

COGS171GS: Mirror Neuron System and Social Cognition

MTuWTH 9:00 am-12:00 pm
Summer 2024 Barcelona, Spain

Instructor: Jaime A. Pineda, Ph.D.
pineda@cogsci.ucsd.edu
858-337-1902
Office Hours: TBD

This class will examine the neuroanatomy, physiology, and functional correlates of the human mirror neuron system and its putative role in social cognition, e.g., action understanding, empathy, and theory of mind. We will examine the developmental, neuroimaging, electrophysiological, as well as clinical evidence for and against this hypothesis.

All students will:

1. Write one critical review or "thought" essay every week based on the required readings that week. Each essay is one page maximum. See class website (or ask instructor) for a sample of a critical review. Essays are due on Monday of the assigned week - for a total of 4 essays (50%). No essay due on Week 5.
2. Take the final (50%).

Week 1 7/3-7/7 The Beginning: Ontogeny and Phylogeny of Mirror Neurons

G. di Pellegrino et al. Understanding motor events: a neurophysiological study. *Exp. Brain Res.*, 1992, 91: 176-180.
Mukamel, R. et al. Single-neuron responses in humans during execution and observation of actions. *Current Biology*, 2010, 20(1-7): 750-756.
Cook, R. et al., Mirror neurons: from origin to function. *Behavioral and Brain Sciences*, 37(2): 177-192, 2014.
Molenberghs et al. Brain regions with mirror properties: a meta-analysis of 125 human fMRI studies. *Neurosci Biobehav Rev.* Jan;36(1):341-9, 2012.

Week 2 7/10-7/14 Unifying Social Cognition

Gallese, V. Embodied simulation theory and intersubjectivity. In T. Fuchs, H.C. Sattel, P. Henningsen (Eds), *The Embodied Self, Dimensions, Coherence and Disorders*. Stuttgart: Schattauer, pp. 78-92, 2010.
Uddin, L.Q. et al. The self and social cognition: the role of cortical midline structures and mirror neurons. *Trends in Cog. Sci.*, 11(4): 153-157, 2007.
Lyons, D. E. The rational continuum of human imitation
Iacoboni, M. Imitation, empathy, and mirror neurons. *Ann. Rev. Psychol.*, 2009, 60, 19.1-19.18.

Week 3 7/17-7/21 Mirror Neurons, Language, and Interpersonal Relationships

Mooney, R. Auditory-vocal mirroring in songbirds. *Phil. Trans. R. Soc. B* 369, 2014.
Levy, F. Mirror neurons, birdsong, and human language hypothesis. *Frontiers in Psychiatry*, 2012.
Keysers, C. and Perrett, D.I. Demystifying social cognition: a Hebbian perspective. *Trends in Cognitive Sciences*, 8(11), 501-507, 2004.
Campbell, M.E.J. and Cunnington, R. More than an imitation game: Top-down modulation of the human mirror system. *Neuroscience and Biobehavioral Reviews*, 75: 195-202, 2017.

Week 4 **7/24-7/28** **Extending the Definition of Mirroring: Empathy and the Aesthetic Experience**

Pineda, J. A. et al., The language and structure of social cognition: An integrative process of 'becoming' the other. In L. Stevens and C. Woodruff (Eds.), *Exploring the Neuroscience of Empathy, Compassion, and Self-Compassion*, 2017.

Tramacere, A. and Ferrari, P.F. Faces in the mirror, from the neuroscience of mimicry to the emergence of mentalizing. *Journal of Anthropological Sciences*, 94, 113-126, 2016.

Montgomery, K.J. and Haxby, J.V. Mirror neuron system differentially activated by facial expressions and social hand gestures: A functional magnetic resonance imaging study. *J. Cogn. Neuroscience*, 2008, 20(10), 1866-1877.

Freedberg, D. and Gallese, V. Motion, emotion and empathy in esthetic experience. *Trends in Cognitive Science*, 11(5), 2007.

Week 5 **7/31-8/4** **Disorders of Mirroring and Alternative Views**

Oberman, L.M., et al. EEG evidence for mirror neuron dysfunction in autism spectrum disorders. *Cog. Brain Res.*, 24(2): 190-198, 2005.

Dapretto, M. et al., Understanding emotions in others: mirror neuron dysfunction in children with autism spectrum disorders. *Nature of Neuroscience*, 2006, 9(1), 28-30.

Hickok, G. Eight problems for the mirror neuron theory of action understanding in monkeys and humans. *J. Cognitive Neuroscience*, 2009, Jan 13, 1-15.

Turella et al., Mirror neurons in humans: consisting or confounding evidence? *Brain & Language*, 2009, 108, 10-21.

FINAL on Friday August 4th in class (morning)

Farewell Dinner - Friday August 4th (evening)