

Incorporating Evidence-based Approaches in Treating Processing Speed and Memory Deficits in MS into the Clinic

Nancy B. Moore, M.A.

Research Manager of Neuroscience and Neuropsychology
and Traumatic Brain Injury Research

Kessler Foundation



Disclosures

The author has no financial disclosures or conflict of interest



What can you do in your practice or clinic using evidence based techniques?



Outline

- Assessing deficits
- Team approach
- Nuts and bolts of evidence based treatment
- Clinic practicality



Outline

- Assessing deficits
- Team approach
- Nuts and bolts of evidence based treatment
- Clinic practicality



Assessing Deficits

- Identify deficits that interfere with the person's ability to function in daily life
- Ensure that the client is performing activities of daily living independently and safely.
- Ensure that the client's treatment is functionally based and holistic in scope.



Assessing Deficits

- Identify past and current level of functioning
 - Self Care
 - Driving
 - Financial Management
 - Medication Management
 - Meal Preparation
 - Work
 - Leisure/hobbies
- Estimate prognosis and rehabilitation potential



Assessing Deficits

- Assess disorders of:
 - Visual processing
 - Attention
 - Memory
 - Executive function skills
 - Psychosocial
 - Behavioral
 - Awareness issues

BICAMS or MACFIMS



Client Interview:

Examples of questions-

- What cognitive changes [changes in thinking] have you noticed since your diagnosis? What changes [in thinking] have your family noticed?
 - Conduct an interview and develop the client's story- lifestyle, life stage, health status, have the client describe their life in terms of a chapter in a book
 - Explore client's support system -connections with neighbors, with the community
-



Client Interview:

- Self report may not be an accurate assessment of deficits
- Include significant other or caregiver in the interview process



Client Interview:

Provide family education & training

- Interventions help but need to be utilized with family support



Outline

- Assessing deficits
- **Team approach**
- Nuts and bolts of evidence based treatment
- Clinic practicality



Team Approach

- Collaborate with an interdisciplinary team to ensure that all important issues have been identified.
- Give client/family feedback on assessment results using basic language and giving examples of how deficits may impact everyday life situations
- Prioritize problem areas and discuss areas of strength
- Integrate the client's priorities and goals into the treatment plan.
- Create Goals: Short term & long term goals



Team Approach

- Clients provided treatment in both an individual and small group format.
- Group members provide support to one another and share ideas, strategies and advice with peers.
- Individual sessions include training in self generated memory strategies for encoding of new information, generalization of compensatory strategies and energy conservation techniques.



Team Approach

Cognitive Rehabilitation Approach

- Incorporate client and family goals.
- Identify patient's strengths and deficits
- Identify strategies that might address the client's challenges, and be easily applied to real life situations
- Improve functional attention through group treatment by managing external and internal distractions.



Moving toward treatment

- Where are you?
 - Identified the big picture through interviewing
 - Identified strengths and weaknesses for the client
 - Identified strategies that might be effective
- Next step
 - Team decides on order of treatment if there is more than one deficit to treat
 - Begin treatment



Outline

- Assessing deficits
- Team approach
- Nuts and bolts of evidence based treatment
 - Modified Story Memory Technique (mSMT)
 - Stylistic Memory Enhancement (SME)
 - Speed of Processing Training (SPT)
- Clinic practicality



Modified Story Memory Technique (mSMT)

Class 1 Evidence

Chiaravalloti, N.D., DeLuca, J., Moore, N.B., Ricker, J.H. (2005). Treating Learning Impairments Improves Memory Performance in Multiple Sclerosis: A Randomized Clinical Trial. *Multiple Sclerosis*, 11, 58-68.

Chiaravalloti, N., Moore, N.B., Nickelshpur, O., DeLuca, J. (2013). A Randomized Clinical Trial to Treat Learning Impairment in Multiple Sclerosis: The MEMREHAB trial. *Neurology*, 10;81(24):2066-72. doi: 10.1212/01.wnl.0000437295.97946.a8. Epub 2013 Nov 8.



mSMT

Decades of research shows that using Context and Imagery significantly improves new learning and memory

- Context
 - The parts of a writing that surround a word or passage that can throw light on its meaning
- Imagery
 - Taking a group of words and converting them to pictures



mSMT

- 10 sessions
 - 2x per week for 5 weeks
 - 45-60 minutes in duration
- Two skills taught
 - Imagery (sessions 1-4)
 - Context (sessions 5-8)
- Generalization
 - How you use skills in daily life (sessions 9 and 10)



mSMT

Session 1-4 Imagery

Instructions

- Each story contains Capitalized words to remember
- Create mental images of each story line
- Picture the Characters, setting, etc.

