

Laura Otis
Department of English
Emory College of Arts and Sciences
lotis@emory.edu

Krish Sathian
Department of Neurology
Emory School of Medicine
krish.sathian@emory.edu

Center for Mind, Brain and Culture Graduate Course Proposal for Spring 2012

Images, Metaphors, and the Brain

PROPOSAL

Designed for graduate students in psychology, neuroscience and other natural sciences, and the interdisciplinary humanities, this course will present the latest cognitive neuroscience research on how the human brain creates and uses images and metaphors, in combination with analytical discussions of literature and creative writing. As explorers of human thought and creativity, the creative writers and scientists will be regarded as equals, differing radically in their methods but sharing a passionate commitment to and curiosity about language, perception, the mind's infinitely variegated possibilities, and the ways in which the brain implements these wondrous abilities. Guest speakers for the course will include leading cognitive neuroscientists, psychologists, literary scholars, novelists, and poets. Similarly, we expect that the students participating in this seminar would include those with a variety of backgrounds, including both scientific and literary. The goal is to stimulate cross-talk between scientific and literary/creative approaches. Such interaction may identify new lines of inquiry that are ripe for study and could potentially lead to interdisciplinary thesis projects for students enrolled in the seminar. Students will be expected to conduct an original interdisciplinary (non-experimental) research project culminating in a research paper, under the guidance of the course instructors.

An important aspect of the beauty and richness of literature is the imagery that is evoked by choice language. Mental imagery is a cognitive function that has been intensively studied by psychologists and cognitive neuroscientists. An interesting finding that has emerged from such studies by Stephen Kosslyn and others has established that imagery and perception share substantial neural processing resources. Thus, to "see in the mind's eye" is actually associated with activity in the same visual regions of the brain as those active during seeing itself. Moreover, mental imagery is not a monolithic process, nor is its use monochromatic. Imagery can occur in other sensory modalities such as hearing, touch or smell. Imagery can also support perception, in the same modality (Kosslyn) or in a different modality (Sathian). Individuals vary widely in the extent to which they rely on verbal codes, spatial imagery that registers relationships between things or their parts, and object imagery that produces detailed "mind-pictures" of things (Kozhevnikov & Blajenkova, Sathian). These individual differences in style probably reflect corresponding differences in brain networks (Kraemer). It is interesting to speculate that writers may have particularly well developed abilities not just in their use of language for abstract verbal coding, but also in their employment of choice language to skillfully evoke mental imagery, and possibly in their brain networks. The seminar will explore these aspects of mental imagery and consider their importance in literary writings.

A classic view of the brain that emerged in the last century was that it has a highly modular architecture, with each little part specialized for a particular function. While this is true at one level, it is now increasingly appreciated that the complexities and richness

of brain function depend critically on dynamic interactions between these modules – interactions whose disruption may be features of disorders such as autism or traumatic brain injury. The concept of “grounded cognition” exemplifies such interactions – this is the idea that high-level thought processes are grounded in basic sensorimotor functions (Barsalou). There is now considerable evidence for this in both psychology and cognitive neuroscience. For instance, hearing action-related words can evoke activity in the relevant motor regions of the brain. Mental imagery can be considered as a highly developed form of grounded cognition. In this seminar, we will discuss the evidence for grounded cognition and its relevance for mental imagery and metaphorical thinking.

Metaphors are often considered rather specialized linguistic devices. However, David Lakoff and Mark Johnson argue convincingly that metaphors are pervasive in our language, and that understanding metaphors involves reference to corresponding concrete entities. We will explore this idea as an instantiation of grounded cognition, and discuss emerging neural evidence in support of this theory (Sathian, Chatterjee). We will also consider how metaphors evolve during their history from novel to familiar (Gentner and Bowdle), and how neural processing changes correspondingly (Jung-Beeman). We will consider metaphors of time-as-space (Boroditsky) and of body parts and how these relate more generally to spatial language (Kemmerer).

