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PSYCH 10

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Table of Contents

Psychology Overview	2
History of Psychology	2
Schools of Thought	3
Research Methods	4
Biological Psychology	8
The Brain	9
The Cerebral Cortex	10
Neurons	12
Studying the Brain	15
Sensation & Perception	16
Perception	17
Sensation - Vision & Audition	22
Learning & Cognition	23
Learning - Classical & Operant Conditioning	24
Memory	27
Decision Making	30
Language & Thought	31
Developmental Psychology	34
Perceptual Development	34
Cognitive Development	36
Social Psychology	40
Social Cognition	40
Group Behavior	42
Clinical Psychology	47
Mental Disorders	54
Psychological Treatments	55
Other Topics	57
Personality	57

Psychology Overview

- **Psychology** - the scientific study of mind/behavior
- Modern psychology fields
 - *Basic* research (purely scientific/curiosity-driven):
 - Biological/physiological/neuroscience - brain, neurons, neurochemicals
 - Cognitive - thinking, memory, attention
 - Developmental - change over time/over development
 - Social psychology - how do people interact
 - *Applied* research (clear practical application)
 - Clinical - treatment of mental illnesses
 - Educational - educational techniques, diagnoses
 - Forensic - criminal and legal contexts
 - Industrial-organizational - analyzing the workplace

History of Psychology

- The Ancient Greeks philosophized about nature vs nurture
 - Theorized about the existence of *four humors* regulating health/personality
- The Renaissance era saw advances in physics (psychophysics), biology (evolution), medicine/physiology
- 19th century:
 - *Phrenology* attempted to localize [identify] areas of brain function
 - Dodgy methodology
 - Cases of traumatic brain injury (e.g. Phineas Gage) affecting behavior
 - Phineas Gage - frontal lobe injury eliminated sense of responsibility, ability to follow plans, emotional self-control [temporarily?]
 - 1879 - Structuralist Wilhelm Wundt founded the first proper experimental psychology laboratory
 - Studied reaction times based on mental effort/concentration on the task

Schools of Thought

- **Structuralists** tried to break conscious experience (e.g. perception, sensations) down into basic components
 - Thought of the mind as composed of distinct components, similar to how elements form compounds in chemistry
 - Relied on *introspection* (subjective observations of one's own experience)
 - Wilhelm Wundt, Edward Titchener
- **Functionalists** tried to determine the purpose/function of mental processes and behaviors
 - Were inspired by the theory of evolution
- **Behaviorists** studied only observable behavior, ignored mental processes
 - Conducted trials with animals (e.g. Skinner)
 - Viewed behavior as more objective/scientific
- **Cognitive psychologists** viewed the mind as an information processor in terms of mental processes (e.g. perception, problem-solving)
 - Broadening/diversifying of the field (Brenda Milner, Elizabeth Loftiss)
- **Psychoanalysts** attempted to explain behavior and personality as results of unconscious processes, childhood events (iceberg model)
 - Had deep ties to clinical psychology (treatment of mental illnesses)
 - Was a primarily European phenomenon (Sigmund Freud)
- **Cross-cultural psychologists** compare & contrast individual and group behavior across different cultures
 - Provides a less Western-centric perspective
 - E.g. Asian cultures placed large value on the family (the mother), American on independence from the family (the spouse)

Research Methods

- Psychology research is not always seen as proper science (studying the obvious)
 - Phrasing may misrepresent or dumb down psychological research
 - Pretesting different phrases as hand washing interventions (men wash upon seeing phrases of disgust, women on knowledge/reminders)
 - Hindsight bias - retroactive justifying of a fact
- The scientific method in psychology
 - Cognitive biases in psychology:
 - People are not the best assessors of their own mind
 - Scientific method helps reduce bias, test hypotheses systematically
 - Scientific method - theory [falsifiable, can be used to make hypotheses], hypothesis [experiment-specific testable prediction], research, return to theory/hypothesis, etc.
 - Create a testable hypothesis, select research method + study design, collect data, analyze and draw conclusions, reflect on the theory/hypothesis as needed based on new information
 - Means of testing hypotheses
 - **Correlational designs** measure the association between two variables (how changes in one affect the other, or how the value of one may predict the value of the other, or the general relationship)
 - Can measure the correlation between two variables (the predictor and the outcome)
 - Positive correlation - variables increase together, negative - one increases, the other decreases, no [0] correlation - do not affect each other (magnitude (from -1 to 1) measuring degree)
 - Operationalization - a description of a property (e.g. an abstract variable) in concrete, measurable terms
 - E.g. operationalize "Internet use" by measuring screen time
 - Is a study conducted via observation
 - Benefits
 - May be a more ethical approach than experimental studies

- May allow for measuring the effect of certain variables not prone to manipulation in an experimental study
- Can be more efficient or faster than experimental studies
 - Can be used to establish the presence of a relationship/make predictions, before conducting a more thorough experimental study
- Limitations
 - Can not prove causation, and is vulnerable to the influence of confounding variables
- **Experimental designs** involve directly manipulating one variable [keeping all other conditions [control variables] constant - carefully controlled conditions] to study its effect on the other (seeing how the second [dependent] variable changes when the first [independent] variable is modified)
 - Compare control vs experimental groups
 - Not all experimental designs have a control - may simply compare across multiple experimental groups
 - Dependent variables typically measured [operationalized] in some form for comparison
 - Pros
 - Can be used to prove causation (unlike correlational studies), and controlled conditions can eliminate the influence of other variables
 - Cons
 - May be considered impractical/unethical to study certain topics experimentally
 - Controlled lab settings may make generalizing experimental results to the broader population more difficult
- Aggression Bobo doll study - how do children watching footage of aggressive vs non-aggressive treatment of a doll by an adult, influence the aggression of the children towards a doll? (e.g. as measured by number of hits/punches by the children)
 - Aggression can be learned from others

- Data collection
- Ensuring equal groups
 - **Random assignment** - assigning study participants to experimental conditions (i.e. groups with different IVs) randomly
 - Aims to ensure an equal distribution of characteristics (e.g. gender, age, etc.) across groups
 - Population vs sample
 - **Population** - the set of people within the general population for whom the experimenter is interested in
 - **Sample** - a subset of the broader population
 - Experiments may be conducted on a sample, with the aim of being generalizable to the broader population
 - Random sampling - creating a sample by means such that every person in the population has an equal chance of being selected
 - Convenience sampling - creating a sample of solely the people most conveniently available for the study
 - A small sample or convenience sampling may impact the generalizability of a study's results
 - Steps 4 & 5 - analyze & draw conclusions
- **Quasi-experimental study** - a study similar to an experiment, but which does not randomly assign experimental conditions
 - Usually relies on existing group membership (e.g. age, gender, ethnicity, etc.)
 - May be used as a means of comparing said groups (i.e. taking group membership as the independent variable)
 - Cannot be used to infer causation
- Experimental considerations
 - **Placebo effect** - receiving special treatment, "something new", etc. may affect human behavior
 - **Experimenter bias** - an experimenter's expectations may influence the outcome (reported or actual) of a study
 - May not be conscious (e.g. an experimenter with certain expectations may unconsciously treat different participants differently)

- **Demand characteristics** - participants may influence/modify their behavior to fit their interpretation of the experiment
 - May also be influenced by experimenter expectations
 - The knowledge of being observed may influence participant behavior
- **Progressive error/order effects** - changes in a participant's responses, caused by a general experience in a research study (i.e. of going through the study)
 - May include practice effects, fatigue
- Are considerations that published studies in the field will generally try to mitigate
 - Reading from a script, or double-blind/naive experimenter
- *Converging operations* - using multiple different research techniques to investigate a topic and converge on a research result
- **Replication** - the process of repeating a study and obtaining the same result
- Other concerns:
 - **Item effects** - certain items (e.g. in a list, or pieces of information) may simply be more memorable than others

Biological Psychology

- History of biopsychology
 - Ancient Greeks speculated on the relationship between body and mind (Mind/Body Problem)
 - Descartes was a [Cartesian] dualist - believed mind and body were separate entities (spiritual mind vs physical body)
 - Believed the pineal gland in the brain was the location where mind & body converged
 - Reasoning: Believed [erroneously] it was unique to humans, pineal gland not mirrored in the brain (unlike most brain portions)

