs) for novel items. Participants completed three study-test cycles, each of which contained novel images and were designed to promote near-perfect recognition performance upon test. Across two experiments, we demonstrate that participants' JOLs do in fact increase across study-test cycles, suggesting that monitoring during test can promote metacognitive sensitivity to near-perfect recognition memory performance. This finding suggests that participants can and do spontaneously monitor their test performance and subsequently use such monitoring to inform future metacognitive judgments. Together, these results highlight an important role for testing experience in shaping metacognitive evaluations of learning and remembering.
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4:00-6:00 PM (3055)

The Influence of Valence on the Tip of the Tongue for the Famous Faces. ALI POURNAGHDALI, BENNETT SCHWARTZ, and HYEONJEONG LEE, *Florida International University* (Sponsored by Bennett Schwartz) – Tip of the tongue states (TOTs) are metacognitive feelings of imminent accessibility when recall fails. We evaluated the impact of valence of targets (whether a target is viewed positively or negatively) on the rate and accuracy of TOTs. Participants recalled the names of famous actors and actresses, when shown a photograph of the person along with neutral information about the person or positive or negative information about a character they portrayed. If recall failed, participants reported if they are in a TOT state and identified the name of the actor/actress in a recognition test. The recall rate was better for positive than negative and neutral targets, but we did not find a significant difference in the TOT rate between the three valence conditions. TOTs were associated with improved recognition, regardless of valence condition. Results indicate that valence of the famous faces does not impact the rate or accuracy of TOTs.
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4:00-6:00 PM (3056)

Are There Stable Individual Differences in Metamemory Abilities? ELIZABETH MCLANE and DAVID FRANK, *Texas A&M University – Commerce* – Previous research has failed to find consistent differences within individuals in regard to participant resolution for judgments of learning (JOLs) tasks (Kelemen, Weaver, & Frost, 2000). Potentially, this is due to Gamma correlations' (used by Kelemen et al, 2000) sensitivity to bias (Higham & Higham, 2018). We use a paradigm designed to test the resolution of individual participants to make metacognitive decisions. Each participant learned two lists of Swahili-English translations on separate days, made JOLs as they learned each translation, and made confidence judgments (CJs) upon taking a test over the words they learned. Through both Gamma correlations and receiver operating characteristic curves (ROC), we analyze the data in order to test for potential individual differences in metacognitive resolution, both on an initial test and when using information from past tests to predict future test performance.
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4:00-6:00 PM (3057)

Quick Keystrokes and Metacognitive Confidence: The Impact of Motoric Fluency on Judgments of Learning. MICHELLE DOLLOIS, COLE POORE-BUCHHAUPT, and CHRIS FIACCONI, *University of Guelph* (Sponsored by Harvey Marmurek) – The ease or fluency with which one processes a stimulus can be used as a cue in judging one's ability to recognize or recall that item in the future. Although manipulations of perceptual fluency are commonly used to study this metacognitive phenomenon, the present study examines whether motoric fluency, or the ease with which one interacts with new information, can influence judgments of learning (JOLs). Despite previous research supporting a role for motoric fluency in metacognition, it is unclear whether such effects are attributable to the experience of motoric fluency itself, or to relevant beliefs regarding how manipulations of such fluency ought to influence memory. Here, we present data from a series of experiments using a novel manipulation of motoric fluency that eliminates the potential contribution of beliefs, thus allowing us to probe the extent to which experiential aspects of motoric fluency shape metacognitive judgments. We found evidence that words that are typed more fluently are judged as more likely to be remembered. Motoric fluency was also found to impact both recognition and recall memory performance. We discuss these results with respect to experience- vs. theory-based contributions to metamemory.
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4:00-6:00 PM (3058)

The Contribution of Visual and Auditory Disfluency to Actual and Predicted Memory for Complex Materials. ECEM EYLÜL ARDIÇ and MIRI BESKEN, *Bilkent University* (Presented by Miri Besken) – The current study investigated the joint contribution of perceptual disfluency in visual and auditory modalities to actual and predicted memory performance. In two experiments, participants were exposed to food recipe clips containing visual and auditory instructions and were asked to remember these for a later memory test. Participants also made predictions during encoding for their subsequent memory performance. The clips were either presented intact in both visual and auditory modalities, or were distorted in one or both modalities. Experiment 1 used a within-subjects design, where participants were exposed to four complete food recipes, followed by free recall. Results revealed that only auditory distortions lowered participants' memory predictions. Experiment 2 used unique steps from different food recipes to eliminate the effect of logical order. Results revealed that perceptual disfluencies in both modalities lowered memory predictions, with a more pronounced effect of auditory over visual modality. Perceptual disfluency manipulation had no effect on actual memory performance in either experiment. When multiple cues are used, participants may not integrate all cues to their memory predictions to the same extent.
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4:00-6:00 PM (3059)

Assessing Workload with the NASA-TLX in an N-Back Task. DAVID HARDY, ARIEL PRUYSER, JASLENE ROMERO, FIABA ZAKARIAN, LESLIE SEPULVEDA, YERICKA ROSE, and REED MORGAN,

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Loyola Marymount University, ALBERTO FERNANDEZ, *Universidad Católica de Córdoba* (Presented by Ariel Pruyser) – The present study looked at working memory in relation to workload. Workload refers to the measure of effort and task difficulty. A routine measure in human factors psychology in complex performance scenarios such as an aircraft cockpit or air traffic control station, workload is rarely if ever assessed in neuropsychology or cognitive psychology. We find this surprising and argue that the measure of workload provides an additional vector of information on the cognitive status of the individual. We attempted to validate a popular measure of workload, the NASA-TLX, as a function of a common measure of working memory, the N-back task. An online format was used because of the COVID-19 pandemic, where 101 participants were recruited via MTurk, and completed four blocks of an N-back task (0-back, 1-back, 2-back, and 3-back), completing the NASA-TLX after each block, all on Inquisit software. As expected, ANOVA results indicated as the N-back became more challenging (with lower response accuracy and slower reaction time), reported workload increased in a stepwise fashion, especially with the Mental Demand subscale. Results suggest that the NASA-TLX is a suitable measure of workload in a simple processing environment such as the N-back.
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4:00-6:00 PM (3060)

Adjustments in Media Multitasking During an Ongoing Working Memory Task. EMILY VALLEJO, ALEJANDRA ZUNIGA, and ALEXANDRA MORRISON, *California State University, Sacramento* – Media multitasking has quickly become part of many individuals' daily routines, and it is common to use other forms of media while completing one's primary task. Considering the ubiquity of media devices, it is important to understand if and how media multitasking affects cognitive performance. The current study investigates working memory performance (n=62) using an n-back task (0-back, 2-back). In certain blocks, participants could modulate their media multitasking by choosing to play or pause a video presented during the task. As expected, individuals performed better on low-demand (0-back) than higher-demand (2-back) trials and performed better when they could not multitask than when they could. Follow-up analyses examine individual patterns of multitasking to determine if multitasking is more prevalent in low-demand trials. This would suggest that individuals modulate multitasking according to task demand. Overall, the present findings help us to understand working memory performance in an increasingly technology-driven world.
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4:00-6:00 PM (3061)

Eradicating a Thought: Distinct Methods for the Removal of Working Memories. LOUISA SMITH, BOMAN GROFF, and HARRY SMOLKER, *University of Colorado, Boulder,* HYOJEONG KIM and JARROD LEWIS-PEACOCK, *University of Texas at Austin,* MARIE BANICH, *University of Colorado, Boulder* (Sponsored by Marie Banich) – Whereas people often examine updating, prioritizing, or replacing information in working memory (WM), fewer have looked at how information is actively removed. The present study examined the behavioral implications of three distinct methods for removing information from WM—suppressing a specific thought, replacing a thought with a different one, and clearing the mind of all thought. Participants (N=208) encoded two items at the beginning of each trial, then manipulated one of the items according to a cue (suppress, replace, clear, or maintain). One second later, participants indicated whether or not a probe item matched either of the two initially encoded items (regardless of whether the item was manipulated or not). Relative to the baseline of non-manipulated items, maintained items were responded to more quickly, as were to-be-replaced items, suggesting that these items were indeed put into the focus of attention. Importantly, suppressing an item slows recognition of that item, suggesting that indeed information can be actively removed from WM. These results provide insights into control processes that act on WM and may have implications for psychiatric disorders characterized by an inability to remove unwanted thoughts.
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4:00-6:00 PM (3062)

Refreshing and Consolidation Effects in Working Memory. MIRIAM DEBRAISE, *Université Côte d'Azur,* NICOLAS GAUVRIT, *Université de Lille,* FABIEN MATHY, *Université Côte d'Azur* (Sponsored by Fabien Mathy) – Short-term memory consolidation is defined as a maintenance mechanism that stabilizes and strengthens novel information. Although the number of consolidation studies has dramatically increased over the recent years, the idea of consolidation as a distinct working memory maintenance mechanism is still a debated issue. We present a complex span task in which we manipulated the opportunity for consolidation and refreshing. According to the consolidation hypothesis, a long delay before the concurrent task should produce better performance in working memory. An alternative hypothesis derived from the predictions of the Time-Based Resource-Sharing model is that it is not the position of the delay per se that is beneficial to recall but rather the amount of uninterrupted time enabling refreshing. Data collected on 32 young adults confirmed that the consolidation effect can be mimicked by introducing an uninterrupted long delay of free time after the first processing item. These findings suggest that consolidation and refreshing could refer to a unique process based on the sole role of refreshing.
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4:00-6:00 PM (3063)

The Effects of Attention and Executive Function on Working Memory Performance Under Varying Levels of Emotional Load. SVETHA MOHAN, HANNAH WEISMAN, EVAN BOWMAN, DONALD BOLGER, and BENJAMIN RICKLES, *University of Maryland, College Park* (Sponsored by Donald Bolger) – Disorders such as ADHD are characterized by various attention and executive function (EF) impairments. Previous research has shown that individuals with weaker attentional capacity and EF skills are more distracted by emotionally-valent information, but the interactions between emotional arousal, working memory (WM), and EF remain unclear. Forty-four undergraduates completed the two-visit study. In visit 1, participants completed the Barkley Adult ADHD rating scale (BAARS), Woodcock-Johnson III (WJ-III) WM subtests, and the AX-continuous performance task. In visit 2, participants completed 3 sets of recall/recognition word-memory tasks under varying levels of laboratory-induced emotional load and responded verbally after hearing each set of words following a short resting/encoding phase. Results indicate that students with high

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hyperactive-impulsive ADHD symptoms/low cognitive abilities and poor EF performed significantly worse on word-memory tasks under emotional load. These differences highlight the need to further explore underlying causes of WM and EF difficulties.
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4:00-6:00 PM (3064)

Predicting Cognitive Abilities Across Individuals Using Sparse EEG Connectivity. NICOLE HAKIM, EDWARD AWH, EDWARD VOGEL, and MONICA ROSENBERG, *University of Chicago* (Sponsored by Monica Rosenberg) – Individuals vary in their cognitive abilities. These differences have important everyday consequences, and there is significant interest in behavioral and neural measures that track these differences. FMRI functional connectivity models have been able to predict cognitive abilities, such as sustained attention, across individuals. Here, we tested whether we could predict working memory capacity and general fluid intelligence using trial-evoked EEG connectivity. To do this, we compiled EEG data from two data-collection sites that had participants do a lateralized change detection task. Using a functional connectivity fingerprinting approach, we found that EEG connectivity patterns are unique to individuals and can successfully distinguish them from a group. Additionally, EEG connectivity predicted working memory capacity and general fluid intelligence across individuals. Our results are the first demonstration of cross-dataset predictions of behavior using EEG. They provide a new arena in which we can investigate working memory specifically, and cognition more broadly.
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4:00-6:00 PM (3065)

Is an Item in the Focus of Attention More or Less Accessible than Other Items in Working Memory? CARO HAUTEKIET, NAOMI LANGEROCK, and EVIE VERGAUWE, *University of Geneva* (Sponsored by Evie Vergauwe) – Research in perception has shown that there is a short facilitative effect for responding to targets that are presented in a previously-cued location. Following an attentional shift away from the cued location, this turns into an Inhibition-of-Return (IOR) effect (Posner & Cohen, 1984). Similarly, researchers have looked at the consequences of attentional focusing in working memory, but the results are inconsistent. Vergauwe and Langerock (2017) found a facilitative effect, while Johnson and colleagues (2013) found an IOR-like effect. To understand whether an item in the focus of attention is more accessible (i.e., facilitation) or less accessible (i.e., inhibition), we tested the consequences of attentional focusing in working memory in a variety of task situations, while varying timing parameters. We show that the task to be performed modulates the effect of attentional focusing. Furthermore, unlike research in perception, we did not find a cross-over from facilitation to inhibition over time.
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4:00-6:00 PM (3066)

A Test of List-Wide Consolidation in the Complex Span Task. EVIE VERGAUWE and NAOMI LANGEROCK, *University of Geneva* – This study tested whether the free time immediately following memory item presentation in complex span tasks is used for single-item consolidation (i.e., strengthening of the just-presented memory item) or for list-wide consolidation (i.e., strengthening of all memory items presented up to that point in the list), see Rhodes & Cowan (2018). To do so, we manipulated the time available for consolidation right after memory presentation such that the duration of free time for consolidation was either increasing over list positions (Ascending lists; i.e., more time after memory items later in the list) or decreasing over list positions (Descending lists; i.e., less time after memory items later in the list). If people try to engage in list-wide consolidation immediately after memory item presentation, we should see better overall recall performance in the Ascending lists than in the Descending lists. The data do not support this hypothesis.
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4:00-6:00 PM (3067)

Subcomponents of Executive Function Involved in Trail Making Test in the Elderly. YUKI OTSUKA, *Kyoto University,* MIHO SHIZAWA, *Kyoto Prefectural University of Medicine,* AYUMI SATO, *Shimane University,* SHOJI ITAKURA, *Doshisha University* – Trail Making Test is often used as a measure of individual differences of Executive function in the elderly. Though Executive function is known to be composed of three subcomponents of executive function (inhibition, updating, and shifting), it is not entirely clear which subcomponent of executive function would affect the performance of the Trail Making Test. We examined the association between the performance of Trail Making Test and three subcomponents of executive function in the elderly. We performed multiple regression analysis of the performance in Trail Making Test, using the indexes of three subcomponents of executive function as predictors. We found that updating and shifting contributed significantly to the variability in performance of Trail Making Test in the elderly. Our results indicate that updating and shifting would be important for the performance of Trail Making Test among three subcomponents of executive function in the elderly.
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4:00-6:00 PM (3068)

The Consequences of Instructed Refreshing on Memory Performance in Children. BEATRICE VALENTINI, *University of Geneva,* ALESSANDRA SOUZA, *University of Zurich,* ANDRIA SHIMI, *University of Cyprus,* CLARA OVERKOTT, *University of Zurich,* EVIE VERGAUWE, *University of Geneva* (Sponsored by Timothy Ricker) – Refreshing is an attention-based, domain-general maintenance mechanism in working memory, which improves the accessibility of mental representations. Although it is thought to be crucial for maintaining and retrieving information, at present there is no agreement on how it develops throughout the childhood. This preregistered study used an instructed refreshing paradigm to disentangle whether children aged 7 and 11 years old can perform the cognitive processes which underlie successful refreshing. In particular, the task uses one or two sequential retro-cues in order to test whether children can, respectively, (1) focus their attention on a mental representation, and (2) switch attention between representations. Preliminary results suggest that children in both age groups can focus attention on a memory item, as reflected in the beneficial effect of a single retro-cue, but that they experience difficulties in switching attention between representations. Therefore, attentional refreshing may not be fully developed until 11 years old.
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4:00-6:00 PM (3069)

On the Nature of Working Memory Resources in Children. NAOMI LANGEROCK, ISABELE JACOT DE ALCANTARA, LOLITA MONNET, and EVIE VERGAUWE, *University of Geneva* – The nature of the cognitive resources underlying working memory performance has been explored in detail in adult populations. There is general agreement on the involvement of domain-general attentional resources, probably supported by domain-specific verbal resources (e.g., Vergauwe et al., 2010). Some studies also claim domain-specific visuo-spatial resources to be involved (e.g., Bayliss et al. 2003), yet the existence of visuo-spatial resources is less supported (Morey, 2018). Here, we investigated the cognitive resources underlying working memory in 10-year old children for whom working memory is still in development. Four complex span tasks were created in which verbal or visuo-spatial maintenance was combined with either verbal or visuo-spatial processing. Additionally, the task demands of processing were manipulated to assess processing-storage trade-offs within each task. The resulting pattern of interference suggests that working memory of 10-year-old children relies on both verbal and visuo-spatial domain-specific resources, as well as on domain-general attentional resources.
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4:00-6:00 PM (3071)

Characteristics of Order Memory and Its Relation to Problem-Solving. KATSUKI HIGO and NAOKO OKAMOTO, *Ritsumeikan University* – In problem-solving, it is important to set goals and subgoals and plan to reach them. This study hypothesized that the function of remembering order is important for setting and planning subgoals. Also, it aimed to investigate its relationship and the characteristics of sequential memory. Here, we used the sequence reconstruction task as the order memory task and the Tower of Hanoi to measure problem-solving function. Three types of stimuli were used for sequence reconstruction task: visual, spatial, and verbal. Result showed a significant correlation between the performance of visual and spatial tasks in the sequence reconstruction task. However, no significant correlation was found between the two tasks and verbal task. Moreover, no significant correlation was found between the performance of the Tower of Hanoi task and all sequence reconstruction tasks. This result suggests that visuospatial sketchpad and phonological loop are responsible for storing order information as well as memory of the item and that pure-order maintenance and problem-solving function may not be related.
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4:00-6:00 PM (3072)

Working Memory Encoding Improves Subsequent Long-Term Memory Retrieval. ALICIA FORSBERG, *University of Missouri,* DOMINIC GUITARD, *Université de Moncton,* NELSON COWAN, *University of Missouri* (Sponsored by Nelson Cowan) – While the amount of information that can be held in visual Working Memory (WM) is limited, we seem able to store a seemingly infinite amount of information in visual Long-Term Memory (LTM). We explored how these two memory systems interact. Specifically, we tested whether encoding items in WM influenced subsequent LTM representations. While a large number of visual items can be held in short-term sensory memory, the probability of successful WM encoding should be reduced when the number of items exceeds WM capacity. Most adults appear able to hold around 3 or 4 items in visual WM. Therefore, we hypothesized that if WM encoding boosts LTM encoding, performance on a subsequent LTM test should be better for items presented as part of a comparatively smaller set during a previous WM task. Young adult participants (N=100) performed a WM change-detection task with unique items, presented simultaneously in sets of 2, 4, 6, or 8 (presentation time = 250 ms per item). Finally, after a brief delay, participants completed a surprise LTM test on items from the WM task. We found strong evidence that items presented as part of smaller WM sets were better remembered in the LTM task, suggesting that holding items in WM boosted LTM encoding.
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4:00-6:00 PM (3073)

The Visual Similarity Effect in Complex Span. SATORU SAITO, *Kyoto University,* AIKO MORITA, *Hiroshima University,* SATORU NISHIYAMA, *Kyoto University,* VALERIE CAMOS, *University of Fribourg,* PIERRE BARROUILLET, *University of Geneva,* TAKEHIRO MINAMOTO, *Shimane University,* WENG-TINK CHOOI, *Universiti Sains Malaysia,* ROBERT LOGIE, *University of Edinburgh* – The visual similarity effect is a hallmark of the use of visual representations in working memory. It has been observed in immediate serial recall of words from visually similar compared with visually dissimilar word sets. In two experiments, we examined the presence of the visual similarity effect in complex span, which has never been tested thus far in the literature. Participants from a Scottish university were required to remember a series of six monosyllabic English words drawn from a visually similar or visually different set, with each word followed by a 4,800 ms retention interval. In Experiment 1, each retention interval was filled by articulatory suppression (AS) or was blank. Results showed a clear effect of visual similarity only in the AS condition. Experiment 2 confirmed the effect with AS while demonstrating disappearance of the effect when participants mentally compared real sizes of object pictures presented during the retention intervals. Several models of working memory can potentially account for the presence and removal of the effect, but based on different theoretical assumptions.
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4:00-6:00 PM (3074)

Cognitive Load Effects Are Not Driven by Attentional Availability. TIMOTHY RICKER, *City University of New York, CSI,* EVIE VERGAUWE, *Université de Genève* – The Cognitive Load effect describes how a secondary task disrupts concurrent working memory performance. Cognitive Load models of working memory predict a near linear relationship between the proportion of time that a secondary task occupies attention and memory performance. This is driven by the assumption that attention is required to perform both maintenance activities and the secondary task during retention but cannot conduct both operations simultaneously. The relationship between attention and Cognitive Load effects is supported by a deep literature and is widely accepted across theoretical approaches. In a series of experiments, we show that Cognitive Load effects are not as universal as they appear and are often driven by assumptions that are not related to the availability of attention during maintenance. We find that the often-overlooked details of participant and trial data filtering to ensure procedure compliance

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radically change the result. The pattern of results across filtering conditions indicates that Cognitive Load effects are driven by task disengagement and are not a result of the availability of attention for maintenance.
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4:00-6:00 PM (3075)

Does Forgetting in Working Memory Depend on the Type of Representation? VANESSA LOAIZA, *University of Essex* – A persistent debate concerns whether decay or interference causes forgetting from working memory. Two experiments explored whether the nature of forgetting depends on the representation. Five unrelated word pairs (e.g., lily – coffee, ballot – dress) were presented, followed by retrieval of each pairing wherein one of the words (e.g., lily) was presented with three options: the correct target (e.g., coffee), a never-presented lure (e.g., rabbit), and a lure from a different pair (e.g., dress). In-between each retrieval attempt, participants responded aloud to 1, 2 or 4 distractors. The presentation rate of the pairs (E1) and distractors (E2) was manipulated. Cognitive modeling allowed estimation of recollection and familiarity at the latent level, with the prediction that presentation rate and pace (but not distractors) should affect recollection (and not familiarity), whereas the number of distractors (and not presentation rate or pace) should affect familiarity (and not recollection). The results revealed a credible effect of presentation rate on recollection, but no impact of pace or distractors on recollection or familiarity. This conflicts with the notion that the nature of forgetting depends on the type of representation.
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4:00-6:00 PM (3076)

More than Just a Performance Check: Processing Performance on Complex Span Tasks Is Related to Working Memory Capacity Estimates. LOIS BURNETT and LAUREN RICHMOND, *Stony Brook University,* ALEXANDRA MORRISON, *California State University, Sacramento,* HUNTER BALL, *University of Texas at Arlington* (Sponsored by Lauren Richmond) – Working memory (WM) individual differences studies often use complex span tasks to estimate WM capacity (WMC). Although these tasks are, by definition, composed of a processing component involving evaluation of a stimulus and a storage component involving presentation of a to-be-remembered stimulus, performance on the former is often overlooked. The current investigation uses a large, multi-study dataset consisting of three complex span tasks (Operation Span, Symmetry Span, Reading Span) to examine the relationship between processing and storage performance and whether consideration of performance on both tasks is more informative than either alone. Results show that individuals with lower WMC estimates exhibit longer mean reaction times during practice of the processing task as well as lower accuracy on the processing component in the context of the task itself. Consideration of both components of complex span task performance may provide greater insight into individual differences in WM.
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4:00-6:00 PM (3077)

Does the Semantic Similarity Have a Detrimental Effect in Short-Term Memory Tasks? SHO ISHIGURO and SATORU SAITO, *Kyoto University* – Short-Term Memory (STM) models, in general, predict the detrimental effect of similarity of stimulus properties on STM. For instance, the detrimental effect of phonological similarity is well-replicated. In contrast, it has been documented that the semantic similarity has a weak detrimental effect in the serial reconstruction task and has a facilitative effect in the serial recall task, suggesting the inconsistency between observations of the semantic similarity effect and the effect expected by models. With a new index for semantic similarity manipulation based on Osgood and colleagues' view on semantics, our systematic review and meta-regression analysis indicate that a) semantic similarity, per se, has a detrimental effect in STM tasks and b) semantic association, a possible confounding factor, might lead to an apparent facilitative effect of the semantic similarity. To examine how semantic similarity and semantic association affect STM, detailed analysis on item and order memory is also presented.
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4:00-6:00 PM (3078)

Predicting Working Memory Training Outcome Patterns Using a Machine Learning Approach. YI FENG, *University of California, Irvine,* ANJA PAHOR, *University of California, Irvine & University of California, Riverside,* AARON SEITZ, *University of California, Riverside,* SUSANNE JAEGGI, *University of California, Irvine* (Sponsored by Susanne Jaeggi) – Individual differences have been discussed as potential factors determining benefits from working memory (WM) training, and several papers have examined the independent effect of selected variables on WM training outcome. However, there is still a big gap between our understanding of which and in what combination individual differences contribute to training outcomes and the development of personalized training programs. In the current study, we used multiple variables as features and applied a machine learning algorithm to train a classification model to predict individuals' training outcomes. Over 200 undergraduates completed one of several N-back intervention variants over the course of 2 weeks. Participants' training performance throughout the intervention period was classified into differential training patterns. Several individual difference variables were considered as predictors, including baseline cognitive abilities, personality characteristics, sleep quality, and socioeconomic status. We will be presenting the construction and performance of the machine learning model. Prediction accuracies for different training patterns and the relative importance of each feature in the model will be reported and discussed.
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4:00-6:00 PM (3079)

Source Memory for Distractors in a Working Memory Task. LAURA WERNER and COLLEEN PARKS, *University of Nevada, Las Vegas* (Sponsored by Colleen Parks) – Manipulations of free-time (i.e., time when there is no guided processing) in a modified complex span task have been shown to affect the number of accidental distractor intrusions during a reconstruction task. This supports the notion that extra time is used to remove bindings between distractors and their context; however, free-time could also be used to tag distractors such that those tags can be used to exclude distractors from output. Thus, we investigated the role of source monitoring in a span task that manipulated free-time. Source memory was tested in long-term memory (LTM) (Experiment 1), on one-third of working memory (WM) trials (Experiment 2), and on 2 surprise WM trials (Experiment 3). Overall, some source information about

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distractors is available in WM, but less so in LTM. However, free-time does not appear to be used to better tag distractors, unless participants are expecting to be tested on source.
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4:00-6:00 PM (3080)

The Role of Creativity in the Relationship Between Working Memory Consolidation and Long-Term Memory. KELLY COTTON, *City University of New York Graduate Center* , TIMOTHY RICKER, *City University of New York Graduate Center & College of Staten Island CUNY* (Sponsored by Patricia Brooks) – While holding items in working memory has been shown to improve delayed long-term recall, the mechanisms underlying this relationship remain unclear. One potential mechanism is working memory consolidation, which may facilitate the formation of novel associations between items during learning and lead to improved memory search at delayed retrieval. Forming novel associations via consolidation may share mechanisms with creative ability. The present research aims to explore how an individual's creativity relates to the relationship between working memory consolidation and long-term memory. Participants completed a stimulus identification task which manipulated the need for consolidation followed by a surprise delayed recognition task and measures of objective and self-reported creativity. Creativity scores were correlated with difference scores for delayed recognition accuracy between consolidated and non-consolidated items to explore the relationship between these constructs.
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4:00-6:00 PM (3081)

The Relation of Intelligence and Working Memory Capacity: An Experimental Analysis. JOHANNA HEIN, *Ruprecht-Karls-University Heidelberg* (Sponsored by Jan Rummel) – While varying time constraints have been shown to affect the relationship between intelligence and working memory capacity (WMC), resulting in near-isomorphic correlations under severe time constraints (Chuderski, 2013), there are no experimental studies on the effects of working memory load under different time constraints on intelligence test performance. In the present study, we examined the joint effects of working memory load and time constraints on intelligence test performance. Moreover, we investigated if the effects were moderated by individual differences in WMC and intelligence. Sixty-six participants were given three blocks of Raven's Advanced Progressive Matrices, with different time constraints while simultaneously engaging in a secondary task loading either working memory or verbal rehearsal. Both experimental manipulations impaired APM solution rates significantly. However, there was no interaction between time constraints and memory load, suggesting that both experimental manipulations affected APM performance independently. Moreover, participants' intelligence and WMC moderated the effect of time constraints, but not working memory load on APM performance.
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4:00-6:00 PM (3082)

The Effects of Alcohol, Marijuana, and Cardiovascular Exercise on the Relationship Between Stress and Working Memory Performance. JENNIFER ROTH, *Carlow University* – Forty-two participants completed Cohen's Stress Scale, questions on alcohol/marijuana use, cardiovascular (CV) exercise, and a modified delay match to sample task. Participants maintained one image for 0, 1.5, 4.5, 7.5, 10.5, or 13.5 s. with distraction images during the working memory (WM) delay (ave accuracy=87%, SD=.17). Participants were 96% accurate at detecting the match to sample at 0 and 1.5 s WM delays versus at 13.5s (87%). Data at all WM delays were used to calculate a "forgetting curve." The slope (ave=-.0053, SD=.0089) had a medium correlation to the number of frequent stressors on Cohen's Perceived Stress Scale (r=-.202, NS). The slope of the forgetting curve is greater with marijuana use (ave=-.0058) versus abstinence (-.0047) and alcohol use (-.009) versus abstinence (-.0039), though mild to moderate alcohol consumption appears to be protective against the negative effects that stress has on WM maintenance (Pritchard & Roth, 2016, Psychonomics). Similar effects of marijuana use did not reach trend levels. Participants who did high intensity CV exercise performed better in terms of WM decay (- .0064) than those who did not (-.0044, NS at this sample size).
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4:00-6:00 PM (3083)

Measuring Human Olfactory Working Memory Using an Odor Span Task. SARAH KRICHBAUM, JACOB VAUGHN, and JEFF KATZ, *Auburn University* (Sponsored by Jeffrey Katz) – The current study implemented an odor span task (OST) to evaluate olfactory working memory in humans. The OST is two-choice, non-match to sample task, in which a response to a session new odor but not a previously encountered old odor from the session is marked correct on every trial. Therefore, the number of trials in a session is equivalent to the number of odors to remember. Participants displayed high levels (71%) of accuracy for overall performance in a 72-trial session with a decrease in performance across trials. A number of parameters effected overall accuracy on the task. For example, the intensity of the previously encountered odor and the number of times it was repeated in the session increased accuracy while the number of trials since the previously encountered odor last occurred decreased accuracy. These findings will be discussed in terms of defining olfactory working memory in humans.
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4:00-6:00 PM (3084)

Measurement of Working Memory Capacity: An Item Response Theory Examination of Complex Span Tasks. HAN HAO, ESTER NAVARRO, KEVIN ROSALES, and ANDREW CONWAY, *Claremont Graduate University* (Sponsored by Andrew Conway) – Working memory (WM) is a construct developed by psychologists to characterize and help further investigate how people maintain access to information in the face of concurrent processing (Baddeley & Hitch, 1974). While complex span tasks have been widely used to measure WM capacity, a debate still exists regarding the extent to which span tasks vary in reliability and validity, especially with respect to capturing domain-general variance in WM. Item response theory (IRT), a largely unexplored approach in this line of research, could help to inform the debate. In the current study, two spatial and two verbal complex span tasks were examined using IRT. The findings show that spatial complex span tasks are generally more reliable and more valid than verbal tasks because they have (1) more variable item difficulty and (2) better item discrimination. The study demonstrates how IRT can be used to evaluate the psychometric properties of WM tasks.

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4:00-6:00 PM (3085)

Comparing Performance on Working Memory Tasks Administered in the Lab Versus Remotely. ALEXIS PEREZ-MARTINEZ, ANDREW RIVERA, ANTHONY SIERRA, and RAECHEL MARINO, *California State University, San Bernardino,* ANJA PAHOR and AARON SEITZ, *University of California, Riverside,* JASON REIMER, *California State University, San Bernardino* (Presented by Jason Reimer) – The closure of university campuses and social distancing protocols have forced the suspension of research programs that depend on in-person data collection. As a result, online versions of experiment-design software platforms have been developed that enable the remote administration of cognitive experiments. The purpose of the present study was to compare performance on working memory (WM) tasks that were administered either in-person, or remotely from participants' homes. Spatial-figural and verbal versions of three computer-based WM tasks (binding, recall 1-back, updating; Wilhelm et al., 2013), as well as gamified, tablet-based versions of four other WM tasks (running span, forward and complex corsi, n-back; University of California, Riverside, 2018), were administered. In-person testing was done in a lab setting, while remote testing was conducted online while participants were at home. For most of the iPad-based tasks, performance at the two locations was comparable. However, for the spatial-figural versions of the computer tasks, participants performed significantly better in the lab than at home. This difference was not found with the verbal versions of the tasks. Implications and one possible account of the results will be explored.
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4:00-6:00 PM (3086)

Measuring Face Value: Validating a Diverse Image Database for Facial Research. DAWN WEATHERFORD, MALIA MYERS, VALERIE DARLING, ASBEL RAMOS, AUTUMN CRANE, and MADELEINE ANDERSON, *Texas A&M University – San Antonio,* MICHAEL HOUT and BRYAN WHITE, *New Mexico State University* – Many of the currently available facial image sets lack sufficient between-person variability (i.e., differences between images of different people such as gender and skin tone) and within-person variability (i.e., differences between images of the same person such as age and context). This lack of real-world diversity has likely hindered the applicability of many findings in the facial recognition/matching literature, especially in geographic regions with a multicultural demography. Therefore, we created a facial database with over 300 identity sets including ambient images, ID photos, and high-quality images and videos with different lighting, poses, and facial expressions. We are collecting similarity data from human participants and computer algorithms to construct a multi-dimensional face space that will allow researchers and practitioners to create instruments like the Cambridge Face Memory Test and Glasgow Face Matching Test. We hope the addition of this tool will encourage other face researchers to consider and incorporate more ecologically valid stimuli into their research designs.
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4:00-6:00 PM (3087)

Is There a Dispersion of Specificity in Episodic Memory? NATHANIEL GREENE and MOSHE NAVEH-BENJAMIN, *University of Missouri* – We introduce a novel paradigm to test whether the specificity with which one component of an episode is retrieved differs from the specificity of the episode altogether. Participants studied Object-Scene pairs and were tested on their item memory (Object or Scene) followed immediately by a test on their association memory (Object-Scene pair). We measured whether participants could distinguish previously studied items and associations from similar distractors and novel lures. This paradigm allows us to measure verbatim and gist memory for items and to compare these to verbatim and gist memory for associations. Differences in verbatim or gist memory between item and associative tests point to a dispersion of specificity in episodic memory, whereby different components of an episode and the episode itself can be remembered at differing specificity levels of representation. We discuss our findings in the context of holistic and fragmentable forgetting.
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4:00-6:00 PM (3088)

Impression Memory and Prosocial Behaviors. PAULINE URBAN LEVY, ANDREA FRANKENSTEIN, ALLISON SKENAR, MATTHEW MCCURDY, and ERIC LESHIKAR, *University of Illinois at Chicago* (Sponsored by Jim Pellegrino) – Prior work has shown evidence for a memory advantage for certain kinds of behaviors, including cheating behaviors and prosocial behaviors. This study examines that advantage for memory for impressions of other people (i.e., impression memory). We predict that impressions for targets that exhibit prosocial behaviors will be better remembered than those that exhibit neutral behaviors. Whether the behavior is prosocial or neutral may be important in not only the type of impression initially formed but also the way it is recalled. In this study participants were asked to form impressions of social targets based on a photo and a behavior. Participants recalled their impressions of social targets significantly more often when the behavior paired with the social target was prosocial than when the behavior was neutral. This study shows the impact of prosocial behaviors on impression formation.
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4:00-6:00 PM (3089)

Response-Category Conflict Improves Memory for Targets in a Flanker Paradigm. MICHÈLE MUHMENTHALER and BEAT MEIER, *University of Bern* – Cognitive conflict at encoding can provide for better subsequent memory. Specifically, previous research has shown that in incongruent Stroop trials, a conflict occurs because task-relevant and task-irrelevant representations, which require different responses, are co-activated. This response-category conflict leads to focused attention towards the target and this improves encoding and thus subsequent memory. In the present study, we investigated whether indeed a response-category conflict is responsible for the improved memory for incongruent targets rather than other features of the Stroop paradigm. Toward this goal we used a flanker paradigm. In the study phase two different classification tasks were flanked by stimuli that were either congruent or incongruent to the target, thus manipulating response-category conflict. Then we assessed recognition memory. The results showed that the response-category conflict enhanced subsequent memory for incongruent targets,

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implying an up-regulation of top-down control that fostered memory encoding. Thus, the results demonstrate that the beneficial memory effect of a response-category conflict generalizes to a flanker task.
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4:00-6:00 PM (3090)

Cognitive Load at Encoding Hurts Memory Selectivity. MIRELA DUBRAVAC and BEAT MEIER, *University of Bern* (Sponsored by Beat Meier) – Selectively attending and remembering relevant information is a key ability for goal directed behavior and is thus critical for leading an autonomous life. In the present study, we tested the influence of cognitive load on memory selectivity. In the study phase, we administered a task-switching paradigm. Pictures and words were presented simultaneously and tasks switched between picture and word classification. Depending on the task, participants had to attend to the picture or to the word. In a subsequent recognition test, we assessed memory for the targets and distractors. Results showed that task switches (vs. task repetitions), a short stimulus presentation duration, a short preparation time, and a long retention interval reduced memory selectivity. In conclusion, higher cognitive load leads to lower selective attention and consequently to lower memory selectivity.
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4:00-6:00 PM (3091)

Eye Movements Are Sensitive to Episodic Memory Regulation. MRINMAYI KULKARNI and DEBORAH HANNULA, *University of Wisconsin – Milwaukee* – Unwanted memory retrieval needs to be regulated to maintain goal-directed behavior. Here we used eye movements to examine the online consequences of two memory regulation strategies (direct suppression and thought substitution). Participants first encoded scene-object pairs (real-world scenes paired with 6 objects; 3 faces and 3 tools). In a subsequent search phase, trials began with studied scenes and participants either retrieved the associate, suppressed it, or substituted it with a studied object from the opposite category. Next, 6 dots were presented for a search task, along with the 6 encoded objects, which were task-irrelevant. We found that in the suppress and substitute conditions, viewing to the associate in the search display was reduced relative to the retrieve condition. Additionally, during substitution, participants looked disproportionately at one of the objects from the opposite category. This suggests that eye movements can provide insights into whether and how episodic memories are regulated.
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4:00-6:00 PM (3092)

Subsequent Memory Failure Predicted by Attention and Goal-State Lapses and Media Multitasking. KEVIN MADORE, ANNA KHAZENZON, and ANTHONY WAGNER, *Stanford University* – Why do some individuals remember better than others, and why does memory vary as a function of engagement with the modern media landscape? To address these questions, 80 young adults performed a goal-directed memory encoding and retrieval task with EEG+pupillometry. Trait-level lapses of attention assayed from posterior alpha power and pupil diameter in the moment before encoding a memory goal cue significantly predicted subsequent memory failure, as did trait-level memory goal coding strength from midfrontal ERP. Heavier everyday media multitasking also significantly related to the propensity to suffer trait-level lapsing during the memory encoding task from posterior alpha power, and significantly related to subsequent memory failure. These findings indicate that individual differences in sustained attention, goal coding, and everyday media multitasking habits partially account for variability in memory.
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4:00-6:00 PM (3093)

