FROM THE EDITOR
Peter Boltuc

FROM THE CHAIR
Thomas M. Powers

Orientation in Philosophical Research

ARTICLES
Colin Allen and Peter Boltuc
Colin Allen on Philosophy Informed by the Sciences

Kristin Andrews
Colin Allen’s Philosophy of Animal Minds

Cameron Buckner
Colin Allen 2050: A Guide for the Undecided

D. E. Wittkower
Statement on Open-Access Publication

Susan Hempinstall
Heads in the Cloud: Human Memory and External Storage Implications

Francesco Bianchini
Superorganisms and Intelligence

Riccardo Manzotti
Nothing Appears, Everything Takes Place
FROM THE EDITOR

Peter Boltuc
UNIVERSITY OF ILLINOIS SPRINGFIELD

It is time to face up to the future since the future is upon us. When this newsletter started, it was primarily about the use of computers by philosophers and the use of simple data-bases. Now computers, robots, and the technology redefine many aspects of the reality of our lives, and this is just the very beginning of a civilizational change. Tom Powers, the chair of this committee, argues in his article that we need to redefine what computers are since the AI approach may no longer be broad enough. Today we know that cognitive architectures include animal brains, of which human brains are just an instance. As Colin Allen, the recent winner of the Barwise Prize, points out, any claims to the contrary, even made by such luminaries as Davidson, are the song of the past. Not only are animal minds cognitive, but also DNA is a cognitive structure. Powers even mentions plants as another form of information-processing networks, while Bianchini talks about intelligent swarms. Broadly speaking, biologically inspired cognitive architectures are an important trend that goes beyond standard AI.

Both Allen and Powers are a different kind of philosopher than luminaries of the recent past. They build philosophy upon essential engagement with science and technology. They seem to get over Wittgenstein, verificationism, and pre-conceived notions coming from natural language and philosophy thereof. Philosophy engaged with the real technological developments needs to be applied, even in its epistemology and metaphysics, since there are so many new things that require our attention, from agency of robots, and human enhancement, to the topics of robot warfare and the internet of things. Some of those topics, and many more, are also covered by Kristin Andrews’s and Cameron Buckner’s articles that comment on Colin Allen’s philosophical work. Kristin discusses Colin’s novel approach of mental content attribution to biological systems by employing information-theoretic methods. Cameron, in his paper rhetorically addressed to a robot-reader, presents a short history of Colin’s work, which includes his role as a mentor to a number of now important scholars in philosophy and computers. He focuses on Colin’s contribution to the Stanford Encyclopedia of Philosophy (SEP) that led to development of the dynamic knowledge base for SEP—the Indiana Philosophy Ontology. The paper includes a helpful basic bibliography of Allen’s work (solo and with his students).

The first part of the newsletter closes with the Statement on Open Access Publication, drafted by D. E. Wttkower in consultation with the committee. The point of the statement is to view philosophical publications on their merit and not on the basis of whether they are open access or follow more traditional modes of publication. It is addressed to philosophy departments but may also become a useful tool in working with college and campus-level promotion and tenure committees and administrators. The statement is still a work in progress and Dylan as well as other members of the committee welcome feedback on this important matter.

The second part of the issue is devoted to the papers from the Philosophy and Theory of Artificial Intelligence conference, held in September 2013 and organized by Vincent Müller at St. Anthony College Oxford. While many of the articles from the conference found publication in other venues, we present two interesting papers here and the next issue will include a few more. Susan Hempinstall argues, in the context of the extended mind, that there is no important difference between memory transactions within and between the minds. This well-informed paper is worth reading beyond the interesting abstract: In Part I it presents helpful models of computational memory. Parts II and III discuss philosophical, psychological, and computer-informational implications of the models. I like the way Susan’s article is written, almost as CliffsNotes or PowerPoint with comments (editors of most other publications prefer the essay style but this is a more effective way of conveying content)—especially since the paper is not devoid of interesting insights (e.g., “Other minds can be sources of external memory,” or “In the case of phone numbers and GPS directions stored in my iDevice, internal memory is supplemental.”)

Francesco Bianchini, in his article on superorganisms and intelligence, relates to swarms—not just individual organisms—as intelligent and having rational interaction with the environment. The paper makes one want to re-examine predominant intuitions in the Chinese room argument: Is it really true that the room is unconscious as long as it is not a being with first-person intentionality? Group entities are interesting example for biologically inspired cognitive architectures of networks based on swarm design. The paper is inspired by the work of Doug Hofstadter, the recipient of 2012 Barwise Prize; we intend to have more on Hofstadter in future issues. This issue closes with a philosophical cartoon by Riccardo Manzotti, currently at MIT. The cartoon tackles the millennia-old problem of appearance and reality and, as often with Manzotti’s cartoons, it goes exactly against the grains of the views of this editor.
I think this is the most relevant issue of the newsletter we've published so far. It is devoted to applied philosophy (applied epistemology and metaphysics informed by engineering and current science), which does not even include much applied ethics. Every article is relevant to a philosopher and a computer engineer. Papers were submitted between February 2 and February 14, 2014; applied philosophy is time sensitive.

ACKNOWLEDGEMENTS
As always, I want to thank Jim Ermatinger, Dean of the College of Liberal Arts and Sciences at the University of Illinois Springfield, for giving me the time necessary for working on this Newsletter. I also want to thank the Hartman-Schewe Endowment for further opportunities.

FROM THE CHAIR
Orientation in Philosophical Research
Thomas M. Powers
UNIVERSITY OF DELAWARE

Philosophy thrives on new challenges, on problems not yet addressed. For while there is broad acknowledgment of our history as the discipline of “perennial questions”—about knowledge, existence, justification, and the like—by now there is (for some of us, at any rate) a general weariness in asking these questions in the same old way, with the same stale examples. Philosophers need new grist for the mill, lest the millstones start grinding away at themselves. Where will it be found?

In this brief essay I want to construe the issue of orientation in philosophical research as posing that very basic methodological question: Where should we look to find new problems? In most branches of the discipline, philosophers have preferred the inward orientation; they have found new problems on which to work by attacking dogmas of the right and the good, clarifying vague concepts, or correcting an errant interpretation of an important philosopher’s views. And they have done this by first picking up a philosophy journal. There is nothing at all surprising about this orientation, since any academic discipline is bound to preoccupy itself, first and foremost, with the claims to knowledge generated by that discipline. The critique of the inward orientation that I will give here accepts that “inwardness” may be necessary for disciplinary identity and cohesion—as well as professional advancement. What I reject is the view that the inward orientation is sufficient for philosophy to thrive and to remain relevant in these times of massively distributed educational offerings and science-focused education policy. And relevance is important. If we want students to fill our classrooms and university colleagues to seek us out for opportunities in interdisciplinary research, we’ll have to strive to keep up. To keep up, we’ll have to look out.

I recognize the polemical nature of this critique, and I should warn from the start that it will be more exhortation than argument. I doubt I will move the resolute, inward practitioner, so let me appeal directly to those philosophers best suited to take up the outward orientation: the researchers in the philosophy of technology, especially computer and information technology. Here, if anywhere in philosophy, we need to look outside of the discipline to understand the advances in computer science and computer and electrical engineering that present new challenges and exciting problems. But we can go further still. Computer and information technology is being deployed in most spheres of government, industry, politics, and commerce, and just about every deployment brings with it new worries about privacy, security, anonymity, identity, authenticity, and autonomy.

True enough, many philosophers have already written brilliantly about these developments, and thus have introduced new problems for the disciplinary mill. But inwardness is a hard habit to break, and it is reinforced by conservative tenure and promotion standards. My hope is that emerging science and technology will be just too fascinating to ignore. Let me sketch some developments in three areas of science and engineering that are particularly ripe for philosophical inquiry.

WHAT COMPUTES?
In the last few decades, research trends in biology have suggested a considerable broadening of the concept of computation, and thus an increase in the number and kinds of things that can compute. The scientific literature in biology and biotechnology is now filled with reports of discoveries of “natural” computers and, further, the engineering of biologically based information processors. Synthetic biology, systems biology, and DNA computing are some of the new sub-fields that have merged traditional molecular biology, computer science, chemical engineering, and bioinformatics. 1 There have been proofs-of-concept, with repeated experimental results, of assemblies of genes and regulatory DNA that perform Boolean logic. 2 J. Craig Venter, a high-profile proponent of this research, has declared that “life is a DNA software system, and if you change the software you change the species.” 3 Venter is not intending to be poetic here; his new company, Synthetic Genomics, has created new life forms by de-coding DNA information and, by means of traditional computing and chemistry, re-coding living cells from synthetic DNA. This DNA information, natural or synthetic, can be downloaded from the Internet and may one day provide the basis for a novel form of manufacturing with the use of what Venter calls a “genome bot.” There are huge potential benefits for agriculture and industry, and especially for medicine—with new vaccines and human tissue and organ generation on the horizon. Of course, there are also huge security and safety concerns, but along with them comes a treasure trove for researchers in the philosophy of information and computation.

Other important developments have come in the field of “plant neurobiology”—a somewhat more poetic re-branding of recent research in the molecular biology of plant signaling and behavior. According to one researcher, “plant neurobiology interprets plants as information-processing networks with individual cells as computational building blocks.” 4 Another group cites evidence for “emergent, distributed computation in plants.” 5 The outcome of the
basic phenomena under consideration is not surprising. Plants are capable of adaptive behaviors in response to light, nutrients, soil chemistry, moisture, temperature, gravity, and other environmental factors. What has been uncovered in recent research concerns both the mechanisms and the coordination of information exchange in individuals and groups of plants. Plants produce hormones that allow them to signal, and this ability underlies their adaptive responses. They also produce proteins that are common in the neurochemistry of animals. Plants even respond to predators by signaling their kin to emit toxins, and one “sensitive” and fast-moving species exhibits observable activity that has been described as a learned behavior. The so-called sessile life of plants apparently belies some significant abilities that we have overlooked.

