* **Learning:** Classical and
Operant Conditioning

Learning

AP PSYCHOLOGY

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* Learning
* **Learning** is a lasting change in behavior or mental process as the result of an experience.
* There are two important parts:
	+ a lasting change…a simple reflexive reaction is not learning
	+ learning regarding mental process is much harder to observe and study.
* Life without Learning
* Learning is more than school, books and tests. Without learning our lives would simply be a series of reflexes and instincts.
	+ We would not be able to communicate, we would have no memory of our past or goals for the future.
* Learning’s Effects on Behavior
* In humans, learning has a much larger influence on behavior than instincts.
	+ Learning represents an evolutionary advance over instincts.
* Types of Learning
* SIMPLE AND COMPLEX LEARNING
* Simple Learning
* Habituation: Learning not to respond to the repeated presentation of a stimulus.
	+ Ex-Emergency sirens in the city

* Simple Learning
* Mere Exposure Effect: A learned preference for stimuli to which we have been previously exposed.
	+ Ex-A coach/parent’s voice
* Complex Learning
* **Behavioral Learning:** Forms of learning, such as *classical* and *operant conditioning* which can be described in terms of stimuli and responses.
	+ Classical conditioning is more simple learning, operant conditioning is more complex learning.
* Ivan Pavlov and Classical Conditioning
* One of most famous people in the study of learning is Ivan Pavlov.
* Originally studying salivation and digestion, Pavlov stumbled upon classical conditioning while he was experimenting on his dog.
	+ Classical Conditioning: A form of learning in which a previously neutral stimulus (stimuli w/o reflex provoking power) acquires the power to elicit the same innate reflex produced by another stimulus.
* Pavlov’s Findings Explained
* Pavlov discovered that a neutral stimulus, when paired with a natural reflex-producing stimulus, will begin to produce a learned response, even when it is presented by itself.
* Neutral Stimulus: Any stimulus that produces no conditioned response prior to learning.
* Pavlov’s Experiment
* Pavlov’s Experiment

 [Watch Pavlov’s Experiment Video](https://www.youtube.com/watch?v=hhqumfpxuzI)

* Components of Conditioning
* There are 5 main components of conditioning. Classical Conditioning always involves these parts. They are:
	+ - * Neutral Stimulus
			* Unconditioned Stimulus (UCS)
			* Unconditioned Response (UCR)
			* Conditioned Stimulus (CS)
			* Conditioned Response (CR)
* Unconditioned Stimulus (UCS)
* **UCS:** A stimulus that automatically-without conditioning or learning- provokes a reflexive response.
* In Pavlov’s experiment, food was used as the UCS because it produced a salivation reflex.
	+ Classical conditioning cannot happen without UCS. The only behaviors that can be classically conditioned are those that are produced by unconditioned stimulus.
* Unconditioned Response (UCR)
* **UCR:** A response resulting from an unconditioned stimulus without prior learning.
* In Pavlov’s experiment, the UCR was the dog salivating when its tongue touched food.
	+ Realize that the UCS-UCR connection involves no learning or acquisition.
* **From Unconditioned to Conditioned**
* During acquisition, a neutral stimulus is paired with the unconditioned stimulus.
	+ After several trials the neutral stimulus will gradually begin to elicit the same response as the UCS.
* **Acquisition:** The learning stage during which a conditioned response comes to be elicited by the conditioned stimulus.
* Conditioned Stimulus
* A CS is the originally neutral stimulus that gains the power to cause the response.