Multiple Routes to Face Recognition Expertise. ALICE TOWLER, JAMES DUNN, and DAVID WHITE, *University of New South Wales* – Accurate face recognition is critical for daily life and in forensic settings. However, people make high proportions of errors on challenging real-world face recognition tasks. Recent research has revealed three groups who perform exceptionally well on unfamiliar face recognition tasks: super-recognisers, forensic facial examiners, and face recognition algorithms. Here, we examine qualitative aspects of their expertise. All experts completed an international proficiency test for forensic practitioners and achieved similarly high levels of accuracy. Critically, we found numerous qualitative differences in the perceptual abilities and decisional strategies of the experts, indicating that there are multiple pathways to face recognition expertise. These findings have important theoretical implications for our understanding of what it means to be a face expert and the processes involved in face recognition. They also have important implications for face recognition decisions made in applied settings.
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4:00-6:00 PM (3094)

Investigating the Effect of Memory Bias on Output Interference. JENNIFER SLOANE, *University of New South Wales & Syracuse University,* RYAN CURL, *Syracuse University,* COREY WHITE, *Syracuse University & Missouri Western State University,* CHRIS DONKIN, *University of New South Wales* (Sponsored by Chris Donkin) – The current study seeks to improve our understanding of memory and decision processes by specifically focusing on two factors that robustly affect recognition memory performance: memory bias, which we will define as a bias to believe categorically related words were studied, and output interference (OI), which typically produces as a decrease in performance over the course of a test list. From a purely theoretical standpoint, if the bias to recognize categorically-related words is due to the overlap of shared features of items in those categories, then we expect related words to show a steeper decline in performance across test. Data was analyzed from multiple standard recognition paradigms where half of the words were related (emotional words or animal names) and half were unrelated. Results from the recognition memory tests showed a clear memory bias for related words and evidence for OI, but no difference in OI between related and unrelated words. Finally, a memory model (i.e. REM) and a drift diffusion model were implemented to further understand the components of memory and decision processes that either stay constant or change over the course of the test list.
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4:00-6:00 PM (3095)

A Cross-Cultural Replication of Materials-Based Bias Effects in Recognition Memory. KAITLYN FALLOW, *University of Victoria,*

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SHINJI KITAGAMI and MASAE TAKENO, *Nagoya University,* D. STEPHEN LINDSAY, *University of Victoria* (Sponsored by D. Stephen Lindsay) – We have consistently observed a set of materials-based differences in recognition memory response bias in studies conducted with undergraduate participants at the University of Victoria in Canada. When stimuli are images of paintings, we have always found average response bias to be conservative (i.e., participants more often miss studied paintings than falsely endorse new paintings as "studied"), and more conservative than for word stimuli (common English nouns) studied and tested using the same procedure. Understanding the extent to which these differences generalize across samples is important to narrowing down possible mechanisms. Here we present the results of a collaboration with researchers at Nagoya University in Japan, in which undergraduate participants from that university completed recognition memory experiments using the same paintings from some of our previous work and Japanese nouns as stimuli. These studies replicated the usual pattern of materials-based differences in response bias, and even response patterns for individual paintings correlated highly with previous results. Whatever the mechanism underlying these materials-based differences, it does not seem to be an idiosyncratic feature of our previous samples.
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4:00-6:00 PM (3096)

I Recognized Him From Facebook! Effects of Modern Repeated Identification Procedures on Juror Decision-Making. MARIANNE KRAUSE, LAUREN STORNELLI, and GARRETT BERMAN, *Roger Williams University* (Sponsored by Garrett Berman) – Eyewitnesses often make multiple identifications of one suspect prior to trial. Increases in social media usage now allows witnesses additional opportunities to view suspects photos (e.g., Facebook, Snapchat) prior to viewing a photoarray. The current study examined the differential effects of identification type (Facebook, mugshot, show-up, photoarray only) on juror perceptions of identification procedures and witness testimony. Participants read one of four trial transcripts depicting a breaking and entering. Results indicated that jurors in the show-up condition perceived the detective as more trustworthy. Findings also revealed that jurors rated the second identification (photoarray) as more suggestive and the prosecution's case as more effective when the eyewitness located the suspect though their own investigation (Facebook and show-up) compared to participants in the conditions where police initiated the first identification test (mugshot and photoarray only). Consistent with best practices, results support avoiding repeated identification attempts using the same witness and suspect.
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4:00-6:00 PM (3097)

Role of Agency in the Movement-Induced Self-Reference Effect's Memory Advantage. SERGE ONYPER and MARK OAKES, *St. Lawrence University* – The movement-induced self-reference effect (MISRE) suggests that memory for information encoded incidentally is enhanced via movement relative to oneself (or its representations) as opposed to a stranger. We manipulated the perception of voluntary control over movement outcomes to determine whether a sense of agency underlies MISRE. Items either moved in a congruent or incongruent fashion (movement did/did not match instructions: internal agency), and the ratio of congruent/incongruent trials varied such that one's ability to predict movement was either high or low (external agency). Across two studies, the MISRE was generally observed for both item and source recognition tests, yet neither external nor internal agency interacted with its magnitude. These findings suggest that MISRE does not depend on perception of control over movement outcomes. Future work needs to examine whether different forms of agentic control—for instance, via participant-initiated motor actions (i.e., key presses) or perception of visual movement (as opposed to items "teleporting" to a location)—might contribute to MISRE.
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4:00-6:00 PM (3098)

Exploring the Facets of Emotional Episodic Memory: Remembering 'What,' 'Where,' and 'When'. KATHERINE CHECKNITA and ALESSANDRA TE, *University of British Columbia,* CHRISTOPHER MADAN, *University of Nottingham,* DANIELA PALOMBO, *University of British Columbia* – The complex relationship between emotion and memory is not yet fully understood. Whereas emotion enhances some aspects of episodic memory—particularly central aspects—it dampens memory for non-central information, such as spatial context. We extended this research by examining effects of negative emotion on the temporal context of an event and introduce a dynamic method of studying emotional memory using video stimuli. We hypothesized that emotion would impair memory for "when" an event occurred, aligning with prior findings. Participants (two independent cohorts, N=116 total) watched video clips depicting everyday activities, wherein a negative or neutral image was superimposed on the scene. After a 10-min delay, participants were tested on different aspects of the images and videos: "what" (which image), "where" (which video), and "when" (time of image onset). As expected, we found that emotion enhanced and impaired memory, respectively, for "what" and "where." Critically, we showed that emotion enhanced memory for "when" an event—contrary to our pre-registered hypothesis. As a replication and expansion of prior work, our study enhances our theoretical understanding of the multifaceted nature of emotional memory.

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4:00-6:00 PM (3099)

Incidental and Intentional Encoding of Associative Information in Double-Item Presentation of Item-Method Directed Forgetting. PELIN TAN, *University of Waterloo,* WILLIAM HOCKLEY, *Wilfrid Laurier University,* COLIN MACLEOD, *University of Waterloo* – Forming associations between items or events is critical for memory. Previous research has demonstrated that participants encode associative information even when they are not required to do so (e.g., for to-be-forgotten items). The present experiments implemented the double-item directed forgetting paradigm (Tan et al., 2020) to investigate incidental and intentional associative memory. Participants studied two unrelated items at a time. Some pairs were followed by the same cue, and participants were instructed to remember or forget both items (pure condition). On other trials, participants were to remember one but forget the other word (mixed condition). In the incidental condition, participants were told to remember only words followed by an R cue. In the intentional condition,

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participants were told the same instructions, but also to form an association between the two words before the cue presentation. Associative memory was greater in the intentional condition. In both conditions, memory for associations for pure-Remember cued pairs was greater than for pure-Forget and mixed cued pairs. Results provide further evidence in support of the selective rehearsal account of item-based directed forgetting.
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4:00-6:00 PM (3100)

Direct Assessment of Global-Local Processing of Emotionally Expressive Faces. AMANDA L. DEVORE and DAWN M. MCBRIDE, *Illinois State University* (Sponsored by Dawn McBride) – Past studies have documented a facial recognition effect based on emotional expression as either a positive expression advantage or a negative expression advantage. However, study-test delay has been inconsistent across studies. Pazderski and McBride (2018) reported a cross-over interaction of delay and expression such that angry faces were better recognized at short delays, but the reverse effect was found at longer delays. The current study further explored this finding through a local/global processing study manipulation modeled from the method used by Srinivasan and Gupta (2011). Participants were instructed to respond to either the digit at the global or local level on each study trial, with recognition tests presented immediately after study and 15 min later. Overall, the results replicated the pattern shown by Pazderski and McBride, with higher recognition for angry than happy faces in the immediate test and the reverse pattern in the 15 min delayed test. However, the results did not replicate the local/global difference across expression reported by Srinivasan and Gupta, and no evidence was found that local/global processing differences explain the delay by expression interaction results.
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4:00-6:00 PM (3101)

Perceptual Similarity of Meaningful and Meaningless Logos on False Memory Formation. AMY HODEL, *Huntington University,* BRENNA PRIETO and JUSTYNA OLSZEWSKA, *University of Wisconsin – Oshkosh* – The current study sought to assess true and false memory for familiar and unfamiliar logos in both immediate and delayed recognition. To test this, the classical DRM procedure (Deese, 1959; Roediger & McDermott, 1995) was adopted and modified to study pictorial material in the form of different product logos. Participants were instructed to memorize four well-known and four new, perceptually similar logos, engage in a distractor task, and perform an immediate recognition test (short-term memory, STM) and delayed (long-term memory, LTM). The recognition test contained either the original brand (studied), a modified original brand with the shape changed (related), or different brand (unrelated). The rate of false memories for familiar logos were similar to unfamiliar in STM. The rate of false memories for familiar logos did not change across delay. However, the rate of false memories for unfamiliar logos dropped from STM to LTM. Memory for studied logos revealed a similar pattern. The results suggest that access to familiar pictorial materials after a delay was based on the meaning of the product logo while unfamiliar images was based on perceptual characteristics.
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4:00-6:00 PM (3102)

Both Informative and Uninformative Pre-Stimulus Cues Benefit Subsequent Source Memory. NICHOLAS YEH and JOSHUA KOEN, *University of Notre Dame* – Evidence from fMRI and EEG/ERP demonstrate that neural activity elicited by a pre-stimulus cue and prior to encoding a stimulus is predictive of later memory. In three pre-registered studies, we investigated whether pre-stimulus cues during encoding benefited subsequent old/new recognition (Study 1-3) and source memory performance (Study 2-3). At encoding, participants made one of two semantic judgments on words that were preceded by an informative cue that identified the upcoming semantic judgment, an uninformative cue that signaled an upcoming trial but no information about the semantic judgment, or no cue. We found little evidence that pre-stimulus cues improved old/new recognition memory performance, as well as recollection and familiarity estimates derived from receiver operating characteristic curves. However, informative and uninformative cues enhanced subsequent source memory accuracy for the encoding task compared to the no cue condition. Our findings are consistent with the hypothesis that pre-stimulus cues benefit memory via recruitment of general attentional resources.
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4:00-6:00 PM (3103)

Different Underlying Mechanisms for Induced and Directed Forgetting. LAURA JANAKIEFSKI, *Vanderbilt University,* PAUL SCOTTI, *The Ohio State University,* ASHLEIGH MAXCEY, *Vanderbilt University* (Sponsored by Ashleigh Maxcey) – Directed forgetting involves subjects exerting top-down control over what information they remember and forget, and is thought to be mediated by executive control mechanisms to suppress unwanted information. Induced forgetting also involves subjects forgetting information, but as an unintentional, incidental byproduct of activating related items in memory. Here we tested the hypothesis that the same executive control mechanism underlies forgetting in both paradigms. We implemented both directed forgetting and induced forgetting tasks in a within-subjects design and found the magnitude of subjects' forgetting was uncorrelated. These results replicated when eliminating roughly half the subjects who did not believe the cue to forget. Further, the magnitude of forgetting was larger for induced forgetting than directed forgetting. These results suggest different underlying mechanisms for directed forgetting and induced forgetting. We discuss the implications of these results for models of memory and the methodological benefits of each paradigm.
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4:00-6:00 PM (3104)

Long-Term Memory Specificity and Inhibition Depend on Memory Strength. BRITTANY JEYE, *Worcester State University,* SCOTT SLOTNICK, *Boston College* – In the current study, we determined whether long-term memory specificity and long-term memory inhibition of related items depend on memory strength. During the study phase, participants were shown abstract shapes. During the test phase, old shapes, related shapes (created by distorting old shapes between 50–200%), and new shapes were presented and participants made an "old-remember" (i.e., high memory strength), "old-know" (i.e., low memory strength), "new-related," or "new-unrelated" judgment. Preliminary

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analyses revealed that memory representations were very specific for only high memory strength items, as the "old-remember" response rate was significantly lower for highly related shapes than old shapes. By contrast, memory inhibition of distantly related shapes was observed for only low memory strength items, as the "old-know" response rate was significantly lower for distantly related shapes than new shapes. These results suggest that long-term memory specificity and inhibition of related items depend on memory strength.
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4:00-6:00 PM (3105)

Using Recognition-Induced Forgetting to Assess Forgetting of Racial Minority Faces. ESEOHE AIKHUELE, *Vanderbilt University,* EMILY SPINELLI, *The Ohio State University,* ASHLEIGH MAXCEY, *Vanderbilt University* (Sponsored by Ashleigh Maxcey) – Recognition-induced forgetting is a forgetting effect whereby items held in visual long-term memory are forgotten as a consequence of recognizing other items of the same category. Previous research has demonstrated that recognition-induced forgetting occurs for white faces but not Black faces. Specifically, while recognizing one white face leads to the forgetting of another white face, memory for Black faces is undisturbed in the same situation. In the real world, the immunity of Black faces to recognition-induced forgetting could cause disproportionately more positive eyewitness identifications of Black suspects than white suspects. Are minority faces immune to recognition-induced forgetting? Here we tested recognition-induced forgetting of Asian faces. Despite replicating the immunity of Black faces to recognition-induced forgetting, Asian faces were susceptible to recognition-induced forgetting. These findings suggest that racial minority status of the face does not create immunity to recognition-induced forgetting.
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4:00-6:00 PM (3106)

An Investigation of the Superior Recognition Memory for Pictures Compared to Natural Sounds. FAHAD AHMAD, SAVANNAH TREMBLAY, MICHAEL KARKUSZESKI, and WILLIAM HOCKLEY, *Wilfrid Laurier University* – Researchers have shown that yes-no recognition memory for object pictures is better than their sounds. Gloede and Gregg (2019) attributed this recognition advantage to representations of auditory stimuli being course and gist-based whereas visual representations are more perceptually detailed. However, research has shown that forced-choice can provide a better test of recognition based on gist versus perceptual details (e.g., Ahmad, Moscovitch, & Hockley, 2019). We tested participants' recognition memory for pictures and sounds in both intentional and incidental study conditions. We found intentional recognition performance was higher for pictures than sounds; the advantage for pictures was seen in both the exemplar (perceptual details) and novel (gist) distractor test conditions. Overall recognition was lower in the incidental condition but the pattern of results was the same. An analysis of Remember, Know and Guess judgments showed that participants provided a higher proportion of know and guess judgments for correct recognition of sounds but showed more remember judgments for pictures. Our results show that recognition for pictures after an immediate test is superior to sounds in not only perceptual details but also gist.
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4:00-6:00 PM (3107)

An Exploration of the Test Position Effect Using the Continuous Recognition Paradigm. JULIAN FOX and ADAM OSTH, *University of Melbourne* (Sponsored by Adam Osth) – In memory research, there is a debate concerning the cause of the test position effect (i.e., the finding that performance decreases throughout testing). The effect is generally attributed to either item-noise (i.e., interference from other test items) or context drift (i.e., the gradual decrease in similarity between the study context and current context). In a traditional recognition task, differentiating these two accounts is difficult. However, in a continuous recognition task—where participants identify novel and repeat presentations throughout a single stream of items—the two accounts make predictions about different data patterns. While item-noise predicts performance decreases as more trials elapse, context drift predicts performance decreases as the lag between presentations of an item increases. In the present investigation, we seek to determine the extent to which each account drives recognition by fitting choice and RT data from a novel continuous recognition experiment using the Osth et al. (2018) model.
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4:00-6:00 PM (3108)

Environmental Sounds and the Verbal Overshadowing Effect. JUSTYNA OLSZEWSKA, *University of Wisconsin – Oshkosh,* JOANNA ULATOWSKA, *Nicolaus Copernicus University,* SARAH OPOLKA and SAMARA MARKLE, *University of Wisconsin – Oshkosh* – According to Schooler and Engstler-Schooler, verbal overshadowing is the phenomenon where verbalization of a complex stimulus can impair subsequent recognition of such stimulus (Schooler & Engstler-Schooler, 1990). The phenomenon was initially demonstrated in face recognition but has since been expanded to other visual and non-visual stimuli such as colors, voices or tastes. The present study examined a verbal overshadowing effect in meaningful sounds, which to our knowledge has never been tested. In this experiment participants heard environmental sounds and were asked to verbally describe the sound for ten seconds (experimental group) or to repeat the word "the" for ten seconds (control group). Immediately after they were presented with the studied sound, an unrelated sound, or a related sound, and had to decide whether the sound they just heard had been previously presented or not. Results showed that participants in the control condition better discriminated between related sounds and unrelated ones and it was accompanied by a more liberal style of responding as compared to the experimental condition. The results are discussed within the criterion shift framework.
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4:00-6:00 PM (3109)

Long-Term Continuous Recognition: Characterizing Repetition Effects at Intervals Spanning from Seconds to Months. MASON PRICE, *University of Oregon,* EMILY ALLEN and YIHAN WU, *University of Minnesota,* THOMAS NASELARIS, *Medical University of South Carolina,* KENDRICK KAY, *University of Minnesota,* J. BENJAMIN HUTCHINSON, *University of Oregon* – Time and repetition influence the loss of information in memory. Studies enlisting continuous

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recognition paradigms to probe memory retention have revealed longer response times (RTs) and decreases in accuracy as a function of time elapsed between item presentations. Such effects are nonlinear, but many investigations have lacked the capability of probing effects beyond a single session. We present an experiment in which subjects made old/new judgments to ~10,000 naturalistic images, each presented up to 3 times across 30-40 sessions. Repetitions were interspersed across lags ranging from seconds to nearly 9 months. Comparisons of RTs and accuracy favored interactions between lag and repetition, wherein an added repetition decreased the rate of forgetting over time, which in turn was less well-described by traditional (e.g., logarithmic) forgetting functions. These results highlight how traditional metrics of forgetting scale well from seconds to months, but also how multiple experiences additionally influence long-term memories.
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4:00-6:00 PM (3110)

Testing the Boundaries Conditions of the Competitive Trace Theory: The Influence of Context Variability on Lure Discrimination. MENGTING ZHANG and ALMUT HUPBACH, *Lehigh University* (Sponsored by Almut Hupbach) – The Competitive Trace Theory (CTT; Yassa & Reagh, 2013) predicts that repeated item encoding leads to semanticization and loss of episodic detail, because non-overlapping contextual elements of repeated encoding events compete with one another, making it difficult to differentiate similar lures from targets. We and others (Loiotile & Courtney, 2015) failed to find empirical support for this prediction. However, repetition under the identical encoding conditions might limit the competition of contextual traces. To test whether encoding under varied context conditions impairs lure discrimination, we manipulated context variability as varied color backgrounds (Exp 1) or varied encoding tasks (Exp 2). In contrast to CTT, repeated encoding, either under identical context or variable context conditions, improved target recognition and lure discrimination. This suggests that repeated encoding preserves rather than impairs perceptual details in memory representations.
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4:00-6:00 PM (3111)

Deficits for Recent but Not Lifetime Familiarity in Amnestic Mild Cognitive Impairment. NICOLE ANDERSON, *Rotman Research Institute, Baycrest Health Sciences & University of Toronto,* ELSA BAENA, *Rotman Research Institute, Baycrest Health Sciences,* HAOPEI YANG, *University of Western Ontario,* STEFAN KOHLER, *Rotman Research Institute, Baycrest Health Sciences & University of Western Ontario* – People with amnestic mild cognitive impairment (aMCI) repeat questions, seemingly without any sense of familiarity, and neurofibrillary tau accumulation in preclinical Alzheimer's disease (AD) begins in perirhinal cortex, a region linked to familiarity. Both observations would predict familiarity impairments in aMCI, but the extant evidence is mixed. Older adults with aMCI and healthy controls were administered two tasks that isolate the role of familiarity—frequency judgments for words from a recent study phase and judgments of cumulative lifetime familiarity—as well as a process dissociation procedure (PDP) task that previously revealed spared familiarity in aMCI. Familiarity was spared in aMCI on the PDP task but was impaired when probed with frequency judgments. Lifetime familiarity was also spared in aMCI. These findings suggest that perirhinal cortex may be necessary for the acquisition and accumulation of familiarity for object concepts, but with extended exposure, these concepts become likely represented in anterolateral temporal lobe cortex, such that they remain accessible even in the face of perirhinal cortex pathology observed in preclinical AD.
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4:00-6:00 PM (3112)

How Features Interact Across Memory Traces to Produce Familiarity-Based Recognition. KATHERINE MCNEELY-WHITE, ANDREW HUEBERT, and ANNE CLEARY, *Colorado State University* (Sponsored by Anne Cleary) – Research on memory traces has established some of the basic types of features that give rise to feelings of familiarity, such as geons, semantics, letters, and spatial relations. However, many outstanding questions remain. For example, do some feature types carry more weight than others in the familiarity signal computation? Does increased exposure to particular features correspondingly increase familiarity? How do different features combine across separate memory traces to contribute to the familiarity signal? In Experiment 1, increased exposure frequency to the same feature-type (semantic features) at encoding led to an increase in later subjective familiarity reports for stimuli in which they were embedded. In Experiment 2, semantic features were more likely to increase subjective feelings of familiarity with stimuli in which they were embedded than orthographic features. The level of familiarity increase occurring when orthographic and semantic features were separately encoded then jointly embedded in a later test stimulus was roughly equivalent to the level of familiarity increase expected from either feature-type presented alone then added together.
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4:00-6:00 PM (3113)

It's Easier to Forget What You Want: Directed Forgetting of Self-Selected Words. KATHLEEN HOURIHAN, *Memorial University of Newfoundland,* TRACY TAYLOR, *Dalhousie University* – In item method directed forgetting, participants are instructed to Remember (R) or Forget (F) items in a study list. When memory for all items is tested, memory is better for R than for F items: a directed forgetting (DF) effect. Research shows that learners can make sensible decisions about which items to study to maximize performance; when participants' choices are honoured, memory exceeds conditions in which choices are dishonoured. Can people similarly select items to maximize intentional forgetting? In a series of experiments, participants were presented with a list of items and asked to choose what they would like to remember (or forget). The study phase honoured half of their choices (R cues for chosen items; F cues for non-chosen items), but dishonoured half of their choices. Results show that item choice strongly influences DF, with the magnitude of the DF effect larger when choices are honoured than when dishonoured.
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4:00-6:00 PM (3114)

The Relation Between Memory Self-Efficacy and Reality Monitoring. KYLE KRAEMER, SHEILA BLACK, and IAN MCDONOUGH, *The University of Alabama* – The ability to correctly identify the source of a memory is of vital importance to a person's everyday life. According

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to the source monitoring framework, memories do not contain source labels, and inferences about the source of a memory must be drawn from the quality of a memory itself. Thus, errors in source memory can occur either due to the quality of the memory in question or due to the inference drawn from characteristics of the memory trace. Recent research has shown the effects of beliefs and expectations on memory, including memory self-efficacy, or belief in one's ability to succeed in memory tasks. However, the proposed mechanisms through which memory self-efficacy affects memory vary widely and have not been systematically investigated and compared. The current studies demonstrate that the correlation between self-efficacy and memory ability extends to reality monitoring tasks. However, our investigation failed to find substantial evidence that this relationship is due to either the quality of the memory or the criteria used during inference. Results raise the possibility that reality monitoring ability may primarily affect memory self-efficacy, rather than vice-versa. Implications for other memory tasks are examined.
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4:00-6:00 PM (3115)

The Benefits of Foreknowledge for Recognition of Faces. PETER HANCOCK, *University of Stirling* – Top-down priming is ubiquitous in perception: it is easier to see something if you know what to expect. This phenomenon was tested in the context of matching faces. Participants saw two face images sequentially, one clear, one almost obscured by noise. Half the clear faces were familiar; half the noisy ones were matched for identity. Participants saw either clear or noisy images first. For unfamiliar faces, performance was at chance for either presentation order. For familiar faces, match trials were identified equally well for both orders. For familiar mismatch trials, performance was at chance only if the noisy image came first. Participants lack insight to realise they would have recognised the noisy face, had it been familiar. Knowledge of the identity has no benefit for match trials but allows mismatches to be rejected. A second experiment, using participants and celebrities from different countries, produced the same pattern of results.
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4:00-6:00 PM (3116)

Simultaneous ROC Modeling of Prevalence and Difficulty Across Recognition Memory Tests; The Best Model Is Individual Specific. EVAN LAYHER, CRAIG ABBEY, COURTNEY DURDLE, SARA LESLIE, TYLER SANTANDER, and MICHAEL MILLER, *University of California, Santa Barbara* (Sponsored by Justin Kantner) – Signal Detection Theory (SDT) is commonly implemented to model performance on recognition memory tests by assessing receiver operating characteristic (ROC) curves generated from confidence ratings. We tested assumptions of SDT at the individual level through model comparison of performance on recognition tests where we manipulated both target prevalence (30% or 70% of images are "old") and difficulty (images studied 1 or 3 times) that required participants to report confidence on a 6-point rating scale. This allowed us to test whether changes in prevalence affect the underlying "old" and "new" distributions or if changes in difficulty affect the placement of decision thresholds. We generated ROC curves based on maximum likelihood estimates and used Akaike information criterion (AIC) to compare four models at the individual level: (1) both distributions and thresholds are invariant across conditions, (2) only distributions are invariant, (3) only thresholds are invariant, and (4) neither distributions nor thresholds are invariant. SDT predicts model 1 to be the best fit, but AIC measures revealed that this was only true for 18/35 subjects. This indicates that the best model of recognition memory is specific to the individual.
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4:00-6:00 PM (3117)

Can You Imagine Your Way to Fewer Errors? A Test of the Generalizability of a Strategy. EMILY STREEPER, AMANDA ARBUCKLE, MEGAN MAXWELL, and JULIE BUGG, *Washington University in St. Louis* (Sponsored by Mark McDaniel) – Older adults are more susceptible to prospective memory (PM) commission errors, the erroneous repetition of a no-longer-relevant intention. This elevated risk can be dangerous. Recent research sought to reduce commission error risk in older adults in the commission error task (Bugg, Scullin, & Rauvola, 2016). Initial evidence indicates a novel strategy called imagined forgetting practice (IFP) reduces commission error risk in older adults (Streeper, Yang, & Bugg, in prep). IFP guides participants through imagining encountering the no-longer-relevant targets but not performing the PM intention. The current study examined two questions: (1) can the IFP strategy improve performance in a task requiring similar cognitive mechanisms (e.g., go/no-go task), and (2) is the IFP strategy transferable from one task (go/no-go) to another (PM commission error task)? We hypothesized the IFP strategy would reduce errors on no-go trials and reduce PM commission error risk. However, strategy condition had minimal impact on no-go trial or commission error performance. Surprisingly, PM commission error risk for both younger and older adults was exceptionally low, suggesting that performing an inhibitory task may impact later commission error risk.
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4:00-6:00 PM (3118)

Self-Reported Strategy Use Among Older Adults for Laboratory Prospective Memory Tasks. KERI KYTOLA, *Wilson College,* CELINDA REESE-MELANCON, ERIN HARRINGTON, and RACHAEL TURNER, *Oklahoma State University,* JAMES PASARIBU, *Wilson College* (Presented by Celinda Reese-Melancon) – The metacognitive components of prospective memory (PM) have received relatively little attention. This study extends earlier work with younger adults (Reese-Melancon et al., 2019) to identify the strategy repertoire older adults employ on a laboratory PM task and to determine whether self-reported strategy is related to performance. Participants completed either a focal or nonfocal PM task embedded in a lexical decision task. Similar to our past work, participants reported the same strategy repertoire regardless of focality, with monitoring and physical action being the most frequently reported strategies. Participants in the nonfocal condition who reported using a strategy performed better than those who did not report using one; in the focal condition, performance was similar regardless of whether strategy use was reported. These findings add to what is known about strategy use and PM among older adults and underscore the need for additional research examining the role of metacognition in PM.
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4:00-6:00 PM (3119)

Preserving Prospective Memory in Daily Life: A Systematic Review and Meta-Analysis of Mnemonic Strategy, Cognitive Training, External Memory Aid, and Combination Interventions. WINSTON JONES, *Baylor University,* JARED BENGE, *Baylor Scott, & White Health,* MICHAEL SCULLIN, *Baylor University* – To preserve independent functioning in older adults and those with neurocognitive impairments, researchers and clinicians need to address prospective memory (PM) deficits via interventions that can compensate for attention and memory impairments from aging, brain injury, and neurodegeneration. We systematically reviewed 75 studies of older adults and clinical groups (N=3,821), who received PM interventions from 1996 to 2019, and rated the ecological validity of each PM outcome measure. Across four broad categories of PM interventions, external memory aids demonstrated consistently positive outcomes (g=.805; Mnemonic Strategies, g=.450; Cognitive Training, g=.538; Combination, g=.254) and included outcomes with substantially higher ecological validity than other intervention categories (External Memory Aid: 84%; Mnemonic Strategy: 14%; Cognitive Training: 20%; Combination: 56%). External memory aids meaningfully improve PM in ecological settings, but larger, comparative effectiveness trials are required to optimize treatments, increase adherence, and broaden daily implementation.
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4:00-6:00 PM (3120)

Effects of Focality on Time-Based PM Task. MU JEN HUANG and BRANDEE SAMLOW, *Illinois State University* (Sponsored by Dawn McBride) – Prospective memory (PM) can be categorized into two types: event-based and time-based. According to multiprocess theory, spontaneous retrieval can aid in PM with focal tasks. In contrast, non-focal tasks require monitoring for cues to facilitate PM (Einstein & McDaniel, 2005). Previous studies have examined the focality effect mainly in event-based PM tasks, but it has yet to be tested in time-based tasks. The current research focused on this question. The present study used a 2 × 2 design to directly compare event-based and time-based PM tasks in focal and non-focal conditions. The results showed a significant accuracy advantage of focality in event-based PM tasks as expected, but no significant effect in time-based tasks. These findings suggest that time-based PM is not affected by focality in the same way event-based PM is.
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4:00-6:00 PM (3121)

Prospective Memory Retrieval Dynamics in Preschool Children Using Mousetracking. ANDREW KELLY, *Georgia Gwinnett College,* MELANY LOVE and BRIELLE JAMES, *Georgia State University,* BONNIE PERDUE, *Agnes Scott College,* MOLLY FLESSERT and MICHAEL BERAN, *Georgia State University* – The current project investigated retrieval dynamics of prospective memory (PM) retrieval in preschool children using mousetracking, filling an important gap in the understanding of PM retrieval. Across three sessions, participants completed an ongoing task, which was sorting foods by color, along with a PM task, which instructed participants to sort apples to a special location. Mouse trajectories were classified as being direct (going directly to the PM area) or reversals (initially moving away from the PM area). Previous research has connected direct trajectories to cognitively demanding attentional-based retrieval, whereas reversals were behaviorally linked to spontaneous retrieval. The results showed that PM performance increased over time. Reversals were relatively rare albeit present throughout. Increases in PM performance were accounted for by increases in direct trajectories. These results suggest that while spontaneous retrieval is present at the beginning stages of PM abilities, successful retrieval is mediated through attention-demanding retrieval processes.
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4:00-6:00 PM (3122)

Focality and Prospective Memory in Preschool Children. MELANY LOVE, *Georgia State University,* ANDREW KELLY, *Georgia Gwinnett College,* AUDREY PARRISH, *The Citadel,* BONNIE PERDUE, *Agnes Scott College,* SUSAN LITTLE and MICHEAL BERAN, *Georgia State University* (Sponsored by Micheal Beran) – Prior investigations of adult populations have demonstrated that focal cues are associated with superior prospective memory (PM) performance relative to nonfocal cues, perhaps due to the instantiation of automatic retrieval processes. Studies of cue focality in PM using younger samples are much less common and present a unique opportunity to explore PM retrieval mechanisms. Over three test sessions, a sample of preschool children completed a memory task in which they named every animal in a series. During retrieval, participants had to identify which animal was missing from the series. We manipulated cue focality by varying the PM instructions. Focal participants removed specific animals (e.g., frog) from the game if they appeared. Nonfocal participants removed animals of a specific color (e.g., green). There were no differences in PM remembering between focal and nonfocal conditions. There also was no difference in performance as a function of the difficulty of the memory task, and PM performance was not correlated with a measure of working memory. These results suggest that the effects of focality may not be present in earlier stages of PM development. The implications for PM retrieval processes also are discussed.
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4:00-6:00 PM (3123)

Modeling Monitoring Behavior in Time-Based Prospective Memory. GIULIO MUNARETTO, *University of Trieste,* TIMO MÄNTYLÄ, *Stockholm University,* FABIO DEL MISSIER, *University of Trieste* (Sponsored by Fabio Del Missier) – Effective monitoring of the passage of time is a fundamental aspect in Time-Based Prospective Memory (TB-PM). Analytical work suggests that reducing the interval between each monitor event is the most effective strategy, and empirical studies usually report a J-shaped function relating time and monitoring frequency. Given the absence of a systematic analysis of monitoring behavior, we carried out a competitive modeling study on new and published data. A proportional rate growth exponential function (PRG-exp) provided the best overall fit to the aggregated data and to individual monitoring behavior of most participants in our study (~60%). Closer fit to PRG-exp was associated with better working memory updating, time perception abilities, and TB-PM performance. A quadratic function better captured the monitoring behavior of the remaining participants (with lower TB-PM performance), especially when there was no upper limit on monitor events. Implications of these results for monitoring strategies in TB-PM will be discussed.
Email: Giulio Munaretto, giulio.munaretto@phd.units.it

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4:00-6:00 PM (3124)

The Role of Offloading on Prospective Memory. PHILIP PEPER, DURNA ALAKBAROVA, and HUNTER BALL, *University of Texas at Arlington* (Sponsored by Daniel Levine) – Prospective memory (PM) refers to our ability to formulate and fulfill future actions. Memory demands can be reduced by offloading intentions onto our environments through reminders, such as handwritten notes or smartphone alerts. Despite their utility in naturalistic settings, relatively little work has examined reminders in controlled laboratory settings. In the current study, we examined offloading in a standard event-based PM task across three experiments. Participants learned five (low load) or ten (high load) PM cues to which they were to later respond. Cues were either presented at the top of the screen during the task (reminder) or had to be maintained in memory (no reminder). In two experiments, reminders improved intention fulfillment regardless of load. Notably, however, memory load did not influence intention fulfillment even without reminders. This study provides a new method for examining PM reminders and has important implications for understanding the mechanisms underlying PM offloading.
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4:00-6:00 PM (3125)

Differences Between Young and Old Adults in Prospective Memory in an Ecological Context. CARMEN GIL, ALAITZ AIZPURUA, and MALEN MIGUELES, *University of the Basque Country* – The prospective memory has been defined as the memory of carrying out an action programmed at a certain moment in the future. In this study the social benefit was examined using a naturalistic design. In addition, young and older adults took part, in order to investigate the "Paradox of age." Thus, 42 older and 42 younger adults took part in this study. Participants were asked to remember to send 10 messages, requesting in each one a different task. The participants in the "social benefit" condition were informed that if they remembered to send the message, a local NGO will receive an economic benefit. Older adults had a significantly higher performance than young adults. There was also a better performance in the groups with social benefit and in the morning tasks than in the afternoon tasks, independently of individuals' age. The results of this study show that social motivation improves performance in a prospective memory task, regardless of age. In addition, older adults performed better than young people, as the paradox of age explains. This study contributes to understanding the differences between young and older adults in prospective memory on a day-to-day basis.
Email: Carmen Gil, cgilrob@gmail.com

4:00-6:00 PM (3126)

Negative Pictorial Cues with High Arousal Impair Prospective Memory. KATHARINA SCHNITZSPAHN, *University of Aberdeen,* FRANCESCO PUPILLO, *Goethe University Frankfurt* – A recent meta-analysis (Hostler et al., 2018) on the effects of emotion on prospective memory suggests enhanced performance for positively-valenced rather than neutral cues, while negatively-valenced cues did not enhance prospective memory overall. However, the authors suggest that effects of valence are moderated by the arousal level of the cues and that task modality (words vs pictures) may further influence effects. We ran two experiments directly testing these predictions by manipulating cue valence and arousal and examining their effects on prospective memory performance in a task using pictures (experiment 1) or words (experiment 2). Results suggest that prospective memory was reduced for negatively-valenced cues. This impairment was especially pronounced when highly arousing negative pictures served as cues. In contrast to previous findings, positively-valenced cues did not improve prospective memory when controlling for arousal in both experiments. Results are discussed in the context of theories on emotion-cognition interactions and application.
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4:00-6:00 PM (3127)

Relationship Between Personality and Intentional Status of Prospective Memory Tasks. TAISUKE MORITA, *Tokyo University of Science* – Several studies have revealed that performance of prospective memory tasks is predicted by conscientiousness of the Big Five personality traits. This study aims to expand the finding by examining the relationship between intentional status of prospective memory tasks and conscientiousness. The intentional status is a key element of retrospective component of prospective memory tasks, and it may vary from wish to must (Ellis, 1996). A sample of 404 adults between 20 and 69 years old were asked to report real-life prospective memory tasks to be performed in the following week. They were then asked to respond to a 12-item questionnaire concerning the strength of intentional status of the reported prospective memory tasks. A questionnaire about conscientiousness was also administered. Result showed that the strength of intentional status was significantly correlated to reported conscientiousness of participants. This result is consistent with the previous finding that prospective memory performance could be predicted by reported conscientiousness.
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4:00-6:00 PM (3128)

The Influence of Covert Visual Attention on Eye Movements During Reading. PETER SHLANTA and JANE ASHBY, *Central Michigan University* – Research indicates that vision and language processes cooperate in contributing to poor reading skill. The present study examines whether the speed with which a reader shifts covert visual attention relates to reading skill (WRAT-4), word recognition speed (TOWRE-2), and eye movements during reading. Experiment 1 presented a forced-choice visual attention task in which two Gabor patch stimuli appeared parafoveally to the left and right of a central fixation cross. Participants used covert attention to evaluate the patches' line orientations as quickly as possible, then make a saccade to fixate the most horizontal patch. Participants who read faster on the TOWRE-2 performed more accurately on the visual attention task, but also responded ~70ms slower when executing saccades toward their response. Experiment 2 monitored eye movements in the visual attention task and during sentence reading to examine whether attention shifting time predicts the location and timing of eye movements during reading.
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4:00-6:00 PM (3129)

In Dyslexia, the Perceptual Span Is Impaired in Reading and Maybe in Visual Search. STEVEN LUKE and BENJAMIN CARTER, *Brigham Young University* – Using the moving window technique, we examined the perceptual span of 30 participants with dyslexia and 24 control participants.

