



PHILOSOPHY AND NEUROSCIENCE AT THE GULF IV
**Fourth annual meeting of the Deep South Philosophy and
Neuroscience Workgroup**

September 23-25, 2021

Hilton Pensacola Beach, Pensacola Beach, FL

Given our beachfront location, long daily lunch breaks and
extended morning and afternoon coffee breaks,
casual (American) beach attire is encouraged at all sessions.

Snacks and beverages available at all breaks are provided by the
Mississippi State University Department of Philosophy and Religion

THURSDAY, SEPTEMBER 23
Meeting Room Emerald Coast

**8:30-9:00AM: Meeting room opens, social time, coffee, bottled waters, pre-packaged
breakfast snacks available**

**9:00-9:10AM: Welcome, Thank Yous, and Ideas to Kick Around this Week for Future
Philosophy and Neuroscience at the Gulf Workshops, Deep South Philosophy and
Neuroscience Workgroup Events (Bickle)**

Session 1: Relating Psychology to Neuroscience: Successes and Failures

**9:10-9:50AM: Carl Gillett (Northern Illinois University), “Brainhood about psychological
properties: Illuminating a justification”**

**9:55-10:35AM: Greg Johnson (Mississippi State University), “Active forgetting in *Drosophila*
and the limitations of cognitive psychology”**

10:35-10:55AM: MORNING BREAK

**10:55-11:35AM: Vincent Bergeron (University of Ottawa), “Constructing cognitive ontologies
for the cognitive neurosciences”**

Session 2: Theory and Observation in Neuroscience

**11:40AM-12:20PM: Mallory Hrehor (University of Denver) and Marco Nathan (University of
Denver), “The phantom menace: Neurophilosophy and the end of theory”**

12:20PM-2:15PM: LUNCH (on your own)

Session 3: Mechanisms in Neuroscience

2:15-2:55PM: Mark Couch (Seton Hall University), “A general proposal for identifying relevant neural parts”

3:00-3:40PM: Caitlin Mace (University of Pittsburgh), “Casting light on the search for engrams: On the reductionism-mechanism debate”

3:40-4:00PM: AFTERNOON BREAK

Session 4: Representations in Neuroscience

4:00-4:40PM: Edouard Machery (University of Pittsburgh) (co-author Luis Favela, University of Central Florida), “Representations and other concepts in the mind and brain sciences”

4:45-5:25PM: Andrew Richmond (Columbia University), “Representation and representational explanation”

Session 5: Addiction, Brain and Law

5:30-6:10PM: Valerie Hardcastle (Northern Kentucky University), “The constitutionality of Casey’s Law: Signals, goals, learning and addiction”

FRIDAY, SEPTEMBER 24

Meeting Room: Emerald Coast

8:30-9:00AM: Meeting room opens, social time, coffee, bottled waters, pre-packaged breakfast snacks available

Session 6: Network Neuroscience

9:00-9:40AM: Keynote Neuroscientist Speaker: Astrid Prinz (Emory University), “Robust neuron and network function from variable parameters”

9:45-10:25AM: Trey Boone (Duke University) and Felipe DeBrigard (Duke University), “The nature of brain networks”

10:25-10:45AM MORNING BREAK

Session 7: Consciousness, Phenomenal Experience and the Brain

10:45-11:25AM: Rocco Gennaro (University of Southern Indiana), “Consciousness, the prefrontal cortex, and higher-order thoughts”

11:30AM-12:10PM: Benji Kozuch (University of Alabama), “A new low: Reassessing (and revising) the local recurrency theory of consciousness”

12:15-12:55PM: Kaleena Stoddard (Tulane University), “Naturalized inference and how things seem”

12:55-2:30PM LUNCH BREAK (on your own)

Session 8: Animal Cognition, the Machine Metaphor and Cognitive Neuroscience

2:30-3:10PM: Elyse Purcell (The State University of New York, College at Oneonta), “Do animals have delusions? A different model for understanding belief in animal minds”

3:15-3:55PM: Ann Sophie Barwich (Indiana University) and Matthew Rodriguez (Indiana University), “Rage against the what? Biology as the origin of the machine metaphor”

Session 9: Neuroscience of Decision

4:00-4:40PM: Dan Burnston (Tulane University), “Intertheoretic reduction of the concept of ‘decision’”

