

College of Arts and Sciences

(<http://artsci.case.edu>)

Department of Cognitive Science (<https://cognitivescience.case.edu/>)

[Home](#) / [Colloquia](https://cognitivescience.case.edu/colloquia/) / [Past Colloquia: 2007](#)

Past Colloquia: 2007

Charles Burroughs. Wednesday, 28 November 2007. 4-5pm. 618 Crawford Hall. Title: "Constructions of Knowledge and the Organization of Consciousness: Architecture and Cognition in a Time of Transition." Website. (<http://www.case.edu/artsci/arth/faculty.html>) Charles Burroughs is the Elsie B. Smith Professor of Liberal Arts and Professor of Art History and Art at Case Western Reserve University.

Abstract: Cognition occurs in an environment. In certain cultural milieus, cognition occurs through the environment, sometimes through an environment expressly shaped or enhanced to cue recollection and to structure perception. What happens when humans are confronted with a milieu in which familiar cues and signs are missing, or undergo change? That is, when a means and medium for cognition suddenly becomes the object of the effort to understand the physical milieu, to organize perception and response? In the early Italian Renaissance, the ordering of the environment in a radically new way was closely bound up with the ordering of vision itself, and with the appeal to various strategies for making sense of the phenomenal world. At the same time, the separation of the observer from the observed and experienced scene was implicit in many cultural productions, and at times given more or less explicit articulation. "Cognition of," perhaps, rather than "cognition in." I will present an extreme case of architectural/environmental transformation, suggesting what may have been at stake for contemporaries, and inviting the members of the colloquium—who all have very different disciplinary perspectives from mine—to reflect on the implications in terms of models or theories of cognition.

Roy Ritzmann. Wednesday, 14 November 2007. 4-5pm. 618 Crawford Hall. Title: How do Insects and Insect Inspired Robots Deal with Barriers? Website.

(<http://www.case.edu/artsci/biol/people/ritzmann.html>) Roy Ritzmann is Professor of Biology and

Professor of Neurosciences at Case Western Reserve University.

Abstract: The ability of animals to negotiate unpredicted barriers in natural terrain makes them attractive models for robotic design. Animals evaluate objects in their path using sensors on their head then use that information to formulate commands that alter movement. In order to understand this process in insects, we employ a range of behavioral and neurobiological studies directed at both thoracic local control circuits and brain centers. Behavioral studies indicate that cockroaches use antennae to investigate objects in their path. For example, if the antennae contact a shelf from the top, the insect will climb over, while contact from the bottom will cause it to tunnel under the barrier. Turning movements can be evoked in cockroaches tethered over a lightly oiled glass plate. Pushing on one antenna generates turning movements that switch from symmetrical left-right leg movements to asymmetrical actions. In particular, the leg on the inside of the turn changes from rearward extension during stance to lateral extension during swing. Associated with this alteration is an increase in distal motor activity, reduction of proximal activity and changes in relative timing of joint extension. Lesion studies suggest that a region of the insect brain called the Central Complex (CC) uses antennal and other sensory information to generate appropriate descending commands. We, therefore, investigated responses of CC units to mechanical stimulation of antennae. Using multi-channel recording techniques, we described a large population of multi-sensory antennal sensitive neurons in the CC. Velocity is encoded in most of these units and about one third of them are biased to one antenna. Most of these units are also sensitive to visual stimulation.

Leland McCleary (Department of Modern Languages) & Evani Viotti (Department of Linguistics) at the University of São Paulo. Wednesday, 7 November 2007, 4-5pm. 618 Crawford Hall. Title: Verbal and gestural contributions to narrative structure in a Brazilian Sign Language narrative.

Abstract: Building on the concepts of real-space blends (Liddell 2003) and body partitioning (Dudis 2004) in American Sign Language, we have been looking at how verbal and gestural elements in Brazilian Sign Language combine to produce narrative discourse, with its overlays of narrative, metanarrative and paranarrative blends (McNeill 1992; Oakley 1998). In sign language linguistics, maintaining the distinction between the verbal and the gestural has traditionally been an issue of theoretical import in the effort to establish sign languages as natural languages. Liddell first showed how the rich use of the body-in-space in sign languages can solve linguistic problems using a different mix of verbal and gestural elements than has traditionally been thought of as falling within language proper. This study uses these insights to analyze an area of language use in sign language which has already been the site for attempts at rapprochement between the verbal and the expressive verbal and gestural envelope of performance in oral languages: narrative structure. In narrative, a matrix of multiple voices, thematic sources and points of view is built up and maintained

through not only verbal but also performatic shifts which mark off distinct frames of time, setting and interpretation. Our analysis of a pear story told in Brazilian Sign Language investigates how the narrator manages these shifts in a seamless stream of sign and gesture.

