

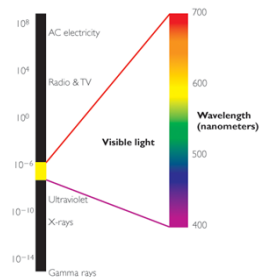
Lecture Preview

- Sensation and perception
- **The visual system**
- The auditory system
- The sensual sense
- Our body senses

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The Visual System

- The human visible spectrum is a narrow band of light that we respond to
- Other animals may have a more restricted or greater spectrum

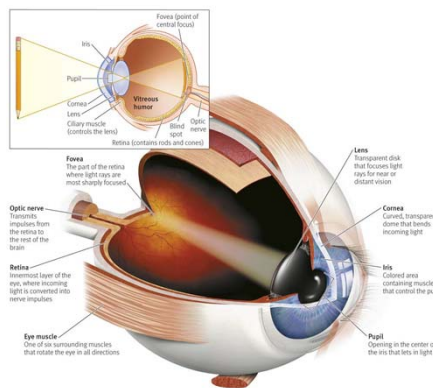


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Structure of the Eye

- **Sclera** is the white portion of the eye
- **Iris** is the colored portion and controls how much light enters the eye
- **Pupil** is the hole where light enters the eye – **Pupillary reflex?**

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Structure of the Eye

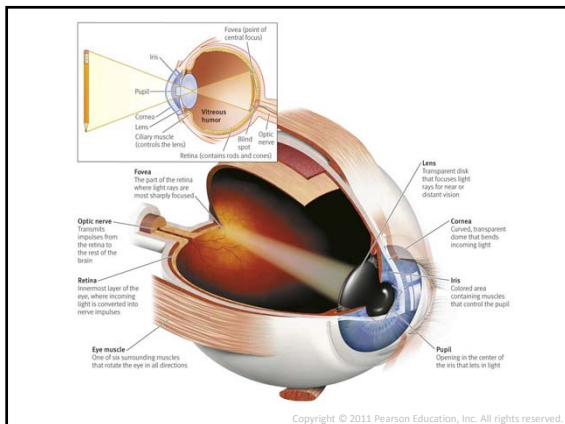
- **Cornea** contains transparent cells that focus light on the back of the eye
- The lens changes curvature (**accommodation**) to retract light onto back of eye (onto fovea)
- Glasses change the way light enters the eye to help correct *myopia* or *hyperopia*

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Structure of the Eye

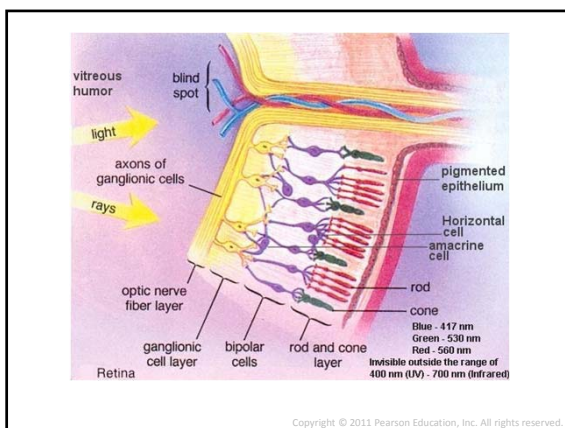
- The **retina** is a thin membrane at the back of the eye
- The **fovea** in the center of retina, responsible for **acuity**
- Light hits two types of sense receptors on the retina—**rods** and **cones**

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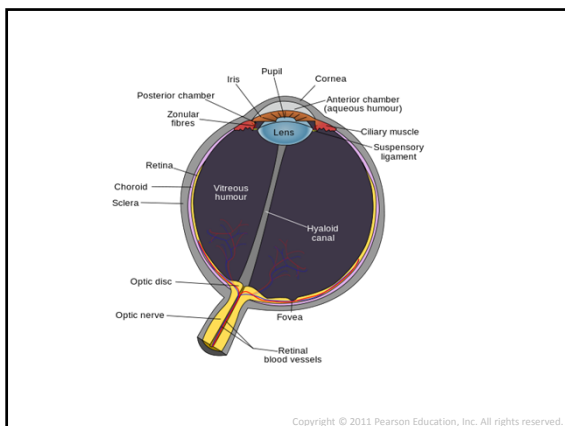
Structure of the Eye

- The **optic nerve** exits the back of the eye and is composed of the axons of the *ganglion cells*
 - Causes a blind spot
- Optic nerves coming from both eyes crosses at **optic chiasm**
- Most of the axons go to the thalamus and then the visual cortex, but some go to midbrain



