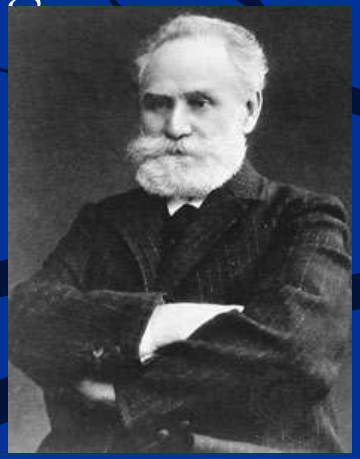
Module 9: Learning

Three Kinds of Learning

1. Classical conditioning: learning in which a neutral stimulus acquires the ability to produce a response that was originally produced by a different stimulus.
   - Discovered by Ivan Pavlov
   - Pavlov had previously won a Nobel Prize for his studies on the reflexes involved in digestion.
2. Operant conditioning
3. Cognitive learning



Procedure: Classical Conditioning

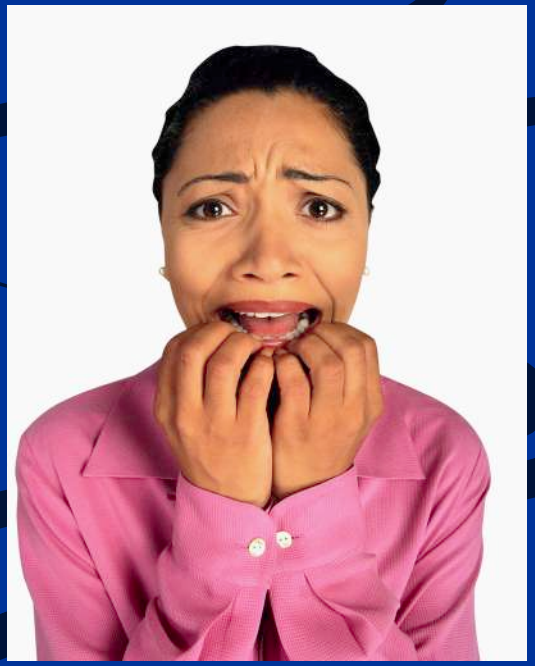
- Carla's example
  - Had several hours of dental work done; process was painful & uncomfortable
  - While getting dental work, smelled the dentist's aftershave, the same aftershave her boyfriend wears
  - Smell of boyfriend's aftershave made her anxious

Procedure: Classical conditioning cont.

- Step 1: choose stimulus & response
  - Choose neutral stimulus: stimulus that causes a sensory response, but does not produce the reflex tested
  - For Carla, the neutral stimulus is: aftershave scent; sensory response is smelling aftershave, but doesn't affect her
  - Choose unconditioned stimulus: stimulus that naturally triggers a response, such as physiological reflex
  - For Carla, US is dental procedures

Procedure: Classical conditioning cont.

- Step 1 continued
  - Select & measure the unconditioned response: unlearned, natural response to the unconditioned stimulus
  - For Carla, the UR is anxiety



Procedure: Classical conditioning cont.

- Step 2: Establishing classical conditioning
  - Conduct a trial: present the neutral stimulus & short time later, present the unconditioned stimulus
  - Neutral stimulus + unconditioned stimulus → Unconditioned response

--For Carla, smell of aftershave (NS) + dental procedures (US) → feelings of anxiety (UCR)

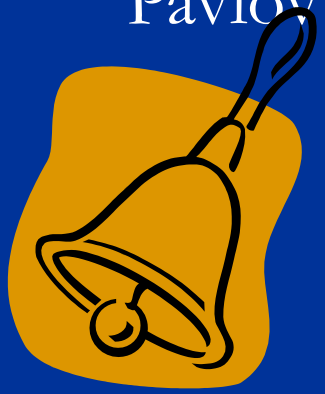
Procedure: Classical conditioning cont.