* In Pavlov’s experiment, the bell/tone began to produce the same response that the food once did.
* Conditioned Response
* A CR is a response elicited by a previously neutral stimulus that has become associated with the unconditioned stimulus.
* Although the response to the CS is essentially the same as the response originally produced by the UCS, we now call it a **conditioned response**.
* Classical Conditioning
* Extinction
* **Extinction:** The diminishing (or lessening) of a learned response, when an unconditioned stimulus does not follow a conditioned stimulus.
	+ To acquire a CR, we repeatedly pair a neutral stimulus with the UCS. But, if we want to reverse this learning, we must weaken the strength of the connection between the two stimuli.
	+ It is important to realize that extinction does not mean complete elimination of a response.
* Spontaneous Recovery
* Extinction merely suppresses the conditioned response, and the CR can reappear during spontaneous recovery.
* Spontaneous Recovery: The response after a rest period of an extinguished conditioned response.
	+ Spontaneous recovery is weaker than the original CR.
* Classical Conditioning
* Reinforcement Procedures
* What if we could not distinguish between stimuli that were similar?
	+ The bell ending class vs. fire alarm
	+ The door bell vs. our cell phones
* **Discrimination:** The ability to distinguish between two similar signals stimulus.
* Classical vs. Operant Conditioning
* With classical conditioning you can teach a dog to salivate, but you cannot teach it to sit up or roll over. Why?
* Salivation is an involuntary reflex, while sitting up and rolling over are far more complex responses that we think of as voluntary.
* Operant Conditioning
* An **operant** is an observable behavior that an organism uses to “operate” in the environment.
* **Operant Conditioning:** A form of learning in which the probability of a response is changed by its consequences…that is, by the stimuli that follows the response.
* B.F. Skinner
* B.F. Skinner became famous for his ideas in behaviorism and his work with rats.
* **Law of Effect:** The idea that responses that produced desirable results would be learned, or “stamped” into the organism.
* B.F. Skinner and The Skinner Box
* Reinforcement
* A **reinforcer** is a condition in which the presentation or removal of a stimulus, that occurs after a response (behavior), strengthens that response or makes it more likely to happen again in the future.
* **Positive Reinforcement:** A stimulus presented after a response that increases the probability of that response happening again.
	+ Ex: Getting paid for good grades
* Negative Reinforcement
* **Negative Reinforcement:** The removal of an unpleasant or averse stimulus that increases the probability of that response happening again.
	+ Ex: Taking Advil to get rid of a headache.
	+ Ex: Putting on a seatbelt to make the annoying seatbelt buzzer stop.
* The word “positive” means add or apply; “negative” is used to mean subtract or remove.
* Punishment
* A **punishment** is an averse/disliked stimulus which occurs after a behavior, and decreases the probability it will occur again.
* **Positive Punishment:** An undesirable event that follows a behavior: getting spanked after telling a lie.
* Punishment
* **Negative Punishment:** When a desirable event ends or is taken away after a behavior.
	+ Example: getting grounded from your cell phone after failing your progress report.

* + Think of a time-out (taking away time from a fun activity with the hope that it will stop the unwanted behavior in the future.)
* Reinforcement vs. Punishment
* Unlike reinforcement, punishment must be administered consistently. Intermittent punishment is far less effective than punishment delivered after every undesired behavior.
	+ In fact, not punishing every misbehavior can have the effect of rewarding the behavior.
* It is important to remember that the learner, not the teacher, decides if something is reinforcing or punishing.
	+ - * Redi Whip vs. Easy Cheese
* Punishment vs. Negative Reinforcement
* Punishment and negative reinforcement are used to produce opposite effects on behavior.
	+ Punishment is used to decrease a behavior or reduce its probability of reoccurring.
	+ Negative reinforcement always increases a behavior’s probability of happening in the future (by taking away an unwanted stimuli).
* Remember, “positive” means adding something and “negative means removing something.
* Uses and Abuses of Punishment
* Punishment often produces an immediate change in behavior, which ironically reinforces the punisher.
* However, punishment rarely works in the long run for four reasons:
1. The power of punishment to suppress behavior usually disappears when the threat of punishment is gone.
2. Punishment triggers escape or aggression.
3. Punishment makes the learner apprehensive: inhibits learning.
4. Punishment is often applied unequally.
* Making Punishment Work
* **To make punishment work:**
	+ Punishment should be swift.
	+ Punishment should be certain-every time.
	+ Punishment should be limited in time and intensity.
	+ Punishment should clearly target the behavior, not the person.
	+ Punishment should not give mixed messages.
	+ The most effective punishment is often omission training-negative punishment.
* Reinforcement Schedules
* **Continuous Reinforcement:** A reinforcement schedule under which all correct responses are reinforced.
	+ This is a useful tactic early in the learning process. It also helps when **“shaping”** new behavior.
* **Shaping:** A technique where new behavior is produced by reinforcing responses that are similar to the desired response.
* Continuous Reinforcement
* **Continuous Reinforcement:**

 A schedule of reinforcement that rewards every correct response given.

