

PSYCH CHAPTER 6

Sensation and Perception

Sensing the World: Some Basic Principles

- **Sensation**- the experience of having your sense organs stimulated
- **Perception**- interpreting the sensations that are experienced, to recognize meaningful objects and events
- **Prosopagnosia**- inability to perceive faces even though vision is fine
- **Bottom-up processing**- analysis beginning with sensory receptors and works up to brain's integration of sensory info
- **Top-down processing**- info processing guided by higher-level mental processes (experience, expectations)
- Thresholds
 - **Psychophysics** – study of relationship between physical characteristics of stimuli (e.g. intensity) and our psychological experiences of them
 - **Absolute threshold** – minimum stimulation needed to detect particular stimulus 50% of the time
 - **Signal detection**
 - Signal vs. background noise
 - Experience, expectation, motivation, fatigue
 - Subliminal stimulation
 - **Subliminal** – below threshold or conscious awareness
 - **Priming** – activation, often unconscious of certain associations, predisposing one's perception, memory, or response
 - **Difference thresholds (aka just noticeable difference or jnd)** – minimum difference a person can detect between 2 stimuli half the time
 - **Weber's Law** – to be detectable the stimuli must vary by constant *proportion* – not constant amount
- **Sensory adaptation**- diminishing sensitivity to an unchanging stimulus

VISION

- Stimulus Input: Light Energy
 - **Transduction** – transforming one form of energy to another
- Visual Information Processing
 - **Feature detectors** – nerve cells that respond to specific features of the stimulus (e.g. shape, angle, movement)
 - **Supercell clusters** – receive info from feature detectors & respond to more complex patterns
 - **Parallel processing** – processing many aspects of a problem simultaneously (vs. serial processing)
- Color Vision
 - The wavelengths of the light waves that an object *reflects* determine the color that we see

- o **Young-Helmholtz trichromatic theory**- retina contains 3 different color receptors (red, green, blue)
- o **Opponent-process theory**- opposing retinal processes allow for color vision
 - Red-green
 - Yellow-blue
 - White-black

HEARING

- **Audition**- sense of hearing
- Sound Waves
 - o Amplitude → loudness
 - o Frequency → pitch
 - Short waves → high pitch (piccolo)
 - Long waves → low pitch (tuba)
- Perceiving loudness
 - o Number of activated hair cells
 - Fewer hair cells activated = softer sound
 - Tall sound waves activate a lot of hair cells
- Perceiving pitch
 - o **Place theory** – different sound waves trigger activity at different places along basilar membrane
 - Where the wave hits the basilar membrane that matters
 - Place theory does fine in explaining how we perceive high pitch sounds, but poor job in explaining how we perceive low pitch sounds
 - o **Frequency theory** – frequency of neural impulses traveling up auditory nerve is monitored
 - More rapidly the nerves fire, the higher the pitch
 - Can't explain how we perceive higher pitch sound because neurons have refractory period
 - o **Volley principle** – neural cells alternate firing so combined frequency is that required
 - Sum the combined firing rates = pitch
- Locating sounds
 - o Humans localize sound using the intensity of the sound
 - o Ear that is on the side of the sound gets a more intensive sound
 - Happening at unconscious level – brain is processing intensity of the sound
 - o Timing – sound will reach ear closer to it sooner and at greater intensity
- Hearing Loss & the Deaf Culture
 - o **Conduction hearing loss** – caused by damage to the structures in the ear that conduct sound waves to the cochlea (middle ear structures)

- o **Sensorineural hearing loss** – caused by damage to hair cell receptors or associated nerves (aging, exposure to loud sounds)
- o **Cochlear implant** – converts sound to electrical signals which then stimulate auditory nerve through electrodes threaded into the cochlea
 - Can only help individuals who have conduction hearing loss

Perceptual Organization

- **Gestalt** – an organized whole
 - o A school of thought emphasizing that the whole is different than the sum of its parts
- Form perception
 - o **Figure-ground** – organization of visual field into its objects (figures) and surroundings (ground)
 - Figure is what we want to attend to, surroundings is the background
 - Constantly shifting what is figure and what is background
 - o **Grouping** – tendency to organize stimuli into coherent groups
 - Proximity – things that are near each other in space tend to get grouped together/perceived as part of the same perceptual unit
 - Similarity – things that look alike get grouped together
 - Continuity – things get grouped together
 - Connectedness – things that are physically connected are perceived as being part of the same group
 - Closure – we automatically impose structure on things
- Depth perception – ability to perceive the world in 3D even though the images that fall on the retina are in 2D
 - o Retina is like a movie-screen, but you see depth in the world around you
 - o You start to perceive depth around the time you become mobile
 - o **Visual cliff experiment** – put baby on patterned piece of cloth and then there is a piece of glass over edge of a cliff with more pattern
 - If they do not have depth perception, they will go off the “cliff”
 - o **Binocular cues** – depth cues that result from the use of both eyes
 - **Retinal disparity** – compare image from retinas of both eyes. Greater disparity means object is closer
 - **Binocular convergence** – information about how much eyes must rotate inward to look at an object. More rotation means object is closer
 - **Monocular cues** – depth cues that are available to each eye separately
 - Relative motion – objects in front of the fixation point will appear as if they are moving backwards
 - Relative size & linear perspective