- Step 3:Testing for conditioning
  - Present conditioned stimulus without the unconditioned stimulus
  - conditioned stimulus: previously neutral stimulus triggers a response
  - Ask: does a conditioned response occur?
  - Conditioned response (CR): learned response to a neutral stimulus
  - For Carla, aftershave smell (CS) elicited anxiety (CR)

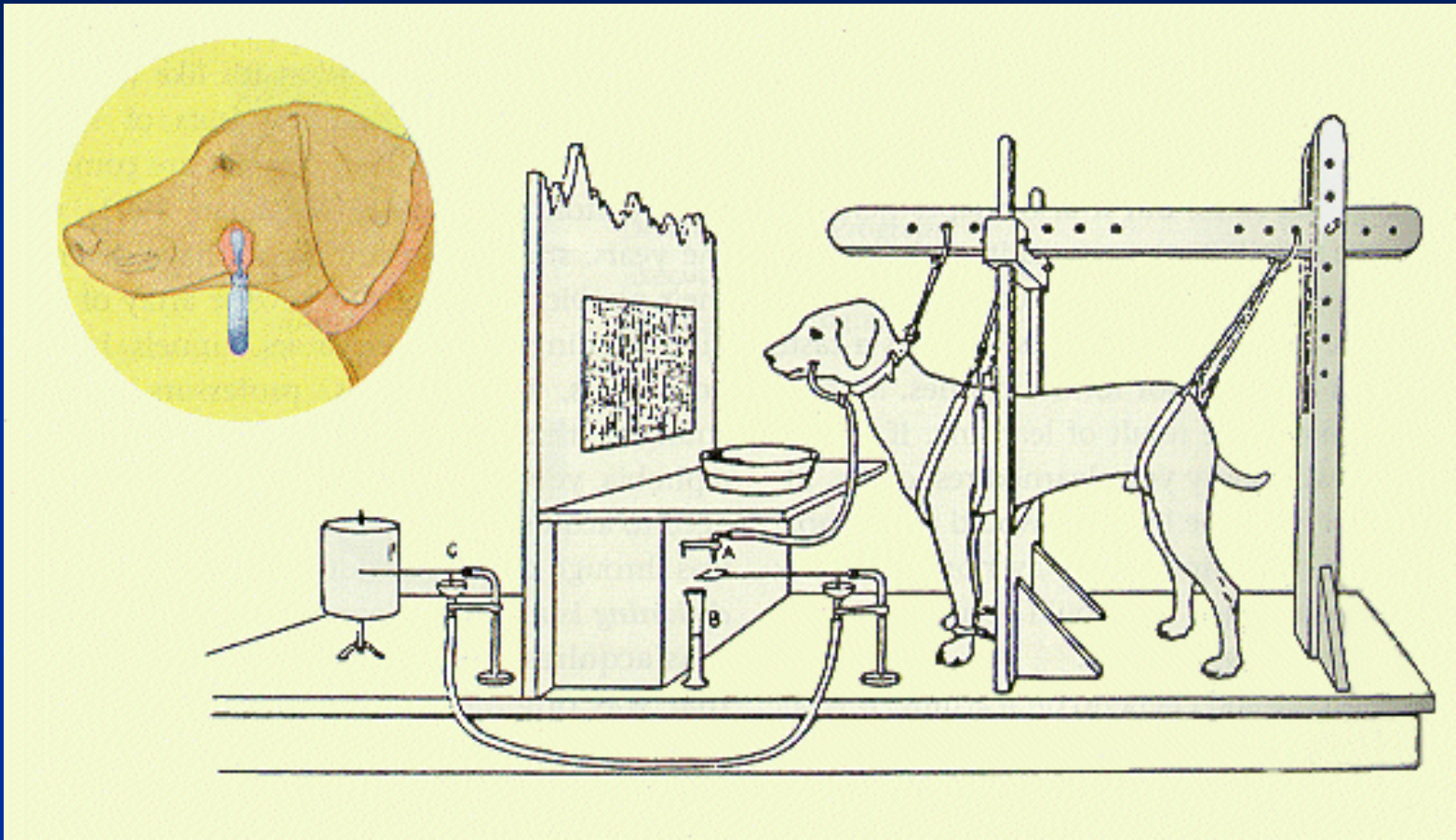
Famous Study: Pavlov's Dogs

- Process:
  - Neutral stimulus: bell; unconditioned stimulus: food; unconditioned response: salivation
  - Trials: Bell (NS) + food (UCS) → salivation (UCR)