4:40-5:00PM AFTERNOON BREAK

****5:00-6:30PM**:** **Session 10: Invited Panel Discussion: The History of the Philosophy of Neuroscience**, moderated by John Bickle and Brian Keeley, featuring Patricia Churchland (University of California, San Diego), Kathleen Akins (Simon Fraser University), and Rick Grush (University of California, San Diego)

***This is the only session of this year’s meeting that will be remote/virtual. The panel will participate on Zoom and will be projected to the screen in the room. Participants will be able to ask questions from the meeting room.*

SATURDAY, SEPTEMBER 25

Meeting Room: Emerald Coast

8:30-9:00AM: Meeting room opens, social time, coffee, bottled waters, pre-packaged breakfast snacks available

Session 11: Sensory Neuroscience

9:00-9:40AM: Keynote Neuroscientist Speaker: Bradley Walters (University of Mississippi Medical Center), “Development, survival and regeneration of neurosensory cells in our systems of hearing and balance”

9:45-10:25AM: Brian Keeley (Pitzer College), “Cyborgs and our concepts of the senses”

10:25-10:45AM: MORNING BREAK

Session 12: Embodied Cognition and Explaining Stochastic Behavior

10:45AM-11:25AM: Firat Soylu (University of Alabama), “The challenges with embodied cognitive neuroscience”

11:30AM-12:10PM: Marshall Abrams (University of Alabama, Birmingham), “On sources of behavioral stochasticity in the brain”

12:10-2:00PM: LUNCH BREAK (on your own)

Session 13: Sleep and Imagination

2:00-2:40PM: Nedah Nemati (University of Pittsburgh and Carnegie Mellon University), “Re-examining the role of experience in neuroscience”

2:45-3:25PM: Alyssa Walker, (Tulane University), “Imagining is not functionally equivalent to belief or desire”

3:25-3:45PM AFTERNOON BREAK

Session 14: History (and Philosophy) of Neuroscience

3:45-4:25PM: Patrick Hopkins (Millsaps College and University of Mississippi Medical Center), “Madness as a problem of interpreting input: Thomas Willis and the two souls theory of mental illness.”

4:30-5:10PM: Zina Ward (Florida State University), “Muscles or movements? Representation in the nascent brain sciences”

5:15-5:55PM: John Bickle (Mississippi State University and University of Mississippi Medical Center), “Identity experiments in neurobiology: The case of the N-methyl-D-aspartate receptor”

PRESENTERS, AFFILIATIONS, EMAILS AND ABSTRACTS OF TALKS

(Alphabetized by last name)



Marshall Abrams (Department of Philosophy, University of Alabama, Birmingham, email: mabrams@uab.edu)

“On sources of behavioral stochasticity in the brain”

Session 12, Saturday morning 11:30-12:10

Natural selection should favor random behavior of different kinds in different contexts. While environmental noise and widespread neuronal noise in the brain can serve functions that require mere *behavioral unpredictability*, some functions can only be served by *probabilistically distributed behavior* (PDB). I summarize arguments that PDB cannot be driven by stochasticity of single neurons alone, or neurons linked in some obvious ways, and I argue that it would be difficult to filter broad patterns of noise in the brain to drive PDB. I review evidence that some collections of neurons produce Poisson-distributed patterns of activation, and argue that they could drive PDB, but that neural implementations of pseudorandom number generating algorithms would be better for this purpose. Finally, I explain why neural implementations of linear feedback shift register algorithms would be more likely to evolve than algorithms that I have discussed previously, and relate this to what’s known about neural development.



Ann Sophie Barwich (Departments of History and Philosophy of Science and Medicine and Cognitive Science, Indiana University, email: abarwich@iu.edu)

and **Matthew Rodriguez** (Department of History and Philosophy of Science and Medicine, Indiana University, email: rodimmatt@iu.edu)

“Rage Against the what? Biology as the origin of machine metaphors”



Session 8, Friday afternoon 3:15-3:55

Machine metaphors have been central to research on biology and neuroscience: animals as automata, mitochondria as engines of the cell, the brain as a computer, etc. Philosophers of biology have provided numerous criticisms of such machine metaphors in the life sciences. Most recently, Nicholson (2019) prominently contended that the cell is simply not a machine. We think the case is not so simple.