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Participants completed two moving window tasks: one reading task and one visual search task. In reading, individuals with dyslexia showed clear impairments, including weaker comprehension, slower reading speed, longer fixations, and shorter saccades. Control participants experienced reading disruptions for 4, 8 and 12 letter windows, while participants with dyslexia were disrupted only by the 4 letter window. This indicates a reduced perceptual span in dyslexia. In visual search, search times did not differ between groups. Fixations were longer in the 4 degree window condition only, while saccades were shorter in all window conditions (4, 6, 8, and 10). Individuals with dyslexia showed this same pattern; however, they experienced more disruption than control participants (i.e., their fixations were proportionately longer and saccades shorter than the control participants) in the smallest window conditions.
Email: Steven Luke, steven_luke@byu.edu

4:00-6:00 PM (3130)

Reading Development vs. Language Structure; Examining the Development of Eye-Movement Strategies in Dyslexic and Normal Readers in an Inconsistent Orthography. CATHERINE ANTALEK, BIANCA DE HAAN, and TAEKO N. WYDELL, *Brunel University London* (Sponsored by Brendan Weekes) – The Hypothesis of Granularity and Transparency (Wydell & Butterworth, 1999) postulates that orthographies can be described in two dimensions—transparency and granularity—with the predictions that phonological dyslexia would be rare in two conditions: (i) transparent orthographies, regardless of the level of translation (e.g., phonemes, syllable, character), and (ii) even in opaque orthographies, if the smallest orthographic unit/grain size representing sound is coarse (i.e., larger grain size, such as a whole character/word). English does not fall into either of these conditions, therefore strategies required to read English may drive the development of poor decoding skills causing readers with phonological dyslexia to engage in compensatory eye movement patterns. The current study sought to determine whether adult readers diagnosed with dyslexia engage in unique eye movement patterns when reading whole sentences for meaning in English. Results indicated that readers with dyslexia engage in unique eye-movement patterns to make up for poor decoding skills. Specifically, they exhibit shorter, but more frequent fixations with more regressions.
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4:00-6:00 PM (3131)

Statistical Learning and Reading: How Motivation Influences This Relation. KELLY NISBET, *McMaster University,* NOAM SIEGELMAN, *Haskins Laboratories,* VICTOR KUPERMAN, *McMaster University* (Sponsored by Victor Kuperman) – Studies show a link between statistical learning (SL) ability and reading proficiency. But is this relationship driven by an unknown third variable? Given its known relations with linguistic performance, motivation to complete a task is an important candidate to rule out. This study investigates how motivation for the task relates to SL and reading. We conducted an online study (n=347) containing tests of motivation, visual statistical learning, reading comprehension, and various reading component skills. Using mediation analyses we found that a significant portion of the shared variance between SL and reading is mediated by motivation. However, there exists a strong direct link between SL and reading, above and beyond motivation. These results validate the link between SL and reading while highlighting the importance of considering individuals' motivation as a factor that may influence this relation.
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4:00-6:00 PM (3132)

The Effects of Transcutaneous Auricular Vagus Nerve Stimulation on Reading Comprehension. VISHAL THAKKAR, ZOE RICHARDSON, ANNIE DANG, and TRACY CENTANNI, *Texas Christian University* (Sponsored by Tracy Centanni) – Reading comprehension is an integral skill in daily life. Currently, there are few options for improving comprehension, suggesting a need for new interventions. A growing body of evidence suggests that cervical vagus nerve stimulation (cVNS) paired with an external stimulus improves learning and drives neural plasticity. However, an invasive procedure is not practical for a reading intervention. Non-invasive transcutaneous auricular vagus nerve stimulation (taVNS) has recently been shown to activate similar brain structures and may drive neural plasticity. We evaluated whether taVNS paired with reading improves comprehension. Participants were screened for nonverbal IQ, reading, memory, and attention. Eligible participants received either sham or active stimulation while reading passages. After reading each passage, stimulation was turned off and participants answered five comprehension questions. Results show a marginal benefit of active stimulation in all comprehension questions. Follow-up analyses showed a significant benefit of taVNS in memory-based questions, but not for inferential questions.
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4:00-6:00 PM (3133)

The Impact of Reading Level on False Fact Detection. AMANDA WITHALL and EYAL SAGI, *University of St. Francis* – Much of our knowledge about the world comes from interacting with others, either in person or by reading their reports, thoughts, and opinions. A question that has risen to prominence in recent years is how we decide which information to trust and accept as true. Existing research has identified the important roles of factors such as our trust in the source of the information and our reading level. We report on the results of a study on how the style of writing, and specifically the difficulty level of the text providing the information, affects our trust in the information provided. Thirty-two informational paragraphs were written and adapted to a high or low text difficulty and contained either intuitive or counter-intuitive information. Participants trusted the information more in texts that were more difficult to read, regardless of whether the information presented was correct or incorrect. Regardless of reading difficulty, participants trusted paragraphs providing truthful information more than those providing false information. This result has important implications for information given over social media platforms, where the source may or may not be readily available and is often not an expert on the topic.
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4:00-6:00 PM (3134)

Reading on Digital Devices: A Comparison of Younger and Older Adults. NICOLE MARTIN, AUBREY SAHOURIA, GRACE BERNATCHEZ, and JENNIFER STIEGLER-BALFOUR, *University of New England* – In a study involving younger (18+) and older adults (65+),

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we explored the impact of reading digital text (vs. print) on the reading comprehension process. Participants completed multiple surveys (e.g., computer anxiety and experience, task motivation and mind wandering) and read text on an iPad, Kindle Paperwhite, or paper and answered comprehension questions. The results revealed that older but not younger adults scored higher on the recall quiz when reading on paper compared to either digital device. Readers in both cohorts experienced higher levels of mind wandering when reading on digital devices as compared to printed text. Interestingly, older and younger adults reported the same level of computer experience, though older adults reported significantly higher computer anxiety. These results will be discussed with a focus on younger and older adults adjusting similarly to reading on digital devices and how reducing computer-related anxiety can strengthen reading performance on digital devices.
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4:00-6:00 PM (3135)

Feeling Connected: The Effects of Text Genre on Thought Content during Reading. MYRTHE FABER, *Tilburg University & Donders Institute,* SHELBY SMITH, ALEXIS LOYED, TYLER STETSON, and CAITLIN MILLS, *University of New Hampshire* – Task-unrelated thoughts (TUTs) are often triggered by stimuli in the environment. For example, a trigger may be semantic or episodic content from the task itself: During reading, the content of the text might trigger a self-referential thought (personal connection; PC) related to the reader's life. How does text influence readers' thoughts? The current study explored how genre impacts rates of TUTs and PCs during reading. Participants (N=126) read an expository and narrative text about two medical conditions and answered thought probes throughout reading. Results showed that readers experienced more TUT when reading expository compared to narrative text (B=-.517, p<.001), but made more PCs when reading narrative text, B=.301, p=.042. TUT was also less likely to contain a PC when reading expository text, B=-.711, p<.001, highlighting the importance of textual features in determining how thoughts unfold during reading.
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4:00-6:00 PM (3136)

A Multi-Task Examination of Word- and Character-Frequency Effects in Chinese. LILI YU, *Macquarie University,* JIANPING XIONG, *Henan Normal University,* AARON VELDRE, *University of Sydney,* DENIS DRIEGHE, *University of Southampton,* ERIK REICHLE, *Macquarie University,* SALLY ANDREWS, *University of Sydney* – In contrast to most alphabetic writing systems, Chinese words are comprised of 1-4 uniformly sized, morpho-syllabic characters that are not separated by clear word boundaries (e.g., blank spaces). Despite these marked differences, word-frequency effects are reliable even though character-frequency effects are not. In this study, we examined the effects of word and character frequency across three commonly used tasks (naming, lexical decision, and sentence reading) using the same stimuli (N=60) and participants (N=81). We found a facilitative effect of word frequency across all three tasks. However, the effects of character frequency varied, being facilitative for naming but inhibitory for both lexical decision and sentence reading. These findings will be discussed in relation to both task differences and models of word identification.
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4:00-6:00 PM (3137)

Intact Visual and Phonetic Strategies in Character Learning among Chinese Children with Dyslexia. YIXUN LI, *University of Maryland, College Park,* HONG LI and YI HUI, *Beijing Normal University,* MIN WANG, *University of Maryland, College Park* – Two experiments were conducted to investigate whether and to what extent Chinese children with dyslexia utilize visual and phonetic strategies in character learning using a paired associate learning paradigm. Experiment 1 included 60 Mandarin-speaking fifth graders (dyslexia, N=32; age-matched peers, N=28) and manipulated the availability of an arbitrary bolded stroke in character (visual cue, available versus unavailable) of eight low-frequency real characters. Sixty-six fifth-grade children participated in Experiment 2 (dyslexia, N=34; age-matched peers, N=32). The regularity of phonetic cues of 12 pseudo-characters was manipulated into regular, semiregular, irregular, providing full, partial, or no pronunciation cues. The results from the two experiments together suggest that, children with dyslexia perform poorer in the character learning stage, but not in visual or phonetic strategies, or in the one-week retention of learning than their peers. Like their peers, they do not use visual cues as indicated by an interference effect of visual cues, but utilize phonetic cues, thus compensating for the poor character learning of regular characters and alleviate that of semiregular characters.
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4:00-6:00 PM (3138)

Learning New Words Through Story Reading: The Specific Link Between Orthographic Skills and New Orthographic Form Acquisition. ANEZKA SMEJKALOVA and FABIENNE CHETAIL, *Université Libre de Bruxelles, LCLD, CRCN* (Sponsored by Fabienne Chetail) – The reading activity is thought to be an important source of new word acquisition in adults. Recently, it has been reported that contextual exposure of written words could advantage high-skill spellers in word learning, especially when words are presented in less informative context. Following this work, the present study investigated the link between spelling skills and orthographical learning with a learning procedure based on a naturalistic situation of story reading. Novel words occurred in contexts which were either highly informative regarding their meaning or less informative. Our results demonstrated a clear link between individual spelling skills and orthographical learning assessed with a spelling task, without any modulation by the contextual informativeness. Additionally, we found no evidence for such a link between semantic learning and individual spelling skills. We will discuss the specificity of the link between new orthographic learning and individual orthographic abilities.
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4:00-6:00 PM (3139)

Representational Gesture's Impact on Integration of Newly Learned Words into Read Sentential Contexts. SARAH HUGHES BERHEIM and LAURA MORETT, *University of Alabama,* JOHN SHELLEY-TREMBLAY, *University of South Alabama* – The purpose of this work was to investigate how learning words accompanied by semantically-congruent and -incongruent representational gestures affects subsequent integration of these words into read sentential contexts. Native English-speaking adults learned pseudowords with representational gestures that either matched or mismatched their English definitions. Subsequently,

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participants read these pseudowords within sentential contexts either semantically-congruent or -incongruent with their meanings and gestures. There were four possible conditions under which pseudowords could be read depending on the semantic congruency of their definitions and the gestures they were learned with within critical sentences. Self-paced reading latencies for pseudowords within critical sentences were examined. Results indicated that when pseudowords were learned with mismatching gestures, latency was higher when definitions were incongruent and gestures were congruent than when definitions were congruent and gestures were incongruent with critical sentences, B=9.83, SE=3.27, t=3.00, p=.003. The findings of follow-up work using a similar paradigm with different instructions and placement of pseudowords in critical sentences will be discussed.
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4:00-6:00 PM (3140)

One Boundary Diffusion Model Analysis on the Distribution of Fixation Durations During Reading. DAJUNG LEE, HYEREE CHOO, and SUNGRYONG KOH, *Seoul National University* (Sponsored by Si On Yoon) – Recently some eye movement studies during reading attempted to describe the characteristics of the distribution of fixation durations using an ex-Gaussian analysis. Specifically, they showed that word frequency would influence location and skew, and predictability influence only location. The current study propose one boundary diffusion model to account for these results. First of all, we showed that word frequency influenced the drift rate parameter and the mask of parafoveal word influenced the starting point parameter. Furthermore, we tried to replicate the reported characteristics of the ex-Gaussian distribution by analyzing the generated data by the parameters fitted to our experiment data.
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4:00-6:00 PM (3141)

The Development of Lexical Competition in Spoken and Written Word Recognition. KEITH APFELBAUM, CLAIRE GOODWIN, and BOB MCMURRAY, *University of Iowa* – Word recognition requires recognizing a word despite competition from similar words. In spoken word recognition, this ability develops through adolescence as children improve at rapidly activating the correct lexical item and suppressing competitors. Simultaneously, written word recognition changes as reading skill grows. Unknown is the link between these modalities: Does the development of competition dynamics show similar patterns in the two domains? And do they develop in tandem for a given child? We assessed lexical access and competition in both spoken and written domains with a visual world paradigm eye-tracking study of 81 children 7-15 years old. Results showed increased speed of activating the target in both modalities, as well as changes in competitor fixations across age in each modality. However, activation of competitors was not correlated between the two modalities, suggesting at least partial independence in the development of lexical competition between spoken and written word recognition.
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4:00-6:00 PM (3142)

Interference in Automatic Word Recognition: An Eye-tracking Study. LAOURA ZIAKA, DZAN ZELIHIC, and CAROLINE SVENDSEN NORDLI, *University of Oslo,* BOB MCMURRAY, *University of Iowa,* ATHANASSIOS PROTOPAPAS, *University of Oslo* (Sponsored by Athanassios Protopapas) – Evidence from crowding and letter flanking suggests that adjacent words may cause interference affecting the recognition of fixated words. To test this, we implemented a backward-masking flanker design within the visual world paradigm. Target words were centrally presented for 75 ms, before being replaced by a mask, in one of three flanker conditions: baseline (no flankers; target was isolated), visual (strings of % signs flanked the target on both sides), and word (a different word flanked the target on each side). Targets were counterbalanced across conditions and shuffled into random order. Preliminary analysis of data from 60 Norwegian adults showed an effect of condition on the proportion of looks to the target-matching image. Specifically, fixations on the target were fewer and delayed in the word-flanker condition compared to baseline and visual flankers. This suggests that automatic word recognition is susceptible to interference from adjacent words even for adult skilled readers.
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4:00-6:00 PM (3143)

Does Learning a New Script Affect Letter Position Coding? MARÍA FERNÁNDEZ-LÓPEZ and ANA MARCET, *University of València,* MANUEL PEREA, *University of València & University of Nebrija* (Sponsored by Manuel Perea Lara) – Location-invariant processing is a marker of orthographic processing (Grainger, 2018): strings of letters are more vulnerable to transposition-effects than strings of other visual objects (e.g., symbols, unknown letters) in same-different tasks. This dissociation is assumed to be due to literacy acquisition. To examine the emergence of location-invariant processing, we conducted a same-different experiment with two unfamiliar scripts (pre-training experiment). Across six sessions, participants learned to fluently read and write one of these scripts. The post-training experiment was parallel to the pre-training experiment. Results showed a training benefit in the trained script for "same" responses, thus suggesting the emergence of an early visual specialization for letters in the trained script. However, the magnitude of the transposed-letter effect was similar in the trained and untrained scripts. Thus, the emergence of location-invariant processing may require thorough experience with specific orthographic structures.
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4:00-6:00 PM (3144)

The Development of a Measure of Orthographic Knowledge in the Arabic Language: A Psychometric Evaluation. SANA TIBI, *Florida State University,* LISA FITTON, *Florida State University & University of South Carolina,* AUTUMN MCILRAITH, *Florida State University & University of Houston* – The purpose of this research was to examine the item functioning of an assessment of Arabic orthographic knowledge. Sixty items were piloted with 201 third grade Arabic-speaking students. Participants were asked to identify the correctly spelled word from a pair of two words. Although the assessment was designed to be unidimensional, competing models were tested to determine whether item performance was attributable to multidimensionality. No multidimensional structure fit the data significantly better than the unidimensional model. The 60 original items were evaluated through item fit statistics and comparing performance against theoretical expectations. Twenty-eight items were

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identified as functioning poorly and were iteratively removed, resulting in a 32-item set. A value of 0.987 was obtained for McDonald's coefficient omega from this final scale. Participants' scores on the measure correlated with an external word reading accuracy measure at 0.79 (p<.001). The task can discriminate among children with below-average orthographic knowledge.
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4:00-6:00 PM (3145)

Incidental Reading and Unconscious Visual Word Processing in the Wild World. SARA UCEDA and JON ANDONI DUÑABEITIA, *Universidad Nebrija* – Every day we consciously and unconsciously perceive hundreds of words that are around us on posters, advertising panels and texts written in different formats. This eye-tracking study was aimed at investigating how young adult readers processed words that were pseudo-randomly arranged on the walls of a room they were in to perform a completely orthogonal task on a computer. While the participants waited for the filler task to begin, their exploratory eye movements and the fixations on the words arranged on the walls were recorded. After completing the filler task, participants completed a recognition task that included both the words to which they had been exposed, and a series of distractors with and without semantic relationship. The results showed that the participants had an active exploration pattern, and that there was a direct relationship between the initial incidental reading behavior and the subsequent recognition. These data demonstrate that readers unconsciously perceive and process the words around them and that this information can be successfully retrieved afterwards.
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4:00-6:00 PM (3146)

Eye Movements Reveal Efficient Visual-Orthographic Processing of Word Forms During Sentence Reading for Deaf Readers. BRITTANY LEE and PRISCILLA MARTINEZ, *San Diego State University,* JONATHAN MIRAULT, *Aix-Marseille Université,* KAREN EMMOREY, *San Diego State University* (Sponsored by Karen Emmorey) – Deaf people have differences in visual attention and access to phonology that may influence how they recognize words during sentence reading. Two eye tracking studies used transposed-letter (TL) nonwords to prime target words (brave) for reading-matched deaf and hearing groups. Primes were presented in the parafovea and changed to the target words once the reader's eye gaze crossed an invisible boundary. Primes in Exp. 1 were pronounceable TL nonwords (barve) and unpronounceable TL nonwords (brvae). We found no effects of pronounceability in either group. Primes in Exp. 2 were TL nonwords (barve) or identity primes (brave). Both deaf and hearing readers had longer gaze durations and more refixations on targets with TL primes compared identity primes, and these effects were bigger in the deaf group. In both experiments, deaf readers had faster reading speeds, shorter gaze durations, more skips, fewer regressions, and fewer refixations on target words compared to hearing readers. These findings support the Word Processing Efficiency hypothesis that deaf readers are more sensitive to the visual-orthographic structure of word forms and are more efficient at extracting this information for word recognition than hearing readers.
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4:00-6:00 PM (3147)

There Is No Phonological Facilitation in Cognate Translation Priming for Chinese-Japanese Bilinguals. CHUXIN LIU, *Tohoku University,* MASAHIRO YOSHIHARA, *Waseda University,* STEPHEN LUPKER, *University of Western Ontario,* MARIKO NAKAYAMA, *Tohoku University* (Sponsored by Mariko Nakayama) – Previous studies suggest that phonological similarity is a facilitatory component in cognate translation priming effects, at least when alphabetic languages are involved (e.g., Gollan et al., 1997; Voga & Grainger, 2007). As we reported at this meeting last year, however, phonologically similar Chinese-Japanese cognate pairs did not produce larger priming effects than phonologically dissimilar cognate pairs. Results in a homophone priming experiment also reported last year suggested that the lack of phonological facilitation for cognates may have been due to Chinese-Japanese bilinguals being sensitive to words' tonal information. In the present study, we manipulated the tone-pitch accent of phonologically similar Chinese-Japanese cognate pairs. The sizes of priming effects, however, were virtually identical for tone-pitch accent matched pairs and for mismatched pairs (66 ms vs. 65 ms effects), suggesting that phonological facilitation is not involved in cognate translation priming effects in logographic words, either at the segmental or suprasegmental level.
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4:00-6:00 PM (3148)

Morphological Representations of L2 English Verbs in Japanese-English Bilinguals. JESSIE WANNERKAWAHARA, *Tohoku University,* MASAHIRO YOSHIHARA, *Waseda University,* LUPKER STEPHEN, *University of Western Ontario,* MARIKO NAKAYAMA, *Tohoku University* – For L1 English readers, past-tense inflection primes (e.g., hatched, fell) facilitate recognition of their stem targets (e.g., hatch, fall) in comparison to orthographic control primes (e.g., hatchet, fill; e.g., Pastizzo & Feldman, 2002). This facilitation is assumed to be due to activation of morphological representations. What has yet to be established, however, is whether morphological representations/relationships of this sort develop in the lexicons of L2 (English) readers when morphological coding in their L1 is somewhat different (e.g., Silva & Clahsen, 2008; Feldman et al., 2010). In the present study, Japanese-English bilinguals made lexical decisions to English stem verb targets preceded by past-tense primes, orthographic control primes, and unrelated primes. Significant facilitation effects were observed from past-tense primes relative to orthographic control primes (and unrelated control primes), suggesting that Japanese-English bilinguals do develop L2 morphological level representations of the sort presumed to exist in the lexicon of L1 English readers.
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4:00-6:00 PM (3149)

The Impact of Word Features on Lexical Decision Tasks. REBECCA KNOPH and JOSHUA LAWRENCE, *University of Oslo* – This study used multiple linear regression to determine if specific features of academic words (from the Academic Word List) could predict reaction times and accuracy on lexical decision tasks. Specifically, we examined five word feature factors: word frequency from different corpora, word complexity (the number of letters, phonemes, morphemes, syllables, etc.), proximity to other words (the number of phonographic, phonologic, and orthographic neighbors), polysemy (the number of senses and meanings for that word),

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and diversity (the number of contexts in which the word can be found). We not only discovered a trend in which word features predicted longer lexical decision reaction times, but also found that this trend was different for accuracy. That is, features that predicted shorter mean reaction times did not always predict more participants would accurately identify the word as a word. The different regression weights indicate that how we identify and process words might not only be explained by the length or frequency of a word, but that it also depends on the context in which we can find the word and how many different ways we can use the word.
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4:00-6:00 PM (3150)

The Role of Orthographic Neighbourhood Effects in Lateralised Lexical Decision: An Online Replication Study. ADAM PARKER and ZOE WOODHEAD, *University of Oxford* – There are hemispheric asymmetries in the representation and processing of phonological, orthographic, and semantic features. With regards to the processing of orthography, evidence suggests that orthographic neighbourhood size (N) has a faciliatory effect in the right hemisphere. The role of N in the left hemisphere remains somewhat controversial: it may have a weaker facilitative role or it may even be inhibitory. The current pre-registered online experiment aimed to replicate the finding of Perea, Acha, and Fraga (2008), who found a facilitative effect of N in the left visual field (i.e., right hemisphere) and an inhibitory effect of N in the right visual field (left hemisphere). Thirty participants were tested and the results indeed revealed a facilitative effect of N in the right hemisphere and an inhibitory effect in the left hemisphere, adding further support for the claim that lexical competition is enhanced in the left hemisphere. Additional exploratory divergence point analysis indicated that the effects of N emerged later in the right hemisphere. Together, these results confirm hemispheric differences for the processing of orthography and have important implications for models of visual word recognition.
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4:00-6:00 PM (3151)

Exploring Inversion Sensitive English Readers' Phonological Processing in Sentence Reading. ELIZABETH HIRSHORN and CODY WOJSZYNSKI, *State University of New York (SUNY) at New Paltz* – Recent research has documented individual differences in the reading profile of native English readers by a using behavioral marker of holistic visual word processing (inversion sensitivity). A more holistic reading profile is associated with less reliance on phonological decoding for word identification. Interestingly, that pattern is strikingly similar to a Chinese reading profile, but not a typical skilled English reading profile. The current study further tests how inversion sensitive readers (ISR) use phonological information at the sentence level using tongue-twister (TT) sentences. Based on research showing Chinese readers' comprehension is not affected by TT, whereas English readers are, we hypothesized that ISR's TT comprehension would not be impaired. While we replicated a lack of correlation between phonological decoding and reading comprehension in ISR, we did not observe group differences in TT reading. These results help refine our understanding of ISR and a potential alternative route to successful reading.
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4:00-6:00 PM (3152)

Incidental Vocabulary Learning with Subtitles in a New Language. MERCEDES PÉREZ SERRANO and MARTA NOGUEROLES LÓPEZ, *Universidad Nebrija,* JON ANDONI DUÑABEITIA LANDABURU, *Universidad Nebrija & The Arctic University of Norway* – The present study is set to explore the way the orthographic distributional properties of novel written words and the number of exposures to these words affect their incidental learning in terms of recall and recognition. To that end, forty undergraduate students watched two 3-minute videos containing a total of 12 targets in their native language. Each target word was paired either with a written nonword or a written pseudoword. These novel strings appeared as on-screen text during the videos. Our results consistently show that items containing legal letter combinations (i.e., pseudowords) are better recalled and recognized than those with illegal combinations (i.e., nonwords). Further analysis in the recall task indicate that frequency modulates the learning of pseudowords and nonwords in a different way. The learning of pseudowords increases linearly with repetitions, while nonwords are equally learned across frequencies. These differential effects found in the recall task do not show up in the recognition task. Although participants took more time to recognize nonwords in the recognition task, increased exposure to the items similarly modulated reading times and accuracy for nonwords and pseudowords.
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4:00-6:00 PM (3153)

How Does Word Identification Change from Childhood to Elderly Age? ANA BACIERO (J. Frank Yates Student Travel Award Recipient), *Universidad Nebrija & DePaul University,* MANUEL PEREA, *Universidad Nebrija & Universitat de València,* PABLO GOMEZ, *California State University, San Bernardino,* JON DUÑABEITIA, *Universidad Nebrija* (Sponsored by Pablo Gomez) – An overlooked issue in cognitive psychology is how our ability to recognize words changes from the moment we become independent readers to the elderly years. Typically, research looking at how word recognition is affected by age has used small-scale studies focused on comparisons of the mean performance of different age-groups, treating age as a categorical variable (e.g., college-aged vs. older individuals). This makes the generalization of the results difficult. To examine this issue, we used from a mega-study lexical decision database (SPALEX; Aguavivas et al., 2018). Results showed a decrease in word identification times from the early 10s to the 30s, moment in which they stabilize until the 60s. From then, response times start to increase. Importantly, accuracy shows a positive monotonic trend across age. To better capture and explain the way reading evolves over time, we fitted the ex-Gaussian parameters to the observed response times. Thus, the current study not only offers a "big picture" of the progression of our reading abilities, but it may also be helpful to delineate a comprehensive theory of reading
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4:00-6:00 PM (3154)

When a Mark Makes a Difference: Visual Similarity Effects with Accented Vowels. ANA MARCET, *Universitat de València,* ANA BACIERO, *Universidad Nebrija,* MANUEL PEREA, *Universitat de València* – Visual similarity effects in masked priming (e.g., obiect-OBJECT) can be easily explained in terms of uncertainty regarding letter

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identity. However, recent research showed visual similarity effects for non-accented vowel primes, but not for accented vowel primes. We tested the hypothesis that the lack of visual similarity effects with accented vowels is a simple consequence of the saliency of the accent marks. We conducted a masked priming lexical decision experiment in which we minimized the saliency of the diacritical marks by focusing on the letter i (i.e., a letter that contains itself a diacritical mark). We manipulated prime-target visual similarity and the presence/absence of an accented vowel in the prime. Results showed a sizeable visual similarity effect regardless of whether the prime was accented or not. Thus, there is nothing special about the processing of accented vs. unaccented vowels once the saliency of the diacritical marks is reduced.
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4:00-6:00 PM (3155)

Is Stroke Neighbor Priming Effect Inhibitory or Facilitatory? An Investigation using Chinese Hanji and Japanese Kanji Characters. PENG DENG, *Tohoku University,* YU KUSUNOSE, *Hiroshima Shudo University,* MASAHIRO YOSHIHARA, *Waseda University,* STEPHEN LUPKER, *University of Western Ontario,* YASUSHI HINO, *Waseda University,* MARIKO NAKAYAMA, *Tohoku University* (Sponsored by Yasushi Hino) – Previous masked priming studies using one-character Chinese stroke neighbors have shown that orthographic neighbor priming can be inhibitory (Wang et al., 2014) or facilitatory (Shen & Forster, 1999). In Experiment 1, we manipulated relative prime-target frequency of Chinese stroke neighbors: Lower-frequency targets were primed by higher- frequency stroke neighbor primes or unrelated primes, and higher-frequency targets were primed by lower-frequency stroke neighbor primes or unrelated primes. L1 Chinese readers made lexical decisions to the targets. Our results did not replicate either of the previous results: Priming effects were null irrespective of relative prime-target frequency. Experiment 2 involved Japanese Kanji stroke neighbor pairs as stimuli for L1 Japanese readers. The null priming effects were replicated. We suggest that the null orthographic stroke neighbor priming effects may be the combination of a facilitatory effect at the sublexical level and an inhibitory effect at the lexical level.
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4:00-6:00 PM (3156)

Phonological Neighborhood Density Effects Evidenced by Pupil Response in Young and Older Adults. DREW MCLAUGHLIN, MAGGIE ZINK, LAUREN GAUNT, BRENT SPEHAR, KRISTIN VAN ENGEN, MITCHELL SOMMERS, and JONATHAN PEELLE, *Washington University in St. Louis* (Sponsored by Jonathan Peelle) – In popular activation-competition frameworks for spoken word recognition, candidate words compete against phonological "neighbors" with similar acoustic properties (e.g., "cap" vs. "cat"). Thus, processing words with more competitors (i.e., from dense neighborhoods) should come at a greater cognitive cost than processing words with fewer competitors (i.e., from sparse neighborhoods). Notably, this fundamental effect has yet to be examined using a measure of cognitive processing. Using pupillometry, we examined the cognitive demand of processing spoken words from dense and sparse neighborhoods, presented in quiet, for young (n=67) and older (n=69) adult listeners. Growth curve analysis of the pupil data indicates that words from dense neighborhoods were indeed more demanding to process than words from sparse neighborhoods. Additionally, older adults had marginally larger pupil response for word processing than young adults overall, but no difference in the effect of phonological neighborhood density was found between groups.
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4:00-6:00 PM (3157)

Letter Contextual Diversity Increases Sensitivity to Orthographic Regularities within Words: A Two-Month Exposure Study. FABIENNE CHETAIL and KARINNE SAUVAL, *Université Libre de Bruxelles - LCLD* – Readers very rapidly capture statistics about letter co-occurrences. This has been demonstrated with artificial lexicons and/or with restricted sets of orthographic regularities. The aim of the study was to examine the incidental learning of new orthographic regularities in a more ecological exposure environment, and to investigate the impact of the diversity of letter contexts in which new orthographic regularities occur. During two months, participants played to detection games 20 min a day and were exposed to a large set of pseudowords, some of them entailing new bigrams (e.g., GK). Half of the new bigrams occurred in eight different items (high contextual diversity) and the other half was presented in only two items (low context diversity). At six time points, the participants performed a word-likeness task during which they chose between two new pseudowords which one was the more similar to the items previously exposed (e.g., PUGKALE vs. PUGZALE). Results showed that readers had a preference for items with a frequent new bigram very rapidly and this sensitivity steadily increased during the two months. Furthermore, the sensitivity to these new orthographic regularities was higher in case of high letter contextual diversity.
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4:00-6:00 PM (3158)

Sublexical Combinations of Stroke Patterns Are Implicated in Chinese Character Recognition. JOANNA ISSELÉ, FABIENNE CHETAIL, and ALAIN CONTENT, *Université Libre de Bruxelles* (Sponsored by Alain Content) – Chinese character recognition is based on a limited set of recurrent stroke patterns (Chen, Allport, & Marshall, 1996). Most Chinese characters are a combination of two or more of these components. To test whether readers are sensitive to sublexical combinations of components, we conducted probe detection tasks where participants had to detect the presence of a probe (a component or a compound) in a target character. Critically, some targets contained a compound that exists as a character on its own, with its own meaning and sound, while other targets contained a compound that only exists embedded within other characters (no associated meaning and sound). Participants had more difficulty detecting component probes that were a part of an existing compound, compared to component probes that belonged to a non-existing compound. This suggests that sublexical combinations of components are implicated in Chinese character recognition.
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4:00-6:00 PM (3159)

Effects of Reading Goals on Parafoveal Processing During Reading. KAYLEIGH WARRINGTON, *University of Leicester,* KIRUTH SIDHU, *NHS East Midlands Deanery,* VICTORIA MCGOWAN, *University of Leicester,* MARINA SOLTAN, *NHS West Midlands Deanery,*

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DARMEENA GOPIKRISHNA, *University of Leicester,* KATARZYNA KOŁODZIEJCZYK, *Leiden University,* KEVIN PATERSON and SARAH WHITE, *University of Leicester* – Two experiments employed the moving window gaze contingent change technique (McConkie & Rayner, 1975) to assess how reading goals (reading vs. skimming) modulate parafoveal processing. Single sentences were presented with either no mask, all words masked except for the fixated word, the fixated word and one word to the right, or the fixated word and two words to the right. Outside of the moving window, words were masked with visually similar letters (orthographic mask). In Experiment 1, sentences were simple and contained familiar concepts. In Experiment 2, sentences contained complex, unfamiliar concepts. The results from both experiments demonstrated reduced disruption resulting from the orthographic mask during first-pass when skimming compared with reading. This may reflect more limited parafoveal preview during skimming as longer saccades result in more eccentric and therefore, visually degraded, previews. The implications for how eye movement control mechanisms may be modulated by reading goals will be discussed.
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4:00-6:00 PM (3160)

Investigating Variability in Morphological Processing with Bayesian Distributional Models. LAURA ANNA CIACCIO and JOÃO VERÍSSIMO, *University of Potsdam* – We investigated the processing of morphologically complex words adopting an approach that goes beyond estimating average effects and allows testing predictions about variability in performance. We tested masked morphological priming effects with English derived ("printer") and inflected ("printed") forms priming their stems ("print") in non-native speakers, a population that is characterized by large variability (Hopp, 2013). We modelled RTs with a shifted-lognormal distribution using Bayesian distributional models, which allow assessing effects of experimental manipulations on both "mu," i.e., the mean of the log-RT distribution, and "sigma," its standard deviation. Our results show similar effects on mean log-RTs for inflected and derived primes, but a difference between the two on the sigma of log-RTs, with inflectional priming increasing RT variability to a significantly larger extent than derivational priming. This is in line with previous evidence suggesting that non-native processing of inflected forms is more variable than derived forms (Ciaccio & Clahsen, 2020; Veríssimo et al., 2018) and shows that looking beyond mean RTs can crucially disentangle effects which would otherwise be indistinguishable.
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4:00-6:00 PM (3161)

Automatic Phonological Access Among Bilinguals with Cross-Script Languages. NAN ZHANG, LIUAN YANG, MIN WANG, and NAN JIANG, *University of Maryland, College Park* (Sponsored by Min Wang) – The current study tested the hypothesis of non-selective access to phonological representations in an integrated lexicon among Chines L1-English L2 bilinguals across logographic and alphabetic writing systems. A lexical decision task was conducted using a masked priming paradigm in two directions (L1 priming L2 vs. L2 priming L1). The primes are either homophones or non-homophones (control) to targets. Improvement was made based on previous research by reducing visibility of primes and increasing phonological similarity among homophone pairs vs. controls. Pilot data showed a clear trend that the target lexical judgment in the homophone condition was faster than that in the control condition. Homophones tended to facilitate accuracy rate in L2 lexical judgment. We plan to use DMDX to collect formal data online to address the question whether non-selectivity to phonological representations still holds across a logographic and an alphabetic script, pointing to an integrated bilingual lexicon independent of script similarity.
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4:00-6:00 PM (3162)

Word Processing Differences in Deaf and Hearing Readers. PRISCILLA MARTINEZ, *San Diego State University,* BRITTANY LEE, *San Diego State University & University of California, San Diego,* KAREN EMMOREY, PHILLIP HOLCOMB, and KATHERINE MIDGLEY, *San Diego State University* (Sponsored by Katherine Midgley) – Previous studies suggest that deaf and hearing readers differ in how they process written words. In this masked lexical decision study, we investigated how reading-matched deaf and hearing participants classified words (brave) and transposed-letter (TL) nonwords that were pronounceable (barve) or unpronounceable (brvae). Participants responded more accurately to words than nonwords (lexicality effect) and to unpronounceable nonwords than pronounceable nonwords. Deaf readers responded more accurately than hearing readers overall although there was no difference in the pronounceability effect between groups. Importantly, the lexicality effect was larger in the hearing group, who performed at chance on the TL nonwords. The group differences in accuracy suggest that deaf readers may have had an advantage in processing TL nonwords because they may be more sensitive to the orthotactics of words. Understanding differences in written word processing can inform reading interventions for deaf students.
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4:00-6:00 PM (3163)

Auditory Lexical Decision: Insights from the Auditory English Lexicon Project. WINSTON GOH, QIAN WEN CHEE, and MELVIN YAP, *National University of Singapore* – Auditory lexical decision megastudies thus far involve single talkers and the extent to which results are robust across multiple talkers remains unknown. We examined the generalisability of 17 structural and lexico-semantic word properties' effects on response latencies across six different talkers, using the lexical decision task data from the Auditory English Lexicon Project (Goh, Yap, & Chee, in press)—a megastudy of over 400 participants for 10,170 spoken words and nonwords produced by American, British, and Singapore English talkers. Item-level regression analyses revealed consistently faster word responses associated with the following properties: higher values on a distinctiveness principal component, sparse phonological neighbourhoods, low neighbourhood frequency, fewer morphemes, acquired at an earlier age, more frequently encountered, familiar, and prevalent, and more arousing. Less consistent effects were observed for other structural and semantic properties such as phonological spread, uniqueness point, clustering coefficient, biphone summed frequencies, concreteness and semantic neighbourhood density. Valence and dominance consistently did not influence lexical decision latencies.
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4:00-6:00 PM (3164)

The Effect of Phonology and Lexical Status in the Masked Priming Same-Different Matching Task. ZIAN CHI and STEPHEN LUPKER, *University of Western Ontario* (Sponsored by Stephen Lupker) – Performance in the masked priming same-different task is presumed to be based entirely on orthographic codes (see the Bayesian Reader model), potentially allowing it to provide a very clear view of the nature of the orthographic coding process. As such, one would not expect to observe either lexicality effects or phonological priming effects in that task. Four experiments were conducted to examine these hypotheses. The results showed that, when the targets are heterogeneous in lexical status (50% words, 50% nonwords), both lexicality effects and phonological priming effects can be observed even when the prime and target are presented in the same language and the same writing script. These results imply that the nature of the same-different matching task is more complicated than previously assumed and, in particular, performance in the task is based on more than just orthographic codes.
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4:00-6:00 PM (3165)

Phonological Parafoveal Preview Benefit Depends on Phonological Decoding Efficiency and Contextual Support. SARA MILLIGAN and ELIZABETH SCHOTTER, *University of South Florida* (Sponsored by Elizabeth Schotter) – Although lexical representations of words combine auditory, visual, and semantic information, only the visual forms are available as input during silent reading. This project investigates whether readers activate phonology during early stages of visual word recognition, before the word is fixated directly by the eyes (i.e., during parafoveal preview). We used the gaze-contingent boundary paradigm (Rayner, 1975) to measure the phonological parafoveal preview benefit (PPB). Past studies investigating the presence and size of the PPB yielded mixed findings. We hypothesized that these inconsistencies arise due to systematic effects of sentence properties and individual differences. Therefore, we factorially crossed phonological preview with a sentence constraint manipulation and measured individuals' linguistic abilities. We find that both sentence constraint and phonological decoding ability significantly influence the PPB and that these factors interact; individuals with better phonological decoding abilities use sentence context to pre-activate phonological information in the parafovea to aid visual word recognition.
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4:00-6:00 PM (3166)

