Crown 85 Winter 2016

Visual Perception: A Window to Brain and Behavior

Lecture 6: The Central Visual System (structure and processing)

Reading: **Joy of Perception**
Eye Brain and Vision
Web Vision

Looking: **Information Processing in the Retina (Sinauer)**
Visual Pathways (Sinauer)
Several Werblin Videos on Visual Cortex

OVERVIEW: Visual information leaves the retina via the optic nerve and is transmitted to structures in the brain. The aim of this lecture will be to see various cortical sites further of the original "photograph" into new codes which emphasize certain aspects of the image while discarding others. We will discuss how this code is refined as information is transmitted along pathways to the brain.

1. **Know the following terms related to the gross anatomy of the central visual system and their general function in visual information processing.**

   a. **optic nerve**
   b. **optic chiasm**
   c. **superior colliculus**
   d. **lateral geniculate nucleus (LGN)**
   e. **visual cortex (V1, V2, V4)**
   f. **inferior temporal cortex**
   g. **medial temporal cortex (MT, V5)**
   h. **ventral (temporal cortex)**
   i. **dorsal (parietal cortex)**
   j. **fusiform area**

2. **Understand the following functional concepts:**

   a. **receptive field**
   b. **concentric on-center receptive field**
   c. **concentric off-center receptive field**
   d. **retinotopic map**
   e. **feature detector**
   f. **orientationally tuned neuron**
   g. **simple cell**
   h. **complex cell**
   i. **"grandmother" cell**
   j. **spatial frequency detector**
   k. **what vs where pathways**

3. What does the Craik-O'brien-Cornsweet illusion imply about information processing by the visual system?

4. In the "simple" picture what are the types of information selectively processed by the parvocellular and magnocellular pathways?

5. What types of information are processed by the ventral (temporal) and dorsal (parietal) cortical streams?

6. Compare the "classical feature" and "spatial frequency" models of visual image processing.

7. How is psychophysical adaptation used to show feature selectivity in the Blakemore-Sutton demonstration (class report) and the McCulloch effect?

8.   What is blindsight and which visual pathway may be implicated?