* + Example: A vending machine.
* What are other examples?
* Reinforcement Schedules
* **Intermittent Reinforcement:** A type of reinforcement schedule by which some, but not all, correct responses are reinforced.
	+ Intermittent reinforcement is the most effective way to maintain a desired behavior that has already been learned.
* Schedules of Intermittent Reinforcement
* **Interval schedule:** rewards subjects after a certain **time interval**.
* **Ratio schedule:** rewards subjects after a certain **number of responses**.

* + There are 4 types of intermittent reinforcement:
		- Fixed Interval Schedule (FI)
		- Variable Interval Schedule (VI)
		- Fixed Ratio Schedule (FR)
		- Variable Ratio Schedule (VR)
* Interval Schedules
* **Fixed Interval Schedule (FI):**
	+ A schedule that a rewards a learner only for the first correct response after some defined period of time.
	+ **Example:** B.F. Skinner put rats in a box with a lever connected to a feeder. It only provided a reinforcement after 60 seconds. The rats quickly learned that it didn’t matter how early or often it pushed the lever, it had to wait a set amount of time. As the set amount of time came to an end, the rats became more active in hitting the lever.
* Interval Schedules
* **Variable Interval Schedule (VI):**

 A reinforcement system that rewards a correct response after an unpredictable amount of time.

* + Example: A pop-quiz
* Ratio Schedules
* **Fixed Ratio Schedule (FR):**

 A reinforcement schedule that rewards a response only after a defined number of correct answers.

* + Example: At Safeway, if you use your Club Card to buy 7 Starbucks coffees, you get the 8th one for free.
* Ratio Schedules
* **Variable Ratio Schedule (VR):**

 A reinforcement schedule that rewards an unpredictable number of correct responses.

* + Example: Buying lottery tickets
* Schedules of Reinforcement
* Primary and Secondary reinforcement
* **Primary reinforcement:** something that is naturally reinforcing: food, warmth, water…

* **Secondary reinforcement:** something you have learned is a reward because it is paired with a primary reinforcement in the long run: good grades.
* Cognition & Operant Conditioning

Evidence of cognitive processes during operant learning comes from rats during a maze exploration in which they navigate the maze without an obvious reward. Rats seem to develop cognitive maps, or mental representations, of the layout of the maze (environment).

* Latent Learning
* Intrinsic Motivation

Intrinsic Motivation: The desire to perform a behavior for its own sake.

Extrinsic Motivation: The desire to perform a behavior due to promised rewards or threats of punishments.

* Biological Predisposition

Biological constraints predispose organisms to learn associations that are naturally adaptive.

Breland and Breland (1961) showed that animals drift towards their biologically predisposed instinctive behaviors.

* Skinner’s Legacy

Skinner argued that behaviors were shaped by external influences instead of inner thoughts and feelings. Critics argued that Skinner dehumanized people by neglecting their free will.

* Applications of Operant Conditioning

Skinner introduced the concept of teaching machines that shape learning in small steps and provide reinforcements for correct rewards.

* Applications of Operant Conditioning

Reinforcers affect productivity. Many companies now allow employees to share profits and participate in company ownership.

* Applications of Operant Conditioning

At Home

In children, reinforcing good behavior increases the occurrence of these behaviors. Ignoring unwanted behavior decreases their occurrence.

