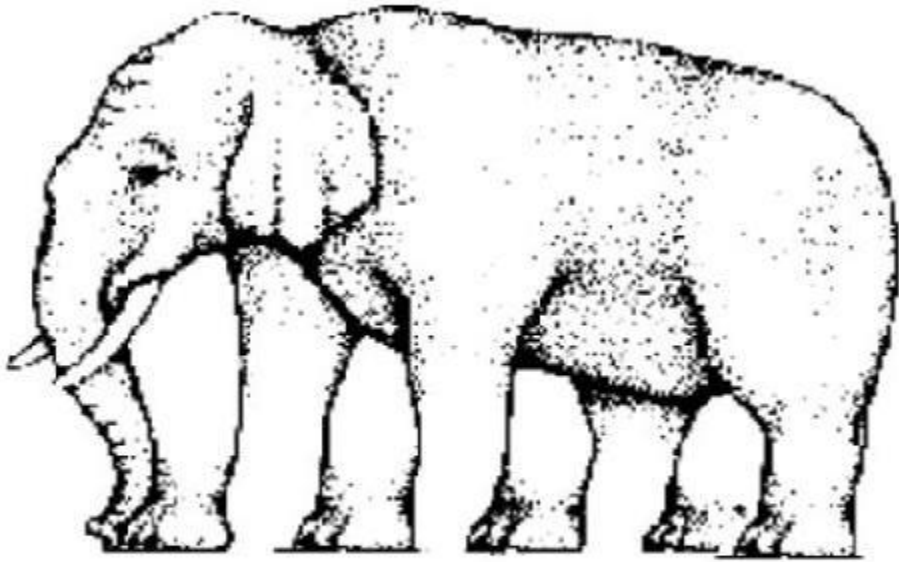


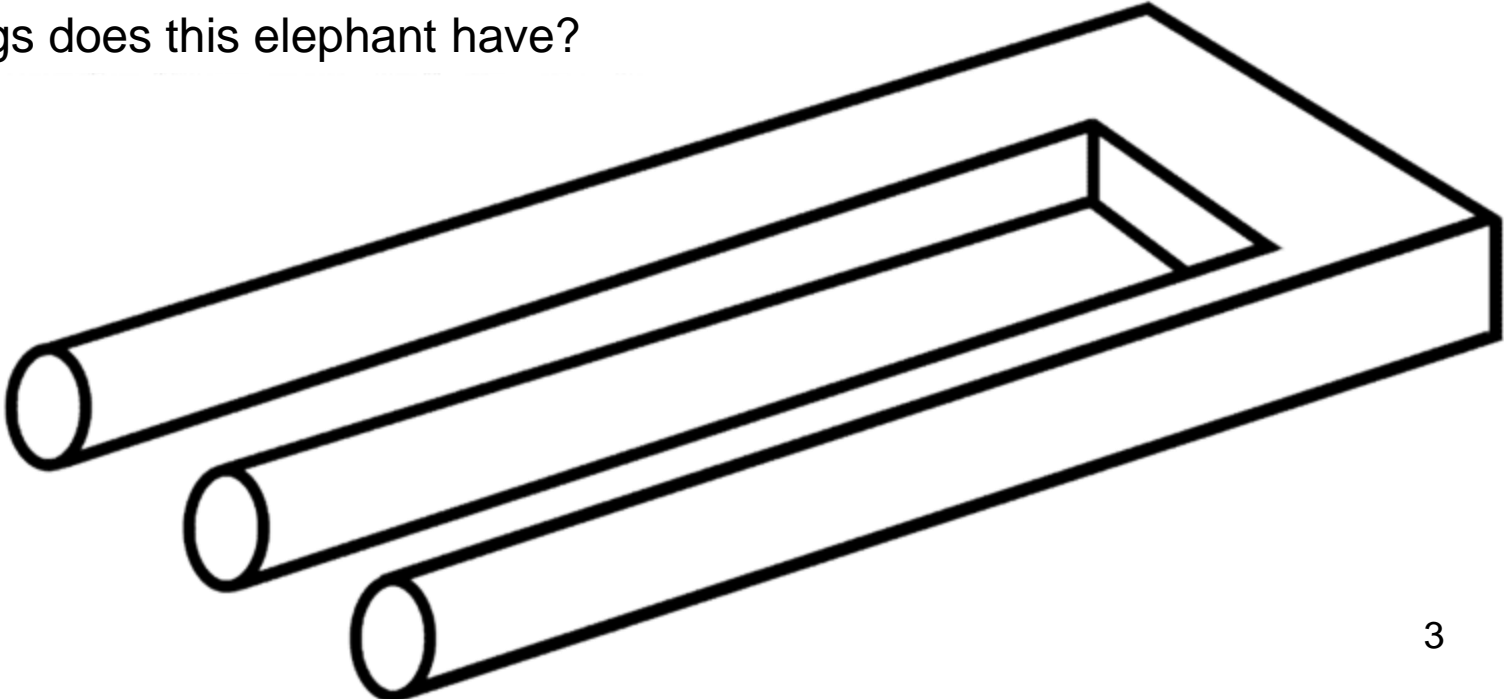
# Vision

You can't always trust your eyes





How many legs does this elephant have?



# The Anatomy of Visual Sensation

- *Visual cortex* -  
Part of the brain - the occipital lobe -  
where visual sensations are processed.

## *Color* -

Psychological sensation derived from  
the wavelength of visible light - color,  
itself, is not a property of the external  
world.

# From Sensory Organs to the Brain

The process of sensation takes place in three steps:

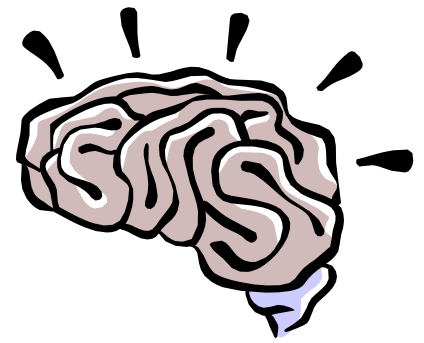


**Reception**--  
the stimulation  