Richard Boyatzis. Monday, 29 October 2007, 4-5pm. 618 Crawford Hall. Title: "Resonant Leadership: Creating Sustainable Leaders Through Mindfulness, Hope and Compassion." Website.

(<http://weatherhead.case.edu/faculty/faculty.cfm?id=5212>) Richard Boyatzis is professor of organizational behavior and psychology at Case Western Reserve University.

Abstract: Great leaders move us. They move us through a basic human process—our emotions. Although they talk of strategy and competition, the great leaders establish a deep emotional connection with others called resonance. They are literally, in tune with others around them. Their own levels of emotional intelligence allow them to create and nurture these resonant relationships. They use their EI as a path to resonant leadership through mindfulness, hope and compassion. But these are also the experiences essential to renewal of the human organism at the neurological, hormonal, emotional, and behavioral levels. Based on decades of research into emotional intelligence competencies and longitudinal studies in their development, Professor Richard Boyatzis will lead the audience through examples of what resonance looks and feels like, as well as ideas as to develop someone's "resonant leadership" capability, their emotional intelligence, and the experiences of mindfulness, hope, and compassion. This session will address the following:

- > (1) The experience of "resonant leadership" in an organization, the role of emotional intelligence, mindfulness, hope and compassion. (2) Understanding the cycle of stress/sacrifice and renewal at the neural and behavioral levels. (3) A process for developing sustainable improvement on EI and resonant leadership. (4) How to coach others to develop EI, resonant leadership, mindfulness, hope and compassion. (Some readings of possible interest:
- > Boyatzis and McKee, *Resonant Leadership: Renewing Yourself and Connecting with Others Through Mindfulness, Hope and Compassion*, Harvard Business School Press, 2005; the August 2006 special issue of the *Journal of Management Development* on Intentional Change Theory from a Complexity Perspective.)

Alberto Vazquez. Wednesday, 24 October 2007, 4-5pm. 618 Crawford Hall. Title: "Experimental Considerations for Cognitive-based fMRI Studies."

Abstract: Functional MRI (fMRI) has had a tremendous impact in studies of brain function. As fMRI continues to mature, its use is quickly moving beyond the mapping of brain function. For example, fMRI could be used (and has been used) to compare brain functions between different populations, and to determine temporal connections between brain areas, to name a few. However, making these

inferences from fMRI signals requires experimental designs that consider its physiological contributions in order to avoid confounding factors. This talk will discuss the physiological basis of the fMRI signal as well as contributions to its variability. Experimental designs that exploit the information embedded in the fMRI signal will also be discussed.

Francis Steen. Wednesday, 17 October 2007, 4-5pm. 618 Crawford Hall. Title: "Incorporating Consciousness: A Cognitive Model of the Mind's Display Layer."Website.

(<http://www.sscnet.ucla.edu/comm/steen/>) Francis Steen is assistant professor of communication studies at UCLA.

Abstract: Cognitive science has largely avoided the topic of consciousness, or attempted to explain it away, arguing we can understand core mental functions without taking it into account. It is not obvious that this is a plausible assumption. Consciousness has the hallmarks of a complex adaptive structure, and it is not likely that it serves no significant biological function. In this talk, I'll go over some of the historical reasons the computational model of mind had no use for consciousness, argue we have been led astray, and propose that consciousness may in fact be playing a vital computational role. The project of integrating consciousness into the causal chains of sensory and conceptual inferences—the so-called "easy problem"—has a series of interesting consequences, theoretical as well as practical. Our understanding of bodily self-regulation, sensory perception and object recognition, imagination, language, and communication technologies are all affected. I'll try to show that even a flawed theory of consciousness is an improvement on the current situation, and develop some strands of what promises to be a rich field for research.

Daniela Calvetti. Wednesday, 10 October 2007, 4-5pm. 618 Crawford Hall. Title: "Food For Thought: Sweet or Sour?" Daniela Calvetti is Professor of Mathematics at Case Western Reserve University. Website (<http://lanczos.math.case.edu/~dxc57/>)

Abstract: The discussion about what fuels neuronal activity has been vibrant for a few decades. The prevailing hypothesis of the primacy of glucose as the preferred substrate for neurons started being questioned a little over a decade ago after a discrepancy found via quantitative imaging techniques, eventually leading to the formulation of the hypothesis that hungry neurons indeed prefer lactate. The difficulty in obtaining direct measurements of metabolites and intermediate concentrations during neuronal activity has kept the debate of whether neurons have a sweet or sour taste alive. In the search for an answer, the role of astrocytes during neuronal activity has been upgraded, and the interactions between neurons and glia cells have been studied in more depth. In this talk we introduce a multicompartment mathematical model of the astroglia-neuron cellular complex and a methodology which allows its utilization to study brain energy metabolism. We will present the results of preliminary investigations with our model in the light of the existing hypotheses, and discuss extensions of this methodological approach to quantitative imaging of brain activity.

