



## Chapter 5 – Sensation and Perception

- I. Definitions
  - a. Sensation = Early stage of perception – initial nerve impulses.
    - i. Sensory neurons (afferent)
    - ii. E.g.: Rods and cones in eyes.
  - b. Perception = Making meaning of sensory patterns (Relies on many cognitive processes – memory, expectation, etc)
  - c. Receptors = Pick up sensations
  - d. Transduction = Process to convert physical energy into neural activity.
    - i. Mechanical energy = Touch, waves, etc
    - ii. Chemical energy = Smell & Taste
    - iii. Light Energy = Electromagnetic
  - e. Empiricism = Knowledge gained through observation. No real 'observation' can occur except through perception. *Id est*, that which we perceive often doesn't exist in the physical world. Color is merely perceived.
- II. What we Perceive
  - a. Threshold = Biological Limitations
    - i. Absolute = Minimal amount of physical stimulus detectable
      1. One candle @ 30? 17? Miles
      2. One drop of perfume in a three-room house.
      3. One watch ticking from twenty feet.
      4. Bee's wing falling to cheek from one centimeter.
    - ii. Difference = Minimal noticeable change.
      1. EG: What if one candle is added? Will it still appear as only one?
      2. Weber's Law:  $\Delta I = kI$  where  $I$  is the intensity of a stimulus, and  $k$  is a 'constant.'
    - iii. Attention
      1. Focusing mental processing / resources on certain portions of stimuli
      2. You must be looking in the right direction, and focusing mentally on the correct area of your vision to notice something.
    - iv. Sensory adaptation >> Perception changes with durations of exposure
  - b. Psychophysics = Relationship between external world and its perception
- III. Signal Detection Theory
  - a. Detection depends on stimulus and background.
  - b. Probability of Detection increases as a function of Probability of Stimulus where  $f(x) = x$
  - c. Detection
    - i. Correct Response = Hit [Stimulus Identified when Present]
    - ii. False Alarm [Stimulus Identified when Absent]
    - iii. Correct Rejection [Stimulus Missed when Absent]
    - iv. Miss [Stimulus Missed when Present]
- IV. Visual System
  - a. Perceiving small fraction of electromagnetic spectrum
  - b. Visible light = 400 > 750 nanometers
  - c. <Refer to figure 5.2 on page 171>
  - d. Color (hue) determined by wavelength
  - e. Cone types
    - i. 435, 540, 565 / Blue, Green, Yellow-Green
    - ii. Wavelengths are not identified exclusively. Each receptor is sensitive to a full range of wavelengths, identified on a graph in the form  $1/X^2$
  - f. Brain processes color, form, position, and depth
  - g. Opponent process theory of color vision: Certain wavelengths inhibit perception of certain others. Sensors 'wear out,' and the brain assumes those wavelengths are absent.
  - h. Brightness = Intensity (amplitude of wave)

- i. Stroop Test >> <http://www.utoledo.edu/~ddwyer/mgmt4780/stroop.htm>
- V. Auditory System
  - a. Perceiving frequency as pitch (20 hz > 20khz)
  - b. Perceiving amplitude as volume.