

COGNITIVE SCIENCE COLLOQUIUM

Spring 2017

April 28

Graduate Student Showcase

Stanley Donahoo, Graduate Student, Department of Linguistics, University of Arizona

TITLE--The Swearing Brain: Language Comprehension Insights

ABSTRACT: Expressives are speaker-oriented, not-at-issue content (Potts, 2005). How is the expressive dimension of language processed and represented? The present study focuses on the most clearly expressive items, swear words (damn, shit, hell, etc.). The study of swear words is important to linguistics and cognition in general. For instance, patients with aphasia or stroke can often recite automatic chunks include swearing (Van Lancker & Cummings, 1999), even when the left hemisphere language areas are completely offline. Thus, swear words provide a testing ground for language processing and representation. In a lexical decision task, participants (N=34) read swear words (shit), negatively valenced but non-swear words (sick), neutral content words (lend), neutral function words (while), and pseudowords. The results show that swear words took longer to access than negatively valenced content words, but were accessed as quickly as the function words. The difference between swear words and negatively valenced but non-swearing words suggests that there is more to the expressive dimension than merely a heightened emotional state. An ongoing EEG experiment (N=9 so far) is further testing the neural basis of expressive language.

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Bryan Kromenacker, Graduate Student, Department of Psychology, University of Arizona

TITLE--Engagement matters: pupil size and performance on a difficult mental task mediate performance reduction on a subsequent physical task

ABSTRACT: Self-control depletion theory claims to account for between-task performance changes in terms of the consumption of a limited cognitive resource. Dual-task designs have been used to demonstrate that *increased* self-control on an initial effortful task predicted *decreased* self-control on a later categorically distinct effortful task, supporting a non-rational (i.e., not based upon explicit value calculation) resource-like effect. These accounts struggle to identify specific mechanisms linking them to rational theories of effort, and the reported effect size has recently come into question. Subject engagement during the depleting task is often assumed, but systematic disengagement may account for inconsistencies in the observed effect. We recreated a common dual-task depletion paradigm using a computer-automated design allowing for measurement of individual task performance as well as pupil size. We found evidence that task engagement measures do indeed account for some individual variation in the depletion effect, offering a possible explanation for inconsistent group-level effects.

April 21

Aneta Kielar, Assistant Professor, Department of Speech, Language, and Hearing Sciences, University of Arizona

TITLE: Language Related and Spontaneous Oscillatory Responses in Acquired Language Disorders

ABSTRACT: Mapping oscillatory neural activity with magnetoencephalography (MEG) is a powerful method for revealing the functional organization of different aspect of language, and the changes associated with stroke. Considerable changes in the cortical representation of language processing can follow stroke. However, the neural mechanisms mediating recovery and relative contributions of each hemisphere are not well understood. In the present set of studies I used MEG to understand the roles of perilesional and contralesional activity in recovery of semantic and syntactic processing in patients with post-stroke aphasia, and to explore the role of right hemisphere in language recovery. The resting state MEG and fMRI, as well as blood flow measures were used to identify dysfunctional cortex.

In healthy controls, a left-lateralized temporo-frontal “ventral network” responded to semantic anomalies during sentence comprehension, and a bilateral fronto-parietal “dorsal network” responded to syntactic anomalies. For participants with aphasia, I observed compensatory recruitment in the right hemisphere. Interestingly, the distribution of this effect was depended on the type of linguistic information that was processed. Better recovery of semantic processing was associated with a shift to the right hemisphere components of the ventral network. In contrast, recovery of syntax was mediated by dorsal brain regions, bilaterally.

The analysis of resting state activity indicated that reduced BOLD variability was associated with aging, whereas spontaneous MEG measures were more sensitive to the cortical abnormalities associated with stroke. Furthermore, reduced MEG complexity in perilesional tissue was correlated with hypoperfusion as assessed with arterial spin labeling, while no such relationship was apparent with BOLD variability. These findings suggest that MEG signal complexity offers a sensitive index of neural dysfunction in perilesional tissue in chronic stroke, and that these effects are distinguishable from those associated with healthy aging. The resting state measures may be useful indicators of cortical dysfunction that is potentially reversible with treatment, and may be used to assess the effectiveness of interventions.

April 14

Ying-hui Chou, Assistant Professor, Department of Psychology, University of Arizona

TITLE: Repetitive Transcranial Magnetic Stimulation and Functional Connectivity Mapping in Clinical and Psychological Research

ABSTRACT: Repetitive transcranial magnetic stimulation (rTMS) is a non-invasive neuromodulation technique that has been closely examined as a possible treatment for a number of diseases. Although accumulating evidence suggests that rTMS can be utilized to enhance motor or cognitive function in clinical populations, little is known about how the rTMS modulates brain activities and how these changes correlate with improvement of function.

Functional connectivity measured by resting-state fMRI has played an essential role in understanding brain functional networks in healthy

individuals and clinical populations. Resting-state functional connectivity is defined as the temporal co-activation level of spontaneous fMRI signals between spatially distinct brain regions when participants are not required to perform a perceptual or behavioral task.

In this talk, Dr. Ying-hui Chou will first present an overview of rTMS and resting-state connectivity separately. Then she will talk about her research that combines both rTMS and resting-state connectivity to investigate the therapeutic rTMS effects on brain connectivity. The long-term goal of Dr. Chou's lab is to adopt a multi-modal approach that combines rTMS and resting-state functional connectivity in conjunction with other brain imaging techniques to leverage the applications of rTMS and resting-state functional connectivity in the study of both normal and pathological conditions.

April 7

Eric D. Smith, Assistant Professor, Department of Educational Psychology, University of Arizona

TITLE—Glancing Through the Looking Glass: Perpetual Pretending and Bearable Behavior

ABSTRACT: The world of fiction appeals to many of us, through books, movies, and even pretending. The power of fictional content has prompted many research questions. How long in life do we engage in pretending? Do children transfer content from fictional worlds, like storybooks, into reality? In this talk, I address these overarching questions by 1) assessing Piaget's claim pretending ceases at 7 years of age; 2) demonstrating permeability in the fiction-reality boundary within the storybook realm; and 3) proposing a working model for fiction-reality breakdowns within the storybook domain.

March 24

Evan MacLean, Assistant Professor, School of Anthropology, University of Arizona

TITLE: The Fundamental Importance of Comparison in the Study of Cognitive Evolution

ABSTRACT: Since Darwin, understanding the evolution of cognition has been widely regarded as one of the greatest challenges for evolutionary research. In the last century, comparative psychologists have made great progress toward identifying aspects of cognition that humans share with other species, as well as cognitive processes that may be uniquely derived in our own lineage. Despite this progress, cognitive studies with animals have focused heavily on a few model species, with less effort toward broadly comparative, and explicitly phylogenetic approaches. I will present recent studies emphasizing the role of comparison in 'comparative cognition' to illustrate how these approaches can reveal major forces driving cognitive evolution, and inform hypotheses for how and why cognition has evolved across species, including humans.

March 3

Melissa C. Duff, Associate Professor, Hearing and Speech Sciences; Director, Communication and Memory Laboratory, Vanderbilt Bill Wilkerson Center, Vanderbilt University School of Medicine

TITLE: The role of hippocampus in language use and processing

ABSTRACT: Language use requires the rapid and incremental processing of flexible and contextually defined linguistic forms that are formulated in rich, multi-modal environments. How this is accomplished in the brain,

however, is an open question. While attempts to link aspects of memory to particular properties of language are longstanding, the hippocampal declarative memory system has not received serious consideration as a neural/cognitive system involved in language use and processing. This is in part due to the long-held assumption that the hippocampal declarative memory system contributes only to long-term memory representations and not those that are available quickly enough to guide on-line information processing. Combining discourse analysis, eye-tracking, and neuropsychological methods I will present evidence for the proposal that the hippocampal declarative memory system is a key contributor to language use and processing. This proposal draws on the relational binding and representational flexibility that are hallmark characteristics of the declarative memory system, along with recent findings stretching the scope of hippocampus-dependent processes to functions that operate in-the-moment and on the narrowest of time-scales. Linking disruptions in language use and processing to the declarative memory system demonstrates how promiscuously the hallmark processing features of the hippocampus are called upon by a variety of cognitive domains, including language, and expands the network of neural and cognitive systems that support language use.

February 24

Megha Sundara, Associate Professor, Department of Linguistics, University of California, Los Angeles

TITLE—Acquisition of Verbs: A window to the mental representation of morphology and phonology

ABSTRACT: Verbs are difficult for infants to learn. Cross-linguistically, children have more nouns in their early vocabulary than verbs. In this talk, I will present perception data from English-learning infants within the first year of life to address when and how infants begin to learn verb forms. Then, I will use infants' abilities (or lack thereof) in relating multiple forms of verbs, like walk, walks, walked and walking, to answer how verbs are represented in the mental lexicon. Finally, I will discuss the implications of these findings for models of spoken word recognition.

February 17

Julia L. Evans, Professor, School of Behavioral and Brain Sciences, The University of Texas at Dallas

TITLE— Poles, Bowls and Dinosaur Bones: How Atypical Lexical Representations may be Derailing Sentence Comprehension for Children with Specific Language Impairment

ABSTRACT: Rumelhart (1979) argued that comprehension, like perception, should be likened to Hebb's (1949) paleontologist, who uses his or her beliefs and knowledge about dinosaurs *in conjunction* with the clues provided by the available bone fragments to construct a full-fledged model of the original. In this talk, I explore studies that suggest that, while real world knowledge is intact in children with SLI, deficits at the lexical level (the bone fragments) may be profoundly influencing sentence comprehension performance in children with SLI.

February 10

Maryia (Masha) Fedzechkina, Assistant Professor, Department of Linguistics, University of Arizona

TITLE: Processing and communication shape language learning and structure

ABSTRACT: Languages across the world—despite their diversity—also exhibit abstract commonalities. Most theories agree that these commonalities can be traced back to biases and limitations of human cognitive systems. Capturing cross-linguistic generalizations and understanding their causes has been one of the central objectives of linguistics and cognitive science as it can shed light on the nature of constraints underlying language processing and acquisition. My research examines the hypothesis that the cross-linguistic distribution of grammars can be accounted for, at least in part, in terms of their processing or communicative utility (cf. Bates & MacWhinney, 1982; Hawkins, 2004; Christiansen & Chater, 2008).

Using a novel type of the miniature language learning paradigm, I identify biases that cause learners to deviate from the input they receive, thus changing the input to subsequent generations of learners and pushing the system towards language change. I present a series of experiments that investigate whether biases towards efficient information processing and efficient information transmission operate during language acquisition. Our findings support this hypothesis: when presented with inefficient input languages, learners produce languages that deviate subtly but systematically from the input towards more efficient linguistic systems. The newly acquired linguistic systems also tend to more closely resemble cross-linguistic patterns in syntax and morphology than the input learners receive. This suggests that at least some cross-linguistic commonalities originate in biases or limitations of human information processing and communication.

