

Idea #1 - Nature vs. Nurture

Heredity: Genetics, Predisposed Characteristics

Environmental Factors: Experience, Family Interactions, Education

Evolutionary Psychology: How the natural selection of traits has promoted the survival of genes.

Natural selection: The principle that, among the range of inherited trait variations, those contributing to reproduction and survival will most likely be passed on to succeeding generations.

Eugenics: A much-criticized nineteenth-century movement that proposed measuring human traits and using the results to encourage only smart and fit people to reproduce, (Nazi Germany 1933-1945).

Research: Family studies - nature, Twin studies - nurture, and Adoptions studies - nurture

Critique: Backwards explanation, Accountability for behavior, Societal & cultural influences

Idea #2 - The Nervous System

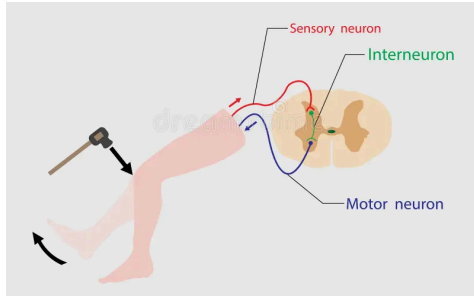
Central (CNS): Brain & spinal cord

Peripheral (PNS): All other nerves

- Somatic
 - Autonomic: Sympathetic - Fight or flight (speed up), Parasympathetic - Rest & Digest (slow down)
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Idea #3 - Neural Firing

Neural Cells: Neurons - Transmit information, Glial Cells - Structure, insulation, communication, waste transport.



Reflex Arc: Sensory Neurons - skin, Interneurons - spinal cord, Motor Neurons - muscle.

Threshold: Minimum intensity needed to fire a stimulus

Action Potential: neural impulse

Depolarization: Movement of a cell's membrane potential to a more positive value.

All-Or-None Principle: Neuron fires everything or nothing

Refractory Period: a neuron's inability to fire

Reuptake: Reabsorption

Neural Disruptions

Multiple Sclerosis (MS): Myelin Sheath is effected and so is vision and movement

Myasthenia Gravis: affects the Acetylcholine and muscles/speech

Neurotransmitters:

- Acetylcholine - skeletal and heart muscles, alertness, interneuron communication.
- Norepinephrine - Fight or flight; attention, and memory.
- Dopamine - movement, learning.
- Serotonin - Moods and emotional states; regulation of sleep-wake cycle
- Endorphins - Modulates the experience of pain or pleasure.
- Substance P - Modulation of pain.
- Glutamate - Learning and memory, sensory and motor functions.
- GABA - Most abundant inhibitory neurotransmitter; regulates daily sleep-wake cycles.

Neurotransmitters VS Hormones:

- Neurotransmitters - Internal, Nervous system, Quick-acting.
- Hormones - Internal, Endocrine system, Long-lasting.

Hormones:

- Adrenaline - Fight or Flight
- Melatonin - Sleep
- Leptin - Hunger
- Ghrelin - Hunger
- Oxytocin - Labor, Location, Love

Idea #1 - Psychoactive Drugs

Excitatory - Makes you excited so much it kills you

Inhibitory - Makes you sad and weak

Agonist - enhances the effects of a neurotransmitter

Antagonist - prevents the effects of a neurotransmitters (prevents signal from going out
Reuptake inhibitor - enhances the effects of a neurotransmitter (keeps signal from coming back)]

Stimulants - Caffeine and Cocaine (Increased neural activity)

Depressants - Alcohol (Decreased neural activity)

Hallucinogens - A lot of Caffeine and Cocaine (Distorts in perception and/or cognition)

Opioids - Heroin, Opium (Pain relievers)

Negative Outcomes of Drug Use

- Tolerance - Requiring larger doses
- Addiction - Disease involving physical and/or psychological dependence
- Withdrawal - Symptoms associated with stopping use

The Brain

- Brainstem - (Contains Medulla) and controls basic functions such as breathing and heart rate.
- Reticular Activating System - (Inside Brainstem) reticular activating system and brain's reward center, voluntary movement, eye movement, and some types of learning, cognition, and emotion
- Cerebellum - (back and base of brain), controls coordination of muscle movement, balance, and some forms of procedural learning
- Cerebral Cortex (2 hemispheres) contains limbic system (thalamus, hypothalamus, pituitary gland, hippocampus, amygdala), corpus callosum and the lobes of the cortex

