

Crown 85 Winter 2016

Visual Perception: A Window to Brain and Behavior

Lecture 5: Structure of and Information Processing in the Retina

Reading: [Joy of Perception Retina](#)
[Eye Brain and Vision](#)
[Web Vision](#)
[How the Retina Works \(American Scientist\)](#) [advanced]

Looking: [Information Processing in the Retina \(Sinauer\)](#)
[How Lateral Inhibition Enhances Visual Edges YouTube](#)

OVERVIEW: Once an image has been formed on the retina and visual transduction has occurred, neurons in the retina and the brain are ready to begin some serious information processing. In this lecture we will first discuss the structure of the retina and then look at the some perceptual phenomena related to the functioning of receptors and the transformations of visual information by neural networks found in the retina.

1. What are the differences between the rod and cone receptors with respect to:
 - a. size
 - b. numerosity
 - c. distribution across the retina
 - d. scotopic and photopic vision
 - e. color vision
 - f. visual resolution

2. Know the following terms associated with the cells of the retina and retinal structure:
 - a. rods
 - b. cones
 - c. horizontal cells
 - d. bipolar cells
 - e. amacrine cells
 - f. ganglion cells
 - g. fovea
 - h. optic nerve

- 3. Response properties and interconnectivity among cells of the retina**
 - a. What are the synaptic connections among the cells of the retina?**
 - b. What is a ribbon synapse?**
 - c. In vertebrates, do receptors hyperpolarize or depolarize in response to light?**
 - d. Which retinal cells communicate by graded potentials and which by action potentials?**

- 4. Lateral inhibition is an important example of coding by neural networks.**
Be sure to understand the how the “simple” network diagramed in class allows the visual system to emphasize the perception of contrast (spatial changes in luminance).

- 5. Understand how the following psychophysical phenomena are related to processes occurring in the retina:**
 - a. dark adaptation**
 - b. Pulfrich pendulum**
 - c. Mach bands**