The Brain

- **Hindbrain** (back/bottom)
 - **Cerebellum** (Lat: “little brain”) - balance, motor coordination/control center
 - **Medulla** - controls heart rate, circulation, respiration (automatic biological processes/homeostasis)
 - **Reticular formation** - regulates sleep, wakefulness, arousal
 - Cluster of neurons running up brain stem
 - **Pons** - carries messages between the cerebellum & the rest of the brain
- **Midbrain** (middle) - help body orient to stimuli (e.g. turning towards sounds)
 - Contains *tectum*, *tegmentum*
- **Forebrain** (top)
 - **Limbic system** (controlling emotion, motivation, memory) located in *subcortical* (i.e. under cortex) *structures*
 - **Thalamus** - filters and transfers sensory information into the cortex
 - **Hypothalamus** - regulates biological needs (autonomic - e.g. breathing, resting, eating)
 - Regulates 4 Fs - fight/flight, fleeing, feeding, sex*
 - **Amygdala** - regulates emotional processes
 - Technically, there are two amygdala in the brain
 - **Hippocampus** (seahorse) - structure involved in creation/integration of new memories [converting short-term memories to long-term memories]
 - Removal of hippocampus in one seizure patient (H.M.) resulted in severe anterograde amnesia (inability to form new memories)
 - As opposed to retrograde amnesia - inability to recall old memories
 - Also occurred in patient with brain disease (Clive Wearing) - 7-10 seconds memories max
 - **Basal ganglia** - intentional movement
 - Works in conjunction with other parts of the forebrain
 - Also part of the reward system
 - Diseases in basal ganglia result in problems with movement
 - Parkinson's - unintentional tremors

The Cerebral Cortex

- **Cerebral cortex** - outermost regions of the brain
 - Is folded in order to maintain large surface area, while minimizing volume
 - Necessary to fit in the skull
- Cerebral cortex lobes:
 - **Occipital lobe** (back) - handles technical aspects of vision/processing of visual information (e.g. spatial/motion perception, color differentiation)
 - **Temporal lobe** (front/bottom) - converts sensory input into derived meanings (e.g. for visual memory, language processing, facial recognition)
 - Contains *primary auditory cortex* - processing auditory information
 - **Parietal lobe** (top) - sensory information, some language processing
 - **Somatosensory cortex** (middle) - handles sensations of touch
 - Divides touch in various regions of the body, into largely discrete sections of the brain
 - Importance of a region reflected in size of somatosensory region [cortical representation] (e.g. face, hands allocated much more brain area than feet)
 - **Wernicke's area** (middle, middle of parietal lobe) - speech comprehension
 - Wernicke's aphasia - damage to Wernicke's area results in inability to comprehend speech
 - **Frontal lobe** (front) - high-level functions (e.g. voluntary movement, personality, thinking, expressive language)
 - **Motor cortex** (middle, directly in front of somatosensory cortex) - handles voluntary movement
 - Maps different regions of the body to discrete, variable-size sections of the brain, similar to somatosensory cortex
 - Places even more emphasis on face (tongue)/hands than the somatosensory cortex
 - Transcortical magnetic stimulation (temporarily disabling certain parts of the motor cortex) used to observe motor cortex mappings
 - **Broca's area** (front, middle of frontal lobe) - handles language production

- Broca's aphasia - damage to Broca's area results in an inability to produce language
 - *Prefrontal cortex* (in charge of personality, decision making, social behavior) one of the last regions in the brain to develop
 - May not fully develop until 20-25 y.o.
- Cerebral cortex divided into left and right hemispheres, connected by **corpus callosum**
 - Are largely symmetric
 - Exception: *contralateral organization* (left side of brain controls right side of body, and vice versa)
 - Includes motion, visual processing, etc.
 - Language centers are largely on the left side of the brain
 - More evenly distributed in women than men
 - Removal of one hemisphere of the brain, can still result in eventual functioning if the other hemisphere is able to rewire
 - **Split-brain** (callosal syndrome) - removal of/damage to corpus callosum disconnects two hemispheres, potentially resulting in loss of information (e.g. left hemisphere and right hemisphere may fail to coordinate senses, motion, etc.)
 - Information on the right half of the brain (i.e. left visual field) may fail to reach the language centers on the left side of the brain
 - Drawing with the right hand draws what the right side of the brain "sees"; drawing with the left hand draws what the left side of the brain "sees"
 - The two sides of the brain may try to perform opposing motor actions
- Brain plasticity - the brain is able to rewire itself

Neurons

- A **neuron** is a type of cell specializing in transmitting/receiving information
- Parts of a neuron:
 - **Cell body** - coordinates information processing
 - Also performs basic biological functions of a cell
 - **Dendrites** - receive information from other neurons
 - Relays information to the cell body
 - Can be receiving signals from multiple other neurons at once
 - **Axons** - long, slender projection [of variable length], carrying electrical impulses away from the cell body [to be transmitted to other neurons]
 - Are enclosed by a **myelin sheath** - fatty “sheath” composed of glial cells (a la wire insulation)
 - Result in faster, more efficient neural communication
 - Multiple sclerosis (MS) - immune system fails to recognize and begins to attack myelin sheaths, disrupting neural communication, resulting in weakened muscle, diminished coordination, paralysis, etc.
 - **Synapse** - region between the axon of one neuron, and dendrite/cell body of another
 - *Axon terminals* [at the end of an axon] are responsible for releasing neurotransmitters into the synapse
- Phases of neuron information transmission
 - **Action potential** - sending information from the cell body down the length of the axon, to the synaptic terminals
 - A neuron begins at a **resting membrane potential** - a state where the inside of a neuron is more negatively charged (-70 mV) than the outside
 - Inside contains more negative ions than outside, maintained through closing ion channels in the cell membrane
 - **Depolarization** - upon being electrically stimulated, sodium channels open in the cell membrane, allowing Na^+ ions to enter the neuron
 - Depolarizes the cell [makes it more positive]

- Occurs automatically once the neuron reaches a certain firing threshold (-55 mV)
- **Repolarization** - after sodium channels close, potassium ions (K^+) will begin to exit the cell, repolarizing the cell
- Action potential process can be seen as a momentary spike in voltage within the cell
 - Opening of sodium channels propagates down the neuron's axon, "moving" the voltage spike down to the synaptic terminals
 - Once an action potential starts, it will always propagate
- Transmission across the synapse - transmission of information across the synapse, to surrounding neurons
 - When the action potential reaches the synaptic terminals, causes release of vesicles containing neurotransmitters into synaptic cleft
 - Post-synaptic neuron contains receptor sites for neurotransmitters to bind
 - **Excitatory neurotransmitters** increase the likelihood of the post-synaptic neuron firing/generating an action potential [making membrane potential less negative]
 - **Inhibitory neurotransmitters** decrease the likelihood of an action potential [make membrane potential more negative]
 - Whether post-synaptic neuron generates an action potential [reaches its firing threshold], is a function of the number of excitatory/inhibitory neurotransmitters it receives
 - Can be partially stimulated, e.g.
- Strong vs weak sensations:
 - Strength determined by rate of neuronal firing, number of neurons stimulated
- Neurotransmitters
 - Receptors are neurotransmitter-specific
 - Allows for very specific communication between neurons (e.g. one neuron firing does not automatically fire every single neuron around it)
 - Examples:
 - **Acetylcholine (ACh)** - transmitter for communication motor neurons and voluntary muscles
 - Also involved in attention, sleep [+Alzheimer's]

- **Dopamine** - regulates motor behavior, motivation/pleasure, emotional arousal
 - Degeneration of dopamine linked to Parkinson's
 - **Serotonin** - regulates sleep, wakefulness, eating behavior
- Other types of neurotransmitters
 - **Agonists** enhance/mimic the action of a neurotransmitter
 - Dopamine agonists (L-dopa) used to treat Parkinson's
 - **Antagonists** block the action of a neurotransmitter
 - Botox (botulinum toxin) is an Ach antagonist (used to disable motor movement)
- Notable figures
 - Neuron doctrine (Santiago Ramon y Cajal) - nervous system is composed of numerous individual cells [neurons]
 - Hodgkin & Huxley (1952) - studied neural impulses (action potentials), using giant squid axons

Studying the Brain

- *Magnetic resonance imaging (MRI)* - uses magnetic fields to produce [still] images of the brain, brain structure
 - Can also be used for other parts of the body
- *Functional magnetic resonance imaging (fMRI)* used to examine changes in ongoing brain activity by measuring changes in blood oxygen
 - Good for determining location of brain activity (uses same principles as regular MRI); bad for observing timing (blood oxygen changes [blood flows] much more slowly than the neurons themselves fire)
- *Electroencephalography (EEG)* - can record electrical signals in the brain, as they occur in real-time
 - Good for observing timing (e.g. sequence of neurons firing), bad for location
 - Can employ both fMRI and EEG simultaneously (i.e. have a person, in an fMRI machine, wear an EEG cap)

Sensation & Perception

- **Sensation** - the physical processing of environmental stimuli by sensory organs
 - 5 senses: sight, smell, hearing, taste, touch
- **Perception** - the psychological process of interpreting sensory information
- *Sensation vs perception*: the way people perceive/interpret sensory stimuli can differ person-to-person, but the raw sensory information is fairly consistent
 - Environmental stimuli is first sensed [sensation], and the resulting information processed and interpreted [perception]
 - Stimuli we perceive to be present may not actually be so, and vice versa

