

BF Skinner: Operant Conditioning

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Skinner - Operant Conditioning

by [Saul McLeod](#), updated 2018

Operant conditioning is a method of learning that occurs through rewards and punishments for behavior. Through operant conditioning, an individual makes an association between a particular behavior and a consequence (Skinner, 1938).

By the 1920s, John B. Watson had left academic psychology, and other behaviorists were becoming influential, proposing new forms of learning other than classical conditioning. Perhaps the most important of these was Burrhus Frederic Skinner. Although, for obvious reasons, he is more commonly known as B.F. Skinner.

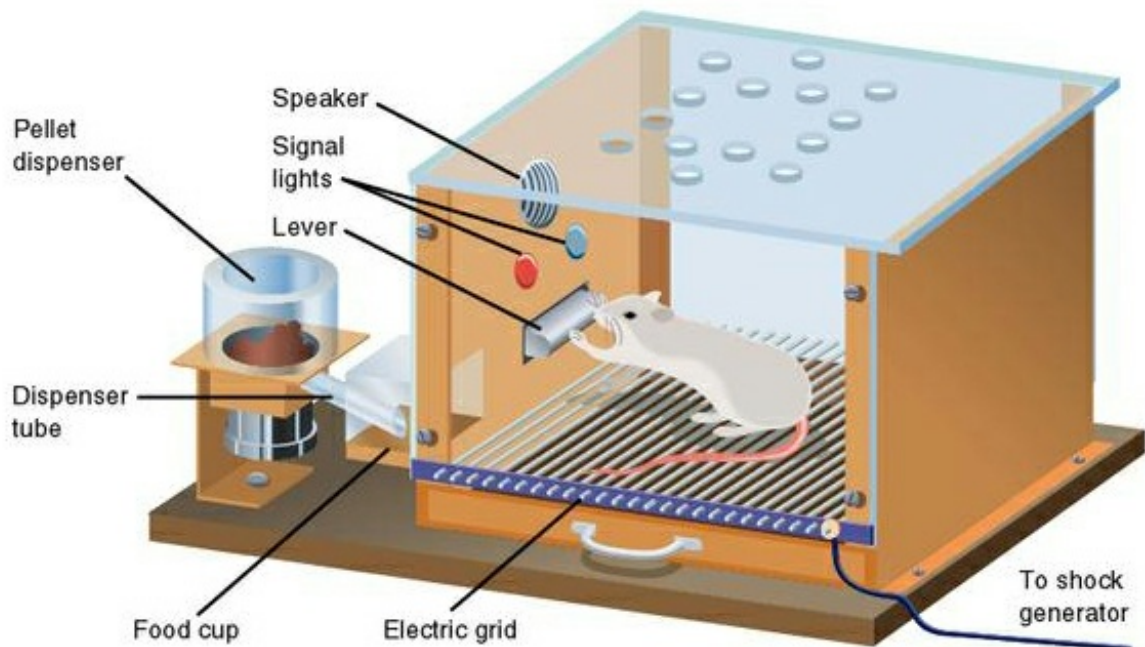
Skinner's views were slightly less extreme than those of Watson (1913). Skinner believed that we do have such a thing as a mind, but that it is simply more productive to study observable behavior rather than internal mental events.

The work of Skinner was rooted in a view that classical conditioning was far too simplistic to be a complete explanation of complex human behavior. He believed that the best way to understand behavior is to look at the causes of an action and its consequences. He called this approach operant conditioning.

Skinner is regarded as the father of Operant Conditioning, but his work was based on Thorndike's (1898) law of effect. According to this principle, behavior that is followed by pleasant consequences is likely to be repeated, and behavior followed by unpleasant consequences is less likely to be repeated.

Skinner introduced a new term into the Law of Effect - Reinforcement. Behavior which is reinforced tends to be repeated (i.e., strengthened); behavior which is not reinforced tends to die out-or be extinguished (i.e., weakened).

Skinner (1948) studied operant conditioning by conducting experiments using animals which he placed in a '*Skinner Box*' which was similar to Thorndike's puzzle box.



