



AP Psychology Unit 4 Study Guide

Sensation

Sensation is the detection and encoding of stimulus energies by the nervous system. It comes from the body and goes to the brain. **Transduction**, on the other hand, is the process where the **body converts energy into neural activity.**

The Eyes (Visual): Light enters the eye through the **pupil**, which is controlled by the iris. The **iris determines how much light enters the eye by changing the size of the pupil.** Once it enters the pupil, the **lens focuses light waves to the retina** which consists of photoreceptors - rods and cones. The **rods are for night vision and black/white** vision while the **cones are used to see color.** The cones are located in the fovea and rods are located in the periphery of our fovea (*hence why cats and dogs have better night vision than us, their rods are located in the central fovea*). The **optic nerve is made of the axons of ganglion cells**, which transmit **visual information to the brain for processing** (lets you see). However, **where the optic nerve leaves the eye, there's a blind spot.** *Visual domination or capture is the phenomenon where visual sensory information dominates the others. The brain reverses the upside-down image of the retina to see. In summary, it goes from rods and cones to bipolar cells to ganglion cells to the optic nerve.*

Young Helmholtz Theory (Trichromatic Theory): We receive waves of light, which we **convert into colors** (either red, green, or blue). So, the length of the wavelength gives off different hues. *Red is the longest wavelength while blue-violet is the shortest.* But, the **Opponent Processing Theory** opposes this one and talks about neurons in the optic nerve that are either excited or inhibited, creating color (also explains color afterimage).

The Ears (Auditory): Sound waves first enter through the outer ear's **pinna**, then go down the **auditory canal to the eardrum.** The **eardrum sends the sound waves to the bones (ossicles) in the middle ear** which amplify the sound waves as they enter the **cochlea in the inner ear.** The **cochlea is where transduction occurs**, where **hair cells (cilia) vibrate** which **causes a nerve impulse through the auditory nerve to go to the brain** (auditory cortex in the

temporal lobe). The brain allows you to hear the sound wave as something coherent. *The semicircular canals in the inner ear consist of liquid which helps us balance ourselves, which is part of our vestibular system.*

Frequency Theory: Explains how we sense **low-pitched** sounds

Place Theory: Explains how we sense **high-pitched** sounds

Volley Principle: Explain how we sense **mid-pitched** sounds

The Nose (Olfactory): Dendrites in the nose send signals to the olfactory bulb (where transduction takes place).

The Taste Buds (Gustatory): Taste buds in the papillae allow you to taste. However, smell + taste give flavor. Taste buds can regenerate.

Pain: There are pain receptors throughout the body. The **Gate Control Theory** explains how we experience pain (Gate Control Theory happens in the Spinal Cord). Fibers of the spinal cord are sending messages; if the inhibitory messages are greater, the pain control gate closes and there is no pain.

Somatic Senses and Sensory Impairments

Kinesthesia: The reason we know where all our body parts are, involves information from the muscles, tendons, and joints.

Prosopagnosia: The inability to recognize faces (the temporal lobe is damaged).

Anosmia: The inability to smell, so the taste is also affected.

Congenital Insensitivity to Pain (CIP): The inability to feel pain.

Synesthesia: Experience multiple sensations (numbers have colors, names have tastes).

Perception

Perception is the way the brain analyzes sensory information.

Perceptual Set: We tend to see things in a group.

Perceptual Expectancy: Predisposition to perceive things a certain way.

Absolute Threshold: The **minimum stimulation needed to sense a stimulus 50% of the time.**

Signal Detection Theory: Explains how we detect signals/false signals. A **hit conveys that the signal was detected**; a **miss conveys the signal was not detected**; a **false alarm conveys that there was no signal but something was detected**; and, a **correct rejection conveys that there was no signal and no detection.** This theory emphasizes personal experience, expectations, and motivations.

Helmholtz's Likelihood: Theory emphasizes that **personal experience, expectations, motivations, etc. influence the level of absolute thresholds.** *People who live in urban areas may not detect certain stimuli because they are used to loud sounds.*

Priming Effect: **Prexposed** to a certain **stimulus**, which **affects the response to another stimulus.**

Just Noticeable Difference: The **minimum difference a person can detect between 2 stimuli 50% of the time.** *Also called the difference threshold.*

Weber's Law: Detectable difference between two stimuli **isn't a constant amount but rather a proportion/percent difference in thresholds.**

Sensory Adaptation: **Not aware of a certain stimulus because it's always there.** *You do not realize the stimuli coming from you wearing clothes.*

Hubel and Wiesel: Talked about specialized **neurons called feature detectors** that **analyze angles, lines, curves, and movement.**

Bipolar Cells: A type of nerve cell that combines the impulses from many of the visual receptor cells in the retina (rods and cones) and then transmits those impulses to the ganglion cells.