Perception

- Our perception is influenced by many factors
- **Psychoperception** - methods measuring the strength of a stimulus and an observer's sensitivity to said stimulus
 - Introduced concept of **sensory thresholds**:
 - *Absolute threshold*: the smallest amount of stimulation needed for detection by a sense [sensory organ] 50% of the time
 - Actual probability of sensation increases gradually relative to stimulus strength, not straight 0->1
 - *Difference threshold/just noticeable difference (JND)*: the minimum difference between two stimuli needed to detect the difference between them, 50% of the time
 - Is affected by the size of the initial stimulus - the more intense the initial stimulus, the larger difference is needed to distinguish between them
- Perception is also influenced by *expectations*
 - *Top-down processing* - when our perception is influenced by our expectations or by prior knowledge
 - *Bottom-up processing* - using individual bits of sensory information to construct a complex message
 - Ex: combining individual sounds to perceive distinct words
- **Signal detection theory** - a person's response to a stimulus depends on their sensitivity and their decision criteria
 - Decision criteria:
 - Prior knowledge/experience
 - Expectations
 - Motivation
 - Level of fatigue
 - Consequences of missing (?)
- **Sensory adaptation** - diminished sensitivity to certain sensory stimuli as a result of constant or recurring stimuli
 - Ex: getting used to the sensation of a phone in a pocket

- Factors influencing attention:
 - **Selective attention** - focusing attention on one specific event/task
 - Can cause *inattention blindness* - a failure to perceive [see] objects that are not the focus of attention
 - *Change blindness* - a failure to detect changes to the visual details of a scene
- **Multimodal perception** - concurrent stimulation in more than one modality [sense] can influence our perception of events, objects in the world
 - McGurk effect - shape of person's mouth influences what we hear
 - **Synaesthesia** - a condition in which perceptual/cognitive activities (e.g. listening to music, reading) triggers exceptional sensory experiences
 - Grapheme-color synaesthesia: words and letters associated with colors
 - Chrome synaesthesia: sounds associated with colors
 - Rarer: words with scents

Sensation

Vision

- The eye
 - Light enters the eye, and is reflected onto the retina
 - Visual images are flipped by the eye before reaching the retina (top -> bottom, left -> right)
 - Process of visual sensation:
 - Transduction: photoreceptors transform light into a neural signal
 - Ganglion cells receive information from photoreceptors
 - Optic nerves transmit messages to the brain
- Two types of photoreceptors - **rods** and **cones**
 - **Cones** are primarily located in the **fovea** (center of the retina)
 - Have high color and detail sensitivity, but low dim light sensitivity
 - **Rods** are primarily in the periphery of the retina
 - Have high dim light sensitivity, but low color/detail sensitivity
 - 20x as many rods as cones
- Theories of color vision
 - **Trichromatic color theory** - color is perceived by 3 different types of cones, each sensitive to a different wavelength of light (short, medium, long)
 - Occurs on the physical level, with cones [sensing phase]
 - Short, medium, and long cones correspond roughly to blue, green, and red
 - Some overlap exists between cones
 - Evidence: *Colorblindness* can result from deficiencies in one particular cone
 - Not sufficient to explain all properties of color vision
 - *Negative afterimages* - looking at one color for a large amount of time, will result in seeing the other
 - **Opponent process theory** - we perceive colors in terms of opposing pairs (red/green, yellow/blue, white/black)
 - Cells that are stimulated by seeing one color in a pair (e.g. red), are inhibited by seeing the other (e.g. green)
 - Negative afterimages are caused by previously inhibited cells, beginning to fire when the source of inhibition disappears

- Occurs at the level of ganglion cells/LGN/the visual cortex [during visual processing]
- Visual processing
 - Neural signals from the brain pass from optic nerves through the thalamus to the primary visual cortex [in the occipital lobe]
- **Feature detectors** - certain neurons respond selectively to specific features
 - Will interpret visual images and fire if it matches a higher-level pattern
 - Analogous to bottom-up processing
 - Ex: A neuron detecting Ts will not fire when perceiving an A
 - Hubel & Wiesel discovered feature detection cells by observing neural signals within a cat
- Visual information travels from the occipital lobe to the parietal lobe [**dorsal pathway** - “**where**”] and temporal lobe [**ventral pathway** - “**what?**”]
 - Ventral pathway involved in object, facial recognition
 - Damage to the ventral pathway can lead to:
 - Visual agnosia - inability to recognize objects
 - Prosopagnosia - inability to recognize [familiar] faces
 - Dorsal pathway involved in
 - **Spatial perception** is the process of inferring 3-dimensional information from 2D sensory inputs [visual images]
 - **Monocular depth cues** help perceive depth using one eye
 - Ex: relative height/size, interposition (objects in front can block objects further back), linear perspectives (i.e. the movement of lines in the distance), light and shadow
 - Optical illusions result from the use of misleading depth clues
 - Muller-lyer illusion: Carpenter world hypothesis (people who have more experience with corners see illusion more strongly)
 - **Binocular depth cues** result from coordination between both eyes
 - **Retinal disparity** - each eye receives different retinal images, based on different perspectives

- **Convergence** - when viewing a nearby object, the eyes will turn inward to see it
- **Object constancy (?)** - our perception of an object is constant, even if the sensory input is different (e.g. different lighting, different distance)
 - *[Adjustment] Size constancy* - the brain will automatically adjust for the impact of distance when inferring the size of objects from visual images
 - *Brightness/color constancy* - the brain will automatically adjust for the impact of shadows/lighting when inferring the color/brightness of objects from visual images
 - The white gold blue black dress

Audition

- Audition [hearing]
- Anatomy of the ear:
 - Pinna [outer part of ear] funnels sounds toward the auditory canal
 - The **eardrum** and **ossicles** vibrate in response to sounds, amplifying sounds
 - Sounds flow into the **cochlea** - has tiny hair cells vibrating various amounts, converting auditory inputs into neural signals
 - Neural signals flow through the thalamus to the temporal lobe
- Different types of hearing loss can result from damage to different parts of the ear
 - *Conductive hearing loss* results from damage to the eardrum/ossicles
 - Can be treated with hearing aids
 - *Sensorineural hearing loss* results from damage to the cochlea
 - Can result from either damage to the hair cells or auditory nerves
 - Also occurs over time as a result of aging
 - We lose the ability to hear higher pitches as we age
- **Sound localization** involves determining from where the sounds we hear originate
 - Can use difference in timing between when sounds hit left vs right ears to determine the direction of incoming sounds

Learning & Cognition

Learning

- **Learning** - any experience that results in a relatively permanent/durable change in the state of the learner

Classical Conditioning

- **Classical conditioning**: using *associative learning* to induce responses to certain stimuli
 - **Neutral stimulus** - a stimulus that, leads to no response in a subject
 - **Unconditioned stimulus** - a stimuli that induces an (unconditioned) response in the subject without any prior training
 - **Conditioned stimulus** - a [formerly neutral] stimulus that induces a (conditioned) response in the subject after training
 - Training involves pairing neutral and unconditioned stimuli to create (*acquire*) an association
 - Time spent in acquisition process is proportional to the strength of the conditioned response
 - *Second-order conditioning* - performing classical conditioning by pairing neutral and conditioned stimuli
 - **Extinction** - conditioned responses will weaken over time if the conditioned stimulus is repeatedly presented without the unconditioned stimulus
 - Exception: *spontaneous recovery* may occur
 - **Generalization** - once a response has been conditioned, similar stimuli may elicit the same response
 - **Discrimination** occurs when the subject can distinguish between similar but distinct stimuli (no generalization)
 - May result in dampened or no response
 - History of classical conditioning
 - Discovery credited to Pavlov in 1906
 - Unintentionally trained dogs to salivate upon seeing a researcher during gastric experiments (associative learning)
 - John B. Watson - father of behaviorism

- Believed all human behaviors could be explained by conditioning
 - Conditioned Albert [baby] to fear a rat by associating rats with clanging
 - Can also un-condition responses
- Factors affecting classical conditioning
 - **Preparedness** - the evolutionary history of an organism may make it easier to learn particular associations
 - Certain classes of stimuli may be more easily associable than others
 - Negative stimuli may be more likely to make associations, e.g.
 - Humans make associations with snakes more easier than guns, possibly due to evolutionary history
 - Conditioned taste aversion - a single pairing between a taste and a negative response (e.g. illness) can result in a negative response
 - Occurs even if the negative response occurs hours after eating
 - **Familiarity/expectations** - we make associations more easily for less familiar (more novel) stimuli
 - Similarly, neutral stimuli do not become conditioned when they also occur in scenarios without the unconditioned stimulus