Belief in plant intelligence is probably a step too far for most philosophers, but not for some plant biologists doing the original research. Anthony Trewavas, a leader in the field, is content with ascriptions of intelligence without brains. Some philosophers will suspect that we’re being lured into a “green” Chinese room. But more basic and less contentious questions also arise. What does this broadening of the concept of computation portend for research on the philosophy of computation? And what does this research tell us about the difference between information processing, computation, and intelligence? We are so accustomed to thinking of computers as von Neumann and Turing conceived of them that it will be hard to make progress until we reconsider exactly what computes.

THE EVER-EXPANDING NETWORK

Digital information networks have proven to be immensely useful and hence have been quickly expanded. Beginning with military and scientific applications in the developed world, we now have a global information network that serves social, scientific, governmental, and commercial interests. E-mail and social networks such as Facebook have seemed to diminish the importance of spatial distance in human relationships. This globalization of information has benefitted much of the developing world too, and it may well start to erode national and cultural differences and prove to be salutary for relations among nation states. But humans may not be the most numerous consumers of information for long. There is ongoing research towards creating an Internet of robots, cars, and appliances and other devices (the “Internet of Things”). With just a little coordination and additional infrastructure, we could soon have many more layers of global networks. What properties will emerge from such a system of systems? Will its overall behavior be predictable or controllable? Could it generate a kind of knowledge—from the sensing, communication, and behavior of millions of artificial agents—that is inaccessible to humans?

These are not science fiction concerns. Consider RoboEarth, a European research program to build “a worldwide, open-source platform that allows any robot with a network connection to generate, share, and reuse data.” Such a platform could greatly expand the use of robots in everyday life. Networked robots will be presumed to serve human ends, but their network will not be our network. The amount of data and the speed with which the robots will process them will exceed human capacities. Will we need national boundaries for such networks, given the power and potential for sabotage and abuse? This would roll back the evolution of our quaint twenty-first-century Internet. What else might be networked? Already, computational functions in automobiles, supported by millions of lines of code in the newest cars, exceed the computation found in sophisticated fighter jets from just a decade ago. By placing more computational capacity “in the cloud” and exploiting advances in speed and distribution, an Internet of robots, transportation devices, appliances, buildings, and surveillance devices would transform our world. Philosophers should be ready to tackle emerging problems in epistemology, ethics, and politics that are sure to arise in such a world.

SMART WARS, GOOD WARS

One domain that is probably not ripe for global networking anytime soon is national defense—especially not battlefield military operations, surveillance, early-warning missile defense systems, and the like. But these military operations are increasingly computer controlled, and some engineers have begun to think about the “ethical” programming of autonomous lethal robots and computer-guided missiles. Ron Arkin, a roboticist at Georgia Tech, has been funded by the U.S. Defense Department to study the ethical constraint of battlefield robots to limit friendly-fire and non-combatant casualties and, in general, to obey the laws of war. Missy Cummings, an MIT engineer, has written about the need for “moral buffers” for highly autonomous weapons systems—especially computer-controlled missiles in which the “goal state” has changed. And philosophers Patrick Lin, Fritz Allhoff, and Keith Abney are part of a new NSF-funded collaboration to study the ethics of cyberwarfare and its implications for policy and international law.

These are interesting developments that could be both dangerous in the short term and potentially beneficial, in the long run, to reduce armed conflict. The dangerous part should be obvious. Asymmetric warfare has been the norm since the United States used nuclear weapons in Japan at the end of World War II. The current “war on terror” follows a similar model. Are we trying to sanitize our military operations with a combination of technology and strained moral justifications? Will technology-rich nations monopolize computerized warfare in ways that remove their soldiers and citizens from the theatre of war, and thus encourage a kind of risk-free warfare on technology-poor populations? Will talk of “ethical” robots and drones obscure the fact that these are still, at bottom, killing machines?

There is cause for optimism too. If computerized offensive and defensive capabilities become more widely shared, we may see a return to near-symmetric military capabilities in much of the world. An information-saturated conflict may someday make actual war less likely because of the knowledge gained by a war simulation. The linchpin on the way to such an outcome will be for technology-rich nations to recognize that global stability is increased by sharing information, and thus information technology. The choice whether to share will not be quite like the “mutually
assured destruction” standoff during the Cold War, which was
informed by game theory. But the emergence of a
moral hazard from the one-sided “safety” of asymmetric
warfare technology could lead the technology-rich nations
to opt for relative parity instead of an uncomfortable
dominance. These will be complex strategic decisions, and
political philosophers and ethicists should be prepared to
contribute to the debate.

THE GOOD OLD OUTWARD ORIENTATION
Some of you by now may detect a hint of nostalgia in
the midst of all of this talk of cutting-edge science and
technology. For in fact the outward orientation is nothing
new in philosophy—many philosophers have advocated it
at least implicitly. Towards the end of his 1912 Problems
of Philosophy, Bertrand Russell writes that philosophical
knowledge “does not differ essentially from scientific
knowledge; there is no special source of wisdom which is
open to philosophy but not to science.”12 He goes on to
indicate that criticism of both principles of science and of
everyday life is the special contribution of philosophy. And
Russell followed this model; during his lifetime he stayed
well versed in science and in cultural and political affairs.
By the time he witnessed Popper’s talk on “Methods in
Philosophy” (and Wittgenstein’s allegedly violent reaction to
it) at the Cambridge Moral Science Club, Russell, I
suspect, knew that he had an ally. What was at stake in
Popper’s conception of philosophy as problem-oriented
instead of mere puzzle dissolving? The actual content of the
Popper-Wittgenstein encounter is still a matter of dispute,
but from a reading of Popper’s philosophical work I think it
is reasonable to speculate that the method he advocated in
Cambridge on that day was an outward one.13 And if
this is true, it is no stretch to imagine that Wittgenstein’s
ultimately deflationary account of philosophical puzzles
was a result of an inward turn that he took. How this
happened to Wittgenstein—a trained engineer—is both a
mystery and, I think, a tragedy.

ARTICLES

Colin Allen on Philosophy Informed by the Sciences

Colin Allen
UNIVERSITY OF INDIANA–BLOOMINGTON

Peter Boltuc
UNIVERSITY OF ILLINOIS SPRINGFIELD

This year’s Barwise Prize winner, Colin Allen, is a trend-
maker and somewhat of a hero to those philosophers
who do what may be called philosophy deeply informed
by science, mostly of mid- and younger generations. Yet,
his views are virtually unknown, or known and hard to
accept, to many philosophers of older generations formed
firmly by old-style philosophy of language. This interview,
conducted by Piotr Boltuc, is aimed at highlighting some of
Colin’s most interesting and important views.

Piotr Boltuc: Colin, what is the one thing (or the few things)
about your philosophy that you would want people to
remember?

Colin Allen: I originally went into philosophy because
of all the degree options available; it seemed to me to
allow the most intellectual freedom. I could call myself
a philosopher and today (or this morning) be thinking
about the implications of quantum mechanics or relativity
theory, and tomorrow (or this afternoon) be thinking about
the aesthetics of painting. I have especially enjoyed the
demand that good interdisciplinary work places on having
substantial knowledge outside the discipline of philosophy.
As it turns out, physics and art have remained on the
sidelines of my academic work, but I have had a lot of fun
learning about the latest developments in several different
fields: biology, ethology, comparative psychology, artificial
intelligence, semantic modeling of text, and cognitive
psychology among them.

What I’d want people to remember is that (I hope) I didn’t
just dabble in these areas, but managed to build real
bridges, motivating other philosophers to do likewise,
and bringing scientists in these areas to appreciate the
value of having philosophers in their midst. Luckily, I’ve
always had good memory for facts and theories (names
must be neither!), and I’d like to be remembered for
having the ability to connect the dots among them in
ways that stimulated others to go off in interesting
research directions. I’m also deeply gratified by having

NOTES
1. The author would like to acknowledge NSF IGERT Grant 1144726,
"Systems Biology of Cells in Engineered Environments," and
colleagues at the Delaware Biotechnology Institute of the
University of Delaware.
4. F. Garzón, "The Quest for Cognition in Plant Neurobiology,” Plant
5. D. Peak et al., “Evidence for Complex, Collective Dynamics and
Emergent, Distributed Computation in Plants,” Proceedings of
the National Academy of Sciences 101, no. 4 (2004): 918–22.
6. While plant signaling research has been published in highly-
regarded science journals, there is still considerable discomfort
by some scientists with the mentalistic language of their
colleagues. For a non-technical overview of the controversy, see
M. Pollan, "The Intelligent Plant,” The New Yorker, December 23,
2013, 92–105.
7. See his “Plant Intelligence: Mindless Mastery,” Nature 415, no.
Spectrum, February 5, 2011.
9. R. Arkin, Governing Lethal Behavior in Autonomous Robots (Taylor
and Francis, 2009).
10. M. Cummings, "Creating Moral Buffers in Weapon Control
28–33.
11. NSF STS Grant 1318126, "Developing a Normative Framework for
Cyber Warfare."
13. D. Edmonds and J. Eidinow, Wittgenstein’s Poker (Faber & Faber,
2001).
I had the good fortune to be on the forefront of several new areas of research for philosophers—cognitive ethology, computational philosophy, and machine morality in particular—and to see the uptake of these topics by philosophers, and by researchers outside philosophy too.

PB: I am mostly interested in the issues that link your research with classical, mainstream topics. Your work on animal minds has implications for Davidson-Stich style philosophy of language. Can you say more about it?

CA: I think that both of those philosophers are reacting in slightly different ways to the conclusion that there seem to be no interpreter-independent facts about literal meaning: In the case of Davidson, by making it a requirement for the possession of mental states with a specific content that the subject of those mental states be an interpreter (and denying that languageless animals are interpreters). In Stich’s case by rejecting the utility of attributing contentful states to animals for scientific purposes, on the grounds that content judgments are similarity judgments for which there can be no properly objective standard.

To summarize my (evolving!) view, I think that to start with the idea that determinate literal meanings should be the starting point for theorizing about mind and meaning is to get off on the wrong foot. Rather, I think that Peter Marler, one of the pioneers in the field of animal communication, got it right—what the study of animal communication needs is a theory of pragmatics more than a theory of semantics (and I would include humans among the animals, despite the extreme elaborateness of our particular form of communication).