The Limbic System

- Thalamus - information is received and and direction (all sensory information, except smell)
- Hypothalamus - (The bridge between the nervous and endocrine systems) Enables fight or flight, hunger, thirst, body temperature, and sexual cycle
- Pituitary Gland - (Controlled by hypothalamus) ("Master Gland") responsible for release of hormones that regulate the activity of other endocrine glands and body systems. It plays an important role in growth, development, and hunger regulation.
- Hippocampus - (Located in the inner region of the brain) Crucial for learning, memory, and converting short term to long term memories. Memories are not stored, but routed through here.
- Amygdala - Responsible for fear and aggression, can send signals to areas like the hypothalamus to trigger fight or flight
- Corpus Callosum - Band of neural fibers that connects the two hemispheres of the brain, allowing the 2 hemispheres to communicate and work together

The Lobes

- Temporal Lobes - Control auditory and linguistic processing and are located on the sides of the brain. The right temporal lobe helps recognize faces
- Occipital Lobes - (rear of brain) control visual information
- Parietal Lobes - (back crown of the brain) control association areas, which organize information and the somatosensory cortex, which processes touch sensitivity
- Somatosensory Cortex - (front of the parietal lobe) processes touch sensitivity (more sensitive areas have a bigger portion dedicated)
- Wernicke's Area - (Only on the left hemisphere) responsible for speech comprehension - Damage to this part of the brain can lead to Wernicke's aphasia, in which an individual would have difficulties with spoken language whether from others or themselves. They can speak clearly but not recognize that what they say does not make sense
- Frontal Lobes - (Located behind the forehead) generally control linguistic processing, higher order thinking, and executive functioning, especially in the prefrontal cortex
- Broca's Area - (Located within the frontal lobe) - responsible for speech reproduction. Damage of this part can lead to Broca's aphasia

1.4B Neuroplasticity & Tools of Discovery

- Biopsychology - A field of study that examines how our brains and biology affect our thoughts and behaviors. (Environmental influence on the brain across the lifespan)
- Plasticity - The brain's ability to change and adapt as a result of experience

Imaging Techniques

- EEG (Electrical Activity function sleep stages)
- fMRI (Oxygen consumption, Structure AND function, Levels of activity)

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- Lesioning - Disruption of or damage due to injury, disease, surgery, drugs, or stimulation

Contralateral Hemispheric Organization

- Left Hemisphere - Right side of body, speech production(Broca's), Language Comprehension(Wernicke's), Logic(interpreter)
- Right Hemisphere - Left side of body, recognizing faces, spatial reasoning(2D/3D), Emotions, Art/Music

1.5 SLEEP

LEVELS OF CONSCIOUSNESS (Awareness of ourselves and our environment)

- Consciousness
- Wakefulness
- Sleep

- Sleep/Wake Cycle - Circadian Rhythm (24.5-26 hours) - Can be disrupted by shift work or jet lag

Sleep Stages: NON-REM

- Stage 1 - Wakefulness to sleep
 - Light sleep or half asleep stage
 - Hypnic Jerk
 - The EEG pattern
 - Easy to awake

1.6A SENSATION

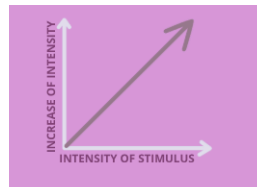
sensation: process by which we receive information from the environment

perception: interpretation of information from the environment so that we identify its meaning

TRANSDUCTION

the process of converting energy of a stimulus into neural activity. stimulus energy, sensory receptors, neural impulses, brain

- **Absolute threshold:** the minimum amount of energy needed to produce sensation more 50% of the time
- **Sensory adaptation:** when sensory receptor cells are constantly stimulated, they undergo a loss of sensitivity to stimuli.
- **Just noticeable difference:** the smallest difference between two stimuli that can be consistently and accurately detected 50% of the time.
- **Weber's Law:** the relationship between actual and perceived differences in stimulus intensity.



SENSORY SYSTEMS

- **Sensory interaction:** the process by which our five senses work with and influence each other.
- **Synesthesia:** when your brain routes sensory information through multiple unrelated senses, causing you to experience more than one sense simultaneously. (ex. bright light when hearing loud sounds)

1.6B THE EYE

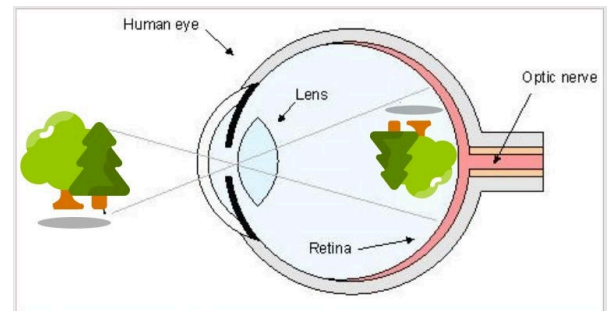
accommodation: focus onto retina by the lens



NEARSIGHTED & FARSIGHTEDNESS

Visual stimuli are focused onto the retina by the lens via a process called accommodation. When this process is altered, nearsightedness or farsightedness can result.