What do metaphors and synesthesia have in common? We will discuss V. S. Ramachandran’s idea that synesthesia, which refers to the unusual experience of perception in one modality evoked by a stimulus in another (e.g. seeing numbers each with a specific color), may share a neural basis with metaphor, in terms of cross-wiring between the relevant brain modules. Relevant to this idea is the observation that synesthesia is more common among writers than in the general population. Finally, we will explore the use of metaphor in literature, including Shakespeare.

TENTATIVE SYLLABUS

- Jan 18 A Poet Talks about Metaphors, Images, and Creativity
Guest speaker: Bruce Covey, Emory Dep't of English
Reading: Selected poems by Bruce Covey
Visit to the Danowski Poetry Collection to view poets' first drafts
- Jan 25 Two Novelists Talk about Metaphors, Images, and Story-telling
Guest speakers: Jim Grimsley and Joseph Skibell, Emory Dep't of English
Reading: Grimsley, *Winter Birds* and Skibell, *A Blessing on the Moon*, selections
- Feb 1 Grounded Cognition
Guest speaker: Larry Barsalou, Emory Dep't of Psychology
Readings: Lawrence W. Barsalou, "Grounded Cognition" (2008)
- Feb 8 Visual Mental Imagery and the Imagery Debate
Readings: Kosslyn et al, *The Case for Mental Imagery* (2006), selections
Elaine Scarry, *Dreaming by the Book* (1999), selections
- Feb 15 Spatial vs. Object Visual Imagery
Readings: Kozhevnikov et al, "Spatial vs. Object Visualizers: A New Characterization of Visual Cognitive Style" (2005); Kozhevnikov et al, "Trade-off in Object versus Spatial Visualization Abilities" (2010); Kraemer et al, "The Neural Correlates of Visual and Verbal Cognitive Styles" (J Neurosci, 2009)
- Feb 22 Non-visual Imagery and Multisensory Processes
Edgar Allan Poe, "The Fall of the House of Usher" and selected poems
Scientific readings on auditory imagery
Lacey and Sathian, "Multisensory object representation: Insights from studies of vision and touch" (Prog Brain Res, 2011)
- Feb 29 Grounded Metaphors
Guest speaker: Salman Rushdie
Readings: Lakoff and Johnson, *Metaphors We Live By* (1981)
Johnson, *The Meaning of the Body* (2007), selections
- March 7 Three Guest Scientists Discuss Language and the Body
Anjan Chatterjee, Dept. of Neurology, University of Pennsylvania
Seana Coulson, Dept. of Cognitive Science, UCSD
David Kemmerer, Dept. of Psychology, Purdue University
Readings: Articles by Anjan Chatterjee, Seana Coulson, and David Kemmerer
- March 8 CMBC Symposium: Metaphors in the Mind
- March 21 Novel vs. Familiar Metaphors

Readings: Gentner and Bowdle, "Career of Metaphor" (2008); Desai et al (J Cognit Neurosci 2011).

- March 28 Shakespeare's Metaphors
Guest Speaker: Pat Cahill, Emory Dep't of English
Readings: William Shakespeare, *Othello*; Cahill, *Unto the Breach* (2009), selections
- April 4 Spatial Language
Readings: Jorge Luis Borges, "The Library of Babel"; Italo Calvino, *Invisible Cities*; D. Kemmerer "The semantics of space: Integrating linguistic typology and cognitive neuroscience (2006)
- April 11 Metaphors of Space and Time
Readings: Henri Bergson, *Matter and Memory*, selections; Michel Denis, "Assessing the Symbolic Distance Effect in Mental Images Constructed from Verbal Descriptions" (2008); D. Casasanto and L. Boroditsky "Time in the mind: Using space to think about time (2008)
- April 18 Synesthesia
Readings: E.M. Hubbard & V. S. Ramachandran, "Neurocognitive mechanisms of synesthesia" (2005); Vladimir Nabokov, *Speak, Memory*, selections
- April 25 Presentations of Student Research Projects