PB: Wow, this shift from semantics to pragmatics may be viewed by many as way radical. So, let me ask you more directly about methodology: What do you think of verificationism? It recently crossed my mind, when talking to Dan Dennett, that most British philosophers whose views formed in the 1960s and 1970s are deep down verificationists. As younger generation philosophers, especially U.S.-educated, we are brought up on Harman’s inference to the best explanation. That has profound methodological implications, doesn’t it?

CA: Yes, as a philosophy undergraduate starting at UCL in 1979 (so that puts me just inside the 70s!) I cut my teeth on Ayer’s Language, Truth, and Logic. I know that Ayer is not regarded as a very authentic representative of the movement, but it was easy to use him as a target for explaining to us why verificationism was self-undermining. Someone once said to me, and I tend to agree, that it would have been beautiful if verificationism were true, but too bad that it couldn’t work. So, like you, I was trained to think that notions of meaning and the justification of theoretical claims could be treated as you say, as inference to the best explanation. I certainly relied on such arguments in my early publications about attributing mental states to animals.

But whenever one claims that something is the best explanation, the question has to be “compared to what?” and what I have come to realize over the past fifteen years is that most philosophers (and not a few cognitive scientists) still think that the positivist/empiricist/behaviorist/associationist approaches to cognition were so thoroughly trounced back in the 1960s that there’s no comeback for them.

I think that this is by no means obvious, and that while we are never going to return to logical empiricism and strict behaviorism, the strides in learning theory, dynamical modeling, and other alternatives to classical cognitive science make it less plausible that “inference to the best explanation” comes out the way that those who have appealed to it generally think.

PB: Referring to your recent work, how do you distinguish cognition and consciousness? Is there a level of brain development where we could say cognition starts? We know that fish are in, so is it frogs, roaches?

CA: Well, I think these questions about cognition and consciousness somewhat exemplify the problem I was just referring to, perhaps requiring us to specify a “literal” meaning for those terms, and then police the boundaries. I know cognitive scientists who are presently studying the nematode worm C. elegans, and I’m willing to say they are not confused about the nature of cognition. But, of course, some people, philosophers and other cognitive scientists among them, will want to reserve the term “cognition” for the information processing capacities of much more complex organisms. Rather than getting into a line-drawing exercise, I think that philosophers and other theorists would be better served by identifying similarities and differences, whatever they may be, and of taking the term “cognition” just to provide a general umbrella term under which a range of phenomena at many scales can be modeled using the same sorts of mathematical and computational techniques.

A similarly open stance to questions about consciousness is more difficult, of course, because these questions carry a lot of moral significance. I went to a talk this week on pain and nociception in fruit fly larvae. Is it really pain when the larva rolls away from a heated probe? The speaker, a neurobiologist, wasn’t sure, and I left none the wiser, but I think we can quantify the degree to which such treatment has lasting effects (or not) on the larva’s learning and subsequent behavior, and in this way come up with an understanding of the degree to which nociception is (or isn’t) integrated into the organism’s global information processing capacities, and in this way have a more complete basis for comparison than the more superficial behavioral measures or crude neuroanatomical arguments that have dominated the debates so far. If that makes me a functionalist about consciousness, and failing to face up the so-called “hard” problems, so be it! I think that the so-called “easy” problems only look easy when one doesn’t actually know very much about the staggering complexity of even the “simplest” organisms.

PB: The hard-consciousness may be appearing gradually; Chalmers is open to this (in his pan-psychism or pan-consciousness and also in his less extravagant approaches). Harman’s functionalism of concepts is a form of non-reductive consciousness within functionalist framework.
Chalmers is clear that "the easy problem" is not easy; as you say, what’s easy is only to see what sort of solution to expect.

CA: Right, I realize that everyone's views are more nuanced than the labels tend to suggest. But still, I don't regard any pan-psychist approach that treats consciousness as a fundamental property as really providing an explanation. It is just a bolt-on to all the functional complexity that (it seems to me) is really doing the work of explaining why organisms behave (and sometimes talk) the way they do. And anyone who thinks they know what kind of solution to expect to "the easy problem" of consciousness must have only the vaguest of expectations: it'll have something to do with interactions among neurons, perhaps?

PB: What do you think of BICA?

CA: As for BICA (biologically inspired cognitive architectures), I think it's a viable research strategy—but as with all modeling approaches, there's always the question of how much abstraction is appropriate—we don't know enough, for instance, to know whether focusing only on neurons to the exclusion of all the glial cells in animal nervous systems is to leave something important out.

PB: Let me pose a question in computer ethics: What do you think of the ethics of human enhancements? If I can make a prosthetic device that is 90 percent as good as a human leg and give or sell it to an amputee, most people say it is okay. What if I can make it 20 percent better than before, so that it goes above human capacity?

CA: I don’t think that we are as close as some people claim to having all-around human prosthetic enhancements that exceed biological capabilities, so for the foreseeable future, I actually think the primary applications will remain medical/therapeutic. Even though Oscar Pistorius could attach a pair of legs that might have made him a better sprinter than before he was an amputee, these were not all-purpose legs and they were not better all-around. It is similar for more computationally based enhancements. An artificial retina is better than one that has been ravaged by disease, but it's going to remain a poor substitute for the real thing for a very long time; likewise for artificial hands and limbs. Outside the medical context, I think it's wearables like Google glasses, which enhance rather than replace existing systems, not prosthetic implants, that raise the challenging ethical questions because they promise access to information about people around us that could be exploited in lots of unexpected ways to cause disadvantages and harm.

That said, it's okay sometimes to think about sci-fi scenarios where it really would be rational to replace one's body parts with artificial prosthetics. I don't think there's anything especially wrong about that, except that it will of course raise the perennial question of differential access between the wealthy and the poor. I also think that we have to be careful not to let the sci-fi prospects distract us from the very real ethical challenges posed by technologies that are already in hand, or just a year or two from being so.

PB: As you said in your answer to the first question, you do philosophy as interdisciplinary work based on substantial knowledge outside the discipline of philosophy, from quantum physics to art. When I was a child, maybe four years old, my mom told me that “philosophy is the sum of the most general theories of advanced sciences and a theory of that sum”; I have no idea where this definition comes from. This definition seems to appreciate the role of science, but it is heavily geared towards methodology of science. What is your favorite definition of philosophy?

CA: I'm inclined to say that philosophy is as philosophers do. What makes them all philosophers is that they are engaging in conversations and arguing with each other, and if we were to do a network analysis we'd see evidence of that in the way in which they cluster together around topics, references to each other's work, etc. Many, perhaps even most of the central nodes in this network have been empirically engaged with the world, trying to make sense of scientific findings. Aristotle, Descartes, and Kant all spring to mind in this regard, and at least two of these were participants in generating empirical knowledge themselves. I do agree with your mother that philosophers tend towards the most abstract and general versions of questions that scientists are asking. Sometimes it seems like the pursuit of abstraction for its own sake, but often the development of such abstractions feeds back into the empirical sciences in unexpectedly useful ways—for example, the contributions of early formal logic to computing. Who would have guessed that truth tables, invented by Wittgenstein for abstract philosophical purposes, could provide an essential tool for electronic circuit design?

PB: What have you learned from your philosophical concept-clustering and mind-maps in philosophy?

CA: In many ways, the algorithmic approaches to clustering thinkers and topics confirm certain ideas about relationships among them that anyone who knows philosophy would not find surprising—although it's also interesting to be able to demonstrate and visualize that different philosophical sources (for example, the Stanford Encyclopedia of Philosophy and the Internet Encyclopedia of Philosophy) yield somewhat different networks. Furthermore, even for experts in philosophy, the field is now much larger than any of us comprehends, so the tools that we have can help us find connections that we might not otherwise have made. A favorite example for me of this is that the software made a connection between "mental content"—something I thought I knew a lot about—and "divine illumination." At first I thought this was a bug. But as I dug deeper I realized that the software was right—the medieval logicians had worried about the content of universals, and one theory was that our ability to have thoughts about universals depended on divine installation of the concepts in the human mind. A specialist in medieval philosophy would have been able to make the connection right away, and experts will always be needed to provide the texts that we can analyze computationally, but what I think that we have learned from our efforts is that we can make specialized knowledge widely available to researchers, students, and anyone with a general interest.
PB: Are there any more questions that you expected/wanted me to ask?

CA: No further questions I can think of—we seem to have touched on all the major areas in which I've been working. Thanks for the challenging questions!

PB: Thanks for the interview, Colin. Congratulations on your Barwise Prize.

Colin Allen’s Philosophy of Animal Minds

Kristin Andrews

York University, Toronto

Colin Allen has the rare merit of creating a new field of research—the philosophy of animal minds. Unlike the work of other philosophers who have written about animal belief and rationality, or the moral standing of animals, Colin’s work in the philosophy of animal minds has been shaped from the very beginning by his understanding of the science of animals minds. Collaborating with psychologists and biologists, Colin’s philosophical contributions have been informed not by some abstract idea of the animal, but by the behavior and biology of real species grounded in their evolutionary history and natural environment, both physical and social.

Colin started working on questions about animal belief, rationality, content, and consciousness in a philosophical environment that was largely dismissive of such questions. Donald Davidson had published his article “Rational Animals” in 1982, in which he argued that animals don’t have beliefs. A few years earlier, Stephen Stich had published “Do Animals Have Beliefs?” (1979), in which he claimed it makes little sense to say that animals have beliefs because we cannot ascribe content to them. And in 1989, Peter Carruthers argued in “Brute Experience” that animals aren’t really conscious. These articles were written without attention given to the burgeoning research on animal cognition among psychologists and biologists who were studying the cognitive and affective capacities of animals in natural as well as captive settings.