Skinner identified three types of responses, or operant, that can follow behavior.

- **Neutral operants:** responses from the environment that neither increase nor decrease the probability of a behavior being repeated.
- **Reinforcers:** Responses from the environment that increase the probability of a behavior being repeated. Reinforcers can be either positive or negative.
- **Punishers:** Responses from the environment that decrease the likelihood of a behavior being repeated. Punishment weakens behavior.

We can all think of examples of how our own behavior has been affected by reinforcers and punishers. As a child you probably tried out a number of behaviors and learned from their consequences.

For example, if when you were younger you tried smoking at school, and the chief consequence was that you got in with the crowd you always wanted to hang out with, you would have been positively reinforced (i.e., rewarded) and would be likely to repeat the behavior.

If, however, the main consequence was that you were caught, caned, suspended from school and your parents became involved you would most certainly have been punished, and you would consequently be much less likely to smoke now.

Positive Reinforcement

Skinner showed how positive reinforcement worked by placing a hungry rat in his Skinner box. The box contained a lever on the side, and as the rat moved about the box, it would accidentally knock the lever. Immediately it did so a food pellet would drop into a container next to the lever.

The rats quickly learned to go straight to the lever after a few times of being put in the box. The consequence of receiving food if they pressed the lever ensured that they would repeat the action again and again.

Positive reinforcement strengthens a behavior by providing a consequence an individual finds rewarding. For example, if your teacher gives you £5 each time you complete your homework (i.e., a reward) you will be more likely to repeat this behavior in the future, thus strengthening the behavior of completing your homework.

Negative Reinforcement

The removal of an unpleasant reinforcer can also strengthen behavior. This is known as negative reinforcement because it is the removal of an adverse stimulus which is 'rewarding' to the animal or person. Negative reinforcement strengthens behavior because it stops or removes an unpleasant experience.

For example, if you do not complete your homework, you give your teacher £5. You will complete your homework to avoid paying £5, thus strengthening the behavior of completing your homework.

Skinner showed how negative reinforcement worked by placing a rat in his Skinner box and then subjecting it to an unpleasant electric current which caused it some discomfort. As the rat moved about the box it would accidentally knock the lever. Immediately it did so the electric current would be switched off. The rats quickly learned to go straight to the lever after a few times of being put in the box. The consequence of escaping the electric current ensured that they would repeat the action again and again.

In fact Skinner even taught the rats to avoid the electric current by turning on a light just before the electric current came on. The rats soon learned to press the lever when the light came on because they knew that this would stop the electric current being switched on.

These two learned responses are known as *Escape Learning* and *Avoidance Learning*.

Punishment (weakens behavior)

Punishment is defined as the opposite of reinforcement since it is designed to weaken or eliminate a response rather than increase it. It is an aversive event that decreases the behavior that it follows.

Like reinforcement, punishment can work either by directly applying an unpleasant stimulus like a shock after a response or by removing a potentially rewarding stimulus, for instance, deducting someone's pocket money to punish undesirable behavior.

Note: It is not always easy to distinguish between punishment and negative reinforcement.

There are many problems with using punishment, such as:

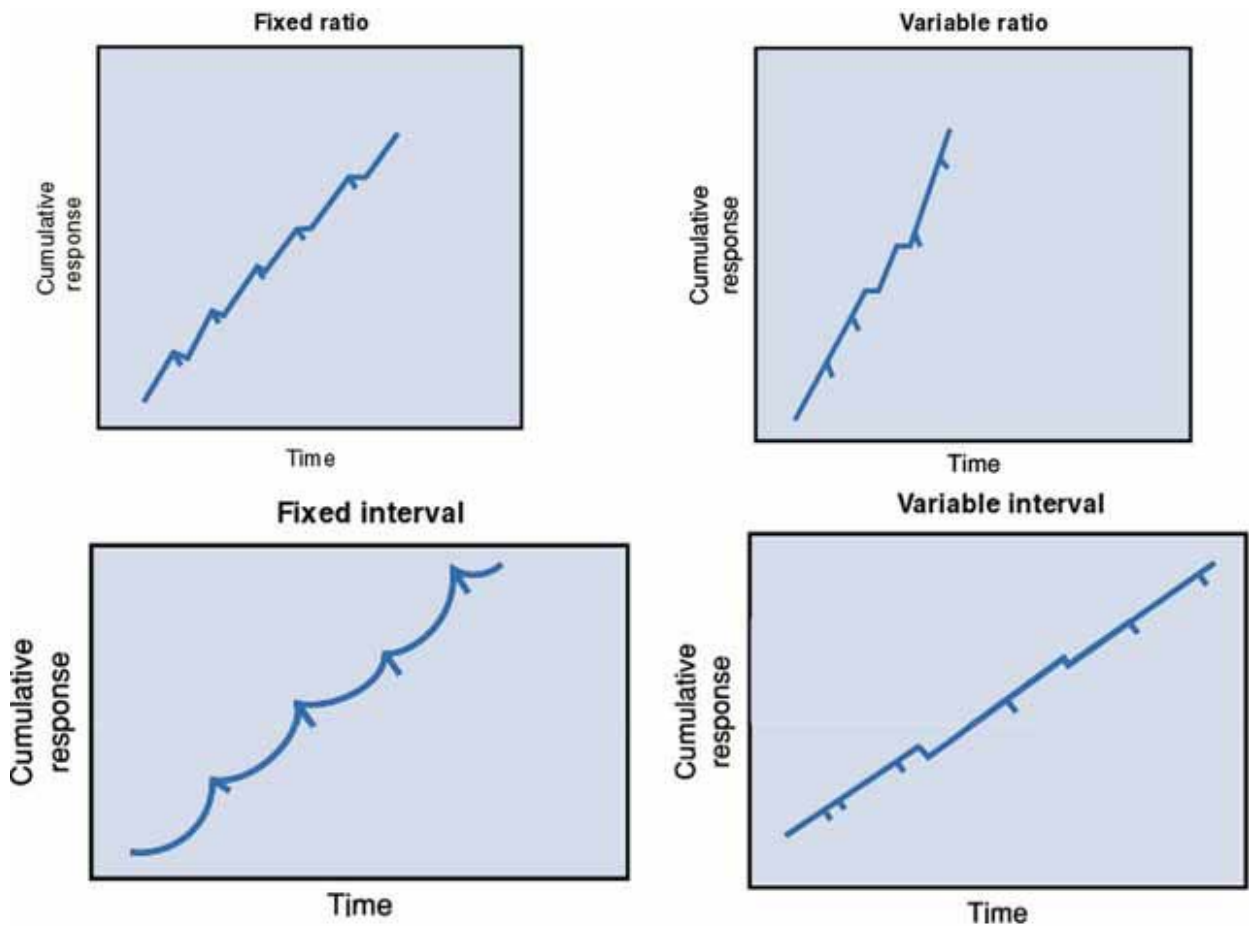
- Punished behavior is not forgotten, it's suppressed - behavior returns when punishment is no longer present.
 - Causes increased aggression - shows that aggression is a way to cope with problems.
 - Creates fear that can generalize to undesirable behaviors, e.g., fear of school.
 - Does not necessarily guide toward desired behavior - reinforcement tells you what to do, punishment only tells you what not to do.
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Schedules of Reinforcement

Imagine a rat in a “Skinner box.” In operant conditioning, if no food pellet is delivered immediately after the lever is pressed then after several attempts the rat stops pressing the lever (how long would someone continue to go to work if their employer stopped paying them?). The behavior has been extinguished.

Behaviorists discovered that different patterns (or schedules) of reinforcement had different effects on the speed of learning and extinction. Ferster and Skinner (1957) devised different ways of delivering reinforcement and found that this had effects on

1. **The Response Rate** - The rate at which the rat pressed the lever (i.e., how hard the rat worked).
2. **The Extinction Rate** - The rate at which lever pressing dies out (i.e., how soon the rat gave up).