February 3

Michael Hout, Assistant Professor, Department of Psychology, New Mexico State University

TITLE: Becoming an expert at difficult visual search: Experience fine-tunes mental representations of target categories

ABSTRACT: In this (still ongoing) project, we investigated effects of expertise on accuracy and oculomotor behavior during difficult visual search. Participants completed up to 23 sessions, searching simultaneously for 20 different categorically-defined targets. Zero to three targets could appear on each trial, with variable frequency, akin to well-documented “prevalence effects.” Unsurprisingly, searchers got faster over time. Despite increased efficiency, with expertise, they were more likely to directly fixate targets, and to spend proportionately more time examining them, relative to distractors. Prevalence effects (better accuracy to more frequent targets) diminished but did not disappear across sessions, and more frequent targets were consistently located more quickly than infrequent ones. Importantly, despite receiving equal attention (indexed by oculomotor behaviors), low-frequency targets suffered more recognition failures (failure to perceive targets after direct fixation) than high-frequency targets. Our findings suggest that, with expertise, searchers refine their mental representations for target categories, particularly common ones, and become more effective at restricting attention to the most relevant features.

January 27

Michael Grandner, Assistant Professor, Department of Psychiatry, University of Arizona

TITLE: Neurocognitive Effects of Sleep Loss and Impact on Cardiometabolic Disease Risk

ABSTRACT: Sleep is implicated in a large number of physiologic regulatory properties. Sleep loss has been implicated in cardiometabolic health risk factors including weight gain and obesity, hypertension, diabetes, hypercholesterolemia, and coronary disease. Sleep loss is also implicated in cognitive dysfunction, including decreased attention, impaired working memory and executive function, and problems with decision making. These two domains may overlap. Neurocognitive impairments due to sleep loss may interact with physiologic cardiometabolic risks to increase likelihood of obesity, cardiovascular disease, and diabetes. This presentation will provide an overview of sleep and cardiometabolic disease risk, sleep and neurocognitive function, and how these may overlap.

COGNITIVE SCIENCE COLLOQUIUM Fall 2016

December 2

Graduate Student Showcase Presenters, Titles & Abstracts

Noah Nelson, Graduate Student, Linguistics-major; Cognitive Science-minor

Title: Targeted reduction of phonetic cues to promote lexical contrast

Abstract: In speech, phonetic cues to the identity of segments are enhanced in response to competition from similar-sounding words (e.g., voice onset time: bat ~ pat). This is explained by two major theoretical approaches. Production-based approaches assume that activation of a word spreads to similar-sounding competitors, and feedback from those competitors further increases activation within the word, leading to increased phonetic durations. Perception-based approaches assume that, for segments that distinguish two words (e.g., /b/ and /p/ in bat ~ pat), the specific cues that differentiate those segments are made more contrastive. This greater contrast is assumed to increase the perceptual distance between competing words. Notably, perception-based approaches predict that competition can lead to reduction of phonetic cues if that reduction creates a greater contrast between competing words. Production-based approaches predict only enhancement of phonetic cues because the competition process leads to increases in activation. I present evidence from the Buckeye Corpus of Conversational Speech (Pitt et al. 2007) that two very different cues to segment identity in English can be contrastively reduced. This result is predicted by perception-based theories of competition effects, but is difficult to reconcile with production-based approaches.

and

Adam King, Graduate Student, Linguistics

Title—Why Junk in the Trunk Matters: Less predictable words end with more redundant material

Abstract: Much psycholinguistic research has shown that listeners process words incrementally. For many words, the point at which sufficient information has been heard to positively identify the word (the "uniqueness point") occurs before the end of the word. For example, the three sounds in "cor-" could be part of several words, "corsair", "corsage", "corpus", but a single sound more, "corp-", can only be the word "corpus". As a consequence, material after the uniqueness point in a word (the "-us" in "corpus") is redundant. In my talk, I will present corpus data from English showing that words which are on average less predictable by their sentential context tend to have more of this redundant material. This supports the hypothesis that this extra material after the so-called uniqueness point plays

a functional role in speech processing by providing additional redundant cues to unexpected words.

November 18

Joshua Knobe, Professor of Philosophy, Psychology, and Linguistics, Department of Psychology, Yale University

TITLE: The Essence of Psychological Essentialism

ABSTRACT: People appear to understand the social world in terms of essences. This notion plays a key role in the way that people ordinarily think about social categories (gender categories, religious categories, etc.) and also in the way that people think about individuals (the person you truly are deep down inside). But how exactly do people ascribe these essences? I present a series of new studies suggesting that people's judgments of essence can be affected in surprising ways with value judgments. These results provide support for the hypothesis that people's ordinary notion of essence is not a purely value-free scientific notion but a notion that is infused through and through with values.

November 4

Judith F. Kroll, Distinguished Professor, Department of Psychology, University of California, Riverside

TITLE: Bilingualism, Mind, and Brain

ABSTRACT: The use of two or more languages is common in most places in the world. Yet, until recently, bilingualism was considered to be a complicating factor for language processing, cognition, and the brain. In the past 20 years, there has been an upsurge of research that examines the cognitive and neural bases of second language learning and bilingualism and the resulting consequences for cognition and for brain structure and function over the lifespan. Contrary to the view that bilingualism adds complication to the language system, the new research demonstrates that all languages that are known and used become part of the same language system. A critical insight is that bilingualism provides a tool for examining aspects of the cognitive architecture that are otherwise obscured by the skill associated with native language performance in monolingual speakers. In this talk, I illustrate this approach to language processing and consider the consequences that bilingualism holds for cognition more generally.

October 28

Lauren Emberson, Assistant Professor, Department of Psychology, Princeton University

Title: How Does Structured Experience Support Perceptual Development?
The Role of Top-down Information from Learning and Memory Systems

Abstract: A hallmark of development is the tuning of perceptual systems to the structure of the environment. These perceptual changes support the development of key abilities such as language comprehension and face processing. I argue that learning and memory systems not only uncover the structure in real-world experience, they also use top-down or feedback connections to shape developing perceptual systems. To this end, I use functional near-infrared spectroscopy (fNIRS) to record the same physiological signals as fMRI (i.e., hemodynamic response) but using light instead of magnetic fields. This emerging neuroimaging modality allows spatial localization of neural signals while infants are awake and learning. Using fNIRS, I'll present evidence that perceptual systems are shaped by learning and top-down information early in life and within minutes of experience. Moreover, comparisons of typically-developing and at-risk populations (preterm infants) reveal that early deficits in learning-based changes in perceptual systems predict atypical developmental trajectories.

October 21

Ervin R. Hafter, Professor of the Graduate School, Department of Psychology, University of California, Berkeley

TITLE: "Relating shared attention in simple psychophysical dual tasks to processing of natural speech spoken by multiple talkers."

ABSTRACT: Reduced performance found when we have to do two things at the same time is often blamed on informational overload, that is, on the need to share a limited attentional resource. In work to be presented here, I will describe results from two quite different conditions that reflect this problem. In one, a subject responds to the levels of simple auditory and visual stimuli when they are presented simultaneously, but otherwise independently, in a psychophysical dual task. In the other, a listener in a simulated cocktail party environment (albeit, w/o booze) derives meaning from speech coming from two different people, each speaking in a cadence descriptive of natural listening. In both conditions, our interest is in the difference between situations where there is a cost of shared attention (serial processing) and where there is not (parallel processing). Without promising closure on this ancient question, I hope to argue convincingly that knowledge of a seemingly related factor in the two conditions, the memories to which target stimuli are compared, provides insight into what it is that allows or prevents freedom from cost in multi-tasking.

October 14

Mariam Aly, Postdoctoral Research Associate, Princeton Neuroscience Institute, Princeton University

TITLE: Perception and Attention in Memory Systems

ABSTRACT: Research in cognitive neuroscience has traditionally progressed by studying different components of cognition largely in isolation. But, ultimately, complex behavior is the result of the interplay between multiple aspects of cognition at the behavioral and the neural

levels. With a combination of behavioral, neuroimaging (fMRI) and patient studies, I'll argue that the computations performed by brain regions allow them to critically and flexibly support many different aspects of cognition, from attention to perception to long-term memory. In the first part of my talk, I'll show that at a behavioral level, perception shares functional commonalities with long-term memory, and traditional memory systems of the brain play a critical role in perception. In the second part of my talk, I'll show that attention modulates these "memory systems", and that this modulation has consequences for attentional and mnemonic behavior. Together, my research points to the utility of understanding the brain and behavior by thinking about the mechanisms that allow any given brain region to flexibly contribute to diverse aspects of cognition.

October 7

Laura Schulz, Associate Professor of Cognitive Science, Department of Brain and Cognitive Sciences, Massachusetts Institute of Technology

2016 Roger N. Shepard Distinguished Visiting Scholar TITLE—

Inferential economics: Self-knowledge and children's understanding of the costs and rewards of behavior

ABSTRACT: Across a series of studies, I will show that very young children reason about when learning will be easy and when it will be difficult. I will suggest that children's understanding of the costs and rewards of information affect both how they learn and how they teach, and I will discuss the ways in which reasoning about the costs and rewards of action gives children insight into others' mental states broadly. Finally, I will suggest that children actively assess their own abilities and that this affects how hard they try at challenging tasks.

September 30

Jacqueline Snow, Assistant Professor, Department of Psychology, Program in Cognitive and Brain Science, and Program in Integrative Neuroscience, University of Nevada, Reno

TITLE—"The treachery of images": how (and why) behavior and brain responses differ for real-world objects versus their representations

ABSTRACT: Ultimately, we aim to generalize and translate scientific knowledge to the real world, yet our current understanding of visual cognition is based almost exclusively on studies of impoverished stimuli. In this talk I will present convergent evidence from human behavioral, neuropsychological, and fMRI studies, showing that real objects elicit differences in behavior and neural coding, compared to matched image displays. I will discuss the underlying mechanisms for the observed effects, and describe a range of innovative techniques and apparatus for 'bringing the real world into psychology and neuroscience'.

September 23

Adam Ussishkin, Associate Professor, Department of Linguistics, University of Arizona

TITLE—Morphology facilitates word recognition independently of phonology: evidence from auditory masked priming

ABSTRACT: Words consist of a phoneme or letter sequence that maps onto meaning. Most prominent theories of word recognition (auditory and visual) portray the recognition process as a connection between these small units and a semantic level. However, there is a growing body of evidence suggesting in the priming literature that there is an additional, morphological level that mediates the recognition process. In morphologically linear languages like English, however, morphemes and letter or sound sequences are co-extensive, so the source of priming effects between related words could be due to simple phonological overlap as opposed to morphological overlap. In Semitic languages, however, the non-linear morphological structure of words reduces this confound, since the morphemes are interdigitated in a non-linear fashion. Semitic words are typically composed of a discontinuous root (made up of three consonants) embedded in a word pattern specifying the vowels and the ordering between consonants and vowels. Active-passive pairs in Maltese, the official language of Malta, illustrate this relationship (the root is underlined); e.g., *fetaħ* ‘open’-*miftuħ* ‘opened’.