of sensory  
receptor cells  
by energy  
(sound, light,  
heat, etc)

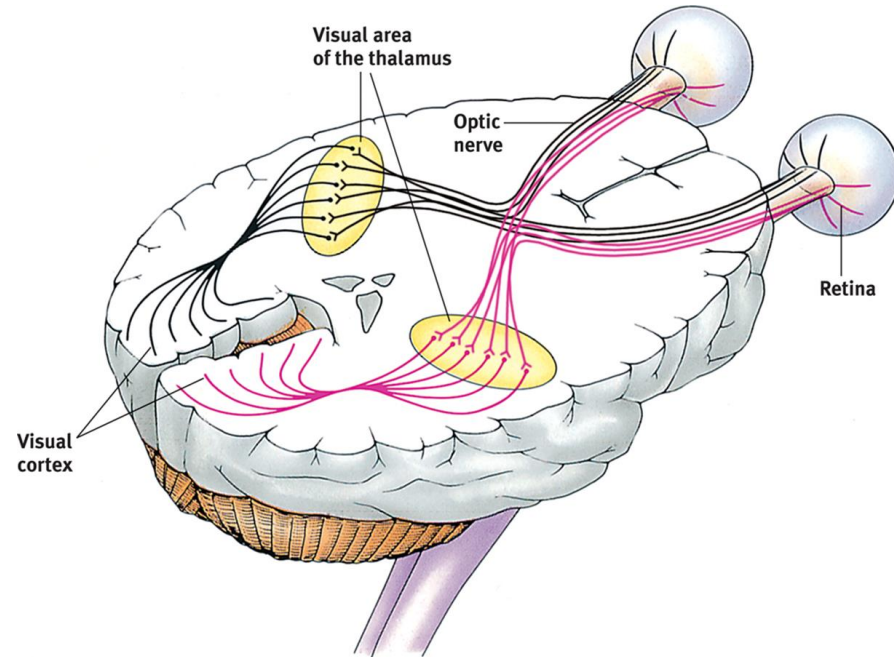
**Transduction**--  
*transforming  
this cell  
stimulation into  
neural impulses*

**Transmission**  
--delivering  
this neural  
information to  
the brain to be  
processed

# Transduction



**Phototransduction:**  
Conversion of light energy into neural impulses that the brain can understand.



- *Receptors* - Specialized neurons that are activated by stimulation and transduce (convert) it into a nerve impulse.
- *Sensory pathway* - Bundles of neurons that carry information from the sense organs to the brain.