Orthographic-to-Semantic Consistency Effects on N400s in a Lexical Decision Task. MITSUKI TACHIBANA, *Waseda University,* TETSUO KIDA, *Aichi Developmental Disability Center,* YASUSHI HINO, *Waseda University* – Because Marelli and Amenta (2018) reported a significant orthographic-to-semantic (O-S) consistency effect on lexical decision performance, we attempted to re-examine the impact of O-S consistency in a lexical decision task. Using Hino, Miyamura and Lupker's (2011) data, we manipulated O-S consistency for Japanese kanji and katakana words. Event-related brain potentials were also recorded during the task. While we failed to detect a consistency effect on our behavioral data, we did observe that the amplitudes of N400s were significantly larger for the less consistent words than for the more consistent words. These results appear to suggest that the initial semantic activation process is modulated by semantic activation of orthographic neighbors. When many of the orthographic neighbors have meanings unrelated to the target word, these unrelated meanings would be activated and, hence, the process of selecting a correct meaning for a target word would require more processing demands, which may result in the O-S consistency effect on N400s. Based on these results, we discuss the nature of semantic activation process.
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4:00-6:00 PM (3167)

Moving Window by Word: Effects of Lexicality and Pronounceability. JONATHAN MIRAULT and JONATHAN GRAINGER, *Aix-Marseille University & CNRS* (Sponsored by Jonathan Grainger) – We used the moving window technique in order to manipulate the nature of the information available around each fixated word as readers' eyes moved along a line of text during sentence reading. The window was the size of the fixated word (N) and outside the window were three types of distractor stimuli at positions N+1 and N-1: words, pseudowords, and unpronounceable nonwords. The distractor words were syntactically and semantically incongruent with the sentence being read. We found significant effects of distractor type on gaze durations and total reading times, with these being significantly longer with word distractors relative to both pseudoword and nonword distractors. The latter two types of distractor did not differ significantly. These results provide further evidence in favor of lexical processing in the parafovea, with incompatible words interfering in the construction of a sentence-level representation.
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4:00-6:00 PM (3168)

All Pseudohomophones Are Not Created Equal: A Normed Peudohomophone Database. GREGORY STONE and STEPHEN WALENCHOK, *Arizona State University* – Pseudohomophones (e.g., NERSE) have been useful tools for exploring the role of pronunciation in reading. However, some putative pseudohomophones have problems that should preclude their use. We describe a database of 450 potential pseudohomophones based on measures from 4 tasks and one computed value. The first, task is a spelling judgement task using confidence ratings and a single stimulus presentation (BLEAK or BLEEK). We propose a measure of spelling certainty using a measure common in the Machine Learning literature, which is a generalization of A'—the Area Under the ROC, or AUROC. A second spelling judgment task presents both options simultaneously (BLEAK and BLEEK). The third is a naming task using both the words and their pseudohomophones. The fourth is a lexical decision task using both the words and their pseudohomophones. Finally, there is a measure of orthographic similarity. From these measures we construct a list of quality pseudohomophones.
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4:00-6:00 PM (3169)

Exploring Auditory Distraction by an Artificial Language During Serial and Semantic Recall. SARAH KNIGHT and SVEN MATTYS, *University of York* – Humans can easily learn novel artificial languages (ALs) and rapidly integrate the newly-learned words and meanings into their mental lexicon. However, it is unclear whether lexico-semantic

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information associated with newly-learned words is activated when the words are presented outside the focus of attention. In this study, participants performed one of two recall tasks (serial/semantic) in both the presence and absence of a to-be-ignored auditory AL. Half of participants had previously learned the AL (trained); half had not (control). Interference from irrelevant sound is thought to be task-specific. Assuming lexico-semantic interference only in the trained group, we therefore predicted: i) interference from the AL for both groups during serial recall; ii) interference only for trained participants during semantic recall. However, results indicate poorer performance in the AL across all task/group combinations. Findings will be discussed in terms of their implications for the use of ALs in studies of auditory distraction and speech-in-noise-perception.
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4:00-6:00 PM (3170)

An Analysis of the Time-Course of Release from Informational Masking in Native and Non-Native Speakers. ALEX MEPHAM, YIFEI BI, and SVEN MATTYS, *University of York* – Research into informational masking has identified what is known as "release from masking" (RfM), i.e., better speech transcription performance against a masker in an unknown than known language. To test whether native (English) and non-native (Mandarin) speakers of English can learn to control informational masking, we measured their ability to stream English target speech from competing English or Mandarin talkers over the course of 50 trials. We found that both groups improved over time. Native listeners exhibited RfM when the masker was an unknown language or time-reversed speech, with RfM increasing over time. In contrast, non-native listeners exhibited RfM in both masker language conditions, and RfM remained steady over time. Additionally, the number of masker-to-target intrusion errors decreased over time in native listeners, whereas non-native listeners did not transcribe masker words. These findings highlight perceptual mechanism differences in how native and non-native listeners deal with informational masking over time.
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4:00-6:00 PM (3171)

The Effects of Captioning Errors, Background Noise, and Hearing Loss on Memory for Text-Captioned Speech in Younger and Older Adults. HANNAH CRANDELL, JACK SILCOX, and BRENNAN PAYNE, *University of Utah* – Previous studies suggest that the negative effects of acoustic challenge on speech memory can be attenuated with assistive text captions. However, no studies have systematically examined the effects of text captioning errors, which are common in ASR systems. We examined memory for text captioned speech (with and without background noise) when captions had no errors (control) or had one of three common ASR errors: substitution, deletion, or insertion. In both Experiment 1 (young normal hearing) and Experiment 2 (older adults with varying hearing acuity), we observed similar additive effects, such that increased background noise and the presence of captioning errors negatively impacted speech recall and recognition memory, particularly among older adults with increased hearing thresholds. These findings suggest that to produce the greatest benefit to memory, it is crucial that text captions are accurate, as even a single word error in text captions can be deleterious to subsequent memory.
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4:00-6:00 PM (3172)

Neural Correlates of Implicit Phrase and Meter Processing in Children's Poetry. AHREN FITZROY, *Mount Holyoke College & University of Massachusetts Amherst,* MARA BREEN, *Mount Holyoke College* – Phrase boundaries (PB) elicit a closure positive shift (CPS) in event-related potentials (ERPs); metric stress elicits a late metric negativity (LMN). To separate these processes, we investigated sensor- and source-domain ERP responses to aprosodic synthesizations of The Cat in the Hat (CITH; Seuss, 1957), a book with strong phrasal and metric structure. Twenty-seven adults listened to canonical and randomized synthesizations while 64-channel electroencephalogram was recorded. CITH syllables form six-beat groups: beat 1 has high strength and intermediate PB likelihood, beat 4 has intermediate strength and high PB likelihood, and beats 2-3-5-6 have low strength and PB likelihood. Mixed-effects modeling revealed a centroparietal CPS 455-600 ms after beats 1/4 offsets (larger to 4) localized to cingulate cortex, and a left-anterior LMN 330-475 ms after beats 1/4 (larger to 1) onsets localized to Sylvian cortex. Results show differentiable CPS and LMN responses, reflecting differentiability of phrase and meter processing during speech perception.
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4:00-6:00 PM (3173)

Electrophysiological (EEG/ERP) Measures of Cognitive Spare Capacity During Speech Perception in a Dual-Task Experiment: Effects of Signal-to-Noise Ratio and Memory Load. CYNTHIA HUNTER, *University of Kansas* – Cognitive spare capacity (CSC) varies inversely with listening effort (LE), that is, with the allocation of working memory resources to a speech perception task. How might CSC during speech perception in a dual-task experiment be reflected in electrophysiological measures? The current, ongoing study in young adults with normal hearing (n=8) compares the effects of signal-to-noise ratio (SNR) and memory load in a dual-task experiment during speech perception on EEG/ERP measures hypothesized to reflect changes in CSC. On each trial, a memory load of one (low load), three (medium load), or five (high load) visually-presented digits was followed by a spoken word that was presented in background noise at an easy, medium, or difficult SNR. An alpha (8-13 Hz) event-related desynchronization (ERD) marked the spoken word onset and showed a linear relation with memory load, being greater with higher load. Amplitude of the P300/LPC ERP was quadratic as a function of SNR, being smallest at the medium-difficulty SNR. In addition, digits were recalled less accurately with increasing difficulty of the speech perception task. The current data contribute to a growing understanding of electrophysiological markers of CSC during speech perception.
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4:00-6:00 PM (3174)

Reconciling Subphonemic Mismatch Effects and Other Psycholinguistic Tests of Lexical Engagement. DONGHYUN KIM, *University of Exeter,* ARTHUR SAMUEL, *Stony Brook University, Basque Center on Cognition, Brain and Language (BCBL), & Ikerbasque, Basque Foundation for Science,* EFTHYMIA KAPNOULA, *Basque Center on Cognition, Brain and Language (BCBL),* ANTONIA NASH,

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University of Exeter, NICOLAS DUMAY, *University of Exeter & Basque Center on Cognition, Brain and Language (BCBL)* – In contrast to other psycholinguistic measures (lexical decision, pause detection, word spotting, semantic categorization), subphonemic mismatch effects in the Visual World Paradigm (VWP) suggest that newly learned words ("jod") do not need to consolidate before they compete with existing neighbors ("jog"), but do so instantly (Kapnoula et al., 2015). We sought to reconcile these findings by tracking the interference from exposure to a new competitor on a target set shared across the VWP and lexical decision. Against all expectations, lexical decision showed interference immediately after training, but a weaker effect after 24 hr, whereas the VWP showed a subphonemic effect only after 24 hr. Interestingly, the latter was larger after excluding targets (and associated competitors) that rhymed across the trained and untrained conditions ("jo[d]g"/"fo[d]g"). While the absence of a consolidation gradient in lexical decision is puzzling, our VWP results give hints that learning-induced subphonemic effects have more than one locus.
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4:00-6:00 PM (3175)

It Takes Two [Mechanisms]: Unsupervised and Supervised Learning of Auditory Categories. SAMANTHA CHIU, JOHN FREEMAN, and BOB MCMURRAY, *University of Iowa* (Sponsored by Jodie Plumert) – Acquiring a language requires learners to differentiate sound categories. First language acquisition likely uses a form of unsupervised learning, where infants use the statistics of the input to identify categories. However, in second language acquisition, category learning is considered a supervised (feedback-driven) process. It is unclear how these relate. This study examined the combined effects of unsupervised and supervised learning on auditory category learning. Participants (n=165) learned categories that consisted of two-tone complexes, where frequency of the tone was the critical feature. Participants completed a passive listening (unsupervised) phase with randomly generated exemplars from two clusters in an acoustic space. They then underwent a 2AFC supervised phase where the reinforced boundary either matched or mismatched the unsupervised phase. Results show stronger learning (higher accuracy) when boundaries in the supervised phase matched the unsupervised (p=0.0407). This did not interact with whether boundaries spanned one or two dimensions.
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4:00-6:00 PM (3176)

Auditory Brainstem Responses and Language Processing. LISA TECOULESCO, ANNELIESE LAPIDES, ERIKA SKOE, and LETITIA NAIGLES, *University of Connecticut* (Sponsored by Letitia Naigles) – Robust neural responses to speech may hinder language processing. We tested two components of auditory brainstem responses (ABRs) to speech sounds: stability (similarity to the same syllable across trials) and specificity (how discriminable ABRs are to different syllables), investigating whether individual differences in ABR related to variability in spoken language processing at the phonetic and syntactic levels. Two tasks, phonetic discrimination and syntax comprehension, were completed by 25 adults. ABRs were recorded to 170-ms /ba/ and /ga/ stimuli. The /ba/ response was analyzed for stability over the 10-40 ms response window. Responses to both stimuli were compared to determine specificity, calculated for 400-720 Hz over the 20-40 ms response window. Stability of neural encoding was positively correlated with phonetic discrimination accuracy (r=.446,p=.026); thus, individuals with more stable encoding were better able to discriminate differences such as bilkent/tilkent. Specificity was negatively correlated with sentence processing speed (r=-.451,p=.024), indicating that better differentiation between speech sounds led to faster sentence processing. ABR dimensions thus seem related to different aspects of language.
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4:00-6:00 PM (3177)

Word Content and Order Influence Speech Prediction and Comprehension. BANGJIE WANG and JANET GIBSON, *Grinnell College* – Studies have shown that speech processing occurs at multiple language levels (e.g., phonetic and word level) in a hierarchical, feedforward way, and meanwhile each level generates predictions of incoming speech. We examined the interaction between top-down prediction and feedforward processing in a task that required participants to choose the last item they heard from two items presented on the screen as quickly as possible. We manipulated whether this last item was a word or pseudoword and whether sentences were syntactically correct or randomly ordered. Participants then provided ratings of meaningfulness of the sentence. A 2 (lexicality) x 2 (syntax) ANOVA found RTs were significantly faster for word targets of syntactically correct sentences, and RTs in the other three conditions did not significantly differ from each other. Additionally, the average meaningfulness ratings significantly differed across conditions, with the ratings of word, syntactically correct sentences highest. These findings indicate that missing information from a language level hampers prediction and feedforward processing performance.
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4:00-6:00 PM (3178)

Multi-Talker Processing Costs in Monitoring Reflect Task Demands, Not Normalization. DAVID SALTZMAN, SAHIL LUTHRA, EMILY MYERS, and JAMES MAGNUSON, *University of Connecticut* (Sponsored by James Magnuson) – Processing costs are observed when talkers change unpredictably. In the speeded monitoring paradigm, response times are slower and occasionally less accurate when the talker changes pseudo-randomly. We investigate the possibility that the multi-talker processing cost in this paradigm may result from task demands unrelated to talker variability. The standard speeded monitoring paradigm has two potentially problematic features: (1) items can serve as targets on one trial but serve as distractors on others, potentially preventing the development of automaticity, and (2) in mixed conditions target items are produced by both talkers, requiring listeners to monitor for two tokens as opposed to one. Across four experiments, we found that multi-talker processing costs did not emerge when targets in mixed trials were produced by one talker (with distractors from both talkers). These results suggest that multi-talker processing costs in speeded monitoring paradigms may be attributable to task demands and not normalization.
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4:00-6:00 PM (3179)

Evidence for Dynamic Adjustment of Cue Weighting in Speech. HUI ZHANG, *Shanghai Jiao Tong University & City University of Hong Kong,* SETH WIENER and LORI L. HOLT, *Carnegie Mellon University* (Sponsored by Lori L. Holt) – Language users integrate multiple acoustic cues in both speech and listening. This study investigates whether and how listeners and speakers change the weighting of secondary cues when the primary cue is unavailable. We examine whispered Mandarin in which the primary cue to lexical tone, fundamental frequency, is eliminated and thus amplitude and duration cues are preserved (and possibly enhanced). Phonated and whispered Mandarin productions from 15 females and 15 males revealed that speakers enhanced both duration and amplitude cues in whispered compared to phonated speech. We predict that listeners are sensitive to these enhancements; perception of nonspeech amplitude-modulated noises, which only contain amplitude and duration information, is more accurate when noises are synthesized according to properties of whispered speech compared to phonated speech. These results contribute to conceptual models of speech processing and production that emphasize dynamic adjustment of cue weighting to accommodate listening context.

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4:00-6:00 PM (3180)

Talkers, Time, Tasks, and Similarity in Spoken Word Recognition. SAMANTHA GRUBB, PURNA DALAL, JONATHAN DANIEL, GIOVANNI PERAZA-SANTIAGO, SAHIL LUTHRA, DAVID SALTZMAN, BOYU XIE, ANNE MARIE CRINNION, and JAMES MAGNUSON, *University of Connecticut* (Presented by James Magnuson) – Many theories agree that as speech unfolds, words are activated proportionally to similarity to the input and their prior probability, and that activated words compete for recognition. Thus, recognition should slow as more words are activated, or more generally, the more similar words there are to a target, the harder it should be to recognize. We examined relationships between reaction times and lexical dimensions (word frequency, numbers of neighbors/cohorts, neighbor/cohort frequency, concreteness ratings) with lexical decision and concreteness categorization judgments for 1000 nouns spoken by 4 talkers (~40 participants/item). We found surprising stability between tasks (with similar relations to all dimensions including concreteness ratings), but surprising volatility between talkers (inter-talker correlations from 0.17 to 0.51), and theoretically interesting changes in patterns when reaction times were anchored to word onsets versus offsets. Our results suggest a need for performance databases with large numbers of talkers (because generalization may be weak), and the possibility of using reaction time anchoring to infer greater detail about the timecourse of spoken word recognition.

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4:00-6:00 PM (3181)

Accommodation to Foreign-Accented Speech: Different Patterns for Different Accent Strengths. JEANNE CHAROY, *Stony Brook University,* ARTHUR SAMUEL, *Stony Brook University, Basque Center on Cognition, Brain and Language (BCBL), & Ikerbasque, Basque Foundation for Science* (Sponsored by Arthur Samuel) – Non-native accents can be a source of unusual variation in speech, due to transfers from speakers' L1 to their L2. One phoneme may even substitute for another - for example, in Mandarin-accented English, "th" may sound like "s", making "think" sound like "sink." Such variation may impair listeners' comprehension, but people can accommodate to the accent after some exposure to it. There is evidence of accommodation to somewhat altered phonemes, but it is not clear that such accommodation can occur when an accented phoneme actually sounds like a different phoneme (e.g., the "th-s" example cited above). In the present study, we used a cross-modal priming paradigm to investigate accommodation to Mandarin-accented English (dental fricatives and final voicing). Using natural speech, we compared accommodation to phonemes that were ambiguous between two categories versus phonemes that substituted for other phonemes. Quite different patterns of accent accommodation were found for the two cases.

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4:00-6:00 PM (3182)

Effects of Visual Context on Maintenance of Subphonemic Information Over Time. JENAH BLACK and JOSEPH TOSCANO, *Villanova University* (Sponsored by Joseph Toscano) – Recent work suggests that acoustic ambiguity is maintained over extended periods of time during speech perception. However, the level of linguistic representation at which this maintenance occurs remains unclear. In the current study, participants (N=79) heard sentences incorporating a pronoun varying along an acoustic continuum between "she" and "he" (e.g. "S/he's standing in a blue square."). Visual stimuli varied in whether or not a referent was present (male and female cartoon characters vs. the words he and she) and whether there was disambiguating information (e.g., a blue square). Mouse movements indicated the degree of commitment to an interpretation over time. An effect of disambiguation ($p<0.01$) and an interaction between presence of a referent and disambiguation ($p<0.05$) were observed, showing later commitment when both disambiguating information and referents were available. This suggests a referent-level locus for maintenance of uncertainty and indicates that maintenance depends on the information established by the task.

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4:00-6:00 PM (3183)

Voices, but not Really Faces, Highlight Speaker Gender for Sentences with Gendered Content. JESSICA ALEXANDER, KAYLEE DUPREE, and MADISON BROGAN, *Centenary College of Louisiana* – We examined how memory for sentences with gendered content differed across male or female speakers. In the first experiment, participants read sentences paired with faces of the "speaker" of each sentence. Each sentence ended with a target word that was stereotypically masculine or feminine, and neutral sentences were included for comparison. Participants were then given a prompt of the first few words of each sentence and were asked to recall the entire sentence. Participants had better recall for sentences containing feminine than masculine target words, and there was a small but significant interaction with the face presented. In the second experiment, participants listened to the same sentences spoken by male and female speakers and were asked to recall them from prompts. Listeners showed a large interaction of speaker gender with sentence content. They best recalled sentences with feminine target words when spoken by female speakers, but they showed poorer recall for sentences with masculine target words and for sentences with male speakers and feminine target

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words. Listening to, rather than reading, sentences highlighted speaker gender and changed the recall performance of participants.
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4:00-6:00 PM (3184)

Speaking Clearly Improves Word Recognition But May Increase Listening Effort. KIRSTEN MEEMANN and RAJKA SMILJANIC, *University of Texas at Austin* (Sponsored by Rajka Smiljanic) – Listener-oriented clear speech (CS) improves word recognition in noise and memory (Keerstock & Smiljanić, 2018, 2019). We examined whether intelligibility-enhancing CS affected listening effort under energetic and informational masking using a dual-task paradigm. Native and non-native listeners repeated sentences varying in speaking style and masker while simultaneously performing a visual task on the computer screen. Reaction times (RT) on the visual task were significantly affected by speaking style and masker condition for native listeners only. In energetic masking, even though CS improved word recognition, processing cost was increased compared to conversational speech. Processing cost for conversational speech was also greater in informational than in energetic masking despite better word recognition. No effect of style or masker was found for non-native listeners whose RTs were substantially longer in all conditions. These results suggest that attentional resources may be allocated to processing of easier-to-understand speech seemingly increasing listening effort.
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4:00-6:00 PM (3185)

Individual Differences in Top-Down Lexical Processing Linked to Cognitive Inhibition. MEGHAN CLAYARDS, CLAIRE SUH, and ROSS OTTO, *McGill University* – Both top-down and bottom-up processing are used in speech perception. Individual differences (ID) in degree of lexical influence (top-down) are correlated across tasks (Ishida, Samuel & Arai, 2016). We tested whether these differences are mediated by inhibition-related functions. 32 young adults did four tasks: 2 lexical tasks—a new task Ganong and LTRS (Locally Time Reversed Speech) used in previous work, and 2 inhibition tasks—flanker (median correct log RT, RT congruent-incongruent), go/no-go (median correct log RT, d'). For each lexical task, mixed effects models predicted degree of lexical influence from 3 cognitive measures and the ID measure of the other lexical task. RT for go/no-go was not included due to co-linearity. As before ID in lexical tasks were correlated, (Pearson R=0.50). We also found that a stronger lexical effect in the LTRS task was related to weaker performance in 2 of 3 inhibition measures (slower RT in flanker, β=0.10, $p<0.001$; smaller go/no-go d', β=0.16, $p<0.001$). Cognitive tasks did not predict performance on Ganong. Individual differences in top-down lexical influence during speech perception may reflect the ability to suppress lexical influence through cognitive control.
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4:00-6:00 PM (3186)

Children Get Better Over Time at Identifying People's Voices—But Why? PRISCILLA FUNG, NATALIE FECHER, and ELIZABETH JOHNSON, *University of Toronto Mississauga* (Sponsored by Elizabeth Johnson) – It takes children at least until early adolescence to develop adult-level talker recognition abilities. However, to date, few studies have explored what drives developmental improvements in talker recognition. An independent literature has suggested that both children and adults use language-specific knowledge to identify talkers. In the current study, we speculate that these two processes might be connected. Specifically, we explore the hypothesis that linguistic knowledge drives the developmental improvements in talker recognition. Children and adults completed a cross-language (English-Polish) and within-language (English-English, Polish-Polish) talker discrimination task. Preliminary results suggest that adults and 8-year-olds outperform 6-year-olds, and that both adults and 8-year-olds are better at cross- than same-language trials. These results are consistent with our hypothesis, implicating a critical relationship between linguistic knowledge and talker recognition in early child development.
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4:00-6:00 PM (3187)

Effects of Clear Speech Perception and Production on Recall and Recognition Memory for Native and Non-Native Listeners and Talkers. SANDIE KEERSTOCK and RAJKA SMILJANIC, *University of Texas at Austin* – Word recognition in noise and memory are improved when native and non-native English listeners hear intelligibility-enhancing clear speaking style relative to conversational speaking style (Smiljanic & Bradlow, 2009, Keerstock & Smiljanic 2018, 2019). The extent to which producing listener-oriented hyper-articulated clear speech affects memory for talkers is unknown. Native and non-native talkers were tested on recall and recognition memory tasks for sentences read aloud in conversational and clear speech. We found divergent memory outcomes for clear speech production compared to perception. While clear speech perception improved within- and cross-modal recognition memory and recall, clear speech production decreased memory in both tasks. In line with models that consider cognitive load and effort (Rabbitt, 1968; Rönnberg et al., 2013; Pichora-Fuller et al., 2016), perceiving clear speech appeared to free up cognitive resources for memory encoding, whereas producing clear speech incurred processing costs to the detriment of encoding information in memory.
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4:00-6:00 PM (3188)

Lipreading in Noise: Crossmodal Evaluation of the Linguistic Similarity Hypothesis. VIOLET BROWN, *Washington University in St. Louis,* NASEEM DILLMAN-HASSO, ZHAOBIN LI, LUCIA RAY, and ELLIE MAMANTOV, *Carleton College,* KRISTIN VAN ENGEN, *Washington University in St. Louis,* JULIA STRAND, *Carleton College* – The linguistic similarity hypothesis states that it is more difficult to segregate target and masker speech when they are linguistically similar. This may be the result of energetic masking (i.e., interference at the auditory periphery) and/or informational masking (i.e., cognitive interference). To provide a rigorous test of the hypothesis and investigate how informational masking alone interferes with speech identification, we presented target speech visually and masking babble auditorily. In Experiment 1, participants completed an English lipreading task in 6 conditions: silence, speech-shaped noise, semantically anomalous English, semantically meaningful English, Dutch, and Mandarin two-talker babble. Participants performed better on the lipreading task in silence and speech-shaped noise than in the other maskers, and worse in the English meaningful masker than in Dutch or Mandarin. Lipreading performance in the Dutch and Mandarin maskers

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did not differ. Experiment 2 confirmed these findings with a larger online sample. These data suggest that any speech masker, particularly an intelligible one, interferes with lipreading, but do not provide evidence that linguistic similarity between the target and masker affects speech intelligibility.
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4:00-6:00 PM (3189)

Robust Lexically-Mediated Compensation for Coarticulation (LCfC) Supports Feedback in Spoken Word Recognition. GIOVANNI PERAZA-SANTIAGO, KEIA'NA BEESON, SAHIL LUTHRA, DAVID SALTZMAN, ANNE MARIE CRINNION, and JAMES MAGNUSON, *University of Connecticut* (Sponsored by James Magnuson) – Do lexical influences on speech perception reflect top-down feedback or post-perceptual bias? A critical test case is the lexically-mediated compensation for coarticulation (LCFC) paradigm, which tests whether the implied place of articulation of a lexically restored segment (e.g., /s/ in Christma#) can shift the perceived place of articulation of an initial phoneme in a subsequent stimulus from a target continuum (e.g., /t/, /k/ in tapes/capes). Results from previous studies have been inconsistent. In this pre-registered study, we extensively piloted our stimuli prior to testing for LCFC, only including contexts that both induced compensation for coarticulation (using unambiguous word-final segments) and exhibited robust phoneme restoration (when the word-final segment was ambiguous). We observed robust effects in an initial sample (n=40) as well as in a direct replication study (n=40). These results provide strong support for computational models of spoken word recognition that include feedback.
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4:00-6:00 PM (3190)

Perceptual Learning of Multiple Talkers Requires Additional Exposure. SAHIL LUTHRA, HANNAH MECHTENBERG, and EMILY MYERS, *University of Connecticut* (Sponsored by Emily Myers) – Because talkers differ in how they produce speech sounds, listeners may benefit from maintaining distinct generative models (i.e., beliefs about the correspondence between acoustics and perceptual categories) for different talkers. Perceptual learning studies have shown that listeners readily update a generative model for a single talker when their speech is atypical. Here, we examined how simultaneously updating two distinct generative models compares toC the process of updating one model at a time. Listeners were exposed to two talkers; for one, an ambiguous fricative corresponded to /s/, and for the other, the ambiguous fricative corresponded to /ʃ/. When listeners encountered the two talkers in a blocked fashion, they adapted to the idiosyncratic pronunciations of these talkers after relatively little exposure to each voice. However, when the talkers were intermixed, listeners required additional exposure before learning was observed. Results suggest a cost for simultaneously updating multiple distinct generative models.
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4:00-6:00 PM (3191)

Facilitative Phonological Neighborhood Effect Interacts with 1/f Scaling. KARL NEERGAARD, *University of Macau,* EILIEN WAEGEMAEKERS, *The University of Hong Kong* – Long-scale dynamics in human behavior, often referred to as 1/f scaling, have revealed the systematic nature of variability. This behavioral "noise" is subject to both intra-individual and task-specific variability leading to performance that is "pink" in its underlying periodicity or "white" in its randomness. We asked if 1/f scaling in reaction times (RTs) interacts with the architectural structure of the mental lexicon. Of interest was whether 1/f scaling would inform on the issue of psychotypological differences in word recognition, wherein English speakers have shown slower RTs and Mandarin speakers faster RTs to auditory words that have a greater number of phonologically similar neighbors in the mental lexicon (a.k.a., PND: phonological neighborhood density). Thirty-five native-Mandarin speaking participants took part in an auditory word repetition task comprising 500 words. In repetition of previous findings, we found a facilitation of greater PND. Meanwhile, greater PND interacted with 1/f scaling such that higher PND and pinker noise values resulted in slower RTs. These results reveal that greater periodicity throughout the task lessens the facilitation seen due to the structural aspects of the lexicon.
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4:00-6:00 PM (3192)

The Effect of Background Music on Memory in Preschool-Aged Children. MADISON BUNTROCK and ROCHELLE NEWMAN, *University of Maryland, College Park* (Sponsored by Rochelle Newman) – Preschool environments pose a developmental challenge: not only has the child's linguistic and cognitive skills not reached mastery, preschool classrooms also involve learning while there is simultaneous distracting visual and auditory input. This study tested whether background music impacted children's working memory capacity. We tested children ages 3.5 to 5.5 years at a university preschool. Participants saw an array of 10 objects and were asked to point to a subset in order; the series length (working memory load) ranged from 1 to 4 objects. The voice naming the objects either spoke in quiet or in the presence of musical noise at a +3 dB SNR. We predicted that if noise impacted working memory, we would see an interaction between the factors of memory load and background music. We found a main effect of working memory load but no main effect of music and no interaction of music and memory load. Thus; we found no evidence of background music leading to poorer working memory, but this may be because it was not sufficiently distracting to pose a challenge; future work will explore background music at ecologically valid sound levels in order to understand noise's effect on memory retrieval.
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4:00-6:00 PM (3193)

Interrupted Speech Perception in Listeners with Cochlear Implants: Noise Bursts Fail to Promote Perceptual Restoration. BRITTANY JAEKEL, SARAH WEINSTEIN, ROCHELLE NEWMAN, and MATTHEW GOUPELL, *University of Maryland, College Park* – Listeners with cochlear implants (auditory prostheses) often show poor speech understanding in noisy, realistic listening environments. In such environments, listeners with normal hearing can utilize perceptual restoration to repair interrupted speech signals. We measured whether the use of perceptual restoration could be enhanced in listeners with cochlear implants through better-ear listening and the provision of semantic cues prior to an interrupted sentence. Since perceptual restoration is believed to involve an interaction of bottom-up acoustic input with top-down linguistic knowledge, presenting stimuli to the better ear was done to

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provide higher-quality bottom-up input to the listener, and provision of a semantic cue was done to increase the amount of linguistic knowledge that could be utilized by the listener during speech processing. We found that listeners with cochlear implants could not, on average, restore interrupted speech, regardless of bottom-up acoustic quality and semantic cue availability. Unlike listeners with normal hearing, listeners with cochlear implants do not appear to use perceptual restoration in noisy listening environments.
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4:00-6:00 PM (3194)

Pupil Dilation Reflects Perceptual Priorities During Continuous Speech Perception. HANNAH MECHTENBERG and EMILY MYERS, *University of Connecticut* – The cognitive demand incurred by speech comprehension fluctuates in normal conversation. At the acoustic level, natural irregularities in the pronunciation of individual phonemes act as speedbumps to accurate lexical selection. Any given utterance may be more or less phonetically ambiguous—a problem that must be resolved by the listener in order to choose the correct word. We used pupillometry as an online measure of phonetic category resolution during perception of continuous speech both in quiet and noisy backgrounds. Results indicate that listeners dynamically allocate attentional resources to resolve competition between phonetic categories depending on the level of background noise. As phonetic competition demand increases in quiet backgrounds, so does pupil dilation. We see the opposite pattern in noisy backgrounds—increased pupil dilation for clearer speech. These data suggest that listeners prioritize efficiency when the cognitive demand of both the speech stream and the background environment are high.
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4:00-6:00 PM (3195)

Long-Term Adaptation to Noise-Vocoded Speech. JONATHAN PEELLE, OLIVIA MURRAY, and ABIGAIL GRAEGIN, *Washington University in St. Louis* – Noise vocoding is a signal processing approach that reduces spectral information in speech but largely preserves temporal information. With exposure, listeners show improved recognition scores for noise vocoded speech, reflecting perceptual learning of altered speech sounds. However, prior studies investigating perceptual learning of noise vocoded speech have typically lasted a single session. Here we asked whether listeners' performance would continue to improve over several weeks of training. We had listeners listen to noise vocoded audiobooks while reading along with the identical text over a course of 12 weeks. We used 4 channels for noise vocoding, resulting in speech that was partly intelligible. We found that listeners doing regular listening and reading showed significantly better intelligibility than those who did not. Additionally, improvement varied within listeners who received training, with some participants showing greater improvement than others. These findings are consistent with long-term perceptual adjustment processes and with individual differences in auditory perceptual learning.
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4:00-6:00 PM (3196)

Pupillometry Reveals a More Sustained Pattern of Effortful Listening in Older than Younger Adults. RONAN MCGARRIGLE, LYNDON RAKUSEN, and SARAH KNIGHT, *University of York,* JASON GELLER, *University of Iowa,* SVEN MATTYS, *University of York* – This study examined age-related differences in sustained effortful listening by recording changes over time in the task-evoked pupil response (TEPR). Participants performed a speech recognition task in the presence of a competing talker at two different target-to-masker ratios, and were administered a questionnaire assessing listening-related fatigue. Normalised TEPRs were larger and more steeply rising and falling around the peak in the older adult (OA) group. OAs also showed a more sustained pattern of change in mean TEPRs over the course of the listening task, consistent with increased recruitment of attentional resources to maintain task performance. No age-related difference was found in terms of total listening-related fatigue. However, scores within the social domain were higher in the OA group. Overall, this study provides evidence for a qualitatively distinct pattern of physiological arousal during effortful listening in OAs compared to YAs which broadly supports age-related neural compensation.
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4:00-6:00 PM (3197)

Facial Threat and Group Categorization Bias. DEAN PURCELL, *Oakland University,* ALAN STEWART, *Stevens Institute of Technology* – Black male angry faces are categorized faster, and with fewer errors, than are black male faces with happy expressions (Miller, et al., 2010). They argue that an angry face produces a bias to respond "black," thus reducing reaction time to pictures of angry black faces while increasing reaction time to white faces. Our results do not support this claim. We presented two sequential pictures of angry or happy faces, and asked observers to classify the second of the two faces as white or black. Using this standard priming task response times should be shorter, according to Miller, et al., when both prime and target are black male angry faces. Response times should be longest when an angry black prime precedes an angry white target. No effects were found with male faces, angry or happy, black or white, results similar to those found when observers judged the racial congruency of two sequential faces (Purcell, et al., 2019). However, when both the prime and the target were white female angry faces response times were longer than any other combination of primes and targets. This result is consistent with previous work that showed stronger interference effects from angry female faces than for angry male faces. (Purcell & Stewart, 2016).
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4:00-6:00 PM (3198)

Getting Brexit Done: Leavers and Remainers Experience of Relief and Regret About the United Kingdom's Decision to Leave the EU. SARA LORIMER, TERESA MCCORMACK, and AGNIESZKA JAROSLAWSKA, *Queen's University Belfast,* CHRISTOPH HOERL, *University of Warwick,* SARAH BECK, *University of Birmingham,* MATTHEW JOHNSTON and AIDAN FEENEY, *Queen's University Belfast* – Recent claims distinguish temporal relief, experienced when an unpleasant event ends, from counterfactual relief, experienced when an undesirable outcome has been avoided. Thus, one may feel relief either because a period of unpleasant uncertainty has ended and an outcome has materialized, regardless of whether it is one's preferred outcome, or because a particular outcome has occurred, when the alternative was unpalatable. A study (N=497) run the day after the United Kingdom

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left the European Union confirmed this hypothesis. UK respondents indicated their Brexit-related regret and relief; "Leavers" experienced high levels of both types of relief and low levels of regret. In addition to strong regret, "Remainers" experienced little relief about the decision to leave, but stronger relief that a decision had been made. Results suggest that there are at least two different triggering conditions for relief and indicate a role for anticipated relief in voting behaviour.
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4:00-6:00 PM (3199)

Implicit Association Test and Explicit Rating Task: Judgments on Disadvantaged People. FRANCISCO SIERRA, MIKAYLA MARTINEZ, CLAIR GUZMAN, AMANDA HUT, and JERWEN JOU, *University of Texas at Rio Grande Valley* (Sponsored by Jerwen Jou) – Greenwald et al. (1998) developed the now widely used implicit association test (IAT) for measuring implicit discriminatory attitude toward people or objects. Disadvantaged people are people with physical and mental limitations. We compared IAT judgment and explicit rating on these people. We conducted an IAT experiment with a compatible and an incompatible condition followed by an explicit rating task (-4, -3, -2, -1, 0, 1, 2, 3, 4, with 0 a neutral feeling, -4 very negative, and 4 very positive). For the IAT, a group name (leader, rapist) or an evaluative word (proud, ashamed) was displayed randomly. In the compatible condition, subjects pressed one key for great people and positive words, and another key for depraved people and negative words. The incompatible condition reversed the key mapping. The disadvantaged people (the elderly, people with obesity) were assigned either to the positive or negative key. This group was responded to faster when assigned to the negative response key. However, they were rated as slightly positive (mean = 0.60) but with the slowest RT of all. These results suggest that there was a conscious editing of the initial negative reaction to this group in the rating task.
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4:00-6:00 PM (3200)

Implicit and Explicit Attitudes Towards Cultural Minorities in Hong Kong. REBECCA Y.M. CHEUNG, YEN NA YUM, and DA JIANG, *The Education University of Hong Kong* – Cultural and racial attitudes may underlie intergroup conflicts and integration. In a sample of 174 local university students in Hong Kong, this study used implicit association tests to contrast attitudes towards Mainland Chinese (same-race outgroup) and South Asians (different-race outgroup). Compared to implicit attitudes toward Hong Kong locals, linear mixed-effects modelling showed that the attitudes were negative to both outgroups, but significantly more so to Mainland Chinese than South Asians ($F=58.95$, $p<.001$). For both outgroups, explicit self-reported stigma did not predict implicit attitudes ($F= 0.13$, $p=.720$), while more years spent outside Hong Kong predicted less negative implicit attitudes ($F= 5.90$, $p=.016$). Results indicated dissociations between the implicit and explicit measures and that race was not a determining factor for implicit attitudes towards minorities. The negative attitudes suggested needs for targeted interventions, in which exposure to non-local experiences may be a possible avenue.
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4:00-6:00 PM (3201)

Transitional Impact and Psychological Consequence of the COVID-19 Pandemic Among General Population of North America. EAMIN HEANOY, *University of Alberta,* LIANGZI SHI, *College of New Caledonia,* NORMAN BROWN, *University of Alberta* (Sponsored by Norman Brown) – The aim was to explore the transitional impact and psychological consequence of COVID-19. A total of 1215 people (77.5% Canada, 22.5% US) participated in a survey which included Transitional Impact Scale, DASS-21, and infection concern ratings (for self and close others). Compared to individuals who did not lose their jobs, job-less individuals experienced greater material and psychological change and were more depressed, anxious, and stressed. Furthermore, younger respondents were more depressed, anxious, and stressed than the middle-aged and older respondents. Regardless of job status, people showed greater concerns for others getting infected than themselves. Material and psychological change and infection concern for others predicted depression and stress. Anxiety was predicted by psychological change and infection concern for both self and others. These findings might prove useful in documenting the short- and long-term transitional and psychological impacts of the pandemic on the content and organization of autobiographical memory.
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4:00-6:00 PM (3202)