*the context is provided- teaching imagery



Story Example skill: imagery

Mr. Jones pulled a fresh APPLE from a tree. This made him think of his childhood summers with the flowers in BLOSSOM and his mother churning BUTTER sitting on a CHAIR drinking COFFEE. Mr. Jones was a DIAMOND salesman but his father worked in a FACTORY using a pitch FORK and a HAMMER. On Saturdays his mother would KISS him and send him to the MARKET. The goods there reminded him of a PALACE. On Sundays he went to church to visit his PRIEST making sure to get a SEAT in the first row. One day Mr. Jones' father left boarding a STEAM boat with a TICKET that his WIFE had bought. Her BETRAYAL by not using DISCRETION in their personal lives led him to mistrust members of the opposite GENDER.



mSMT

- Free Recall- List all of the Capitalized words
- Cued Recall
 - Contextual Cues
 - Semantic Cues

mSMT

- Guidance for Imagery
 - concentrate on forming a mental image of a chunk of the story
 - several pieces of information in 2 images
 - verbal information transformed into pictures

mSMT

Session 5-8 Context

Instructions

- Make up story using a provided list of words
- Create easy to visualize story

*Continue using imagery – adding meaningful context.



List Example skill: context / organization

AUTOMOBILE	MOTHER
BOTTLE	PHYSICIAN
CASH	PUPIL
CHURCH	SKIN
CORN	STRENGTH
DOOR	TREE
FLOOD	WOMEN
GARDEN	ADAGE
HOTEL	COMPETENCE
LETTER	ESSENCE



mSMT

AUTOMOBILE BOTTLE CASH CHURCH

Sunday after **CHURCH** I need to take my **AUTOMOBILE** to the bank to get **CASH** for a **BOTTLE** of wine.



mSMT

- Free Recall- List all of the Capitalized words
- Cued Recall
 - Contextual Cues
 - Semantic Cues



mSMT

Sunday after _____ I need to take my
_____ to the bank to get _____ for a
_____ of wine.

mSMT

- Guidance for Context and Imagery
 - keep the story simple
 - basic ideas and concepts
 - chunk several target words with meaningful information

mSMT

LAWN SIDEWALK SNOW

Example of poor context:

There was SNOW on the SIDEWALK next to the LAWN.

Example of more effective context:

In the winter, the green LAWN was covered in SNOW from shoveling the SIDEWALK



mSMT

Session 9-10 Everyday life

Instructions

- Words from shopping list, to-do list, or directions
- Make up story using a provided list of words
- Create easy to visualize story



mSMT

Feedback from Clinicians

- Repeating sessions 3 and 4 for extra practice with imagery
- Repeating sessions 7 and 8 for extra practice with context



mSMT

Adaptations clinicians have made

Making my own list of very concrete words and presenting an example - in early session 5:

HOUSE CAR PENCIL TIRE RIBBON

When I started the **CAR** and pulled away from my **HOUSE**, I realized that my **TIRE** was flat. When I looked at it, I saw a **PENCIL** sticking out of the tire- I grabbed the pencil and stuck it in the **RIBBON** of my hat.



mSMT

Feedback from Patients

- Still use the techniques in daily life
 - shopping lists, chores, schedules
 - alleviates some stress & worry about forgetting and missing appointments



mSMT

Practical Considerations

- Spanish and Chinese Languages
- Group Administration
 - Not computerized, uses flash cards and word processing program.



Stylistic Memory Enhancement

Goverover, Y., Hillary, F. G., Chiaravalloti, N., Arango-Lasprilla, J. C., & DeLuca, J. (2009). A functional application of the spacing effect to improve learning and memory in persons with multiple sclerosis. *Journal of Clinical and Experimental Neuropsychology*, 31(5), 513-522.

Goverover, Y., Basso, M., Wood, H., Chiaravalloti, N., & DeLuca, J. (2011). Examining the benefits of combining two learning strategies on recall of functional information in persons with multiple sclerosis. *Multiple Sclerosis Journal*, 17(12), 1488-1497.