Instead, we show that this currently popular angle of criticism misses a critical point in applying machine metaphors to biological phenomena: their reciprocity. Analogical modeling of machines and biological entities is not a one-way street in which our understanding of biology must obey some preconceived notion of machines. While our understanding of biological phenomena undoubtedly has been shaped by machine metaphors, the resulting insights have likewise altered our understanding of what machines are and what they can do.



Vincent Bergeron (Departments of Philosophy and Cognitive Science, University of Ottawa, email: vbergero@uottawa.ca)

“Constructing cognitive ontologies for the cognitive neurosciences”

Session 1, Thursday morning, 10:55-11:35

A primary goal of cognitive neuroscience is to map cognitive functions onto brain structures. A serious problem for this kind of research is the fact is that many different cognitive functions can often be assigned to the same brain structure depending on the cognitive context. This failure to observe systematic mappings between cognitive functions and brain structures has led many to conclude that our cognitive ontologies—i.e. our current descriptions of cognitive processes and their components—must either be incorrect or too coarse (e.g. Anderson 2014, Poldrack 2010, Price & Friston 2005). The solution, we are told, is to develop new cognitive ontologies, or at the very least revise our current ones, although there is little agreement on how to proceed. In this talk, I present a framework for the construction of cognitive ontologies that support systematic mappings between brain structures and cognitive functions.



John Bickle (Department of Philosophy and Religion, Mississippi State University and Department of Neurobiology and Anatomical Sciences, University of Mississippi Medical Center, email: jbickle@philrel.msstate.edu)

“Identity experiments in neurobiology: the case of the N-methyl-D-aspartate receptor”

Session 14, Saturday afternoon, 5:15-5:55

This talk adopts a science-in-practice approach to investigate the discovery of N-methyl-D-aspartate receptors (NMDARs) and their key features and activities. We now know that NMDARs are components of “Hebbian” synapses involved in a crucial form of activity-driven synaptic plasticity and that activated NMDARs permit rapid calcium ion influx into post-synaptic neurons to initiate a cascade of intracellular signaling pathways in post-synaptic neurons. In short, NMDARs are one of contemporary neurobiology’s most important phenomena. But the practices that produced this scientific product were a sixty-year hodgepodge of time-, luck-, and most importantly research tool-dependent experiments which together constitute what Silva, Landreth and Bickle dubbed “identity experiments.” The detailed history of NMDARs (of which here I’ll only be able to discuss a tiny portion) also raises important comparisons with ‘exploratory experiments’ much discussed in recent philosophy of science, and suggests three features of such experiments that the published literature has neglected.



Trey Boone (Department of Philosophy and Imagination and Modal Cognition Laboratory, Duke University, email: treyboone@gmail.com) and **Felipe De Brigard** (Departments of Philosophy, Psychology and Neuroscience and Center for Cognitive Neuroscience, Duke University, email:

felipe.debrigard@duke.edu)

“The nature of brain networks”

Session 6, Friday morning 9:45-10:25



The field of “network neuroscience” has grown exponentially in the last decade. This explosion of research has brought with it numerous challenges, many of which reveal deep conceptual difficulties at the foundations of the field. For instance, researchers disagree about the evidence required to posit that a network

model refers to a *real* brain network as opposed to merely providing an *instrumental* model that summarizes or aggregates some set of data. Researchers also disagree about how to characterize functional brain networks, with some arguing that they should be characterized cognitively (e.g., “salience network”), while others claim that they should only be characterized neuroanatomically (e.g., “fronto-parietal network”). In this talk, we argue that such disagreements are not *mere* terminological disputes: They reflect fundamental disagreements over the appropriate ways to characterize brain networks, how to attribute functions to them, and how to understand their roles in explaining cognitive processes and behaviors.



Dan Burnston (Department of Philosophy, Tulane University, email:

dburnsto@tulane.edu)

“Intertheoretic Reduction of the Concept of ‘Decision’”

Session 9, Friday afternoon 4:00-4:40

I argue that models from the neurosciences are rapidly making progress in intertheoretically reducing the folk concept of ‘decision’. These models view decision as a thresholded process of competition between neural representations. Intertheoretic reductions accomplish three things: they fit the phenomenon of interest into the broader natural world, they explain the phenomenon using concepts not present in the reduced theory, and they explain anomalies or exceptions to the higher-level concept or theory. I claim that neural models achieve all of these with respect to the concept of decision, as taken up in philosophical and decision-theoretic accounts. They show how conscious decision-making is of a piece with subconscious neural processes and with decision processes in other organisms. They account for notions like preference and commitment purely in terms of the dynamics of the neural processes involved. And they can hope to explain anomalous results such as preference reversal.