Depth Perception - Binocular and Monocular Cues

Depth perception refers to the fact that we see objects in 3 dimensions. The **visual cliff** was a fake, illusory cliff that was used to see if babies had depth perception and knew not to

cross the cliff. The **babies normally refused to cross over the "deep" side** to their mothers, showing how depth perception is inborn (nature).

- **Binocular Cues: Requires both eyes**
 - **Retinal Disparity:** The two eyes see differently, so the **brain puts both images of both eyes together as one. The greater the disparity between the images from both eyes, the closer something is and vice versa.**
 - **3D Movies (Stereopsis):** When **two images are closely on top of each other**, it appears in 3D.
 - **Convergence:** As an object moves close, the eyes come closer together to focus. As the eye look at an object further away, the eyes move further apart to focus.
- **Monocular Cues: Requires only one eye**
 - **Relative Size:** **Smaller** objects tend to be **farther** away
 - **Interposition:** If **one object blocks** the other, the **“blocker” is closer**
 - **Aerial Clarity (Relative Clarity):** Atmospheric conditions affect perception; **clearer objects are closer**
 - **Texture Gradient:** If you can **see a lot of texture, the object is probably closer**
 - **Relative Height:** Objects in a **higher field of vision are farther away**
 - **Motion Parallax:** As we move, inanimate objects seem to do so as well; the **faster the object moves, the closer they are**
 - **Linear Perspective:** **Parallel lines** look like they **come together with distance**
 - **Light and Shadow:** **Closer objects usually reflect more light**

Motion Perception

If **objects appear as if they are shrinking, you are moving away from them.** On the other hand, enlarging objects appear as you move closer toward them. **Stroboscopic movement** is when **flashing pictures are perceived as movement** while the **phi phenomenon** is when **lights go on/off and there's an illusion of movement.**

Bottom Up vs. Top Down Processing

These two concepts are both related to perception, not sensation and are two different ways of making sense of stimuli. In **bottom-up processing**, we allow the stimulus itself to shape our perception, without any preconceived ideas. In **top-down processing**, we use our background knowledge and expectations to interpret what we see.

Top-down processing: When you look at clouds and see shapes resembling animals because your brain interprets the random patterns based on your past experiences and expectations.

Bottom-up processing: When you see a jigsaw puzzle piece with a curved edge and match it with another piece based solely on its physical shape, without considering the overall image.

Constancies and Illusions

Shape Constancy: We view shapes as constant even at different orientations

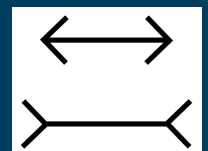
Color Constancy: The color of an object looks the same under different illuminations

Size Constancy: Size is the same even with distance

Ponzo Illusions: Lines of the same length look different because one is flanked between two lines (this proves Learning-based theorists).



Muller-Lyer Illusion: Lines of the same length with arrows that are either inward or outward-pointing appear as if the outward-pointing one is longer (this proves Learning-based theorists).



Moon Illusion: The Moon seems larger near the horizon than high in the sky.

Gestalt Principles

Proximity: Elements that are close to each other tend to be perceived as a unified group rather than individual elements.

Similarity: Elements that are similar to each other in shape, color, size, or orientation tend to be perceived as belonging together.

Closure: When there is a gap in an object, our brains tend to perceive it as a complete figure by mentally filling in the missing parts.

Continuity: When elements are arranged in a line or curve, we tend to perceive them as belonging together and forming a continuous pattern.

Symmetry: Objects that are symmetrical are perceived as more aesthetically pleasing and harmonious.

Figure-Ground: Our brains tend to organize visual information into a figure (the main object of focus) and a ground (the background or surroundings).

Common Fate: Elements that move in the same direction or share a common fate are perceived as belonging together.

More Info

Opponent processing cells are located in the thalamus

The olfactory cortex is located in the temporal lobe

Selective Attention: You only give attention to important things

Cocktail Party Effect: You concentrate on what you choose to give attention to (part of selective attention).

Inattentional/Perceptual Blindness: You do not see something in plain sight because attention is somewhere else

Change Blindness: You do not notice differences between things when you give little attention

Learning-Based Inference Theorists: Challenge Gestalt's belief that perception is nature. They believe that perception is equally influenced by our experiences and our environment (Nurture)

Divided Attention: The attempt to focus on **two stimuli at once** and therefore, make multiple responses, which result in an inference. *An example of this is the Stroop test.*

Perceptual Adaptation: When your perception can change due to current circumstances like after you wear drunk goggles for a long time, you will get used to it.