Sumowski, J. F., Leavitt, V. M., Cohen, A., Paxton, J., Chiaravalloti, N. D., & DeLuca, J. (2013). Retrieval practice is a robust memory aid for memory-impaired patients with MS. *Multiple Sclerosis Journal*, 1352458513485980.



Cognitive Rehabilitation Unique techniques

- Various techniques are out there to improve memory
 - We have data that shows they improve the memory abilities of persons with MS
 - Techniques are:
 - Self Generated Learning
 - Spaced Learning
 - Retrieval practice
-



- All of the techniques utilized in Stylistic Memory Enhancement are evidence based.
- Dr. Yael Goverover discussed each



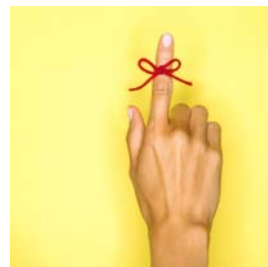
Stylistic Memory Enhancement

- 8 Sessions- with Homework
 - 2- Education about Memory vs. other aspects of cognition
 - 2 - Self Generated learning
 - 2 - Spaced learning
 - 2 - Retrieval practice



Stylistic Memory Enhancement

- Focus is improving everyday life
- Ideally, involve a family member to use the techniques



Speed of Processing Training

Research in Aging population

Rebok, G. W., Ball, K., Guey, L. T., Jones, R. N., Kim, H. Y., King, J. W., ... & Willis, S. L. (2014). Ten-year effects of the advanced cognitive training for independent and vital elderly cognitive training trial on cognition and everyday functioning in older adults. *Journal of the American Geriatrics Society*, 62(1), 16-24.

Ball, K., Berch, D. B., Helmers, K. F., Jobe, J. B., Leveck, M. D., Marsiske, M., & ACTIVE Study Group. (2002). Effects of cognitive training interventions with older adults: a randomized controlled trial. *Jama*, 288(18), 2271-2281.



Speed of Processing Training

Aging literature

Shown to improve everyday life activities

Long Lasting effects- up to 10 years



Speed of Processing Training

- 10 session computerized PS treatment
 - Laptop administration
 - Highly automated
 - Used extensively in normal aging
 - Karlene Ball and colleagues
 - University of Alabama at Birmingham



Speed of Processing Training

- Level I
 - Target Discrimination
- Level II
 - Discrimination task + simultaneous location of a peripheral target
- Level III
 - Selective attention training



SPT: Level I

- Target Discrimination
 - Single task of increasing complexity
 - Target present or absent?
 - What is the target (car or truck)?
 - Is each target the same or different from a eachother?
 - Black and white image
 - Task becomes faster and more complex as participant can perform the task
 - Patient progresses to level 2 when he/she can perform this level at 75% accuracy at an exposure duration of 17 ms



Present or Absent



Was there an object inside the white box?