Wolfgang Wildgen. Wednesday, 3 October 2007, 4-5pm. 618 Crawford Hall. Title: "Evolution and Discourse ." Guest Professor, Linguist, University of Bremen, Germany. Website 1. (<http://www.fb10.uni-bremen.de/homepages/homepagebyid.asp?id=34>) Website 2. (<http://www.cms.fb10.uni-bremen.de/lehrpersonal/wildgen.aspx>)

Abstract: The evolution of language has two sides corresponding to different semiotic aspects of linguistic signs: the social / referential meaning and the organization of signs in words/sentences/discourse. The first aspect is linked to the evolution of significance ("pragmance") and Ren Thom has linked it to basic features of light (visual perception) and to evolutionary significance (survival values). The second aspect is of a pragmatic nature. Out of behavioral patterns, cultural techniques, rituals etc., discourse features emerge and open the way for complex linguistic competences. The theoretical preconditions for these two major evolutionary forces are discussed and their relevance for the explanation of modern linguistic competences is exemplified. The consequences for an evolutionary theory of language and grammar are drawn.

Ethics & Cognition. Wednesday, 12 September 2007. 4-5pm. 618 Crawford Hall. Presenters include Sara Waller, Anthony Jack, William Deal, and Per Aage Brandt.

Abstracts:

William Deal. "Ethics in Mind." Traditions of moral philosophy and religious ethics have generally failed to incorporate insights derived from research on cognition. Such research, inter alia, challenges moral perspectives founded on the assumption that rationality is key to moral knowledge, as well as bedrock moral concepts like free will, rights, and moral agency. How, then, to negotiate comparative ethics in light of the cogency of recent cognitive scientific critiques of moral philosophy? Current scholarship on morality and cognition has been written primarily by cognitive scientists, while moral philosophers remain on the periphery. I suspect that human ethical sensibilities are located at intersections between the cultural and the biological—between the ought and the is. My presentation will suggest how moral philosophy and comparative ethics might further illuminate insights into the nexus between ethics and cognition advanced by cognitive science.

Per Aage Brandt. "Evil, Unjust, Irresponsible – Three Ethical Values in the Light of Cognitive Semantics." Negative values are regularly clearer than their positive counterparts; it is easier to exemplify the negative, since it has a more salient narrative structure; the positive counterparts are often their simple dual, inverse, or neutral versions. The immediate cognitive task is to isolate and study the schematic-conceptual structure of values and value paradigms; second: to identify other cognitive, possibly conceptual structures, to which they may be evolutionarily or developmentally connected, and third: to investigate the neural correlates of such clusters. Here, I will only present an outline of the diagrams that may be primary models of each of the three values above.

Sara Waller. "Neuroethics and the Naturalization of Moral Judgments." Neuroethics is a field that asks questions about the power of new discoveries in the neurosciences to change human lives. As such, it is a field that investigates our moral experiences. By what standard do we determine that we measure moral experience well, neatly, and unequivocally? Experiments purporting to measure human moral responses presuppose that we have a well-honed definition of 'moral response'. I will review recent studies in an attempt to coalesce a workable notion of 'moral response' for discussion. I will discuss the potentially problematic nature of the divide between subjective worlds and objective measures, and examine the strengths and weaknesses possible bridges (shared venues of information gathering, such as language) across the divide. The talk will reveal our philosophical standards for creating standard empirical measures of human consciousness, rationality, and response to moral quandaries.

Anthony Jack. "Moral concern and consciousness." A common thought about the link between morality and consciousness runs as follows: We should do our best to determine the biological basis of consciousness, so that we can be sure that we act responsibly towards all conscious entities. I want to suggest an alternative, and somewhat subversive, point of view: Perhaps there is no biological basis of (phenomenal) consciousness. Perhaps, instead, the only thing that determines whether or not we are willing to label a creature as (phenomenally) conscious is whether or not we are willing to treat it as belonging in our sphere of moral concern.

In putting forward this radical proposal, I hope to point to some interesting potential connections between social psychology, social cognitive neuroscience, consciousness studies and moral thinking. Furthermore, it appears that some simple empirical methods may allow us to further explore these issues.

Jay Alexander. Wednesday, 5 September 2007. 4-5pm. 618 Crawford Hall. Title: "Blending and Mathematics." Alexander's Website (<http://www.case.edu/artsci/math/alexander/>). The Blending Website is at <http://blending.stanford.edu> (<http://blending.stanford.edu/>). Jay Alexander is Levi Kerr Professor of Mathematics and Cognitive Science and Chair of Mathematics at Case Western Reserve University.