In this talk, I report on a number of experiments our lab has carried out in Maltese and Hebrew investigating the extent to which the non-linear morphemes used in Semitic facilitate auditory word recognition, and to what extent potential priming effects are independent of the phonological overlap typically inherent in morphological relationships. These experiments make use of the auditory masked priming technique (Kouider and Dupoux, 2005). I show that not only do roots facilitate auditory word recognition in these languages, but that these morphological effects are independent of phonological overlap effects.

September 16

Daniel Sullivan, Assistant Professor, Department of Psychology, University of Arizona

TITLE: Exploring the Cultural Psychology of Time and Space

ABSTRACT: Researchers in cultural, cognitive, developmental, and social psychology have amassed a fascinating and unwieldy corpus of data on both uniformity and variation in the way people think about time and space. What is lacking in this area is (1) a comprehensive theory of how social structural and cultural factors (e.g., mode of subsistence; religion) are related to individual attitudes about and experiences of time, space, and their interrelation, that (2) may be utilized to empirically test psychological hypotheses. Drawing on the sociology of Anthony Giddens and David Harvey, my colleagues and I (Palitsky, Sullivan, Keefer, & Stewart, 2016; Sullivan, Keefer, Stewart, & Palitsky, in press) propose that time-space distancing is an interdisciplinary, multilevel construct suited to these functions. This construct refers to the extent to which, in a society, time and space are treated as “separate” dimensions, and individual activities are abstracted across distance and timespan. I will present some of our preliminary research showing the implications of cultural and individual

variation in time-space distancing for well-being and health, as well as social and disordered cognition.

September 9

Vicky Lai, Assistant Professor, Department of Psychology & Cognitive Science Program, University of Arizona

TITLE: The Role of Metaphor in Embodied Cognition

ABSTRACT: Metaphors occur on average once every twenty words in daily language. It has been suggested that metaphors play a major role in the organization of semantic memory, as cognitive and neural resources for dealing with concrete domains are recruited for the conceptualization of more abstract ones. In this talk I will discuss the when and the where of metaphor grounding and how such grounding may be enhanced in context. Our latest findings indicate that concrete senses, when used in a metaphorical way, are exploited further and made semantically richer for grounding the abstract concept of interest.

COGNITIVE SCIENCE COLLOQUIUM Spring 2016

April 22

Graduate Student Showcase

Speakers: Dylan Cooper and Katie Newman-Smith

Dylan Cooper, Graduate Student, Management (Major), Management and Organizations (Major), Cognitive Science (Minor)

Title: Social-Standing and Decision-Quality Goals in Advice Taking

Abstract: Research in advice taking has traditionally assumed that people accept or reject advice based on perceptions of its usefulness for solving the issue for which it is offered. The research described in this talk tests whether anticipated social consequences of the use of advice are an additional antecedent of advice taking. I first differentiate between decision quality goals and social standing goals: Decision quality goals increase striving toward a good outcome, while social standing goals focus attention on the social effects of the act of taking or rejecting advice. For example, advisees may take advice when they fear that rejecting it will anger their advisor. I then propose that an advisor's relative expertise influences advice taking through decision quality goals, while the advisor's position in a formal hierarchy (i.e., supervisor, peer, or subordinate) influences advice taking through social standing goals.

Katie Newman-Smith, Graduate Student, Psychology (Major), Psychology (Minor)

Title: Using Targeted Memory Reactivation (TMR) to Induce Forgetting

Abstract: Recent studies demonstrate memory improvement following targeted memory reactivation (TMR) using associated sounds or odors during sleep (see Oudiette & Paller, 2013 for review). TMR can also diminish fear conditioning (Hauner, Howard, Zelano, & Gottfried, 2013) and implicit social biases (Hu et al., 2015). Here we investigate whether TMR can induce forgetting in episodic memory. Eighteen participants completed two learning tasks prior to sleeping. In the first task, participants experienced a directed-forgetting task with words. Participants saw 46 words, with half followed by a ‘forget’ tone. For the second task, participants saw 28 novel object-location pairs. Objects were paired with their associated sounds. From these objects, we randomly chose five for reactivation and five for controls. At night, during the first period of slow wave sleep, we reactivated the five objects with the forget tone 20 times. One week later we tested participants memories of the objects and words using free-recall and recognition. Participants recalled fewer reactivated than control objects ($t(1,17)=3.682$ $p = .002$, Cohen’s $d = 1.23$). Of the reactivated objects that were not recalled, participants were also less likely to remember their spatial locations ($t(1,15) = -2.132$ $p = .05$, Cohen’s $d = .764$) and had lower confidence in their answers ($t(1,15) = -5.558$ $p > .001$, Cohen’s $d = 1.983$). We demonstrate proof of concept that TMR can be used to reduce memory for objects one week later. Participants are less likely to recall the objects, and are also less likely to correctly locate those they successfully forgot. Future studies will determine whether TMR-forgetting can reduce stronger or more emotional memories, paving the way for novel therapeutic treatments for disorders including PTSD or phobias.

April 15

Randall O'Reilly, Professor, Department of Psychology and Neuroscience, Institute of Cognitive Science, Center for Neuroscience, University of Colorado, Boulder

TITLE: The Emergence of Symbolic Cognition from Sensory-Motor Dynamics

ABSTRACT: One of the greatest mysteries of human cognition is how higher-level symbolic processing emerges out of lower-level sensory-motor learning. We are developing biologically-based computational models that explore this transition, in the domain of active processing of visual displays, leading up to the ability to perform tasks such as the Raven’s progressive matrices – a widely-used test of general fluid intelligence. It has been critical to incorporate the functions of the deep neocortical layers, and their interactions with the thalamus, to enable our models to exhibit the dynamic top-down attention required. These attentional mechanisms interact with bidirectional excitatory connectivity in the superficial cortical layers to support flexible access to visual information by executive function areas in the prefrontal cortex and basal ganglia.

April 8

Jamie Edgin, Assistant Professor, Department of Psychology; Director, Memory Development and Disorders Lab, University of Arizona

TITLE—Sleep: The beloved teacher?

ABSTRACT: In recent years there has been a resurgence of an age-old idea that adequate sleep is needed for healthy cognition and behavioral development. Numerous studies have pointed to sleep quality as a correlate of a child's level of executive function and behavior, language development, and school performance (Beebe, 2011; Bernier et al., 2013; Edgin et al., 2015). There is also evidence that knowledge may be consolidated across sleep periods (Gomez et al., 2006; Henderson et al., 2012). More recent work has pointed to the provocative notion that sleep might actually serve a mechanistic role in how the brain refines networks important for higher-level cognitive function (Huber & Born, 2014; Walker, 2006). In this talk I will discuss some knowns and unknowns regarding the relationship between sleep quality, physiology, and learning. I will draw examples from my research program, which examines the effects of early sleep quality on memory and learning in typical and atypical development.

April 1

Andrew Lotto, Associate Professor, Speech, Language and Hearing Sciences, University of Arizona

TITLE— The Sorcerer's Spectrum: Relative Perception in the Auditory System

Abstract: The human ability to understand speech from talkers with widely varying vocal anatomy is remarkable. It has been proposed that humans solve the problem of acoustic variance in speech by relying on either innate (divinely-granted?) specialized processes or on substantial linguistic knowledge. I will present evidence that this ability is actually accomplished by a general auditory mechanism that likely evolved to handle the problem of detecting acoustic events in the presence of noise. I will then ask whether such a mechanism can also account for demonstrations that listeners tune their speech perception to accommodate speakers with a non-native accent or a different speaking style. If nothing else, I hope to demonstrate the usefulness of the first chapter of the first Harry Potter book for studying perception.

March 25

Cathleen Moore, Professor, Psychological and Brain Sciences, The University of Iowa

TITLE—Beyond parsing: Some functional consequences of perceptual organization in vision

ABSTRACT: Processes of perceptual organization, such as those that result in phenomena like grouping, surface completion, and figure-ground segregation, have been a central focus in vision research since at least the 19th century. One reason for this focus—besides the appeal of the phenomenology—is that perceptual organization is considered foundational; it parses the retinal image into the building blocks out of

which more complex visual representations are built. Research has focused on understanding the rules of organization, such as “similarly colored items tend to be grouped together”, “aligned edges tend to be represented as continuous” and “surrounded regions tend to be represented as figure rather than ground.” In this talk rather than rules, I will consider some of the functional consequences of perceptual organization for downstream visual processing. Specifically, I will suggest that perceptual organization processes serve to establish changeable information “channels” that guide the updating of existing visual representations on the basis of newly sampled visual information. While not directly conflicting with more traditional treatments of perceptual organization, this view seeks to emphasize the functional role that perceptual organization plays in dynamic visual processing.

March 11

Julie Miller, Ph.D., Assistant Professor, Departments of Neuroscience and Speech, Language, and Hearing Sciences, University of Arizona

Title: The Role of the Basal Ganglia in Neural Control of Speech

Abstract: Information from multiple brain regions contributes to neural control of speech, but in more recent years, studies have highlighted an important role for the basal ganglia in vocal learning and control. When neural circuits in the basal ganglia are disrupted by disorders or neurological diseases, communication is impaired. Insights into the normal and abnormal functioning of these vocal motor pathways have been obtained through studies using the songbird model. I will present data on molecular mechanisms important for vocal learning and control including the role of dopamine.

March 4

Noa Ofen, Assistant Professor, Life-Span Cognitive Neuroscience, Institute of Gerontology, Wayne State University

TITLE: The Development of Memory Systems in the Human Brain

ABSTRACT: Episodic memory – the ability to encode, maintain and retrieve information – is critical for everyday functioning at all ages, yet little is known about the development of episodic memory systems and their brain substrates. The use of neuroimaging methodologies including magnetic resonance imaging (MRI) in the study of episodic memory development is providing new insights into the neural underpinnings that support improvements in episodic memory. I will present data on these neural mechanisms and highlight evidence that demonstrates how functional and structural brain development underlies changes in memory functioning throughout childhood and adolescence. We find age-related increase in memory-related activation in prefrontal cortex (PFC), a region that also shows protracted structural development. Age-related increase in the functional contribution of the PFC to memory may be directly related to improvement in the use of mnemonic strategies with age. The hippocampus, known to be critical for the integrity of episodic memory, shows a more complex pattern of functional development that may be dependent on its

involvement in binding and associating among an increasingly large knowledge-base through development. Characterizing normative development of brain systems that support episodic memory has direct implications for the understanding of memory systems in adults and aging, as well as in atypical development.