YES

NO

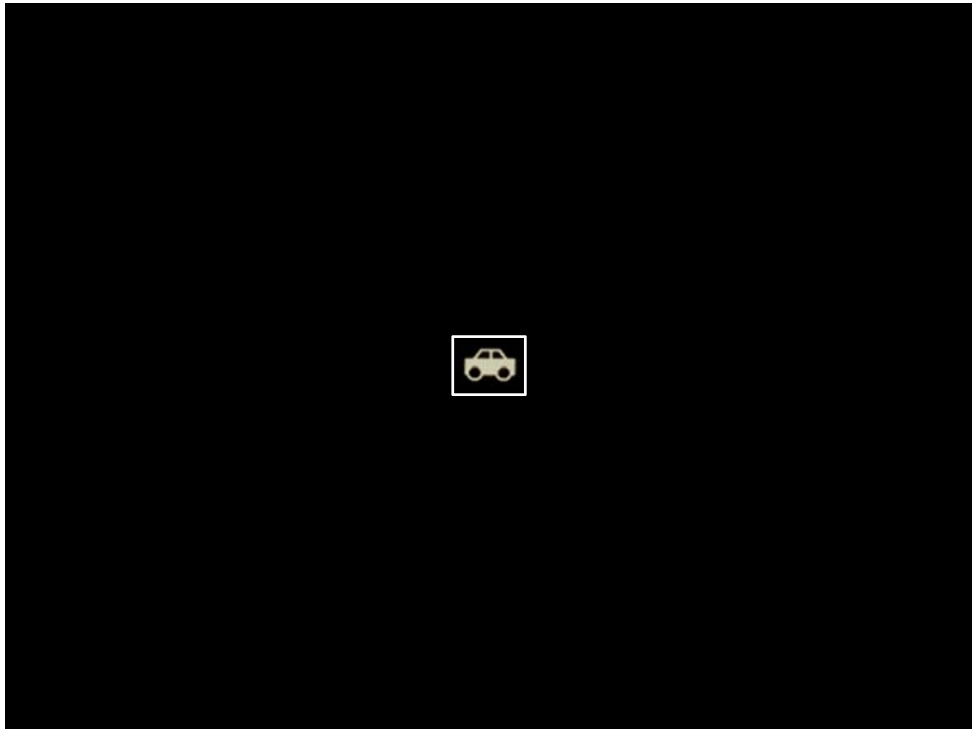


Was there an object inside the white box?

YES

NO

Identify



Which object was inside the white box?



Same or Different



Were the objects the same or different?

SAME

DIFFERENT

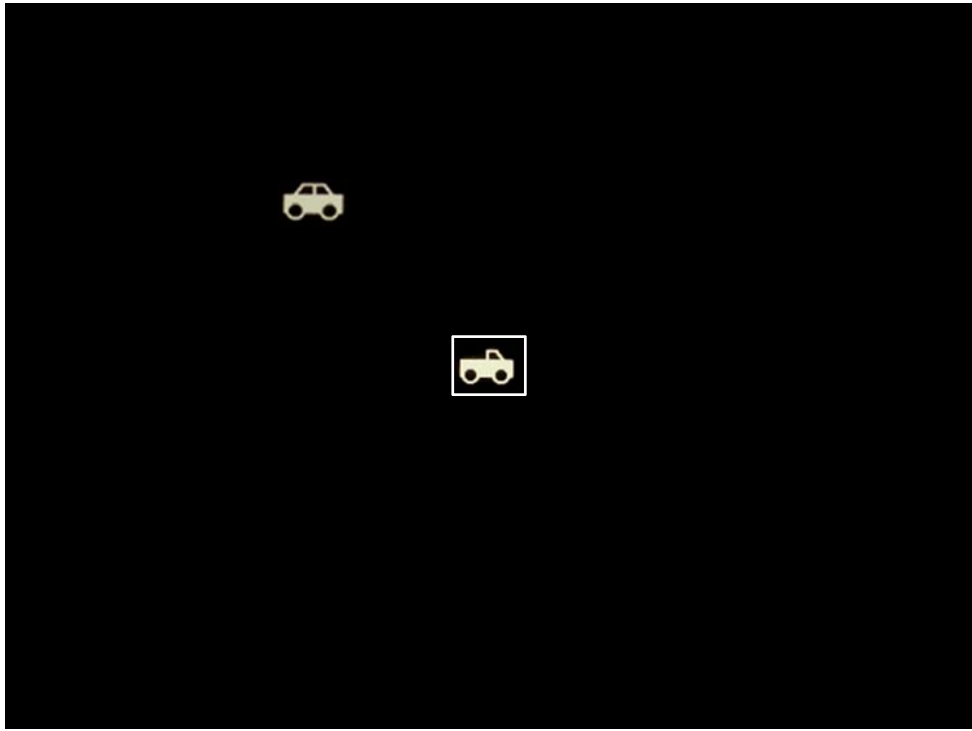
SPT: Level II

- Discrimination task in level 1 + simultaneous location of a peripheral target
 - Task demands increase as participant becomes more proficient:
 - Discrimination task – as in Level I
 - Peripheral task: increasing the distance of the peripheral target from the center target
- Repeated until performance of *both* center and peripheral tasks is 75% accurate at 50ms or less

Divided Attention

Divided Attention

Present or Absent

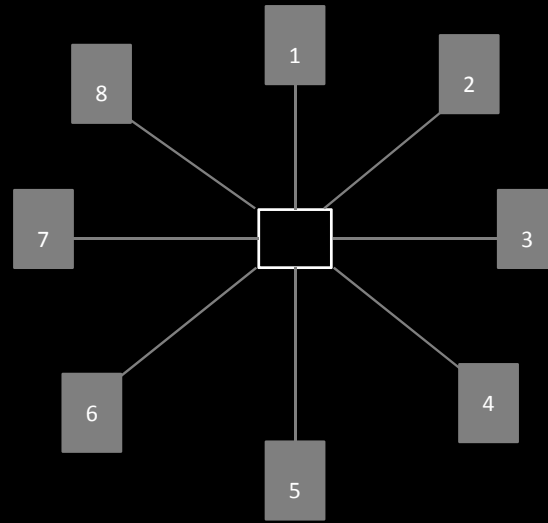


Was there an object inside the white box?

