

# Chapter 5 Test Review

Try the practice questions in the  
Study Guide and on line

# Printing game plan

- Put six slides on a page
- Select pure black and white as the printing option
- Okay, now wade into the answers>>>>

# Sensation v. perception, page 197

- Sensation

- a process by which our sensory receptors and nervous system receive and represent stimulus energy

- Perception

- a process of organizing and interpreting sensory information, enabling us to recognize meaningful objects and events

# Sublimation, pages 200-201

- *Subliminal stimulus*: any stimulus below your absolute threshold
- Ex: a microscopic cell that you cannot see with your naked eye
- Subliminal advertisements do have an affect on you, but do not persuade you
- Thus, we may be processing something without being aware that we are...

# Adaptation, page 202

- *Sensory adaptation*: lowered sensitivity due to constant pressure from a stimulus
- Ex: you go into someone's house and notice a smell, but this only lasts for a while because sensory adaptation allows you to focus on other stimuli
- Ex: you notice your foot in contact with the floor, but then move on to other stimuli

## Ernst Weber's Law, 202-203

- Difference thresholds grow with the magnitude of a stimulus
- For example when a \$5/hr. worker gets a 25 cent/hr raise, how much would the \$10/hr. worker need to notice the same difference in income?
- Ans. 50 cent/hr.
- Sales people use this knowledge to get you to buy accessories. Once you've shelled out big bucks on a pricey item you're more likely to buy the add-ons since they don't cost as much.

## Vision, pp. 204-205

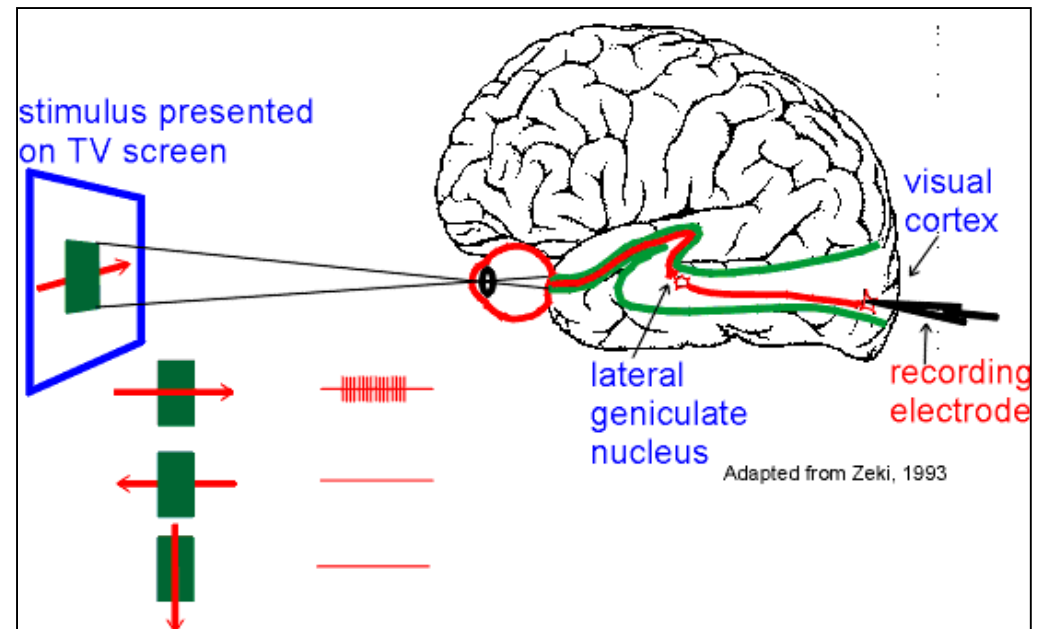
- **Transduction**- conversion of one form of energy to another
- **Wavelength**- the distance from the peak of one wave to the peak of the next
- **Hue**- dimension of color determined by wavelength of light
- **Intensity**- amount of energy in a wave determined by amplitude
  - brightness
  - loudness

# Feature Detectors

- neurons in the visual cortex      respond to  
    specific features
- shape
- angle
- movement