February 26

~~**CANCELLED--Melissa Duff**, Assistant Professor, Interdisciplinary Graduate Program in Neuroscience, the University of Iowa Graduate College~~

February 19

Amitai Shenhav, Princeton Neuroscience Institute

Title: The Costs of Choice and the Value of Control

Abstract: Two largely separate bodies of research offer different insight into the process by which we engage decisions. Research on goal-directed, value-based decision-making describes how we weigh the costs and benefits of our options, whereas research on cognitive control describes how we exert the necessary cognitive effort to overcome prepotent biases that interfere with the execution our choice (e.g., flankers directing us toward the incorrect response). I will discuss recent and ongoing studies aimed at examining questions that arise at the intersection of these two fields. I will focus in particular on two sets of studies that explore the cognitive effort costs we associate with the act of making a choice: one set of studies examines the neural circuits that drive simultaneously positive and aversive experiences of being offered multiple good options (e.g., great graduate schools to attend); the other set of studies explores the costs of considering alternatives to our default option (i.e., the choice we are prepotently biased to make in a given situation). I will then describe a recent theoretical framework and ongoing modeling work that seeks to address how we weigh the costs and benefits of control itself (i.e., how much cognitive effort is worth exerting?).

February 5

Yuhong Jiang, Professor, Department of Psychology, University of Minnesota

TITLE: Attention in Space and Time

ABSTRACT: The visual world is complex; it is not possible to process all incoming sensory information at once. Selective attention allows us to prioritize processing of behaviorally relevant information. Selectivity often applies to specific spatial locations and occurs in certain moments of time. In the first part of this talk on “attention in space”, I present evidence that implicit learning affects spatial attention. Borrowing terminologies from memory research, I divide attention into a declarative component - the “where” of attention, and a procedural component - the “how” of attention. I show that implicit learning affects how people deploy attention in a viewer-centered (egocentric) reference frame. I argue that successful target detection serves as a reinforcement signal for learning. In the second part of the talk on “attention in time”, I present behavioral and fMRI evidence that

detecting behaviorally relevant events in time facilitates global perceptual and brain function. Such facilitation overcomes dual-task interference and counters the traditional push-pull effects of spatial attention.

January 29

Andrew Yonelinas, Professor, Psychology Department; Associate Director, Center for Mind and Brain, University of California, Davis

TITLE—The Role of the Medial Temporal Lobe in Memory, Perception and Emotion: The Promiscuous Hippocampus

ABSTRACT: (Tentative abstract) The ability to remember the important events that make up our lives is critically dependent on the medial temporal lobe (MTL). Today, I will start by briefly reviewing some work indicating that different regions within the MTL play distinct roles in long term episodic memory. More specifically, I will describe work suggesting that the hippocampus plays a central role in binding together and subsequently recollecting the different aspects that make up an episode or event, whereas other regions such as the perirhinal cortex can support familiarity-based memory discriminations even when recollection fails. Second, I will then discuss some more recent work that has suggested that the MTL may not be limited to supporting long term episodic memory, but that it may also be involved in supporting short-term memory and even visual perception, and will present data that suggests that in general the primary function of the hippocampus is to support processing of high-resolution complex bindings, that can play a critical role in making long term memory, short term memory and perception judgments. Third, I will examine how emotion impacts remembering and show emotional memories are particularly resistant to the effects of forgetting. I will argue that this arises because the amygdala supports recollection of emotional bindings that exhibit relatively slow forgetting compared to hippocampal bindings. Forth, I will present data showing that when acute stress occurs immediately after an event has been encoded into memory that this can rescue memory from the effects of forgetting. I will then present some data suggesting that this occurs because stress acts as a mnemonic filter biasing us toward remembering items that were strongly encoded by the MTL.

January 22

Jonathan Weinberg, Associate Professor, Department of Philosophy, University of Arizona

TITLE--Cognitive science can help burn an armchair, but can it help separate wheat from chaff? On the 'experimental philosophy' challenge to traditional philosophical methodology.

ABSTRACT: An important methodology in philosophy, in recent decades but also going back to Socrates, has been the *armchair method of cases*: we consult our armchair judgments about what hypothetical cases are or are not instances of philosophically interesting categories. If you want to know about the nature of knowledge, consider what pre-theoretically seem to count as excellent cases of knowledge, and excellent cases of non-knowledge, and try to systematize. Likewise for, say, moral goodness, or

human agency, and so on. This methodology has come under fire in recent years from ‘experimental philosophers’, deploying both existing results and empirical research tools from the social sciences to argue that armchair judgments about these cases may be susceptible to all sorts of noise: order effects, framing effects, demographic variation, and so on. More recent results indicate that philosophical training and experience does little to dampen the influence of such noise. I will discuss this body of work, and then ask the audience for help with what seems to me one of the most pressing questions: if we cannot trust the armchair to help us determine the nature of philosophical categories, can we find ways for scientific tools and methods to help us do better?

COGNITIVE SCIENCE COLLOQUIUM

Fall 2015

December 4

Elissa Newport, Professor, Georgetown University Medical Center; Director, Center for Brain Plasticity and Recovery

TITLE—Statistical Language Learning: Computational, Maturational, and Linguistic Constraints

ABSTRACT: In recent years a number of problems in the brain and cognitive sciences have been addressed through statistical approaches, hypothesizing that humans and animals learn or adapt to their perceptual environments by tuning themselves to the statistics of incoming stimulation. Our own work on statistical language learning shows that infants, young children, and adults can compute, online and with remarkable speed, how consistently sounds co-occur, how frequently words occur in similar contexts, and the like, and can utilize these statistics to find candidate words in a speech stream, discover grammatical categories, and acquire simple syntactic structure in miniature languages.

However, statistical learning is not merely learning the patterns that are presented in the input. Our research also shows that there are maturational changes in statistical learning, with children sharpening the statistics and producing a more systematic language than the one to which they are exposed. Our most recent work examines variation in relation to linguistic universals, suggesting that, when inconsistencies occur on dimensions on which languages tend strongly to align in one direction, learners also shift the languages they learn in this direction. These processes potentially explain why children acquire language (and other patterns) more effectively than adults, and also how systematic language structures emerge in communities where usages are varied and inconsistent.

November 20

Matthew D. Grilli, Assistant Professor, Department of Psychology, University of Arizona

TITLE—Mechanisms and Functions of Personal Semantic Memory: Insights from Amnesia

ABSTRACT: Personal semantic memory can be defined as knowledge that is specific and unique to each individual. It consists of autobiographical facts, knowledge of self-referential traits and roles, and personal thoughts and beliefs. Recently, there has been much interest in understanding the cognitive and neural bases of personal semantic memory, as well as the contributions of this type of memory to other cognitive constructs. In regards to mechanisms, current research is focused on elucidating the extent to which personal semantic memory relies on two other types of human memory: episodic memory, which is memory for unique events, and semantic memory, which is general world knowledge. In addition to the cognitive and neural mechanisms of personal semantic memory, there is

considerable theoretical and clinical interest in shedding light on how this type of memory can be used to support the self-concept: the cognitive construct that enables us to experience an identity. To provide insight into the mechanisms and functions of personal semantic memory, I have conducted a series of studies investigating personal memory and self-concept in individuals with medial temporal lobe (MTL) amnesia. Based on the findings of this work, I will present a conceptual model that separates personal semantic memory into “experience near” semantics, which contain information linked to personal experience and depend on the MTL for retrieval, and “experience-far” semantics, which are abstract memories that rely on neocortical brain regions involved in retrieval of general semantic memory. I also will discuss findings demonstrating that personal semantic memory supports the ability to construct a self-concept in the present moment and to create a continuous sense of identity across mental time.

November 13

Nina Dronkers, Ph.D., VA Research Career Scientist, Director, Center for Aphasia & Related Disorders, University of California, Davis

TITLE: Lesion and Connectivity Analysis of a Network Supporting Language Comprehension

ABSTRACT: Classic models of language comprehension have focused on the left posterior superior temporal gyrus as the key region involved in language comprehension. However, recent lesion and functional imaging studies have suggested the involvement of numerous cortical regions that could assist in supporting the complexities of language. This presentation will review some of the major findings from our laboratory concerning the neural correlates of auditory comprehension disorders in stroke patients with aphasia. Voxel-based lesion-symptom mapping analyses of behavioral and neuroimaging data from aphasic patients will be presented that associate several brain regions with the language disorders of our patients. In addition, the structural and functional connectivity of these regions will be described, based on our recent work using diffusion tensor and resting-state functional magnetic resonance imaging (MRI). This comprehensive approach has allowed us to evaluate both the cortical regions and the underlying fiber pathways that are affected after brain injury and to examine the ramifications of these disconnections for patients with language comprehension disorders.

November 6

Teenie Matlock, McClatchy Chair of Communications, Associate Professor of Cognitive Science, University of California, Merced

TITLE: A Look at Linguistic Framing in Everyday Language

ABSTRACT: Framing is important in everyday communication and reasoning. People constantly frame events, states, and situations with the intention of encouraging others to adopt a particular point of view or take particular actions in the world. Social scientists and linguists know a good deal about framing, but relatively little about how some of the finer linguistic details effect reasoning. This presentation will discuss recent

experimental findings on aspectual and metaphorical framing across various domains, including political messages, reckless driving reports, and risk alerts.

October 30

STUDENT SHOWCASE

Presenters—

Natalie Dailey, Graduate Student, Speech, Language and Hearing Sciences

Title: Neurological Models of Dyslexia and White Matter Integrity

Abstract: Dyslexia is a neuropsychological developmental disorder, affecting roughly 5 - 12% of the population, and persisting into adulthood. Previous research has identified neurological differences in individuals with dyslexia. However, little is known about the white matter integrity of the cerebellar-cerebral pathways within the reading network for adults. The current proposal outlines neurological models of dyslexia and how cerebellar-cerebral pathways relate to reading. Building upon previous findings from function MRI, the present study proposes differences in white matter integrity within in the reading network, between individuals with and without dyslexia. Bilateral Iterative Parcellation (BIP) will be introduced and discussed as a novel method to identify the location and size of connected cortical regions involved in reading. Results from preliminary analyses will be presented, demonstrating successful implementation of the BIP procedure and the identification of cortically connected regions important for reading.

Continued on next page

Noah Nelson, Graduate Student, Linguistics

Title: Hyperarticulated Speech Correlates with Phonetically Specific Lexical Competition

Abstract: Languages change over time in many ways, including the sounds that are used to form words. One possible way for this to happen is in gradual shifts in the pronunciation of words in response to similar-sounding competitors. True to this view, phonetic competition between words correlates with hyperarticulation, or the exaggeration of distinguishing phonetic cues (Baese-Berk & Goldrick, 2009). Experimental work to date has focused on either very broad measures of competition or very phonetically specific ones, leaving uncertain what intermediate types of competition may affect phonetic realizations of words (though see Kirov & Wilson 2012 and Schertz 2013). What is more, very little work has attempted to find these effects in conversational speech outside the lab.