3. Test: Does the bell (CS) trigger salivation (CR)? Pavlov found that it did



Pavlov: Salivary Conditioning Apparatus



Another Famous Study: Little Albert

- John Watson & Rosalie Rayner published in 1920; classic experiment on conditioning emotions
- Subject: Eleven-month-old infant known as Little Albert
- Developed a conditioned emotional response through the following experiment:

-White rat (NS) + loud bang (UCS) → startle response (CR)

Another Famous Study: Little Albert Picture

Other Conditioning Concepts

- Generalization: transfer of effects of conditioning to similar stimuli
- Carla may also feel anxiety with products that smell similar to aftershave
- Discrimination: Subject learns to respond to one stimulus, but not to a similar stimulus; may have adaptive value

--Carla doesn't feel anxious after smelling nail polish

Other Conditioning Concepts cont.

- Extinction: conditioned stimulus is repeatedly presented without the unconditioned stimulus & the conditioned stimulus no longer elicits the conditioned response

--Carla would no longer react to aftershave

Application: treatment of phobias

- Spontaneous recovery: conditioned response reappears after being extinguished; doesn't persist for long & lesser magnitude

--Carla sees dentist & response to aftershave reappears

Adaptive Value of Classical Conditioning

- Adaptive value: usefulness of certain traits that have evolved in animals & humans & tend to increase their chances of survival.
  - Taste-aversion learning: associating a particular sensory cue with getting sick & thereafter avoiding that sensory cue in the future; can last weeks, months, or years. ex: rats & poison bait, avoiding a drink after getting sick

Adaptive Value of Classical Conditioning cont.

- Taste-aversion learning was inconsistent with belief that classical conditioning required many trials
- Psychologist John Garcia explained it with the concept of preparedness
- Preparedness: phenomenon that animals & humans are biologically prepared to associate some combinations of conditioned & unconditioned stimuli more easily than others.

Examples of adaptive value of classical conditioning:

- Salivating when seeing or thinking about food

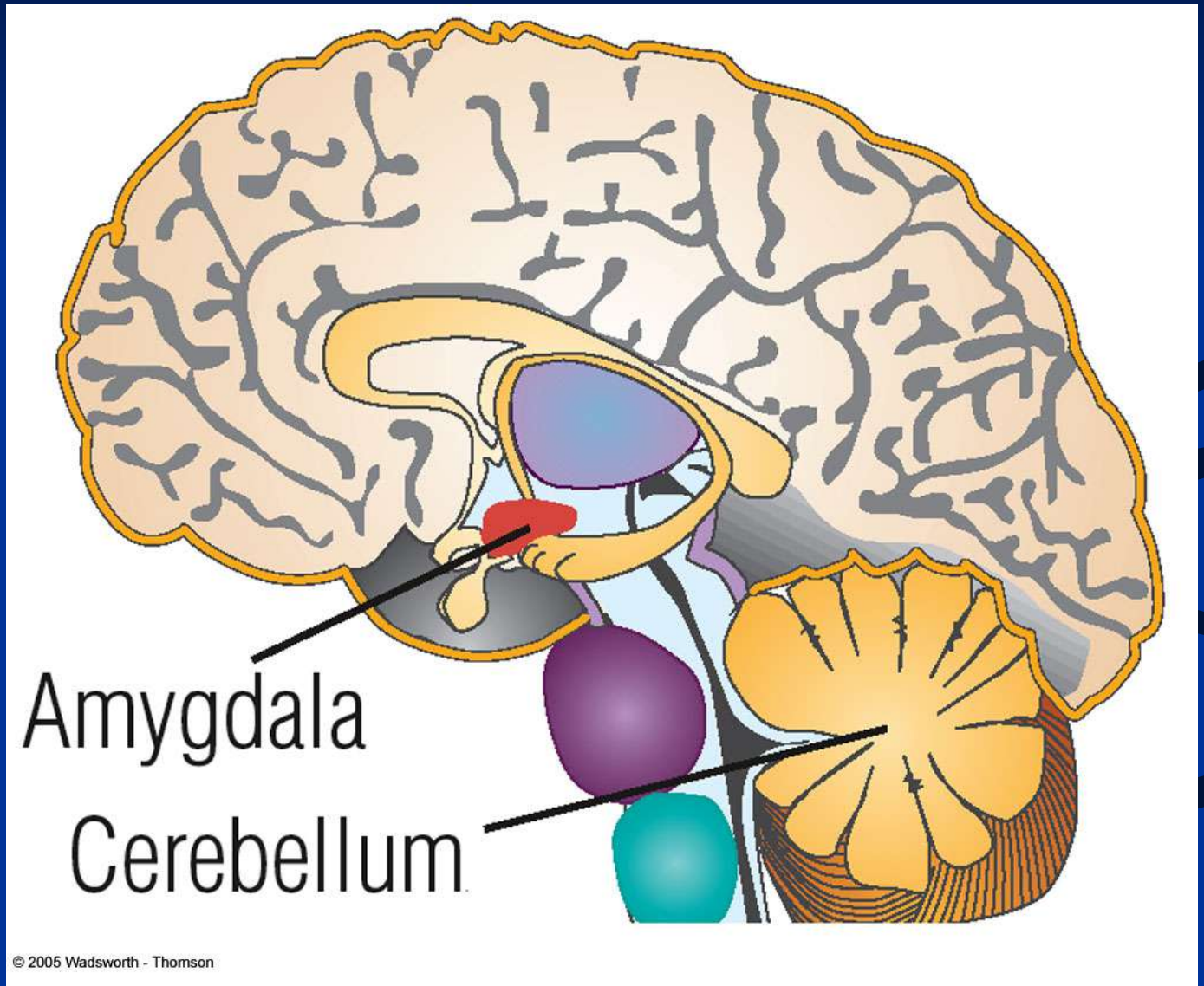
Conditioned emotional response: feeling positive or negative emotion when experiencing a stimulus that initially accompanied a pleasant or painful event, such as a shot

- Part of brain responsible for classical conditioning:

-cerebellum for motor responses

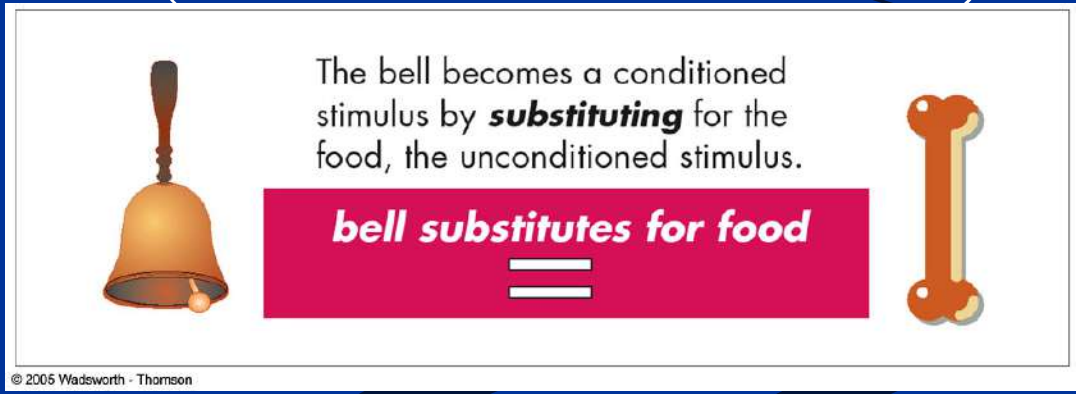
-for emotional response, the amygdala is responsible

Does this elicit a response?