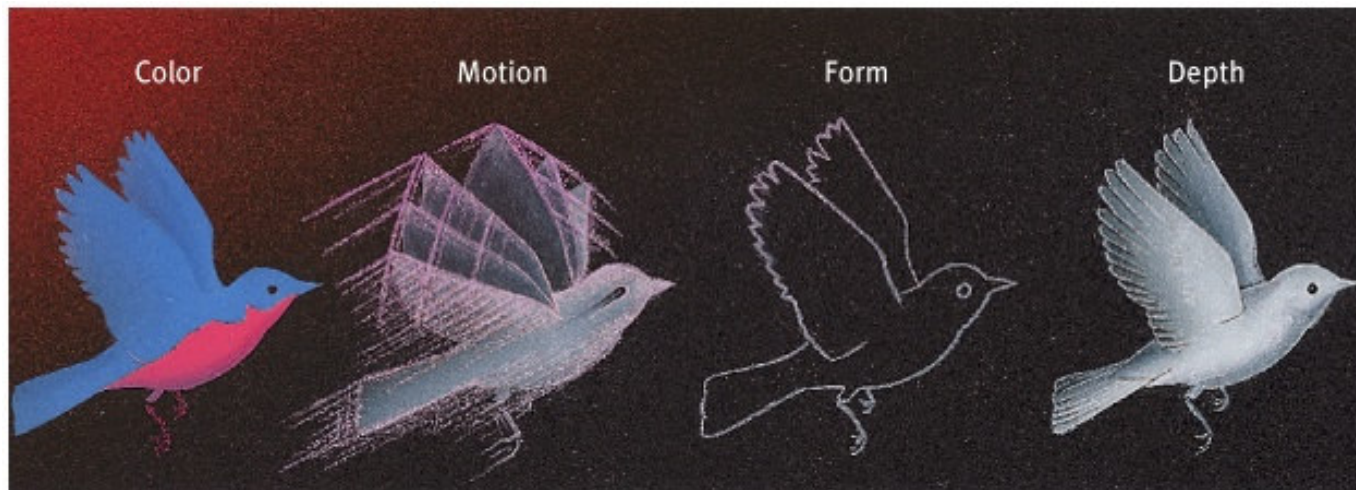
# David Hubel and Torsten Wiesel

- They discovered feature detectors
- Most cells in the visual cortex respond to a specific feature regarding shape or movement, etc.
- [www.yorku.ca/eye/cortfld.htm](http://www.yorku.ca/eye/cortfld.htm)



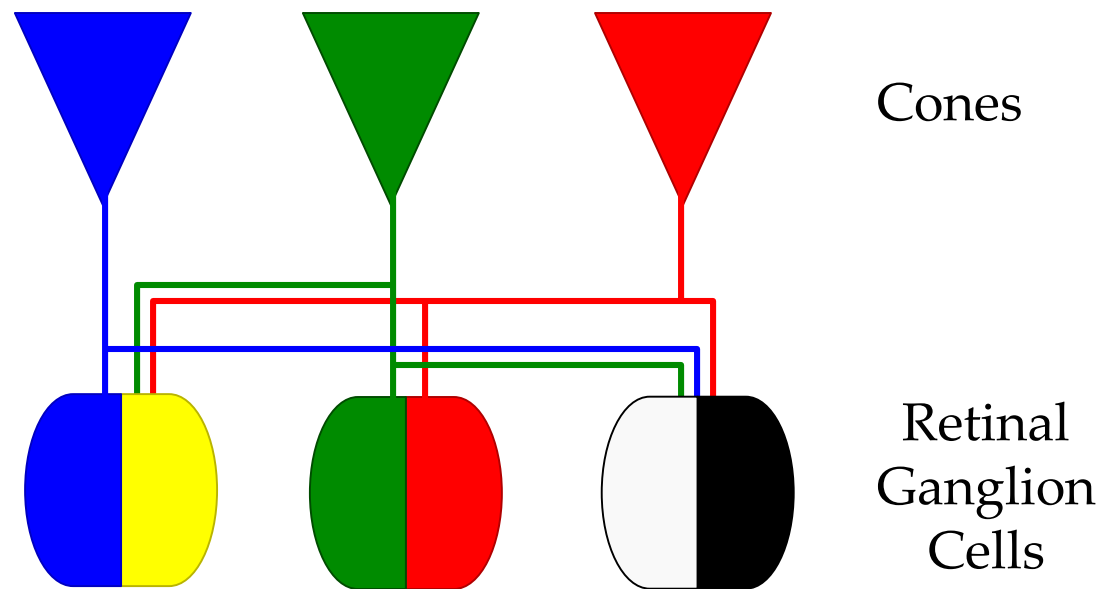
# Parallel Processing

Processing of several aspects of the stimulus simultaneously is called **parallel processing**. The brain divides a visual scene into subdivisions such as color, depth, form and movement etc.



# Opponent Process Theory

Hering proposed that we process four primary colors combined in pairs of red-green, blue-yellow, and black-white.



