

9.14 class #26: Neocortex 3: Role of activity in the development of cortical connections

Readings

- Purves and Lichtman, "chapter 14: The development of behavior", pp 345-355;
Purves and Lichtman, "chapter 12: The development of behavior", pp 280-295.
Katz, L.C. and Shatz, C.J., "Synaptic activity and the construction of cortical circuits", *Science*, 1996, 274: 1133-1138,
Bonhoeffer, T., "Neurotrophins and activity-dependent development of the neocortex", *Current Opinion in Neurobiology*, 1996, 6: 119-126.
Sur, M., Angelucci, A. and Sharma J, "Rewiring Cortex: The Role of Patterned Activity in Development and Plasticity of Neocortical Circuits", *J Neurobiol.*, 1999, 41: 33-43.

Additional Reading:

- Shatz, C.J. , "Impulse activity and the patterning of connections during CNS development", *Neuron* 1990,5:745-756,.

Questions:

1. Why is the visual system a good model for examining the role of activity in cortical development?
2. How does sensory experience alter electrical activity in the brain?
3. What is the ocular dominance of a cell in primary visual cortex? What is an ocular dominance column?
4. What are the following terms: "critical period", "binocular competition"?
5. What is Hebb's postulate of learning? What does this have to do with activity-dependent development of cortical connections?
6. What is the NMDA receptor? What makes it special?
7. What is "long-term potentiation"?
8. What are neurotrophins?
9. How might neurotrophins be involved in competition regulated by neuronal activity?