Operant Conditioning

- **Operant conditioning** involves the learning of doing a certain skill
 - Thorndike's puzzle box - would put a hungry cat in a puzzle box, where stepping on a certain lever opens the box and gives food
 - The cat may be faster to press the lever in subsequent trials
 - *Thorndike's law of effect*: Behavior followed by favorable consequences become more likely; behaviors followed by unfavorable consequences become less likely
 - B.F. Skinner studied operant conditioning on rats and pigeons
 - Mapped out four classes of consequences:
 - **Positive/negative reinforcement** reinforce the likelihood of performing a behavior
 - *Positive reinforcement* adds a favorable consequence to increase a behavior

- *Negative reinforcement* removes an unfavorable consequence that would otherwise decrease the behavior
- **Positive/negative punishment** decrease the likelihood of performing a behavior
 - *Positive punishment* adds an unfavorable consequence to decrease a behavior
 - *Negative punishment* removes a favorable consequence that would otherwise increase a behavior
- Positive vs negative: “adding vs taking away”
- **Shaping** - gradually modifying an animal’s behavior using successive approximations of the desired behavior
 - Rewards for similar behavior, with increasing specificity
 - May “reward” with conditioned stimuli (combining operant and classical conditioning)
- Discrimination, generalization, extinction apply to operant conditioning also
- Rate of extinction affected by initial *schedule of reinforcement*
 - Rewarding every trial vs **partial/intermittent reinforcement** (not rewarding every trial)
 - Partial reinforcement-trained behaviors more resistant to extinction than continuously reinforced behaviors
- Schedules of intermittent reinforcement
 - Fixed vs variable schedules
 - *Fixed* - reinforcement given after a certain, set amount of time/responses
 - *Variable* - amount of time/responses between reinforcements may vary around an average value (less predictable)
 - Interval vs ratio schedules
 - *Interval* - based on time intervals
 - *Ratio* - based on number of behaviors (e.g. responses)
 - Ratio schedules result in higher response rates;
 - All intermittent schedules have relatively steady response rates; fixed interval less steady than others
 - Analogy: fixed intervals a la tests in a class [studying]

- Variable schedules more resistant to extinction than fixed schedules
- Classical vs operant conditioning:
 - Classical conditioning is based on involuntary responses
 - Pairing of neutral and unconditioned stimuli occurs before behavior
 - Operant conditioning is based on voluntary behavior, based on consequences
 - Reward/punishment occur after behavior
- The biology of rewards
 - Nucleus accumbens is activated during the processing of rewards
 - Dopamine is released when behavior is rewarded
 - Genetic variation in dopamine, dopamine circuits may result in individual differences
- Observational learning - an organism learns by watching others being rewarded/punished

Memory

- Our memory is selective - we remember details that are important to us, and forget those that aren't
- Our memory is constructed, not recorded
- Phases of memory
 - **Encoding** - process of transforming what we perceive, think, or feel into memory
 - **Storage** - the process of storing information, such that it can later be retrieved
 - **Retrieval** - the process of retrieving (bringing to mind) information that has previously been encoded and stored
- Encoding
 - Different levels of processing affect the extent to which items are remembered
 - Shallow to deep: physical, acoustic, semantic encodings
 - Memory techniques often involve translating to semantic encodings
- Storage
- **Atkinson-Shiffrin model** - three different locations in the brain for storing memory:
sensory memory, short-term memory, long-term memory
 - Sensory memory holds a large amount of perceptual information for a very brief amount of time
 - Consists of iconic [visual] memory (<1s), echoic [auditory] memory (3-4s)
 - Short-term memory is of limited duration (~20s; 15-30s)
 - Information can be kept in short-term memory for longer via rehearsal/repetition [conscious activation]
 - Sensory information transferred to short-term memory via attention
 - Information transferred between short-term, long-term memory via operations of transfer and retrieval
 - Capacity - ~7 (5-9) chunks of information
 - Working memory - location holding information relating to an active current task
 - Baddeley & Hitch model - working memory composed of phonological loop, visuospatial sketchpad (visualizing)
 - Central executive handles transfer between components
 - Long-term memory (>20s) represents all memory persisting over time, without conscious activation

- Events, known facts, vocabulary, motor skills, etc.
 - Can last indefinitely, but may also last only for a few minutes
 - Can be retrieved and brought into working memory, but the ability to do this may be lost
- Memory effects
 - **Serial position effect** - the position of a word in the list affects recall of the word
 - **Primacy effect, recency effect** - given a list of words, we tend to remember the words at the beginning and the words at the end
 - Evidence of separate short-term [recency effect], long-term [primacy effect] memory systems
 - Adding delay removes recency effect, but not primacy effect
- Mental arithmetic:
 - Sensory store, short-term/working memory hold information about current problem, retrieved rules/strategies taken from long-term memory
 - Store intermediate results, final solution
 - Long-term memory holds rules of arithmetic, learned strategies for solving problems
- Types of long-term memory:
 - **Explicit/declarative memory** - information about “what”
 - Can be expressed verbally; brain is consciously aware
 - **Implicit/non-declarative memory** - information about “how”
 - Is expressed behaviorally; brain may not be consciously aware of it
- Types of explicit memory:
 - **Episodic memory** - contains personally experienced events/memories, located in a specific time and place
 - Also contains prospective memory - predictions of future events
 - **Semantic memory** - holds facts, general knowledge, vocabulary
 - May contain previously episodic memories (cannot be recalled in a specific time and place)
- Types of implicit memory:
 - **Procedural memory** - holds skills (“how to” do things), e.g. trained motor skills
 - **Priming** - exposure (i.e. prior exposure) influences behavior
 - **Conditioning** - responses from classical/operant conditioning

- Types of amnesia: **retrograde** (inability to recall old memories) vs **anterograde** (inability to form new memories)
 - Anterograde - inability to form new explicit memories (removal of hippocampus results in difficulties transferring from short- to long-term memory)
 - Can still form implicit memories (e.g. train motor skills), even if the explicit memory of doing so is forgotten
 - Some patients with both types of amnesia may have intact semantic memories, but lose episodic memory
- Retrieval - is not perfect (e.g. memories of events may differ from the actual events)
 - Rely on cues/hints to bring information to mind; may be subject to context effects
- **Context effects:** context can aid in, or influence, retrieval of memory
 - **Context:** other words on a list, internal mental state at time of retrieving, environmental cues (e.g. odors, sounds), etc.
 - **Encoding specificity principle** - memory is improved when information available at encoding is also available at retrieval (e.g. being in the same place helps memory)
 - The closer the retrieval situation to the encoding situation, the better the retrieval
 - Taking tests in the same room as used for studying boosts recall; but varying setting of studying can lead to more retrieval clues, e.g.
- Measures of retrieval:
 - **Recall:** being able to recall elements on need
 - **Recognition:** on recognizing an item, being able to recognize whether it was present in memory [on a list, e.g.]
 - **Savings:** being able to learn items faster on subsequent tries
- Memory failures - memory is very unreliable, especially on subsequent recalls
 - **Proactive interference** - old learning can interfere with attempts at new learning
 - **Retroactive interference** - new learning can interfere with recalling old learning
 - **Blocking** - failure to recall some piece of known information
 - Varying the context in which a question is presented may affect how it is remembered, even leading to misremembering [misinformation]
 - The misremembering may be carried forward and “learned”

Decision Making

- **Decision making** - the process of evaluating alternatives and making choices among them
- Biases and influences on decision making
 - **Availability bias** - items more readily available in memory (e.g. more well-known/familiar items) are judged as occurring more frequently
 - **Framing effects** - changing how an issue is presented/phrased, can change the decisions that people make
 - *Sunk-cost fallacy* - people make decisions about a current situation, based on their previous investment in the situation
 - **Loss aversion** - people tend to want to avoid losses, over achieving gains
 - **Anchoring** - given an initial numerical value (an anchor) for a value, even arbitrarily, people tend to make guesses around the anchor [fail to move the anchor]
 - Ex: the “initial value” presented during sales affect customers’ responses
 - Anchoring effects can occur even for entirely unrelated/random values

Language & Thought

- **Language** - a system that relates sounds or gestures to meaning
 - Human language may employ **symbolism** - words may not directly “reflect” the objects they are describing
 - Human language is typically **structured** and **meaningful** - the structure (e.g. order, grammar) of a sentence affects the meaning of the sentence
 - Other primates tend to struggle with grammatical structure comparatively, even though they are okay with symbolism
 - Human language has **displacement** - can describe events that are not at the current location (not physically present), not currently occurring, etc.
 - Human language is **generative** - we can produce a large number of sentences that we have never heard or seen
- Components of language:
 - **Phonemes** - smallest units of sound (e.g. individual letters)
 - *Phonology* - study of sounds
 - **Morphemes** - smallest units of meaning
 - Ex: suffix ‘-s’ [meaning: more than 1], prefix ‘un’ [meaning: 1]
 - A single word can be composed of multiple morphemes (e.g. untied -> “un” “tie” “d”)
 - **Syntax** - rules for word combinations
- Theories of language acquisition usually emphasize either nature or nurture
 - Nurture - most language is learned from the environment [behaviorists]
 - Nature - children are born with innate mental structures guiding their acquisition of language [nativists; Noam Chomsky, e.g.]
 - Evidence:
 - Children apply rules of grammar to novel words (e.g. adding “-s” to made-up words)
 - There exist critical/sensitive periods of language acquisition for humans; it is difficult for humans to learn language (both first and second languages) afterward
 - Animals (primates, e.g.) do not learn language as easily/successfully as humans, even if provided a similar environment/training