# Hering's Opponent-Process Theory

- opposing retinal processes enable color vision

There are six types of cells

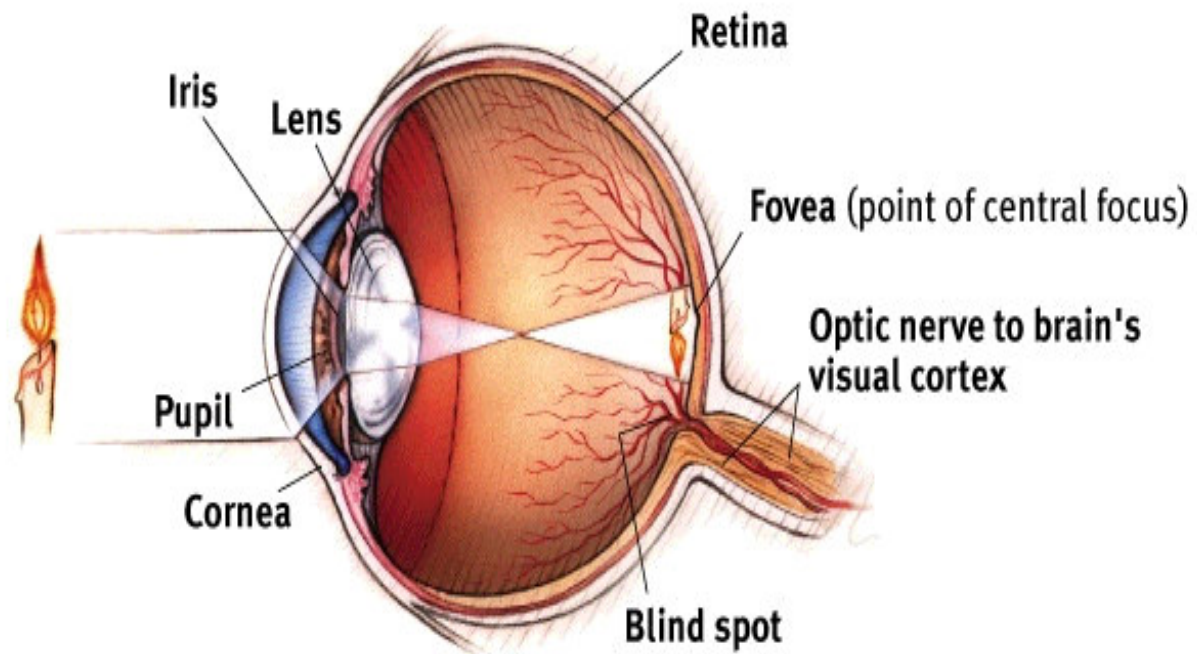
“ON” (responds) “OFF” (inhibits)

1	red	green
2	green	red
3	blue	yellow
4	yellow	blue
5	black	white
6	white	black

*Opponent process* theory and Color  
afterimages, page 213

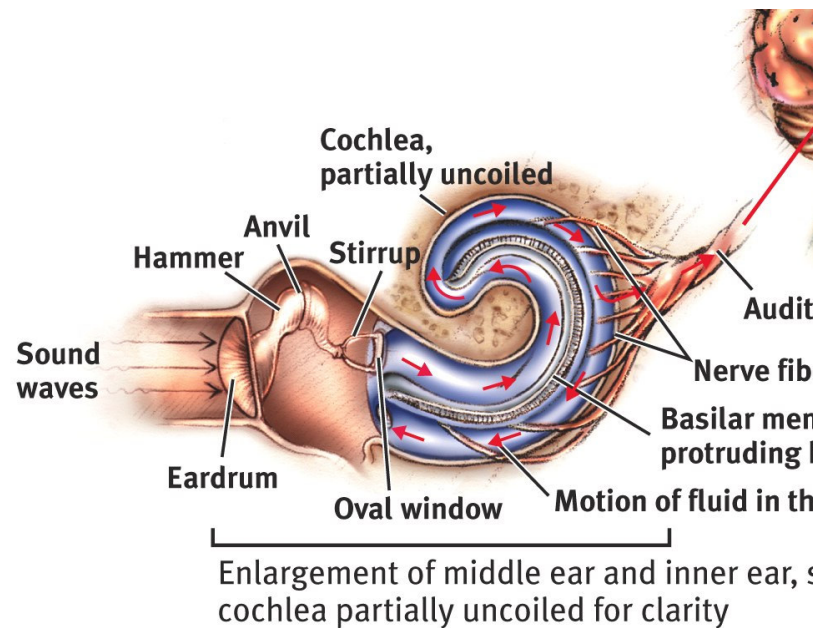
- *After images support the Opponent process* theory, which says that color is then processed by opposition in the receptor cells.
- Example: yellow is inhibited and blue is exhibited

# Vision-Retina



# Audition- Cochlea

**Cochlea:** Coiled, bony, fluid-filled tube in the inner ear that transforms sound vibrations to auditory signals.



# Ear and Eye compared

The cones and rods perform the same function for the eyes that hair cells do for the sense of hearing.  
Both are receptors.