To address these issues, the present study examined spontaneous, conversational speech from the Buckeye Corpus (Pitt et al. 2005, 2007) to see what measures of competition correlate with hyperarticulation. Only the most phonetically specific measure of competition was found to reliably predict hyperarticulation, suggesting that speakers may manipulate fine-

grained phonetic detail to enhance intelligibility. This finding is consistent with previous research suggesting that phonetically specific competitor words may drive language change (Wedel et al. 2013).

October 23

G. John Andersen, Professor, Department of Psychology, University of California, Riverside

TITLE: Age-related Declines in Vision and Recovery of Function Using Perceptual Learning

ABSTRACT: A major problem for the rapidly growing population of older adults (age 65 and older) is age-related declines in vision, which have been associated with increased risk of falls and vehicle crashes. My talk will briefly review what is known about age-related declines in vision and review in detail behavioral and imaging research that examines how training using perceptual learning methods can be used to improve vision and sensory processing among older adults. This research has found that with a few days of training older adults can perform visual tasks as well as untrained college age adults, that the improvements are maintained for up to 3 months, are not the result of task practice and that the improved performance is not associated with changes in attention. The results of our imaging studies indicate activation changes for younger adults and structural changes for older adults due to training – providing evidence of multiple mechanisms of plasticity within the adult brain. These findings, considered together, indicate that behavioral interventions can greatly improve visual performance for older adults.

October 16

Chad Woodruff, Associate Professor, Psychological Sciences, Northern Arizona University

TITLE: EEG α -rhythm β -rhythm and Event-Related Potential Correlates of Perspective-Taking, Personal Distress and Self-Other Discrimination

ABSTRACT: Taking another's perspective requires not only the experiencing of another's intentions/feelings, but these experiences must be represented as belonging to the other and not to the self. Failures of self-other discrimination can lead to personal distress, which necessarily entails self-focus – the antithesis of empathy. This talk will feature a series of experiments demonstrating some of the neural correlates of processes related to empathy. Using α - and β -rhythms (possible correlates of mirror neuron activity) as well as ERP's, we will see that empathy-related processes correlate not only to neural responses to others, but also to self-other differences in neural responses. The data are consistent with claims that greater self-other discrimination relates to greater empathic abilities. The talk will also include comparisons of α -rhythms from omnivores and vegetarians as relates to perception of traditional food animals and, separately, from those who do and do not hold paranormal beliefs.

October 9

CANCELLED ~~Evelina Fedorenko, Assistant Professor, Psychiatry Department, Massachusetts General Hospital; Department of Brain & Cognitive Sciences, Massachusetts Institute of Technology~~

October 2

Tania Lombrozo, Roger N. Shepard Distinguished Visiting Scholar, Associate Professor, Department of Psychology, University of California-Berkeley

TITLE—Explanation: The Good, The Bad, and the Beautiful

ABSTRACT: Like scientists, children and adults are often motivated to explain the world around them, including why people behave in particular ways, why objects have some properties rather than others, and why events unfold as they do. Moreover, people have strong and systematic intuitions about what makes something a good (or beautiful) explanation. Why are we so driven to explain? And what accounts for our explanatory preferences? In this talk I'll present evidence that both children and adults prefer explanations that are simple and have broad scope, consistent with many accounts of explanation from philosophy of science, and with ties to ideas about inference to the best explanation in epistemology. The good news is that a preference for simple and broad explanations can sometimes improve learning and support effective inferences. The bad news is that under some conditions, these preferences can systematically lead children and adults astray.

September 25

Mark T. Wallace, Director, Vanderbilt Brain Institute, Vanderbilt University

TITLE—Development and Plasticity of Multisensory Function: Single Neurons to the Clinic

ABSTRACT: We live in a world in which we are continually bombarded with stimuli from a number of different sensory modalities. As such, one of the important functions of our brains is to combine this rich sensory mélange into a coherent and unified perceptual representation. Although we now know a great deal about how multisensory interactions guide behavior and shape perception and cognition, and about the neural correlates of these interactions, our knowledge about the development and plasticity of multisensory representations has lagged behind. In this talk, I will begin with an overview of the benefits that can be gleaned from multisensory interactions, and review some of the neural bases for these effects. I will then describe work in animal models that has revealed some of the basic features of how multisensory representations develop, and the inherent plasticity contained within these representations. I will then transition to describe studies in humans that highlight the multisensory plasticity that takes place not only during the course of development, but also in the adult. I will end with a discussion of the clinical implications of alterations in multisensory function, with an emphasis on neurodevelopmental disabilities.

September 18

Jonathan Tullis, Assistant Professor, Educational Psychology, University of Arizona

TITLE—Reminders: The influence of prior episodes on present behavior
ABSTRACT: One aspect of successful cognition is the efficient use of prior relevant knowledge when navigating novel situations. Reminders – stimulus-guided retrievals of prior episodes – allow us to link prior knowledge to current problems by prompting retrieval of relevant knowledge from events that are distant from the present. Here, I explore the causes and consequences of reminders for interpretation, memory, and generalization. I will present research showing that reminders bias the interpretation of ambiguous stimuli, that memory for the first item in a reminded pair is enhanced, that the benefits of reminders depend upon the association and lag between related presentations, and that reminders can produce better generalizations than comparison. Further, I will describe a mathematical model of reminders, which demonstrates that reminders provide a useful unifying theme for memory phenomena that otherwise lack theoretical coherence. Reminders are an important cognitive mechanism that enables our past experiences to influence our current behavior.

September 11

Don T. Fallis, Professor, School of Information, University of Arizona

TITLE: Shedding Light on Keeping People in the Dark

ABSTRACT: We want to keep hackers in the dark about our passwords and our credit card numbers. We want to keep potential eavesdroppers in the dark about our private communications with friends and business associates. And especially after Snowden's revelations, we probably want the government kept in the dark as well. But in order to know whether we are achieving these sorts of goals, we first need to understand exactly what it is to *keep someone in the dark* about something. Several philosophers (e.g., Bok 1983, Scheppele 1988, Mahon 2009, Carson 2010) have analyzed this concept in terms of concealing and/or withholding information. However, these analyses incorrectly exclude clear instances of keeping someone in the dark. And more importantly, they incorrectly focus on possible *means* of keeping someone in the dark rather than on what it *is* to keep someone in the dark. In this talk, I argue that you keep X in the dark about P if and only if you intentionally leave X without a true belief about P. I then show how my analysis of keeping someone in the dark can be generalized from a categorical belief model of epistemic states to a degree of belief model. I also show how my analysis connects to recent research in cryptography and game theory.

September 4

Martin Reimann, Assistant Professor, Marketing, Eller College of Management, University of Arizona

TITLE: Can a Happy Meal help you eat less? New behavioral and neurophysiological findings on motivating smaller portion choice

ABSTRACT: Four studies show that offering consumers the choice between a full-sized food portion alone and a half-sized food portion paired with a small non-food premium (e.g., a small Happy Meal toy or the mere possibility of winning frequent flyer miles) motivates smaller portion choice. Importantly, we investigate why this is the case and find that both food and the prospect of receiving a non-food premium activate a common area of the brain (the striatum), which is associated with reward, desire, and motivation. Finally, we show that the choice results are mediated by a psychological desire for, but not by liking of, the premium. Notably, we find that choice of the smaller food portion is most pronounced when the probability of obtaining the premium is not disclosed compared to when the probability is disclosed or when the receipt of the same premium is stated as being certain.

COGNITIVE SCIENCE COLLOQUIUM Spring 2015

May 1

Graduate Student Showcase

Speakers: Goffredina Spano and Erica Wager

Goffredina Spano, Graduate Student, Psychology (Major) & Cognitive Science (Minor)

Title: Testing the Boundaries of Boundary Extension Across Development

Abstract: In adults, perceptions of the world are influenced by past experience and memory. Boundary extension (BE) is a phenomenon in which observers will extend the background details of a previously viewed scene, reflecting a rapid top-down influence on perceptual representations. Given recent evidence findings suggesting a role for the hippocampus in BE (Mullally, Intraub & Maguire, 2012), and findings evidence of BE in very young infants (Quinn & Intraub, 2007), we tested whether this phenomenon may change during rapid periods of hippocampal development or may be altered in populations with hippocampal dysfunction (i.e., Down syndrome, DS). The findings suggest that there are no clear links between the development of hippocampus and BE in school-age children or individuals with DS. These findings raise questions regarding the continuity of mechanisms underlying BE across development.

Erica Wager, Graduate Student, Psychology (Major) & Cognitive Science (Minor)

Title: Exploring the Effects of Long vs. Average Sleep on Cognition in Healthy Older Adults

Abstract: Previous research suggests that too little or too much sleep time in adults can have negative consequences on mortality, health, mood and various cognitive outcomes. Most of these studies, however, have measured sleep subjectively by using sleep diaries and self-report measures. I'll be discussing results from a Multi Site Sleep Study where we explored how average or long sleep measured objectively in older adults is associated with cognitive function. In this study, as part of a larger longitudinal study, we hypothesized that long sleepers would have worse cognitive performance than average sleepers. Among other measures, we calculated total sleep time in 72 healthy older adults by using actigraphy (a device similar to "fitbit") and sleep diaries. The older adults were then classified as average or long sleepers. At baseline, after participants had monitored their time in bed and sleep for two weeks, we gave them various cognitive and health measures. We found that longer sleep among older adults was associated with slower completion time on a task that requires inhibition of an automatic response – the Stroop Task, but that there were no significant differences on a task that requires set shifting and visual attention – the Trail Making Test. I'll discuss these findings and the broader impact of these results in aging populations in my talk.

April 24

Edward F. Chang, MD, Associate Professor, Departments of Neurosurgery and Physiology, University of California-San Francisco

TITLE: Feature Organization in Human Speech Cortex

ABSTRACT: Communication systems generally rely on upon defined organizational schemes for signal generation and sensing. In humans, the production and perception of speech is processed by highly specialized neuroanatomical areas and processes. We have recently identified important phonetic-level features for vocal tract control during articulation in the speech motor cortex, and for speech sounds in the higher order non primary auditory cortex. I will discuss important similarities and differences in these representational systems with respect to feature organization and dynamics. I will also present related work on auditory-vocal (sensorimotor) integration and transformation in speech.

April 17

Sarah Shomstein, Associate Professor of Cognitive Neuroscience, Department of Psychology; Affiliated Faculty, Neuroscience Institute and Mind-Brain Institute, George Washington University **TITLE—** Structuring Visual Input: Evaluating Representations Influencing Attentional Selection

ABSTRACT: Behavioral goals and motivations play a critical role in shaping and refining information processing so that only the most relevant sensory stimuli are used to guide attention and ultimately influence perception and decision making. Traditional accounts hold that multiple representations (spatial, object-based, features, etc.) guide attentional selection automatically. Using visual system as a model, I will present evidence drawn from behavioral, neuroimaging, and eye-tracking experiments challenging the traditional automaticity assumptions. Focusing

on the influence of spatial and object-based representations, I will demonstrate that while spatial contribution is automatic, the influence of object representations to attentional selection is not. I will further argue that the degree to which object representations are used for attentional guidance is determined by the amount of uncertainty in the scene.