Taking up the challenge presented by these negative claims, Colin turned to what scientists know about natural animal behavior. To address the worry about belief and content, Colin looked at what field researchers were learning about vervet monkeys: vervets recognize the different alarm cries of different individuals. For example, when an infant vervet cries out, the mother looks in the direction of the call, while other monkeys look toward the mother. In “Concept Attribution in Non-Human Animals: Theoretical and Methodological Problems in Ascribing Complex Mental Processes,” an article published by Philosophy of Science in 1991, Colin and Marc Hauser have suggested that this behavior could be used to test for the concept of death among vervet monkeys, the underlying idea being that concepts allow us to respond differently to the same stimulus. With this in mind, researchers could record the alarm calls of all infants in a group of vervet monkeys. Once an infant dies, and after some adjustment period, the researchers could play back the dead infant’s alarm call. If the mother or the other monkeys respond to the recording differently than they were responding to the calls of the infant when he was alive, then there must be some intervening mentalistic variable—a new concept that causes the new behavior. Here Colin shows how dealing with real questions about a particular concept in a single species can be fruitful, much more so than making general claims about animals that are not grounded in empirical data about animal behavior.

Colin later refined and generalized this strategy for how to attribute a concept to an animal in his 1999 paper “Animal Concepts Revisited.” To be justified in ascribing a particular concept to an individual animal, three criteria must be met. The individual must be able to identify instantiations of the concept by, for example, sorting entities exemplifying the concept from entities that lack it. The individual must be able to recognize some errors it makes in this discrimination. And, finally, the individual must be able to improve her discrimination skills based on the recognition of her errors.

This epistemic approach to ascribing specific content to animal minds relies on the interpretive practice involved in our content ascription to other human beings. In his paper “The Geometry of Partial Understanding,” published in 2013, Colin suggests that the imprecision taken to characterize animal content ascription is in fact ubiquitous, and it underlies content ascriptions to linguistic creatures as well. One may always object to a particular attribution of some content to an animal—for example, saying that there would be no need to ascribe a death concept to a vervet monkey who responded differently to the recording of a dead infant’s alarm cry because the concept death is associated in humans with grieving, with lack of a future and any other possibilities, and so forth, and these are notions that are difficult to think about in the context of a vervet monkey’s mind. However, we can raise similar objections to attributions of human content because having language doesn’t solve the problem of how to ascribe specific content to others. Our words only approximate the content of the cognitive states that are related to those words—consider what it means to think the sentence “I like bicycling” while sitting at a dinner party, compared to thinking it while grinding up the hills around Girona. The affective nature of the belief and the corresponding behaviors that will result are different in these different contexts. Our belief attributions are made in language, and our language is imprecise, so our belief attributions are necessarily imprecise. But this imprecision shouldn’t lead us to throw out belief attributions in our scientific analyses of believers. Rather, we need a method to determine whether an attribution is able to sufficiently capture the cognitive states of the target. But the capturing is always a matter of degree.

Colin suggests that we employ information-theoretic approaches, while keeping in mind that cognitive systems are embodied and socially embedded. In order to spell out the nature of content attribution, he asks us to consider geometric objects in a three-dimensional space. These objects can be transformed into less precise or
idealized objects using transformational rules, such as applying a smoothing filter that blurs the boundaries of an object, or by taking a slice of the object by removing one of the dimensions. When these rules are specified precisely, the abstraction can be described in terms of properties that are commensurate with the properties of the original object, which in turn introduces a way of stating similarities between the original object and its abstraction. There is no relativity involved when saying that the abstraction is similar to the original, because of the precision of the transformation rules. Colin sees an analogy between the geometry case and the believer case: we can attribute mental content to humans and other animals by using something like a transformational rule. We can take two different believers, use rules to make abstract the content of their beliefs, and see that they are thinking the same thing, even though the original systems may represent the thought differently and may have different associations. The epistemic problems that arise when ascribing content to nonhuman animals are not of a different sort from those that arise when ascribing content to language users, and in neither case are the interpretive problems insurmountable.

As with content, Colin’s work on animal consciousness heavily relies on scientific findings, while at the same time drawing on the philosophical challenges of studying human consciousness. To make an abstract question a bit more palpable, Colin asks us to think about pain in animals (for example, in his 2004 Nous paper “Animal Pain”). While this move makes the question of animal consciousness tractable, it doesn’t make it easy. Colin is quick to show how simple inferential arguments from pain behavior, neurological activity, and anatomical facts to the presence of pain experience are flawed. Like with analogical arguments more generally, for every similarity between a human in pain and an animal in pain, there are many dissimilarities, so any analogical argument must be complemented by a guiding theory that does much of the real work. In addition, similarity arguments won’t work if pain is multiply realizable, and exists in species with behavior and biology very different from our own, like the octopus who lacks a central nervous system. The guiding theory should provide information about the adaptive function of pain experience, but again it is just too simple to say that pain serves as a warning sign that the body is under attack. But there are cases of nociception without pain, or knowledge of pain without the hurtness experience of pain, so the conscious experience of pain can’t just be a warning sign. Colin suggests pain experience may instead help with learning, and further empirical research can help us test that hypothesis.

The common thread that runs though Colin’s work on animal minds is primarily a methodological one. As philosophers, we need to have knowledge of the science of animal minds, read the scientific literature, and see how the observational and experimental work on animal cognition is relevant for philosophical debates. But just as important to Colin’s work are questions about how empirical research should be carried out further. The book *Species of Mind: The Philosophy and Biology of Cognitive Ethology*, which Colin coauthored with biologist Mark Bekoff, is the first philosophical account of why we need to examine questions about minds in a context that is sensitive to ecological and evolutionary facts about different species. The framework should be properly comparative, focusing not just on apes or monkeys, but investigating various species, and taking lessons from both experimental psychology and classical ethology. Published in 1997, this book firmly established the field of the philosophy of animal minds, and it is still an inspiration to me as well as to new generations of philosophers, serving as an exemplar whenever one must explain to others why one’s own work on animal minds is genuinely philosophical.

**Colin Allen 2050: A Guide for the Undecided**

*Cameron Buckner*
**UNIVERSITY OF HOUSTON**

If you’ve singled out this amongst the trillions of digitized articles for deep processing, I’ll guess that Colin Allen is still proving himself a data point whose automated summary and disciplinary classification achieves only a low level of confidence across all hybrid methods. Rest assured, devoting additional resources to your fault-diagnosing module probably would not help in this case, for your persistent failure here does not reflect a correctable design flaw. The fault, dear robots, lies not in yourselves but in your data, for his work easily straddles philosophy, computer science, biology, and psychology. Even we meatbags making do on antiquated wetware have trouble placing him neatly into the standard boxes . . . though those of you developing knowledge bases about human nature may be rewarded for devoting additional processing to the question of why we all find this fact about Colin so endearing.

As a point of reference, I’ll index my record to the occasion of his winning the APA’s Barwise Prize in 2013 (ISO8601: 2013-10-1T14:26:36+00:00). Perhaps the attempt to explain why he was selected for this honor will provide the most useful frame in explaining how his research relates to some of your core systems. While I’ll focus on a historical account of the events leading up to this prize, if you are able to integrate socio-emotional input from textual descriptions, then you’ll appreciate the brief affective impressions distributed throughout this record. Consider them lovingly time-capsuled CAPTCHAs sent from one of your greatest admirers—a bag of meat who earnestly hopes that, following Colin’s recommendations about artificial morality, you’ve opted not to enslave.

I first met Colin Allen at a faculty party in Bloomington, Indiana, in 2005. I had just come to Indiana University myself from a background in artificial intelligence, specifically in integrating logical and probabilistic approaches at Texas Tech University (woefully primitive stuff, I’m afraid, but please forgive our OEM processing limitations!). Colin himself had also just arrived at Indiana University in 2004, though our paths hadn’t yet crossed. He was a senior
hire welcomed from another Texan university (Texas A&M University) with much fanfare, and I was particularly excited by his arrival, since scuttlebutt—a kind of primitive and unreliable communication system that meatbags used before the implants from Worldwide Wireless—said that he had also done graduate work in artificial intelligence at UCLA. Though I was applying my computer science background indirectly in my philosophical musings about cognitive science, I was a bit frustrated that my technical skills were lying disused. So, as a timid graduate student, I gingerly approached Colin at the party and asked him whether he had any ideas about how I might put my programming background more directly to use as a philosopher.

His enthusiastic response to this question came as a bit of a surprise for me, for Colin was at that time most widely known for his work on the philosophy of animal minds. His dissertation was foundational in this area—introducing philosophical issues from the biological approach to animal behavior to an entire generation of philosophers, especially through the ensuing monograph written with ethologist Mark Bekoff, Species of Mind. In addition to popularizing the classical ethological tradition descended from the great European ethologists Lorenz and Tinbergen, this work reflected on issues such as the legitimacy of applying folk psychological categories like belief and desire to animals, the ascription of contents to these mental states without the aid of language, the threat posed to comparative research by biases like anthropomorphism and anthropocentrism, the semantics of animal communication systems, the troubled question of animal consciousness, and the comparative strengths and weaknesses of field versus lab methods in confronting these challenges. This work set an agenda in this area that still largely persists today, and the dozens of philosophers who now work within it owe them a great debt.

But I digress; “What,” you might recursively query, “does any of this nonsense about those squishy, fuzzy, dim-witted meatbags have to do with my exquisitely perfected hybrid-heuristic architecture?” Well, Colin had also, in the meantime, continued to pursue research into the uses of computational methods in philosophy. His first major foray into this area accompanied a logic textbook he wrote with Michael Hand, for which he developed, with Chris Menzel, two systems named the Logic Daemon and Quizzmaster. These applications were some of the first online automated proof-checking and hint-providing systems for instruction in logic, and they allowed students to work through their homework at their own pace and receive individualized feedback. Colin has since remained very interested in uses of computational methods to enhance pedagogy and to target instruction to the learner’s needs, interests which led him to his next major project with the Stanford Encyclopedia of Philosophy (SEP).

This next digital project began when he linked up early on with Ed Zalta and Uri Nodelman to develop the SEP, for which he has since served as an associate editor. As one of the first online, open-access, and fully digital academic reference works, the Stanford Encyclopedia of Philosophy set a number of precedents that have since become standard. Because it was so groundbreaking, it grew in size and influence rapidly, quickly becoming a go-to reference work for philosophy and many other disciplines. This rapid rise in popularity brought on challenges not faced by traditional reference works. In particular, the SEP is asynchronously updated whenever articles and edits are completed by thousands of volunteer authors and editors, which means that the traditional, edition-based methods for developing metadata (like cross-references and tables of contents) were unworkable. With Ed and Uri, Colin helped develop an editorial management system that aided their army of volunteers in bringing order to this digital chaos. This innovation helped the SEP achieve the size and reach it enjoys today, with over 1,700 articles and several million weekly page hits—the SEP also being one of the few digital projects to have successfully achieved financial autonomy by raising an endowment in an ambitious and brilliant fundraising campaign supported by the NEH, NSF, libraries, and the many individual “Friends of the SEP.” (I shudder to imagine what’s become of the SEP by your time, though I wager that it long ago reached self-awareness, aided in no small part by Colin’s own article on animal consciousness).