# Lamaze classes for childbirth

- Relaxation
- Massage
- distraction

# Taste and sensory interaction

- **Sensory Interaction**

- the principle that one sense may influence another
- as when the smell of food influences its taste

# Smell, the olfactory sense

Like taste, smell is a *chemical* sense. Odorants enter the nasal cavity to stimulate 5 million receptors to sense smell. Unlike taste, there are many different forms of smell.

# Kinesthetic sense

- The kinesthetic sense tells you the positioning of your body as you are moving
- This system tells you about the movement, posture, and location of your body through receptors in your joints, ligaments, muscles, and skin

# Vestibular sense

- The four by four balance
- The vestibular sense gives you the feeling of balance and tells you where you are in space
- Fluids in the semicircular canals and in the vestibular sacs (inner ear) shift and stimulate hair cells (receptors)
- This information is sent to the brain by the vestibular nerve

# The Middle Ear and sound waves

**Outer Ear:** Pinna. Collects sounds.

**Middle Ear:** Chamber between eardrum and cochlea containing three tiny bones (hammer, anvil, stirrup) that concentrate the vibrations of the eardrum on the cochlea's oval window.

**Inner Ear:** Innermost part of the ear, containing the cochlea, semicircular canals, and vestibular sacs.

# Color Constancy

Color of an object remains the same under different illuminations. However, when context changes the color of an object may look different.

# Young -Hemholtz Tri-chromatic Theory of Color Vision

- Proposed by Thomas Young and Hermann von Helmholtz this theory deals with the three types of cones in the retina
- These respond at different rates depending on the wavelength of incoming light rays.
- Out of these three---red, green and blue-- the visual system is able to derive all other perceptible colors.

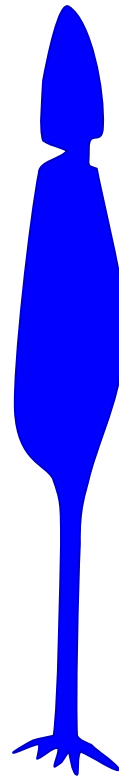
# Color processing theories

- Both theories are correct: trichromatic and opponent process
- According to trichromatic, there is a three color system in the retina
- According to opponent process, cells act in opposition en route to the visual cortex

# Photoreceptors

MacNichol, Wald and Brown (1967) measured directly the absorption spectra of visual pigments of single cones obtained from the retinas of humans.

