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.

**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 ù-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 ù- 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 ù-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—Remindings: 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. Remindings – 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 remindings for interpretation, memory, and generalization. I will present research showing that remindings bias the interpretation of ambiguous stimuli, that memory for the first item in a reminded pair is enhanced, that the benefits of remindings depend upon the association and lag between related presentations, and that remindings can produce better generalizations than comparison. Further, I will describe a mathematical model of remindings, which demonstrates that remindings provide a useful unifying theme for memory phenomena that otherwise lack theoretical coherence. Remindings 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
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.

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

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.
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 Snavely**, 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*

**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.

**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 idea 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
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  
**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-Schiil, 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