When Spatial Compatibility Meets Different Self-Concepts: Differences in the Simon Effect Across Cultures. PAMELA BAESS, *University of Hildesheim,* ULLRICH ECKER, *University of Western Australia,* STEVE JANSSEN, *The University of Nottingham,* JIN ZHENG, *Zhengzhou Normal University,* CHRISTINA BERMEITINGER, *University of Hildesheim* – Spatial compatibility tasks such as the Simon task are often used to investigate how humans structure their environment spatially. Less is known about whether spatial compatibility effects are modulated by distinct cultures. The current study investigated how the Simon effects were altered between four different cultures that are divergent in regard to their dominant spatial side used in daily life (right [Germany, China] vs. left [Australia, Malaysia) and their general view of the self-concept (individualistic [Germany, Australia] vs. collectivistic [China, Malaysia). For each culture, a sample of N=50 students participated in a version of the Simon task with drawings of stick-figure manikins holding a task-relevant colored ball in either hand. The manikins allowed the spatial coding according to multiple reference frames, i.e. based on the manikin's screen position and manikin's ball position. The amount of stimuli simultaneously displayed on the screen varied (1-manikin vs. a perceptual set of 9-manikins), The spatially dominant side in daily life influenced the size of the Simon Effect based on screen's position. However, the general view of the self-concept modulated the size of the Simon Effect based on ball's position.
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4:00-6:00 PM (3203)

Mandatory Versus Volitional Attentional Selection During Film Viewing: The Roles of Culture and Cognitive Load on Attention. TAYLOR SIMONSON, *Kansas State University,* YANA YU and SHUNSUKE KUMAKIRI, *Kyoto University,* ASHLEY WEIGEL and JAZMIN ROYG-QUEVEDO, *Kansas State University,* YOSHIYUKI UEDA and JUN

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SAIKI, *Kyoto University,* LESTER LOSCHKY, *Kansas State University* (Sponsored by Yoshiyuki Ueda) – We hypothesized two different modes of top-down attentional selection when watching movies: mandatory (based on prior knowledge), and volitional (goal-oriented) (Baluch & Itti, 2011). Volitional attentional selection is cognitively demanding when performing executively demanding secondary tasks (e.g., N-back). Is a volitional task conflicting with film narrative comprehension more demanding than a mandatory attention task involving narrative comprehension? We paired those primary tasks with a secondary N-back task, and measured eye-movements during film viewing. We also hypothesized that Japanese would more broadly fixate than Americans during film viewing (a mandatory attentional selection effect). Results supported both hypotheses. However, the Japanese showed greater load effects on volitional eye-movements than the Americans. Further analyses showed equal N-back performance across cultures, but better primary task performance by the Japanese. Thus, the Americans traded off tasks, reducing load, but the Japanese performed both tasks well, producing greater load, and stronger decrements in volitional attentional selection.
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4:00-6:00 PM (3204)

The Contagious Nature of Cognitive Control: A Replication Study. ELLEN VOORRIPS, *KU Leuven,* KOBE DESENDER, *KU Leuven & Ghent University,* GETHIN HUGHES, *University of Essex,* EVA VAN DEN BUSSCHE, *KU Leuven* (Sponsored by Eva Van den Bussche) – Task performance of an individual can be influenced by the mere presence of another person. Previous work shows that this depends on what this other person is doing. It has been observed that the amount of cognitive control exerted by one person is affected by the amount of cognitive control exerted by another person, thereby implying that cognitive control is contagious. The current study aims to replicate this finding of the contagious nature of cognitive control, as well as to explore the influence of interpersonal relationship between participants on this effect. Two participants (A and B) are seated next to each other while individually performing a Simon task. To see whether the amount of cognitive control exerted by A can influence the amount of cognitive control exerted by B, we selectively manipulate the task difficulty of participant A by varying the proportion of congruent trials. In contrast to previous studies, our results suggest that task difficulty of participant A does not influence the amount of cognitive control exerted by participant B, indexed by the size of the congruency effect. Previous findings of cognitive control contagion are thus not replicated by this study.
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4:00-6:00 PM (3205)

The Influence of Non-Linguistic Stimuli on the Direction of the Mental Timeline. KEVIN AUTRY, *California State Polytechnic University, Pomona* – Time is structured through spatial metaphors via a mental timeline. The spatial-temporal association of response codes (STARC) effect correlates with reading direction (e.g., past(left)/future(right) in languages read left-to-right, past(right)/future(left) in languages read right-to-left). Reversal of the mental timeline has also been demonstrated in monolinguals while reading mirror-reversed text. This study investigates whether the direction of the mental timeline is influenced by non-linguistic spatial factors. Subjects were primed with a leftward or rightward moving stimulus (i.e., side-scrolling video game in Experiment 1, picture sorting task in Experiment 2). Subjects' mental timelines were then measured via a temporal sequence judgment task. In both experiments, subjects in the leftward prime condition demonstrated a significantly weaker STARC effect than subjects in the rightward prime condition. Unlike mirror-reversed text, non-linguistic spatial primes did not reverse the STARC effect; however, the reduced strength of the STARC effect suggests the non-linguistic stimuli did influence the mental timeline.
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4:00-6:00 PM (3206)

That's Got to Hurt: Perception of Pain in Expressions of Athletes. JOYCE OATES and MEGHAN THORNTON, *Aquinas College* (Presented by Meghan Thornton) – Identification of facial expressions, specifically pain, plays an important role in social relationships. Previous research has shown that African Americans are believed to experience less pain than Caucasians (Trawalter et al., 2012). In the current study, the aim was to determine if expressions of pain were viewed as more severe when stimuli were the same race and biological sex of the viewer. Participants were shown photos of faces of athletes as they experienced an injury and were asked to rate the pain level. Results showed a main effect of race; participants, (who were predominantly Caucasian), rated African American athletes to be in greater pain than Caucasian athletes. There was an interaction between race and biological sex of the stimuli; Caucasian males were rated in less pain than African American males. Further, male participants appeared to be driving this effect. These findings are incongruent with previous studies of racial bias and pain perception.
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4:00-6:00 PM (3207)

Canine Aggression Ratings Predict Processing of Human Approach-Avoidance Decisions. ELIZABETH BRIONES and PHILIP MARSHALL, *Texas Tech University* (Sponsored by Philip Marshall) – There being only limited research on the effects of companion animal characteristics combined with other contributing social factors on interpersonal distance decisions (proxemics), we investigated the effects of the presence of aggressive/non-aggressive dogs on stop distances during interpersonal interactions. From a previous study, ten most and ten least aggressive dog breeds were identified. Using a game application, 163 undergraduate student volunteers "walked" vectorized avatars toward opposing stationary handler/dog avatar pairs. Participants performed a simulated approach task to investigate effects of dog breed category, personal familiarity ("friends vs. strangers"), and participants' point of view (were they the "handler" or the "approacher") on stop distance decisions. Results showed greater stop distances for breeds higher in aggression, unfamiliar pairs, and for the point of view of handler than approacher. A significant interaction for participants' point of view and dog breed category ($p<.001$) showed that "handlers" yielded greater stopping distances than "approachers" only for more aggressive breeds, suggesting that "handlers" may overestimate or use greater caution with their aggressive breeds.
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4:00-6:00 PM (3208)

The Role of Neuroscience in Gender Essentialist Beliefs. SARAH IRONS, HARPER GILLENTINE, and SIMON FISCHER-BAUM, *Rice University* (Sponsored by Simon Fischer-Baum) – The seductive allure effect describes how inclusion of neuroscience jargon in explanations of psychological research make findings more believable (Weisberg et al., 2008). We examined how the seductive allure effect interacts with the notion that people use nuggets of truth to reinforce their prejudices by looking at gendered findings in cognitive research. In Experiment 1, participants evaluated explanations of research (half gendered, half without gender). Within each condition, half of the explanations contained neuroscience jargon. We found that neuroscience jargon makes the explanations more believable, more attributable to essential biology, and less attributable to social factors than explanations without neuroscience jargon. Further, the size of this seductive allure effect is greater when the explanations were about gender. In Experiment 2, we examined how education might mitigate the seductive allure effect. Students in a cognitive neuroscience class evaluated the same explanations as Experiment 1, at both the beginning and the end of a semester. We found that the size of the seductive allure effect decreased at the end of the semester, suggesting that education may be a promising intervention for neurosexism.

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4:00-6:00 PM (3209)

Determinants of Trust in Healthcare-Related Scenarios. STEPHAN CANTARUTTI, *City University of London* – This study investigated four putative determinants of trust in healthcare-related scenarios: individuals vs. collective groups as communicators of healthcare advice; expert vs. laypeople as providers of healthcare communication; public vs. private healthcare sector; and positive vs. negative information. 274 participants were recruited via Prolific Academic. Participants were presented with a series of anecdotes related to a minimally described fictional healthcare system and asked to rate the system on its trustworthiness. Trust was assessed using a four-dimension framework, consisting of benevolence, reliability, competence, and predictability. Key results included: claims relating to the public sector had a significantly stronger impact on benevolence and reliability than claims relating to the private sector; claims from individuals had a significantly stronger impact on all trust variables than claims from collectives; and claims from laypeople had a significantly greater impact on reliability and competence ratings than claims from experts.

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4:00-6:00 PM (3210)

How Perceived Dominance of Groups Affect Negativity Bias in Collective Future Thinking. DENIZ HACIBEKTASOGLU and AYSECAN BODUROGLU, *Bogazici University* – People typically expect their social groups' future to be negative. Recently we demonstrated that sociopolitical identity impacts valence of collective future projections, arguing that the negativity bias may be moderated by perceived power of one's social group. To test this, we manipulated perceived power buy asking a group of university students to read either a text about the prestige and privileges associated with their own university or one about other universities, excluding their own. Then, they provided events that might happen in the future of their university and rated the properties of each. There were no differences between the two conditions on negativity, but more distant events were rated less negative and more central to identity. Near future events were rated to have higher psychological impact and were rehearsed more often. We discuss these findings in relations to group processes and findings on the temporal properties of collective future thoughts.

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4:00-6:00 PM (3211)

Preserving Positively Consistent Self-Concept in Social Interactions. JOSUÉ GARCÍA-ARCH, DAVID CUCURELL, and LLUÍS FUENTEMILLA, *University of Barcelona* – Does social feedback to one's personality traits shape one's self-concept? Here, we asked participants to self-evaluate their traits before and after receiving feedback from peers after a real-life interaction. By computing changes in self-evaluations, we were able to assess whether and how participants integrated social feedback into their self-concept. We found that self-evaluations changed more toward desirable than toward undesirable feedback but only when the positive feedback was coherent to one's self-concept. These results suggest that humans maintain a positive self-concept by distorting incoming information in a positive direction and preserve self-consistency by doing it when feedback is coherent to one's self-concept.

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4:00-6:00 PM (3212)

It Takes Only One: Contagion of True and False Memory in the Presence of Multiple Collaborative Partners. ALEXANDRA FRONZEK and CHRISTIAN LUHMANN, *Stony Brook University* – The transmission of information, particularly false information, in social networks is a pressing issue. Studies have shown that re-exposure to information increases its perceived accuracy. However, the underlying contagion mechanisms are not well understood. Some propose that the number of exposures drives transmission (simple contagion), whereas others emphasize the number of unique sources (complex contagion). The current collaborative memory study manipulated both these dimensions. Participants (N=67) were asked to recall previously studied Deese-Roediger-McDermott word lists in two collaborative recalls, either with two different partners (once each) or the same partner twice, followed by an individual recall. The results of a Bayesian mixed effects logistic regression model indicate that recall was not particularly influenced by the number of sources. However, true information was more likely to benefit from re-exposure than false information. These findings suggest that information is more likely subject to simple contagion and should be taken as a warning regarding the ease of transmission of false information.

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4:00-6:00 PM (3213)

Inhibition of Lesbian and Gay Stereotypes for Story Characters. AMBER WILLIAMS and DAVID COPELAND, *University of Nevada, Las Vegas* – People tend to remember stereotypical information about others better than non-stereotypical information (Fyock & Stangor, 1994), but limited research has examined this idea with information about lesbian, gay, bisexual, or transgender (LGBT) characters in narratives (Bellezza & Bower, 1981; Clark & Woll, 1981; McGann & Goodwin, 2007; Snyder

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& Uranowitz, 1978). Past research suggests that, instead of genuinely remembering stereotypical information better, participants tended to guess stereotypical answers. We conducted an experiment where participants read a short story about a gay (gay male or lesbian) or heterosexual couple and answered both recall and recognition questions about the characters' traits. In contrast to previous studies, our experiment suggests that heterosexual young adults tend to engage in stereotype inhibition, avoiding the use of gay and lesbian stereotypes. These findings can be used for understanding how stereotyping occurs and developing interventions to reduce stereotype use.
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4:00-6:00 PM (3214)

Mere Incidental Pairings Between Ingroup and Target Items at Encoding Produce an Ingroup-Memory Advantage. YOUNGBIN JEON, *Wesleyan University & University of Southern California,* ALEXIS BANQUER, ANAYA NAVANGUL, and KYUNGMI KIM, *Wesleyan University* – Recent studies have shown that co-presenting an item with self-relevant vs. other-relevant information at encoding produces a memory advantage for the item in the absence of any task demand to evaluate the item's self-relevancy. In three experiments, the present study examined whether this incidental self-memory advantage extends to the level of social identity using newly-created, minimal groups (Experiments 1 and 2) and pre-existing groups (Experiment 3). During encoding, participants judged the location of each target word in relation to a simultaneously presented cue (ingroup-cue, outgroup-cue, or neutral-cue). Consistent across all experiments, a subsequent surprise recognition test revealed a significant memory advantage for words presented with the ingroup-cue. This incidental ingroup-memory advantage was driven by ingroup memory enhancement rather than outgroup memory suppression (Experiment 2) and was positively correlated with individuals' self-reported levels of ingroup identification (Experiment 3). The present findings provide novel evidence that a mere incidental association between an item and one's ingroup in a non-referential, non-evaluative encoding context can produce a memory advantage for the item.
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4:00-6:00 PM (3215)

The Other-Race Effect in Memory But Not in Attractiveness Ratings of Faces. MUNIBA KHAN (J. Frank Yates Student Travel Award Recipient), PEI-XUAN LUO, and DENISE HSIEN WU, *National Central University* (Sponsored by Denise Hsien Wu) – People recognize and remember own-race faces better than other-race faces, which is known as the other-race effect (ORE). The ORE is assumed to result from less experience with other-race faces, and has been found in observers of different races. Whether the ORE would be observed in appreciating facial attractiveness remains to be determined. To address this issue, we tested 39 South-Asian and 39 Caucasian participants' memory and attractiveness ratings of Australian and Chinese faces. Their performance showed a clear ORE in memory, as Caucasian participants remembered Australian faces better than Chinese faces in the Cambridge Face Memory Test (CFMT) while South-Asian participants remembered both races equally. On the other hand, Australian faces were rated as more attractive than Chinese faces by both groups of participants. These findings suggest that an only facial characteristic related to race but not to attractiveness is modulated by familiarity and experience with faces of difference races.
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4:00-6:00 PM (3216)

What Does an Androgynous Face Look Like? LEIGH GREENBERG, *McMaster University* (Sponsored by Allison Sekuler) – Androgyny is colloquially understood to mean "of indeterminate gender," but face perception studies often assume that androgynous faces lie at the midpoint of a masculinity-femininity continuum. The validity of this assumption has yet to be tested, however, so the current study addresses that gap. Undergraduate students (n=107) used a 5-point scale to independently rate 24 morphed (50:50 weighted morph of a strongly masculine face and a strongly feminine face, based on previous participants' ratings) and 195 natural faces' levels of femininity, masculinity, and androgyny. For faces rated strongly androgynous, we found no difference in androgyny or masculinity ratings between natural-androgynous and morphed-androgynous faces, but higher femininity ratings for natural-androgynous faces compared to morphed-androgynous faces. Thus, not all androgynous faces fall at the midpoint of a masculinity-femininity continuum. We currently are investigating the stimulus characteristics that distinguish natural- and morphed-androgynous faces, and that influence gender judgments.
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4:00-6:00 PM (3217)

The Importance of a Team Science Approach in Psychological Research: The Psychological Science Accelerator. DANA BASNIGHT-BROWN, *United States International University - Africa,* ERIN BUCHANAN, *Harrisburg University of Science and Technology,* JORDAN WAGGE, *Avila University,* SAU-CHIN CHEN, *Tzu-Chi University Taiwan* – As research over the past decade has stressed issues surrounding replication challenges within psychological research, many have highlighted insufficient statistical power, the need for more open and transparent research practices, as well as more globally representative samples. In their seminal paper, Henrich, Heine, and Norenzayan (2009) reported that "96% of psychological samples come from countries with only 12% of the world's population," populations often referred to as WEIRD (Western, educated, industrialized, rich, and democratic). In an effort to address these challenges, the Psychological Science Accelerator (PSA), the largest distributed network of laboratories, was designed to support crowdsourced research projects focused on diverse samples and open science practices. Currently, the PSA consists of more than 500 laboratories representing 70+ countries across six continents. This democratic and crowdsourced approach to psychological science has the potential to advance the study of human behavior in important ways, through rigor, transparency, and with greater representation from diverse populations. Successes and challenges of a large-scale team science approach to psychological science will be examined.
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4:00-6:00 PM (3218)

Effects of Social Power on Cognition: A Review and p-Curve Analysis of the Experimental Evidence. PAUL PRICE, LUPE CERVANTES CHAVEZ, SEBASTIAN FLORES-MONDRAGON, and DELILAH

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LUCATERO, *California State University, Fresno,* ANDREW SMITH, *Appalachian State University* – There is a fairly large literature on the effects of social power on behavior and cognition, including effects on attention, memory, judgment, and decision making. Much of this research is experimental, where power is manipulated by, for example, having people write about a time that they were powerful or powerless or by assigning them to "manager" and "subordinate" roles in a laboratory task. The present research is a review and preliminary p-curve analysis of this literature. We identify several unresolved theoretical issues, such as why experimentally manipulated social power should have similar effects to real social power. More importantly, however, we find that the p-curve indicates an overall lack of evidential value. Of the 24 significant p-values (from 11 published articles), only 10 are less than .025, which does not differ significantly from what would be expected if there were no true effect (p=.271). Furthermore, the estimated statistical power of these studies is only 10%. Although the hypothesis that real social power affects behavior and cognition is highly plausible—and consistent with some correlational research—it is questionable whether these laboratory experiments reflect such an effect.
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4:00-6:00 PM (3219)

Impact of Memory Specificity on Depressive Symptoms Across Cultures. ADDAM ANTUNEZ, JESSIE CHIEN, and ANGELA GUTCHESS, *Brandeis University* (Sponsored by Angela Gutchess) – Cultures differ in the amount of detail with which they remember information, including autobiographical episodes and pictures of objects. Given cultural differences in the emphasis on detail in memory, we questioned whether the relationship between memory detail and depressive symptoms would differ across cultures. Previous studies, focused largely on Western cultures (e.g. American, European), have identified that Overgeneral Autobiographical Memory (OGM), difficulty retrieving specific autobiographical events and instead retrieving general events, is strongly associated with depression in Western cultures. The current study examined the extent to which culture (i.e. Western vs. East Asian culture) moderates the relationship between OGM and depressive symptoms. We examined memory specificity (internal details) during the Autobiographical Interview (Levine et al., 2002) in East Asian students studying in the United States (n=61) and Americans (n=39). Counter to predictions, we found that the number of internal details did not predict depressive symptoms for either cultural group. However, Americans reported more depressive symptoms than East Asians. The importance of different methods and scoring approaches will be considered.
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4:00-6:00 PM (3220)

The Cultural Career Script: College Students' Expectations for a Typical Career. RACHEL MARTIN and ANDREW BUTLER, *Washington University in St. Louis* (Sponsored by Andrew Butler) – Cultural life scripts are composed of the events people expect to occur in the life of a typical person in their society. Building on this psychological construct from the field of autobiographical memory, we investigated the existence of a cultural career script, which refers to the shared expectations individuals have about the typical career trajectory in their culture. Using a mixed-methods approach, our study characterizes the nature of the cultural career script using data from 300 undergraduate students. An analysis of over 2,000 future career events showed similarities with findings from previous cultural life script research, such as a tendency for participants to nominate events that are positive and predicted to occur during the second or third decade of life (i.e., the "reminiscence bump"). However, notable differences emerged that provide insight into how young adults may conceptualize the career of a typical individual. Our findings advance scientific understanding of the cultural life script, episodic future thought, and autobiographical memory while also providing practical implications for educational practice.
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4:00-6:00 PM (3221)

Social Event Segmentation Relates to Individual Differences in Social Competence. FRANCESCA CAPOZZI and JELENA RISTIC, *McGill University* – Humans spontaneously parse information into social and nonsocial events. Although social segmentation is thought to be a fundamental social process, the role of social competence in this ability remains unclear. Here we examined how social and nonsocial event segmentation correlated with participants' scores on the Autism Quotient (AQ) scale, which measures social competence within a typical population. Participants viewed a clip depicting a social interaction. Separate groups viewed the clip first including auditory or visual information only and second including both modalities. Participants marked social and nonsocial events in separate blocks. Replicating past data, social events were recognized with higher agreement and lower variability than nonsocial events, especially when both auditory and visual information was available. However, these effects varied with AQ such that higher social functioning was associated with better social segmentation while lower social functioning was associated with better nonsocial segmentation. Thus, social segmentation relates to social competence.
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4:00-6:00 PM (3222)

An FMRI Investigation of the Effects of Aging and Semantic Knowledge on Event Segmentation. MAVERICK SMITH, *Kansas State University,* LAURA MARTIN and MORGAN BRUCKS, *University of Kansas Medical Center,* HEATHER BAILEY, *Kansas State University* (Sponsored by Lester Loschky) – Event segmentation is supported by a group of brain regions that play a role in how everyday activities are encoded and later remembered. Unfortunately, segmentation ability declines with age, so we asked if older adults can use semantic knowledge to offset these declines in segmentation. We had young and older adults watch videos depicting actions that were familiar to either older adults (balancing a checkbook) or young adults (setting up a video game console) in the MRI scanner. Replicating prior work, we found a group of brain regions that selectively responded at event boundaries for both age groups. Importantly, we found age-related activation differences in brain regions important for updating mental models when people viewed familiar activities. Young adults showed knowledge-related effects in the precuneus and medial temporal lobes, which are both involved in integrating episodic information. Older adults showed knowledge-related effects in the superior temporal sulcus, which is involved in integrating audio-visual information. This was the first study to investigate how semantic knowledge impacts neural responses of older and young adults while encoding familiar activities.

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4:00-6:00 PM (3223)

Time for Integration: Durations of Response-Response Bindings Allow for a Hierarchical View on Binding and Retrieval in Action Control. BIRTE MOELLER and CHRISTIAN FRINGS, *Trier University* – Feature binding is an important mechanism in human action control: Executing a response results in bindings between features of present stimuli and features of the response (Hommel et al., 2001). Repetition of any of these features can then retrieve other integrated features thus affecting following action (binding effects). Recently, we found that bindings can also exist between individually planned and executed responses, suggesting that binding processes might play a role in hierarchical action representation (Lashley, 1951). Yet, more information is necessary regarding the characteristics of response-response bindings to be able to integrate binding research with research on hierarchical action representation. Here, we analyzed durations of bindings between individual responses to decide whether these hold for sufficiently long durations to support binding of actions also on a higher level in a hierarchy. In two experiments, response-response binding effects did not decrease for relatively long times (2000, 4000 or 6000 ms) after response integration. These findings support the suggestion that binding mechanisms can play a role in relating low-level micro-operations to high-level macro-procedures in human action control.
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4:00-6:00 PM (3224)

Impaired Event Segmentation and Memory for Everyday Events in PTSD. BARBARA PITTS and HEATHER BAILEY, *Kansas State University,* MICHELLE EISENBERG and JEFFREY ZACKS, *Washington University in St. Louis* – Current theories of posttraumatic stress disorder (PTSD) propose that memory abnormalities are central to the development and persistence of symptoms. While the most notable memory disturbances in PTSD involve memory for the trauma itself, individuals often have trouble remembering aspects of everyday life. Further, the segmentation of ongoing activity into discrete units is important for our perception and later memory of the activity and may be disrupted in PTSD. The current study investigated differences in event segmentation and memory for everyday activities in 68 people with PTSD and 64 controls with a trauma history. Participants watched, segmented, and recalled several videos of everyday activities. Overall, viewers agreed on the locations of event boundaries, but those with PTSD did so less than controls. Individuals with PTSD also recalled fewer fine-grained actions than did controls. These results suggest that PTSD alters event segmentation, which may contribute to subsequent memory disturbances.
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4:00-6:00 PM (3225)

Optimising Episodic Encoding with Event Segmentation in a Virtual Environment. MATTHEW LOGIE, *University of Stirling,* DAVID DONALDSON, *University of St Andrews.* – Event segmentation theory describes how the flow of information experienced during life is segmented into distinct episodes. Event segmentation has been proposed as a process that supports the transfer of information from working memory into long term memory. The present research explores the possibility of optimizing episodic encoding and makes use of a virtual environment to present lists of words in a series of virtual locations. Spatial-temporal boundaries are imposed by moving between locations and the number of words presented between boundaries is manipulated. The results demonstrate that segmenting word lists within a virtual environment allows for more information being available for episodic recall. Furthermore, there are significant increases in clustering of the words recalled by the locations that they were presented in. Critically the results suggest that episodic encoding may be optimised if the amount of information between boundaries can be maintained within working memory.
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4:00-6:00 PM (3226)

The Impact of Cinematics on Film Comprehension. ELEANOR YAN and KATHRYN MCCARTHY, *Georgia State University,* THOMAS ACKERMAN, *University of North Carolina School of the Arts,* CHRISTOPHER KURBY, *Grand Valley State University,* RAYMOND MAR, *York University,* JOSEPH MAGLIANO, *Georgia State University* – Film editing directs attention (Smith, 2012) and supports our ability to understand aspects of a film's narrative (Magliano & Zacks, 2011). In this study, participants (n=141) engaged in a "type-aloud" at six points during a short film. A professional filmmaker created three versions of the same event (a dance) to systematically vary the presence of editing and shot-scale to engender a sense of narrative. In an objective version, the dance was presented in a single long shot. A second version focused on the male dancer and a third version focused on the female dancer. All three versions ended with an identical end scene. Analyses of the type-aloud protocols will explore the degree to which the editing manipulation influenced perception of the film in terms of attention to events and actions as well as the perceptions of the characters' intentions and emotions.
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4:00-6:00 PM (3227)

Modeling Anticipatory Saccades in Goal-Directed Action Control. FLORIAN GOURET and CHRISTINA U. PFEUFFER, *University of Freiburg* (Sponsored by Andrea Kiesel) – When performing an action that contingently yields the same effect, we bi-directionally associate action and effect (e.g., light switch and light). Subsequently, we are able to select the action by anticipating its effect. This anticipation also shows in anticipatory saccades towards the position of our actions' future effects. To explore mechanisms underlying anticipatory saccades, we developed a two-level machine learning model to predict saccades towards future effects based on participants' basic saccade characteristics (e.g., overall saccade frequency; 10 types; level 1) and experimental conditions (e.g., action mode: free-choice vs. forced-choice, action-effect compatibility; level 2, including level 1 type). The model was trained and tested on two experimental datasets on anticipatory saccades in ideomotor action control (see Pfeuffer et al., 2016, for basic paradigm). Our model, with individual characteristics and basic trial information, accurately predicted the occurrence of an anticipatory saccade towards a future effect on the majority of trials.
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4:00-6:00 PM (3228)

Determining the Binding Structure of Event Elements in Episodic Memory. MARCEL SCHREINER, THORSTEN MEISER, and ARNDT BRÖDER, *University of Mannheim* (Sponsored by Arndt Bröder) – Experienced events consist of multiple elements which need to be bound together in memory to be represented as an episode. Thus, the likelihood of retrieving one event element should be related to the likelihood of retrieving another element from the same event. We test whether the binding structure of event elements is represented by an integrated structure, in which elements are stored in a single engram, or by a hierarchical structure, in which elements are preferentially bound to one particular element. In an experiment, participants learned word triplets consisting of an animal, an object, and a location, which were presented pairwise, and were then tested with a cued recognition task. As experimental conditions, we excluded one particular association in the learning phase. While an integrated binding structure predicts no differences in retrieval relatedness between conditions, a hierarchical structure does, because associations may vary in strength.
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4:00-6:00 PM (3229)

Unexpected Event Changes Lead to Event Boundaries. MATTHEW BEZDEK, AARON BOBICK, CORY FOX, GARRETT CUNNINGHAM, and JEFFREY ZACKS, *Washington University in St. Louis* – Current experiences can cue retrieval of related previous episodes, leading to predictions about the new experience. When an event changes, this leads to a prediction error that, according to current theories of memory updating, can cause one to perceive that a new event has begun. Here, we tested the effect of episodic retrieval on event segmentation and subsequent memory. Participants first marked event boundaries while viewing events forming one day in an actor's life. After 24 hours, participants segmented a second video representing another day in the actor's life, in which some events changed and some repeated. One week later, they completed a memory test. Participants were more likely to perceive boundaries during changed events and less likely to perceive boundaries during repeated events. Segmentation during changed event outcomes was associated with subsequent recall. Both episodic representations and knowledge structures may contribute to these effects on event comprehension and memory.
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4:00-6:00 PM (3230)

The Influence of Event Boundaries on Recognition of Outside-Event Information. OMAR CARRASCO and ASHLEY BANGERT, *University of Texas at El Paso,* CHRISTOPHER KURBY, *Grand Valley State University* – We examined whether recognition memory for information presented alongside a transpiring activity benefits from attentional increases that occur during meaningful changes (i.e., event-boundaries) in an unfolding, everyday event. Participants watched movies of actors engaged in everyday activities while listening to words presented event-boundaries and event-middles. Words were either related to the depicted activity (related condition), or unrelated to the activity but related to the other words within the word list (mixed condition). Participants were assigned to only one word-type condition. After watching the movie, participants completed filler tasks for 3 minutes prior to the word recognition task. We report preliminary results here (data collection had to be suspended due to the COVID-19 pandemic). Using mixed effects modeling we found no difference in accuracy between the related and mixed conditions and a trend towards an interaction, p=.07. Follow-up tests revealed higher recognition accuracy for words presented at event-middles than at event-boundaries only in the related condition. These data suggest that we integrate semantic information more successfully within events rather than at event boundaries.
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4:00-6:00 PM (3231)

Self-Similarity of the Stage: Fractality in Live Theatre Performances. ASHLEY DHAIM and MEGAN CHIOVARO, *University of Connecticut - CESPA,* JULIA BLAU, *Central Connecticut State University* – Both naturally occurring (e.g., earthquakes, lightning) and human-generated events (e.g., movies, sporting events) exhibit fractal structure: a recursive phenomenon with self-similarity at multiple scales. The extent to which humans can influence the fractality of events is under-studied but has shown particular promise in the arts. The current research extends research done on the fractality of movies into live theatre performances. While all productions of a play intend to tell the same story, it can be argued that their individual differences and variable audience responses impact the structure and thus the quality of the experience. Here, we use detrended fluctuation analysis on audio-recordings of Hamlet performances to investigate how theatre groups of various skill levels (i.e., high school-, university-, and professional-theatre) influence fractality. Results are discussed both in the context of the dynamic creation of live performance and human perception more generally.
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4:00-6:00 PM (3232)

Measuring Events: An Investigation into the Stability of Event Segmentation Patterns Across Groups. KAREN SASMITA and KHENA M. SWALLOW, *Cornell University* (Sponsored by Khena Swallow) – Processing experience involves segmenting streams of sensory information into smaller units (events) at points of perceptual or conceptual change (event boundaries). Research on the influence of event segmentation on cognitive and neural processing often assumes that group segmentation patterns are reliable predictors of individual segmentation. However, significant individual variability in segmentation behavior could arise from sources such as task performance error, inattentiveness, cognitive ability, and cultural background. This project examined the stability of group segmentation patterns and their association with individual segmentation for varying sample sizes (n=2-32). Data from in-lab and online experiments using commercial film and videos of everyday activities were examined. For coarse and fine segmentation, measures of agreement varied significantly for smaller samples, started stabilizing at sample sizes of 10, and increased up to sample sizes of 32. However, detecting non-random and video-specific segmentation patterns required fewer participants. These findings highlight the efficacy of explicit segmentation tasks at capturing both group and individual segmentation behavior with moderate sample sizes.
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4:00-6:00 PM (3233)

What Is the Importance of First Fixation, Validity, SOAs, and Abstract Directional Cues in Spontaneous Visual Perspective Taking? ABBIE MILLETT, *University of Suffolk,* GEOFF COLE, *University of Essex* – Recent developments in the investigation of Theory of Mind (ToM) has suggested that the computation of another's visual perspective occurs both "rapidly" and "spontaneously." This concept has been examined using the gaze cueing (i.e. Driver, et al. 1999), dot perspective (i.e. Samson et al. 2010), and ambiguous number paradigms (i.e., Surtees, Butterfill and Apperly 2012). The presented work increased the sensitivity of this investigation by assessing the first fixation upon a target, alongside manual RT. Simultaneously, SOA, validity and the effect of abstract and humanised directional stimuli were also examined in terms the computations of another's visual perspective. As expected, results found that RTs were shorter for first fixation upon the target, in comparison to manual RT. Additionally, RTs were significantly shorter during Valid conditions as well as at a SOA of 300ms, irrespective of the type of directional cue. Consequently, it was concluded that the effects identified were unlikely to be associated with the spontaneous assumption of an allocentric visual perspective, as the same effects were found in conditions absent of a humanised directional cue and with a greater effect at longer SOAs.
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4:00-6:00 PM (3234)

Implicit Coordination of Joint Action. CHEN ZHENG, LU LIU, and BARBARA TVERSKY, *Columbia University* – How do people coordinate complex joint tasks, here, assembling a piece of furniture? Previous research suggests that collaborators would need to use language to negotiate to achieve joint understanding of references to parts and actions, and that one partner would assume leadership. All thirteen unacquainted pairs of students successfully assembled a TV cart from its parts, guided only by a photo of the completed cart. Language, actions, and gestures were coded and analyzed. Early planning used language and gesture to set up a general plan that did not completely specify steps, parts, or actions. Despite the lack of specificity, most of the actual assembly proceeded implicitly without a consistent leader. The actions of each partner served both to advance assembly and as suggestions, acknowledged by partners primarily by continuing action. Smooth implicit coordination seemed to rely on a shared schematic representation that allowed understanding each other's specific actions.
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4:00-6:00 PM (3235)

Is Gesture Effective Across Presentation Types of the Same Mathematical Concept? MARY ALDUGOM and SUSAN COOK, *University of Iowa* – Although hand gestures are known to support mathematics learning, it is not clear how gesture influences learning across representational formats. One salient characteristic of mathematical concepts is that they can often be represented in qualitatively different ways. For example, functions can be represented graphically and algebraically. We are examining how the beneficial effect of gesture is related to the mathematical representations used to depict a to-be-learned concept. In this experiment, we will examine the effect of gesture on math learning during instruction supported by a notational representation or a graphical representation. Participants will observe video instructions that are either presented in a notational format or a graphical format, and the instructor in the instructional videos either used pointing gestures or did not gesture at all. After instruction, participants will solve a series of posttest problems, and performance on the posttest will be analyzed to assess learning.
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4:00-6:00 PM (3236)

The Selection of Moves to Study the Role of Motor Activity in Insight Problem Solving. ALEXANDRA CHISTOPOLSKAYA and ALEXANDER KURITSYN, *Yaroslavl State University* – Earlier, we investigated the facilitating function of motor programs in the insight problem solving (we used the symmetry problem). However, the movements for the experiment we selected at random. We checked how used movements were perceived: symmetrical or separating. As a result, most of the movements were not perceived as we expected. We decided to conduct a preliminary study to find out how much the proposed movements really activate the decomposition principle and the symmetry principle as key principles for solving the symmetry problem to select the most "strong" and unambiguous movements. With help of psychology of thinking experts we get 14 adjectives that described concepts of "symmetry" and "decomposition." The adjectives were used as the bipolar scales. Next, we proposed for assessment on these scales 14 videos with various motor programs (for example, simulating logging, rowing on a boat, etc.) and invited people to rate each movement on the scales (divisible-whole, smooth-uneven, etc.). As a result, movements that we can use for the symmetry problem as motor programs were selected. The work is supported by President of Russian Federation grant No.\MK – 70.2019.6
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4:00-6:00 PM (3237)

Emoji Improve Comprehension of Indirect Requests in Text Messages. PATRICK HANCOCK, *Metropolitan State University,* CAITLIN HILVERMAN, *Qntfy Corporation,* SUSAN WAGNER COOK, *The University of Iowa,* KIMBERLY HALVORSON, *Metropolitan State University* – As reliance on digital communication grows, so does the importance of communicating effectively with text. Yet, when communicating with text, benefits from gesture, meaningful movements that co-occur with speech, are diminished. Can emoji (pictures used to supplement text) perform similar functions as gesture? Here we ask whether emoji improve comprehension of indirect requests (IR). IRs are ambiguous, and comprehension depends on the receiver decoding context cues. We adapted gesture conditions from Kelly and colleagues (1999, Experiment 1) to a digital, text-based format, replacing gestures with emoji. Participants interpreted 12 hypothetical text-message exchanges that ended with an IR. In a between-groups design, the IR was communicated via text, text and emoji, or emoji only. Like gesture, emoji improved comprehension: the proportion of correct interpretation of IRs was greatest in the emoji only condition compared to the text and emoji and text only conditions. Thus, emoji are not mere decoration, but rather are integrated with text to communicate complex messages. Similar to gesture in face-to-face communication, emoji improve comprehension during text-based communication.

