

UNIT 4: VISION NOTES

A) The visual system works on sensing and perceiving light waves. Light waves vary in their length and amplitude:

- a) wave length (also referred to as frequency, since the longer a wave, the less often/quickly it occurs) - affects color perception (ex., red=approx 700, yellow approx 600)
- b) wave amplitude (this is the size/height of the wave) affects brightness perception.

B) Structure of The EYE:

- 1) **Cornea** - the round, transparent area that allows light to pass into the eye.
- 2) **Lens** - the transparent structure that focuses light onto the retina.
- 3) **Retina** - inner membrane of the eye that receives information about light using rods and cones. The functioning of the retina is similar to the spinal cord - both act as a highway for information to travel on.
- 4) **Pupil** - opening at the center of the iris which controls the amount of light entering the eye. Dilates and Constricts.
- 5) **Rods & Cones** - many more rods (approximately 120 million) than cones (approx 6.4 million)
*** cones - visual receptor cells that are important in daylight vision and color vision.

The cones work well in daylight, but not in dim lighting. This is why it is more difficult to see colors in low light.

Most are located in the center of the retina...called the FOVEA, which is a tiny spot in the center of the retina that contains ONLY cones...visual acuity is best here.

SO...when you need to focus on something you attempt to bring the image into the fovea.

6) **Rods** - visual receptor cells that are important for night vision and peripheral vision.

- the rods are better for night vision because they are much more sensitive than cones.

- in addition, the rods are better for peripheral vision because there are many more on the periphery of the retina. The cones are mostly in and around the fovea but decrease as you go out.

- to see best at night, look just above or below the object...this keeps the image on the rods.

C) Seeing In Color - we can see many colors, but only have 3 types of cones that receive information about color. We have cones that pick up light waves for red, green, and blue.

Color Vision Theories:

1) **Trichromatic Theory** - this theory indicates that we can receive 3 types of colors (red, green, and blue) and that the cones vary the ratio of neural activity (Like a projection T.V.). The ratio of each each color to the other then determines the exact color that we see.

2) **Opponent-Process Theory** - color perception depends on the reception of pairs of antagonist colors. Each receptor can only work with one color at a time so the opponent color in the pair is blocked out. Pairs = red-green, blue-yellow, black- white (light-dark).

DOES COLOR EXIST? People just assume that because we see colors, that they actually exist in the world. In other words, that when they see the color red, that red is a real, physical, tangible, "thing". But is it, or is color just a matter of our perception? If we had different types of nervous systems, we would see things differently (literally) and so wouldn't we think those other things we saw were the real "things"?