YES

NO

On which spoke was the
outside object located ?



Divided Attention

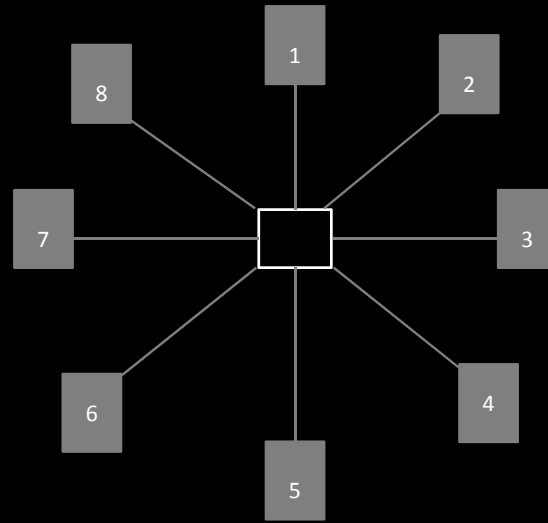
Identify



Which object was inside the white box?

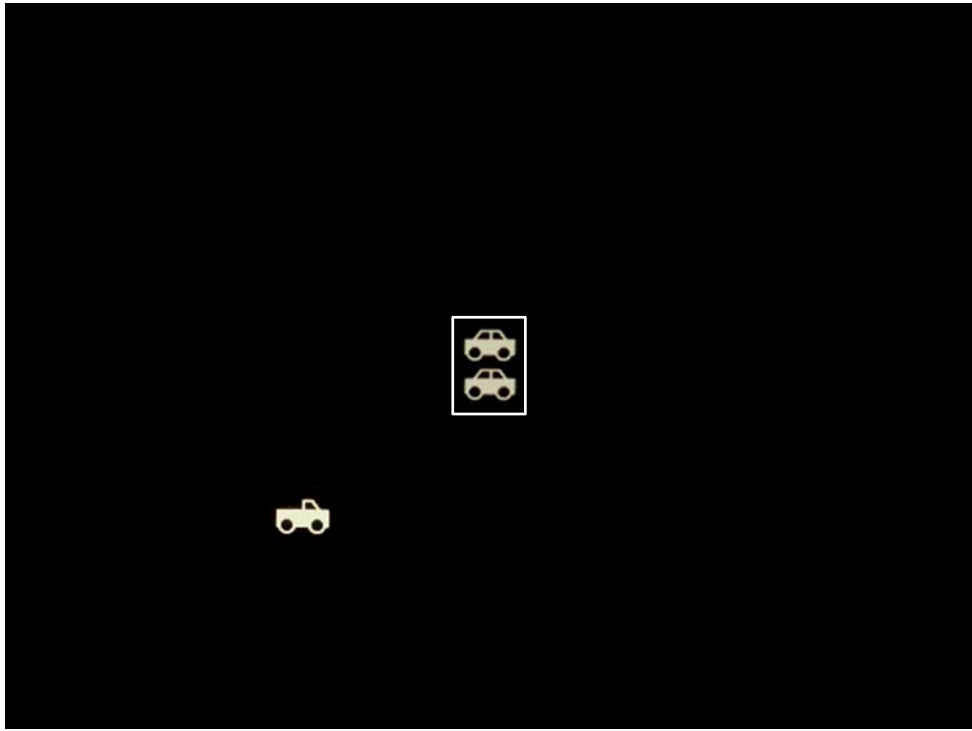


On which spoke was the
outside object located ?