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4:00-6:00 PM (3238)

To Act or Not to Act: The Impact of Narrative Perspective and Negation on Mental Simulation During Reading. STEVE BUENO, ALIX SEIGNEURIC, and HAKIMA MEGHERBI, *Université Sorbonne Paris Nord* – It has been shown that a text written in the second-person pronoun (YOU) leads to better memory for action of the protagonist compared to the third-person pronoun (HE) (Ditman et al., 2010). This effect is in line with the embodiment approach proposing that reading involves the mental simulation of events described in a text. In the present study we examined how the manipulation of pronoun (YOU vs. HE) interacts with negation. To do so, four versions of the same text were created by crossing two factors: Narrative perspective (using YOU vs. HE pronoun) and Form of the action-verbs relating to the protagonist (Affirmative vs. Negative). Participants were asked to carefully read the version of the text they were assigned to. After a one-minute delay during which a filler task was completed, participants were invited to recall as many verbs from the text as possible. Result show that negating actions had an impact only in the second person pronoun condition. Results are discussed in the framework of the embodied cognition theory.
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4:00-6:00 PM (3239)

Messi Hits an Ace! Action Embodiment Follows Sport Contexts and Not the Athlete, but Only for Unfamiliar Athletes. I SAK KIM, *University of Hawai'i at Mānoa,* ALAN KINGSTONE and NICOLA HODGES, *University of British Columbia,* SCOTT SINNETT, *University of Hawai'i at Mānoa* (Sponsored by Alan Kingstone) – The current study extends previous research (Bach & Tipper, 2007; Sinnett et al., 2011) to evaluate whether action embodiment is modulated when viewing an expert athlete in a sporting context that is different from their expertise and if participant familiarity of the expert athletes further modulates the effect. Participants responded with hand or foot responses to images of expert tennis (Roger Federer) or soccer player (Lionel Messi) in either congruent or incongruent sport contexts (e.g., Federer playing soccer). When most participants did not know the athletes (Exp 1), response times were faster with the effector that matched the context-oriented action (e.g., foot response for soccer). However, when participants were familiar with both athletes (Exp 2), a social-contrast effect emerged; that is, faster responses with the opposite response effector (e.g., foot responses to Federer). This pattern of results suggests that social contrast effects drive action embodiment, but only when participants are familiar with the athlete.
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4:00-6:00 PM (3240)

Risk Preferences in Option Generation: Do Risk-Takers Generate More Risky Courses of Action? DOUGLAS MARKANT, MEAGAN PADRO, and MITRA MOSTAFAVI, *University of North Carolina at Charlotte* – Decision making research typically focuses on choices between predetermined sets of options. In many real-world decisions, however, individuals must generate potential courses of action themselves. Individual differences in cognitive processes involved in option generation therefore influence which actions are considered. We examined the role of one such factor: the propensity to take risks. We hypothesized that risk-taking propensity would be related to the generation of more risky actions associated with uncertain or unfavorable outcomes. Participants generated options in ill-structured situations and rated the perceived risk associated with each option. As predicted, higher risk-taking propensity was associated with increased generation of risky options that could lead to unfavorable outcomes. The riskiness of generated options was also related to affective state, consistent with prior evidence of emotional influences on risky decision making. The findings suggest that both real-life risk-taking and risky option generation arise from common cognitive processes involved in responding to uncertainty.
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4:00-6:00 PM (3241)

Algorithm Adaption: How People Adaptively Use Decision-Aids. GARSTON LIANG, JENNIFER SLOANE, CHRISTOPHER DONKIN, and BEN NEWELL, *University of New South Wales* (Sponsored by Ben Newell) – Algorithmic decision aids have become near-ubiquitous in several applied domains. Recent investigations have yielded evidence of algorithm aversion following poor experiences, and algorithm appreciation in the absence of such experience. An underemphasized aspect of both perspectives is participant expectations of algorithm accuracy. In three experiments, we present participants with an algorithm that is explicitly described as imperfect (i.e. it recommends the correct response on 70% of occasions). We find that with sufficient experience in the task participants engage in algorithm adaptation: only consulting the algorithm when they judge their own performance as inferior to the 70% threshold. Various training, feedback, and strategy manipulations strengthened this pattern of responding. Although participants under-utilised the algorithm relative to a strict maximization strategy, the ability to adapt emphasizes the importance of experience in dictating participants' choices to rely upon or ignore algorithm-generated advice. Algorithmic decision aids have become near-ubiquitous in several applied domains.
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4:00-6:00 PM (3242)

The Effect of Causal Beliefs about COVID-19 on Health-Related Decision-Making. NICK UNGSON, JESSECAE MARSH, DOMINIC PACKER, and DANIEL ABRAHAMS, *Lehigh University* – Variability in the recommended responses to COVID-19 (e.g., social distancing, hand-washing) emphasizes the importance of understanding the cognitive underpinnings of health behaviors. In the current research, we examined how causal beliefs regarding COVID-19 transmission predicted important health-related behaviors at multiple time points during the COVID-19 pandemic. Past research demonstrates that beliefs related to causality guide health-related decision-making, affecting judgments such as treatment efficacy. We explored causal beliefs related to COVID-19, including the transmission of COVID-19, as well as beliefs about the ability to intervene on its underlying cause and symptoms. Believing that scientists understand transmission of COVID-19 predicted more social distancing, advice-following, and hand-washing. However, believing that doctors can treat the cause or symptoms of COVID-19 predicted less distancing, advice-following, and hand-washing. We discuss implications

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of this research for individual and community decision-making in response to the COVID-19 pandemic.
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4:00-6:00 PM (3243)

Probabilistic Tornado Warnings. SUSAN JOSLYN, SONIA SAVELLI, and CHAO QIN, *University of Washington,* JULIE DEMUTH and REBECCA MORSS, *National Center for Atmospheric Research (NCAR),* KEVIN ASH, *University of Florida* (Presented by Chao Qin) – The current polygon tornado warning format used by the National Weather Service is deterministic, without communicating uncertainty. Prior research suggests that numeric probability information in text-based form improves understanding, trust, and decision quality. The NWS believes that color-coded risk expressions are easier for the public to understand despite little research to support this claim. Here we tested five probabilistic formats, two with color and three with numeric probabilities, comparing them to polygon and text-based deterministic formats across two experiments. Participants decided whether to take shelter based on tornado warnings. Probabilistic formats led to better understanding of the likelihood of a tornado. However, color-coded formats led to overestimation of the likelihood, affected by forecasts on surrounding areas, and conflated likelihood and severity, comparing to numeric probability formats. Probabilistic format led to higher decision quality when decision threshold was higher. Text-based probabilistic format without forecasts on surrounding areas had highest performance.
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4:00-6:00 PM (3244)

Social Distance Predicts Sunk-Cost Fallacy. HUANGQI JIANG, AMANDA MERNER, ALEX OLEJKO, ROCK LIM, MICHAEL KING, BROOKE MACNAMARA, *Case Western Reserve University* (Sponsored by Brooke Macnamara) – How did social distancing during the COVID-19 pandemic influence people's decision-making? When most states had implemented shelter-in-place rules, we collected data from 306 MTurk workers in the USA. We measured perceived interpersonal (i.e., social) distance, consistency in risk perception (a decision-making competency in following probability rules), and susceptibility to the sunk-cost fallacy. We found that people who perceived more interpersonal distance were more susceptible to the sunk-cost fallacy. Furthermore, consistency in risk perception, moderated the relationship: As consistency in risk perception increased, the strength of the relationship between perceived interpersonal distance and sunk-cost fallacy decreased.
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4:00-6:00 PM (3245)

The Adaptive Role of Recency in Dynamic Decision Environments. MAHI LUTHRA and PETER TODD, *Indiana University Bloomington* (Sponsored by Robert Goldstone) – Decision-making environments faced by humans (and other animals) are typically autocorrelated and dynamic (e.g., resource patches that extend and change in space and time). Researchers have proposed that recency biases in human memory are adaptations to such environmental structures—in such environments, averaging across all previously experienced outcomes can eliminate useful information that is predictive of future states. Here we explore the influence of such recency effects in human sequential decision making and investigate the role of working-memory capacity in mediating recency. We expected working-memory limits to amplify adaptive recency effects by narrowing the window of experience included in decision making. We compared recency-based choice behavior in a static structure (where probabilities of choice outcomes remaining constant across time) with choices in a dynamic, autocorrelated structure (where outcome probabilities changed gradually or abruptly). Computational modelling revealed strong recency effects, but an inconclusive role of working-memory capacity in producing them.
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4:00-6:00 PM (3246)

Evidence Integration and Confidence Are Modulated by Stimulus Consistency. MOSHE GLICKMAN, *Tel Aviv University,* RANI MORAN, *University College London,* MARIUS USHER, *Tel Aviv University* (Sponsored by Marius Usher) – Evidence-integration is a normative decision algorithm for alternatives with noisy evidence, which has been successful in accounting for a vast amount of behavioral and neural data. Here, using a novel model-free behavioral method, we monitor the decision boundary, and reveal integration to a collapsing-boundary in data from two experiments (with numerical and perceptual evidence). Second, we find that the shape of the boundary varies with the consistency of the evidence and find support for a mechanism in which incoming samples are modulated based on their consistency with previous ones. To test this mechanism, we conducted an additional experiment, in which stimulus-consistency is manipulated independently from the total evidence. The results confirm the model, showing that both accuracy and decision confidence are modulated by stimulus-consistency, indicating a new type of within trial confirmation-bias. Finally, we show that this bias has the benefit of making the decision more robust to non-encoding noise.
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4:00-6:00 PM (3247)

Explanation of Biases and Acquiescence to Intuition. GUÐRÚN GUÐMUNDSDÓTTIR, MARGRÉT NILSDÓTTIR, and PETER SHEPHERDSON, *University of Akureyri* (Presented by Peter Shepherdson) – Dual-process models of decision-making incorporate various proposals for how conflicts between different systems are resolved. Recent evidence suggests that, in some instances, people acquiesce to intuitive beliefs, despite explicitly identifying them as less likely to result in a desired outcome (Walco & Risen, 2017). We conducted two experiments exploring the extent to which explaining a bias or intuitive tendency would affect people's (a) experience of an intuition that conflicted with an objectively optimal choice, (b) ability to identify which choice was objectively optimal, and (c) tendency to acquiesce to intuition. In Experiment 1, providing participants with an extended explanation of the ratio bias effectively abolished acquiescence in a choice between two lotteries when win probabilities were explicitly provided. By contrast, in Experiment 2, an extended explanation of magical thinking and superstition led to increased acquiescence when the task involved a choice between two buttons, where the one associated with a greater win probability was labelled with an irrelevant negative outcome. It appears explanation can have conflicting effects on acquiescence, which may depend on the explanation's content and quality.
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4:00-6:00 PM (3248)

Delaying Receipt of a Future Reward Depends on More Than Just Magnitude of the Reward. REBECCA WELDON, SIMEON BIEN-AIME, and RYAN CAPRAK, *SUNY Polytechnic Institute* – In the present study, we examined how a self-construal prime affected sensitivity to magnitude of reward in a delay discounting paradigm. We found that priming participants to think about oneself versus the group affected choices for a larger delayed reward for different magnitudes of reward, but this interacted with self-reported impulsivity. When participants higher in impulsivity were primed to think about the group, they made more immediate choices than participants lower in impulsivity. Further, socioeconomic status interacted with both impulsivity and magnitude of reward. Participants of lower income status and lower impulsivity were more likely to wait for a larger delayed reward than participants of lower income status and higher impulsivity, but only for medium and large rewards. Participants of higher income status and higher impulsivity discriminated between magnitudes of reward (more than participants of higher income/lower impulsivity), making more choices for the delayed option for incrementally larger rewards. In combination, these results indicate that the likelihood of choosing a reward occurring in the future depends on a multitude of variables, including self-construal, impulsivity, and socioeconomic status.
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4:00-6:00 PM (3249)

Context-Dependent Sensitivity to Gains and Losses Across Adulthood. SEBASTIAN HORN and ALEXANDRA FREUND, *University of Zurich* – People's preferences are not stable but are constructed in context. In the present research, we investigated how the proximate experimental context affects younger, middle-aged, and older adults' decisions about monetary gains and losses. According to theories of memory-based decision making, the preferences driving a specific choice depend on previously experienced distributions of events. Past research indicates that younger and older adults track frequencies of events relatively accurately and with little effort. However, age differences in motivational orientation may moderate such effects (e.g., older adults might be generally more motivated to prevent losses than younger adults). We tested these propositions by manipulating the frequencies (distributional skew) with which participants (age: 18 to 82 years; N=628) encountered gains and losses of different magnitudes. The findings indicate that people's extent of loss aversion depends on the experienced context. This effect was similar across age groups, suggesting that sensitivity to context and to frequencies of gains and losses remains stable across adulthood.
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4:00-6:00 PM (3250)

Modeling Regret in Experience-Based Decisions: The Effects of Unequal Expected Values and Losses. WILLIAM HAYES and DOUGLAS WEDELL, *University of South Carolina* (Sponsored by Douglas Wedell) – Previous research established the role of regret in decisions between gains-only gambles with equal expected values (EVs). We investigated the role of regret for mixed gambles with unequal EVs. Participants (n=105) completed three online tasks that involved repeated choices between a "safer" and "riskier" option with full feedback. Both options produced high and low outcomes, but the riskier option yielded a better outcome with p=0.80 so that choosing it minimized the probability of experiencing regret. In one task, the options had equal EVs and yielded only gains. In the other two tasks, the riskier option had a lower EV and outcomes were either gains or mixed. Risk-taking decreased when outcomes included losses and options had unequal EVs. Valence ratings showed large regret effects, consistent with decision affect theory. Reinforcement-learning models fit jointly to choices and ratings suggested that both expected outcomes and anticipated emotions mediated choice.
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4:00-6:00 PM (3251)

Increased Risk Taking in Methamphetamine Dependents During the Balloon Analogue Risk Task: Evidence from Computational Modeling. XIAO-YANG SUI and LI-LIN RAO, *Chinese Academy of Sciences & University of Chinese Academy of Sciences* (Sponsored by Li-Lin Rao) – Risky decision making is one of the cognitive domains in which drug users are commonly impaired. Few studies have investigated the underlying mechanism of risk preferences among methamphetamine dependents with computational approach. We conducted two experiments by using the Balloon Analogue Risk Task (BART) with and without methamphetamine-related pictures and the method of computational modeling. We found that methamphetamine dependents displayed higher risk preferences than healthy controls. The results of computational modeling revealed that the risk-taking propensity parameter was significantly higher in methamphetamine dependents than in healthy controls and that the risk-taking propensity parameter and the updating coefficient were positively correlated with craving scores when methamphetamine dependents were exposed to methamphetamine-related pictures. Increased risk taking in methamphetamine dependents may partly be explained by differences in outcome evaluations. These findings can be used to guide future work in targeting the evaluation process among people with drug-use disorders.
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4:00-6:00 PM (3252)

Data Foraging: Spatiotemporal Data Collection Decisions in Disciplinary Field Science. CRISTINA WILSON, *Temple University & University of Pennsylvania,* FEIFEI QIAN, *University of Southern California,* DOUGLAS JEROLMACK, *University of Pennsylvania,* THOMAS SHIPLEY, *Temple University,* SONIA ROBERTS, *University of Pennsylvania,* JONATHAN HAM, *Temple University,* DANIEL KODITSCHEK, *University of Pennsylvania* – Field scientists collect data in a noisy heterogeneous environment, where the value of additional data for characterizing the natural system is weighed against the costs involved in data collection. Here, we conduct a novel simulated data foraging study to determine how spatiotemporal data collection decisions are made in field sciences, and how search is adapted in response to in-situ data. Expert scientists were asked to evaluate a hypothesis by collecting environmental data using a mobile robot. At any point, participants were able to stop the robot and change their search strategy or make a conclusion about the hypothesis. We identified previously unrecognized spatiotemporal reasoning heuristics, to which scientists strongly anchored, displaying limited adaptation in response to new data. We analyzed two key decision factors: variable-space coverage, and fitting error to a given hypothesis. We found that, despite varied search strategies, the majority of scientists

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made a conclusion as the fitting error converged. Scientists who made premature conclusions, either due to insufficient variable-space coverage or before the fitting error stabilized, were more prone to incorrect conclusions.
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4:00-6:00 PM (3253)

Decision Making in Hiring: What Happens When the Applicant Has a Criminal Background History? ALEXANDRA CROSSBY and KENNETH BARIDEAUX, JR., *University of South Carolina Upstate* (Presented by Kenneth Barideaux, Jr.) – According to the Bureau of Justice Statistics (BJS), about 1 in 38 individuals residing in the United States are supervised by correctional institutions (Kaeble & Cowhig, 2016). While the incarceration rate has been slowly declining since 2009, a growing concern and top policy problem has been how to successfully reintegrate ex-offenders into the community. Successful reintegration into the community typically depends on the offender's ability to procure gainful employment. Unfortunately, stereotypes about offenders play a significant role in hiring decisions and ultimately impact recidivism rates. In the current study, we investigated whether the type of crime committed (e.g., white-collar or blue-collar) influenced participant's decision to hire an ex-offender. In addition, we examined how negative, positive, and neutral media messages about offenders could change the outcome of the participant's decision to hire. The results indicated that the participant's race and the type of crime committed affected hiring decisions. Implications of the current study may lead to a better understanding of what social and cognitive factors play a role in the willingness to hire those with a criminal background history.
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4:00-6:00 PM (3254)

Laypeople Overestimate the Harm Caused by Traumatic Events. RYAN BURNELL and MARYANNE GARRY, *The University of Waikato* – Most people experience a "qualifying" traumatic event at some point in their life, yet these events rarely cause long-term harm (Kilpatrick et al., 2013). In fact, people often report growing from their trauma (Tedeschi & Calhoun, 2004.) Therefore, we hypothesised people might overestimate how common long-term harm is, much like people overestimate how distressed they themselves would feel if something negative were to happen to them (Wilson & Gilbert, 2003). We asked subjects how likely it is that people who experience a trauma would have post-traumatic stress symptoms 6 months after the event, and how likely those people would be to grow from the trauma. Subjects greatly overestimated the likelihood of post-traumatic stress symptoms and thought these symptoms would be more likely than growth. Our findings suggest that laypeople hold beliefs about trauma that do not align with reality.
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4:00-6:00 PM (3255)

An Application of Optimal Stopping Theory to Eyewitness Identification Decisions in Sequential Lineups. JEROME HOOVER, ANDREW COHEN, and CAREN ROTELLO, *University of Massachusetts Amherst* (Sponsored by Andrew Cohen) – Decision-making in optimal stopping tasks and sequential eyewitness lineups share a number of key features. For example, each involves rejecting options presented one at a time based on internal thresholds until a selection has been made. Although there are also key differences between these tasks, a comparison is useful because it allows application of results from the optimal stopping domain to sequential lineups. In particular, we explore the possibility that the increasingly liberal responding found in some optimal stopping tasks also applies to sequential lineups. Empirical differences between tasks were compared and computationally ideal threshold changes were determined within the signal-detection framework and contrasted with participant data. In general, the results suggest a liberal shift across test positions in both conditions, although these shifts are not directly in line with optimal responding. Implications and future directions are discussed.
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4:00-6:00 PM (3256)

I've Seen Him Before! The Effect of Exposure Frequency and Eyewitness Type on Juror Decision-Making. LAUREN STORNELLI, MARIANNE KRAUSE, and GARRETT BERMAN, *Roger Williams University* (Sponsored by Garrett Berman) – The use of surveillance videos by law enforcement to investigate crimes and identify suspects has increased exponentially. Although studies have examined participants' ability to accurately match previously viewed faces with faces viewed on surveillance video, few studies have investigated the effects of witness face identification expertise and suspect familiarity on mock-juror decision making. Investigators are increasingly testifying at trial based on their perceived familiarity of perpetrators viewed on surveillance video uncovered during the investigation. The current study examined the effects of differential perpetrator exposures and witness type (detective vs. layperson) on juror perceptions. Participants read one of four transcripts depicting an arson case. Results indicated that jurors perceived the detective's testimony as more effective (e.g., believable, credible, trustworthy, etc.) and the prosecution case as stronger compared to a layperson witness. Implications highlight perceived differences in similar testimony for identifications made from surveillance videos.
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4:00-6:00 PM (3257)

Ignoring the Evidence in Evidence-Based Decision-Making. AUDREY MICHAL, YIWEN ZHONG, and PRITI SHAH, *University of Michigan* – People are increasingly asked to make decisions based on data and evidence. However, making evidence-based decisions can be challenging—people must be able to objectively evaluate evidence strength while ignoring prior beliefs or personal experience. Here we examined the effects of prior beliefs on evidence evaluation and decision-making separately. We asked 86 undergraduate students to evaluate fictional media articles describing effects of two learning interventions on academic performance—exercise and a tidy environment. Although students rated the exercise article as showing stronger evidence for improving learning, they rated the tidy environment intervention as the more promising intervention for a hypothetical classroom. Students were more likely to cite personal experience than the evidence as the basis for their decision to implement the tidy environment intervention. Our results suggest that people fail to apply their evaluations of evidence and instead rely on experiential factors when making evidence-based decisions.
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4:00-6:00 PM (3258)

The Role of Probabilistic Concepts in Explanations of Learning and Decision Making. ABA SZOLLOSI, CHRIS DONKIN, and BEN NEWELL, *University of New South Wales* (Sponsored by Balazs Aczel) – Referring to probabilistic concepts (such as randomness, sampling, and probability distributions among others) is commonplace in contemporary explanations of how people learn and make decisions in the face of environmental unknowns. Here, we critically evaluate this practice and argue that such concepts should only play a relatively minor part in psychological explanations. To make this point, we provide an analysis of what people need to do in order to deal with unknown aspects of a typical experimental task (a repeated-choice gamble). This analysis reveals that the use of probabilistic concepts in psychological explanations may (and often does) conceal essential, non-probabilistic steps that people need to take in order to successfully solve the problems that environmental unknowns present. When these necessary steps are taken into consideration, the role of probabilistic concepts reduces substantially. We conclude that we should move our focus towards non-probabilistic parts of psychological explanations.
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4:00-6:00 PM (3259)

A Failure of the Selective Influence Assumption Underlying Theories of Human Response Time. MATHIEU SERVANT, *University of Franche-Comté,* GORDON LOGAN, *Vanderbilt University,* THIBAULT GAJDOS, *Aix-Marseille University,* NATHAN EVANS, *University of Queensland* – A universal assumption in human behavioral research is that response time can be divided into a series of sequential stages that perform different computations. This assumption implies selective influence of experimental factors on stage durations. For instance, manipulations of perceptual difficulty should affect perception and decision stages but not the motor stage. We tested this assumption by recording the electromyography of response agonists in a paradigmatic perceptual decision task, the random dot motion task, which allowed us to measure premotor time (PMT) and motor time (MT) on single trials. We found that PMT and MT substantially increased with perceptual difficulty. In addition, we observed covert motor activity during the decision process that reflected the ongoing uncertainty of the decision. These findings reveal a violation of selective influence and suggest an alternative conception of human information processing involving parallel and interactive cognitive and sensorimotor states.
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4:00-6:00 PM (3260)

Wisdom of the Crowds for Naturalistic Image Categorization and Decision Making. EESHAN HASAN, QUENTIN EICHBAUM, PAYTON O'DANIELS, and JENNIFER TRUEBLOOD, *Vanderbilt University* (Sponsored by Jennifer Trueblood) – "Wisdom of the crowds" is a phenomenon in which judgments and decisions of several humans can be aggregated to improve accuracy. In our experiments, novice undergraduate students and medical professionals performed a diagnostic decision task involving the classification of digital images of blood cells as either normal (Non-Blast) or cancerous (Blast). On each trial, participants were asked to make a binary choice followed by a confidence rating, indicating their confidence in their decision. Participants viewed each image twice. We demonstrate a "wisdom of the crowd within" effect where confidence ratings are used to aggregate responses from a single individual. We also demonstrate a standard "wisdom of the crowds" effect by using different methods to combine decisions across individuals. We show that by using straightforward algorithms, one can combine the decisions of a small group of novices to achieve comparable performance of a medically trained professional.
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4:00-6:00 PM (3261)

Salience Biases Ensemble Decision-Making for Data Visualizations. STEVE HAROZ, *Universite Paris-Saclay Inria* – We can rapidly compare set summaries (e.g., averages) without attending to each individual item in those sets. When sets vary across multiple visual features, such as position and color, we must discount differences in the task-irrelevant features. However, this collection of experiments shows that we are biased by these task-irrelevant differences. Subjects were asked which group in a scatterplot had a higher average position. Feedback was provided after each trial. Subjects were biased towards the set with the larger set size, even though other cues such as the highest single point were counterbalanced. Moreover, this effect holds in same-set-size comparisons that manipulate shape, item size, brightness, and color. And this task-irrelevant salience bias is not limited to experiments where the target feature is position. In experiments that asked which set had a larger average item, subjects were biased by set size, color, and brightness. Overall, this bias towards task-irrelevant salience implies that ensemble aggregation may be unable to select only one visual feature. For data visualizations, differentiating groups using color or other salient features may cause an inaccurate interpretation.
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4:00-6:00 PM (3262)

A Circular Diffusion Model of Continuous-Outcome Source Memory Retrieval. JASON ZHOU, ADAM OSTH, SIMON LILBURN, and PHILIP SMITH, *The University of Melbourne* (Sponsored by Adam Osth) – Source memory is memory for the context in which items were previously encountered. Harlow and Donaldson (2013) found evidence of a retrieval threshold underlying source accuracy in a continuous report task. However, this finding did not account for the influence of decision-making in generating responses in memory retrieval. Additional research has also suggested that participants had no source memory for items which were not recognised, which was also not accounted for (Hautus et al., 2008; Malejka & Broder, 2015). In working towards a comprehensive account of decision-making in source memory retrieval, this study used the Smith (2016) circular diffusion model to introduce diffusion analogues of the threshold and continuous models of source memory retrieval in a replication of the Harlow and Donaldson (2013) task. Participant performance was conditioned on item recognition in order to disentangle recognition from a potential source retrieval threshold. Model selection done using the BIC found support for a circular diffusion model where memory discretely fails, as both RT and response accuracy data suggested that there were two components in performance.
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4:00-6:00 PM (3263)

Acute Alcohol Effects on Rationality of Risky Sexual Decision-Making. LAURA HATZ, DENIS MCCARTHY, and CLINTIN DAVIS-STOBER, *University of Missouri* (Sponsored by Clintin Davis-Stober) – We tested the effects of acute alcohol intoxication on properties of sexual decision-making. Young adult drinkers (N=44) participated in a within-subjects laboratory alcohol administration study consisting of counterbalanced alcohol and placebo sessions. At matched points on the ascending and descending limbs of intoxication (BrAC≈.080%), participants completed a sexual gambles task in which they made repeated choices between hypothetical sexual partners based on physical attractiveness and risk of contracting a sexually transmitted infection (STI). We used Bayesian model selection to test whether participants used a compensatory (i.e., a numerical utility representation) or non-compensatory decision-making strategy. In previous studies, we found that the vast majority of participants (~98%) used a compensatory strategy when choosing between partners (Hatz et al., in press). In a replication of our previous findings, nearly all participants (98.5%) in this study used a compensatory strategy when making sexual decisions, regardless of beverage condition or limb of intoxication.
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4:00-6:00 PM (3264)

Psychological Inferences on Choice Consistency Using Stochastic Choice Rules Can Be Confounded by Model Error. VERONIKA ZILKER, *Max Planck Institute for Human Development* – In cognitive modeling, free parameters of stochastic choice rules have often been used in a psychometric sense, to measure and compare the consistency of participants' behavior across conditions or groups. Here I demonstrate that such inferences may often be confounded: This is because estimates of choice consistency parameters may not only reflect genuine differences in participants' choice consistency, but also differences in the estimated core model's ability to account for the systematic component of participants' behavior. If the estimated core model does not accommodate participants' preferences equally well across conditions or groups, then estimates of choice consistency parameters are likely to be contaminated and should not be used for psychological inferences. This is demonstrated in simulations and recoveries for four commonly used stochastic choice rules (trembling hand, logit, probit, Luce). These analyses consistently demonstrate that using estimates of choice consistency parameters of stochastic choice rules, attempting to assess differences in participants' choice consistency, may lead to misattributing errors on the side of core model to errors on the side of the participant.
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4:00-6:00 PM (3265)

Task Context Affects the Group Decision Efficiency. PENG-FEI ZHU (J. Frank Yates Student Travel Award Recipient), CHENG-JU HSIEH, and CHENG-TA YANG, *National Cheng Kung University* (Sponsored by Cheng-Ta Yang) – We examined how task context (i.e., task rules and task difficulty) affects collective decisions. The Systems Factorial Technology was adopted to infer group decision-making efficiency. A T/L conjunction search task was conducted. Participants had to search for 0/1/2 Ts among 25/60 Ls. Specifically, in Experiment 1, participants had to detect the presence of any target (i.e., OR search rule); in Experiment 2, participants had to report the number of targets (i.e., AND search rule). Our results revealed supercapacity processing in both tasks, suggesting collective benefit. However, how task difficulties affected the collective benefit differed depending on the task rules. With an OR rule, collective benefit was unaffected by the number of distractors; by contrast, with an AND rule, collective benefit increased as the number of distractors increased. Together, our results suggested that under suitable task difficulty and appropriate decision rule, group decision-making would outperform individual decisions with more efficient processing.
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4:00-6:00 PM (3266)

Using Peer Forecasters to Improve Forecasting Accuracy. YE FENG and DAVID BUDESCU, *Fordham University* (Sponsored by David Budescu) – Crowdsourcing followed by optimal aggregation of human forecasts is becoming more popular and it is used in many contexts. In situations where a large number of judges are offered the opportunity to predict multiple events, one often encounters large numbers of "missing" forecasts. This paper proposed a peer-based approach that seeks to predict the missing responses, based on the answers of other "similar" forecasters. We use the pattern of every judge's recorded forecasts to select for a group of peers and then we impute the missing forecasts based on the median of his/her peers. We use data collected during a recent geopolitical forecasting tournament to illustrate the approach and test its feasibility. Our analysis indicates that the proposed method can improve the performance of most individuals, as well as the collective accuracy, while preserving diversity. Further analysis of the selected peers suggests that the proposed method is successful because it overweights and propagates the responses of the most engaged (active) and accurate forecasters. These influential peers can be identified based on pre-existing differences in intelligence and calibration.
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4:00-6:00 PM (3267)

Social Trading: Do Signal Providers Trigger Gambling? ANDREAS OEHLER and JULIAN SCHNEIDER, *Bamberg University* (Presented by Julian Schneider) – Social trading – also termed copy trading – is an interactive platform-based innovation facilitating visibility and traceability of signal provider trading activities. Based on published portfolio transaction and return track records, platform users can copy one or several signal providers, i.e. delegate their investment decisions, and thereby become signal followers. Allowing signal providers to administer purely virtual portfolios, in combination with a renumeration scheme based on performance fees and high watermarks, creates convex or option-like incentives. We argue that the imposed incentive structure may induce signal providers to trade lottery-like assets which, in turn, will expose signal followers to a lottery-like return structure—triggering gambling. In this context, we assess the factors that have an impact on signal provider lottery-like stock trading. We provide empirical evidence that signal providers tend to increase the traded relative share of lottery-like stocks when exhibiting relatively good past performance. We argue that the increase in lottery-like stock trading may be due to a surge in signal provider overconfidence, induced by good relative past performance, as well as by the imposed incentive structure.
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4:00-6:00 PM (3268)

Mental Model Updating and Pupil Response. SUNGJOON PARK, *Texas A&M University,* BRITT ANDERSON, *University of Waterloo* (Sponsored by Britt Anderson) – The process of mental model updating, or changing our minds, has been characterized as following a delta-rule model (Nassar et al., 2010). For instance, when an individual is surprised, the violation of their expectation, it signals a flaw in their prediction. This prediction error influences the degree to which individuals update their mental models. However, not all surprises are useful and people will disregard unreliable ones. In our study (N=8), we investigated the relative influence of the utility and reliability of prediction errors to participants' belief state and to phasic pupil dilation. In a probabilistic learning task with two alternating rules, participants received feedback with varying utility and reliability to inform their next decisions. We found that surprises predicted belief change and greater pupil dilation. Additionally, more useful surprises predicted greater belief change, but not greater pupil dilation. And reliability neither predicted the degree of belief change nor pupil dilation. This suggests that the probability that a surprise is reliable does not influence how much participants are informed by it, and that phasic pupil dilation is neither sensitive to surprise utility nor reliability.
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4:00-6:00 PM (3269)

We See What We Believe: Prior Belief Biases Correlation Perception. CINDY XIONG, CHASE STOKES, and STEVEN FRANCONERI, *Northwestern University* (Sponsored by Steven Franconeri) – Even if data is definitive, we can still see it with bias. While people can extract correlations from scatterplots, we demonstrate that they perceive correlations as stronger or weaker depending on their prior beliefs. After training participants to extract correlations from scatterplots, they estimated correlations for four no-context scatterplots (axes labeled "X" and "Y") and for the same four plots with context (axes labeled with real-world variable pairs), separated by a distractor task. We counterbalanced the variable pairs to be belief-triggering (e.g., gun ownership and crime rates) or neutral (e.g., number of lawyers and annual rainfall). In the end, participants reported how strongly they believed there to be an association between the variable pairs. Comparing the no-context and with-context plots, prior belief significantly impacted correlation estimates for all variable pairs. People who believed the variable pairs to be correlated overestimated their correlation values, while people who did not hold those beliefs underestimated the correlations. These results suggest that people are influenced by their prior beliefs when judging otherwise objective patterns in data.
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4:00-6:00 PM (3270)

Prospect Theory in Selective Attention. SUNGHYUN KIM, JASON HARMAN, and MELISSA BECK, *Louisiana State University* (Sponsored by Melissa Beck) – To investigate whether prospect theory (Kahneman & Tversky, 1979) operates in selective attention, the current study tested whether the seminal findings (Thaler, 1980; Tversky & Kahneman, 1981) for the diminishing sensitivity principle of prospect theory were replicated in the reference-dependent attentional capture paradigm (Kim & Beck, 2020). Multiple targets were associated with values and had different reference points during training. During test, the training targets were used as distractors. Experiment 1 showed that 100-point distractors (compared to 1-point reference points) captured attention more than 1000-point distractors (compared to 901-point reference points), indicating the difference between 1 and 100 looms larger than that between 901 and 1000. Experiment 2 showed that 100-point distractors (compared to 1-point reference points) and 1000-point distractors (compared to 10-point reference points) captured attention similarly, indicating the difference between 1 and 100 looms similar to that between 10 and 1000. The results imply that when valuable items attract attention, their values are distorted reflecting diminishing sensitivity. Thus, prospect theory extends to selective attention.
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4:00-6:00 PM (3271)

Cue Omission Reduces Sensitivity to Impulsive and Self-Controlled Reward Contingencies. BRIAN HOWATT and MICHAEL YOUNG, *Kansas State University* (Sponsored by Michael Young) – Previous research using escalating interest (EI) impulsivity tasks has demonstrated that individuals are appropriately sensitive to reward contingencies for waiting. However, it is unclear how specific environmental variables guide intertemporal choice beyond experiencing the delay to reinforcement. In the present study we investigated how omitting color cues that signaled reward contingencies influenced participants' preferences for waiting in an EI task. Results revealed that removing these color cues desensitized participants to both impulsive and self-controlled reward contingencies. Specifically, participants were more impulsive in self-control contingencies and more self-controlled in impulsive contingencies compared to when color cues were present. Moreover, participants were also more likely to switch to different rewards when color cues were omitted, despite available reinforcement at the current reward. These findings suggest that the omission of environmental information associated with reward contingencies 1) reduced people's ability to maximize reinforcement density, and 2) encouraged greater sensation-seeking type behaviors.
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4:00-6:00 PM (3272)

An Examination of Exploration During Reinforcement Learning (RL) Using Delta and Decay Rule Models. DONG-YU YANG and DARRELL WORTHY, *Texas A&M University* (Sponsored by Darrell Worthy) – We examined how well two popular RL models accounted for data in a task where participants could either select options or 'explore' options by seeing the rewards associated with each. The Delta model updates expected value (EV) by tracking each option's average reward, while the Decay model updates EV by tracking each option's cumulative reward. Participants performed a four-choice binary outcome decision-making task where each option had a set probability, p, of giving a gain (+100), and a 1-p probability of giving a loss (-100). Participants could choose to explore on each trial and would see the outcome for all options but receive a set payoff that varied by group (either -5, 0 or +5). The Decay rule model fitted participants' responses better than the Delta rule model. This suggests that exploratory behavior during decision-making could be driven more by representations of cumulative, or total reward, rather than average reward.
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4:00-6:00 PM (3273)

Category Learning in Children: Some Memorize and Some Find Rules. JERI LITTLE and JULIETTE JAYME, *California State University, East Bay* – In a category learning task, participants can use different strategies to learn, and these different strategies have implications for how they classify new transfer items. For example, memorizers may classify transfer items based on how physically similar they look to a trained item, whereas rule-abstractors will classify items based on the rule they found. While both strategies have been shown in adults, the current study examines strategy and transfer item classification in children between the ages of 7 and 12. Participants were trained on eight items, classified two types of transfer items, and then self-reported their strategy. The results showed that self-reported strategies predicted the classification of the transfer items. However, age did not predict children's strategies nor how they classified transfer items. These findings suggest that children differ in the strategies that they use to learn and may have implications for learning in educational contexts.
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4:00-6:00 PM (3274)

Using Grip-Force to Investigate the Involvement of Hand-Action Networks in Tool Recognition. NATHAN LAUTZ, COLIN ANNAND, DANIEL WALKWITZ, and TEHRAN DAVIS, *University of Cincinnati* (Sponsored by Gerry Altmann) – Neuroimaging research has shown activity in hand-action networks during conceptual tasks involving both tools and hand-action-associated verbs. Relatedly, research measuring participants' grip force (GF) has shown that hearing hand-action verbs causes a transient increase in GF. Here, we asked if simulation of the motor features of tools is orientation-specific by measuring the GF of participants' right and left hands during a picture naming task. Participants were instructed to maintain a constant GF throughout 4 blocks of trials. During blocks, participants named images from one of two categories – tools or animals, with the tool's handle or animal's head oriented towards the right or left hand. We found a greater mean and SD of GF for tools than animals. Moreover, the temporal structure of the GF time series for each hand depended on an interaction between the image category and its relative orientation. These findings provide converging evidence that simulation of the motor features of tools can affect peripheral motor response and can be orientation-specific. Such findings support and refine a "grounded" view of concepts, in which concepts are grounded, at least partly, in brain areas associated with perception and action.
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4:00-6:00 PM (3275)

Feature-to-Feature Relationships in a Category Learning Experiment. MATT WETZEL and KENNETH KURTZ, *Binghamton University, SUNY* (Sponsored by Kenneth Kurtz) – Formal models of category learning typically leverage similarity to data-driven category representations or rules based on logical operators (or boundaries) to predict category membership. To our knowledge, little to no work has explored category structures defined by feature-feature relationships with a truth condition. For example, consider the natural category of "square," which requires the height and width of the shape to be equal in magnitude. In the present work, subjects learned a category structure using stimuli that varied on two continuous-valued features. Critically, the basis for distinguishing the categories was whether or not the two features had the same value (i.e., a perfect feature correlation). Subjects reliably generalized the rule to new items, but only when features were different instantiations of the same underlying dimension (e.g., both features defined as length of different stimulus parts). We find many leading theoretical frameworks are unable to account for these results.
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4:00-6:00 PM (3276)

Investigating Discriminative Constraints to the DIVergent Autoencoder (DIVA) Model of Human Category Learning. MERCURY MASON, MATT WETZEL, and KENNETH KURTZ, *Binghamton University, SUNY* (Sponsored by Kenneth Kurtz) – The divergent autoencoder (DIVA; Kurtz, 2007, 2015) is a connectionist model of human category learning that leverages within-category statistical regularities—acquired via a generative learning objective—as the basis for classification decisions. The degree of reconstructive success indexes the goodness of fit between a stimulus and a statistical model of the category inherent in the weights. While DIVA already provides a compelling alternative to traditional reference point models, the approach is generally less sensitive to the discriminative pressures of classification learning. We investigate the explanatory power of potential additions to DIVA's core design principles including modifications to the learning/decision rules, training regimen, and model architecture. The goal is to constrain the model toward solutions that serve to optimize successful reconstruction on the correct category channel while also yielding poorer reconstruction on the incorrect channel(s). We present theoretical analysis along with model fits to benchmark human learning phenomena.
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4:00-6:00 PM (3277)

What Gives a Diagnostic Label Value? Common Use Over Informativeness. BABAK HEMMATIAN, *Brown University,* SZE-YU CHAN, *Peking University,* STEVEN SLOMAN, *Brown University* (Sponsored by Steven Sloman) – A label's entrenchment, its degree of use by members of a community, affects its perceived explanatory value even if the label provides no substantive information (Hemmatian & Sloman, 2018). Here we show that entrenched psychiatric and non-psychiatric diagnostic labels are seen by laypersons and mental health professionals as better explanations even if circular. This preference is not attributable to conversational norms, reflectiveness or attentiveness, and the recipient's unfamiliarity with the label. In Experiment 1, whether a label provided novel symptom information had no impact on laypersons' responses, while its entrenchment enhanced ratings of explanation quality. The effect persisted in Experiment 2 for incoherent random categories and regardless of provided mechanistic information. The entrenchment manipulation induced causal beliefs about the category even when respondents were informed that no causal relation exists. We replicate the effect in Experiment 3 with mental health professionals despite a marked tendency to find all uninformative explanations unsatisfactory.
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4:00-6:00 PM (3278)

Generalization in Category Learning Depends on Both: The Object's Reward Magnitude and Category Membership. ANN-KATRIN HOSCH and RENÉ SCHLEGELMILCH, *University of Bremen,* BETTINA VON HELVERSEN, *University of Bremen & University of Zurich* (Sponsored by Bettina von Helversen) – Little is known about how categorization decisions are influenced by reward magnitude (i.e., the amount of payoff received for an object). While recent cognitive modelling studies suggest that reward magnitude affects similarity-based stimulus generalization, this study seeks to uncover the nature of this influence empirically by manipulating decision rewards for category objects in two different categorization tasks: a one-category task (A vs. Non-A) and a two-category task (A vs. B). Category objects in each task were created from a unidimensional structure and only one object of each category was shown in a learning phase. In a first experiment, we found that participants show a lower response strength for generalization of objects of the Non-A category compared to objects of the B category. This effect was especially pronounced for participants who perceived Non-A as more than one category. Further, participants narrowed their generalization of objects expected to yield high reward in the one-category task only. Thus, generalization in category learning depends on both, the object's reward magnitude as well as its category membership (A, B or Non-A).