Theories of Classical Conditioning

- Stimulus substitution: neural association forms in the brain between the neutral stimulus & unconditioned stimulus. After trials, neutral stimulus becomes the conditioned stimulus and acts like a substitute for the unconditioned stimulus. (bell substitutes for food)

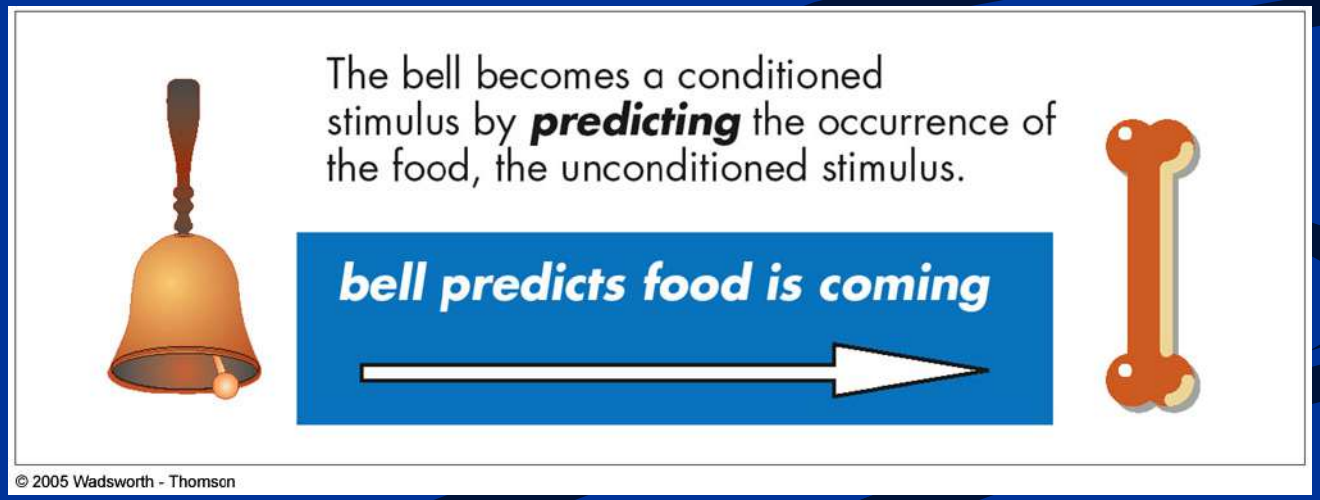


Theories of Classical Conditioning cont.

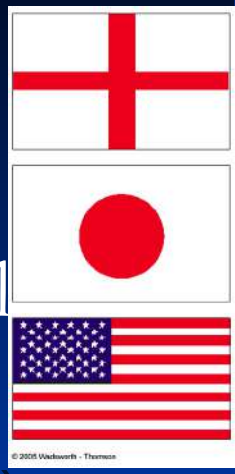
- Contiguity theory: classical conditioning occurs because two stimuli (NS & UCS) are paired close together in time (contiguous). Consequently, neutral stimulus becomes the conditioned stimulus, which elicits the conditioned response. (bell & food are paired, bell becomes CS & causes salivation)

Theories of Classical Conditioning cont.

- Cognitive perspective: an organism learns what to expect; one stimulus (NS) predicts the other (UCS).
- Widespread support for this theory



Cultural Diversity: Conditioning Dental Fears



- Rates of dental fears varies by country; dental fear is greater in the U.S. & Asia than in Scandinavian countries
- Rates differ because of availability of dental care; free & easily available in Scandinavian countries; receive regular dental care
- Neither America nor Japan have free, universal coverage; many wait until they have serious and/or painful dental problems

Cultural Diversity: Conditioning Dental Fears cont.

