

SENSATION AND PERCEPTION

Psychology 101

Sensation

- The process of receiving stimuli energies from the external environment and transforming these energies into neural energy
- Receiving messages from the world around you and creating brain signals
 - Sight
 - Hearing
 - Touch
 - Taste
 - Smell

Perception

- Process of organizing and interpreting sensory information so that it makes sense
- Process through which the brain gives meaning to sensation
- Sensation and perception are a unified processing system

Bottom-up and Top-down Processing

- Bottom-up: Taking in information and trying to make sense of it
- Top-down: Cognitive processing (thinking, remembering) begins with a sense of what is happening and applies that framework to information from the world

Sensory receptors

- Specialized cells that pick up information from the environment and transmit it to sensory (afferent) nerves via electrical signals
- Electrical currents “graded”
- Action potential generated
- Greater stimulation (e.g., a brighter light) requires more frequency of action potentials
- Different sensory receptors follow different pathways to the brain, but all pass through the thalamus

Sensory Receptors

- Vision: Photoreception detection of light, perceived as sight
- Hearing: Mechanical perception of vibration, perceived as hearing
- Touch: Mechanical perception of pressure, perceived as touch
- Smell: Chemoreception of chemical stimuli, perceived as smell
- Taste: Chemoreception of chemical stimuli, perceived as taste

Synesthesia

- Experiencing one sense as another
 - Hearing colors
 - Seeing sounds
 - Tasting sounds
- Rare

ESP

Thresholds

- Absolute
- Difference
- “Noise”
- Subliminal perception

Perceiving Sensory Stimuli

- Attention
 - Selective perception (“party effect”)
 - Shifting attention
 - More likely to be focused on something that is large, colorful and moving
 - Inattention blindness
- Culture, attention and perception
- Perceptual set
- Sensory adaptation

Visual Processing: Light

- Light occurs in *wavelengths*
- Some wavelengths are beyond our capability to see (X-rays, shorter ultraviolet)
- Amplitude (height): Determines the brightness of the stimulus

Visual Processing: Light

- Hue: The wavelength of a visual stimulus determines its hue or color
 - Violet - shortest wavelength
 - Indigo
 - Blue.
 - Green
 - Yellow.
 - Orange.
 - Red
- Purity: Are the wavelengths the same or a mixture?
 - Purity determines saturation or richness

Structure of the eyes

- Visible:
 - Sclera
 - Iris
 - Pupil
- Not visible:
 - Cornea
 - Lens
 - Bend light so it focuses on the back of the eye

Structure of the eyes

- Not visible:
 - Retina: The eyes “film” with 126 million receptor cells
 - Rods (Sensitive to light, but not color)
 - Cones: Sensitive to color, but only in light
 - Fovea: Middle of the retina where vision is best/(Cones only)
 - Optic nerve
 - Optic chiasm

Visual Processing

- Visual cortex
- Feature detectors
- Parallel processing
- Binding
- Color vision
- Shape
- Depth perception
- Motion perception
- Perceptual constancy

Visual Processing

- Feature detectors
 - Neurons that respond to specific shapes, sizes, angles, movement
- Parallel processing
 - Allows processing of shapes, sizes, movement and color at the same time
- Binding
 - Brings together and integrates what is processed by different brain pathways

Visual Processing

- Color vision
 - Trichromatic theory
 - Cones respond to red, blue and green
 - Opponent process theory
 - Cones sensitive to two complementary color sets
 - Red-green
 - Blue-yellow
- Shape
 - Figure-ground relationship

Visual Processing

- Depth perception; The ability to see things in three dimensions
 - Height
 - Width
 - Depth
 - Dependent on monocular and binocular cues
 - Binocular: Depends on how the two eye differ in seeing an object. Used to determine depth
 - Convergence

Visual Processing

- Depth perception
 - Monocular cues (using just one eye)
 - Familiar size
 - Height in the field of vision
 - Linear perspective and relative size (Objects that are further away take up less space on the retina)
 - Overlap (Objects that overlap or partially conceal another object are seen as closer)
 - Shading
 - Texture gradient

Visual Processing

- Motion perception
 - Retinas cannot detect motion
 - Brain recognizes motion through specialized sensors
 - Neurons that detect motion
 - Feedback from our body tells us if we are moving or if some other object is moving
 - The environment give us cues
- Apparent movement

Visual Processing

- Perceptual constancy
 - Understanding that objects do not change just because we are closer to further away, or there is more or less light.
 - Size constancy: Object remain the same size even if the retina sees them as different
 - Shape constancy: Objects stay the same shape even as we move around them
 - Color constancy: Objects remain the same color even if light seems to change them