Abstract: A number of cognitive scientists—Mark Turner, Gilles Fauconnier, and others—have emphasized the role that cognitive blending plays in human cognition. George Lakoff and Raphael Núñez have stated, "Many of the most important ideas in mathematics are ... conceptual blends." Mathematics is rigorously deductive, formally based on a few axioms and constructions. As such, it could easily become sterile, but in fact it is an incredibly rich and fecund discipline. I posit that one reason is that it rather explicitly incorporates cognitive constructions in its formal structure. I would like to support this thesis, both by explaining how blending has been incorporated into the methodology of mathematics and presenting some case studies.

Michele Feist. Thursday, 30 August 2007. 3-4pm. 618 Crawford. Title: "Inside *in and on*." Website. (<http://www.ucslouisiana.edu/~mif8232/>) Michele Feist is Assistant Professor of Cognitive Science at the Institute of Cognitive Science (<http://ics.louisiana.edu/>) at the University of Louisiana, Lafayette. Pdf of background reading. (<http://case.edu/artsci/cogs/feistchapter.pdf>)

Abstract: What do we pay attention to when we talk about space? At first blush, spatial relational terms appear simple, clear, and obvious. Research into their use and meanings, however, suggests that they are semantically quite complex, encoding geometric, functional, and qualitative physical aspects of the scenes they describe. In this talk, I will consider two kinds of evidence for these three aspects of spatial relational meaning with respect to topological spatial terms: psycholinguistic evidence (within English), and cross-linguistic evidence. I will conclude that the use of these terms is in fact influenced by geometric, functional, and qualitative physical aspects of spatial scenes, suggesting that our representations of topological spatial meaning must be similarly complex.

Lev Gonick. Wednesday, 9 May 2007. 4-5pm. 9 Crawford Hall (on the floor below SAGES café®). Title: "Considerations of Learning Experiences and Cognition in the 3D Virtual World" or where Cog Sci meets the Next Big Platform from the Tech World. Lev Gonick is Vice-President for Information Technology and Adjunct Professor of Information Sciences at Case Western Reserve University. In addition to numerous national titles and appointments, he holds a Ph.D. in International Political Economy from York University in Ontario, Canada. Bio. (<http://wiki.case.edu/User:Lev.Gonick>) Bytes from Lev (<http://blog.case.edu/lev.gonick/>)

Mathew McCubbins. Thursday, 26 April 2007. 4-5pm. 9 Crawford Hall (on the floor below SAGES café®). Title: "The Possibility of Deliberation." McCubbins is Distinguished Professor and Chancellor's Associates Chair in the Department of Political Science at UC San Diego, Adjunct Professor of Law at the University of San Diego School of Law, and Visiting Professor of Law at the University of Southern California. He is a Fellow of the American Academy of Arts and Sciences. Website. (<http://mccubbins.ucsd.edu/index.html>)

Abstract: Is deliberation possible? This talk will survey experiments on reason, social cognition, communication, persuasion, and agreement to propose a model of decision and a theory of the possibility of deliberation.

Edward Slingerland, Wednesday, 11 April 2007. 4-5pm. 618 Crawford Hall. Title: "Thinking with the Body: Somatic Marking and Blending Jujitsu in Early China."

Edward Slingerland is Associate Professor of Asian Studies and Canada Research Chair in Chinese Thought and Embodied Cognition at the University of British Columbia. He received a B.A. from Stanford in Asian Languages (Chinese), an M.A. from UC Berkeley in East Asian Languages (classical Chinese), and a Ph.D. in Religious Studies from Stanford University. His research specialties and teaching interests include Warring States Chinese thought, cognitive linguistics and conceptual metaphor theory, cognitive science and behavioral neuroscience, evolutionary psychology, methodologies for comparative religion and philosophy, virtue ethics, and the classical Chinese language. pdf of slideshow to accompany the talk. (<https://artscimedia.case.edu/wp-content/uploads/sites/91/2014/04/15000507/slingerland.pdf>) Website

(<http://www.asia.ubc.ca/index.php?id=5220>). Background Reading: "Conceptual Blending, Somatic Marking, and Normativity: A Case Example from Ancient China."

(http://www.asia.ubc.ca/fileadmin/template/main/images/departments/asian_studies/Faculty/Ted_Slingerl

Abstract: This talk will draw upon blending theory and Antonio Damasio's concept of "somatic marking" to analyze samples of philosophical argumentation in 4th B.C.E. China. Themes will include how blends are used to recruit somatic markers and thereby influence normative judgments, how extremely complex multiple-scope blends can be built up in the course of verbal exchanges, and how the normative implications of multiple-scope blends can be quickly and skillfully altered by the introduction of novel spaces.

Thinking Animals: Animal Cognition and Consciousness?