- Stages of early speech production: crying (birth), cooing (long vowels; ~1 month), babbling (consonant-vowel pairs [ex: bababa, mamama]; ~6 months), patterned speech (word-like gibberish, basic conversation flow; ~1 year), first words (10-15 months), “naming explosion” (quick learning of words; ~18 months), basic combining words (~2 years)
 - Cooing/crying stage of speech learning is universal (are identical across cultures); languages begin to diverge in the babbling stage
 - Babbling also includes sign language
- Infants perceive speech sounds categorically, like adults
 - Growth/development teach us what speech sounds/distinctions are relevant
 - Language-specific: infants are capable of separating many different phonemes in many different languages, but we lose the ability to as we develop (become culture-based listeners)
 - We are capable of differentiating until 6-8 months; lose the ability by 10-12 months
 - Benefit of perceptual narrowing: infants faster to tune into their native language have larger vocabularies at age 2
 - Ex: We perceive /b/ and /p/ as distinct sounds, even if they fall on a continuum
 - Conditioned head turn procedure: test for seeing which sounds infants can distinguish between
 - Test procedure: play different phonemes to an infant, [operant] conditioning the infant to look at a toy whenever the phoneme changes (e.g. having the toy light up when the sound changes)
 - Test: delaying the time between when the phoneme changes and when the toy lights up, and seeing if the child looks at the toy before it lights up
- Categorizing speech
 - Voice onset time - interval between putting lips together, and vibration of vocal cords (distinguishes between /b/ and /p/, e.g.)
 - Very small transitional period between where we perceive /b/, /p/; otherwise, we almost always perceive the two sounds as separate
- Language and cognition
 - **Sapir-Whorf hypothesis** - language shapes the way we think/what we think about
 - Ex: we may not experience/recognize certain emotions if we do not have a word for them, e.g.

- Strong hypothesis: our thoughts and behavior are *determined* by the language(s) we speak
 - The language we speak determines the concepts and categories we use, and thus shapes what we can think about
 - We cannot conceptualize things we do not have words for
 - Not strongly supported by evidence
 - Evidence: Inuit people have many words for types of snow, English does not -> we can't think of snow in the same way
 - Counterargument: we absolutely can, and even in cases where we don't we can still describe the associated phenomena in other words
 - Some languages have very few words for color, but people can still color match across languages, e.g.
- Weak hypothesis: our thoughts and behavior are *influenced* by the language(s) we speak
 - May influence what we pay attention, which in turn shapes our experience, which in turn influences how we think
 - Evidence:
 - When asking speakers of languages with gendered nouns to describe the associated objects [not physically present], the gender of the object influenced the adjectives given (and possibly even the mental image of the object)
 - Spanish [where key = feminine] gave different adjectives than German [where key = masculine]
 - Russian speakers (who have dedicated words to shades of blue) are faster at color-matching when there are different shades of blue compared to many of the same shades
 - English speakers have no such difference
 - Hypothesis: Russian speakers having different words for light vs dark blue influenced their recognition

Developmental Psychology

- **Developmental psychology** - the study of how an organism changes (or does not change) over time between when they are born and when they die
 - Definition: scientific study of changes or continuities in an organism between initial conception and death
- Classes of development
 - Perceptual development – how our vision, hearing, and taste develop
 - Ex: How do the perceptual experiences of infants differ from adults’?
 - Cognitive development – the development of thinking across one’s lifespan

Perceptual Development

- Infant auditory experiences begin developing prior in utero [prior to birth]
 - The auditory systems of infants become active during the third trimester (last three months prior to birth)
 - Can hear mother’s voice, heartbeat, stomach [digestion noises, e.g.]
 - Can hear low-pass filtered speech (muffled, a la listening underwater)
 - May not distinguish between phonemes, but can hear different language rhythms, e.g.
 - Evidence:
 - Newborns prefer to listen to their mother’s voice over other women’s, prefer their mother’s native language over other languages
 - Potential evidence: The acoustics of a newborn’s cry may exhibit characteristics of mother’s native language (i.e. their cry is influenced by the languages we hear)
 - Young infants can recognize stories, music they heard while in utero
- Infant taste experiences also begin in the womb
 - Amniotic fluid is flavored by what the mother has eaten
 - Evidence:
 - Infants show preferences for flavors they were exposed to in utero
 - Infants with mothers who drank carrot juice enjoyed carrot-flavored cereal more than water-drinking mothers

- Infant testing methods regarding enjoyment of perceptual experiences must infer perceptual abilities/preferences based on behavior (cannot measure enjoyment directly)
 - Three premises of infant testing:
 - Infants will attend/orient to stimuli they prefer or find interesting
 - *Familiarization*: Infants prefer stimuli that they have heard/seen before
 - *Habituation*: infants who have been repeatedly exposed, and become bored of a stimulus, should prefer novel stimuli
 - Certain individuals may become habituated to stimuli at slower/faster rates than others (different points on the familiarization/habituation continuum)
 - Young infants habituate much slower than older infants
 - High amplitude sucking procedure (HASP) - babies will naturally suck on a soother
 - Soother measures pressure, rate of sucking (dependent variable)
 - Play sounds when baby is sucking; stop sounds when baby stops sucking
 - Sucking rate decreases during habituation
 - Changing language: if baby can tell languages apart, they will dishabituate (start sucking more - stimulus is novel)
 - Baby rate of sucking may also depend on how much they like the sounds/which sound they suck longer for
- Infant visual experiences begin at birth
 - May “see” in the womb, but do not experience much visual stimuli
 - Snellen fractions for visual acuity: 20/50 vision = individual sees at 20 feet away, what a person with perfect vision would see at 50 feet away (e.g.)
 - Newborns initially see at worse than 20/200 (poor visual acuity: 20/200 to 20/800, legally blind aside from centimeter distances)
 - Visual acuity increases significantly in the first 6 months of life, to within the normal adult range by 6 months (not yet 20/20, but close)
 - Improvements continue until 20/20 at 3 years of age
 - Tests of infant visual acuity
 - Robert Fantz, 1961 - Preferential Looking paradigm
 - Baby placed within a box/room; experimenters observe whether they look at image on left or image on right
 - Modern: may use computer screens, eye tracking
 - Premise: infants will look longer at interesting stimuli

- Ex: two squares (striped vs solid gray), predict striped is more interesting -> infants will show preference for striped over solid if they can see the difference
- Experimenters can manipulate the distance between stripes to simulate getting further away (further away -> smaller gaps, smaller stripes); measure the distance at which the baby stops showing a preference, convert into Snellen
- Fantz used for determining infant preferences for faces
 - Normal face vs scrambled face vs no face: infants are born with a preference for face-like stimuli
 - Face preferences become more specific to faces in their environment/most familiar [based on exposure]
 - 3-month-olds prefer faces of their own race (most familiar/more present in their environment), faces of their parents, e.g.