- Researchers have found that the majority of dental fears are acquired in childhood or adolescence through classical conditioning; may make individuals avoid checkups or seek treatment only for emergency problems
- To reduce dental fear, must receive nonpainful dental treatment, which will extinguish some of conditioned emotional responses

Examples of Classical Conditioning

- Fear of needles injections, or seeing blood
- Anticipatory nausea: feelings of nausea that are elicited by stimuli associated with nausea-inducing chemotherapy treatments; can be in anticipation of treatment; ex: Michelle experienced nausea when smelling her dish soap that smelled like the treatment room
  - Difficult to treat with drugs
  - Can be treated with systematic desensitization

Systematic Desensitization

- Procedure based on classical conditioning in which a person imagines or visualizes fearful or anxiety-provoking stimuli & immediately uses deep relaxation to overcome the anxiety
- Form of counterconditioning; it replaces fear & anxiety with relaxation
- Developed in 1950s; most frequently used nonmedical therapies for relief of anxiety & fears in children & adults
- Very effective

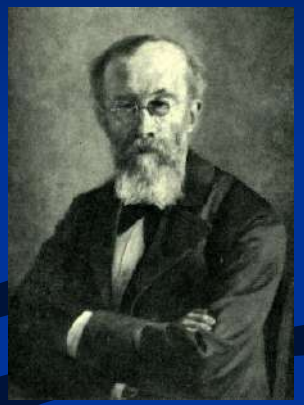
Systematic Desensitization cont.

- Step 1: Learning to relax on cue (for several weeks)
- Step 2: Make an anxiety hierarchy; a list of items that elicit anxiety

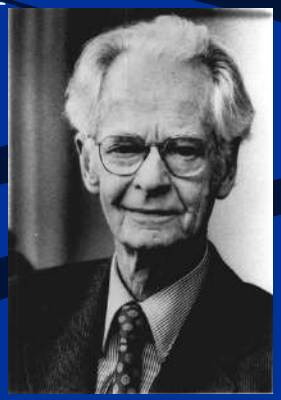
- Imagining & relaxing; imagines least stressful situation while in relaxed state &she continues up the anxiety hierarchy

Three Kinds of Learning cont.

Operant conditioning: learning in which consequences that follow some behavior increase or decrease the likelihood of that behavior's occurrence in the future.



- Discovered by E.L. Thorndike
- B.F.Skinner further developed & expanded the study of operant learning



History of Operant Conditioning

- E.L Thorndike conducted an experiment with a series of puzzle boxes from which a cat could escape & receive a reward by learning a specific response
- He formulated the **law of effect**: behaviors followed by positive consequences are strengthened, while behaviors followed by negative consequences are weakened

History of Operant Conditioning cont.

- Skinner devised the concept of **operant response**: response that can be modified by its consequences & is a meaningful unit of ongoing behavior that can be easily monitored.
- Used Skinner box; box with a bar that when pressed, releases food; used with rats
- Shaping is also part of process. It is a procedure in which an experimenter successively reinforces behaviors that lead up to or approximate to the desired behavior.
- Skinner stresses that the reinforcement should be immediate

Examples of Operant Conditioning

- Superstitious behavior: behavior that increases in frequency because its occurrence is accidentally paired with the delivery of the reinforcer
- Toilet training
- Food refusal
- Process:
  - Determine target behavior
  - Preparation
  - Use reinforcers
  - Shaping

Consequences

- Reinforcement: a consequence that occurs after a behavior & increases the chance that the behavior will occur again
- Punishment: consequence that occurs after a behavior & decreases the chance that the behavior will occur again
- Pica example. Pica: behavioral disorder that involves eating inedible objects or unhealthy substances.

Reinforcement

- Positive reinforcement: the presentation of a stimulus (positive reinforcer) that increases the probability that a behavior will occur again
- Negative reinforcement: an aversive (unpleasant) stimulus whose removal increases the likelihood that the preceding response will occur again; example: taking an aspirin to get rid of a headache

Negative Reinforcers

- Taking aspirin to relieve a headache
- Hurrying home in winter to get out of cold
- Fanning oneself to escape the heat
- Leaving a movie theater if the movie is bad
- Faking a stomach ache to avoid school
- Putting on a seatbelt to avoid the buzz
- Saying “uncle” to stop being beaten
- Putting up an umbrella to escape the rain

Reinforcers

- Primary reinforcer: stimulus that is immediately satisfying & requires no learning on the part of the subject to become pleasurable, such as food, water, sex
- Secondary reinforcer: stimulus that has acquired its reinforcing power through experience; learned, sometimes through pairing with primary reinforcer or other secondary reinforcers, such as grades & money

Punishment

- Positive punishment: presenting an unpleasant stimulus after a response, such as spanking; decreases chances that response will recur.
- Negative punishment: removing a reinforcing stimulus after a response, such as taking the allowance away; decreases chances that response will recur.
- BOTH stop or decrease the occurrence of a behavior
- Self-injurious behavior: serious & sometimes life-threatening physical damage a person inflicts on his or her own body. Can use positive punishment to treat this.