(<http://case.edu/artsci/cogs/thinkinganimals.html>) **A colloquium and discussion. Wednesday, 28 March 2007. 4-5:15pm. 618 Crawford Hall**

Dr. Hillel Chiel: Concepts for Cognitive Neuroethology

Dr. Chiel will argue that the ability to perceive cognition and consciousness in other human beings is predicated on observation, analogy, and operational definitions, and this provides a basis for extending the concepts of cognition and consciousness to nonverbal and nonhuman organisms. He will briefly outline a research program, cognitive neuroethology, that could be used to explore the neural mechanisms of cognition and consciousness in a wide variety of animals, and describe some of the technology that is being developed that may be important for such research.

Dr. Per Aage Brandt: Animal Consciousness

In humans, consciousness comprises an integration of two essential constructions: a neutral surround space and a first-person angle space. Within this integrated present-state space, there are

at least 4 types of sign 'windows' allowing us to attend to other (conceptualized) spaces only related to our present-state space through these 'windows'. Do other mammals have the same or comparable 'windows', or do they live in a 'windowless' present space-time? I would like to make a suggestion as to the existence and the nature of certain animal 'windows'.

Dr. Sara Waller: Animal models for cognition and consciousness

Dr. Waller will review Nagel's main points in the article "What is it like to be a bat?" and present arguments for making the leap to attributing mental states to other creatures. Using recent evidence for higher cognition in non-human primates, dolphins and wolves, she will discuss the role of imagination and interpretation in understanding animal cognition and consciousness, and clarify the functions of our notions of consciousness, categories for concepts, and empathetic understanding in theorizing about animal minds.

Dr. Jutta Ittner: Imagining the Animal

Dr. Ittner will present two contrasting examples of literary animal constructs by Virginia Woolf and Paul Auster that reflect the move from traditional to "new" anthropomorphism. Imagining nonhuman existence raises multiple questions about human and nonhuman cognition and consciousness: Can we imagine animal alterity without anthropomorphizing? When we imagine entering the animal mind, are we "becoming animal"? Do fictitious representations of Otherness offer insights into animalness, or are they just mirror images of the human condition? Etc.

Richard Boland. Wednesday, 21 March 2007. 4-5pm. 618 Crawford Hall. Title: "Designing Visual Thinking Environments for Situated Action." Richard J. Boland, Jr., is Professor of Information Systems in the Weatherhead School of Management at Case Western Reserve University.

Website: <http://weatherhead.case.edu/faculty/boland> (<http://weatherhead.case.edu/faculty/boland>).

(http://case.edu/artsci/cogs/BolandAn_Ecology_of_#1B6C4D.pdf)

- › Abstract: Our research is on the design of visual thinking environments for acting responsibly in organizational settings. I will discuss two examples of visual thinking environments we are developing, and will demonstrate a software system we have created for one of them. In the first example, the actor is understood as being located in a situation and experiencing forces that shape her possibilities for action. Representations in this environment depict the experience of being embodied and confronting the problem of self and other. In the second example, the actor is understood as intervening in a situation and encountering a social structure that is stretched across time and space. Representations in this environment depict her perceptions of the elements and relationships causing the social structure to be produced and reproduced. The software I will demonstrate is based on the second example and is named Theory Garden.**Ciarán Benson.**

Wednesday, 7 March 2007. 4-5pm. 9 Crawford Hall (on the floor below SAGES café). Title:

“Emotions in the Maintenance & Reproduction of Identities: From Cultural to Personal Memory.” Ciarán Benson is Professor of Psychology at University College, Dublin.

Website: <http://www.ucd.ie/psychology/academicstaff/benson/research.html>

(<http://www.ucd.ie/psychology/academicstaff/benson/research.html>). This presentation was part of a minisymposium on “Time and Memory.” (<http://cognitivescience.case.edu/benson-symposium/>)

Lawrence Zbikowski. Wednesday, 7 February 2007. 4-5pm. 9 Crawford Hall. Title: “Music, Gesture, and Musical Grammar.” Lawrence Zbikowski is Associate Professor of Music, University of Chicago.

Website: <http://humanities.uchicago.edu/faculty/zbikowski/>

(<http://humanities.uchicago.edu/faculty/zbikowski/>).

Abstract: Musicians have long made recourse to the notion of gesture when they want to evoke the kinesthetic and expressive part of musical experience. In my presentation I explore this notion in a slightly more systematic fashion by drawing on recent work by David McNeill and Susan Goldin-Meadow on the gesture that accompanies language. In brief, this work shows that the gestures that accompany our speech reflect a mode of thought that is independent from but coordinated with language. Through an analysis of Jerome Kern’s “The Way You Look Tonight” I show that musical gestures can play a role analogous to the gestures that accompany speech. This finding in turn suggests how a construction grammar for music might be developed, something I sketch in the concluding portion of my presentation.