Cognitive Development

- Young children may appear impressive in some ways cognitively, but may also make major errors in other ways
 - Ex: may have a large vocabulary, but miscategorize objects (esp. objects with similar characteristics to known objects)
 - Ex: may know how to be polite and dress themselves, but be unable to take perspective of others
- Jon Piaget - interested in learning about why children make certain errors
- Piaget's view: children are "little scientists"
 - Independent of environmental influence
 - Labels for items can persist for a long time, even if corrected
 - Are naturally curious, actively acquiring knowledge
 - Children have a **schema** - organized units of knowledge used to try and understand situations
 - May describe the properties of an object, place, etc.
 - Assimilation vs accommodation

- **Assimilation** – children will Incorporate new information/experiences into their existing schema
 - **Accommodation** – children may have to modify their schema based on new experiences, if they conflict with existing schema
- Schemas are typically relatively stable within stages; start to falter at the boundaries between stages
 - Once a boundary to a new stage has reached, schema is failing – large amounts of accommodation are occurring, resulting in the next stage
- Accommodate a lot; assimilate relatively little
 - Accommodate: retroactively changing/revising existing schema to match new information
 - Assimilate: adapting new information into existing information
- Four stages are strictly sequential
- **Piaget's four stages of cognitive development:**
 - **Sensorimotor** (0-2 years): children move from simple reflexes to symbolic thought
 - Develop understanding of object permanence (that objects exist even when no longer visible); build a basic vocabulary
 - Object permanence test: cover an object with a blanket/place it behind an obstacle, testing to see if the child looks for the toy
 - Piaget: object permanence at month ~9
 - Criticism: object permanence task also requires motor coordination [searching for toy], but child may be able to know toy is present even before that
 - Modern tests of object permanence: paradigm of violation of expectations – infants will look longer at events that violate their expectations
 - If a blanket is placed over a toy, and then the toy is no longer present once the blanket is removed, infants will look longer at the toy if they expected the toy to be there (had object permanence)
 - Baillargeon test: place an object behind an obstacle, and drive a toy car through obstacle
 - Expected: car hits object, unexpected: car passes through without hitting object
 - Found that infants could have object permanence at 3 ½, 4 months

- **Pre-operational** (2-7): can mentally represent objects, think symbolically
 - Difficulties: logical reasoning, problem solving, representing psychological experiences of others
 - Conservation task: not passed until ~6, 7 years
 - Conservation: understanding that changes in physical appearance, does not change quantitative properties (e.g. liquid, number, etc.)
 - Piaget:
 - Children display centration: excessive focus on one piece of information
 - Lack reversibility: cannot reverse
 - Counterarguments:
 - Vocabulary of task may be verbally demanding or unclear (“more”, “same”, etc.)
 - Simplifying experiments improves children’s results
 - Transformation is superficial
 - Children do better when the change is presented as accidental (less emphasis on the change)
 - Three-mountains task: asking children to try to visualize objects/arrangements of objects from others’ perspectives
 - Used by Piaget as a measure of egocentrism; children do not pass until ~7, 8 years
 - Counterarguments: complicated/unclear question wording [verbally demanding], need for spatial abilities + memory
 - 3 year olds can succeed at police officer task
- **Concrete operational** (7-11): children become capable of logical reasoning, conservation
 - Flaws in conservation, logical reasoning
 - Requires objects be physically present for reasoning (cannot visualize)
 - Have difficulty with tasks requiring mental manipulation
 - Has difficulty thinking abstractly, reasoning hypothetically

- **Formal operational** (11+): children become capable of flexible, abstract thought
- Piaget founded discipline of cognitive development; attempted to explain development, rather than simply describing
 - Criticism: may have underestimated abilities of children, was vague with respect to processes/mechanisms of change, did not account for variability in performance/development of children, undervalued influence of sociocultural environment on development
 - Horizontal decalage - Piaget's term for variation between children (did not expand on it significantly)
 - Children who did certain types of play may perform better on certain conservation tasks than others

Social Psychology

- **Social psychology** – study of how individuals' thoughts, feelings, behaviors are influenced by others [by the presence of other people]
- Key questions of social psychology:
 - **Social cognition:** how do we understand and evaluate others?
 - **Group behavior:** how does our behavior change in the presence of other people

Social Cognition

- **Social cognition:** the process of making interpretations about the social world
 - We make judgments about others, e.g.
 - May make inferences on varying amounts of information: a lot, or very little
- People often make judgments and evaluations of others based on very little information (first impressions)
 - **Thin-slice studies** – studies asking participants to make various judgments about people based on small amounts of information
 - Ambady & Rosenthal: participants watched 10-second silent clips of unfamiliar professors teaching, then rated professors on scales 1-9 about various dimension of personality; ratings were then compared with actual student evaluations
 - Found relatively strong correlations with participants' first impressions, actual student teaching evaluations (participants were fairly accurate)
 - Accuracy - ability to predict end-of-year evaluations
 - Nick Rule – people can achieve >50% accuracy (57%) on guessing sexual orientation (male vs female) after only 50 milliseconds
 - People who self-identify as LGBTQIA perform better
 - People are above 50% on political orientation (Republican vs Democrat)
 - People can somewhat guess future success of lawyers based on college yearbook photos, chances of couples staying together based on 3-minute conversations, etc.
 - Conclusion: we can make somewhat accurate judgments on others fairly quickly

- We use schemas and **stereotypes** to help us make social decisions quickly
 - Problem: can also lead to errors and biased decisions
 - May be overused, or simply inaccurate
 - We may also underestimate variability within categories
 - Biases
 - Men judged as more competent, hireable, mentoring than women in hiring and course evals, by both men and women
 - **Stereotype threat** – a fear of confirming a negative stereotype about one’s social group (Claude Steele)
 - Results in decreased performance, e.g. academically
 - Ambady – stereotype threat exists as young as in preschool age
- **Impression-formation tasks** – informing participants about fictional groups (e.g. A vs B), and seeing how impressions/stereotypes about members of those groups form
 - Finding: participants tend to have a better impression of the larger group than of the smaller group, even if the ratio of positive to negative traits is equal
 - **Illusory correlation** – when people estimate that they have encountered more confirmation of an association between social traits, than they actually have
 - Stories about minority groups, negative events are especially susceptible to skewing our perception of frequency
 - May be an instance of availability bias
 - Hypothesis: negative stories about minority groups are especially attention-grabbing, potentially resulting in the formation of stereotypes
- Long-term impacts of receiving bias/discrimination, and possible interventions
 - Dunkel Schetter (UCLA) – experiencing discrimination can have long-term impacts on health (e.g. racial discrimination, maternal health)
 - Banaji, Nosek et al. – held research contest for implicit bias interventions
 - Holyoak, Lu, Priniski et al. (UCLA) – researched what forms of evidence were most effective in getting people to change their beliefs
- Reducing bias
 - Contact and friendship with members of the outgroup facilitates learning about the outgroup, reduces fear and anxiety
 - Brannon and Walton – contact with people in other groups can reduce bias, increase interest in other cultures

- Contact can even help in artificial settings
 - Forcing contact and personal disclosure in a lab, e.g., can reduce prejudice

Group Behavior

- Factors affecting behavior: conformity and obedience
- **Conformity** – the tendency to do what others do simply because others are doing it (i.e. to follow along with others)
 - **Solomon Asch Experiment** – participants were placed in groups, shown four lines, asked participants to say out loud which of the later 3 lines matched the length of the first line (for 12 different sets of lines)
 - Groups were composed of one real participant (last to speak) and six **confederates** (people told to say a certain answer)
 - On trials where every confederate gave the same incorrect answer: 75% of participants conformed at least once (gave the wrong answer), conformed on an average of $\frac{1}{3}$ of 12 trials
 - Variations:
 - Presence of an ally (e.g. someone else cooperating, or giving the same answer) decreases conformity
 - People conform less when confederates will not hear their responses (e.g. if they write their responses)
 - Smaller numbers of confederates (i.e. smaller groups) decreases conformity
 - Two reasons for conformity:
 - **Normative influence** – conformity resulting from concern of what other people think of us
 - **Informational influence** – conformity resulting from a feeling the group is correct (or giving useful information)
- **Obedience** – the tendency to do what an authority figure says to do
 - **Stanley Milgram experiment** tested obedience
 - Wanted to measure to what extent people would obey orders to harm others (context: descended from Holocaust survivors)
 - Procedure:

- Told participants experiment was about effects of punishment on memory
- Experiment rigged so participants always teacher; confederate always learner
- Teachers read word pairs to learner, test their memory; told to administer a shock to confederate with every incorrect response
 - Increase voltage after each wrong answer
 - Teachers hear learners; confederates pretend to be in pain after each shock, eventually protest study and then pretend to be unconscious
 - Experimenter (authority) tells participants to continue if participants object
- Predictions: people surveyed predicted less than tenth of a percent would reach the maximum shock
- Results: ~65% of people continued to maximum shock
 - Possible some amount (25%?) believed it was fake
- Ethics: experiment may be stressful to the participants, even if they were debriefed at the end (possibly inadequately)
 - Follow-up questionnaire: participants said they were glad to have participated, wanted similar experiments conducted
- Variations:
 - Closeness of confederate: learner in the same room decreases probability of continuing to end
 - Variant where teacher has to physically touch learner's hand to plate: only 30% continued to end
 - Closeness of experimenter:
 - Original: experimenter in same room
 - Variant: experimenter on phone (in another room) increases probability of stopping early
 - Respectability of environment: experimenter not wearing lab coat (not looking like a real experimenter) -> ~25%
 - Rundown site (room in a mall) -> ~48%
 - Number of teachers:

- Coteachers refusing -> 10%
 - Coteachers continuing -> 70%
- Original experiment all male participants; similar experiments had similar rates across males, females
- **Disposition** (certain people are inherently bad/worse than others) vs **environment** (people do bad things if they're in a bad environment)
- **Stanford Prison Experiment** (Phillip Zimbardo, 1971): why do good people do bad things if placed in a bad situation?
 - Procedure:
 - Randomly assigned male college students to be either guards or prisoners
 - Mock-arrested prisoners; brought prisoners in prison smocks in Stanford hall basement, pretended they were prisoners
 - Guards given uniforms/reflective sunglasses; instructed to do whatever they thought was necessary to maintain law and order, demand prisoner respect
 - Prison: no clocks/windows, no specific guard training (Zimbardo)
 - Progression: Guards began to abuse prisoners over time (physically/sexually)
 - Created solitary confinement; humiliated prisoners
 - One prisoner left @ 36 hours for emotional breakdown
 - Some guards treated it like a game
 - Continued for six days until Zimbardo's girlfriend saw experiment and was horrified, intervened, experiment ended
 - Conclusions
 - Zimbardo: experiment shows power of social roles in influencing behavior (even if randomly assigned)
 - Potential issues: participants were recruited via ad mentioning "prison life"; may have enforced demand characteristics
 - Zimbardo gave specific instructions: no physically abuse/torture, told to create boredom/frustration/some

fear, take away individuality, do not call by names (only number), create powerlessness, allow only guards allow

- May have created expectations for guards (demand characteristics)

- Considered unethical

- **Bystander effect** – the failure of people to offer help to someone in need, when there are other people present
 - People are less likely to help when people are in groups [larger groups], crowds
 - Kitty Genovese - murdered while walking home from work; NYC headline: 37 people saw murder, did not call police
 - Sparked research into bystander effect
 - NYU professors' study (Darley & Latane (1968))
 - Procedure:
 - Study was described as being about college life
 - Brought participants into lab to talk about college experiences, alone (preserve anonymity)
 - Told to talk with other participants over intercom
 - Only one real participant on intercom: other people all confederates
 - One subject appears to have medical emergency (talks like they're having seizure/epilepsy)
 - Asks others for help; stop speaking
 - Experiment manipulated number of confederates talking to original participant
 - Levels: two people, three people, seven people (incl. Participant, medical emergency subject)
 - Experimenters measured how many participants left/to check on subject/stood up + time participants waited
 - 2 people: people are generally likely to respond (85%) and respond pretty quickly
 - 3 people: rates drop to 62%, a bit slower (100s)
 - 7 people: 31%, even slower

- Argument: **diffusion of responsibility**: people tend to feel less personally responsible (e.g. for helping) when they are around other people acting the same way
 - Criticism: not all participants may have actually thought the medical emergency was real (thought it was part of the study)
- Other results: if 1 person helps, other people will generally also pitch in to help
 - Diffusion of responsibility is not a sufficient explanation
- Modern research: bystander effect may be driven more by **uncertainty**
 - Namely, uncertainty that the person actually needs help
 - Rates of helping may be higher than we think
 - CCTV footage of crimes: strangers may help 90% of the time
- Kitty Genovese case: lots of uncertainty involved (many residents only heard people yelling), people did actually call police
- Removing uncertainty: explicitly stating help is needed, targeting specific people

Clinical Psychology

- Making clinical diagnoses is difficult: context matters a lot (duration of symptoms, alternative causes (significant life events?))
 - No clear line for what level of symptomatology warrants a diagnosis (e.g. “being sad” vs “clinical depression”)
 - How much does it affect daily life?
 - Different people may experience emotions differently
 - Diagnostic and statistical Manual of mental Disorders (DSM[-V]) used to make diagnostic decisions
 - Lists symptoms needed for diagnoses; a certain number needed for a certain time period for a diagnosis
 - Diagnoses generally need to be persistent (occurring over a long period of time) and cause significant distress/impairment (change their daily lives)
 - Uses a medical model, similar to general medicine: assumes psychological disorders have biological/environmental causes, symptoms, and possible treatments
 - Does not view psychological disorders as punishments, resulting from possession/supernatural forces
 - Benefits: use of diagnostic labels/medical records help facilitate communication between practitioners, standardization, guide practitioners in selecting most effective treatment option for the patient’s specific disorder
 - Diagnostic labeling should be used as part of a person-centered approach (i.e. the label should not define the person: people with depression [good] vs depressed people [bad])
 - Drawbacks: labeling/diagnosis can lead to stigma, lower self-esteem, feelings of helplessness
 - Some people can actually see diagnoses, possibility of treatment as validating; but not all
 - Labeling/stigma is a large reason why many people do not seek treatment

- Medical model may fail in the case that people just fail to meet the cutoff for a diagnosis; certain treatments/medical services may require diagnoses, and thus be unavailable
- Systematic diagnosis of mental illnesses can be difficult, since people describe/experience symptoms differently
 - Descriptions may be unclear in terms of whether they actually refer to a specific symptom
- DSM diagnoses change over time, with advances in research
 - Good: Homosexuality no longer classified as mental disorder
 - Bad: people may lose diagnoses, access to services as diagnostic criteria change
- Role of culture: how people express/explain distress can vary across cultures
 - General patterns of diagnoses are similar across cultures, but prevalence rates may vary
- 1 in 5 will experience mental illness/addiction in a given year (67% in silence/without seeking treatment); half in their lifetime
- Other approaches: Research Domain Criteria Project (RDoC) views psychological disorders as resulting from differences/dysfunction in normal psychological processes
 - Generally used in research (potentially with DSM); focuses on studying basic processes/underlying causes of disorders
 - Based on work showing *comorbidity* (commonalities across disorders): many people who have a disorder may satisfy multiple disorders
- Potential causes of mental health issues:
 - Extent to which different things cause issues can vary person-to-person
 - Two models:
 - **Bio-psycho-social model:** all three of biological (genes, brain structure, hormones), psychological (learning, perceptions, memory), social (support, environment, culture) contributors can play in a role in varying proportions

- **Diathesis-stress model:** combinations of diathesis (predispositions to mental health issues: brain structure, hormones, early learning, memory bias, genes) and stressors/stresses (abuse, physical illness, trauma, loss) result in psychological disorders
- Mental health not always seen by the public as an aspect of health; may affect likelihood of people seeking treatment
 - Ad campaigns run to increase awareness of mental health as part of health

Mental Disorders

- Paquette-Smith taught based on DSM criteria; individual experiences may not fit diagnostic criteria perfectly
 - Paquette-Smith taught based on frequency (prevalence of disorders), myths (misconceptions about disorders), MCAT contents

Anxiety Disorders

- Anxiety disorders – disorders involving the experience of anxiety out of proportion with the risk involved, such that it affects day-to-day life
 - **Anxiety** – negative mood state accompanied by bodily symptoms: increased heart rate, muscle tension, sense of unease, apprehension about future
 - Is a normal emotion; but there can be too much of it
 - Possible contributors:
 - Genetic factors may affect how people deal with stress (stress responses)
 - Women are twice as likely to have an anxiety disorder as men
 - Certain anxiety disorders (phobias esp.) can run in families
 - Psychological factors - early learning, perceptions, memory
 - Social environment – social support, culture
- Specific anxiety disorders:
 - **Generalized anxiety disorder (GAD)** – excessive worry about everyday things, out of proportion to specific causes of worry
 - Occurs in about 6% of the population; more frequently in women, with a late median onset (31 years of age)
 - Sources of anxiety shift; not a single cause/source

- Has to occur for at least 6 months of excessive anxiety
 - May be accompanied by difficulty concentrating, muscle tension, fatigue, sleep problems
- Worry can be self-reinforcing: gratification from the dispersion of undue anxiety can operant condition to feeling of stronger anxieties in the future
- **Panic disorder** – recurrent, unexpected panic attacks
 - **Panic attacks** – acute feelings of panic [very intense fear] (usually <10 min, unlike GAD)
 - Symptoms: shortness of breath, heart palpitations, sweating, feelings of dread
 - May feel like a heart attack to first-timers
 - 11% of adults experience a panic attack each year; only 5% meet diagnostic criteria in their lifetimes
 - Requirements:
 - Panic attacks must be recurrent (i.e. >1)
 - Intense anxiety/avoidance related to attacks for at least 1 month, causing significant distress/interference with life
 - Can also result in **agoraphobia** – fear of public places [namely, having panic attacks in a public place]
- [Specific] Phobias – irrational fears of a specific object or situation
 - Must impair the person's everyday function
 - Subtypes: blood-injury-injection, situational (planes/elevators, e.g.), natural environment (storms, heights, water), animal type, other (choking/vomiting)
 - Most types cause panic (increase in heart rate)
 - Exception: blood-injury-injection phobias decrease heart rate (result in passing out)
 - Blood-injury-injection phobias seem to have a genetic connection (tends to run in families)
 - Generally involve a well-founded fear at an extreme level
 - Preparedness theory – people are predisposed to have certain fears (e.g. spiders > flowers)
 - Proof: learning does not fully explain behavior (people with phobias are not necessarily more likely

to recall negative experiences with feared object/situation)