April 10

Dan Bartels, Assistant Professor of Marketing, University of Chicago
TITLE: Psychological Connectedness to the Future Self and Forward-Looking Decisions

ABSTRACT: In this talk, I'll build on a philosophical account of personal identity (Parfit, 1984) which argues that the degree of concern one has for one's future self may be scaled by the degree of "psychological connectedness"—overlap in properties such as beliefs, values, and ideals—held between one's current and future self. Our studies pose participants with tradeoffs between consuming a benefit in the near future versus consuming more of that benefit in the distant future. When people's sense of connectedness with their future self is reduced, they make impatient choices. When their sense of connectedness with the future self is bolstered, they make more prudent-seeming, forward-looking choices. I'll then discuss some studies that examine people's preferences about whether to engage in discretionary spending vs. save their money and find that reduced spending in the present requires the combination of both being motivated to provide for one's future self (valuing the future) and actively considering long-term implications of one's choices (awareness of the future). Finally, I'll talk about some studies that explore goal setting and striving. The exercise of self-control involves setting priorities and adhering to plans, even in the face of immediate temptations. Many decisions requiring self-control involve trading off consumption or happiness in the present or immediate future with consumption or happiness in the distant future. We posit that a crucial variable in such decisions is how a person views her distant future self (i.e., as a somewhat different person from her current self or as fundamentally the same person). We find, in several studies, that how people view their future selves influences the plans they make and how successfully they adhere to those plans.

April 3

Robert C. Wilson, Assistant Professor, Department of Psychology and the Cognitive Science Program, University of Arizona

TITLE: The Explore-Exploit Dilemma in Human Reinforcement Learning

ABSTRACT: When you go to your favorite restaurant, do you always get the same thing, or do you try something new? Sticking with an old favorite ensures a good meal, but exploring other options might yield something better - or something worse. This simple conundrum, choosing between what you know and what you don't, is called the exploration-exploitation dilemma. Whether it's deciding on a meal, a vacation destination or a life partner, this is an important problem for humans and animals to solve.

In this talk I will discuss how humans solve the explore-exploit dilemma. Theory suggests two distinct strategies: a directed strategy, in which choices are biased toward information, and a random strategy, in which exploration is driven by noise. Here I will show that humans use both approaches, and that furthermore, the mixture of random and directed exploration is optimal in that it maximizes reward in the long run. These results have implications for our understanding of how decisions impact learning, the role of exploration in development and mental disorders, and even for choosing what to eat for dinner.

March 26 & 27 Open Forum (Thursday) & Workshop on Neural Systems and Memory (Friday) Special Event—No Cognitive Science Colloquium scheduled for Friday, March, 27, 2015

March 13

Tyler Peterson, Assistant Professor, Department of Linguistics, University of Arizona

TITLE: Structural Complexity and the Acquisition of Recursive Locative PPs

ABSTRACT: Phase-based models of grammar hold that the role of syntax is to build formal objects that are interpretable at the interface between semantics and syntax. Derivations are believed to be cyclic, such that a structure is built until it constitutes a category of the right type, which can then be mapped into one of the two basic semantic primitives: referential expressions or propositions. At such point in the syntactic derivation, a cycle or phase is complete, and the syntactic object is ‘shipped off’ to the semantic interface. In the syntax, only certain components of it remain accessible for further syntactic manipulations. According to Arsejinovic & Hinzen (2011), the syntactic consequence of this model is that recursion – the basis of the generative capacity of language – does not occur within a single phase. The semantic consequence is that at each point in a derivation of a complex structure, only a single element is interpretable, so that the extension or semantic value can be calculated. Such cyclic accounts of referential opacity predict asymmetries in the interpretation of matrix and embedded constituents, but are silent on whether embedding itself introduces complexity. The overarching goal of this paper is to examine how structural complexity arising from embedding can be represented in this model, and whether grammatical complexity should be defined in terms of compositional semantics, or phrase structure. More specifically, we shed light on the complexity that recursion introduces in grammar and meaning by comparing child and adult patterns of production of recursive noun phrases. The results of this study provide evidence for the limitations of syntax-only or semantics-only approaches to complexity in certain kinds of complex NPs – despite the fact that these NPs are made up of the same syntactic and semantic ingredients.

March 6

David Raichlen, Associate Professor, Department of Anthropology, University of Arizona

TITLE: Evolutionary Links between Exercise and the Brain

ABSTRACT: Recent work suggests exercise can have profound impacts on the brain. From altering psychological state and improving mood, to enhancing brain structure and improving cognitive function in older adults, aerobic exercise generates surprising links between the brain and body. Here, I explore these effects from an evolutionary perspective. Human evolution was marked by a shift from relatively sedentary, ape-like lifestyles, to more aerobically active lifestyles beginning with the origins of hunting and gathering nearly two million years ago. I suggest that this shift helps us understand how and why exercise alters the brain today. First, humans and other distance running mammals seem to share exercise-induced upregulation of neurotransmitters associated with rewards and analgesia. This convergence may be a product of selection, and suggests that the positive change in psychological state associated with exercise has deep evolutionary origins. Second, humans have a long lifespan compared to other primates and mammals which many suggest evolved so that older adults could help care for, and provide knowledge to, younger generations. Exercise-related improvements in cognitive function and brain structure in older adults may help explain how and why the long human lifespan evolved. Combined, these studies show how we can use our evolutionary history to better understand the links between the brain and body today.

February 27

Anastasia Flevaris, Postdoctoral Fellow, Department of Psychology, University of Washington

TITLE: Contextual Processing in the Primary Visual Cortex and Variations with Autistic Tendency

ABSTRACT: Neurons in the primary visual cortex (V1) respond to basic image features (e.g., orientation, spatial frequency) in small, restricted areas of the visual field (“receptive field”). However, visual information beyond the receptive field can significantly alter neural responses. For example, the neural response to a stimulus can be suppressed by similar stimuli (e.g., same orientation/spatial frequency) outside the receptive field, in the “surround,” even though the neuron would not otherwise respond to the surround stimulus. This form of contextual processing - termed “surround suppression” - is thought to arise from both lateral connections within V1 itself as well as feedback from higher-level regions. Given the potential high-level influence on surround suppression, an important question is whether and how attention modulates the suppression. In this talk I will discuss attentional influences on surround suppression as well as how surround suppression varies with autistic tendency. In the first part of the talk I will present evidence that surround suppression is modulated by attention to features. Next, I will examine how attentional enhancement interacts with surround suppression. Prior studies have shown that enhanced processing of an attended stimulus automatically spreads to items in an

image that are perceptually grouped with and/or share features with the attended stimulus. I will provide a unified account for surround suppression and surround enhancement by showing that suppression and enhancement in V1 of the *same* stimulus depends on the focus of attention. Finally, in the last part of the talk I will examine how surround suppression in V1 differs as a function of autistic tendency. Prior work has suggested that individuals with autism exhibit differences in perceptual phenomena thought to be associated with surround suppression. I will present data suggesting that surround suppression in V1 of neurotypical individuals varies as a function of the degree to which they have autistic tendencies, as measured by the “Autism Quotient” scale (AQ). Individuals with more autistic tendencies exhibit less surround suppression, which could contribute to the perceptual differences exhibited by individuals with autism.

For a copy of Dr. Flevaris’ CV, please contact Nova Hinrichs @ nhinrich@email.arizona.edu.

February 20

Tamar Kushnir, Associate Professor, Department of Human Development, Cornell University

TITLE—Seeing the Road not Taken: The Origin of Our Beliefs about Choice in Childhood

ABSTRACT: Our adult concept of choice is not a simple idea, but rather a complex set of beliefs about the causes of actions. These beliefs are situation-, individual- and culture- dependent, and are thus likely constructed through social learning. Initially, infants and young children evaluate actions as choices by two criteria: they are intentional, and there are possible (or likely) alternatives. By preschool, these same considerations guide children’s inferences about their own choices as well. Moreover, preschoolers can talk explicitly about how physical, biological, and psychological constraints can limit choice by constraining the possibility to “act otherwise.” Developments beyond the preschool years suggest that more complex aspects of our beliefs about choice - In particular about how actions can or cannot be freely chosen in the face of strong desires or against social and moral norms – take time to emerge, and are subject to significant cultural variation.

February 6

Jill Lany, Assistant Professor, Department of Psychology, University of Notre Dame

TITLE: Discovering the Underpinnings of Statistical Language Learning in Infants

ABSTRACT: A longstanding question in the developmental and cognitive sciences concerns how we learn our native language. Very young infants are adept at learning statistical regularities, such as sequential structure and correlations between stimulus dimensions in novel artificial languages. These data suggest that statistical learning plays an important role in language acquisition. They also have implications for children’s real-world language development, as variation in statistical learning ability may help

explain divergent learning trajectories. However, few studies have tested whether there is a connection between statistical learning and native language competence, and little is known about sources of variation in statistical learning. Moreover, statistical learning is itself poorly specified. In this talk I will discuss several studies designed to bridge these gaps in our knowledge. Specifically, these studies test the hypothesis that statistical learning is related to native language development, and that infants' ability to encode and identify fluent speech supports statistical learning.

January 30

Noah Snaveley, Assistant Professor, Department of Computer Science, Cornell University

TITLE: Planet-Scale Visual Understanding from Online Photos

ABSTRACT: We live in a world of ubiquitous imagery, in which the number of images at our fingertips is growing at a seemingly exponential rate. These images come from a wide variety of sources, including mapping sites, webcams, and millions of photographers uploading billions upon billions of images to social media and photo-sharing websites such as Flickr, Facebook, and Instagram. Taken together, this imagery can be thought of as constituting a distributed camera capturing the world at unprecedented scale, and continually documenting its cities, events, and the natural environment. This talk will outline how we might use this distributed camera as a fundamental new tool for science, engineering, and environmental monitoring, and how a key problem is deriving *structure* from these unstructured and uncalibrated image collections -- making sense of the soup of pixels that is being captured all around the globe. I will talk about my group's work on new computer vision methods for extracting meaning from these massive photo collections.

January 23

Rebecca Gomez, Associate Professor, Department of Psychology, University of Arizona

Title: Sleep and Time Dependent Learning in Infants and Young Children

Abstract: It seems as if sleep has taken the world by storm. Not a week goes by that a new finding is not reported in the media regarding the health or cognitive consequences of good or poor sleep. Here I present studies investigating the role of sleep in newly formed memories in infants, toddlers, and preschool children. Sleep and wake, both, contribute to generalization but for very different reasons in different periods of brain development. Our work has implications for understanding the impact of sleep on infant and child learning in language acquisition, as well as for mechanisms of memory formation at these ages, but more generally is the first to ask how learning unfolds over time as a function of sleep across changing neural structures in such young children. Our research also speaks to questions of practical importance such as whether learning time is more

important than nap time in preschool and whether and when preschool children can safely transition out of naps.