Skinner found that the type of reinforcement which produces the slowest rate of extinction (i.e., people will go on repeating the behavior for the longest time without reinforcement) is variable-ratio reinforcement. The type of reinforcement which has the quickest rate of extinction is continuous reinforcement.

(A) Continuous Reinforcement

An animal/human is positively reinforced every time a specific behavior occurs, e.g., every time a lever is pressed a pellet is delivered, and then food delivery is shut off.

- Response rate is SLOW
- Extinction rate is FAST

(B) Fixed Ratio Reinforcement

Behavior is reinforced only after the behavior occurs a specified number of times. e.g., one reinforcement is given after every so many correct responses, e.g., after every 5th response. For example, a child receives a star for every five words spelled correctly.

- Response rate is FAST
- Extinction rate is MEDIUM

(C) Fixed Interval Reinforcement

One reinforcement is given after a fixed time interval providing at least one correct response has been made. An example is being paid by the hour. Another example would

be every 15 minutes (half hour, hour, etc.) a pellet is delivered (providing at least one lever press has been made) then food delivery is shut off.

- Response rate is MEDIUM
- Extinction rate is MEDIUM

(D) Variable Ratio Reinforcement

Behavior is reinforced after an unpredictable number of times. For examples gambling or fishing.

- Response rate is FAST
- Extinction rate is SLOW (very hard to extinguish because of unpredictability)

(E) Variable Interval Reinforcement

Providing one correct response has been made, reinforcement is given after an unpredictable amount of time has passed, e.g., on average every 5 minutes. An example is a self-employed person being paid at unpredictable times.

- Response rate is FAST
- Extinction rate is SLOW

Behavior Modification

Behavior modification is a set of therapies / techniques based on operant conditioning (Skinner, 1938, 1953). The main principle comprises changing environmental events that are related to a person's behavior. For example, the reinforcement of desired behaviors and ignoring or punishing undesired ones.

This is not as simple as it sounds — always reinforcing desired behavior, for example, is basically bribery.

There are different types of positive reinforcements. Primary reinforcement is when a reward strengthens a behavior by itself. Secondary reinforcement is when something strengthens a behavior because it leads to a primary reinforcer.

Examples of behavior modification therapy include token economy and behavior shaping.

Token Economy

Token economy is a system in which targeted behaviors are reinforced with tokens (secondary reinforcers) and later exchanged for rewards (primary reinforcers).

Tokens can be in the form of fake money, buttons, poker chips, stickers, etc. While the rewards can range anywhere from snacks to privileges or activities. For example, teachers use token economy at primary school by giving young children stickers to reward good

behavior.

Token economy has been found to be very effective in managing psychiatric patients. However, the patients can become over reliant on the tokens, making it difficult for them to adjust to society once they leave prison, hospital, etc.

Staff implementing a token economy programme have a lot of power. It is important that staff do not favor or ignore certain individuals if the programme is to work. Therefore, staff need to be trained to give tokens fairly and consistently even when there are shift changes such as in prisons or in a psychiatric hospital.

Behavior Shaping

A further important contribution made by Skinner (1951) is the notion of behavior shaping through successive approximation. Skinner argues that the principles of operant conditioning can be used to produce extremely complex behavior if rewards and punishments are delivered in such a way as to encourage move an organism closer and closer to the desired behavior each time.

To do this, the conditions (or contingencies) required to receive the reward should shift each time the organism moves a step closer to the desired behavior.

According to Skinner, most animal and human behavior (including language) can be explained as a product of this type of successive approximation.

Educational Applications

In the conventional learning situation, operant conditioning applies largely to issues of class and student management, rather than to learning content. It is very relevant to shaping skill performance.

A simple way to shape behavior is to provide feedback on learner performance, e.g., compliments, approval, encouragement, and affirmation. A variable-ratio produces the highest response rate for students learning a new task, whereby initially reinforcement (e.g., praise) occurs at frequent intervals, and as the performance improves reinforcement occurs less frequently, until eventually only exceptional outcomes are reinforced.