Benjamin Bergen. Wednesday, 24 January 2007. 4-5pm. 618 Crawford Hall. Title: “Mental Simulation and Grammar.” Benjamin Bergen is Associate Professor of Linguistics and Cognitive Science, University of Hawai’i at Manoa. Website: <http://www2.hawaii.edu/~bergen/> (<http://www2.hawaii.edu/~bergen/>).

Abstract: Converging evidence from text analysis, behavioral experimentation and brain imaging suggests that in understanding language, comprehenders construct mental simulations – mental imagery – of motor and perceptual components of described scenes. For instance, processing a sentence like ‘Jenny hurled the water balloon at her little brother’ might drive understanders to mentally simulate the motor action of throwing a water balloon, including the required handshape, amount of pressure applied by the hand, and trajectory of the arm. Or they might simulate visual components of the scene – a water balloon being thrown, flying through the air, or making contact with a face; this visual imagery can take place from any of a number of perspectives – that of the thrower, of the throwee, or an outside viewpoint. In this presentation, I will present evidence that

grammar plays a role in configuring how mental simulations enacted by understanders take place. First, we'll investigate how grammatical aspect ('Jenny has hurled the water balloon' versus 'Jenny is hurling the water balloon') affects the degree of detail with which a motor image is constructed. Second, we'll look at how grammatical person ('you' versus 'Jenny') affects the perspective adopted in visual simulation. And finally, we'll look at how word order (Subject-Verb-Object as in English versus Subject-Object-Verb as in Japanese) affects the timecourse of mental simulation of described components of a scene.

Sarah Shomstein. Tuesday, 23 January 2007. 4:15-5:15pm, 618 Crawford Hall. Title: "Mechanisms of Selective Attention in Human Cortex."

Sarah Shomstein is Postdoctoral Research Associate, Carnegie Mellon University, and Ph.D., Psychological and Brain Sciences, Johns Hopkins University, 2003.

Website: <http://www.psy.cmu.edu/~shomstein/>. (<http://www.psy.cmu.edu/~shomstein/>)

Abstract: Attention is the cognitive process by which behaviorally relevant information is selected in accordance with the current goal of the organism. After several decades of behavioral research, the neural substrate of attentional selection remains elusive. I will present evidence suggesting that attention is a flexible mechanism that selects information from the environment based on different properties—spatial locations and objects that occupy them—that are modality-independent. I will discuss how these types of attentional mechanisms are instantiated in the human cortex by presenting several fMRI experiments demonstrating that (a) independent of what the basis of selection is, attended information benefits perceptually and (b) that posterior parietal cortex is the possible neural substrate of attentional control. In addition, I will present series of experiments, conducted with patients who have sustained damage to parietal cortex, that examine whether specific regions of the cortex are necessary or sufficient for attentional selection. This research uncovers the neural substrate of attentional control, and addresses the importance of employing multiple methodologies, thus further constraining theories of attentional selection.

Osamu Fujimura. Wednesday, 17 January 2007. 4-5pm. 618 Crawford Hall. Title: "Symbolic representation in language and biology."

Dr. Fujimura is Professor Emeritus, Ohio State University. He established and directed the Research Institute of Logopedics and Phoniatrics at the University of Tokyo. In 1965, he led the speech section of the Acoustical Society of Japan, receiving its Award for Distinguished Service in 1999. He collaborated for four years with the research laboratory in electronics at MIT and for two years with the Royal Institute of Technology in Stockholm. For was a director at Bell Laboratories (AT&T) for fifteen years, serving in the Departments of of Linguistics and Speech Analysis and Artificial Intelligence Research. He was professor in the Department of Speech and Hearing Science, The Ohio State University for fifteen years. He is currently preparing a new introductory book on speech science.

Abstract:

The emergence of intelligence, specifically in the case of homo sapiens in relation to the development of language, may be assumed to be inherently related to the innate metagrammatical system of human infants as a special biological framework. This initial condition of human cognitive faculty was suggested originally by Noam Chomsky to explain the specially efficient development of the linguistic competence in human children. On the other hand, the evolution of biological species is traditionally ascribed to formation of successful genes as particular linear strings of molecular elements along with other accidentally produced variants in competition, combined with a subsequent selection process accepting more suitable forms and eliminating less suitable forms for survival within the environment that can provide limited resources. Can the speed of evolution, particularly in the recent phase from higher primates to homo sapiens, be explained by randomly produced variants combined with this binary choice between survival or extinction of the embodiments of the genes through generations? Should the concept of evolution be limited to the change from generation to generation via reproduction? Should the process of selection and survival be limited to competition for life of individuals eliminating existing copies that are already embodied?