# Wavelength (Hue)

- **Hue (color)**  
the color experienced.
- **Wavelength** is the distance from the peak of one wave to the peak of the next.
- **Intensity** (perceived brightness,) is determined by the amplitude of the wavelength.

Short wavelength = high frequency  
(bluish colors, high-pitched sounds)



Long wavelength = low frequency  
(reddish colors, low-pitched sounds)



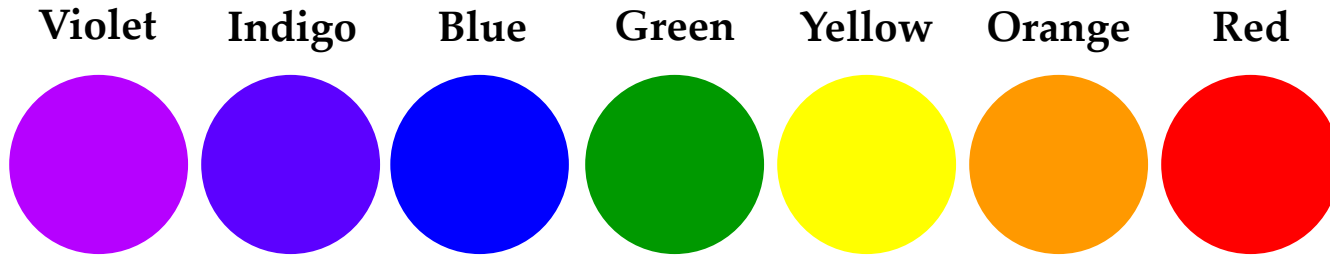
Great amplitude  
(bright colors, loud sounds)



Small amplitude  
(dull colors, soft sounds)



# Wavelength (Hue)



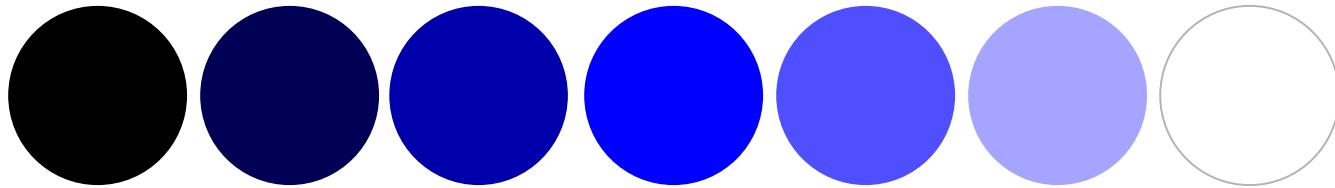
Short wavelengths

Long wavelengths

Different wavelengths of light result  
in different colors.



# Intensity (Brightness)



Blue color with varying levels of intensity.  
As intensity increases or decreases, blue color  
looks more “washed out” or “darkened.”

The upper and lower cubes in the foreground appear very different in brightness: white below and dark grey above. Despite this appearance, the surfaces are in fact physically identical. Move your mouse over the 'mask' to reveal their 'true' similarity.

'MASK'