Blue  
Cones



Short  
wave

Green  
Cones



Medium  
wave

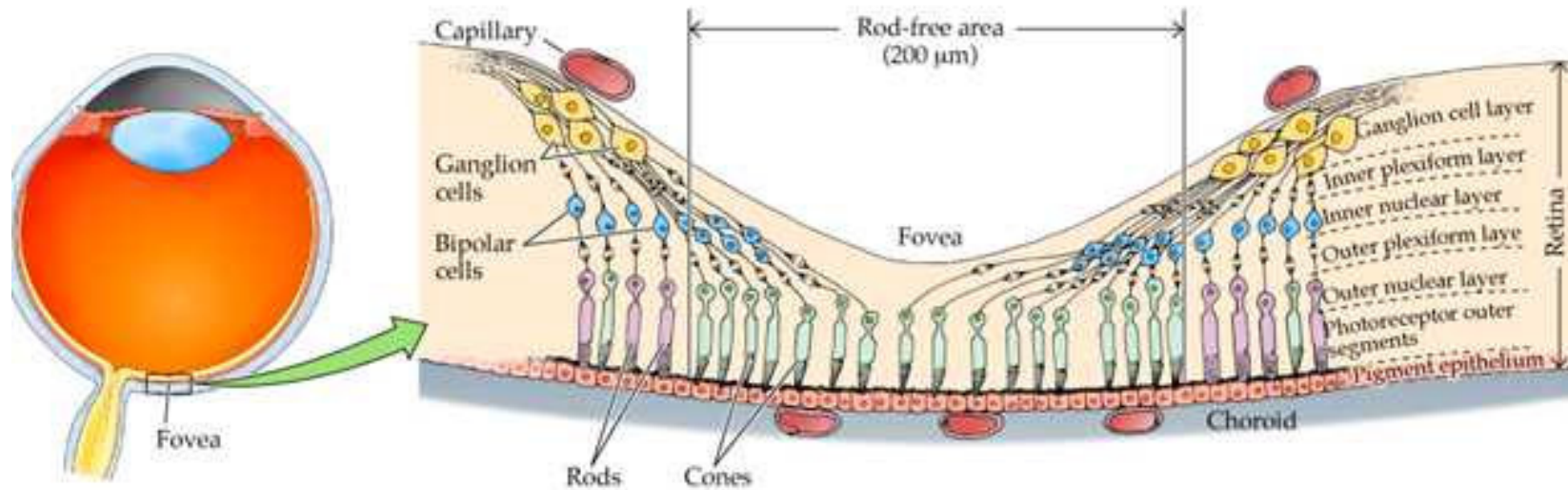
Red  
Cones



Long  
wave

# Fovea

**Fovea:** Central point in the retina around which the eye's cones cluster.



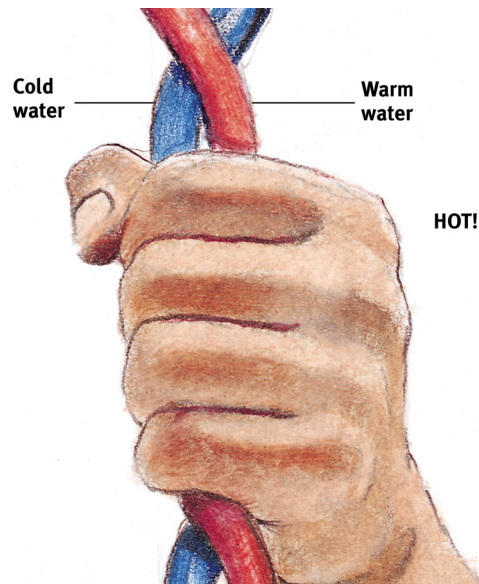
<http://www.bergen.org>

# Cones v. Rods

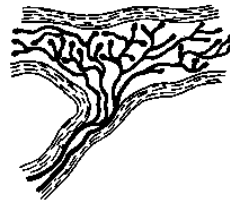
- Cones
- near center of retina (fovea)
  - fine detail and color vision
  - daylight or well-lit conditions
- Rods see table 5.1 on page 208
  - peripheral retina
  - detect black, white and gray
  - twilight or low light

# Skin Senses

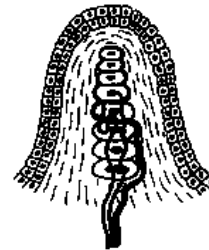
Only pressure has identifiable receptors. All other skin sensations are variations of pressure, warmth, cold and pain.



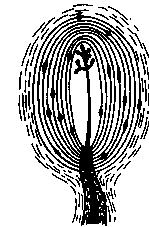
Burning hot



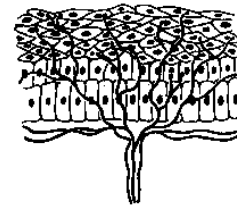
Pressure



Vibration



Vibration



Cold, warmth and pain

# Nerve Hearing Loss

- hearing loss caused by damage to the cochlea's receptor cells or to the auditory nerve

# Gate-Control Theory of Pain

- theory that the spinal cord contains a neurological “gate” that blocks pain signals or allows them to pass on to the brain
- “gate” opened by the activity of pain signals traveling up small nerve fibers
- “gate” closed by activity in larger fibers or by information coming from the brain

# Phantom limb sensations

- When they feel pain in a phantom limb it is due to the brain interpreting neural activity as pain in a limb that really isn't there.

# Taste

Traditionally, taste sensations consisted of sweet, salty, sour, and bitter tastes.

Recently, receptors for a fifth taste have been discovered called "*Umami*".

