BRYSON'S AP PSYCH – SENSATION AND PERCEPTION

SENSATION AND PERCEPTION OUTLINE NOTES

1. Transduction
    1. Sensory messages are transformed into neural impulses
        1. then sent to the thalamus, which sends them to other parts of the brain
        2. exception: smell
2. Sensory Adaptation
    1. Decreasing responsiveness to stimuli due to constant stimulation
3. Sensory Habituation
    1. Our perception of sensations is partially due to how focused we are on them
4. Cocktail-Party Phenomenon
    1. Someone across the room says your name
    2. Your attention involuntarily switches to them
5.
6. Sensation and Perception
    1. Sensation
        1. the activation of our senses
    2. Perception
        1. the process of understanding these sensations

2. Energy Senses
    1. Vision
        1. Step one: gathering light
            1. light is reflected off of objects and gathered by the eye
            2. the color we perceive depends on:

        1. intensity- how much energy the light contains. determines brightness
        2. wavelength- determines hue
2. Step two: within the eye
    1. cornea
        1. light first enters the eye through it
        2. helps to focus the light
        3. a protective covering
    2. pupil
        1. light goes through it after the cornea
    3. iris
        1. determines how much light gets in the eye by controlling the size of the pupil
    4. lens
        1. through accommodation, light that enters the pupil is focused by it
        2. curved and flexible
        3. as light passes through it, the image is flipped upside down and inverted
    5. retina
        1. the focused inverted image projects on it
3. Step three: transduction
    1. occurs when light activates neurons in the retina
    2. cones and rods
        1. the first layer of cells in the retina
        2. directly activated by light

3. cones- activated by color, clustered around the fovea
4. rods- peripheral vision, respond to black and white, outnumber cones

3. bipolar and ganglion cells
    1. when enough cones and rods fire, they activate the next layer of bipolar cells
    2. if enough bipolar cells fire, the next layer of ganglion cells is activated
4. ganglion cells
    1. the axons of it form the optic nerve that sends impulses to the LGN
5. lateral geniculate nucleus (LGN)
    1. in the thalamus
    2. sends messages to the visual cortex
6. blind spot
    1. where the optic nerve leaves the retina
    2. has no cones or rods
7. optic nerve
    1. impulses from the left side of each retina go to the left hemisphere of the brain, right right
    2. optic chiasm- spot where the nerves cross each other

4. Step four: in the brain
    1. feature detectors
        1. impulses travel from the retina to the visual cortex to them
        2. Hubel and Weisel
        3. vertical lines, curves, motion, etc.
        4. visual perception is a combination of all features

2. Theories of Color Vision
    1. Trichromatic theory
        1. we have three types of cones:
            1. detect blue, red, or green
            2. these are activated in combinations to produce other colors
        2. can't explain afterimages or color blindness
    2. Opponent-process theory
        1. the sensory receptors arranged in the retina come in pairs
            1. red/green, blue/yellow, black/white
        2. when one sensor is stimulated, the other is inhibited from firing
3. Hearing
    1. Sound waves
        1. created by vibrations which travel through the air
        2. collected by our ears
        3. transduction → neural impulses
        4. amplitude
            1. height. determines loudness in decibels
        5. frequency
            1. length
            2. determines pitch (megahertz)
    2. Process
        1. sound waves are collected in the pinna (outer ear)
        2. waves travel down ear/auditory canal
        3. they reach the eardrum (tympanic membrane)
            1. a thin membrane that vibrates as sound waves hit it

        2. connects with the hammer (malleus) which is connected to the anvil (incus) which connects to the stirrup (stapes) → these 3 small bones = ossicles
    4. the ossicles transmit the vibrations to the oval window
        1. attached to cochlea, which is shaped like a snail's shell and filled with fluid
    5. as the oval window vibrates, the fluid moves
    6. hair cells on the basilar membrane (floor of cochlea) move
        1. the hair cells are connected to the organ of corti (neurons activated by movement of hair cells)
    7. transduction occurs
        1. organ of corti fires
        2. auditory nerve sends these impulses to the brain
4. Pitch Theories
    1. Place theory
        1. hair cells in the cochlea respond to different frequencies of sound based on where they are located
        2. some bend to high pitches, others to low
        3. better explains how we sense higher pitches
    2. Frequency theory
        1. the hair cells fire at different rates
        2. explains lower tones
5. Deafness
    1. Conduction deafness
        1. problem with the system of conducting the sound to the cochlea
        2. in ear canal, eardrum, ossicles, or oval window
    2. Sensorineural (nerve) deafness

1. hair cells in the cochlea are damaged
2. often results from loud noise
3. hair cells can't regenerate

6. Touch
    1. Some nerve endings respond to temperature, others to pressure
    2. Our brain interprets the amount of indentation (temperature change) as intensity of touch
    3. Nerve endings are very concentrated in the fingertips
    4. Pain receptors will fire when other receptors are stimulated sharply
    5. Pain warns us of danger
    6. Gate-control theory
        1. some pain messages have a higher priority
            1. gate is open to it, and shut to lower priority messages
        2. endorphins
            1. swing the gate shut
            2. natural endorphins control pain