Mark Couch (Department of Philosophy and Director of Liberal Studies, Seton Hall University, email: Mark.Couch@shu.edu)

“A general proposal for identifying relevant neural parts”

Session 3, Thursday afternoon 2:15-2:55

An important issue in recent philosophy of neuroscience concerns how to identify the parts of neural mechanisms. This has been called the problem of “constitutive relevance” (Craver 2007) and concerns the relation between a mechanism and its parts. A mechanism is a structure with its parts and properties organized to perform a particular behavior,

and scientists need an account of the difference between relevant and irrelevant parts. I will consider some recent accounts of relevance from philosophers and offer an alternative approach. The first account can be found in Bechtel and Mundale's (1999) paper and appeals to the practice of neuroscientists. The second account can be found in Craver's book (2007) and depends on the notion of interventionism. The third account comes from Couch (2011) and appeals to a version of *in us* conditions from Mackie.



Rocco J. Gennaro (Department of Philosophy, University of Southern Indiana, email: rjgennaro@usi.edu)

“Consciousness, the prefrontal cortex, and higher-order thoughts”

Session 7, Friday morning 10:45-11:25

There is a continuing debate about whether or not the prefrontal cortex (PFC) is necessary for having conscious mental states including typical first-order conscious perceptual states. I explore some of the evidence with attention to brain imaging studies relevant to various conscious states, PFC lesions studies, subjective reports, and the effects of anesthesia. I also examine the findings with an eye toward how the data might bear on the empirical plausibility of the higher-order thought (HOT) theory of consciousness which I have previously defended in print. The HOT theory of consciousness says that what makes a mental state conscious is that there is a suitable higher-order thought directed at the mental state. It is, for example, not at all clear to me that the PFC is required for conscious states or that HOT theory should be committed to the view that the PFC is required for having conscious states, contrary to the claim of some HOT theorists and opponents of HOT theory.



Carl Gillett (Department of Philosophy, Northern Illinois University, email: cgillett@niu.edu)

“Brainhood about psychological properties: Illuminating a justification”

Session 1, Thursday morning 9:10-9:50

Researchers in the neurosciences have long talked about brains or brains areas instantiating rich psychological properties like episodically remembering, deciding, being angry, etc. Critics have derisively labelled this “Brainhood” (Vidal (2009)), but the main critique (Hacker and Bennett (2003)) of such commitments of working scientists has been soundly rebutted. However, we still lack a positive justification of such claims. In this paper, I provide such a justification using evidence internal to the sciences. This argument deploys negative and positive arguments about which of the plausible candidate kinds of individuals, at different compositional levels in the body, can and cannot play the causal roles assigned to rich psychological properties in psychology and the neurosciences. First, I sketch the “Negative Argument” that shows that the organism plausibly cannot play the role of, and instantiate, psychological properties. Second, I detail the “Positive Argument” that shows that brains or brain areas can play the role of, and instantiate, psychological properties. Putting these arguments together, along with our evidence about the plausible candidates, in what I term the “Argument from Scientific Roles” we have a clear, and apparently scientifically well supported, justification for the scientific practice. My conclusion is that we are justified in accepting Brainhood and taking brains or brain areas to instantiate rich psychological properties like episodically remembering, deciding, being angry, etc.



Valerie Gray Hardcastle (Institute for Health Innovation, Northern Kentucky University, email: hardcastle@nku.edu)

**The Constitutionality of Casey’s Law: Signals, Goals, Learning, and Addiction
Session 5, Thursday afternoon 5:30-6:10**

Despite an increasing emphasis on public health approaches to addressing substance misuse, involuntary care through civil commitment is also becoming increasingly common. But should those with substance use disorder (SUD) should be forced to give up their right to govern their own lives? Neuroscience data converge around the idea that addiction is tied to neural reward mechanisms that shape survival behaviors. These models of addiction also suggest that addiction is a normal, context-sensitive response to learning environmental contingencies. But if the processes underlying addiction are not pathologic, then it is difficult to claim that those with SUD should be treated differently from those who have learned other environmental contingencies. These models also suggest that the appropriate approach to modifying substance misuse is an individualized one, reflecting whether one is more a “signal tracker” or a “goal tracker.” I close with a brain-based discussion of why the outcomes of voluntary treatment are no better than coerced treatment, or no treatment at all.