- May relate to temperament/neurobiological factors
 - Most common anxiety disorder – 12%
- **Social anxiety disorder** – fear of social situations leading to worry and diminished day-to-day function
 - Second most common anxiety disorder (behind phobias)
 - Types: May be around 1-on-1 situations, performance anxiety (public speaking)

PTSD

- **Post-traumatic stress disorder (PTSD)** – mental disorder resulting from exposure to a traumatic event
 - Separate axis from the anxiety disorders
 - Traumatic event does not need to be first-person – can also have been heard about, read about, etc.
 - Diagnostic symptoms:
 - Chronic psychological arousal
 - Recurrent unwanted thoughts or images of the trauma
 - Avoidance of things that call the traumatic event to mind
 - Symptoms must occur for at least 1 month

OCD

- **Obsessive-compulsive disorder (OCD)** – mental disorder involving the experience of obsessive thoughts and/or compulsions that seem irrational or nonsensical
 - *Ritualistic behaviors* must take up a significant amount of time (at least 1 hour/day), cause significant amount of distress/impairment in function
 - May involve checking, ordering/patterns of objects or actions, cleansing rituals (e.g. obsessive hand washing), repeating actions/words (until something “feels right”)
 - Two components: **obsessions** and **compulsions**
 - **Obsessions:** unwanted, inappropriate, and persistent thoughts
 - **Compulsions:** repetitive, ritualistic behaviors
 - Performed to gain temporary relief from obsessions

Mood Disorders

- **Mood disorders**
 - **Unipolar disorders (depression) –**
 - **Major Depressive Disorder (MDD)**
 - Requires individual to have one or more major depressive episodes (MDE), but no history of manic/hypomanic episodes
 - **Major depressive episode** – requires at least 5 of 9 symptoms: depressed mood, anhedonia, weight loss/increase in appetite, insomnia/hypersomnia, agitation/psychomotor retardation (feeling things have slowed down), fatigue/loss of energy, worthlessness/excessive or inappropriate guilt, diminished ability to concentrate/indecisiveness, recurrent thoughts of death/suicidal ideation/attempts
 - Must have one or both of depressed mood or anhedonia (lack of interest in/enjoyment of formerly pleasurable things) recurring every day
 - Must last for at least 2 weeks, not be resulting from chemical substance
 - Other diagnoses exist under the umbrella of depression (e.g. persistent depressive disorder – longer-lasting, but not necessarily as severe)
 - Depression prevalence: ~18%; higher in women (possible hormonal contributors – post-partum depression)
 - Contributors to depression:
 - Biological factors
 - Twins (monozygotic [same DNA] vs dizygotic [different egg/sperm]) –shared genes?
 - Some antidepressants target certain neurotransmitters (namely SSRIs with serotonin)
 - Psychological factors

- Attribution style: pessimistic attribution style (the tendency to view negative events as persistent/stable)
 - Social factors: stressful life events, interpersonal factors, having a lower socioeconomic status (SES)
 - Gene x environment interactions – certain genes may interact with environment to lead to depression
 - Study: Life stress and the serotonin transporter gene (5-HTT gene) – people with more of shorter allele seems to make people more susceptible to environmental/life stress, leading to higher rate of depression
 - Short/long alleles have similar rates of depression in cases of no childhood maltreatment; but short allele rates increase with larger likelihoods of maltreatment, where long allele rates do not
 - More stressful life events – higher rates for shorter allele-d individuals relative to long
- **Bipolar disorders** – mental disorders characterized by cycles of abnormal and persistent high moods (*mania*) and low moods (*depression*)
 - Mania must last at least one week
 - Symptoms: Decreased need for sleep, talkativeness, racing thoughts, reckless behavior
 - Negative symptoms: irritability/agitation
 - Can technically be diagnosed with just mania
 - Lower prevalence than depression (~2.5%)
 - Contributors:
 - Biological factors: twin studies (higher concordance with identical than fraternal twins)
 - Psychosocial contributors: life stressors
 - Positive life events (especially those resulting in attainment of a goal) may increase likelihood of manic episodes

- Types: bipolar I vs bipolar II

Schizophrenia

- **Schizophrenia** – mental disorder resulting in the experience of **delusions** (false beliefs)
 - **Delusions** are beliefs generally held to be false, or false for that person
 - Categories: persecutory (that the person is being persecuted), grandiose (of inflated self-importance), referential (that other people are talking to the person/that media is messages sent to the person)
 - Can also experience **hallucinations**: perceptual experiences that occur without any corresponding stimulus in the outside world generating said experiences
 - Can be auditory, visual, olfactory, gustatory, or somatic
 - Auditory hallucinations most common (~65%) – may involve people talking to the person (usually in a negative manner: demeaning, commanding, e.g.)
 - May be perceived as coming from either inside or outside of the body
 - Can also cause **disorganized speech** – difficult-to-follow speech, where answers do not clearly follow questions or sentences do not logically flow from each other
 - May jump from topic to topic, e.g.
 - Diagnostic criteria requires at least 2 symptoms (of delusions, hallucinations, disorganized speech, disorganized/catatonic behavior [reduction in voluntary movement], and negative symptoms), present for at least 1 month
 - At least one of delusions, hallucinations, disorganized speech must be present
 - Symptoms divided into **positive** and **negative symptoms**
 - **Positive symptoms** generally involve the experience of sensations in excess
 - Are generally the most visible symptoms: hallucinations, delusions, disorganized speech, disorganized behavior
 - **Negative symptoms** resemble symptoms of depression
 - Flat affect (reduced emotional reactivity), alogia (poverty of speech), anhedonia/amotivation, social withdrawal
 - Other symptoms/findings

- **Cognitive symptoms** involve differences in cognitive functioning
 - Cognitive symptoms: difficulty in sustaining attention, poor problem solving, deficits in learning/memory, poor abstract thinking
 - May also be seen in first-degree relatives of schizophrenics
 - Not part of the diagnostic criteria, but possible predictors
- Schizophrenics on average have larger cerebral ventricles, reduced overall brain volume (namely grey matter)
 - Not universal symptoms; may instead be a side effect of schizophrenia medications
 - Reduced overall brain volume may also be seen in first-degree relatives
- Prevalence: ~1%
- Contributors:
 - Biological factors: genetics (strong familial link), possible neurotransmitter associations (dopamine inhibitors for treating schizophrenia)
 - Environmental factors: issues during mother's pregnancy (stress, infection, malnutrition, hypoxia)
 - Weak association between schizophrenia and winter birth month (greater exposure to flu through mother?)

Psychological Treatments

- Psychological treatments
 - **Psychoanalytic/psychodynamic therapy** – therapy meant to reduce inner conflict by giving patients insight into their unconscious thoughts and feelings
 - Based on Freudian psychology
 - May emphasize impact of childhood experiences
 - **Cognitive behavioral therapy (CBT)** – therapy meant to teach people new, more constructive ways of thinking and acting
 - Meant to change cognitions/behaviors of a disorder; teach coping skills
 - Intended to be an intervention to break the entrenched, self-reinforcing cycles that may result from a mental disorder

- More active than psychoanalytic therapy – encourages learning of new techniques by patients (may even have practice, as homework)
- Biomedical therapies
 - **Psychopharmacology** – the effect of drugs on the mind and behavior
 - **Antipsychotic medications** (e.g. Chlorpromazine/Thorazine) block dopamine receptor sites
 - Can be used to treat positive symptoms of schizophrenia
 - **Selective serotonin reuptake inhibitors (SSRIs)**; e.g. fluoxetine/Prozac) cause serotonin to remain longer in the bloodstream
 - Can be used as antidepressants; can also treat anxiety disorders
- Both psychological and biological treatments may be used to treat mental disorders, and may even be used together
 - No single answer as to which is necessarily better (no one-size-fits all solution to any disorder; depends on individual)
 - Psychological disorders are more than just “bad chemistry” – just because biological treatments help, may not reflect the actual mechanism
 - Some psychological, biological treatments may actually work in similar ways from a neurological perspective (e.g. affect function of the same parts of the brain)
 - Treatments may be culturally sensitive, or tailorable to certain groups
- Barriers to treatment: lack of awareness, problems finding/affording treatment, stigma around mental disorders
- Preventative programs promoting well-being, mental health

Other Topics

Personality

- **Personality traits** – enduring dispositions in behavior, varying across individuals, that characterize a person across various situations
 - Are generally fairly consistent and stable – persist in an individual over time
 - Scores in personality tests at various points in life tend to have a strong inter-test correlation
- Big 5: a 5-dimensional model of personality
 - Consists of: openness to experience, conscientiousness, extraversion, agreeableness, neuroticism (emotional stability)
 - Age cohort effects: people do increase somewhat in conscientiousness, agreeableness as they age
- Findings/slight correlations
 - People higher in conscientiousness perform well in work, live longer
 - People higher in extraversion have more Facebook friends