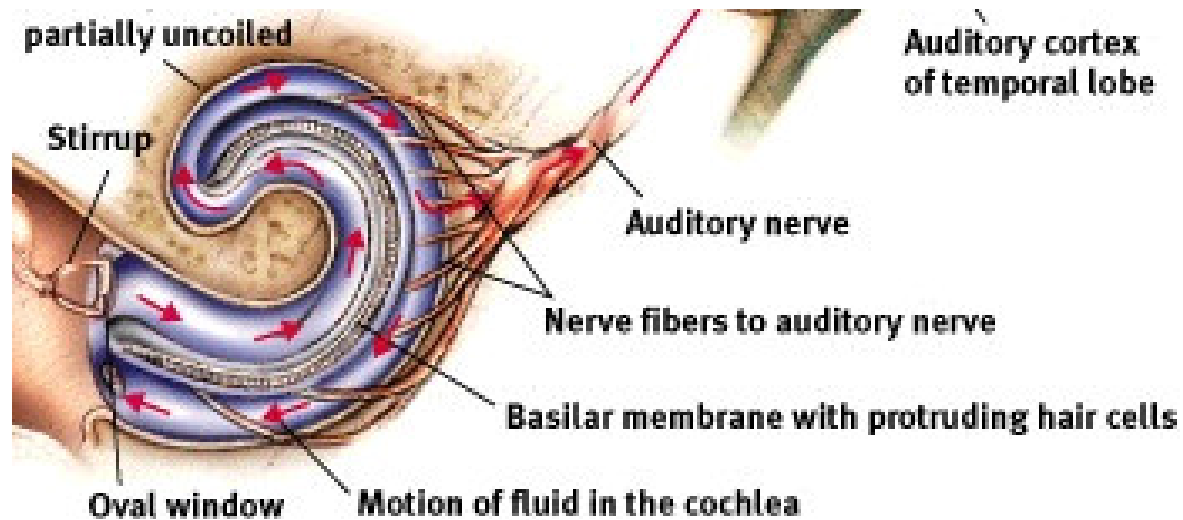
# Place v. Frequency theory of hearing

- Place Theory
  - the theory that links the pitch we hear with the place where the cochlea's membrane is stimulated; higher frequency sounds trigger vibrations near the basilar membrane
- Frequency Theory
  - the theory that the rate of nerve impulses traveling up the auditory nerve matches the frequency of a tone, thus enabling us to sense its pitch
  - Frequency theory is better than place at explaining the lowest pitches

# Volley principle

- This theory explains how we can hear very high pitch sounds
- Neural cells alternate firing in rapid succession allowing us to hear high pitch

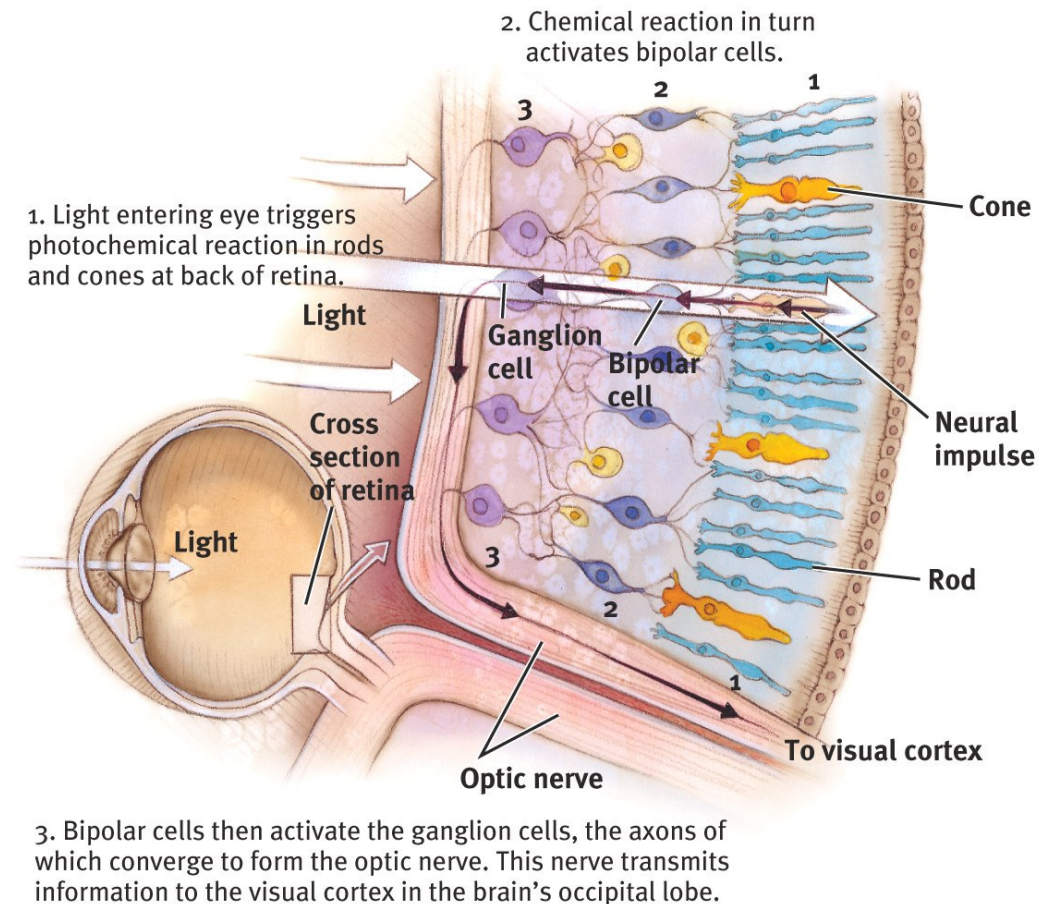
Basilar membrane: important component of audition necessary for transducing sound waves into neural energy for hearing sound.