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4:00-6:00 PM (3279)

Training Away Face-Type Bias: Perception and Decisions About Emotional Expression in Afrocentric Faces. CLAY KILLINGSWORTH, *University of Central Florida,* HEATHER KLEIDER-OFFUTT and ASHLEY MEACHAM, *Georgia State University,* COREY BOHIL, *University of Central Florida* – We investigated whether face-type bias related to Afrocentric facial features influenced the interpretation of neutral expressions to seem threatening. Moreover, could such biased responses be trained away with feedback? Stimuli were pre-rated by face-type (stereotypical-black, non-stereotypical) and expression (neutral, threatening). Stimuli were presented in a speeded identification task that included corrective feedback, and participants indicated whether the face stimuli were stereotypical-black or not and threatening or not. Computational modeling based on General Recognition Theory revealed that training produced changes in decision bound placement to become less biased toward the "threatening-expression" response for stereotypical faces. Relative attention to the stimulus dimensions also changed over training, converging on slightly more attention to the stereotypicality dimension than to the emotional-expression dimension. Results suggest that although people are inclined to use face-type when judging threat, both perception and decision bias are malleable with training.

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4:00-6:00 PM (3280)

Count-Mass Distinction of Novel Aggregates Among Classifier and Non-Classifier Language Speakers. YEE PIN TIO and USHA LAKSHMANAN, *Southern Illinois University Carbondale* – This study contributes to debates on the count-mass distinction in classifier and non-classifier languages and its impact on cognition (perceptual processing and object individuation). Li et al (2009) found Chinese speakers (vis-a-vis English speakers) are less likely to construe objects (e.g., cork piece) as individual entities, which impacts their interpretation of novel nouns (e.g., blicket). We assessed 124 speakers of one-classifier (Chinese), two-classifier (Chinese-Malay) and non-classifier (English) languages using Middleton et al.'s (2004) novel aggregate task in order to assess sensitivity to the perceptual features of proximity and size of novel aggregates as a function of count and mass nouns. While there was a similar preference across groups for proximity (distance between aggregates), even in condition when size and proximity varied, the Chinese classifier-language group in contrast to the two other groups, relied on differences in size rather than proximity to distinguish between count and mass nouns, $F=8.730$, $p<.01$. We propose that differences in size preference across groups arise from their classifier-language experience and discuss the implications for the link between classifiers and cognitive processing

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4:00-6:00 PM (3281)

Structure of Linguistic and Nonlinguistic Event Categories. LILIA RISSMAN and GARY LUPYAN, *University of Wisconsin – Madison* – Are linguistic and nonlinguistic event categories structured in the same way? We focus here on event roles: in "Jan eats sorbet," Jan is an "Agent" and the sorbet is a "Patient" (Rissman & Majid, 2019). Linguistic event roles have been analyzed in terms of prototypes, e.g., a prototypical Agent plays an intentional and causative role (Dowty, 1991). We asked whether the same role prototypes guide category learning in a non-linguistic task. English speakers (n=202) saw 24 images of one figure acting on another (e.g., one figure kicking another). A salient red dot marked the agent (or patient) in each scene. Participants had to learn to group the pictures into Agent and Patient categories using accuracy feedback on each trial. Participants then completed 52 test trials containing all new scenes. This was a surprisingly difficult task: 42% failed to learn the Agent/Patient distinction during training. Among people who learned the distinction, categorization accuracy at test was predicted by the intentionality of the Agent ($\beta=.60$, $SE = .10$, $p < .001$) and the degree to which the Agent caused the event to occur ($\beta=.33$, $SE=.09$, $p<.001$). These results suggest similarities in event structure in linguistic and nonlinguistic domains.

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4:00-6:00 PM (3282)

Defying the Odds: The Inverse Base-Rate Effect with Degraded Cue-Outcome Contingencies. EVAN LIVESEY, JUSTINE GREENAWAY, and JULIE CHOW, *University of Sydney,* HILARY DON, *University of Sydney & University College London* – In contingency learning, phenomena such as the inverse base-rate effect (IBRE), where participants predict the rarer outcome when choosing between outcomes signalled by conflicting predictors, demonstrate that people are not always good at incorporating base-rate information into their decisions when learning from experience. Although this effect potentially reveals important insights into the way we learn predictive relationships, there are questions regarding the generality of the IBRE, as it typically involves perfect contingencies between predictive cues and outcomes. Across a series of experiments, we demonstrate that the IBRE is present when contingencies are partially degraded by reducing the probability of the outcome in the presence of the cue or increasing the probability of the outcome in the absence of the cue. This speaks to the generality and robustness of the

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effect and highlights the need for theorists to provide plausible accounts of this form of base-rate neglect in human contingency learning.
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4:00-6:00 PM (3283)

Interleaved Training Improves Category Learning by Increasing Category Discriminability. SHARON NOH, *University of Texas at Austin,* BRETT ROADS and BRADLEY LOVE, *University College London,* ALISON PRESTON, *University of Texas at Austin* (Sponsored by Alison Preston) – Category learning paradigms using naturalistic stimuli have found that interleaving exemplars across categories during training (as opposed to blocking exemplars by category) leads to superior category learning. Using a cognitive model that infers feature representations from similarity judgments, referred to as psychological embedding, we quantified changes in perceptual representations that occur as a function of different learning schedules. Participants learned to identify paintings by six artist categories in either a blocked or interleaved fashion. Cognitive modeling of similarity judgments performed before and after category learning was used to infer a psychological embedding for each condition (pre-training, blocked, interleaved). Results revealed that category learning resulted in overall increases in within-category similarity and between-category distance (pre- to post-learning). Furthermore, interleaved training led to better category discriminability (as measured by KL divergence between category distributions) and predicted categorization performance. These findings demonstrate how interleaved training shapes perceptual representations to improve category induction.
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4:00-6:00 PM (3284)

Is Category Learning a Unitary Process? Unique Neuropsychological Associations Across Task Types. KRISTINA CABRAL, *Texas Tech University,* HILARY DON, *Texas A&M University,* MICAH GOLDWATER, *The University of Sydney,* DARRELL WORTHY, *Texas A&M University,* TYLER DAVIS, *Texas Tech University* – Categorization is a core cognitive faculty that underlies much of our reasoning and decision making. However, the degree to which categorization reflects a stable unitary process within an individual and across categorization tasks or a higher-order combination of component processes remains an open question. We tested this question by examining test-retest reliability in the classic Shepard, Hovland, and Jenkins tasks and whether task types were differentially associated with cognitive measures from a standard neuropsychological battery. We found that, within problem type, the tasks had acceptable test-retest reliability and showed some unique associations with neuropsychological measures. Type I and II associated with measures of cognitive control and type III associated with measures of impulsivity and disinhibition. These results suggest that although individuals may vary reliably on and across specific problem types, the types of cognitive processes that contribute to performance may vary, in line with a component processes account.
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4:00-6:00 PM (3285)

The Role of Feedback in Category Learning. ADDISON BABINEAU and SARAH "UMA" TAUBER, *Texas Christian University* – The discriminative contrast hypothesis suggests that making comparisons between categories enhances category learning (e.g., Kornell & Bjork, 2008). As such, elaborative feedback that encourages between-category comparisons should improve category learning relative to types of feedback that do not encourage category comparisons. To explore this possibility, participants studied categories of organic compounds (e.g., Nitrile, Organochloride) and received no feedback, corrective feedback, or elaborative feedback. The novel form of elaborative feedback (dubbed contrast feedback) included the critical features of two categories, and participants compared them. Participants completed transfer and non-transfer classification tests. The results of multiple experiments revealed that compared with no feedback, feedback during learning was beneficial for transfer and non-transfer classification performance. Further, elaborative feedback that encouraged between-category comparisons was the most beneficial type of feedback. We explored the mechanisms driving the feedback effect and students' preferences for feedback and found some support for discriminative contrast hypothesis.
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4:00-6:00 PM (3286)

Attention and Memory Processes Both Play a Role in the Interleaving Effect. BRENDAN SCHUETZE and VERONICA YAN, *University of Texas at Austin* – Attention and memory-based accounts of sequencing effects in category learning are often pitted against one another, but we argue that both are important. We created an unsupervised learning task in which the rules governing categories would be difficult to notice under interleaved sequences. Specifically, participants were presented with a series of Chinese characters and their meanings. These words fell into five categories (e.g., water-related words: tears, splash, swim). Category-related characters all shared a subcomponent ("radical"), but participants had to abstract this detail. No character was repeated. On the day-delayed test, participants were shown new Chinese characters and asked to select a possible meaning to test category induction. Under both passive (Exp 1) and active (Exp 2) study, we found no interleaving benefit. However, when we eliminate the demand on attentional processes by directing attention to the rules (Exp 3), we obtain an interleaving benefit. Together, we find that attention (e.g., category discriminability) and memory processes are important, supporting an integrative attention-then-memory model of sequencing effects.
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4:00-6:00 PM (3287)

Are Disruptions of Category Learning During Deferred Feedback Determined by Number of Relevant Dimensions or Difficulty of Verbalization? BROOKE JACKSON, BARBARA CHURCH, and J. DAVID SMITH, *Georgia State University* (Sponsored by J. David Smith) – Multiple-systems theories assume category learning can take place by either associative/operant (implicit) or rule (explicit) learning, and rule-based (RB-explicit) and information-integration (II-implicit) category structures have been used to show many supportive dissociations (Ashby & Valentin, 2017). Smith et al. (2014) found that only II tasks are disrupted by deferred feedback. However, Le Pelley et al. (2019) showed that learning a two-dimensional conjunctive rule could also be disrupted by deferred feedback. They hypothesized that previous differences were due to differential working-memory demands rather than reinforcement

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timing. To compare these ideas, we examined learning of two conjunctive rules with deferred and immediate feedback. In one of the conditions, the rule was easier to verbalize (Big-bright are A vs Big-dark). Deferred feedback only disrupted learning in the less verbalizable condition. To determine if salience rather than verbalizability was responsible, we tested monkeys. Animals, unlike humans, show no consistent advantage for a big-bright "rule".
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4:00-6:00 PM (3288)

Do Categories Get Stronger with Use? The Effects of Category Size on Unsupervised Learning. JOHN CLAPPER, BRYAN ALVAREZ, and MATTHEW APPEL, *California State University, San Bernardino* – Clapper (2019) showed that unsupervised categorization in a novel label generation task could be modeled as a form of similarity-based generalization, where the probability of assigning two objects to the same category declines exponentially as a function of their dissimilarity, consistent with Shepard's (1987) universal law of generalization. Standard models of categorization incorporating the Shepard rule (e.g., Nosofsky, 1984, 1986) predict that the probability of generalizing a label (category) to a new object should increase with the number of other objects already assigned that label, implying by extension that clustering probability should increase with category size in the label generation task. The results of our initial attempts to test this prediction suggest that increasing the number of examples shown from a given category does increase their probability of receiving the same label in this task. We discuss the implications of our results for models of unsupervised categorization.
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4:00-6:00 PM (3289)

Family Resemblance Category Learning; The Effects of Feedback and Typicality Order. BARBARA CHURCH and BROOKE JACKSON, *Georgia State University,* EDUARDO MERCADO, *University of Buffalo* – Children with autism spectrum disorder (ASD) may process perceptual categories atypically (e.g., Church et al., 2010) and cannot learn without direct feedback (Church et al., 2020). Church et al. (2015) found that training with just the prototype can help these children, suggesting that learning with progressive typicality might also help. Unfortunately, we don't know how progressive typicality affects learning in neuro-typicals. To examine this, college students completed six family-resemblance categorization tasks. First and last, they categorized without any pre-exposure. In two tasks, they attended to category and non-category members in a memory task before categorizing (exposure learning). In the other two, they directly learned to categorize items with feedback (reinforced learning). For each type of learning, we also manipulated whether items were presented progressively (typical items first) versus randomly (random intermixing). Random presentation produced more generalization than progressive but only after reinforced learning. Future research will examine children with ASD.
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4:00-6:00 PM (3290)

The Effect of Terminology and Affect in STEM Learning: Does What You Call a Feedback Loop Matter? REBEKAH BANERJEE and TIM SHIPLEY, *Temple University,* KIM KASTENS, *Columbia University, Lamont-Doherty Observatory* (Sponsored by Thomas Shipley) – In this study we explored the relationship between two different terms of art used to teach the STEM concept of feedback loops and their relative success with undergraduates. The words "Positive" and "Reinforcing" can both be used to describe a specific type of feedback mechanism, and each are the preferred term in certain disciplines. Pilot work demonstrated that some students conflated the term "positive" with desirable outcomes of a scenario as opposed to the mechanism of the loop. Our current study employed a signal detection task to determine if the term "Positive," which conflates affect and outcome, could interfere with students' ability to correctly identify feedback mechanisms relative to the more affectively neutral term "Reinforcing." In a mixed two-way ANOVA we found no significant effect of training group, "Positive" or "Reinforcing," on bias (C) scores of participants; however, we found a significant bias within our sample to identify narratives with desirable outcomes as positive/reinforcing feedback loops, regardless of which label was used for training and testing. Implications associated with learning this key STEM concept to further sophisticated understanding of complex systems will be discussed.
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4:00-6:00 PM (3291)

Familiarity Judgments Behind Category Transfer in an Implicit Category Learning Task. ANETT RAGO, JULIA BAROSS, and KRISZTIAN BORBELY, *Eotvos Lorand University* – The transfer process reveals the strength of category learning: we need to retain some of the specific information but also generalize that for categorizing a new item successfully. Our aim is to reveal the background mechanisms of the transfer effect in a hidden information-integration task. Furthermore, using a pattern separation testing method we ask whether a recollection happens during retrieval. Seventy-four adults participated in a category learning task concealed as a go/no-go paradigm; they were to detect (and for an extra reward predict) those learning items that are followed by the target stimulus. All target-related stimuli were the members of a category following a family resemblance structure. In the test phase, we presented the never seen prototypes among old and new members. A remember/know memory task was followed by a categorization task. Participants judged new prototype (lure) items as "old" and mostly "remembered" them with a higher rate than the learning items. The categorization of the lure items was also better than the learned members. Our findings reinforce the assumption that pattern separation tasks don't necessarily measure episodic recollection and that the transfer process is based on familiarity.
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4:00-6:00 PM (3292)

Individual Differences in Categorization Induced by Focusing on Exemplars of Singular Category. LEE-XIENG YANG, *National Chengchi University* – In this study, the participants were asked to learn the incomplete XOR category structure, in which the first and third quadrants in the stimulus space were defined as Category A and the second quadrant was defined as Category B. Following each training block was the reviewing block, in which the participants in different conditions were asked to memorize the exemplars of Category A only (Condition A), Category B only (Condition B), or all categories (Condition AB).

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In the transfer phase, the participants firstly made old/new recognition judgments for all stimuli and then predicted their categories. The results showed that the participants in Condition A tended to predict the stimulus in the fourth quadrant as Category B (i.e., XOR pattern). However, the participants in Condition B tended to predict the same stimuli as Category A (i.e., Proximity pattern). The participants in Condition AB showed no particular tendency for either response pattern. It is implied that these different categorization strategies might depend on which category is focused on. A modified version of ALCOVE, SD-ALCOVE, can account for all the observed response patterns via incorporating dissimilarity computation and the importance bias for each category.
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4:00-6:00 PM (3293)

Effects of Categorical and Continuous Feedback on Learning. ASTIN CORNWALL, *Texas A&M University,* TYLER DAVIS, *Texas Tech University,* KAILEIGH BYRNE, *Clemson University,* DARRELL WORTHY, *Texas A&M University* – In the environment, category learning experiences often come in the form of a continuous range of rewards or punishments (i.e., reaction to temperature, payment amount, etc.). However, feedback used in category-learning research are invariably categorical in nature (i.e., different forms of yes/no feedback). The impact of continuous reward-based feedback on category learning has been less explored even though we often have to translate continuously valued information into categories. In the current paper, we sought to compare continuous and binary feedback in terms of their effects on learning. In a behavioral study, we had participants learn categories using categorical, continuous, or both types of feedback. Simulations and fits of a connectionist model to participants behavior showed that learning performance is better when categorical feedback is given than continuous feedback alone. However, we show that it is possible to learn categories solely from continuous feedback, and such feedback can shape category representations.
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4:00-6:00 PM (3294)

The Influences of Category Learning on Perceptual Reconstructions. MARINA DUBOVA and ROBERT GOLDSTONE, *Indiana University Bloomington* (Sponsored by Robert Goldstone) – Human perception is highly adaptable to the structure of the environment and individual cognitive demands. We explore different ways in which the human visual system adapts for both perceiving and categorizing the environment. We articulate the predictions of various accounts of supervised (categorical) and unsupervised perceptual learning, developed under the Bayesian, Information Theory, and ecological approaches to perception. We demonstrate that common experimental designs are insufficient to differentiate between the predictions of these hypothesized perceptual learning mechanisms and propose a relatively underutilized and efficient way of studying potential categorical effects on perception with a two-dimensional, interleaved categorization-plus-reconstruction task. We find evidence that human visual encodings adapt to the feature structure of the environment, allocate encoding resources with respect to categorization utility, and adapt to prevent miscategorizations.
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4:00-6:00 PM (3295)

Multilingualism, Working Memory, and the N400 Effect. CATHERINE REED and JESSICA KIM, *Claremont McKenna College,* CINDY BUKACH, *University of Richmond,* JANE COUPERUS, *Mount Holyoke College* – Multilingualism has been associated with greater working memory. We investigated whether multilingualism interacted working memory to influence semantic processing as indexed by the N400 effect (amplitude differences between related and unrelated word pairs). 269 college students (161 monolingual, 46 multilingual English L1, 62 multilingual English L2) performed a word-pair task during EEG data collection. Working memory and vocabulary were assessed separately. Neither visuospatial nor attentional control working memory interacted with multilingualism. Compared to the monolingual and L1 groups, the L2 group differed in the size and scalp distribution of the N400 effect early (275-350 ms) and later (500-800ms) in processing, showing a relatively smaller N400 effect early and a bigger N400 effect later. Within the L2 group, a similar pattern was observed those who acquired English after age 7. When English is a second language and acquired after 7, smaller initial N400 effects and later prolonged processing are observed for semantic processing.
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4:00-6:00 PM (3296)

Eye Movement Measures of Cross-Language Activation During Reading in Bilingual Children and Adults: A Focus on Neighborhood Density Effects. VERONICA WHITFORD, *University of New Brunswick,* MARC JOANISSE, *University of Western Ontario* – Nearly all eye-tracking studies of cross-language activation have focused on skilled, young adult readers. Here, we used eye-tracking to examine cross-language activation (indexed by cross-language neighborhood density effects) during L1 and L2 paragraph reading in 33 English-French bilingual children (aged 7 to 12) compared to 30 English-French bilingual adults (aged 18 to 21). We had three main findings. First, cross-language neighborhood density effects were facilitatory across the L1 and L2. Words with many cross-language orthographic neighbors were easier to process. Second, cross-language neighborhood density effects were more pronounced in the L2. In the L2, they were observed during both early-stage and late-stage reading; whereas in the L1, they were observed during late-stage reading only. Third, cross-language neighborhood density effects were larger in children across the L1 and L2 (and both reading stages). Children found words with few cross-language orthographic neighbors especially difficult to process. Thus, we find that cross-language activation of orthographically similar word forms (neighbors) facilitates reading behavior, especially in the weaker language (L2) and among developing readers (children).
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4:00-6:00 PM (3297)

A First! The SNARC Effect in Arabic-English biliterates. JACQUELYN BERRY, *American University in Cairo* – Cultural reading habits can influence non-linguistic behaviors. One example is the SNARC effect whose origin is a "mental number line" that progresses in magnitude from left to right and causes faster left-side responses to smaller values and faster right-side responses larger values. In Dehaene et al.'s original study the effect was absent in Iranian subjects who were fluent in French but

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for whom reading and writing natively proceeds from right-to-left. Many similar studies have also found weak, absent, or reversed SNARC effects for "bidirectional biliterates." Presently, Arabic-English biliterates judged the magnitude of Eastern Arabic digits, Romanized Arabic number words, Arabic numerals, and English number words. There was a significant left-to-right SNARC effect for Arabic numerals, a result we believe to be a first among native Arabic speakers. Our results counter Dehaene et al.'s conclusion that the mental number line is determined by the direction of the writing system. Our results also do not support Dehaene et al.'s triple code model which proposes a verbal representation for numbers. We discuss this result in the context of differences in bilingual reading strategies and in models of numeric mental representations.
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4:00-6:00 PM (3298)

Bridging Personal and Environmental Language Dynamics with Network Science. MEHRGOL TIV, *McGill University,* ETHAN KUTLU, *University of Florida,* JASON GULLIFER, RUO YING FENG, and DEBRA TITONE, *McGill University* (Sponsored by Debra Titone) – According to the Complex Dynamic Systems Theory of Bilingualism, personal language use is embedded within a broader environmental context. We quantify and bridge personal and environmental language dynamics by applying the novel approach of Network Science. Ninety-six English- and French-speaking bilingual adults completed a social network survey that assessed their language use with 8-12 people (alters). We then constructed full ego networks consisting of all alters and three language-tagged subnetworks consisting of English, French, and bilingual alters. We extracted common network measures (e.g., network size, density, centrality) from the full network and the language subnetworks. We related measures from each of these networks to indices of environmental language use based on census information from the postal code of each participant's residence. Ongoing analyses reveal that the full network measures (without language) do not co-vary with environmental dynamics of language use; however, stronger personal English subnetworks and weaker personal French subnetworks relate to stronger environmental English use. Together, this work supports the confluence of personal and environmental language dynamics among bilinguals.
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4:00-6:00 PM (3299)

Knowledge Is a River and Education Is Like a Stairway: An Eye Movement Study on How L2 Speakers Process Metaphors and Similes. HENRI OLKONIEMI, RAYMOND BERTRAM, and JOHANNA KAAKINEN, *University of Turku* – At present, very little is known about the processes underlying L2 speakers' understanding of written metaphors and similes. This information would add to current theories on figurative language comprehension, which as of yet do not take into account reader-related factors in comprehending figurative expressions like metaphors. In the present study, we used eye tracking to examine how native Finnish speakers (N=63) read written English nominal metaphors ("education is a stairway") and similes ("education is like a stairway") (Ashby, Roncero, Almeida, & Agaus, 2018). Identical words were used in the topic–vehicle pair (education–stairway) in both conditions. After reading, participants evaluated familiarity of each topic-vehicle pair as metaphors. Participants' English proficiency was measured using the Bilingual-Language Profile Questionnaire and the Lexical Test for Advanced Learners of English. The results showed that readers were more likely to regress within metaphors than within similes, indicating that processing of metaphors requires more processing effort than processing of similes. The familiarity of a metaphor and English language skills modulated this effect. The results are discussed in the light of current theories.
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4:00-6:00 PM (3300)

The Effects of Orthographic Similarity on Novel Word Learning in Adults. GABRIELA MEADE and PHILLIP HOLCOMB, *San Diego State University* – Second language (L2) words that can anchor to many form-similar neighbors in the native language lexicon are learned better. Here, we tested whether the same holds true for neighbors among the to-be-learned L2 words or whether lexical competition among L2 neighbors detracts from learning. Participants learned L2 words that had no neighbors (e.g., wrand, griph) and L2 words that belonged to dense neighborhoods (e.g., plusk, plusm, plesm, glesm, glesk, glusk). Learning outcomes were indexed over four days in a two-alternative forced-choice (2AFC) task and a typing task. Accuracy in both tasks increased over time. In the first sessions, typing accuracy was higher for L2 words from dense neighborhoods, which we interpret in terms of the strategic use of shared letter combinations across neighbors. In subsequent sessions, 2AFC accuracy was higher for words that had no neighbors, which we interpret in terms of lexical competition among L2 neighbors. By the end of training, there were no differences in accuracy as a function of neighborhood density. Overall, these results suggest that L2 words are quickly integrated into a lexical network and begin interacting with form-similar words in a way that influences early learning outcomes.
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4:00-6:00 PM (3301)

Accounting for Second Language Aptitude: The Role of Domain-General Cognitive Abilities. JOSHUA BUFFINGTON and KARA MORGAN-SHORT, *University of Illinois at Chicago* – Recent views of language aptitude, which predicts success at second language (L2) learning, suggest the importance of domain-general cognitive abilities (Wen et al., 2017). Two cognitive, learning and memory systems theorized to impact L2 acquisition are declarative and procedural memory (DM/PM; Ullman, 2020). To examine relationships among these constructs, we measured each one (DM: Continuous Visual Memory Task, PM: Serial Reaction Time Task, Aptitude: MLAT, and L2 morphophonological learning task: Ettlinger et al., 2014) and examined correlational and regression results. Preliminary results (N=27) suggest that DM is marginally associated with aptitude but not L2, whereas PM is associated with L2 but not aptitude. Regression models suggest that aptitude predicts L2 and adding DM and PM to this model reveals PM, but not DM, to independently predict L2 and significantly add to the explained variance. Thus, domain-general abilities seem to contribute to L2 and may constitute aspects of aptitude.
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4:00-6:00 PM (3302)

Gradient Effects of Bilingual Experiences on Lexical Access: An Examination of Language Brokering and Code-Switching. TARA HAZEL, JOSHUA FRANK, and BELEM LÓPEZ, *University of Texas*

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at Austin – Variability among bilinguals has recently received much attention in relation to cognitive and linguistic processing (e.g., Tabori et al., 2018). Two important bilingual experiences to include here are language brokering (i.e., translation, López, 2020) and code-switching. These experiences require the ability to switch between languages and access lexical information across language boundaries. The current study examined gradient effects of language brokering and code-switching experiences on lexical fluency. It was hypothesized that language brokering and code-switching affect lexical fluency in Spanish and English and that different contexts of language brokering experiences and code-switching would lead to divergent effects on lexical fluency across languages. Latinx Spanish-English bilinguals completed lexical fluency tasks in both languages spaced a week apart. Results are interpreted within the larger discussion of the relationship between bilingual experiences and cognition, particularly how language brokering and code-switching are interrelated yet differential social factors contributing to variability among bilingual populations.
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4:00-6:00 PM (3303)

Predicting L2 Prediction: The Role of Cognitive Factors and First Language Skills. IRENE FINESTRAT and KARA MORGAN-SHORT, *University of Illinois at Chicago* (Sponsored by Kara Morgan-Short) – It is argued that prediction constitutes a fundamental skill for language acquisition. However, whether second language (L2) learners use prediction is debated and the factors that explain L2 prediction are largely unknown (i.e., Curcic et al., 2019). Our goal is to investigate cognitive (statistical learning and working memory) and linguistic (L1 grammatical knowledge and processing) individual differences that may account for L2 predictive processing. Participants were 40 native speakers of English, intermediate L2 learners of Spanish. Learners' ability to exploit grammatical number markers as predictive cues in comprehension was assessed through a picture selection task (adapted from Marull, 2015) that contained informative and uninformative trials. Results revealed that participants were significantly faster in the informative condition, showing evidence of predictive processing. Regression results revealed that only linguistic factors, in particular, L1 grammatical knowledge significantly predict L2 prediction. This finding suggests that L1 skills play a relevant role on L2 processing.
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4:00-6:00 PM (3304)

Consolidation and Second Language Vocabulary Development. ROSA PADT and KATHERINE KERSCHEN, The *Pennsylvania State University,* ZOFIA WODNIECKA, *Jagiellonian University,* CARRIE N. JACKSON, The *Pennsylvania State University* – Consolidation occurs when a speaker establishes semantic and phonological connections between novel and previously acquired words, thereby integrating novel words into their mental lexicon (Davis & Gaskill, 2009). Sixty-four L1 Polish-L2 English speakers listened to a story containing novel words and tested immediately after exposure and 24 hours later. A pause detection task measured lexical integration by inserting pauses into real words (daffodil) resembling the novel words (daffodat); identifying pauses in existing words takes longer once novel words are integrated into the mental lexicon. A forced-choice task measured participants' ability to distinguish novel words from novel foils. While no overall consolidation effect in the pause detection task emerged, participants who performed better on the forced-choice task on Day 1 showed greater consolidation of novel words on Day 2. This suggests L2 vocabulary consolidation proceeds similarly to L1 consolidation, but the magnitude of L2 consolidation depends on learners' recognition of novel lexical forms.
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4:00-6:00 PM (3305)

Cross-Linguistic Lexical Competition in Spanish Second Language Learners. MCCALL SARRETT, CHRISTINE SHEA, and BOB MCMURRAY, *University of Iowa* (Sponsored by Cathleen Moore) – Second language (L2) learners must not only acquire new knowledge of their L2 (i.e., vocabulary and grammar) but also rapidly access this new knowledge to communicate effectively. In monolinguals, efficient speech perception is accomplished via lexical competition, where phonologically similar words compete for activation as the speech signal unfolds. We asked how lexical competition dynamics develop both amongst words of the new L2, and between L2 words and native language (L1) words. Adult L2 learners (N=33) in their second year of college Spanish completed a cross-linguistic Visual World Paradigm task, along with vocabulary assessment (LEXTALE-ESP). Our results indicated that early L2 learners show within-L2 and cross-linguistic (L2-L1) competition, similar to fluent bilinguals. Furthermore, performance on LEXTALE-ESP significantly correlates with the growth of fixations to the target word and the degree to which competition resolves. This suggests that an integrated lexicon is built immediately as learners begin acquiring a new L2.
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4:00-6:00 PM (3306)

Acquiring Grammatical Classes from Distributional Properties of the Input: The Challenge of Bilingual Acquisition. ALLISON LINK, MATTHEW CARLSON, and DANIEL WEISS, *The Pennsylvania State University* (Sponsored by Daniel Weiss) – An important development in language acquisition research has been determining the structural properties of language that can be extracted from distributional information in linguistic input. This challenge is compounded when multiple languages are acquired. This study investigates how monolinguals and bilinguals contend with statistical learning of two artificial languages with conflicting grammatical structures, probing the conditions under which learners encapsulate statistics versus generalizing across languages. We created artificial languages with grammatical classes that could only be derived from distributional cues (following Reeder, 2013). Experiment 1 exposed participants to one of two languages with different grammars and with contrasting phonetic and phonotactic patterns based loosely on Romance and Slavic languages. Monolingual English-speakers learned both languages equally despite the non-native phonetics and phonotactics. Experiment 2 (currently underway) investigates whether these languages can be acquired in tandem and whether acquisition is dependent on the presence of contextual cues across both monolinguals and bilinguals.
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4:00-6:00 PM (3307)

The Chosen Few—Representation and Professional Visibility of Scholars of Color in Cognitive Psychology. JYOTSNA VAID, *Texas*

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A&M University, JEAN FOX TREE, *University of California, Santa Cruz* – That U.S. psychology is disproportionately comprised of white men, especially at higher academic ranks, is clear. Less clear is how this fact affects what is studied or who is deemed meritorious. In cognitive psychology all editors of two flagship journals over the past forty years have been white as have been most authors. Scholarship on equity in cognitive science has been absent. What might account for the rarity of scholars of color at higher academic ranks in cognitive psychology? We identified a sample of tenured scholars of color (men and women) currently employed full time in cognitive psychology at top ranked universities in the U.S. We compared indicators of professional visibility obtained from public sources for this cohort with those of white counterparts at similar career stages from the same institution. Our findings offer a starting point for needed discussion around factors that promote or impede equity in recognition.
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4:00-6:00 PM (3308)

Examining the Relationship Between Attention, Memory, and Daydreaming. CHRISTOPHER KOCH and TANNER ALIFF, *George Fox University* – Singer (1975) noted different styles of daydreaming. Among these types is the idea that poor attentional control results in an inability to concentrate on the immediate circumstances, which can lead to daydreaming. When maladaptive daydreaming takes place, the daydreams interfere with everyday functions such as work, relationships, and learning (Schimmenti, Somer, & Regis, 2019). The present study was conducted to examine the relationship between attentional unawareness and daydreaming. Eighty introductory psychology students completed the Mindfulness Attention Awareness Scale (MAAS, Carlson and Brown, 2005), Everyday Memory Questionnaire (EMQ, Royle and Lincoln, 2008), Patient Health Questionnaire (PHQ-9, Kroenke and Spitzer, 2002), and the Maladaptive Daydreaming (MDS; Somer, Lehrfeld, Bigelsen, & Jopp, 2016). All measures were significantly correlated with each other. Alternative regression analyses showed that attentional unawareness is a better predictor of daydreaming than daydreaming is of attentional unawareness. Everyday memory errors are also predictive of attention and daydreaming.
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4:00-6:00 PM (3309)

Computational Free Will as an Adaptive Self-Aware Search Process. THOMAS HILLS, *University of Warwick* – Free will is an apparent paradox because it requires a historical identity to escape its history in a self-guided fashion. Philosophers have itemized design features necessary for this escape, scaling from action to agency and vice versa. These can be organized into a coherent framework that cognitive capacities provide and that form a basis for a neurocognitive free will. Its capacities include (1) adaptive access to unpredictability, (2) effortful conscious control of the tuning of this unpredictability in the service of hierarchical goal structures, (3) goal-directed deliberation via search over internal cognitive representations, and (4) a role for conscious construction of the self in the generation of and choice over alternatives. This frames free will as a process of generative self-construction, by which an iterative search process samples from experience in an adaptively exploratory fashion, allowing the agent to explore itself in the construction of alternative futures. This provides an explanation of how effortful conscious control modulates adaptive access to unpredictability and resolves free will's key conceptual paradox: how randomness is used in the service of the will.
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4:00-6:00 PM (3310)

Individual Differences in Cognitive Ability, Motivation, and Intentionality of Mind-Wandering. MATTHEW WELHAF, BRIDGET SMEEKENS, and MICHAEL KANE, *University of North Carolina at Greensboro* (Presented by Michael Kane) – Mind-wandering is often defined as an unintentional attention failure, but prior work has suggested that task-unrelated thoughts (TUTs) can occur intentionally, and that individual differences in cognitive ability and motivation might differentially predict intentional vs. unintentional TUTs (Unsworth & Robison, 2018). In the current study, participants completed measures of working memory (WM) and attention control as ability measures and self-reported their motivation; we assessed intentionality of on- and off-task thought in three attention tasks and manipulated motivation between tasks. Attention control, but not WM, was negatively associated with intentional TUTs and neither was associated with unintentional TUTs in our non-motivation tasks. Increasing motivation reduced both TUT types and their correlations with cognitive ability. TUT rates' associations with attentional control and motivation may be driven by intentional, rather than unintentional, task disengagement (but we also will ask questions about the validity of self-reported TUT intentionality).
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4:00-6:00 PM (3311)

Psychological Experiences and Restorative Characteristics of Virtual Nature and Urban Images. BROOKE CHARBONNEAU and AUDREY HOOD, *Montana State University,* ALEXANDRE MAROIS and JASON WATSON, *University of Colorado, Denver,* KEITH HUTCHISON, *Montana State University* – Virtual natural scenes improve performance on cognitive tasks when these scenes are more fascinating. In an MTurk study, 243 (Final N=222) participants provided normative ratings for nature and urban images on fascination as well as their experiences of anxiety, likability, mindfulness, mystery, and resilience. Thought probes were also included to measure rates of mind wandering. The image characteristic ratings of fascination, likability, and mystery were higher for nature compared to urban images. Furthermore, nature images resulted in higher self-reported levels of state mindfulness and resilience, and lower self-reported levels of mind wandering and anxiety. These results both replicate and extend previous findings and suggest that more fascinating nature images tend to have positive effects on psychological experiences that may assist restoration for cognitive tasks.
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4:00-6:00 PM (3312)

Mind-Wandering During Scene Perception: On the Role of Meaning and Salience. HAN ZHANG, *University of Michigan,* NICOLA ANDERSON, *University of British Columbia,* KEVIN MILLER, *University of Michigan* (Sponsored by Kevin Miller) – We examined whether mind-wandering (MW) involves a decoupling between eye movements and scene content. Participants studied real-world scenes and occasionally answered thought probes assessing their attentional states.