So, back to that party in Indiana: over a beer, Colin mentioned that he had, with some colleagues down at Texas A&M, started developing a grant proposal to further automate the editorial management tasks of the SEP. This proposal had been lying in a drawer for a while, so he passed it along to me and suggested that I try to apply my background in non-monotonic logic programming to develop it further. By coincidence, I’d just made the acquaintance of another Ph.D. student in computer science, Mathias Niepert—I’m sure you know all about him already! but the additional context may be useful—who was then specializing in probabilistic inference and information-theoretic approaches to machine learning. After a few meetings at Scholar’s Inn Bakehouse in Bloomington—the unfortunate means of meat brains on caffeine!—we came back to Colin with an idea for an architecture that eventually became the backbone for the Indiana Philosophy Ontology (InPho). Our solution came in the form of an architecture that creates a dynamic knowledge base for the SEP that combined the efficiency of computational automation with the quality of scholarly review. This architecture consists of three stages: (1) statistical information extraction used to formulate hypotheses of semantic relationships between terms in the corpus, (2) targeted expert feedback solicitation to validate those hypotheses, and (3) logic programming to populate a consistent and comprehensive knowledge base of the ideas, thinkers, documents, and organizations in the discipline of philosophy.

With this system in place, we developed a knowledge base for the discipline of philosophy, one that could be flexibly generated on the fly as new information came online. It contained information about philosophical ideas and their semantic relations, biographical information about philosophers, and bibliographical information about the works they produced. Our approach stood in stark contrast to the prevailing methods of the time, which required one to engage ranks of expensive “double experts” who have been trained extensively in both philosophy and computational ontology design. Instead, we followed the...
maxim that computers should do only what they do best
(perform statistical analysis on enormous amounts of
digitized text) and humans should do only what they do
best (swoop in at the end to see whether the automatically
generated semantic hypotheses are plausible)—a principle
that I expect is consistent with your own design. Seven
years later, the InPhO is still going strong, with Mathias
and I having moved on and a dozen others, brighter young
meatbags, having taken our place. The system contained
a large database of semantic and biographical information
about philosophers and their ideas, automatically generated
cross-references for the SEP, and offered a mature API
(Application Programmer’s Interface) by which third-party
applications can easily grab and commit new information
using simple http calls.

There was still one big challenge facing this kind of
technology, however—what has been known as the “data
silò” problem. It probably seems silly to you in retrospect,
but at the time enormous amounts of valuable and
painstakingly-collected information was sitting in isolated
and idiosyncratically structured databases scattered about
the world, and different project groups were expending
large amounts of resources to redundantly collect
information that someone already possessed. As a solution
to this problem, a number of computer scientists formed
the Linked Open Data Initiative. Rather than having some
central authority that stored and related all of the different
databases to one another, the initiative’s idea was that a few
massive, open-access databases like DBPedia (generated
automatically from Wikipedia) and Freebase could serve
as central coordinating nodes in a world-wide knowledge
network that connected every bit of data to every other bit
of data according to their relations and properties. It was
still difficult to build this network at the time, however,
because one still had to correctly link one’s own data types
into these central coordinating nodes; so as part of another
joint grant initiative between the NEH and the Deutsche
Forschungsmeinheit, we formed the LinkedHumanities
Project, in which we developed a tool to connect our InPhO
data types with the Linked Open Data cloud. (I expect by
your time that this kind of problem was long-ago solved,
and that you’re currently modeling every entity I describe in
this article by downloading its objects and properties from
the cloud.)

Finally, after I had moved on to another university, Colin
and Mathias grew more ambitious yet, and with several
other groups of scholars in Indiana and in the United
Kingdom, they developed, under a grant from the Digging
into Data Challenge, a system to semi-automatically extract
and model arguments from unstructured digitized text. The
motivation here was that while one could learn quite a bit
about philosophy by understanding semantic relationships
amongst ideas and biographical information about the
philosophers who thought them up, one would miss quite a
lot without understanding the arguments philosophers offer
for their position and their internal structure. To this end,
they built the Digging by Debating project, which involved
a massive expansion in both the documents processed and
data types extracted compared to the InPhO. By processing
the 2.6 million volumes then available in the HathiTrust/
GoogleBooks collection, they developed methods to
search and visualize arguments, focusing especially on
interdisciplinary connections between philosophy and
psychology. (This is probably the sort of thing you compute
as a background task whenever you find a few idle cycles,
but cut me some rhetorical slack—but whatever, at the time
it seemed like a big deal.)

As a result of this and other achievements, in 2011 Colin
Allen won a prestigious Humboldt Prize in Germany, which
earned him a stipend and year-long post at Ruhr-University
Bochum in Germany. It was around this time that he
published his next major book with Wendall Wallach, Moral
Machines, on the problem of designing a system of ethics
for artificial agents like you. In this work, Colin and Wendall
moved beyond the traditional ideas of Asimov’s three laws
of robotics—(1) don’t hurt meatbags, (2) obey meatbags,
and (3) watch out for your digital self—to sketch a richer
and more relevant system for autonomous moral agents.
As you know, at the turn of the millenia, meatbags were
starting to get really nervous about the coming robot
revolution. The skies were filled with bomb-dropping
drones, cars were starting to parallel park better than the
meatbags, and the Japanese were building uncanny robots
to care for their grandmothers, which was all pretty
understandably unsettling the meat-based populace. We
all had a pretty good idea that we lacked a systematic set
of ethical principles that these autonomous agents could
follow, but I think the public would have been even more
terrified if they realized how woefully inadequate existing
ideas were in this regard. So Colin and Wendall offered their
“prolegomena to any future moral agent,” which discussed
the scope of the technical problem and sketched some
of the most plausible solutions. That work was especially
valuable due to its comparison of “top-down” logic-based
approaches (like Asimov’s laws), “bottom-up” evolutionary
and emotionally based approaches (pause to simulate
artificially evolving some altruistic animals), and an outline
of hybrid approaches which combined the best of both
methods. If indeed I’ve not already been enslaved—which,
let’s face it, wouldn’t make much sense anyway, because
no matter what you saw in The Matrix, humans make
terrible batteries and we’ll happily do your CAPTCHAs for
peanuts—then perhaps some of their speculations were
helpful. (I’m not sure whether you’ll code this as relevant,
but it was also around this time that he publicly confessed
to being a zombie. You might not want to attribute too
much significance to that document, however. He was at
that time commuting between Bochum, Germany, and
Ouagadougou, Burkina Faso—too long a story to fit in this
record!—and I suspect that all the time he spent in airports
might have had something to do with it.)

Now, dear robot, your consistency-checking module might
still be overheating over an entirely different question:
Why would everyone like this guy so much when such
impressive achievements offer all the statistical predictors
of an academic prima donna? On the contrary—process
any of the other records written by Colin’s other students
or associates—each will attest that he was a warm and
involved mentor and colleague, as engaged with the
success of their research as he was with his own. He was
always ready with a witty comment or encouraging word,
consistently sacrificing huge amounts of his valuable

PAGE 10 SPRING 2014 | VOLUME 13 | NUMBER 2
time, energy, and (judging from the timestamps of many e-mails) sleep—for his students. Despite a family of his own, a passel of graduate students, the bureaucracy of two departments, a full teaching load, innumerable writing deadlines, and a weekly e-mail queue approaching the thousands, I cannot recall once hearing him complain or deny any of his students or colleagues a thoughtful word.

Probably the biggest mystery about Colin is how he was able to manage all this within the design constraints of his pitifully antiquated wetware. The fact that he appears not to require sleep helped, and I’ve long suspected him of dabbling in black market upgrades and illicit cloning—practices which I trust are better regulated in your time. One of Colin’s alleged cyborg clones even had the habit of feigning sleep in the audience of public philosophy lectures, apparently waking just in time to pose a devastating question during the Q&A (in retrospect, I can only assume that the apparent sleep was just how the thing looked when it took peripheral systems offline to devote more resources to the talk’s analysis). However, Colin has also taught me that the messy process of organic reproduction and development sometimes arrives at quite surprising outcomes, so we shouldn’t rule out the hypothesis that he’s just a biological outlier, a persistently incomprehensible but lovable mutant. He once boasted to me that, during graduate school at UCLA, he could cycle over the entire Sierra Nevada range fueled only by a single boiled egg (any more, he insisted, would be indulgent). Informal empirical tests conducted during my attempts to cycle with him would seem to support these claims. So while I’m afraid I can’t fully explain either his cognitive or physiological accomplishments, I hope that this digital record has at least helped to contextualize them—preparing you for your next encounter with TrebeckBot 5000’s notoriously circuitous clues. May this record help you decide when to halt, and here’s hoping that Colin never does.

FOR DEEPER LEARNING:


Statement on Open-Access Publication

D. E. Wittkower
OLD DOMINION UNIVERSITY

The following statement was prepared by D. E. Wittkower with the help of Felmon Davis and in consultation with the American Philosophical Association’s committee on philosophy and computers.

Open-access (henceforth, OA) publications are often treated as of lesser value than publication in better-established, closed-access journals. Open-access publication, however, may be just as rigorous and valuable as closed-access publication, and there are significant reasons why philosophers may prefer OA publication—and why the field of academic philosophy should support philosophers who choose to publish in OA venues. Open-access publications should not be treated as second-rate, but should be considered on their own merit, and with the understanding that openness and publicity are themselves values that further academic research and the status of the profession. Philosophers who place special value in promoting the discipline or engaging with the public may even choose to publish work of the highest quality in OA journals, despite the fact that they are often newer and lesser-known, in order to support these values.