Patrick Hopkins (Department of Philosophy, Millsaps College and Center for Bioethics and Medical Humanities and Department of Psychiatry and Human Behavior, University of Mississippi Medical Center, email:

hopkipd@millsaps.edu)

“Madness as a problem of interpreting input: Thomas Willis and the two souls theory of mental illness”

Session 14, Saturday afternoon 3:45-4:25

Thomas Willis (1621-1675), a member of the Oxford Experimental Philosophical Club and widely accepted as the founder of neuroanatomy, was among the first to study brains directly and correlate specific regional brain damage with specific cognitive dysfunction. His 1664 work, *Cerebri Anatome* (which coined the term “neurology”), was strongly materialist and laid the framework for thinking of behavior and belief as governed by physical brains. His 1672 work *Two Discourses Concerning the Souls of Brutes*, however, took a much more dualistic tone, and included a fascinating theory of madness in which an immaterial, rational, cognitive system depends entirely on the input of a material, sensing, mechanical system for information to cognize. Since the material, sensing system is fallible and subject to physiological pathology, mental illness can be understood as the rational system drawing the best conclusions it when presented with faulty sensory information. This view of mental illness—as a failure of sensory input and not a failure of cognitive logic—is a recurring theme in the history of psychiatry and is much more easily understood than a view in which the logic of drawing conclusions is itself faulty.



Mallory Hrehor (Department of Philosophy, University of Denver, email: Mallory.hrehor@du.edu) and **Marco Nathan** (Department of Philosophy, University of Denver, email: Marco.Nathan@du.edu)

“The phantom menace: Neurophilosophy and the end of theory”

Session 2, Thursday morning 11:40-12:20

Theory has traditionally been the holy grail of scientific inquiry. With the emergence of big data technology in biology, this hallowed stance has started to erode, posing a pressing question for philosophers and practitioners of the brain sciences. Should neuropsychology follow suit and trade in hypotheses for evidence? We argue that the ongoing debate over the relative dominance of theory vs. practice is grounded in a false dichotomy, an ill-posed question—it is a “phantom menace.” On the one hand, the claim that observation is fundamentally theory-laden is a legacy of an outmoded, positivist notion of hypothesis as conceptually independent of experiment. On the other hand, the very idea of theory-free neuroscience falls prey to the old inductivist fallacy of evidence “speaking for itself.” We propose a fresh characterization of theory and data as two sides of the same coin, supporting our noble quest to unravel the mysteries of the brain.



Gregory Johnson (Department of Philosophy and Religion, Mississippi State University, email: gregory.johnson@nsstate.edu)

“Active forgetting in *Drosophila* and the limitations of cognitive psychology”

Session 1, Thursday morning 9:55-10:35

From a behavioral perspective, it is not possible to differentiate between memories that no longer exist and those that are merely inaccessible. Since it is known that some seemingly inaccessible memories can be retrieved with the proper cues, the default stance in cognitive psychology has been that all memories are permanent, albeit often inaccessible. Cellular and molecular investigations of forgetting are relatively new, but research on *Drosophila* has revealed separate molecular processes in mushroom body neurons that underlie transient forgetting and permanent forgetting. Hence, while investigating the neurobiological processes reveals that there is a mechanism for actively erasing some memories, this is an aspect of memory that is opaque to cognitive psychology. The moral is that there is an in-principle limitation to the investigations that can be undertaken and the subsequent explanations offered in cognitive psychology.



Brian Keeley (Department of Philosophy, Pitzer College, email: Brian_Keeley@pitzer.edu)

“Cyborgs and our concepts of the senses”

Session 11, Saturday morning 9:45-10:25

How should we conceptualize our own senses and the senses of others? We seem to naturally categorize our sensory experiences into different kinds, which forms an important part of our self-conceptual understanding. I argue that when we introspect our own sensory experiences we apply a conceptual and theoretical framework to that process. This “theory-ladenness of introspection” is the philosophy of mind counterpart to the philosophy of science proposal of the theory-ladenness of perception, proposed by Russell Hanson, Paul Churchland, and others. These days, the most interesting new challenges to our self-conception are coming from sensory cyborg technologies, from cochlear implants to the creation of a human magnetic sense. Such technology promises (or threatens) to expand our space of perceptual concepts. Also, the various possibilities related to new cyborg sensation represent an interesting set of thought experiments (with actual cases either in-hand or soon to come) with which to pump our intuitions about philosophy of perception.