Clarification

- Positive & negative punishment *decrease* the likelihood of a behavior occurring again
- Positive & negative reinforcement *increase* the likelihood of a behavior occurring again

Schedules of Reinforcement

- Schedule of reinforcement: program or rule that determines how & when the occurrence of a response will be followed by a reinforcer.
- Continuous reinforcement: every occurrence of the operant response results in delivery of the reinforcer.
- Partial reinforcement: situation in which responding is only reinforced only some of the time.

Partial Reinforcement Schedules

- Fixed-ratio: reinforcer occurs only after a fixed number of responses are made by the subject; predetermined set of responses; ratio (number or amount is fixed)

Ex: Car wash employee receives $10 for every 3 cars washed

- Fixed-interval: reinforcer occurs following the first response that occurs after a fixed interval of time; the interval (time) is fixed

Ex: Monthly paycheck

Partial Reinforcement Schedules cont.

- Variable-ratio: reinforcer is delivered after an average number of correct responses has occurred; occurs unpredictably; ratio (number or amount) varies

Ex: Slot machines

- Variable-interval: reinforcer occurs following the first correct response after an average amount of time passed; unpredictable; interval (time) varies

Ex: Study steadily because pop quiz is possible

Other Conditioning Concepts

- Generalization: an animal or person emits the same response to similar stimuli
- Discrimination: a response is emitted in the presence of a stimulus that is reinforced & not in presence of unreinforced stimuli.
- Discriminative stimulus: cue that a behavior will be reinforced

Other Conditioning Concepts cont.

- Extinction: reduction in an operant response when it is no longer followed by a reinforcer.
- Spontaneous recovery: temporary recovery in the rate of responding.

All four of these phenomena occur in both operant & classical conditioning.

Three Kinds of Learning cont.

3. Cognitive learning: learning that involves mental processes (attention & memory), may be learned through observation or imitation & may not involve external rewards or require the person to perform any observable behaviors.

- Major figure is Albert Bandura
- Roots date back to work of Wundt in late 1800s
- Theory died in 1950s, reborn in 1960s, became popular in 1990s
- Extremely useful in explaining animal & human behavior; vital to development of cognitive neuroscience

Three Viewpoints of Cognitive Learning

- Against: B.F. Skinner: said psychology's goal should be to study primarily observable behaviors rather than cognitive processes
- In favor:
- Edward Tolman: developed concept of the cognitive map: mental representation in the brain of the layout of an environment & its features; can complete tasks without reinforcement
- Albert Bandura: social cognitive learning: learning from watching, imitating & modeling & does not require the observer to perform any observable behavior or receive any observable reward.

Observational Learning

- Famous study: Bobo Doll Experiment
- Preschool children involved in an art project witnessed an adult kicking, hitting, and yelling at a large Bobo doll (in the same room). Another group of children was not exposed to this. Children were then put in room with toys including Bobo doll & put through a mildly frustrating situation.
- Results:
  - children who witnessed the attack on Bobo also kicked, hit & yelled at Bobo.
  - The children who had not observed the attack did not hit or kick Bobo.
  - The point: these children learned to perform specific aggressive behavior by simply watching a model perform these behaviors (no practice or reinforcement needed). Also, some children did not exhibit aggressive behavior after observing.

Learning Vs. Performance

- Learning-performance distinction: learning may occur but may not always be measured by, or immediately evident in, performance.
- Shown through another Bobo experiment. Children watched movie in which an individual hit & kicked Bobo; some did not imitate the behavior until promised a reward for doing so.

