

Lecture 18 -- Vision II -- Bailey

Central Visual Pathways

A. The Retinal Image Is An Inversion of the Visual Field

1. The visual field has both binocular and monocular zones.
2. At the initial stages of visual processing each half of the brain is concerned with the contralateral hemifield of vision.
 - a. segregation of axons in the optic chiasm: fibers from the two eyes dealing with similar parts of the visual field are brought together.
 - b. the monocular portion of each hemifield is called the temporal crescent.

B. The Retina Projects to Three Subcortical Regions in the Brain

1. The pretectal area of the midbrain controls pupillary reflexes.
2. The superior colliculus controls saccadic eye movements.
3. The lateral geniculate nucleus processes visual information.

C. Visual Field Deficits and the Topography of the Central Visual Pathway

D. Magnocellular and Parvocellular Pathways Convey Different Information to the Visual Cortex

1. Retinal axons terminate in the lateral geniculate nucleus to produce an orderly representation of the contralateral hemifield of vision.
2. The magnocellular pathway is concerned with the analysis of movement and gross features of the visual stimulus.
3. The parvocellular pathway is concerned with an analysis of fine detail and color.
4. Neurons in the LGN have concentric receptive fields.

E. Functional Architecture of Primary Visual Cortex

1. The primary visual cortex has distinct anatomical layers, each with characteristic synaptic connections.
2. Resident neurons of primary visual cortex and the flow of information.
3. The primary visual cortex is organized into columns which abstract different properties of the visual image.
4. Anatomical basis for ocular dominance columns, important for binocular interactions.

Relevant reading: chapters 27 and 29 in “Principles”