Benjamin Kozuch (Department of Philosophy, University of Alabama, email: bkozuch@ua.edu)

“A new low: Reassessing (and revising) the local recurrency theory of consciousness”

Session 7, Friday morning 11:30-12:10

Recent years has seen Lamme’s local recurrency (LR) theory of visual consciousness become eclipsed by theories holding that more widespread and higher-level brain activity is necessary for consciousness (e.g., global neuronal workspace and higher-order theories), in part because of a body of evidence thought to disconfirm LR theory. However, as I explain in this talk, a majority of the evidence alleged to go against LR theory is actually predicted by it, and the rest can be absorbed by making minor modifications. That this is the case, along with steadily accumulating evidence against the prefrontal cortex being necessary for consciousness (an idea embraced by both global neuronal workspace and higher-order theories), means that LR theory should again be considered a leading contender for a theory of visual consciousness.



Caitlin Mace (Department of History and Philosophy of Science, University of Pittsburgh, email: CBM49@pitt.edu)

“Casting light on the search for engrams: On the reductionism-mechanism debate”

Session 3, Thursday afternoon 3:00-3:40

Ruthless reductionists characterize neuroscientific research as providing evidence for direct causal relations between molecular processes and cognitive phenomena, whereas new mechanists characterize neuroscientific research as providing schemata for multilevel explanations of cognitive phenomena. I examine the debate between these competing characterizations via a case study of the search for engrams in optogenetics research. Optogenetics is a tool that neuroscientists use to elicit learned behavior by labeling and re-activating neurons that were active during learning. The role of the engram construct—conceived as the neurophysiological entity resulting from learning-induced changes and responsible for the retrieval of a memory—is to guide optogeneticists to the neurophysiological structures that function as engrams. I argue that this science is not settled, so the reductionism-mechanism debate is premature because the metascience is not settled either. Further, more philosophical work—to establish engrams and set criteria for explanatory dispensability—is required to adjudicate the debate.



Edouard Machery (Department of History and Philosophy of Science, Director, Center for Philosophy of Science, University of Pittsburgh, email:

machery@pitt.edu) (paper co-author **Luis H. Favela** (Department of Philosophy and Cognitive Sciences Program, University of Central Florida, email:

Luis.Favela@ucf.edu)

“Representation and other concepts in the mind and brain sciences”

Session 4, Thursday afternoon 4:00-4:40

Numerous philosophers have described representations as indispensable to the study and explanation of mind; the word ‘representation’ is also commonly utilized in scientific disciplines, such as neuroscience and psychology; finally, philosophers have often claimed to explain what practitioners of those scientific disciplines mean when they utilize the concept “representation.” In this talk, we explore two issues related to those three observations. First, how is the concept of

representation used in the mind and brain sciences? Second, do philosophical notions of representation have any influence on those uses? To shed light on these issues, we conducted an experiment aimed at making explicit what scientists mean by “representation” and whether their uses of the concept of representation suggest commonalities with philosophical conceptions. Participants were researchers from relevant disciplines (e.g., cognitive science, neuroscience, and philosophy), who were presented with descriptions of four experiments via an online survey platform. Each description involved text, images, and time series describing the data in response to a stimulus. Participants were then asked to state on a Likert scale how much they agreed with several statements describing the experiment in representational and other related (e.g., “about,” “carry information,” etc.) terms. Three conclusions are drawn from preliminary data analyses. First, participants from scientific disciplines care more about causal versus noncausal terms when describing data in the experimental vignettes. Second, across all disciplines, participants are more confident using causal notions and are reluctant to use intentional notions when describing data in the experimental vignettes. Third, it is unclear whether philosophical analysis of representations connects to scientific uses. This work is noteworthy for being among the first to provide empirical evidence of the ways “representation” is actually used in the relevant scientific disciplines.