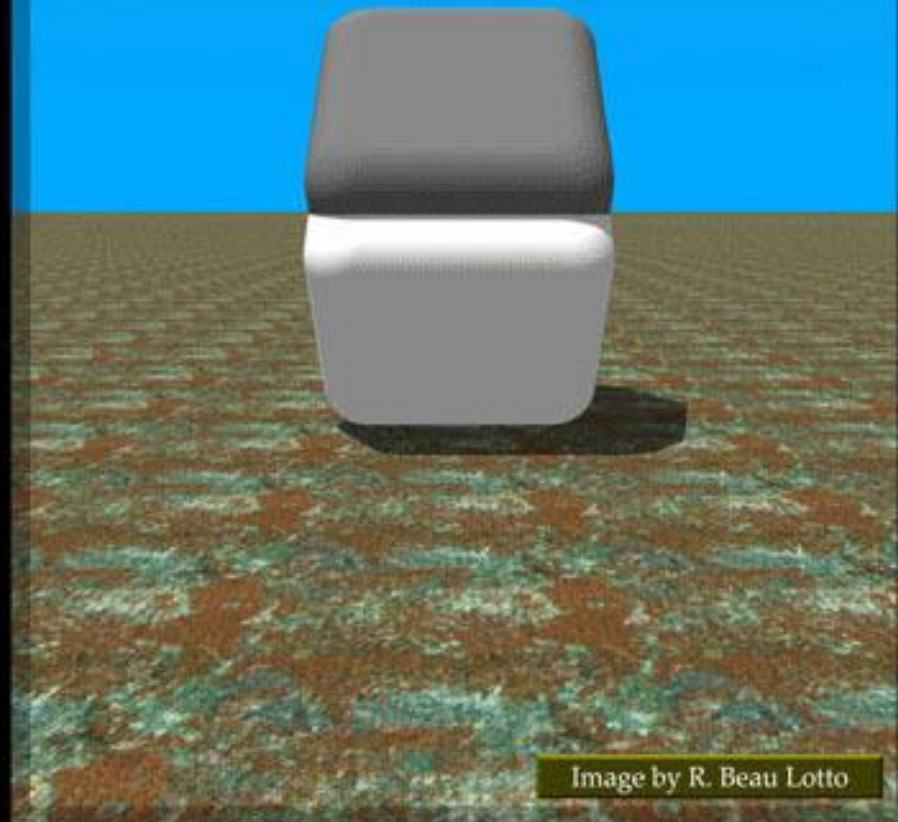


Image by R. Beau Lotto

<http://www.youramazingbrain.org.uk/superstudies/brightness.htm#>

# The Stimulus Input: Light Energy

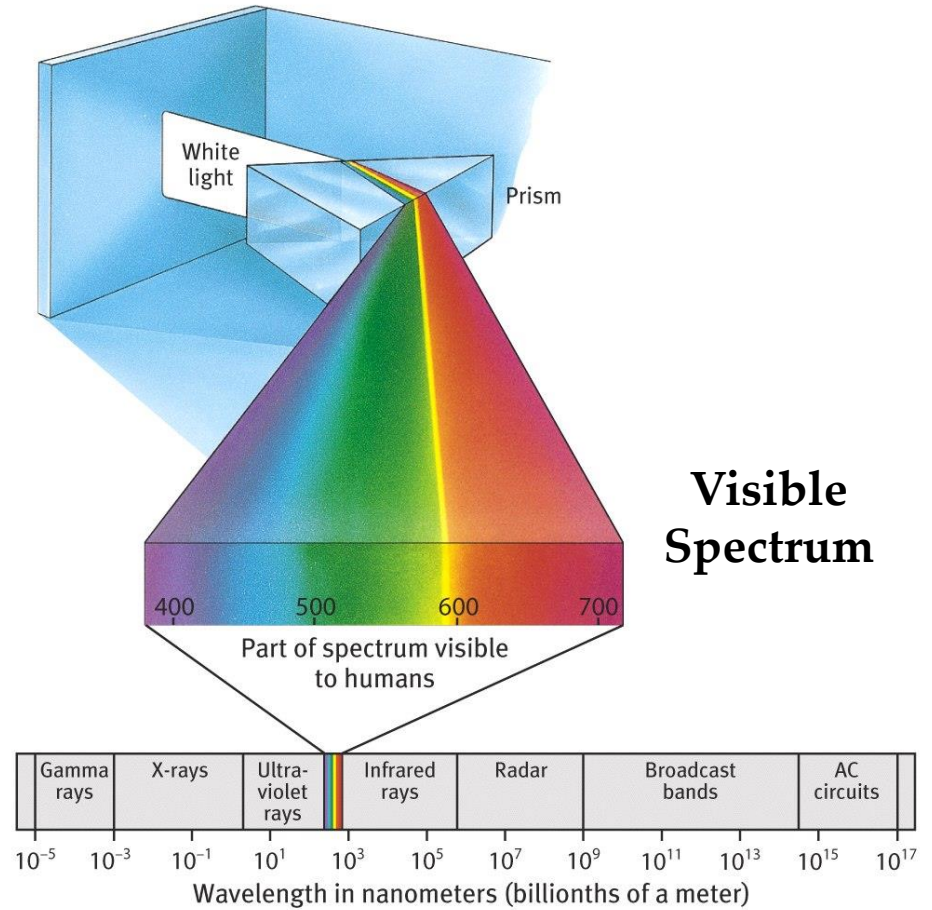


Human eye



Bee's eye

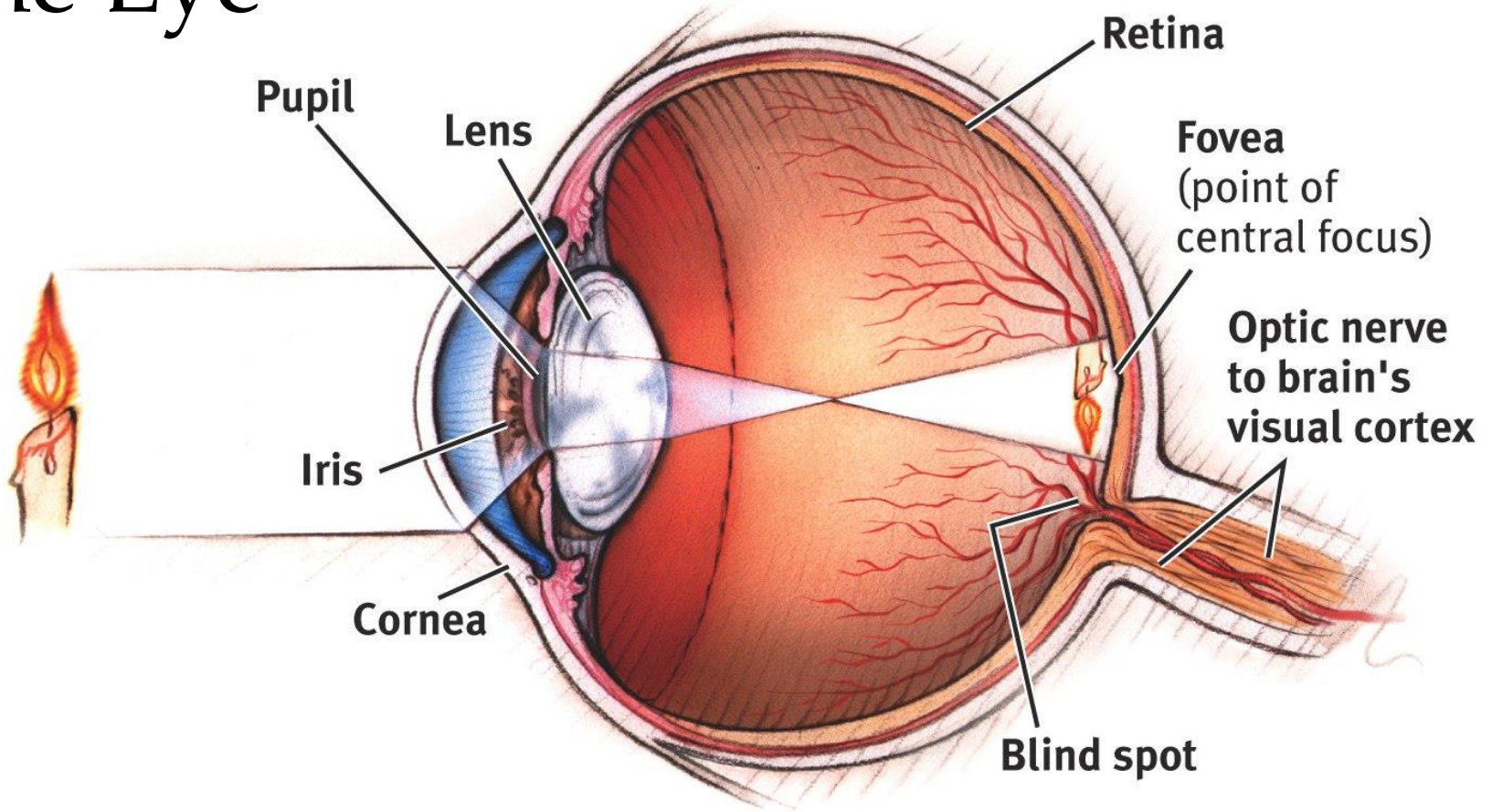
Both Photos: Thomas Eisner



# The Eye



# The Eye

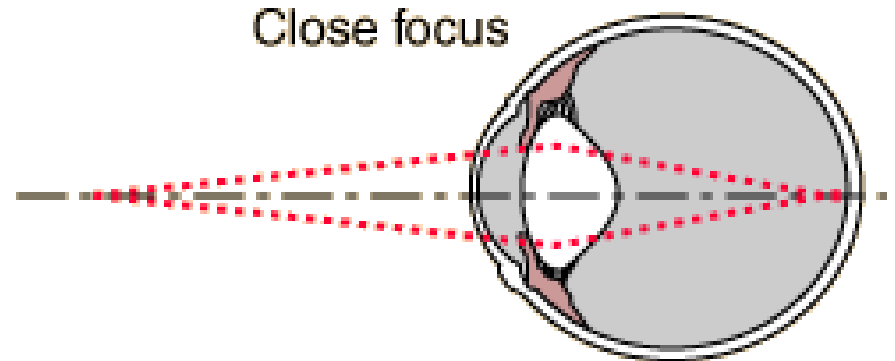
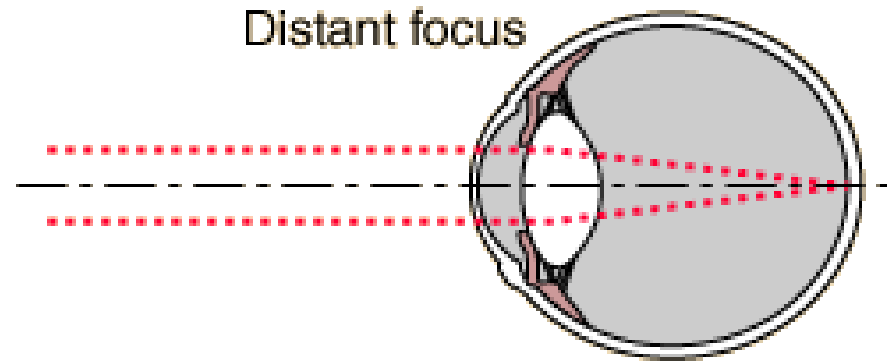


1. **Cornea:** Transparent tissue where light enters the eye. (COVERS get it Cornea)