COGNITIVE SCIENCE COLLOQUIUM Fall 2014

December 5

Graduate Student Showcase

Christina Meyers and Zachary Brooks, presenters

Titles & Abstracts below

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Christina Meyers, Graduate Student
Speech, Language, and Hearing Sciences (major)
Cognitive Science (minor)

Title: Effect of Schedule for Children Receiving Treatment Targeting Grammatical Morphology

Abstract: This study examined the relative effects of *massed* and *spaced* treatment delivery schedules on learning outcomes for 16 preschool age children with specific language impairment involved in an intervention program targeting grammatical morphology. All children received equivalent individual Enhanced Conversational Recast treatment for 30 minutes each day for five weeks (25 days). Half of the children received treatment in the *massed* condition (30 consecutive minutes in one session) and half of the children received treatment in the *spaced* condition (three 10-minute sessions separated over a 2 hour period). Children's progress was assessed 3 times weekly by probing the use of the treatment morpheme using toys and a set of word stems not used during treatment. Children's use of an untreated morpheme was also tracked over the treatment period as a control for maturational effects. Treatment effect sizes (d) were calculated for each child's treatment morpheme and control morpheme. Overall treatment efficacy was confirmed by effect size (d) for treated morphemes significantly greater than the effect size (d) for untreated morphemes, which was true for both groups, *massed* and *spaced*. There were no group differences for treated morpheme effect size or any other outcome measure. The implications for Enhanced Conversational Recast treatment delivery schedule and treatment efficacy studies will be briefly discussed.

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Zachary Brooks, Graduate Student
Second Language Acquisition and Teaching (major)
Cognitive Science (minor)

Title—Bilingual Decision Making: A Verbal Probability Study

Abstract: Probability can be expressed numerically (“75%”) or verbally (“probable”) and both numerical and verbal probability expressions have been studied extensively in medical, management, and political research contexts. However, verbal probability expressions are preferred more than numerical probability expressions despite their lack of precision because of their ease of use (Kuipers, Moskowitz, Kassirer, 1988), their ability to express a wider range of possibilities (Zwick, 1987), and the fact that using verbal probabilities rather than numerical probabilities costs decision-makers very little in terms of accuracy (Hamm, 1991a; Wallsten, Budescu, & Erev, 1988). Using verbal probabilities to investigate possible differences in native vs. non-native numerical valuations is a step to explore if there are differences in decision-making between first-language (L1) and second-language (L2) speakers and if there are by how much in what direction.

In this study, L1 and L2 speakers were provided the same verbal probability expressions (VPEs) in varying contexts and asked to assign numbers to ten VPEs – “rare,” “very unlikely,” “unlikely,” “likely,” “possible,” “probable,” “good chance,” “frequent,” “usually,” and “very probable” (Theil, 2002). Within subject and between subject tests were conducted and results show differences between native and non-native speakers’ numerical valuations in specific sentence contexts. This session reports findings of over 182 L1 and L2 subject responses, and it details the implications for SLA theory in terms of language use differences that translate into decision differences, such as decisions found in medical settings among care providers and patients who speak English as second language.

November 21

Oisín Deery, Visiting Scholar, Department of Philosophy, University of Arizona

TITLE: Neuroscience, Causes, and Free Will

ABSTRACT: According to some, neuroscience reveals free will as illusory. This is because we typically judge choices as free only if they are caused by the agent’s mental states, whereas neuroscience claims that choices have sufficient neural causes. If events with sufficient neural causes cannot also have distinct mental causes, then free choice is illusory. Of course, one might deny that events with sufficient neural causes cannot also have mental causes. Still, the claim that choices are free only if they are caused by mental states is often presented as unassailable. I maintain that it is not true *a priori*. It is an empirical question whether the relevant causes are neural. If they are, then neuroscientific skepticism about free will is defused. This is because the term (or concept) ‘free’—when it is used to pick out paradigmatically free choices—functions as a natural-kind term (or concept) that refers to whatever properties underpin such choices. Thus, it is irrelevant whether choices have sufficient neural causes. We are free, unless the properties underpinning paradigmatically free choices do not constitute a kind that is useful for predicting and explaining actions. I

conclude by pointing to work in neuroscience that suggests that neural kinds may *already* be better than psychological kinds at predicting and explaining behavior. If that is right, then not only does neuroscience fail to reveal free choice as illusory, it might tell us what free will is.

November 14

David Raichlen, Associate Professor, School of Anthropology, University of Arizona

TITLE: Evolutionary Links between Exercise and the Brain

ABSTRACT: Recent work suggests that exercise leads to improvements in cognition, changes in brain structure and function, and can reduce cognitive decline during aging. While researchers are beginning to understand how exercise affects the human brain, why the brain and body are linked in this way remains unclear. Here, I explore evidence that the effects of exercise on the brain are due, in part, to humans' evolutionary history as aerobic athletes. In this talk, I review evidence that natural selection acting on endurance exercise performance affects the evolution of the mammalian brain. These effects are apparent in experimental evolution experiments as well as in large comparative datasets. Based on comparative evidence, I explore the possibility that aerobic activity in our ancestors altered human brain evolution. The hunting and gathering lifestyle adopted by human ancestors approximately two million years ago required a large increase in aerobic activity. The links between exercise and the brain suggest that a significant portion of human neurobiology may have evolved due to selection on features unrelated to cognitive performance and may be tied to the adoption of a novel lifestyle during human evolution.

November 7

Jonathan Lifshitz, Associate Professor, Child Health, College of Medicine-Phoenix, University of Arizona

TITLE: Translational Studies into Circuit Reorganization as a Result of Traumatic Brain Injury

LEARNING OBJECTIVES:

- (1) Describe the general process by which circuit disruption explains the chronic neurological consequences of traumatic brain injury (TBI).
- (2) Since the CNS is composed of neurons and other components, recognize the neurovascular and neuroglial consequences of TBI.
- (3) Translational studies generate new knowledge necessary to advance the diagnosis and prognosis of TBI.

ABSTRACT: To meet the learning objectives, a series of conceptual ideas and experimental results will be presented to introduce and define traumatic brain injury (TBI). Conceptual ideas about neural circuitry will be presented as a concrete analogy to building and rebuilding Lego® structures. By understanding that Lego structures can be built and reorganized with the same basic building blocks, the consequences of TBI are understood as a reorganization of functional circuits. Thus, circuits that are dismantled and subsequently reorganized by TBI would manifest into neurological symptoms, depending on which circuits are reorganized. In the rodent, we

primarily focus on the whisker-barrel circuit, because our diffuse TBI model impacts the somatosensory thalamus and cortex. However, brain injury does not occur with neurons in isolation; glia are active in clearing damaged tissue and contributing to repair. These glial contribution may be principal sites to direct recovery of function. To this end, experimental studies must meet strict translational standards in order to advance the diagnosis, prognosis and treatment of TBI patients. Ongoing experimental studies mirror clinical investigation in order to advance the field.

October 24

Elizabeth Loftus, Distinguished Professor of Social Ecology, Professor of Law, and Cognitive Science, University of California-Irvine

TITLE: The Memory Factory

ABSTRACT: In our studies of memory distortion, we can alter, in people's minds, the details of events that were actually experienced. We can also plant entire memories of events that never happened – “rich false memories.” False memories matter: they affect people's later thoughts, intentions, and behaviors. Moreover, false memories look very much like true memories – in terms of behavioral characteristics, emotionality and neural signatures.

October 17

Fei Xu, *Roger N. Shepard Distinguished Visiting Scholar*, Professor, Department of Psychology, University of California, Berkeley

TITLE: Towards a Rational Constructivist Approach to Cognitive Development

ABSTRACT: The study of cognitive development has often been framed in terms of the nativist/empiricist debate. Here I present a new approach to cognitive development: rational constructivism. I will argue that 1) learners take into account both prior knowledge and biases (learned or unlearned) as well as statistical information in the input; 2) prior knowledge and statistical information are combined in a rational manner (captured by Bayesian probabilistic models); and 2) there exists a set of domain-general learning mechanisms that give rise to domain-specific knowledge. Furthermore, learners actively engage in gathering data from their environment. I will present evidence supporting the idea that early learning is rational, statistical, and inferential, and infants and young children are rational, constructivist learners.

October 10

Elena Plante, Professor, Department of Speech, Language, and Hearing Sciences, University of Arizona

TITLE: Learning from Inside the Brain

ABSTRACT: The typical fMRI study of auditory-verbal language functioning returns what is now so commonly found as to constitute “the usual suspects” of classic language cortex (Broca's and Wernicke's areas) plus fronto-parietal regions associated with attention and memory encoding. Far less is known about how this network emerges. One approach is to study children, who are in the process of acquiring or refining language

skills. Large-scale study of children's language processing has documented age-related changes in networks that already look remarkably adult-like as early as age five. A second approach is to look at language learning, unconfounded by maturational change. My lab has recently implemented natural language paradigms that capitalize on principles from the statistical learning literature to examine learning as it happens in the scanner to examine the emergence of this skill in adult learners. This work demonstrates differences between learners who are provided with consistent statistical regularities in the input and those who are presented nearly identical input that lacks these statistical regularities. We also demonstrate that learners who are given input that contains multiple statistical regularities (e.g., those governing identification of word units and others for word order) shift their processing strategy over time to reflect attention to different aspects of the input.

October 3

Leah Fabiano-Smith, Assistant Professor, Department of Speech, Language, and Hearing Sciences, University of Arizona

TITLE: Misdiagnosis of Speech Sound Disorders in Latino Children: Linking Theory with Practice

ABSTRACT: Bilingual children are often misdiagnosed as having a speech disorder when they truly exhibit normal development. In addition, speech-language pathologists (SLP) are avoiding the assessment of bilingual children due to the lack of knowledge and resources necessary for best practice with this population (Kritikos, 2003). Misdiagnosis of speech sound disorders in this population has long-term emotional, financial, and educational costs. These clinical errors can be prevented if we acquire more information on what constitutes normal and disordered speech development in the bilingual population. A theoretical model that allows us to differentiate difference in speech production (i.e., a difference in how a bilingual child speaks due to the influence of one language on the other) from speech disorder (i.e., an underlying speech-learning disability) will provide SLPs with the knowledge they need to prevent misdiagnosis. Recent research has found evidence in bilingual children's speech productions that they may be using some sounds interchangeably in both languages. For example, Fabiano-Smith and Goldstein (2010b) found that bilingual children exhibit higher production accuracy on sounds shared between English and Spanish than on sounds specific to either language. Those findings suggest that perhaps bilingual children have speech sound representations that differ from those of monolingual children. This talk will present a series of studies examining the production patterns of bilingual Spanish-English speaking children in order to (1) extend current theories on speech perception to speech production and (2) provide an evidence-based theoretical framework for assessment practices in bilingual Spanish-English speaking children that takes into consideration interaction between their two languages.