* Two Important Theories
* Token Economy: A therapeutic method based on operant conditioning that where individuals are rewarded with tokens, which act as a secondary reinforcer. The tokens can be redeemed for a variety of rewards.
* Premack Principle: The idea that a more preferred activity can be used to reinforce a less-preferred activity.
* Operant and Classical Conditioning
* A Third Type of Learning
* Sometimes we have “flashes of insight” when dealing with a problem where we have been experiencing trial and error.
* This type of learning is called ***cognitive learning***, which is explained as changes in mental processes, rather than as changes in behavior alone.
* Wolfgang Kohler and Sultan
* Kohler believed that chimps could solve complex problems by combining simpler behaviors they had previously learned separately.
* Kohler taught Sultan the chimp how to stack boxes to obtain bananas that were over his head and how to use a stick to obtain something that was out of his reach. He taught Sultan these skills in separate situations.
* Sultan’s Situation
* When Sultan was put in a situation where the bananas were still out of his reach after stacking the boxes, Sultan became frustrated. He threw the stick and kicked the wall before sitting down.
* Suddenly, he jumped up and dragged the boxes and stick under the bananas. He then climbed up the boxes and whacked the fruit down with the stick.
* This suggested to Kohler that the animals were not mindlessly using conditioned behavior, but were learning by reorganizing their perceptions of problems.
* Sultan the Chimp
* Cognitive Learning
* Sultan was not the only animal to demonstrate cognitive learning. When rats were put into a maze with multiple routes to the reinforcer, the rats would repeatedly attempt the shortest route.
* If their preferred route was blocked, they would chose the next shortest route to the reward.
* **Cognition Map:** A mental representation of a place.
* Latent Learning
* In a similar study, rats were allowed to wander around a maze, without reinforcements, for several hours. It formerly was thought that reinforcements were essential for learning.
* However, the rats later were able to negotiate the maze for food more quickly than rats that had never seen the maze before.
	+ **Latent learning:** Learning that occurs but is not apparent until the learner has an incentive to demonstrate it.
* Latent Learning
* Observational Learning
* You can think of observational learning as an extension of operant conditioning, in which we observe someone else getting rewarded but act as thought we had also received the reward.
* **Observational learning:** Learning in which new responses are acquired after other’s behavior and the consequences of their behavior are observed.
* Learning by Observation

Higher animals, especially humans, learn through observing and imitating others.

The monkey on the right imitates the monkey on the left in touching the pictures in a certain order to obtain a reward.

* Mirror Neurons

Neuroscientists discovered mirror neurons in the brains of animals and humans that are active during observational learning.

* Imitation Onset

Learning by observation begins early in life. This 14-month-old child imitates the adult on TV in pulling a toy apart.

* Observational Learning
* After observing adults seeming to enjoy punching, hitting and kicking an inflated doll called Bobo, the children later showed similar aggressive behavior toward the doll.
* Significantly, these children were more aggressive than those in a control condition who did not witness the adult’s violence.
* Bandura's Experiments

Bandura's Bobo doll study (1961) indicated that individuals (children) learn through imitating others who receive rewards and punishments.

* Bobo the Clown

[Video of the Bobo doll.](http://youtu.be/dmBqwWlJg8U)

[A Modern Representation of BoBo](http://youtu.be/128Ts5r9NRE)

* Media and Violence
* Does violence on tv/movies/video games have an impact on the learning of children?
* Correlation evidence from over 50 studies shows that observing violence is associated with violent behavior.
* In addition, experiment evidence shows that viewers of media violence show a reduction in emotional arousal and distress when they subsequently observe violent acts-a condition known as ***psychic numbing***.
* Applications of Observational Learning

Unfortunately, Bandura’s studies show that antisocial models (family, neighborhood or TV) may have antisocial effects.

* Positive Observational Learning

Fortunately, prosocial (positive, helpful) models may have prosocial effects.

* Television and Observational Learning

Gentile et al., (2004) shows that children in elementary school who are exposed to violent television, videos, and video games express increased aggression.

* Modeling Violence

Research shows that viewing media violence leads to an increased expression of aggression.