2. **Iris:** Muscle that expands and contracts to change the size of the opening (pupil) for light.

# The Lens

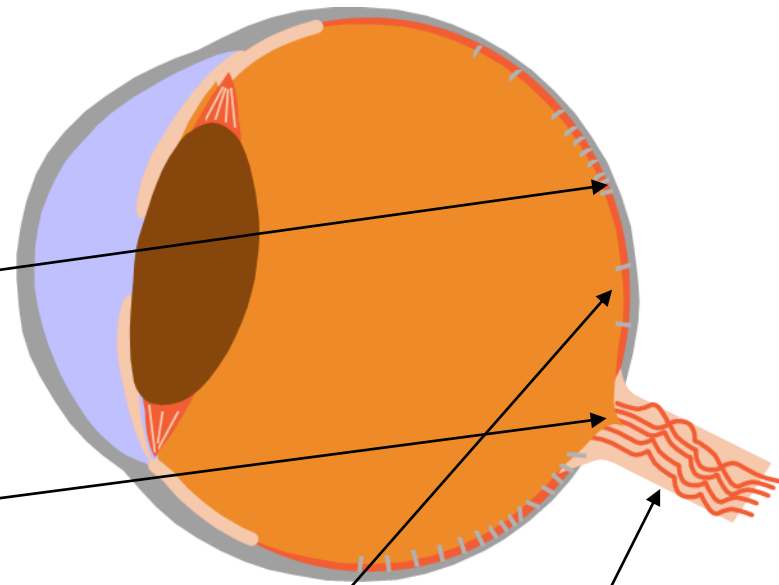
**Lens:** Transparent structure behind the pupil that changes shape to focus images on the retina.

**Accommodation:** The process by which the eye's lens changes shape to help focus near or far objects on the retina.



# The Retina

- *Retina* - Light-sensitive layer at the back of the eyeball, converts light energy into neural impulses.
- Blind spot: no receptors where information exits the eye
  - The visual system uses information from cells around the blind spot for "completion," filling in the blind spot
- Fovea: high acuity area at center of retina



*Optic nerve* - Bundle of neurons that carries visual information from the retina to the brain.

# Test your Blind Spot

Use your textbook. Close your left eye, and fixate your right eye on the black dot. Move the page towards your eye and away from your eye. At some point the car on the right will disappear due to a blind spot.