- **The Retina:** (TRANSDUCTION) hits back of retina (where transduction occurs), the rods/cones, bipolar cells, ganglion cells form optic nerve (blind spot)



PHOTORECEPTORS

- **Rods (shapes & movement):** interpret peripheral vision, shapes & movement, low light, light & dark adaptation
- **Cones (color):** Interprets Fovea (center of eye with most detail), Detail, and Color

How we see color

- Retinal cells that respond to particular wavelengths of light, allowing us to see color
- Most of our cones are located on the fovea, which gives us the sharpest resolution of visual stimuli
- 3 types of cones, each sensitive to different light frequencies
- **The blind spot:** area beyond peripheral vision where nothing is visible

COLOR VISION

explanations

- **trichromatic theory:** cones
- **opponent-process theory:** ganglion cells
 - ganglion cells -> bipolar cells -> rods -> cones

Young-Helmholtz trichromatic theory: color vision takes place within the cones.

Opponent-process theory: color vision takes place within the ganglion cells.

Cones & Wavelengths

- 3 types of cones, each interprets a different color/frequency
- red (Long), green (Medium), blue (Short)
- "other colors" are perceived via mixtures of multiple types of cones

OPONENT PROCESS THEORY

After Images: certain ganglion cells in the retina are activated while others are not

- ganglion cells involved in this opponent process are red/green, blue/ yellow/ and black/white.
- complementary colors can trigger after images

two-color processes, one for red versus green perception, and one for yellow versus blue perception

In the thalamus, some neurons are activated by red but off by green, for example, which helps explain afterimages.

COLOR VISION DEFICIENCY

Involves:

- damage or irregularities to one or more cones or galigon cells (red/green, blue/yellow)
- can lead to dichromatism(only 2-3 visual pigments) or monochromatism(no colors)

DISORDERS DUE TO THE BRAIN

prosopagnosia: face blindness, faces are never familiar because the temporal lobe, occipital cortex, and fusiform gyrus fail to connect

blindsight: response in spite of visual deficit (ex. You know where something is despite being blind)

1.6C THE AUDITORY SYSTEM

THE PHYSICAL PROPERTIES OF WAVES

Wavelength: refers to how fast the wave vibrates or the number of cycles per second, the distance between any 2 peaks on the wave

- Shorter wavelength -> higher pitch
- Long wavelength -> lower pitch

Amplitude: refers to the height of the wave from the center line. Dictates the loudness of the sound

- Higher amplitude -> louder sound
- Lower amplitude -> softer sound

THEORIES OF SOUND & PITCH PERCEPTION

Place Theory: We hear different pitches because different sound waves trigger activity at different places along the cochleas basilar membrane

Frequency Theory: We hear different pitches because different sound waves trigger neural impulses to the brain of the same rate as the sound wave. 100 waves/s -> 100 pulses/s in auditory nerve

Valley Theory: Neural cells work together, alternating when they fire. Rapid succession -> achieve combined frequency above 1000 waves/s

Sound Localization: Ability to identify the position and changes in position of sound sources based off of acoustic information

Hearing Loss: Due to age

- Conduction Deafness: Damage to mechanical system that transmits sound waves to the cochlea, most often in the bones
- Sensorineural Deafness: damage to the cochlea's hair cells or the auditory nerve, some sounds are soft or not at all.

1.6DEFG Chemical & Bodily Senses

Chemical Senses

Smell: Olfactory system, thalamus, Pheromones

Taste(Gustation): Uses smell, Sweet, Salty, Sour, Bitter, Umami, Oleogustus

Gustatory System: Brain, Mouth Tongue

- Higher density of taste receptors -> better taster
- Flavor = Combination of Smell and taste receptors

Phantom Limb: Ability to feel sensations or pain in limbs no longer present

Gate Control Theory: Non-painful sensory input can dampen or block painful sensations from reaching the brain

Kinesthetic Sense: Enables control and coordination over movements including walking, talking, facial expressions, gestures, and posture

Vestibular Sense: Enables the maintenance of balance in part controlled by the semicircular canals, which contain receptors that detect motions of the head