September 26

Bruno Galantucci, Research Affiliate, Haskins Labs; Associate Professor, Department of Psychology, Yeshiva University

TITLE: Studying Novel Forms of Human Communication in the Laboratory

ABSTRACT: When deaf people are not exposed to a pre-established sign language, they spontaneously develop a novel one. This phenomenon can be simulated in the laboratory with non-deaf people and this is what my collaborators and I have been doing over the last decade in order to investigate the fundamentals of human communication. In this talk I will provide an overview of these investigations, presenting two lines of research.

The first of these concerns the emergence of basic linguistic structure in human communication systems. In particular, I will present research aimed at uncovering forces that push human communication systems toward a combinatorial design, that is, toward recombining a small set of basic meaningless forms to express an indefinite number of meanings.

The second line of research concerns the foundations of human communication. People sometimes show severe communicative limitations in the laboratory, failing to develop even the simplest forms of communication. This raises the question of how sophisticated forms of human communication can come about. I will present three hypotheses to address this question and discuss some preliminary evidence relevant to them.

September 19

Peter Ditto, Professor of Psychology and Social Behavior, University of California, Irvine

TITLE: Motivated Moral Reasoning

ABSTRACT: Moral judgments are important, intuitive, and complex. These factors make them particularly fertile ground for motivated reasoning. After reviewing the general concept of motivated reasoning, I will describe research examining several different pathways by which motivational forces affect moral reasoning including: 1) affecting perceptions of the actor's moral accountability for an act, 2) influencing the normative moral principles people rely on to evaluate an act, and 3) promoting the selective recruitment of factual beliefs related to the practical effectiveness of an act. Discussion will focus on motivated moral reasoning as both a contributor to political conflict and as an example of people's long recognized difficulty maintaining clear conceptual boundaries between descriptive and prescriptive judgment, that is, between what is and what ought to be.

September 12

Mihai Surdeanu, Associate Professor, School of Information: Science, Technology and Arts, University of Arizona

TITLE: Teaching Computers to Answer Non-Factoid Questions

ABSTRACT: In this talk, I will describe our work towards teaching computers to answer complex questions, i.e., where the answer is a longer piece of text that explains a complex phenomenon, using linguistic information that is automatically acquired from free text.

I will present a robust question answer model for non-factoid questions that integrates multiple sources of information, such as lexical semantics and discourse information, driven by two representations of discourse: a shallow representation centered around discourse markers, and a deep one based on Rhetorical Structure Theory.

I will describe how to evaluate the proposed system on two corpora from different genres and domains: one from Yahoo! Answers and one from the biology domain, and two types of non-factoid questions: manner and reason. I will experimentally demonstrate that the discourse structure of non-factoid answers provides information that is complementary to lexical semantic similarity between question and answer, improving performance up to 24% (relative) over a state-of-the-art model that exploits lexical semantic similarity alone. I will further demonstrate excellent domain transfer of discourse information, suggesting these discourse features have general utility to non-factoid question answering.

September 5

Mary-Frances O'Connor, Assistant Professor, Department of Psychology, University of Arizona

TITLE—Conflict Resolution in Bereavement and Complicated Grief: An fMRI Investigation

ABSTRACT: Complicated Grief, marked by a persistent and intrusive grief lasting beyond the normal grief process, is associated with a relative inability to disengage from idiographic loss-relevant stimuli. Functional magnetic resonance imaging (fMRI) studies investigating the neural networks associated with this bias consistently implicate the anterior cingulate cortex (ACC) in tasks of emotion regulation. To date, no such investigation of the neural mechanisms of Complicated Grief exists. Twenty-eight older adults were categorized into three groups based on grief severity: Complicated Grief (n=8), Non-Complicated Grief (n=9), and Nonbereaved controls (n=11). Using a block design, all participants completed the emotional-counting Stroop task during fMRI data acquisition. Differences in regional activation to grief-related (as opposed to neutral) stimuli across groups were examined. Those with Complicated Grief showed an absence of rACC and fronto-cortical recruitment. Post hoc analysis evidenced activity in the dorsal ACC in the Complicated Grief and Nonbereaved groups late in the task. These results indicate a group-specific deficit in recruitment of fronto-cortical regions often associated with emotion regulation. This deficit was not observed in recruitment of the orbitofrontal cortex and the rACC during processing of idiographic semantic stimuli in Noncomplicated Grief. These findings suggest a relative

inability to recruit the regions necessary for successful grief-related emotion regulation in those with Complicated Grief.

COGNITIVE SCIENCE COLLOQUIUM Spring 2014

- May 2** **Graduate Student Showcase** (Speakers, titles and abstracts listed below.)
- Jae-Hyun Sung**, Graduate Student, Linguistics (major) and Cognitive Science (minor)
Title: What Does the Tongue Tell Us about Scottish Gaelic? A Case of Lexical Palatalization.
- Jinyan Guan**, Graduate Student, Computer Science (major) and Cognitive Science (minor)
Title: Bayesian Statistical Modeling of Temporal Interpersonal Emotion System (TIES)
- Rachel Kraut**, Graduate Student, Second Language Acquisition and Teaching (major) and Cognitive Science (minor)
Title: L2 Word Recognition and Storage: Evidence from Masked Priming
- April 18** **Amanda Woodward**, William S. Gray Professor and Chair, Department of Psychology, University of Chicago
TITLE: Infants' Grasp of Others' Intentions
- April 11** **Gene Alexander**, Ph. D., Professor and Director, Brain Imaging, Behavior, & Aging Lab, Department of Psychology, Neuroscience and Physiological Sciences Inter-disciplinary Graduate Programs and Evelyn F. McKnight Brain Institute, School of Mind, Brain, and Behavior, College of Science, University of Arizona
TITLE—Neuroimaging of the Aging Brain: Implications for Successful Aging and the Risk for Alzheimer's disease
- April 4** **Yaoda Xu**, Assistant Professor, Vision Sciences Laboratory, Psychology Department, Harvard University
TITLE: Multi-Level and Dynamic Visual Object Representation in the Human Brain
- March 28** **Heidi Harley**, Professor, Department of Linguistics, University of Arizona
TITLE: Forces Instead of Events in Verb Meaning
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- March 7** **Wally Boot**, Assistant Professor, Cognitive Psychology, The Florida State University
TITLE: Video Games as a Means to Improve Perceptual and Cognitive Abilities? The Promise and Challenges of Video Game Research.
- February 28** **Noah Goodman**, *Roger N. Shepard Distinguished Visiting Scholar*, Assistant Professor, Department of Psychology, Stanford University
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**TITLE:** Language, Reasoning, and Commonsense Knowledge
- February 21**                **Barbara Mellers**, Heyman University Professor, Department of Psychology, University of Pennsylvania  
**TITLE:** Improving the Accuracy of Intuitive Predictions of Geopolitical Events by Putting Psychology to Work
- February 14**                **Jessica Payne**, Assistant Professor, Department of Psychology, University of Notre Dame  
**TITLE:** Stress, Sleep, and Memory Consolidation: Independent and Interactive Effects
- January 31**                    **Stuart Hameroff**, MD, Anesthesiology, Psychology, Center for Consciousness Studies, The University of Arizona  
**TITLE:** ‘A finer scale’ – Intra-neuronal origins of EEG, memory, language and consciousness
- January 24**                    **Nicholas Turk-Browne**, Assistant Professor, Department of Psychology, Princeton University  
**TITLE:** Statistical Learning in the Mind and Brain
- January 17**                    **Tony P. Chemero**, Professor, Departments of Philosophy and Psychology, University of Cincinnati  
**TITLE:** The End of the Debate over Extended Cognition

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COGNITIVE SCIENCE COLLOQUIUM
Fall 2013

- December 6** **Cognitive Science Graduate Student Showcase**
 Three speakers:
J. L. Sanguinetti, Psychology Department
Title—The Ground Side of an Object: Perceived as Shapeless yet Processed for Semantics
- Will Leonard**, Philosophy Department

Title: Elusive cognitive experience

Bryan Chambliss, Philosophy Department

Title: Social Cognition and Social Interaction

- November 22** **Suzanne Curtin**, Associate Professor, Department of Psychology, University of Calgary
TITLE—How Forms Become Labels: Phonological Knowledge Guides Infants' Word-Object Mappings
- November 8** **Eric Reiman**, M.D., Banner Alzheimer's Institute and Banner Research, Department of Psychiatry, University of Arizona; Neurogenomics Division, Translational Genomics Research Institute, Arizona Alzheimer's Consortium, Phoenix, AZ
TITLE: Launching the Era of Alzheimer's Prevention Research
- November 1** **John Serences**, Associate Professor, Department of Psychology, Neuroscience Graduate Program, University of California, San Diego
TITLE: The Role of Attentional Priority Maps in Supporting Selective Attention and Working Memory
- October 25** **Sharon Thompson-Schill**, Christopher H. Browne Distinguished Professor of Psychology; Director, Center for Cognitive Neuroscience, University of Pennsylvania
TITLE: Costs and Benefits of Cognitive Control for Language Processing
- October 18** **Leah Kapa**, Ph.D., Research Associate, Department of Speech, Language, and Hearing Sciences, University of Arizona
TITLE: Considering a Bidirectional Relationship between Executive Function and Language-Learning
- October 11** **Rick Dale**, Associate Professor, Cognitive and Information Sciences, School of Social Sciences, Humanities and Arts, University of California, Merced
TITLE: A "Centipede's' Dilemma" in Human Linguistic Interaction
- October 4** **Eve Edelstein**, Associate Professor, College of Architecture, Planning and Landscape Architecture (CAPLA), The Institute for Place and Well-Being, University of Arizona
TITLE—The Neuroscience of Design: The Human Response to the Built Environment

- September 27** **Raymond M. Klein**, Professor, Department of Psychology and Neuroscience, Dalhousie University; Presently on sabbatical in the Department of Cognitive Science, UCSD
TITLE—On the Flavors of Inhibition of Return: Two Ways to Enhance Orienting to Novelty
- September 20** **Jack Gallant**, Professor, Department of Psychology, University of California, Berkeley
TITLE: Detailed Maps of Semantic Information across the Human Brain
- September 13** **Terence Horgan**, Professor, Department of Philosophy, University of Arizona
TITLE: Reasons-Responsive Moral Judgment and the Phenomenology of Moral Experience
- September 6** **Huanping Dai**, Associate Professor, Department of Speech, Language, and Hearing Sciences, University of Arizona
TITLE: Seeing the Forest for the Trees: Delineating Global and Local Processing in the Perception of Sound Patterns