Psych 646: Seminar in Neural Plasticity and Behavior
Fall 2013, Otto

Course Overview: There is now a wealth of data suggesting that anatomical, biochemical, and electrophysiological plasticity play a prominent role in behavior and the encoding of experiences (memory). This course will focus on both historically-relevant and recent findings implicating these forms of plasticity in alterations of behavior and recovery of function following nervous system damage, as well as on the experimental techniques currently employed in these studies. Students will present and discuss several original research papers each week; grades will be based on presentations, discussion, and a final paper.

As with all graduate seminars, the success of this course will be determined primarily by your participation. Although individual students will be primarily responsible for presenting papers each week, ***all*** students will be expected to do ***all*** of the reading each week and come prepared to discuss and critique the primary findings, techniques, and conclusions of each of the papers under discussion. Moreover, ***it is expected that students who are presenting papers will have read one or more other (i.e. non-assigned) articles related to the article they are presenting***. The specific number of presentations for which each student will be responsible will be determined by the number of students enrolled in the course

At the end of the class period one week before your presentation(s), you will be expected to provide the class with a reading list for the following week. This reading list should include a general reading, such as a review (if available) and one or more primary research articles. Both historically-relevant and recent research articles are acceptable. I will assist you in selecting appropriate papers.

Date Topic

9/3 Historical background

Primary Readings:

Hebb, D.O. (1949). The organization of behavior, Chapter Four: The first stage of perception: growth of the assembly. New York, Wiley.

Berlucchi, G., & Buchtel, H.A. (2009). Neuronal plasticity: historical roots and evolution of meaning. Exp. Br. Res., 192:307-319.

Suggested Reading:

Rosenzweig, M.R. (1996). Aspects of the search for neural mechanisms of memory. Ann. Rev. Psychol., 47: 1-32

9/10 Visual cortical plasticity induced by experimental deprivation - Historically relevant issues.

Primary Readings:

Hirsch, H.V.B. (1972). Visual perception in cats after environmental surgery. *Experimental Brain Research, 15,* 405-423.

Spinelli, D.N., et al. (1972). Visual experience as a determinant of the response characteristics of cortical receptive fields in cats. *Experimental Brain Research, 15,* 289-304.

Chang, F.F., & Greenough, W.T. (1982). Lateralized effects of monocular training on dendritic branching in adult split-brain rats. *Brain Research, 232*, 283-292.

9/17 Trauma-induced plasticity in somatosensory and barrel cortex

Primary Readings:

Merzenich, M.M. et al. (1984). Somatosensory cortical map changes following digit amputation in adult monkeys. *Journal of Comparative Neurology, 224,* 591-605.

Pons, T.P., et al., (1991). Massive cortical reorganization after sensory deafferentation in adult macaques. Science, 252, 1857-1860.

Kossut, M., & Juliano, S.L. (1999). Anatomical correlates of representational map reorganization induced by partial vibrissectomy in the barrel cortex of adult mice. Neuroscience, 92, 807-817.

Related Reading:

Kossut, M. (1992). Plasticity of the barrel cortex neurons. Progress in Neurobiology, 39, 389-422.

9/24 Compensatory plasticity

General Reading: Rauschecker, J.P. (1995).Compensatory plasticity and sensory substitution in the cerebral cortex, *Trends in Neuroscience, 18,* 36-43

10/1 Neurogenesis

10/8 Songbird stuff

10/15 Plasticity induced by training

10/22 Long-term potentiation
10/29 Student Choice
11/5 Student Choice
11/12 Student Choice
11/19 Student Choice
12/3 Student Choice, Papers Due
12/10 Student Choice