Divided Attention

Same or Different

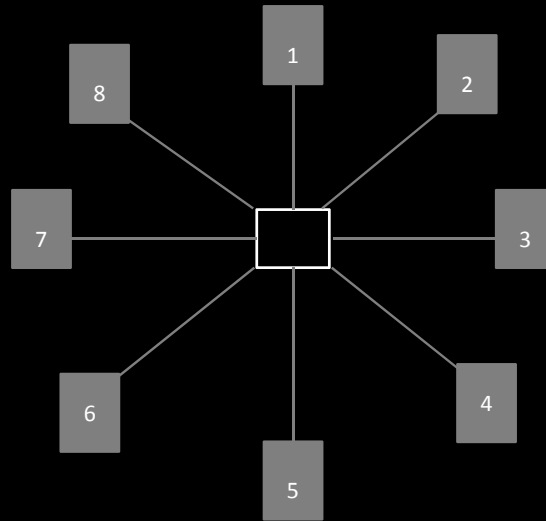


Were the objects the same or different?

SAME

DIFFERENT

On which spoke was the
outside object located ?



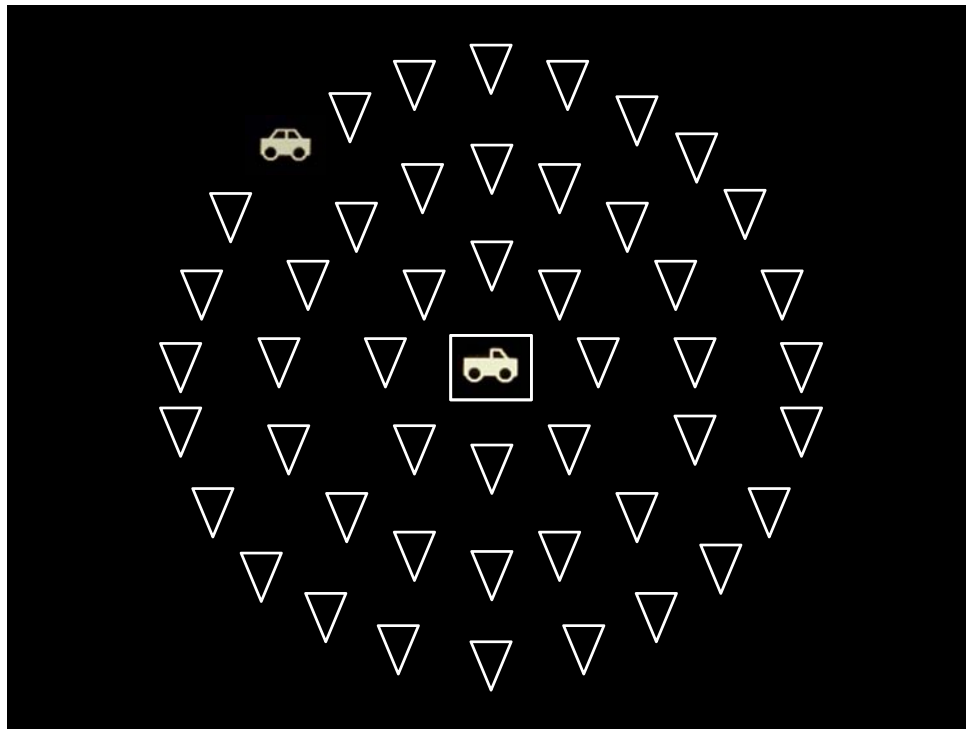
SPT: Level III

- Selective attention training
 - Locate peripheral target embedded among distractors
 - Begins with:
 - Peripheral target near center
 - When the participant can perform the task 75% of the time → task becomes more demanding
 - Peripheral target further from center
 - Training continues until 75% correct at exposure duration of 120 ms with peripheral targets at most extreme position

Selective Attention

Selective Attention

Present or Absent

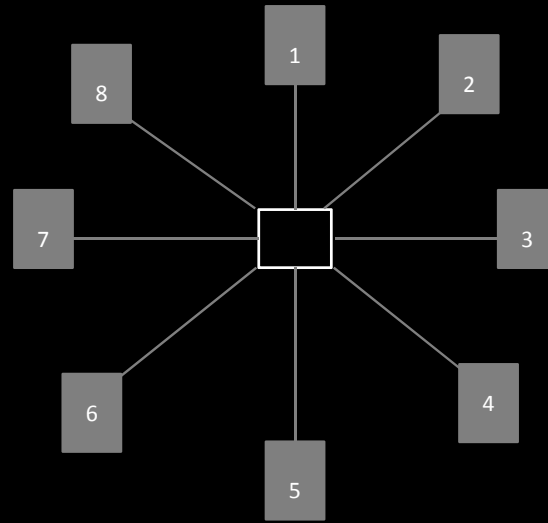


Was there an object inside the white box?