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We built salience maps and meaning maps (Henderson & Hayes, 2017) to represent how low- and high-level image features were distributed across the entire scene. We first analyzed image statistics around viewed locations and found that participants prioritized meaningful regions over less meaningful ones even during MW. But a subsequent analysis incorporating unexamined locations showed that participants tended to overlook meaningful regions during MW compared to when being on-task. Results for image salience were similar to the results for meaningfulness and were highly correlated. When directly compared to each other, meaning maps outperformed salience maps in predicting fixations regardless of participants' attentional state. To sum up: (1) individual fixations preferred meaningful regions even during MW, but overall attention was insufficient to cover all meaningful regions in the scene, and (2) even during MW, eye movements appeared to be primarily driven by meaning, not salience.
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4:00-6:00 PM (3313)

Tracking Attentional States: How Distributing and Focusing Attention in Visual Working Memory Affects Self-Reported Attention. ANDRA ARNICANE and ALESSANDRA SOUZA, *University of Zurich* (Sponsored by Alessandra Souza) – Retro-cues focus attention in visual working memory (VWM), enabling prioritization of the cued item. Here, we examined how retro-cues change the subjective experience of attention in VWM. Attention reports could reflect: (1) memory maintenance effort, which should decrease with a retro-cue; (2) total attention, thereby remaining unchanged with retro-cues; or (3) average attention towards an item, in which case attention should increase with retro-cues. Across three experiments, participants (N=170) memorized colors for a continuous reproduction test. A subset of trials solicited attention ratings. Performance improved and rated attention was higher after retro-cue than no-cue and neutral-cue trials. In all conditions, performance and rated attention covaried. Critically, retro-cues improved performance for all levels of rated attention. Manipulation of ratings' time-point (before or after memory test) and retro-cue validity (valid: 67%, invalid: 33%) showed that retro-cues increase rated attention irrespective of performance levels. In sum, transitioning from distributing to focusing attention in VWM increases self-reported attention indicating accurate metacognition of how much attention is assigned to an item in VWM.
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4:00-6:00 PM (3314)

Brooding Bad: Explaining Rumination through Stream of Consciousness Dynamics and Content. QUENTIN RAFFAELLI and RAMSEY WILCOX, *University of Arizona,* CAITLIN MILLS, *University of New Hampshire,* NADIA-ANAIS DE STEFANO, KATE CHAMBERS, ROHITH BOYILLA, SURYA FITZGERALD, ZAIN MAJEED, SYLVIA ZARNESCU, RUDY MALUSA, ERIC ANDREWS, MATTHIAS MEHL, MARY-FRANCES O'CONNOR, and JESSICA ANDREWS-HANNA, *University of Arizona* (Sponsored by Jessica Andrews-Hanna) – Rumination is a mental health construct characterized by persistent attention to one's symptoms and sources of distress. Despite the centrality of "mental stickiness" to rumination and other forms of repetitive negative thinking, most methods fail to quantify the dynamics of thought and/or rely on retrospective questionnaires subject to memory bias and failures in meta-cognitive awareness. To assess how unprompted thoughts arise, unfold, and change over time in different ways for ruminative and non-ruminative individuals, we asked participants (n=46) to voice aloud their naturally-arising thoughts continuously in real-time for ten minutes. This "think aloud" paradigm allowed us to measure the contribution of content and dynamics to rumination. Higher trait rumination was linked to more negative, past-oriented, and self-focused content, and disproportionately longer time spent in negative versus positive thoughts, suggesting that dynamics depend on valence. Overall these findings underscore the importance and clinical validity of methods that capture both the content and dynamics of thought.
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4:00-6:00 PM (3315)

Attentional Bottlenecks and Time Perception. JUAN-SHU WU, SENLING SHU, and HAL PASHLER, *University of California, San Diego* (Presented by Hal Pashler) – When people try to do two speeded tasks at approximately the same time, a stubborn "bottleneck" appears: central processing stages in task 2 are delayed until completion of the corresponding stages of task 1 (psychological refractory period or PRP effect). Corallo et al. (2008) had subjects not only perform two tasks in a PRP design, but also estimate the latency of both responses. They found that while task 2 response latencies (RT2) were slowed as the SOA was shortened (PRP effect), subjects' estimates of RT2 were unaffected by SOA. They suggested the bottleneck may suspend the perception of time. We confirmed the main findings of Corallo et al. in two studies. However, we also noted that subjects' time estimates in this setting showed little trial-to-trial relationship to actual latencies, suggesting that time estimation was more limited than Corallo et al. had assumed. However, in a third study we found that subjects could estimate the interval from the first stimulus to the second response with reasonable accuracy. We offer a parsimonious possible explanation for the whole pattern of results: bottlenecks don't interrupt time perception but people cannot start or stop their internal stopwatch while doing another task.
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4:00-6:00 PM (3316)

The Fickle Nature of the Effect of Mindfulness Meditation on Cognition. IRENE REPPA, GABRIELA JIGA, and RHYS SWAINSTON, *Swansea University* – Mindfulness meditation (MM) is known to have wide-ranging benefits on mental and physical health. Less is known about which cognitive functions MM can influence and about what the mechanism behind its effect on those functions may be. The present study examined the effect of MM on executive function, compared with 4 control groups. Two measures of executive function were examined: inhibitory control, using the Simon task, and working memory, using the operation span task. Before completing the two tasks, four groups of University-age participants took part in a 15-minute audio of either mindfulness meditation, mind-wandering meditation, a shipping forecast, or an audiobook, whereas the fifth group acted as a passive control merely completing the cognitive measures without prior intervention. The mindfulness, mind-wandering, and shipping forecast groups showed significant benefits in working memory compared with the audiobook and passive control. The same groups—mindfulness, mind wandering, and shipping forecast—showed significantly higher

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levels of stimulus-response interference as measured by the Simon effect. The results speak to the possible mechanism that mindfulness meditation may act to influence cognitive functioning.
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4:00-6:00 PM (3317)

Automatically Controlled: Task Irrelevance Fully Cancels Otherwise Automatic Imitation. EITAN HEMED, ILYA MARK-TAVGER, URI HERTZ, SHIREL BAKBANI-ELKAYAM, and BARUCH EITAM, *University of Haifa* (Sponsored by Baruch Eitam) – Automatic Imitation refers to the unintentional mimicking observed actions and is taken by some as evidence that an unselective (imitate all) "mirror-neuron" system exists in humans. We tested whether automatic imitation depends on the task-relevance of the to-be-imitated movements. Replicating previous results, we find that movements that are part of the participant's task-set unintentionally influence responding. Crucially we also find that task-irrelevant movements are not imitated, automatically or otherwise. Computational modelling shows that imitation depends on the observed movement inducing changes in the rate of evidence accumulation rather than changes in response conservativeness and that no such change occurs when seeing task-irrelevant movements. We conclude that automatic imitation depends on the activation of action representations, which in turn depends on their task relevance. In other words, in this task at least, imitation is controlled notwithstanding it being unintentional.
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4:00-6:00 PM (3318)

Level of Construal Influences Visual Acuity of Mental Images. NATALIE WYER, *University of East Anglia* – Construal Level (whether an event is interpreted at an abstract "high" level or a more concrete "low" level) has been shown to have effects on visual and attentional processing. As of yet, there has been no satisfactory account of how and why construal manipulations—which activate different types of semantic knowledge—influence perceptual processing. Two experiments tested the hypothesis that construal level manipulations have a direct impact on the mental imagery used to represent events. In Experiment 1 (pre-registered, N=90) participants produced mental images of recalled past or imagined future events that varied in their psychological distance (a well-established manipulation linked to construal level). Participants reported that images of recent past or near future events were significantly higher in visual acuity (sharp in focus, bright and clear etc) whereas more distant past or future events were imagined with low acuity (blurry, dull, and hazy, etc). Experiment 2 replicated these effects using a different manipulation of construal in which participants imagined how or why they would interact with various objects. These experiments highlighting a potential mechanism linking construal with visual processing outcomes.
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4:00-6:00 PM (3319)

Pay Attention to Me: Task-Unrelated Thought During Computer-Mediated Conversations. ALEXANDER COLBY, IAN GLISER, LAURA ALLEN, ANDREW KUN, and CAITLIN MILLS, *University of New Hampshire* – Task-unrelated thought (TUT) is common in our daily lives, but we know little about its occurrence during conversations. The current study explored how frequently our minds go off-task during computer-mediated text conversations and whether perceived group membership impacts this rate. Participants (N=126) were assigned to an arbitrary ingroup, outgroup, or control condition using a sham dot estimation task. Each participant chatted with another participant for ten-minutes while self-reporting TUT; participants never saw each other and did not know one another's identities. Participants self-coded topic shifts after the conversation ended. On average, participants reported TUT about once every two minutes. Consistent with predictions, ingroup participants reported TUT less than those who received no ingroup identity. Higher rates of TUT were also related to more negative valence and more frequent topic shifts across all three conditions. These results suggest that TUT is incredibly frequent during computer-mediated conversation but conversing with those we perceive to be similar can reduce its occurrence.
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4:00-6:00 PM (3320)

Intentional Binding: An Unintentional Artifact? LAURA SAAD, JULIEN MUSOLINO, and PERNILLE HEMMER, *Rutgers University - New Brunswick* (Sponsored by Pernille Hemmer) – Intentional Binding (IB) is typically regarded as an implicit measure of the sense of agency (SoA) itself a core aspect of our mental lives. Given the fundamental nature of SoA, one would expect IB to be present at the individual level. To find out, we compared aggregate vs. individual data in an experimental study and in a publicly available dataset. Aggregate results replicated the expected directionality for action and outcome binding in both studies. However, individual-level analyses revealed that almost half of the participants in our study (N=15/35) and half of the participants in the public dataset (N=10/20) had mean binding values for either action or outcome that were in the opposite of the expected direction, in line with results from involuntary action conditions. These findings raise serious methodological and theoretical concerns for the study of IB. More importantly, they call into question the very nature of the phenomenon itself.
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4:00-6:00 PM (3321)

Effect of Length of Mindfulness Practice—A Randomized Controlled Experiment. SARAH STROHMAIER, FERGAL JONES, and JAMES CANE, *Canterbury Christ Church University* (Sponsored by James Cane) – Mindfulness-based programs vary in length of mindfulness practices included. It is expected that longer practice leads to greater psychological benefits. However, evidence for such dose-response effects is mixed. This study sought to clarify which length of mindfulness practice led to greater benefits using an experimental design. Participants were randomized to either four 20-minute mindfulness practices, four 5-minute mindfulness practices or audiobook control. All sessions were in-person over two-weeks and lasted the same total length. Participants refrained from formal mindfulness practice outside sessions. Both practices significantly improved trait mindfulness and distress compared to controls. Unexpectedly, short practice had a significantly greater effect on trait mindfulness ($d=2.17; p<.001$) and stress ($d=-1.18; p<.01$) than long practice. Even relatively small amounts of mindfulness practice can be beneficial. Short practices may be less challenging for novice practitioners when there is minimal teacher contact. Further research could examine these

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dose-response effects with experienced practitioners or prolonged teacher involvement.
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4:00-6:00 PM (3322)

No Psychological Influence in the Magician's Force. GEOFF COLE, *University of Essex* – Forcing is a common procedure employed in stage magic in which the performer asks a spectator to choose a random stimulus. Rather than receive the stimulus chosen by themselves, the spectator receives a stimulus covertly forced onto them by the magician. The technique has been employed as a method by a number of experimental psychologists concerned with, for instance, social influence, priming, and awareness. In the present paper I will argue that forcing researchers, when framing and describing the phenomenon, have exaggerated what magicians typically achieve with the technique. Specifically, forcing is mostly defined and described as the effect in which magicians "influence" or "manipulate" choices made by spectators. This misrepresents the phenomenon. An analysis of 677 forces shows that in the vast majority the magician does not attempt to manipulate choice. The result of this exaggeration is that experimental psychologists will be led to think that the technique has more to offer the field of social influence and priming than it actually does.
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4:00-6:00 PM (3323)

When More Is Less: Adding Action Effects Can Reduce Dual-Task Costs. JONATHAN SCHACHERER and ELIOT HAZELTINE, *University of Iowa* (Sponsored by Eliot Hazeltine) – Dual-task costs are theorized to stem from conflict between the central operations for the two tasks. One aspect of the tasks contributing to this conflict is the action effects that follow the responses. At present, there are two accounts for how action effects may affect dual-task costs. The first suggests that central operations process and monitor action effects, and only once this monitoring has finished can a second response be selected. The second suggests that action effects are integrated into the representations used by central operations, and interference arises when the central operations for the two tasks interact. To test these competing accounts, we used a dual-task paradigm in which a response for one of the tasks was or was not followed by a manipulated auditory action effect. We demonstrated that the addition of an action effect reduced dual-task costs in a bimanual task, allowing central operations to select responses with less interference, consistent with the representation account. We also assessed how the relationship between task pairings affects dual-task costs. These results add to a growing body of work illustrating how central operations act on representations of post-response action effects.
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4:00-6:00 PM (3324)

Investigating Attentional Theories of Multiple Object Tracking Using Sparse Displays. MIRANDA JOHNSON, JOHN PALMER, and GEOFFREY BOYNTON, *University of Washington* (Sponsored by John Palmer) – Our ability to track moving objects decreases with the number of objects. We studied this effect using the dual-task paradigm with sparse displays to distinguish two models of attention. In the all-or-none serial model, participants can track only one object, and performance is at chance for a second object. In the fixed-capacity parallel model, a representation of the stimulus is formed through sampling, and more targets means each target is sampled less. Performance was compared for one (single task) vs. two (dual tasks) targets moving in separate regions of the visual field. The two models predict differing magnitudes of the dual-task deficit. Additionally, the all-or-none serial model differs in predicting a negative correlation between dual-task responses. Results show a dual-task deficit that is consistent with the all-or-none serial model, but no negative correlation. We discuss alternative models that can account for our results.
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4:00-6:00 PM (3325)

Audiovisual Vigilance Performance Declines Faster than Auditory and Visual Vigilance. BRIDGET WILSON, *Leidos,* CHAD PELTIER, *Naval Submarine Medical Research Laboratory,* MATTHEW DALEY, *Leidos,* JUSTIN HANDY, *Naval Submarine Medical Research Laboratory* – Vigilance declines over time, resulting in missed targets and/or slowed reaction times. Vigilance decrements have been investigated extensively for unisensory visual and auditory tasks, but less so for multisensory tasks. We asked participants to respond to infrequent targets intermixed with non-targets in three conditions: visual, auditory, and audiovisual. The audiovisual condition presented either a visual or auditory stimulus at random; they were not presented concurrently. Results indicate a significant interaction between condition and time $F(6, 309)=3.01$, $p=.02$, $\eta^2=.06$., such that audiovisual target detection accuracy declines more over time relative to the unisensory tasks. There were no systematic changes in reaction time, suggesting that the decrease in accuracy was not due to a speed-accuracy trade-off. We conclude that monitoring for targets in two competing modalities may be more fatiguing and results in a greater vigilance decrement than unisensory vigilance.
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4:00-6:00 PM (3326)

The Attentional Boost Effect Enhances Both Perceptual and Gist Processing of Visual Objects. CAITLIN SISK and YUHONG JIANG, *University of Minnesota, Twin Cities* (Sponsored by Yuhong Jiang) – Contrary to dual-task competition theories, encoding of background stimuli paradoxically improves at the moment in which a response is required in a concurrent continuous detection task, demonstrating an Attentional Boost Effect (ABE). While memory for perceptual context (e.g., ink color) of background words was not affected by concurrent target detection, researchers have observed enhanced relational memory (e.g., memory for irrelevant facial features). Thus, it remains unclear whether the ABE reflects enhanced perceptual encoding, enhanced gist processing, or both. To compare perceptual and gist memory in an ABE paradigm, we presented images of objects as the background stimuli and used a four-alternative forced choice test. This included the target, two category foils, and one exemplar foil, allowing us to independently measure category memory and exemplar memory. The results showed a significant boost for both category memory and exemplar memory, suggesting that the ABE enhances both perceptual and conceptual memory.
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4:00-6:00 PM (3327)

Aging and the Attentional Boost Effect. BRYANNA MACKEY and STEPHANIE CROCCO, *Skidmore College,* ELLIOTT JARDIN, *Miami University* – The Attentional Boost Effect (ABE) refers to the counter-intuitive finding that recognition memory may be enhanced by a divided attention target-monitoring task during encoding. While the ABE has been replicated several times in younger adults (Swallow & Jiang, 2010, Mulligan et al., 2014), conflicting results for its existence have emerged in older adults (Bechi Gabrielli et al., 2018; Prull et al., 2019). The present study aims to reconcile previous findings and proposes the significance of affect. Preliminary results reveal (n=13) a marginally significant ABE for older adults. Despite a main effect of Affect, the ABE and Affect do not significantly interact. These preliminary results suggest that the ABE is robust to manipulations of emotional valance in older adults.

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4:00-6:00 PM (3328)

Does Doodling Impact Our Ability to Attend Information? SUSAN RUPPEL and SETH MCELVEEN, *University of South Carolina Upstate* – Previous research has shown that doodling has a positive effect on attention. One area of concern with these studies, however, is in how they define doodling. These studies used the term "doodling" when they had their participants shade in a predetermined shape. This then raised the question, would actual doodling result in the same positive effects as shading? The current study tried to answer this question by having participants either shade in predetermined shapes or doodle participant-generated images while engaging in a task. It was hypothesized that of the two different presentation conditions, participants would retain more information for the audio only condition than they would with the visual only condition. It was further hypothesized that the group who were shading predetermined shapes would also retain more information than the group who were doodling, because shading does not require as much attention or cognitive resources. With doodling you must first decide what to draw and then concentrate on bringing that image to reality, while shading does not require much attention, leaving cognitive resources left over to focus on new information. Results were partially consistent with our hypotheses.

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4:00-6:00 PM (3329)

Anticipatory Heart Rate as a Predictor of Delayed Match-to-Sample Problem Solution. D. WAYNE MITCHELL, CASSANDRA KEMMEL, MOLLY SMITH, and AUTUMN HOUSER, *Missouri State University* – The relationship between Anticipatory Heart Rate (AHR) and Response Latency (RL) was examined on a Delay Match-To-Sample (DMTS) task. It has been demonstrated that the direction (acceleration or deceleration) and magnitude of HR change represent specific allocation of attentional resources; that is, HR deceleration is associated primarily with stimulus encoding and readiness to respond, whereas HR acceleration corresponds to mental effort. The purpose of this study was: (1) to establish AHR (changes in HR between Sample stimulus offset and Test stimuli onset) as an indicator of changes in allocation of attention while solving recognition memory problems, and (2) to demonstrate that AHR is related to working memory (RL). The degree of AHR profile fit was correlated negatively with RL. The theoretical AHR profile begins with effortful attention allocated to encoding and storing of stimulus information (evident by AHR acceleration) followed by a decrease in AHR (indicating that stimulus information has been stored successfully into memory and a readiness to respond). The observed HR profiles in this study lend support for the authors' AHR model and provides evidence that HR is a valid indicator of individual processing differences.

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4:00-6:00 PM (3330)

Triarchic Psychopathy and Moral Judgments. MARIOLA PARUZEL-CZACHURA and ZUZANNA FARNY, *University of Silesia in Katowice,* BERTRAM GAWRONSKI and DILLON LUKE, *University of Texas at Austin* – Research on moral dilemma judgment implies that higher levels of psychopathy are related to a preference for utilitarian over deontological judgments (e.g., Bartels & Pizarro, 2011; Kahane et al., 2014; Patil, 2015). The dominant paradigm is based on the famous trolley problem (Foot, 1967; Thompson,1985) in which a runaway trolley is approaching a group of five workers who would be killed by the trolley, but there is a possibility to switch the level and kill one person instead of five. The CNI model allows to quantify sensitivity to consequence (C), sensitivity to moral norms (N) and the general preference for inaction versus action, irrespective of consequence and norms (I) in response to moral dilemmas (e.g., Gawronski, et.al., 2017). The latest research based on CNI model and LSPR (Levenson et.al, 1995) showed that high psychopathy correlates with low sensitivity to consequences in participants' personal and societal judgments (Gawronski & Luke, 2020). The aim of the current presentation is to show results of the study (N=500) with the aim of answering the question of how individual differences in psychopathy (measured by TriPM; Patrick, et al., 2009) are connected with C, N, and I (Gawronski et. al., 2020).

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4:00-6:00 PM (3331)

Attention and Creativity: An Individual Differences Approach. BEATRICE RUIZ, JEFFERY MOCK, and EDWARD GOLOB, *University of Texas at San Antonio* (Sponsored by Edward Golob) – Convergent evidence from the personality, intelligence and cognitive neuroscience literatures implicates attention as a basic process in creativity, but little is known about specific attentional mechanisms. We hypothesized that individual differences in the ability to divide and selectively focus attention would positively correlate to creative achievement and creative problem solving. Participants were young adults (n=98). Creativity was assessed with the Creative Achievement Questionnaire and a creative problem-solving test. Attention was quantified using consonant-vowel (CV) dichotic listening under divided (attend both ears) and focused (attend left or right ear) conditions. Measures included laterality index of left vs. right ear bias, and reports of non-presented CVs (intrusions), indicating attention lapses. Intrusions averaged across all conditions negatively correlated to creative achievement (r=.-.31, p=.002) and problem solving (r=-.40, p<.001). Laterality indices in focused attention conditions had trend-level associations with creativity measures (r's=.16 and .17; p's<.12). The strong associations between intrusions and both creativity measures may quantify the negative effects of attentional lapses on creativity.

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4:00-6:00 PM (3332)

Engagement of Attention by Nature Improves Creative Problem Solving. BROOKE CHARBONNEAU, *Montana State University,* ALEXANDRE MAROIS, *Université Laval,* MAX MILLSPAUGH and THOMAS POEHLMAN, *University of Colorado, Denver,* CHAD MOFFITT, *University of Utah,* ANDREW SZOLOSI, *Ohio University,* JASON WATSON, *University of Colorado, Denver* – Mystery in nature may elicit fascination, thereby engaging or even replenishing attention, relieving mental fatigue, and promoting better cognitive performance. In the current lab study, half of participants were primed with two images of nature for 20 seconds (10 seconds/image), and the other half for 2 seconds (1 second/image). Within-subjects, the images were either high or low in mystery according to attention restoration theory. Following the primes, participants completed a creative problem solving task, Remote Associates, which partly relies on attention to retrieve convergent solutions. Specifically, participants were shown three words (e.g., opera, hand, dish) and asked to generate a fourth, unifying associate (soap). When primed with high mystery images, regardless of presentation duration, participants were faster and more accurate to generate solutions, suggesting exposure to nature can improve creativity. Implications of these results for attention restoration theory will be discussed, including how rapidly attention can be engaged by nature.
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4:00-6:00 PM (3333)

Here's Looking at You: Social Attention Across Task Goals and Settings. YANFEI SONG, HUDA AL-SHAMALI, AMARA HUSSAIN, and DANA HAYWARD, *University of Alberta* (Sponsored by Dana Hayward) – Various forms of technology are used for social connection, but it remains unclear whether attention manifests similarly across technology-supported and face-to-face communication. We manipulated participants' task goals (structured/unstructured) and task settings (computer/face-to-face) while employing eye tracking technology. All participants completed a computer task to provide a baseline lab measure of social attention (structured computer), participated in a virtual conversation (unstructured computer), and participated in a face-to-face conversation (unstructured face-to-face). We found typical social attention in the baseline task and high proportions of looking at the partners' eyes/head in both conversations. Further, we found a negative correlation between gaze to eyes/head in the video conversation and baseline social attention, suggesting attention differs across tasks. Finally, although gaze behaviour was similar for both conversation settings—highlighting a common feature of simple conversation—our preliminary findings indicate no correlation in gaze to eyes/head across the two settings. Together, our results indicate that overt gaze behaviours change depending on our specific goals and context.
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4:00-6:00 PM (3334)

Returning to the Effects of Inhibition of Return on Lexical Decisions. KELSEY MACDONALD, KYLE LEVESQUE, BRETT FELTMATE, RAYMOND KLEIN, and RALPH REDDEN, *Dalhousie University* (Sponsored by Raymond Klein) – Inhibition of return (IOR), an inhibitory aftereffect of visuospatial orienting, typically results in slower responding to targets presented in recently attended locations. Although IOR has been ubiquitously observed in simple tasks, the extent to which it influences more complex tasks, such as lexical decisions (Chasteen & Pratt, 1999), is largely unexplored. There are two forms of IOR: an input form operating to reduce the quality of information, and an output form operating to bias responding. With careful monitoring of eye movements, our first experiment sought to examine how these two forms (generated with and without saccades to the cue) might affect lexical decisions. IOR was not generated in either condition. Our second experiment is a direct, preregistered (web-based) replication of Chasteen and Pratt (1999). Here we replicated their finding of IOR slowing lexical decisions but failed to observe the interaction with word frequency. Implications of these patterns are discussed.
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4:00-6:00 PM (3335)

The Effect of Mind Wandering Probes on Mind Wandering. MAREN GREVE, CHRISTOPHER WAS, and R. BENJAMIN HOLLIS, *Kent State University* (Sponsored by Christopher Was) – The purpose of this study was to examine the use of probes as a measure of mind wandering. Probes involve having participants stop at varying points during a task and rate the degree to which they were attending to the task. In many mind wandering experiments, participants are given multiple probes in order to assess the amount of mind wandering that occurs over the course of the entire task. This method relies on catching students in the act of mind wandering. However, it is not clear whether responding to a probe may lead participants to develop an expectation of future probes, perhaps causing them to mind wander about the possibility of upcoming probes itself. This study required participants to complete a working memory task (OSPAN) and respond to mind wandering probes throughout. Results indicated a negative correlation between the degree of mind wandering reported on the final probe and performance on the working memory task. The number of mind wandering probes also influenced the degree to which participants reported mind wandering on the last probe during the OSPAN task.
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4:00-6:00 PM (3336)

Affect But Not Arousal Influences the Spatial and Temporal Resolution of Visual Processing. LISA JEFFERIES, *Griffith University* – Positive moods are thought to broaden the scope or spatial spread of attentional selection whereas negative moods are thought to narrow the scope (Fredrickson, 2001; Rowe et al., 2007). Changing the scope of attention affects several aspects of visual perception, including the resolution of visual processing (Goodhew et al., 2016). Given this, mood may modulate the spatial and temporal resolution of visual processing. The present study tested whether mood—as defined by the intersection of two orthogonal dimensions, affect and arousal—modulates the spatial and temporal resolution of visual processing. A mood-induction procedure employing music and pictures was used to induce one of four moods in 141 participants: happy (positive affect, high arousal), calm (positive affect, low arousal), anxious (negative affect, high arousal), or sad (negative affect, low arousal). After mood induction, participants completed both a Landolt-square task and a two-flash fusion task to assess the spatial and temporal resolution of visual processing, respectively. The results revealed

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that affect influenced the spatial but not the temporal resolution of visual processing; arousal affected neither spatial nor temporal resolution.
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4:00-6:00 PM (3337)

Eying the Eyes of Predators and Prey: A Test of Saliency. JESSICA YORZINSKI, *Texas A&M University,* BRADLEY KARSTADT, *Simon Fraser University,* NICOLA ANDERSON, *University of British Columbia,* ELINA BIRMINGHAM, *Simon Fraser University* (Presented by Bradley Karstadt) – Humans preferentially fixate the eyes of people, and this preference is not driven by visual saliency of the eye region (Birmingham, Bischof, & Kingstone, 2009). The present study examined whether humans likewise preferentially fixate the eyes of nonhuman animals—predators (lions) and prey (impalas)—exhibiting either direct or averted gaze. We found that human participants preferentially fixated the eyes of the animals, especially when viewing lions exhibiting direct gaze. Visual saliency of the eye regions of both animals was low, particularly for lions. The results suggest that participants' fixations are largely driven by a default tendency to look towards the eyes for scene comprehension (including possible threat evaluation) rather than visual saliency.
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4:00-6:00 PM (3338)

Visual Attention During Seeing for Speaking in Healthy Aging. GWENDOLYN REHRIG, TAYLOR HAYES, JOHN HENDERSON, and FERNANDA FERREIRA, *University of California, Davis* – As we age, we accumulate a wealth of information, but cognitive processes become slower and less efficient. There is mixed evidence on whether world knowledge compensates for age-related cognitive decline (Umanath & Marsh, 2014). We investigated whether older adults fixate more meaningful scene locations than young adults. Young (N=30) and older (N=30, aged 66-82) adults described scenes while eye movements and descriptions were recorded. We used a logistic mixed-effects model to determine whether fixated scene locations differed in meaning, salience, and center distance from locations that were not fixated, and whether those properties differed for locations young and older adults' fixated. Older adults showed less center bias than young adults. Although meaning predicted fixated locations well overall, the locations older adults fixated were less meaningful than those that young adults fixated, suggesting older adults' visual attention is less sensitive to meaning than young adults, despite extensive experience with scenes.
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4:00-6:00 PM (3339)

Visual and Verbal Working Memory Loads Interfere with Scene-Viewing. DEBORAH CRONIN, CANDACE PEACOCK, and JOHN HENDERSON, *University of California, Davis* – Working memory is thought to be divided into distinct visual and verbal subsystems. Studies of visual working memory frequently use verbal working memory tasks as control conditions or use articulatory suppression to ensure visual load is not transferred to verbal working memory. Using these verbal tasks relies on the assumption that a verbal working memory load will not interfere with the same processes as visual working memory. In the present study, participants maintained a visual or verbal working memory load as they simultaneously viewed scenes while their eye movements were recorded. Because saccadic eye movements and visual working memory are closely linked, we anticipated the visual load would interfere with scene-viewing (and vice versa), while the verbal load would not. Surprisingly, both visual and verbal memory loads interfered with scene-viewing behavior, while eye movements during scene-viewing did not significantly interfere with performance on either memory task. These results have implications for the design of experimental studies and challenge our understanding of the relationship between visual working memory and saccadic eye movements. This work was supported by the NEI of the NIH, award number R01EY027792.
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4:00-6:00 PM (3340)

A Neurocognitive Psychometrics Account of Executive Attention. ANNA-LENA SCHUBERT, CHRISTOPH LÖFFLER, FARINA HÖPFNER, and DIRK HAGEMANN, *Heidelberg University* – Individual differences in executive attention have been suggested to give rise to individual differences in higher-order cognitive abilities. However, due to problems in the measurement of attentional-control processes, associations between executive attention and cognitive abilities are often small and inconsistent. In the present study, 149 participants completed the Eriksen Flanker task while their EEG was recorded. We combined model parameters from the dual-stage two-phase model, a mathematical model of executive attention, with neural correlates of conflict processing in a latent neurocognitive psychometrics account to improve the measurement of executive attention. Times predicted by the model for stimulus- and response-selection processing stages were substantially related to the latencies of corresponding components in the lateralized readiness potential. Moreover, individuals with higher cognitive abilities showed greater advantages during response-selection than during stimulus-processing stages. Taken together, our results demonstrate that individual differences in executive attention can be more validly and reliably measured in a neurocognitive psychometrics framework.
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4:00-6:00 PM (3341)

Computational Model of the Human Salience System. GEORGE SPERLING and PENG SUN, *University of California, Irvine* – An important brain process is a salience map, a representation of the relative importance (salience) of the locations of visual space. It is needed to prioritize eye movements and attention, to compute the center ("centroid") of a cluster of items, to compute higher-order motion, and more. Two critical properties of a salience map are: (1) Only salience is represented, the features that produced the salience are represented elsewhere, not within the map; (2) The representation of space is sufficiently accurate to enable subsequent computations that rely on Euclidean distance. We propose a salience architecture in which visual stimulus elements are segregated into groups, the contents of each group are submitted to a salience map, and a computation, e.g., a centroid, is performed on the map contents. After viewing a brief flash of 24 dots of 3 different colors, randomly interleaved, our subjects can accurately report all 3 color-centroids. A single salience map cannot discriminate dots of different colors. In terms of the model, concurrently computing three centroids requires not just one, as is commonly believed, but at least three salience

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maps, each with its own initial grouping process and subsequent centroid computation.
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4:00-6:00 PM (3342)

Self, Reflections, and the Brain: A Study of the Default Mode Network Using Near-Infrared Spectroscopy. JEFFREY TOTH, KAREN DANIELS, and JOHN HOLSTEN, *University of North Carolina at Wilmington* – A fascinating issue in cognitive neuroscience concerns the neural basis of self. A number of recent studies have shown that self-related processing activates the anterior medial prefrontal cortex (amPFC). This region is also considered to be part of the brain's default mode network (DMN) which is active during various forms of internally directed thought. The current study explored whether near-infrared spectroscopy (NIRS) of the amPFC could detect processing consistent with DMN function (internal vs external attentional focus) as well as self-related processing (judgments of self vs other, completed with or without a mirror present). Results (changes in oxygenated hemoglobin) showed large modulations of amPFC consistent with DMN function (internal > external) but smaller differences in self-related processing. Additional analyses examined relations among brain activations, task performance (RTs), and measures of self-consciousness. Overall, the data suggest that NIRS can be used to explore the DMN and the neural basis of self.
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4:00-6:00 PM (3343)

Changes in Attentional Engagement During Narrative Comprehension. HAYOUNG SONG, *University of Chicago,* EMILY FINN, *Dartmouth College,* MONICA ROSENBERG, *University of Chicago* (Sponsored by Monica Rosenberg) – As we comprehend narratives, attentional engagement fluctuates over time (Dmochowski et al., 2012). Here, we characterize cognitive processes that comprise subjective engagement during narratives, show how engagement is reflected in brain dynamics, and elucidate the consequences of engagement for memory. In behavioral studies, we estimated changes in subjective engagement during comprehension of two narratives. Engagement was synchronized across individuals perceiving the same story. FMRI data collected as people watched (Chen et al., 2017) or listened to (Finn et al., 2018) these stories revealed that default mode network activity was more synchronized across individuals when people were, on average, more engaged. Dynamic functional connectivity (FC) predicted engagement using within-dataset cross-validation, and predictions also generalized across datasets. The same FC that predicted engagement predicted event recall, suggesting that engagement during encoding has consequences for memory. Finally, corroborating theorized relationships between sustained attention and engagement, FCs that predict sustained attention during visual tasks (Rosenberg et al., 2016) predicted engagement during the story delivered in visual modality.
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4:00-6:00 PM (3344)

High Degree Accounts for Loss of Betweenness Centrality Hubs in Alzheimer's Disease: A Multimodal Hub Definition Approach. CHRISTIAN GREEN, ROBERT LYDAY, and PAUL LAURIENTI, *Wake Forest University School of Medicine,* DALE DAGENBACH, *Wake Forest University* – Studies of functional connectivity networks from individuals with Alzheimer's disease (AD) have found highly connected hub nodes to be particularly vulnerable to degradation. However, these studies have used different network centrality metrics, including degree (Ki), betweenness centrality (BC), and participation coefficient (PC), to classify hubs. Hubs identified by different centrality metrics likely have different characteristics and play different roles within a network. The present research addressed this by identifying hubs using a multimodal approach based on either degree, betweenness centrality, or by both. A permutation framework was then used to compare the spatial distributions of each classification of hub between cognitively normal (CN) individuals and those with AD. Nodes which were classified as hubs based on Ki or both Ki and BC showed significant differences in spatial overlap between AD and CN groups. However, nodes that were only identified as hubs based on BC showed no significant differences. These results suggest that studies which classify hubs by their BC and find significant differences in AD may actually be detecting changes that are better explained by other centrality metrics such as Ki.
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4:00-6:00 PM (3345)

A Computational Model of the Interaction of Neurobiological Circuits for Category Learning. LI XIN LIM and SÉBASTIEN HÉLIE, *Purdue University* (Sponsored by Sébastien Hélie) – For years, attention has been drawn to explain how category learning is mediated by multiple learning systems psychologically and biologically. However, the interaction between learning systems is assumed but rarely the theoretical focus. We propose a neurobiological circuit that describes the interaction and switching between an explicit hypothesis-testing system and an implicit procedural system. The model focus on the switching mechanism and incorporates the Izhikevich firing model to simulate neuronal activity from the hyperdirect pathway of the cortico-basal ganglia network. The hyperdirect pathway gates the transmission of the procedural learning system's response signal to the premotor units for action selection. We fitted the model to data from two behavioral experiments that tested participants for individual differences in their switching capabilities in category learning tasks. The results revealed the poor switching capabilities association to lower tonic dopamine level, higher susceptibility to proactive interference and poor strategy searching ability.
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4:00-6:00 PM (3346)

Warning Prior to Misinformation Exposure Modulates Frontal Activity and Improves Subsequent Memory Performance. JESSICA KARANIAN, *Fairfield University,* NATHANIEL RABB, *Tufts University & Brown University,* ALIA WULFF, MCKINZEY TORRANCE, AYANNA THOMAS, and ELIZABETH RACE, *Tufts University* – We recently demonstrated that warning participants about the threat of misinformation—before or after exposure to it—reduced memory errors and biased sensory reinstatement on a later memory test. These results revealed that warnings can protect memory from misinformation by biasing reconstructive processes at the time of retrieval. Using fMRI, we investigated whether warning participants prior to misinformation exposure also influences the initial encoding of misinformation into

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memory. After watching a crime video, participants were presented with an auditory retelling of the crime that included some misleading information. Before listening to this narrative, some participants were warned about the reliability of its source (pre-warned). Compared to unwarned participants, pre-warned participants displayed greater frontal activity (BAs 44, 6, 10) while listening to the narrative. Frontal activity (BAs 44, 6) during encoding of misleading information, in particular, positively correlated with performance on misleading trials during a later memory test. This suggests that warning-induced modulation of frontal regions during encoding of misleading information contributes to the memory benefit of warning observed on the final test.
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4:00-6:00 PM (3347)

Electrophysiological Evidence that the Fidelity of the Focus of Attention Does Not Underlie the Primacy Effect for Spatial Source Memory. DAVID SUTTERER, GEOFFREY WOODMAN, and SEAN POLYN, *Vanderbilt University* – Attention is thought to play an important role in producing the primacy effect (Sederberg et al., 2006), although how attention enhances primacy source memory remains an open question. Recent work has shown that patterns of EEG alpha-band activity can be used to track the focus of spatial attention. In the present study, we measured alpha-band activity during an immediate free recall task where observers memorized short lists of words presented in unique locations around fixation. This allowed us to test predictions from models of memory that the operation of attention during memory encoding underlies the primacy effect. Although we found that source memory was superior for the location of the first word in each list relative to middle positions, the fidelity of the focus of spatial attention derived from subjects' EEG for these first items was not enhanced relative to mid list positions, suggesting that enhanced spatial attention does not contribute to the behavioral primacy effect that we observed.
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4:00-6:00 PM (3348)

Pupil Dilation Reflects Objective Explicit Memory While Reaction Time Reflects Implicit Memory in Visual Old/New Recognition. K. KIRBY DOSHIER, KARA STUART, STEPHON PRIMOUS II, and ANTHONY RYALS, *University of North Texas* – Recent studies have reported pupil dilation occurring for learned items remembered as old (hits > misses or correct rejections), while others have reported that pupil dilation occurs for items subjectively experienced as old, even if they are not (false alarms > correct rejections, misses). We aimed to replicate both types of old/new effects in a traditional recognition paradigm. Fifty-four participants studied lists of 12 objects, followed by a retrieval phase with 24 objects (50% old). This was repeated across four study-test blocks, with eye movements recorded during retrieval. Results indicated a replication of the objective pupil old/new effect, which was also reflected through lower fixation numbers for hits vs. misses and correct rejections, and a pattern of faster responding for hits vs. false alarms and misses. We found no evidence of a subjective pupillary old/new effect. Interestingly, response times were slower for misses vs. correct rejections, which we argue may reflect implicit memory, specifically partial retrieval of oldness.
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4:00-6:00 PM (3349)

Increased Deontological Responses in Medial Temporal Lobe (MTL) Amnesia: Evidence for Hippocampal Mediation in Moral Decision Making. RENEE HUNSBERGER, *Villanova University* (Sponsored by Irene Kan) – Growing evidence suggests that the hippocampus plays a role in various forms of decision making, but studies examining moral decision making in MTL patients have yielded inconsistent results. We examined whether discrepancies across studies in how patients respond to emotionally conflicting scenarios (moral dilemmas) might stem from a difference in question framing that affects the psychological distance of the aversive action. Compared to control participants, patients with damage limited to the hippocampus endorsed the aversive action significantly less frequently (i.e., gave more deontological responses), regardless of question framing; they also rated the dilemmas as more emotionally intense. This pattern was not present in a patient whose lesions extended to the amygdala bilaterally. These findings suggest that the hippocampus is important during moral decisions for integrating a strong initial aversion to causing harm with the future beneficial outcome. Discrepant results across prior studies may reflect different lesion extent.
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