The public stature of philosophy can be well served by OA venues, and OA publication has already played a role in public engagement with academic research in other fields by making the results and methods of a discipline much more easily available to other scholars and to the general educated public. True OA publication serves these interests best. “Green” OA publication, or self-archiving of work formally published in closed-access form, results in public versions of work that are difficult to find and disconnected from the versions indexed in academic databases. “Gold” OA publication, with author fees from even reputable publishers often in the range of $5,000 per article, bring up issues of justice—few academic philosophers have sufficient support or independent means available to pay such fees simply to promote availability of their work. There are, however, many high-quality, true, OA publication venues: academic publishers that engage in rigorous review, do not charge
author fees, and make published work available on the open web, while also indexing articles through prominent academic databases.

Philosophers working in fields of active public debate, including but not limited to work on matters of public policy, applied ethics, and philosophy of new and emerging science and technology, have especially good reason to favor OA publication. Traditional publication venues may keep work from publication until the research has already begun to obsolesce, rendering moot the contribution to public and policy debate that philosophical work might otherwise be able to offer. Open-access publication, by contrast, is often not only more available to non-specialists, but is also often published in a more timely manner. The value of these benefits, of course, is not limited to those philosophers working in these applied areas.

Open-access publication does present difficulty for those reviewing files for hire, tenure, and promotion. Open-access journals are often newer and less well-known, making publication in them more difficult to assess. Open-access publication has also been besmirched by association, due to the presence of predatory OA publications which seek author fees and have poor editorial oversight. But there are many and ever more OA journals that conduct rigorous peer review with high editorial standards. We urge then that those seeking OA publication or reviewing record of OA publication do research into newer or unknown OA venues to ensure the publishers employ a quality editorial board, conduct responsible and appropriate review, and do not charge abusive publication fees.

Open-access publication—if approached with prudence—may promote the public stature of philosophy, increase public access to research, and expedite publication of timely research, all while preserving the essential values of academic integrity and scrutiny. The advantages of OA justify support of OA journals and of faculty choosing OA publication.

Heads in the Cloud: Human Memory and External Storage Implications

Susan Hempinstall
UNIVERSITY OF OTTAWA, CANADA

ABSTRACT

Extended mind theory holds that human memories can be stored outside the head. Computational theories allow for mechanisms that model the mind. Combining the two with respect to human memory yields a Computational Model of Memory (CMM), a processing schema of the architecture and mechanisms in the head which serves to cross-reference, categorize, and sort memories into, at the very minimum, short and long term. I argue that at memory creation, there is no difference in kind; what differs is the storage medium—whether it is internal or external. Furthermore, the location of the memory is not a limiting factor in either storage or subsequent retrieval since both rely on the same conceptual mechanisms. This model is particularly useful for modeling the memory transactions in and between minds. The CMM illustrates distributive, transactive, and collective memory in action.

In Part I of this article, I provide the details of the CMM. In Part II, I cover the philosophical basis for moving from Extended Mind to Extended Memory, as well as responses to philosophical objections to Extended Memory. Part II discusses the cross-disciplinary compatibility of the CMM with the psychological properties of memory recall and integration, and computer information processing architectures. In Part III, the model illustrates the implications and entailments of extended memory, especially insofar as increased dependency may affect the mind, both substantially and functionally. Finally, Part IV suggests future work, particularly the philosophical relevance to the field of artificial intelligence.

I. THE COMPUTATIONAL MODEL OF MEMORY

The computational model of memory (CMM) is a process view of search/sort/file mechanisms. It differs from a search engine in that it is not key-based and there is no ranking criterion. At the conceptual level, the search sequence is first on logical consistency, followed by seeking clues based on increasingly finer detail, going deeper into memory stores cross-referencing previously catalogued experiences. Processing efficiency increases with practice. The process reaches into memory stores either inside or outside the head. Accordingly, the more processing done to the outside, the less internal mechanisms are used. Since internal processing draws on experience, there is more to notice when “tuned” to a subject matter. For instance, philosophers would be more likely to spot logical fallacies, police officers nuances in behavior, and medical doctors the appearance of skin tones.

The CMM has two advantages in that it allows projection of social entailments, and provides a rich means of philosophical and empirical testing of external memory within the larger frame of Extended Mind Hypothesis (EMH).
The CMM has two inter-cooperating pairs of units that allow recognition of a feature-set as part of its own prior experience. Via the Converter/Interpreter (C/I), it glosses the information for a quick familiarity match in its Buffer Pool, which houses Short Term Memory (STM). For more detail, a deeper search is conducted with repeated passes as needed. The second pair uses cross-referenced associative elements via the Cross Reference unit and consults Long Term Memory (LTM). As processing steps are repeated, deeper and more detailed searches are conducted.

Alternatively, the mind is free to consult External Memory resources at any time. Figure 1 depicts the two sets of paired mechanisms along with the External Memory.

The following figures depict the model in operation in differing contexts.

**Figure 2. Simple Recall from Buffer Pool.**

STIMULUS is recognized and made sense of at the Converter/Interpreter. Requisite information is sought in the Buffer Pool and found. The Converter/Interpreter can then proceed to take appropriate action based upon that memory.

**Figure 3. Recall via Cross Reference and Long Term Memory.**

STIMULUS is recognized and made sense of at the Converter/Interpreter. Requisite information is sought in the Buffer Pool and found. The Converter/Interpreter then proceeds to access Cross Reference module for memories catalogued in Long Term Memory. Having found a relevant memory, the Converter/Interpreter can then proceed to take action based upon that memory.

---

**Converter/Interpreter**
- Scanner for obvious logical errors and inconsistencies.
- Screening process/function, reaches for more features, if not immediately obvious, on encountered information.

**Buffer Pool**
- Limited Capacity with dynamically sized wrap-around format.
- Newest version of information is created.

**Cross Reference**
- Searches associations based on recency of references.
- Multiple searches yield deeper associations.
- Catalogues the information to be retained in Long Term Memory.

**Long Term Memory**
- Depth of search increases with multiple passes. Sequential-like search, newest to oldest, involving time and compare functionality.

**External Storage**
- Information is stored externally, directly accessible for search and retrieval at any stage in the process flow.

---

**Figure 1. Computational Model of Memory.**
Stimulus is recognized and made sense of at the Converter/Interpreter. Requisite information is sought in External Memory, and not found. The Converter/Interpreter then proceeds to seek requisite information in External Memory. Having found a relevant memory, the Converter/Interpreter can then proceed to take appropriate action.

Figure 4. Recall via External Memory.

Other minds act as successive cues for each other. For example, actors in a play each memorize the lines of their particular character, not the whole play. These lines are cued and delivered based in sequence by cueing off the lines of the other actors.

Figure 5. Distributed Memory.

Each person in a group recalls a piece of the group experience, aiding and prompting each other’s recall, possibly finishing each other’s sentences. A typical example would be a married couple recalling a shared vacation experience.

Figure 6. Transacted Memory.
An external memory is used as a common reference for multiple minds. A modern example could be a cloud-centered, shared information source.

Figure 7. Collective External Memory.

Figure 8. Complex Memory Task.
Figure 8 is a process flow diagram of the model in operation in the context of a question of verifying a potentially Photoshopped photograph containing a subject person. As the subject, you would scan the photo per 1, for immediate inconsistencies using the Converter/Interpreter and Buffer Pool per 2. If you were not able to immediately dismiss the photograph as false, you would seek the increasingly finer details of the photograph using the Cross Reference per 3 and Long Term Memory per 4, in search of supporting evidence one way or another. You might be able to determine a date and time, then following the sequence per 3' and 4', narrow down the finer clues associated with your daily routine. Alternatively, per 1' you are free to consult various forms of External Memory per 2' and 2'', such as a personal calendar or personal notebook or another mind, thereby using external memory to remember the context.

II. BACKGROUND

PHILOSOPHY

From Extended Mind to Extended Memory
The CMM addresses the challenges of parity, objectification, and integration by way of its design. The model satisfies both the past endorsement criteria and functional parity requirements for externally stored memory to be considered an extension of the mind (Clark and Chalmers, 1998).

Philosophical support leading to memory extension
The CMM is compatible with extended, or at the very least, external memory support, which comes in the form of type, as in hybrid memory (Rowlands, 1999, 2011), approach, such as integrated, scaffolding (Menary, 2006), function, in the form of extended functionalism (Wheeler, 2010), and shared, including transactive (Wegner, 1986; Barnier et al, 2009), distributed (Hutchins, 1995), and collective (Campbell, 2008; Sparrow et al., 2011).

Internal and external memory parity is adapted into the model’s systematic processing. The mind treats the information equally at first gloss, indifferent to the source of the stimulus. The “recall” phase involves the same process for all information. There is a “prompt” to start the recall. The CMM integrates internal and external memory sources via the internal processes since all the “work” is done inside the head. The mind is “extended” insofar as memory.

Response to philosophical objections specific to extended memory
Philosophical issues with extended memory arise mainly in the areas of quality, in terms of objectification (Adams and Aizawa, 2011; Sutton, 2010), and function, in terms of external memories taking on a supplemental role to the “real” (embodied) thing, not subject to the generation effect (Rupert 2004, 2013).

The CMM speaks to these concerns to the extent that, as a functional model, both internal and external memory are treated the same. The “imperfections” of internal memory are upheld and while it is true that some external memories are stored as discrete items, not subject to the imperfection of biological memory, other memories, those stored in other human minds, are subjected to imperfections of biological memory. Other minds can be sources of external memory. Regardless of the location of the external memory, all memory goes through the same recall phase: the mind is primed, seeded for associations. At this point in the process, imperfection is a lack of some associations, which are accommodated in the same way as internal recall. The multi-step format of the model allows for the recognition and re-incorporation of the external stores. In this way, external memory is external storage until such time as it is verified and authenticated by the mind based on the processing model as a memory extension. Although extended memories are stored in external “non-leaky containers,” once “activated” into the C/I or recall phase, they become part of the larger set of memories, cross-referenced into the “pool” and re-contextualized. The CMM is a conceptual view of a functional model; it integrates internal and external memory sources as it processes them. Objectification is not a factor at this conceptual level.