Can there be a principle that evaluates the merit of a promising gene among variants and facilitates its embodiment before they are materialized? Is there a principle that filters or restricts the generation of genes, or their specifications encoded as genomes, in terms of some level of abstract representation that serves as genomic codes and for their possible changes? Can there be some criteria for selecting good qualifications (in terms of features, as in linguistic theory) of variants in terms of their representations (particular organizations of elements), in such a way that once such selections of features are made, their combinations may develop effective changes explosively rapidly, as we observe in the development of human knowledge? Provided appropriate basic hardware design that leads to such selective combinations by proper choices in the form of organization of features as software, we may expect, as in the case of human-made computation machines, extremely rapid "progress" toward a direction that seems to be "purposeful" through merely random processes. For such changes to take place, and for effective criteria to be applied for "useful" selections, physical (chemical) processes that are based on interactions between contiguous elements in the genome may not be expected to be sufficient. Global principles of interaction, based on feature matching, may be more effectively applicable. We remind ourselves that such global feature interactions are characteristic of syntactic and phonological organization principles in theoretical linguistics. If such principles operate based on innate biological properties of humans, where do they come from? Are there basic principles that govern, perhaps just as a matter of accidental selection or according to some deeply seated principle of our universe, the organization of biological systems and emergence of life, as well as the linguistic systems, in relation to the development of the nerves and their physiological network organization?

The physical structures of genes are being identified using advanced technology, and new insights are being obtained discovering some parts and properties within the genome to have specific functions for its embodiment as proteins. We wonder if the organization principle of genomes may be described by an abstract representation of some structure, perhaps in some sense similar to the phrase structure of sentences in syntax, that underlie particular linear strings of base elements but contains more crucial information. The organizations of biological organs may be associated with a hierarchical structure of proteins, building the more complex out of the more simple, propagating crucial features. Such an abstract structure may be effective in producing possible (i. e., grammatically acceptable and biologically survivable) preselected variants produced by random perturbation. The structure may automatically prevent, under normal circumstances, changes that cannot (or should not, in some sense) occur, and such constraints may not be apparent in the local properties of the genomic codes; for example, most random changes deviating from the legitimate patterns may result in blocking its implementation, except in pathological developments that are likely to be removed by Darwinian selection. In this connection also, we should be able to understand why the actual lives are mostly normal.

According to the current (Chomskyan) syntactic theory, there are simple principles underlying the design of human language in general, and the diversity of natural languages as we observe are the results of selecting one of a few discrete values of each of a small number of parameters for particular languages. Human language acquisition, according to the surrounding spoken language for the newborn baby, works as a process of setting such parameter values of the innate system of language based on the grammatical principles by the use of available very limited empirical data. The representation of the grammatical structure, however, uses a complex hierarchical organization of each sentence rather than a linear string of constituent elements directly observable in speech signals of the sentences that are heard.

This abstractness of representation with the underlying hierarchical organization of functional units characterizes human language. Do we have corresponding principles and selection of parameter values within any abstract framework for specifying genes in the process of genetic evolution? It would not be particularly surprising if nature employs common principles or elemental operations for the design of genetic codes on the one hand and the linguistic cognitive system on the other. For example, does recursion as a general computational principle characterize the structural representation of genomes or their manifestations such as proteins and chromosomes, like in syntactic specifications of sentences? Does the endocentricity (self embedding based on designated critical features) in the process of syntactic projection play a central role also in genomic code formation processes? There must be a way to represent genomic structures by a general biological principle, with parameters to be set for individual species.

Robert Morrison. Tuesday, 16 January 2007. 4:15-5:15pm, 618 Crawford Hall. Title: "Analogy in Working Memory: Developmental, Neurocognitive and Computational Evidence." Robert Morrison is Executive Director of Xunesis, Chicago and Ph.D., Cognitive Neuroscience, University of California, Los Angeles, 2004. Website: http://www.xunesis.org/people_morrison_right.html (http://www.xunesis.org/people_morrison_right.html).

Abstract: Analogical reasoning is ubiquitous in accounts of human learning and discovery. While cognitive scientists have studied analogy for nearly one hundred years, efforts to understand how the brain performs and constrains analogy are relatively recent. In this presentation, I will outline a program of research using developmental, neurocognitive, and computational methods to explore the importance of the human working memory system as managed by inhibitory control for performing analogical reasoning.

Rajeev Raizada. Thursday, 11 January 2007. 4-5pm, 618 Crawford Hall. Title: "Towards Applying Cognitive Neuroscience to Education." Rajeev Raizada is Postdoctoral Fellow, Institute for Learning and Brain Sciences, University of Washington and Ph.D. Boston University, Cognitive & Neural Systems, 2000. Website: <http://ilabs.washington.edu/scientists/raizada/raizada.html> (<http://ilabs.washington.edu/scientists/raizada/raizada.html>).

