

**Philosophy of Neuroscience**  
**Wintersemester 2011/12**

Neuroscience has been rapidly growing in the last few decades, with consequences for nearly every academic discipline, especially philosophy. In this course we will look at a number of core issues in the philosophy of neuroscience. In general, we will not be doing "Neurophilosophy," which would involve considering the way in which results from neuroscience impact traditional philosophical questions. Instead, we will look at the discipline of neuroscience itself. The questions we shall investigate include the following: Can mental states be reduced to neural states? How might the brain work? Does the brain have functional localization? What kinds of models are appropriate in neuroscience? What constitutes a good explanation in neuroscience?

**14:15 to 15:45**

**Room P207**

**Office Hour: 16-17 Tuesdays**

Texts available electronically through Ilias.

**25 October 2011**

**Introduction to Philosophy of Neuroscience**

**8 November 2011**

**Review of Philosophy of Mind and Neuroscience**

Bickle, Mandik, and Landreth "The Philosophy of Neuroscience" in the Stanford Encyclopedia of Philosophy. URL =  
<http://plato.stanford.edu/entries/neuroscience/index.html>

**15 November 2011**

**Basics, Methods, and Methodology**

Pinel, J. Biopsychology chapters 3, 4, and 5

**22 November 2011**

**Neural Reduction**

Bickle, J. "Multiple Realizability" in Stanford Encyclopedia of Philosophy. URL =  
<http://plato.stanford.edu/entries/multiple-realizability/>

Bickle, J. "Precis of Philosophy and Neuroscience: A Ruthlessly Reductive Account"  
Phenomenology and the Cognitive Sciences 4 (2005) 231-238.

Van Eck, Dingmar; De Jong, Huib Looren & Schouten, Maurice K. D. (2006). "Evaluating  
New Wave Reductionism: The Case of Vision" British Journal for the Philosophy of  
Science 57 (1):167-196.

**29 November 2011**

**Localization in the Brain**

Bechtel, W. "Decomposing and Localizing Vision: An Exemplar for Cognitive  
Neuroscience" in Philosophy and the Neurosciences Blackwell, 2001

Davies, M. "Double Dissociation: Understanding its Role in Cognitive Neuropsychology"  
Mind and Language 25 (2010) 500-540.

Bechtel, B. and Richardson, R. Discovering Complexity MIT Press, 2000. Chapter 6.

**6 December 2011**

**Against Localization in the Brain**

Spivey, M. *The Continuity of Mind* Oxford University Press, 2007. Chapter 5.

Van Orden, G., Pennington, B., Stone, G. "What do double dissociations prove?" *Cognitive Science* (2001) 111-172.

Anderson, M. "Neural reuse: A fundamental organizational principle of the brain" *Behavioral and Brain Sciences* 33 (2010) 245-313.

**13 December 2011**

**Neurons and Computation**

Churchland, P.S. and Sejnowski, T. "Neural Representation and Neural Computation" *Philosophical Perspectives* (4) 343-382.

Friston, K. and Klaas, E. "Free-energy and the brain" *Synthese* 159 (2007) 417-458.

**10 January 2011**

**Dynamical Systems in Neuroscience**

Van Gelder, T. "What Might Cognition Be, If Not Computation?" *Journal of Philosophy* 92 (1995) 345-381.

Freeman, W. *How Brains Make Up their Minds* Columbia University Press, 2000. Chapter 3.

Izhikevich, E. *Dynamical Systems in Neuroscience* MIT Press, 2007. Selections.

**17 January 2012**

**Dynamical Causal Models**

Egan, F. and Matthews, R. "Doing cognitive neuroscience: a third way" *Synthese* 153 (2006) 377-391.

Gallistel, R.C. "The nature of learning and the functional architecture of the brain" in Jing et al. (Eds.) *Psychological science around the world*, Vol. 1 (pp. 63-71) Psychology Press, Sussex: 2006

Friston, K. "Dynamic causal modeling" *Neuroimage* 19 (2003) 1273-1302.

**24 January 2012**

**Representation and Dynamics**

Eliasmith, C. "Moving beyond metaphors: Understanding the mind for what it is" *Journal of Philosophy* 10 (2003) 493-520.

Akins, K. "Of Sensory Systems and the 'Aboutness' of Mental States" *Journal of Philosophy* 93 (1996) 337-372.

**31 January 2012**

**Scientific Explanation**

Woodward, J. "Scientific Explanation" in *Stanford Encyclopedia of Philosophy* URL = <http://plato.stanford.edu/entries/scientific-explanation/>

Craver, C. *Explaining the Brain* Oxford, 2007. Pages 21-40

**7 February 2012**

**Mechanistic Explanation**

Craver, C. *Explaining the Brain* Oxford, 2007. Chapter 4.

Salmon, W. *Scientific explanation and the causal structure of the world* Princeton, 1984. Selections.

Bechtel, B. and Richardson, R. *Discovering Complexity* MIT Press, 2000. Chapter 2

**14 February 2012**

**The Hodgkin-Huxley Model**

Hodgkin, A.L. and Huxley, A.F. "A quantitative description of membrane current and its application to conduction and excitation in nerve" *Journal of Physiology* 117 (1952) 500-544.

Craver, C. *Explaining the Brain*. Oxford, 2007. Pages 49-62.

Weber, M. "Causes without Mechanisms: Experimental Regularities, Physical Laws, and Neuroscientific Explanation" *Philosophy of Science* 75 (2008) 995-1007.