YES

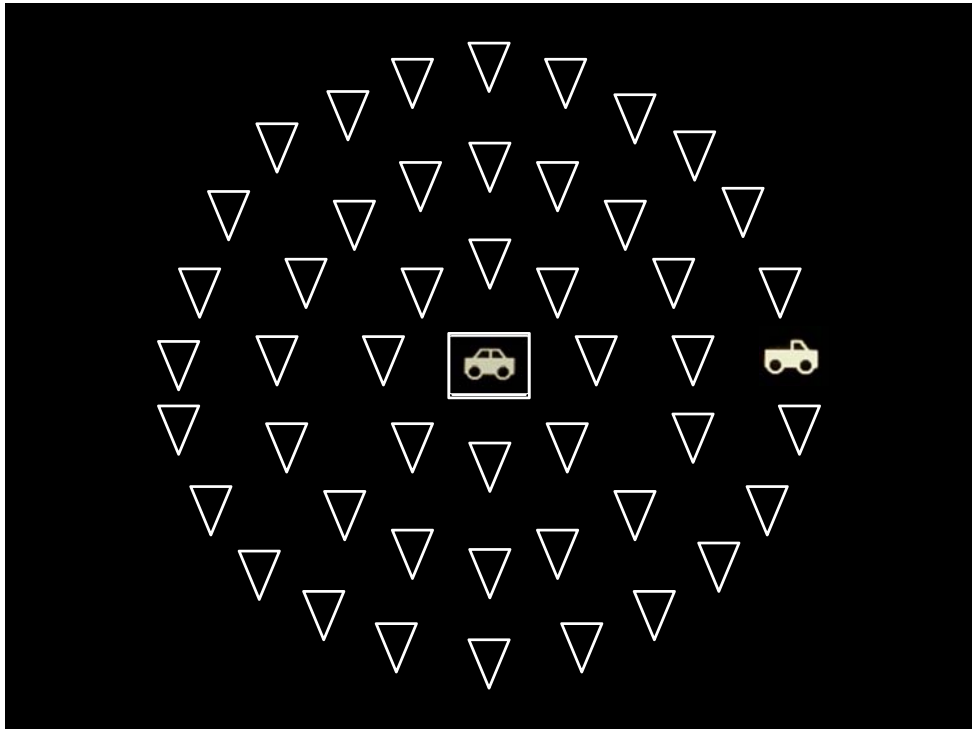
NO

On which spoke was the
outside object located ?



Selective Attention

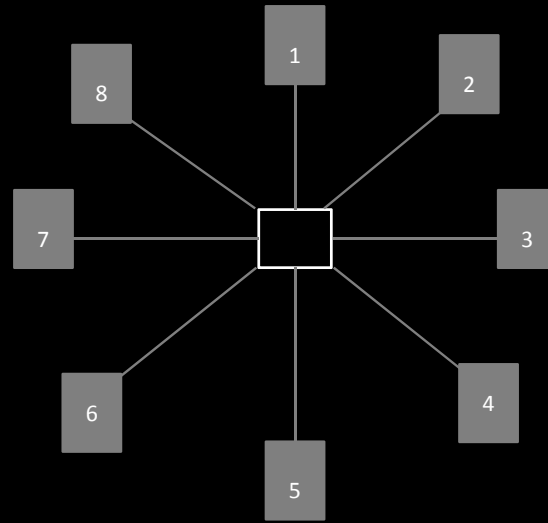
Identify



Which object was inside the white box?