# Bipolar cells

The retina contains receptor rods and cones in addition to layers of other neurons bipolar and ganglion cells that process visual information.

Axons of ganglion cells converge to form the optic nerve

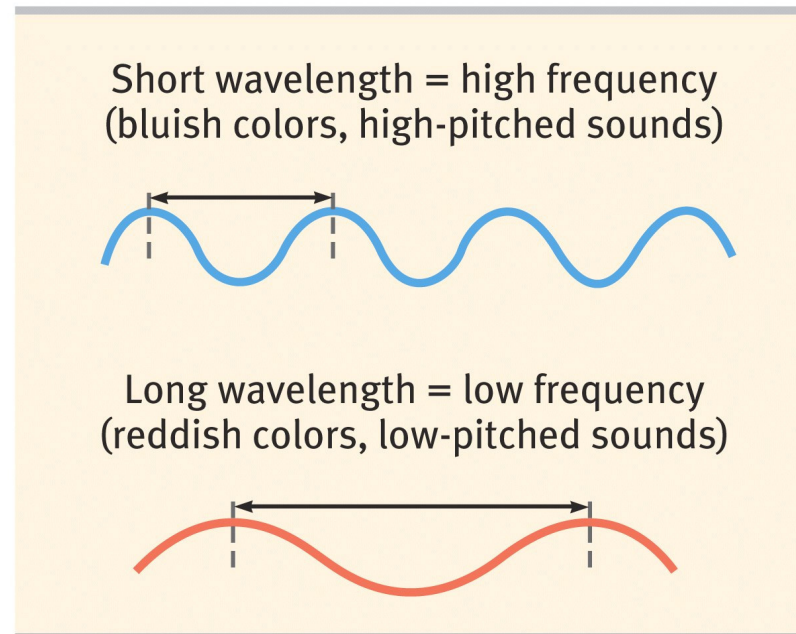


# See previous slide for...

- The order of how visual information is processed:
  - 1. Rods and cones
  - 2. Bipolar cells
  - 3. Ganglion cells

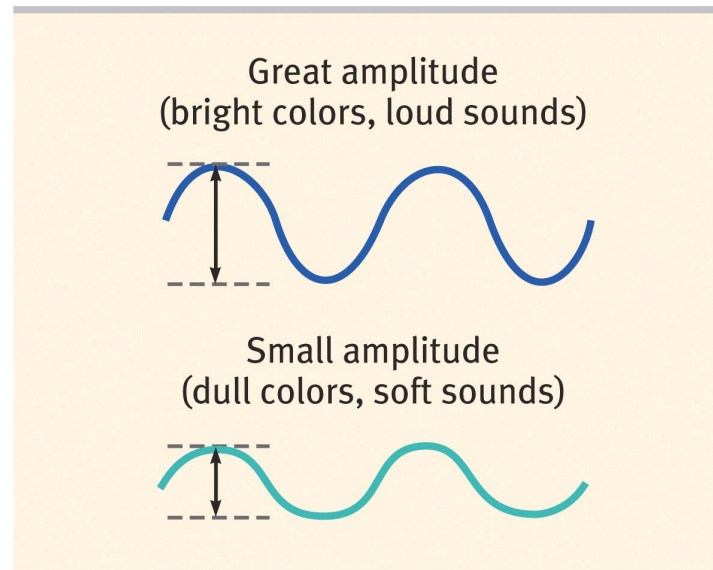
# Frequency (Pitch)

Frequency (pitch): The dimension of frequency determined by the wavelength of sound.



# Amplitude (Loudness)

**Amplitude (Loudness):**  
Amount of energy in a wave, determined by the amplitude, relates to the perceived loudness.



# Subtraction of Colors

If three primary colors (pigments) are mixed, subtraction of all wavelengths occurs and the color black is the result.