Nedah Nadia Nemati (Department of History and Philosophy of Science, University of Pittsburgh and Center for the Neural Basis of Cognition, Carnegie Mellon University, email: nnn10@pitt.edu)

“Re-examining the role of experience in neuroscience”

Session 13, Saturday afternoon 2:00-2:40

What is sleep and why do we do it? In fact, what is - and what is the purpose of - any behavior? Toward answering these questions, naturalist philosophers and neuroscientists have explored a ‘traditional schema of refinement’. Common to these schemas is the view that behavioral neurobiology can refine behaviors without giving much attention to how lived experiences impact experimentation. I draw from sleep studies in behavioral neurobiology to contest this view and traditional schemas engaging it. I show first that scientists frequently invoke a variety of experiences - what I call ‘experientially derived notions’ - to refine behaviors under investigation, and second that these behaviors must remain sufficiently ‘fuzzy’ throughout experimentation to permit refinement. This work aims to posit a new schema, one that acknowledges neuroscientists’ use of lived experience to refine behaviors and to render behavioral terms relevant to human life, needs, and experience.



Astrid Prinz (Department of Biology, Emory University, email: astrid.priz@emory.edu)

“Robust neuron and network function from variable parameters”

Session 6, Friday morning 9:00-9:40 Keynote Neuroscientist Speaker

Neurons and neuronal systems can produce functional activity on the basis of different cellular and network parameters, such as cellular excitability and synaptic connectivity. Even when producing the same, stereotyped neuronal activity – for example, a stereotyped rhythmic activity pattern that governs a periodic behavior such as breathing, walking, or chewing – different individuals find different neuronal parameter sets (“solutions”) that produce the same behavior. Within the larger space of all hypothetically possible parameter combinations that define a neural system, what is the nature of the “solution space” that produces functional

behavior? How does an individual position itself in this solution space, and stay in it or return to it when faced with developmental changes or environmental perturbations? I will discuss experimental and computational evidence that suggests how robust neuronal and network function might arise from high-dimensional, complex neuronal dynamics with variable parameters, in part through activity-dependent parameter regulation mechanisms.



Elyse Purcell (Department of Philosophy, The State University of New York, College at Oneonta, email: Elyse.Purcell@oneonta.edu)

“Do animals have delusions? A different model for understanding belief in animal minds”

Session 8, Friday afternoon 2:30-3:10

Often, we use common sense “folk psychology” to explain human behavior. Specifically, philosophers have relied on a common sense “belief-desire” conception of mental events and processes to explain the desires, beliefs, and attitudes of human and animals. This reliance has led to a philosophical divide on whether animals can think. Yet, exploratory research in animal cognition may settle this debate by turning to something philosophers have overlooked: whether or not animals have delusions.

In research on delusions, experimental models define a delusion as a fixed belief about something or someone, which indicates social capital. By using a new experimental model called the “social defeat model” targeting the dopamine system, researchers may be able to determine if this social capital is present in animal minds. This paper investigates the implications of the social defeat model for evidence of delusions and beliefs in animal minds.



Andrew Richmond (Department of Philosophy, Columbia University, email: ar3688@columbia.edu)

“Representations and representational explanation”

Session 4, Thursday afternoon 4:45-5:25

This paper explores the way representational notions figure into cognitive science, with a focus on neuroscience. In philosophy we typically study the property of representation itself. But I argue that for our goals as philosophers of neuroscience it is important to understand the role the *notion* of representation plays in cognitive science — how it is used and what it enables scientists to do — and not at all important to understand what neural representation *itself* is. I propose that representational notions in cognitive science help us construct and understand models of the brain’s causal structure, insofar as that causal structure supports cognitive capacities. This use of representational notions need not be understood via a definition of neural representation itself, and this poses a problem for the typical approach, which aims to understand representational explanation by defining neural representation.



Firat Soyly (Department of Educational Studies, University of Alabama, email: fsoyly@ua.edu)

“The challenges with embodied cognitive neuroscience”

Session 12, Saturday morning 10:45-11:25

Even though research and theoretical work on embodied cognition—how cognition is grounded in the body and the body's interactions with the environment—has gained momentum across different fields, its impact on empirical cognitive neuroscience studies

has been limited. In this talk, we will discuss (1) the implications of 4E (embodied, embedded, enactive, and extended) approaches to cognition for cognitive neuroscience, (2) why, in spite of flurry of research on 4E cognition, change in cognitive neuroscience has been slow and challenges preventing incorporation of these ideas in empirical studies, and (3) ways in which insights from 4E cognition can impact the way we conduct empirical research in cognitive neuroscience.