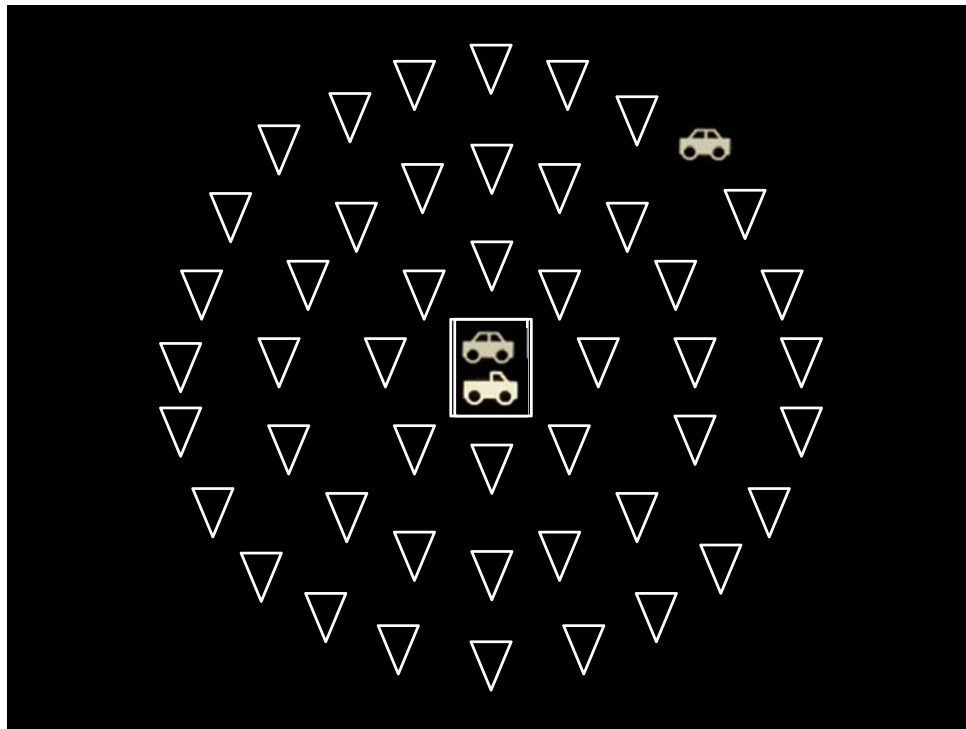


On which spoke was the
outside object located ?



Selective Attention

Same or Different

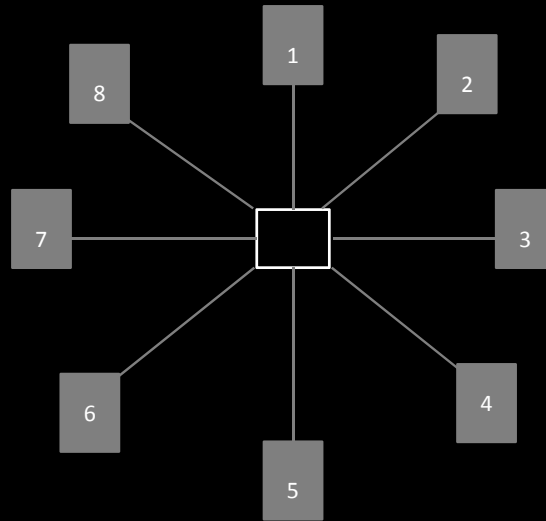


Were the objects the same or different?

SAME

DIFFERENT

On which spoke was the
outside object located ?



Summary

- 3 treatment protocols that target specific deficits.
 - Modified Story Memory Technique (mSMT)
 - Stylistic Memory Enhancement (SME)
 - Speed of Processing Training (SPT)

Outline

- Assessing deficits
- Team approach
- Nuts and bolts of evidence based treatment
- Clinic practicality
 - Insurance
 - Bigger picture



Clinic Practicality

- Insurance
 - reimbursement possible using proof of efficacy



Clinic Practicality

- Bigger Picture
 - Cognitive rehabilitation success needs a multidisciplinary team approach
 - Interventions that target specific deficit areas can be a part of the process



Clinic Practicality

Cognitive rehabilitation has many components

Family involvement

Individual needs

Vocation

Psych / Drug issues

All aspects of a clients life need to be considered in order to have a successful outcome.



Collaborators

Nancy Chiaravalloti, PhD

John DeLuca, PhD

Jean Lengenfelder, PhD

Yael Goverover, PhD

Glenn Wylie, D.Phil

Michele Hart, M.S.,
OTR/L

Helen Genova, PhD

Lauren Strober, PhD

Jim Sumowski, PhD

Angela Smith, MA



Funding Sources

National Multiple Sclerosis Society:

Pilot Grant (mSMT)

Pilot Grant (SPT)

Pilot Grant #P0782 (SME)

*Thank
You!*

NIH Grants (NCMRR):

1R01HD045798

1R01HD045798 Supplement

Kessler Foundation

