AP PSYCHOLOGY | UNIT 1

TOPIC 1.6

Sensation

Sensation begins when receptors detect physical energy and convert it into neural signals the brain can process.



detect -> transduce

physical energy becomes a neural signal

FROM THE WORLD TO THE NERVOUS SYSTEM

STIMULUS
physical energy

→

DETECTION
receptors respond

→

TRANSDUCTION
energy is converted

→

NEURAL SIGNAL
message travels

BY THE END, YOU SHOULD BE ABLE TO...

1. Explain transduction, thresholds, difference thresholds, and sensory adaptation.
2. Trace vision and hearing from stimulus energy to neural processing.
3. Compare chemical, touch, pain, balance, and body-movement senses.

BIG IDEA

Receptors do not copy the world. Each sensory system selects, converts, and sends information, and sensitivity changes with context.

1 Vision and hearing

Both systems transduce physical energy, but they use different receptor structures and coding rules.

VISION: LIGHT -> RETINA -> BRAIN

LIGHT wavelength → **LENS** accommodation → **RETINA** transduction → **BRAIN** visual processing

RODS low light, shape, movement

CONES fovea, color, detail

Blind spot: where the optic nerve exits; the brain fills the gap.

COLOR VISION

Trichromatic theory: three cone types.
Opponent-process theory: opposing color pairs.

VISUAL PROCESSING DISORDERS

Prosopagnosia: face blindness.
Blindsight: response without conscious vision.

HEARING: AIR WAVES -> COCHLEA -> BRAIN

PITCH frequency / wavelength

LOUDNESS amplitude

LOCALIZATION Differences between the ears help locate a sound source.

PLACE where the cochlea responds

FREQUENCY neural firing rate

VOLLEY groups alternate firing

Hearing loss: conduction = sound transmission; sensorineural = inner ear / auditory nerve.

2 Thresholds and the other senses

Sensitivity is limited and adjustable; chemical and body senses complete the sensory picture.

SENSORY LIMITS AND CHANGE

ABSOLUTE THRESHOLD

Minimum stimulation detected 50% of the time.

DIFFERENCE THRESHOLD

Smallest noticeable change; also called the JND.

SENSORY ADAPTATION

Reduced sensitivity during constant stimulation.

CHEMICAL SENSES

OLFACTION

Smell is the only sense that does not travel first through the thalamus. Pheromones are chemical messages.

Smell + taste interact

GUSTATION

Sweet, sour, salty, bitter, umami, and oleogustus. Receptor number helps explain supertasters, medium tasters, and nontasters.

TOUCH, PAIN, BALANCE, AND MOVEMENT

TOUCH + PAIN

Skin receptors send touch information. Hot sensations can involve both warm and cold receptors. Gate control theory explains how spinal and brain signals can influence pain.

Phantom limb sensation where a lost limb used to be

BODY POSITION

VESTIBULAR balance; semicircular canals

KINESTHESIS sense of body movement

They work together, but they are not the same sense.

REMEMBER Sensation detects and transduces energy. Perception organizes and interprets the resulting neural information.