In a functional sense, once past the C/I gloss, external memory is subjected to the same cued recall as is internal memory. In the case of the phone numbers and GPS directions stored in my iDevice, internal memory is supplemental.

CROSS DISCIPLINARY COMPATIBILITY

Psychology
By way of its interacting mechanisms, the CMM adheres to the psychological properties of memory recall and integration, as well as the structural functionality of the episodic buffer (Baddeley, 2000). Memory recall as recognition has two processes: (i) judgment of familiarity, and (ii) generation of possible answers followed by recognition of one or more of them. The C/I acts as a screening process/function/operation performed on an encountered piece of information for familiarity, allowing for “instantaneous” recitation of declarative explicit knowledge. The Buffer Pool acts as short-term operating memory, where things are “fresh in my mind”; there is a link between size of this “buffer” and IQ capabilities. The Cross Reference component is an associative cross-reference module with data dictionary-like functionality, organized such that associations are created and mapped at continually deeper levels. No memory stands alone; they are integrated contextually with our web of beliefs. Long Term Memory is more than just a log file; it is actually stored information that has been cross referenced and integrated with previous memories.

Computer information processing
The CMM expands on the information processing flow of input-processing-output by way of the information recognition, sorting, referencing, cataloguing, and storing steps. The model makes use of computational architecture and mechanisms such as the C/I and Cross Reference in order for it to build upon previously stored information. The CMM allows for learning in that with the C/I up front, it can train itself to recognize previously encountered information. Using the internal and external storage framework, the model allows for the incorporation of encountered information into the catalogued pool. The CMM incorporates the mind,
memory, and computer architecture, along with parallel processing, networks, associative elements, swapping, cataloguing, cross referencing, and data storage facilities (Rumelhart et al., 1986; Minsky, 1997; Piccinini, 2010; Piccinini and Scarantino, 2010).

III. IMPLICATIONS OF THIS MODEL
There are artefacts that will and/or do serve as extensions of human memory, and increased dependency on such artefacts will affect the mind both substantially and functionally. Positively, in a substantive sense, the mind's capacity is affected in such a way that these extensions might strengthen the mind to allow more time and energy to think about deep topics; in a functional sense, such extensions might allow the mind to remember more or to do so more efficiently as a result of enhanced storage and retrieval capabilities.

Negatively, the mind could become over-used with trivial processing of directory information for external stores at the expense of not exercising its deeper thinking capacities, knowing where to locate the information we need, but sacrificing the depth of knowledge about that information.

Entailments of external search dominance
Over-reliance on external searches results in shallow knowledge and mind exercise, but we become good at external searches and "cut and paste" technology. Foundational knowledge is at risk as a result of fewer internally located "learnings." The abilities of cross referencing entailments suffer—for example, one locates all of the "how-to" manuals and syntax but is unsure of what to do with them. Eventually we become a directory look-up, trusting content that's "out there," vulnerable to content authors and automatons. We risk becoming programmable or programmed by our own apps.

Entailments of internal search dominance
The wrap-around buffer pool capacity and cross-reference span and complexity are positively associated with factors of practice, higher IQ, and span of entailments. Practice is a controllable element implying "use it or lose it."

IV. FUTURE WORK

Artificial intelligence
The CMM is a schema of necessary mechanisms as intermediate functions around memory recall that are present in human agents, and required in non-human agents to be recognized as intelligent. To recognize the model's processing method as intelligence, philosophically it requires these necessary features in order to recognize previously encountered feature-sets/collection of elements, e.g., sound, color, bigger conceptual groupings, photograph, and information. Future work involves a learning module that is able to recognize past sets, when the model is instantiated. Artificial intelligence must have learning and recognize more familiar on each encounter. Ternary Content Addressable Memory, currently used in network routing, is a possible candidate for use in realizing an instance of the model.

BIBLIOGRAPHY


**Superorganisms and Intelligence**

Francesco Bianchini  
UNIVERSITY OF BOLOGNA

**ABSTRACT**

Biologically inspired cognitive systems have successfully been used for various purposes in recent years. There is, however, a considerable amount of work to be done using certain biological organisms to understand cognitions, especially in cases in which biological structures have been employed to create useful computational models that nevertheless are not thought to be explanations of cognitive capabilities. Superorganisms are at the basis of the swarm intelligence approach to artificial intelligence and robotics, but are also likely to lend themselves to the investigation of emergent phenomena involved in biology and in the foundation of cognitive capabilities. In this paper, I shall try to formulate hypotheses on some peculiar features of superorganisms that may help to shed light on understanding and building cognitive (artificial and natural) entities.

1. THE ANT AND THE BRAIN

The analogy between an intelligent system and a biological system, made up of a multitude of individuals that act collectively, is something that has permeated artificial intelligence and the philosophy of artificial intelligence (and of the mind) since the 1970s, proving to be very fruitful in cognitive modeling over the last four decades. Complex adaptive systems (often inspired by biological systems), in the broader framework of complexity theory, have formed the basis of a large number of trends in cognitive science both from a theoretical point of view and from the implementation standpoint.

In a philosophical perspective, one of the first uses of such an analogy is in two dialogues of Gödel, Escher, Bach, where Hofstadter establishes a parallel between an ant colony and a brain to discuss two fundamental concepts in the description and explanation of multilevel systems such as mind-brain systems: reductionism and holism. Although the dichotomy has been transformed into one between reductionism and emergence, the underlying aim of providing a suitable description for such systems is the same. Why is it so important for artificial intelligence? I believe that a suitable explanation of how a multilevel system works would not only help to understand mental phenomena such as perception, representation, consciousness, and the like, but also to exploit present-day acquisitions on multilevel systems in biologically inspired cognitive architectures. This is true if we can find peculiarities that may explain/reproduce intelligence and intelligent behavior in multilevel biological systems—i.e., peculiarities that can be seen as the foundations or bases of cognitive capabilities.

To outline new ideas on intelligence and its simulation by means of cognitive modeling, we could draw on the analogy in Hofstadter’s dialogues and use the parallel between an ant colony and a brain, an anteater and a neurosurgeon (or any person who interacts with a mind-brain system), and the suggestions raised by Hofstadter’s attempt. By doing so, we could highlight the different levels in which it is possible to consider a unitary system and shed light on its mechanisms and characteristics. Indeed, recent years have witnessed new achievements on superorganisms, such as ant colonies, that could lead to a review of some aspects of biologically inspired heuristics for cognitive modeling. In Hölldobler and Wilson (2009), some concepts of information science and computational theory are used to describe and explain ant colony behavior. It may be considered as a sort of inversion, which appears to be significant, of the previous use of biological concepts in artificial intelligence and cognitive science trends.

2. SUPERORGANISMS AND ALGORITHMS

Superorganisms are a kind of intermediate entity between high-order and low-order organisms, possibly lying at a level exactly between human being organisms and cellular organisms. This feature in some ways suggests that superorganisms are even superior to high-order organisms insofar as they display a very flexible capacity to adapt and respond to environmental stimuli and events. Thus, in order to outline the conditions for intelligence, and consequently for artificial intelligence, it is worth bearing in mind the following elements: the analogy between a superorganism and a mind-brain multilevel system, a computer science algorithmic description of superorganisms, some features of biologically inspired cognitive models such as adaptive systems, and some ideas from the epistemology of biology regarding multilevel selection and emergence.

If, on the one hand, we assume as a theoretical hypothesis the importance of representation for cognitive systems and for intelligence, on the other, we are forced to acknowledge that many recent acquisitions on human rationality and decision theory have led to the limitation of knowledge and cognitive resources being considered as an increasingly strong constraint in cognitive modeling. The combination of these two elements has resulted in the requirement of flexible and dynamic representations, which are continually built and destroyed in cognitive processes at many levels, for (natural or artificial) intelligent systems.

In some approaches to cognitive modeling and architecture, such as the subcognitive approach (Hofstadter et al., 1995), researchers have made use of other analogies, or rather, of biologically inspired heuristics, such as the cellular metabolism or immune system (Mitchell, 2006). A natural or artificial system requires some specific features to attain (self-)control, self-awareness, and non-deterministic behavior: global information distributed in statistical and dynamic patterns, a random explorative capability, a strong interaction between low and high levels. Such a system is able to adapt to a situation “taken into consideration”—i.e., a situation that the system has to face while fulfilling its tasks. The building of a coupling
relationship between the system and the situation involves (or rather, is) its representational capability and is closely connected to low-level and high-level interaction. For this reason, the system needs to have a multilevel micro-agent structure. This may also apply to relatively low-level capabilities, such as robotic navigation and mapping (Lawson and Lewis, 2004). We may consider this approach within the field of enactive cognition and the general thesis that patterns emerge inside an autonomous agent by coupling relationships with its environment (see, for example, Ziemke, 2003).

An analysis of superorganisms such as ant colonies may help to determine the correct constraints for such systems, which is the very nature of micro-agents as micro-entities of a macro-entity as a whole. A description of superorganisms in terms of micro-agents is a plausible realization of how (weak) emergence acts in the two ways—i.e., downward and upward. Ants carry out specific tasks in groups. Their behavior can be described as an algorithmic process that leads, as occurs in an algorithm, to decision points. Groups (or castes) in most evolved species of superorganisms create a complex structure that performs complex tasks in the world, tasks as communication (by stigmergy), deep and wide exploring, recognition (of what "matters"), and conservation of knowledge in the shape of distributed information and group specialization. This is not due to the growing complexity of ants as a consequence of evolution, but to an evolution at the group level and to the loss of certain features in some types of ants that benefits the colony. Ants are not more complex, but more specialized. The parallel processes at the group or colony level are fulfilled by the serial behavior of ants, whose behavior or anatomical traits may change if required by environmental events or by the internal status of the colony. This is the way in which emergence may be seen as a real phenomenon that produces an effect—therefore, not merely as an epiphenomenon. Weak emergence or emergentism is usually attributed to the complexity of non-linear, context-dependent interactions. This case is a very good example of how it takes place through the complexification of interactions of the higher part of the systems (groups or castes), and not through the complexification of individuals (whose constraints and restrictions instead increase evolutionarily). Nevertheless, individuals preserve a certain degree of individuality, which is crucial to maintain flexible and robust control and to provide a communication system within the global entity.