Abstract: Can insights from cognitive neuroscience be used to improve children's education in our schools? The gulf between what we understand about the brain and what might be relevant to schooling can seem too wide to bridge. I will argue that in order to start to build such a bridge, we need not just to observe brain activity, but instead to look for brain activity that is involved in specific cognitively interpretable neural representations. I will present examples from my fMRI studies that try to achieve this, including work looking at the structure of phonetic representations in the brain, experiments distinguishing between neural processing and behavioural performance in children, and ongoing work on the role of neural representations of reward during trial-and-error learning. Finally, I will discuss future directions in which such research could be extended.

Suzy Scherf. Wednesday, 10 January 2007. 4-5pm, 618 Crawford Hall. Title: "The Development of Face and Object Representations: Cognitive and Neural Mechanisms." Suzy Scherf is Post-Doctoral Fellow in the Laboratory of Neurocognitive Development, Department of Psychiatry, University of Pittsburgh and Ph.D., Developmental Psychology, University of Pittsburgh, 2003. Website: <http://www.pitt.edu/~scherf/> (<http://www.pitt.edu/~scherf/>).

Abstract: Human adults can accurately distinguish between thousands of different faces and can recognize an individual face across many transformations, including changes in lighting, hairstyle, expressions, angle of view, and jewelry. Despite the social significance of this ability, it is unclear when, in the course of development, face recognition skills become adult-like. At issue is when configural processing strategies, which involve recognizing objects on the basis of subtle metric variations between constituent features, are available to and can be used efficiently by children. The acquisition of face expertise over many years of experience has been suggested as one of the reasons for late-developing configural processing strategies in children. I will present evidence that 1) experience and configural processing abilities can be dissociated in children and 2) limited experience is not the only constraint on developing object recognition skills. I will also show that, relative to the development of place- and object-selective ventral visual cortex, which is adult-like even in late childhood, there is a delay that extends into early adolescence in the development of face-selective cortex. The conclusion is that by age 12 there is a convergence in the maturation of configural processing abilities and functional organization in the ventral temporal lobe for face recognition. Finally, I will show how this convergence fails to occur in children with autism. This research reveals important mechanisms supporting the formation of stable visual representations and may help identify vulnerable developmental periods in which targeted intervention programs could have more success for individuals with developmental disorders.

Christopher Chabris. Monday, 8 January 2007. 4-5pm, 618 Crawford Hall. Title: "Individual Differences in Cognition: General Intelligence and Beyond." Christopher Chabris is Research Associate, Department of Psychology, Harvard University, and Ph.D., Psychology, Harvard University, 1999.
Website: <http://www.wjh.harvard.edu/~cfc/> (<http://www.wjh.harvard.edu/~cfc/>).

Abstract: Cognitive scientists typically study the species-universal architecture of the human mind. In any given study, however, a large fraction of the total measured variance is accounted for by differences among the participants, rather than among the experimental conditions. For over a century, research has consistently shown that individuals who perform well on one cognitive task tend to perform well on other tasks. Positive correlation among cognitive test scores is observed so ubiquitously that it can be regarded as a behavioral law—the "Law of General Intelligence." In the first part of this talk, I will present evidence that general intelligence is found in animal species as well as in humans, and that it is a biological trait grounded in neural mechanisms of information processing efficiency and cognitive control. In the second part, I will argue that a full understanding of individual differences in human cognition must go beyond general intelligence to incorporate both special cognitive abilities and "cognitive traits," or characteristics of cognition that do not reflect "ability" per se. I will present data suggesting that (1) the ability to recognize faces may be a special ability, relatively unconnected to general intelligence; and (2) individuals' preferences for spatial- and object-based visualization strategies are separate dimensions of cognitive style that predict the

performance of collaborative teams. The talk will conclude with a brief discussion of how cognitive neuroscience approaches can further our understanding of the mechanisms underlying individual differences.



© 2023 Case Western Reserve University (<http://www.case.edu/>)

10900 Euclid Ave.

Cleveland, Ohio 44106

216.368.2000 ([legal notice \(https://case.edu/utech/departments/information-security/policies/legal-privacy-notice\)](https://case.edu/utech/departments/information-security/policies/legal-privacy-notice))

DEPARTMENT OF COGNITIVE SCIENCE

Case Western Reserve University

617C Crawford Hall

10900 Euclid Ave.

Cleveland, OH 44106

eric.tolliver@case.edu (<mailto:eric.tolliver@case.edu>)

[Site Feedback \(mailto:cas-cms@case.edu\)](mailto:cas-cms@case.edu)

SOCIAL MEDIA



CWRU LINKS

[Apply \(http://case.edu/admissions/\)](http://case.edu/admissions/)

[Give \(https://giving.case.edu/cas/\)](https://giving.case.edu/cas/)

[Visit \(http://case.edu/visit/\)](http://case.edu/visit/)

[Directory \(https://webapps.case.edu/directory/\)](https://webapps.case.edu/directory/)