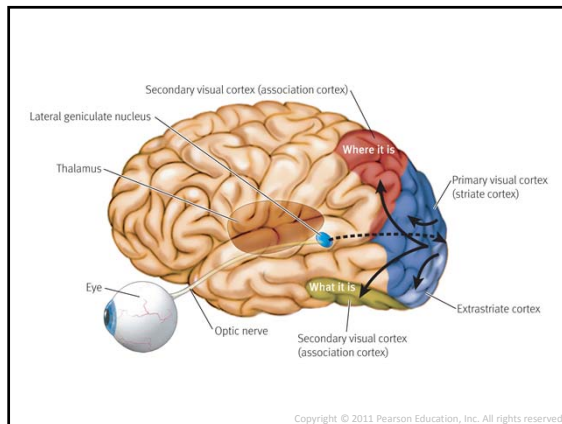
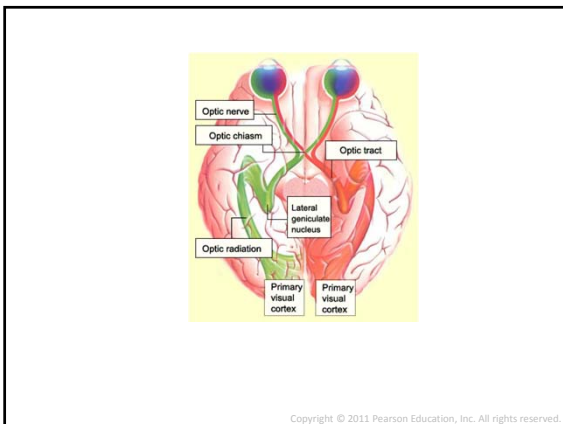
Video

- MultiMedia Library
- Explore
 - Light and the Optic Nerve
 - <http://www.mathxl.com/info/mmlib.aspx?bookcode=Lilienfeld2e>



Video

- MultiMedia Library
- Explore
 - Normal Vision and Nearsightedness
 - <http://www.mathxl.com/info/mmlib.aspx?bookcode=Lilienfeld2e>



Sensation vs. Perception

- The external stimulus is converted by a **sense receptor** into neural activity via **transduction**
 - Eyes gather and transmits visual information.
 - Eyes transduce light waves to neural impulses
- **Perception** is the brain's interpretation of raw sensory data
- Our brains piece together
 - A) What's in our sensory field
 - B) What was there a moment ago
 - C) What we remember from our past

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Visual Perception

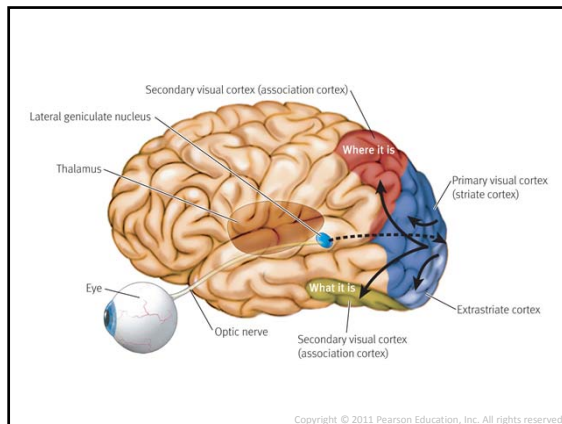
- D. Hubel & T. Wiesel
 - The first systematic recordings from visual cortex
 - They observed that there are different neural cells that respond to vertical, horizontal, or oblique lines

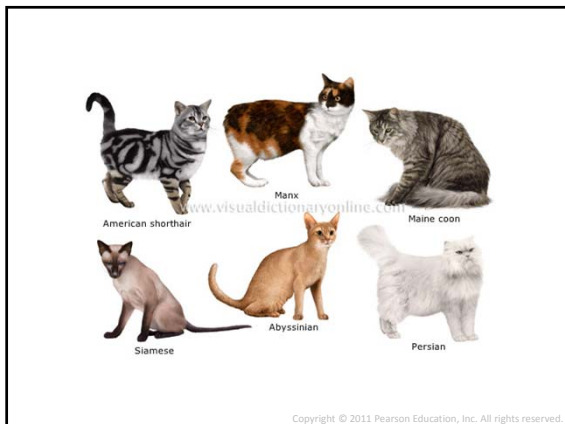
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Visual Perception

- Different cortical cells respond maximally to different types of stimuli
- **Feature detector** cells allow us to detect lines and edges
 - *Simple cells*—orientation-specific slits of light in a particular location
 - *Complex cells*—orientation-specific but less dependent on location
- More complex feature detector cells are resided in higher cortical levels

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Gestalt Principles

- **Top-down:** building perception based on beliefs and expectations. From knowledge to perception.
- Rules that govern how we perceive objects as wholes within their overall context
- The motto of Gestalt principles
 - “the whole is more than the sum of its parts.”

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Gestalt Principles

(a) Proximity

(b) Similarity

(c) Continuity

(d) Closure

(e) Symmetry

(f) Figure-ground

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Video

- MultiMedia Library
- Simulate
 - Gestalt Laws of Perception
 - <http://www.mathxl.com/info/mmlib.aspx?bookcode=Lilienfeld2e>

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Face Recognition

- The **temporal lobe** of the brain is partly responsible for our ability to recognize faces.
- Some neurons in the temporal lobe respond to particular features of faces.
- Some people who suffer damage to the temporal lobe lose their ability to recognize and identify familiar faces.
- This disorder is called **prosopagnosia**.
- <http://faculty.washington.edu/chudler/java/faces.html>

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