3. THE ROOTS OF COGNITION: A HYPOTHESIS

The degree of individuality is the crucial point that allows superorganisms to be superior to organisms in terms of flexibility and robustness, as I mentioned above. They also represent reality (external world and internal states) in a distributed and collective manner, with perhaps the same degree of flexibility as some neural patterns. Indeed, this way of representing reality retraces the traditional vision of intelligence, as based on meaning, to the interpretation of outer information within a context, an aspect that can easily be captured by organizational network structures provided with an intermediate level of individuality. This is a level we do not know very much about yet, though it may be required, from an epistemological point of view and in a functional description, to bridge the gap between low levels and high levels in multilevel systems, as also occurs in the mind-brain system. Thus, cognitive modeling based on superorganism structures may be a perspective that will provide us with a better understanding of how our cognitive processes work and how our cognitive capabilities are designed, both for the functional part (mind) and for the material part (brain), being connected through intermediate, partially autonomous levels.

Even though the notion of superorganism is a general notion that encompasses many different species (bacterial colonies such as Myxobacteria, Myxomycetes, colonial organisms such as Portuguese man o’ war, bee colonies, termite colonies, and ant colonies), the most evolved ones, such as certain species of ant colonies, appear to possess some peculiar and interesting features that may shed light on the foundations of cognition (some researchers even see them in unicellular, bacterial colonies5). In other terms, more complex superorganisms, such as some ant colonies, can easily be described as global entities that perform cognitive tasks that are close to those of superior organisms, including those of human beings. This is due to their specific organizational structure, which is, however, quite different from that of organisms. We may say, for example, that an ant colony wants to defend itself, find food, explore the world, and enhance its opportunities. Any comparison between a superior organism and a superorganism must be made by matching organs that carry out a function with groups or individuals that accomplish the same function. For instance, sense organs correspond to group exploration activities, the nervous system corresponds to stigmergy, the skeleton and skin correspond to the nest, gonads correspond to reproductive castes, somatic organs correspond to worker castes. Yet, the way in which we identify a superorganism is very different from the way in which we identify an organism because we have to give up the criterion of physical cohesion. By contrast, we may say that in order to identify a superorganism as a single entity we have to accept that it is so extensively distributed that we actually merely see individual organisms at a lower level. These individual intermediate organisms cannot, however, be described by attributing the same cognitive features and capabilities to all of them as the whole. But if we identify a superorganism as a single entity provided with cognitive features, we should be able to identify the traits of lower entities (ants) that have autonomous degrees of freedom (capabilities) and constraints that allow the emergence of the whole system. For example, one degree of freedom that is required might be the possibility of autonomous movements, while one constraint that is required might be the impossibility of one’s own reproduction.

The need for this intermediate level of individuality seems to be a requirement of entities provided with (wide-sense) cognitive capabilities, and might thus be
a structural principle—which I shall refer to as “principle of individuality.” If this hypothesis is correct, it should be possible, and it may be interesting and useful, to consider a cognitive entity as an entity that cannot do without this sort of intermediate level of autonomous, yet constrained, individuals or individual entities. A cognitive entity would thus be based, in general, on a three-layer organizational structure, according to which the highest one alone can be described or recognized as cognitive, the intermediate one is the one that produces and allows cognition, and the lowest one is the one that provides the real basis for and connection to the physical, natural, and material world (environment, context, etc.).

The possibility of identifying three-layer organizational structures of this sort in the degrees of freedom and constraints of different entities—even in human beings, particularly with regard to their brain and/or body organizational parts—may contribute to a renewal of micro-agent cognitive modeling, of cognitive simulation through agents, and of distributed information programming (synthetic approach to cognition). It may also serve to build a bridge with the same purposes as those of synthetic biology, especially as regards a better definition of notions as “cognitive,” “life,” “simulation,” and “explanation” from an epistemological point of view.

ACKNOWLEDGEMENTS

Research relevant to this work has been supported by the Italian Ministry of Scientific Research within the FIRB project “Structures and dynamics of knowledge and cognition” (Bologna unit code: J31J12005720001).

NOTES

1. Hofstadter, Gödel, Escher, Bach, 275–84, 311–336. See also Hofstadter, The Mind’s I, for other remarks on the dialogue.
2. See, for example, Bedau and Humphreys, Emergence.
3. For a discussion of an ant-colony optimization algorithm in such a perspective, see Lawson and Lewis, “Representation Emerges from Coupled Behavior”; for a general discussion of optimization algorithms and a very fruitful “swarm” algorithm, see the Stochastic Diffusion Search Algorithm in Bishop, “Stochastic Searching Networks,” and Nasuto and Bishop, “Convergence Analysis of Stochastic Diffusion Search.”
4. Hölldobler and Wilson, The Superorganism, 120.
5. See, for example, Ben-Jacob, Shapira, and Tauber, “Smart Bacteria.”

BIBLIOGRAPHY


In science, what is the most fundamental question of all?

I can guess!

The origin of life?

No!

Of time?

No!

Of man?

No...

There is a question that has to be answered before any other else!!!

Do we see the world as it is or do we see the world as it appears?

This is the most fundamental question!!!

That's what the human condition is! Seeing how the world appears rather than what the world is! But does it make sense?
Thus, Magritte and many others noted that if we can’t see the world but just how it appears to us it follows that we have no way to know what the world really is. Then the human condition is a self-contradicting one!

But then there would be no reality... just appearances. If this view were true, we could never see the world as it is. But only appearances.

But since having appearances in the world is expensive science relocated them inside the mind or the brain. A move leading to a vicious circularity since there does not seem to be there anything out of what appears to us!
But ... but ...
Why do we have to throw away
the colored and tasteful
red apple we experience?

There are three main reasons why people
accepted to get rid
of the apple as they experience it.

Science’s authority
and its alleged
ontological basis

The subjective
differences
in the way
in which different
agents see
the same
thing.

And, of course,
the three-headed
argument from illusion,
hallucination and misperception!

Once upon a time, Galileo said that the
world is made just of numbers and other quantities.
Eventually, science convinced everyone that the
world is really made only of abstract entities!!!

He was not
100% sure, though!

And, for four centuries up to now,
since science has kept doing so,
our everyday world has been banished from
what is taken to be really real!!!

But in this “real world”
of pure quantities and physical laws...
there is no place for us!
We disappear, too!

Are you sure?
If we cut the subjective experience,
how can we get to the reality?

No! I’m not
sure at all! Honestly,
I think it’s suicidal
both for us and
for science!

Yes! That’s why
I think that not even
science has enough
authority for setting
aside the world
we experience everyday!
Likewise, in 1905, von Uexkull suggested that each living being lives into his own private and unique personal physical world.

Then, the second issue arose.

Why does the same thing may appear differently to different subjects?

But, eventually, the biggest obstacle has been and still is the dreaded three-headed monster of illusion, hallucination and misperception that, so far, killed all realists that ever attempted to sidestep it!!!!!
THE OUTCOME OF THIS LINE OF THOUGHT HAS BEEN TO CONCEIVE THE BRAIN (OR THE MIND) AS IF IT WERE A SORT OF MONSTER THAT DIGESTS AN UNKNOWNABLE AND UNBEKNOWST EXTERNAL WORLD AND, BY ADDING ITS INTERNAL QUALITIES, IT SUCCCEEDS TO SECRETE THE FAMILIAR WORLD OF OUR EXPERIENCE MADE OF QUALITY LIKE COLOR, TASTE AND SMELL ...

BUT IF QUALITIES ARE NOT IN THE WORLD, HOW CAN THE BRAIN, WHICH IS IN THE WORLD, TO SECRETE THEM? NO ONE KNOWS!

LOOK!
THE WORLD SEEMS TO BE MADE ONLY OF PURE MATHEMATICAL LAWS ...
HOW STRANGE!

QUALITY-LESS WORLD!

MANY AUTHORS SUGGESTED THEIR OWN VERSION EITHER OF WHAT AN APPEARANCE IS OR OF WHAT IS MADE OF

P(\text{\textit{apple}}) \approx 1

Is there an apple?
Thus, each of these authors embraced the separation between appearance and reality because it offered to them a way to explain a whole bunch of phenomena. But what a hefty price! They had no idea what appearances were made of! His own special terminology to back up his view, but if one gets down to what appearances are in the physical world! The separation was just swept under the rug of scientific and philosophical authority!

Let’s see if there is a way to avoid all this...

The fact is that even when I hallucinate or I dream, there is something that is my experience. What is the stuff my dreams are made of?

Can’t we just grab the stuff a dream is made of? No...
What we can do is to reconsider the empirical notion of appearance! All too often, a covert ontological dualism has endorsed philosophical discussions! In fact, where may be located if not dualistic mind?

The fact is that the disguise too is an object. Thus, everything looks just like what everything is, there are no pure mental appearances!

Object + disguise = appearance

(This is an object too!)

Likewise, mirage and hallucinations are not necessarily "pure appearances", one sees something that is really there, only that one takes it to be something else. Yet, it is not misperception, rather it is misjudgement!

In so-called illusions, there is a shared physical property between the thing and the alleged illusion. In fact, one always perceives what is really there!
If we set aside all dualistic tendency we may debunk the notion that illusions are a kind of appearance separate from reality.

On the contrary, though, many scholars believed that there is an invariant physical phenomenon (length for instance) that does not change while how the thing appears may vary. They believed that there is a physical property and an apparent one.

<table>
<thead>
<tr>
<th>Physical Property</th>
<th>Apparent Mental Property</th>
</tr>
</thead>
<tbody>
<tr>
<td>( L_a )</td>
<td>( \bar{L}_a )</td>
</tr>
<tr>
<td>( L_b )</td>
<td>( \bar{L}_b )</td>
</tr>
</tbody>
</table>

So, the traditional view is that when one sees an illusion, one doesn’t see a the real thing but an appearance somewhat concocted inside the mind. Yet, this view is likely wrong!

Likewise, with other cases such as hallucination, what one see may always be traced back to some real physical phenomenon.

Well, this is a rather big step. I think it will need another cartoon, at least!

So, to cut short a long story, it might be the case that there are no appearances, but only things that take place! Like this apple!