3. Chemical Senses
    1. Taste (Gustation)
        1. Chemicals from food are absorbed by taste buds
            1. located on papillae
            2. tastes: sweet, salty, sour, bitter
                1. some taste buds respond more intensely to one
            3. the more densely packed the taste buds, the more chemical absorbed → intense taste
    2. Smell (Olfaction)
        1. Process

1. molecules of substances rise into the air
2. molecules are drawn into the nose
3. they settle into a mucous membrane
4. absorbed by receptor cells

2. Olfactory bulb
    1. receptor cells linked to it
    2. gathers messages from the olfactory receptor cells
        1. sends this information to the brain
    3. nerve fibers from it connect to the brain at the amygdale and hippocampus
        1. may explain why smell triggers memories

4. Body Position Senses
    1. Vestibular Sense
        1. Tells us about how our body is oriented in space
        2. Process:
            1. three semicircular canals
                1. tubes are partially filled with fluid
                2. give brain feedback about body orientation
            2. body position changes
            3. fluids in canals move
            4. sensors in canals move
            5. movement of hair cells
            6. neurons activated
                1. impulses go to brain
    2. Kinesthetic Sense

1. Gives us feedback about the position and orientation of specific body parts

5. Perception
    1. Psychophysics
        1. The study of the interaction between the sensations we receive and our experience of them
    2. Thresholds
        1. Absolute threshold
            1. the minimum amount of stimulus we can detect 50% of the time
            2. subliminal- below the absolute threshold
        2. Difference threshold (just noticeable difference)
            1. smallest amount of change needed in a stimulus before we detect a change
            2. computed by Weber's Law
                1. psychophysicist Ernest Weber
                2. the change needed is proportional to the intensity of the original stimulus
                3. hearing- 5%
                4. vision- 8%
6. Perceptual Theories
    1. Signal Detection Theory
        1. Investigates the effects of the distractions and interference we experience while perceiving the world
        2. Tries to predict what we'll perceive among competing stimuli
        3. Takes into account response criteria:
            1. motivations and expectations
            2. also called receiver operating characteristics

4. False positive
    1. we think we perceive a stimulus that isn't there
5. False negative
    1. not perceiving a stimulus that is present

2. Top-Down Processing
    1. We perceive by filling in gaps in what we sense with background knowledge
    2. Schemata
        1. created by experience
        2. mental representations of how we expect the world to be
        3. influence how we perceive the world
        4. can create a perceptual set
            1. a predisposition to perceive something in a certain way
    3. Backmasking
        1. supposed hidden messages musicians played backwards in their music
3. Bottom-Up Processing (Feature Analysis)
    1. Perception starts at the bottom with the individual characteristics of the image
    2. Puts characteristics together into our final perception
    3. More accurate than top-down processing

7. Principles of Visual Perception
    1. Figure-Ground Relationship
        1. Figure- objects
        2. Ground- surrounding background
    2. Gestalt Rules

1. We normally perceive objects as groups, not isolated elements
2. Factors that influence how we group objects:
    1. proximity
        1. objects close together → perceived as belonging to the same group
    2. similarity
        1. objects are similar in appearance → perceived as part of the same group
    3. continuity
        1. objects that form a continuous form are grouped together
    4. closure
        1. objects that make up a recognizable image are grouped, even if the mind needs to fill in gaps
        2. similar to top-down processing

3. Constancy
    1. Constancy
        1. our ability to maintain a constant perception of an object even as sensation from it changes
    2. Size constancy
        1. we keep a constant size in mind for an object if we're familiar with it
            1. we know it doesn't grow or shrink as distance changes
    3. Shape constancy
        1. we know the shape of an object remains constant, even as retinal images change
    4. Brightness constancy

1. we perceive objects as being a constant color even as the light reflected from them changes

4. Perceived Motion
    1. Our brains can perceive objects at rest to be moving
        1. stroboscopic effect
            1. images in a series of still pictures presented at a certain speed seem to move (flip books)
        2. phi phenomenon
            1. a series of light bulbs turned on and off at a particular rate appear to be one moving light
        3. autokinetic effect
            1. spot of light is projected on a wall in a dark room
            2. it appears to move if you stare at it
5. Depth Cues
    1. Visual cliff experiment
        1. Eleanor Gibson
        2. an infant that can crawl won't cross the cliff
        3. infants have depth perception
    2. Monocular cues
        1. depth cues that need only one eye
        2. linear perspective
            1. parallel lines converge with distance
        3. relative size cue
            1. larger objects appear closer
        4. interposition cue
            1. objects that block the view to other objects must be closer

5. texture gradient
    1. we can see more details in the texture of objects that are closer
6. shadowing
    1. implies where the light source is

3. Binocular cues
    1. depth cues that need both eyes
    2. binocular (retinal) disparity
        1. the closer the object, the more disparity there will be between the images from each eye
    3. convergence
        1. the more the eyes converge, the closer the object must be

8. The Effects of Culture on Perception
    1. Principle
        1. Some basic perceptual sets are learned from culture
    2. Muller-Lyer Illusion
        1. an optical illusion consisting of a stylized arrow. When viewers are asked to place a mark on the figure at the midpoint, they invariably place it more towards the "tail" end.