# Addition of Colors

If three primary colors (lights) are mixed, the wavelengths are added and the color white is the result.

# Wavelength (Hue)

Hue (color) is the dimension of color determined by the wavelength of the light.

# Intensity (Brightness)

**Intensity** Amount of energy in a wave determined by the amplitude. It is related to perceived brightness.

## Ch. 5 Test essay (Thursday)

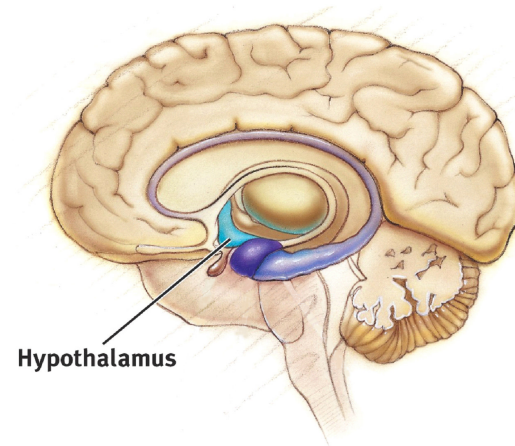
- Write this down.
- A friend believes that the five human senses--- seeing, hearing, tasting, smelling, and feeling---are distinct and independent.
- Explain what is wrong with your friend's belief.
- See page 230-231 for the answer.
- I will be looking for your definition of *sensory interaction* and your explanation of an example of how it works.

# Which recognizes self identity?

- A. amygdala
- B. cerebellum
- C. Sympathetic nervous system
- D. hypothalamus
- E. cerebral cortex

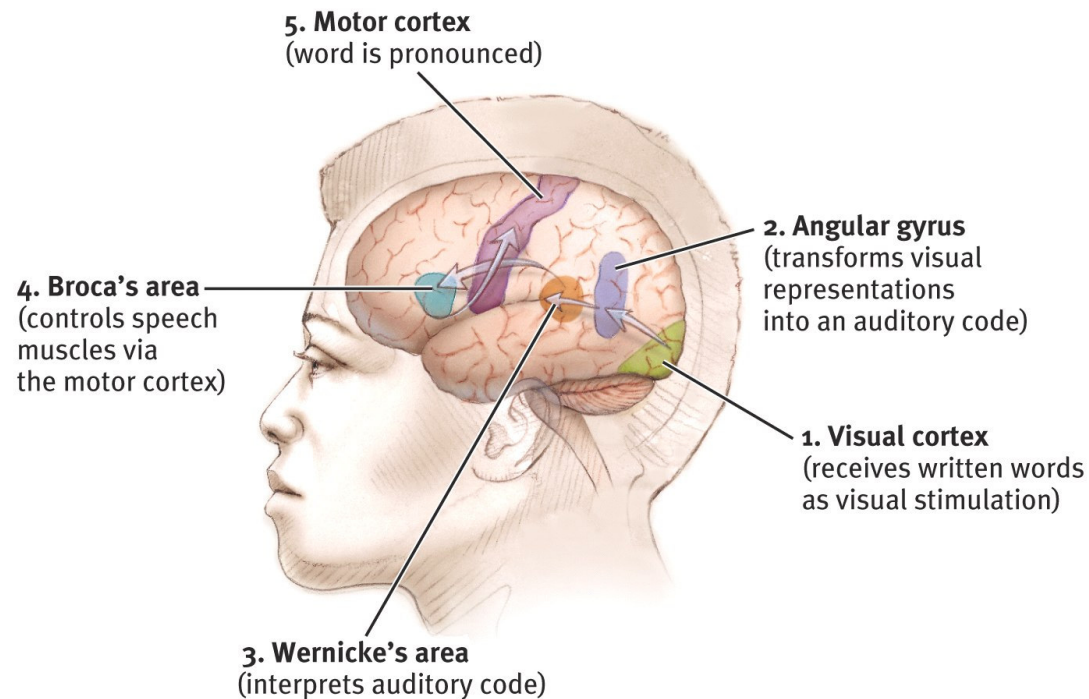
# Hypothalamus: the reward center

The **Hypothalamus** lies below (*hypo*) the thalamus. It directs several maintenance activities like eating, drinking, body temperature, and control of emotions. It helps govern the endocrine system via the pituitary gland.



# Language and the left hemisphere

Broca's area (speaking); Wernicke's area (understanding).



# The thalamus

the brain's sensory switchboard, located on top of the brainstem. It directs messages to the sensory areas (visual, auditory, etc) in the cortex and transmits replies to the cerebellum and medulla.