Kaleena Stoddard (Department of Philosophy, Tulane University, email: kstoddard@tulane.edu)

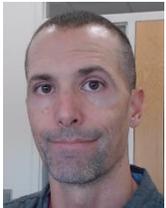
“Naturalized inference and how things seem”

Session 7, Friday morning 12:15-12:55

Phenomenal Conservatism (PC) is an internalist view within foundationalist epistemology which states that justification for perceptual beliefs is generated when a perceptual scene just strikes the perceiver as being a certain way:

(PC): If it seems to S that p, then, absent defeaters, S is justified in believing that p.

I argue that PC is false on the grounds that it is overly permissive in the justification it generates. PC lacks a principled description of how a seeming state can consistently generate true beliefs, deferring only to the reliability of the phenomenal character of the subject's experience. As a solution to this problem, I propose that a seeming state is the output of a modularly organized system - one that has a function-specific means of processing sensory input and propositional output - and offer a theory of naturalized inference in support of that claim.



Bradley J. Walters (Departments of Neurobiology and Anatomical Sciences, and Otolaryngology and Communicative Sciences, University of Mississippi Medical Center, email: bwalters2@umc.edu)

“Development, survival, and regeneration of neurosensory cells in our systems of hearing and balance”

Session 11, Saturday morning 0:00-9:40 Keynote Neuroscientist Speaker

Hearing and balance are two of our primary senses that help us to interact with each other and with the world around us. Both of these senses rely on mechanosensory hair cells in the inner ear and while these hair cells are fine-tuned marvels of structure and function, they are too often prone to degeneration or dysfunction. Indeed, sensorineural hearing loss and age-related vestibular dysfunction are two of the most common and costly ailments in our modern society. Furthermore, along our evolutionary path, we mammals have lost nearly all ability to regenerate these remarkable cells, which in turn prevents the full rehabilitation of our senses of hearing or balance once they have been lost. As such, we seek to better understand how these cells develop, why they die, and how we might induce them to survive or to regenerate. This talk will cover some of our recent work using tools to manipulate gene expression in the inner ear sensory epithelia of mice, which has helped us to uncover several key mediators of important processes in hair cell development, hair cell survival, and regeneration.



Alyssa Walker (Department of Philosophy, Tulane University, email: a.walker11@tulane.edu)

“Imagining is not functionally equivalent to belief or desire”

Session 13, Saturday afternoon 2:45-3:25

Imagining is not a simple task, yet philosophers of cognitive science treat it as functionally equivalent to belief and desire. The reasoning tends to go as follows: if imagining is distinct but analogous to the functional processes of belief and/or desire, then it is distinct attitude which functions over a content. Since both beliefs, attitudes oriented toward truth, and desires, oriented toward satisfaction, are sensitive to some conditions outside of ourselves, and since imagining is not directed toward either of those, philosophers of cognitive science tend to conclude that “imagining” is not world-directed and is thus of no essential import to domains of knowledge-acquisition. The conclusion has bad consequences for many avenues for pursuing knowledge, including exploration and collective reasoning. In response, I look at “imaginative” as prior to “imagining” and argue that neuroscientific studies that converge on these terms suggests against a functional analogy with belief and desire.



Zina Ward (Department of Philosophy, Florida State University, email: zward@fsu.edu)

“Muscles or movements? Representation in the nascent brain sciences”

Session 14, Saturday afternoon 4:30-5:10

The idea that the brain is a representational organ has roots in the nineteenth century, when neurologists began drawing conclusions about what the brain represents from their clinical and experimental studies. One of the earliest controversies surrounding representation in the brain was the “muscles versus movements” debate, which concerned whether the motor cortex represents complex movements or rather fractional components of movement. Prominent thinkers weighed in on each side: John Hughlings Jackson and F.M.R. Walshe in favor of complex movements, Charles Sherrington and Wilder Penfield in favor of movement components. In my talk, I’ll discuss these and other brain scientists’ evolving notions of representation during the first seventy-five years of the muscles versus movements debate (1873-1950). Although they agreed that representations can be graded and overlapping, other dimensions of representation remained unsettled during this period of conceptual negotiation.