Bandura's Social Cognitive Theory

- Social cognitive theory: emphasizes observation, imitation & self-reward in the development and learning of social skills, personal interactions & other behaviors; it is not necessary to perform observable behaviors or receive external rewards to learn.
- Four processes involved:
  - 1. attention-observer pays attention
  - 2. memory-observer stores the information
  - 3. imitation-use remembered information to model the behavior
  - 4. motivation-needs reason or incentive to imitate

  Application: reduce fears

Insight Learning

- Insight: mental process marked by the sudden & expected solution to a problem, called "ah-ha" experience
- Wolfgang Kohler coined the term after doing research with a chimp; chimp had to figure out a strategy to obtain a hanging banana
- Example: A man walks into a bar & asks for a glass of water. The bartender points a gun at the man. The man says "Thank you," & walks out. Use insight to help you solve the problem.

Biological Factors in Learning

- Biological factors: innate tendencies or predispositions that may either facilitate or inhibit certain kinds of learning; may serve adaptive functions.
- Example: play behaviors may help animals or humans learn to develop social relationships among peers
- Imprinting: inherited tendencies or responses that are displayed by newborn animals when they encounter certain stimuli in their environment; are irreversible, such as baby chicks who follow the first moving object they see

Biological Factors in Learning cont.

- Critical, or sensitive period: relatively brief time during which learning is most likely to occur.
- Preparedness also contributes to learning
- Human infants' brains are biologically prepared to recognize & discriminate among sounds that are essential for learning speech

Research Focus: Noncompliance

- Noncompliance: child refusing to follow directions, carry out a request, or obey a command given by a parent or caregiver.
- Time-out: negative punishment in which reinforcing stimuli are removed after an undesirable response; decreases chances that undesired response will recur; considered effective

Application: Behavior Modification

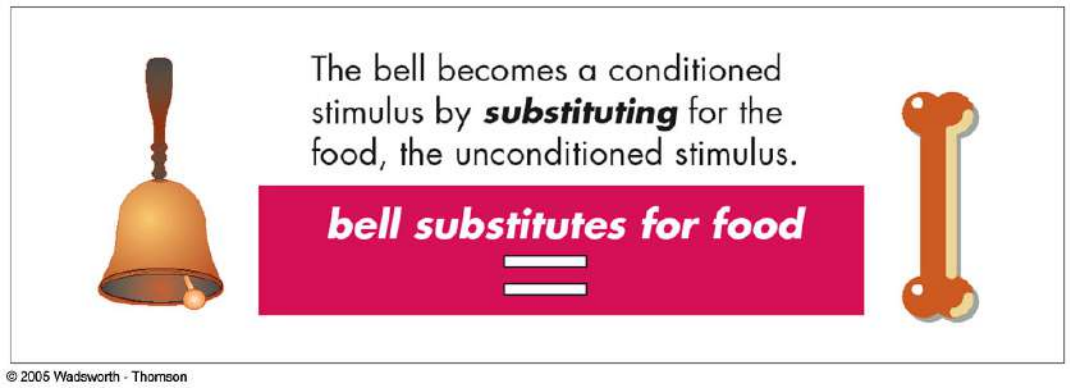
- Behavior modification: treatment or therapy that changes or modifies problems or undesirable behaviors by using principles of learning based on operant conditioning & social cognitive learning.
- Used to treat autism
- Biofeedback: training procedure through which a person is made aware of his or her physiological responses; they later try to control them to decrease psychosomatic problems.

Pros & Cons of Punishment

- Spanking: positive punishment; presentation of an aversive stimulus (pain)
  - -May cause the child to imitate aggressive behavior
  - -only points out what a child should not do
  - Should be given immediately after behavior, only be severe enough to be effective, delivered consistently, reason for it should be explained
  - Time-Out: negative punishment: removal of a reinforcing stimulus
  - Should be used consistently & combined with teaching the child alternative behaviors using positive reinforcers

Theories of Classical Conditioning

- Stimulus Substitution: association forms between the neutral stimulus & unconditioned stimulus



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Theories of Classical Conditioning Cont.

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- Widespread support for this theory