For example, if a teacher wanted to encourage students to answer questions in class they should praise them for every attempt (regardless of whether their answer is correct). Gradually the teacher will only praise the students when their answer is correct, and over time only exceptional answers will be praised.

Unwanted behaviors, such as tardiness and dominating class discussion can be extinguished through being ignored by the teacher (rather than being reinforced by having attention drawn to them). This is not an easy task, as the teacher may appear insincere if he/she thinks too much about the way to behave.

Knowledge of success is also important as it motivates future learning. However, it is

important to vary the type of reinforcement given so that the behavior is maintained. This is not an easy task, as the teacher may appear insincere if he/she thinks too much about the way to behave.

Summary

Looking at Skinner's classic studies on pigeons' / rat's behavior we can identify some of the major assumptions of the behaviorist approach.

- Psychology should be seen as a science, to be studied in a scientific manner. Skinner's study of behavior in rats was conducted under carefully controlled laboratory conditions.
- Behaviorism is primarily concerned with observable behavior, as opposed to internal events like thinking and emotion. Note that Skinner did not say that the rats learned to press a lever because they wanted food. He instead concentrated on describing the easily observed behavior that the rats acquired.
- The major influence on human behavior is learning from our environment. In the Skinner study, because food followed a particular behavior the rats learned to repeat that behavior, e.g., operant conditioning.
- There is little difference between the learning that takes place in humans and that in other animals. Therefore research (e.g., operant conditioning) can be carried out on animals (Rats / Pigeons) as well as on humans. Skinner proposed that the way humans learn behavior is much the same as the way the rats learned to press a lever.

So, if your layperson's idea of psychology has always been of people in laboratories wearing white coats and watching hapless rats try to negotiate mazes in order to get to their dinner, then you are probably thinking of behavioral psychology.

Behaviorism and its offshoots tend to be among the most scientific of the psychological perspectives. The emphasis of behavioral psychology is on how we learn to behave in certain ways.

We are all constantly learning new behaviors and how to modify our existing behavior. Behavioral psychology is the psychological approach that focuses on how this learning takes place.

Critical Evaluation

Operant conditioning can be used to explain a wide variety of behaviors, from the process of learning, to addiction and language acquisition. It also has practical application (such as token economy) which can be applied in classrooms, prisons and psychiatric hospitals.

However, operant conditioning fails to take into account the role of inherited and cognitive factors in learning, and thus is an incomplete explanation of the learning process in humans and animals.

For example, Kohler (1924) found that primates often seem to solve problems in a flash of insight rather than be trial and error learning. Also, social learning theory (Bandura, 1977) suggests that humans can learn automatically through observation rather than through personal experience.

The use of animal research in operant conditioning studies also raises the issue of extrapolation. Some psychologists argue we cannot generalize from studies on animals to humans as their anatomy and physiology is different from humans, and they cannot think about their experiences and invoke reason, patience, memory or self-comfort.

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Operant conditioning involves learning through the consequences of behavior.

Positive Reinforcement

Presenting the subject with something that it likes. e.g., Skinner rewarded his rats with food pellets.

Negative Reinforcement

Reward – in the sense of removing or avoiding some aversive (painful) stimulus. E.g., Skinner's rats learned to press the lever in order to switch off the electric current in the cage.

Punishment

Imposing an aversive or painful stimulus. e.g., Skinner's rats were given electric shocks.

Primary Reinforcers

These are stimuli which are naturally reinforcing because they directly satisfy a need. E.g., food, water.

Secondary Reinforcers

These are stimuli, which are reinforcing through their association with a primary reinforcer. i.e., they do not directly satisfy a need but may be the means to do so. E.g., Money! You cannot eat it or drink it, but if you have it, you can buy whatever you want. So a secondary reinforcer can be just as powerful a motivator as a primary reinforcer.

Shaping

In shaping, the form of an existing response is gradually changed across successive trials towards a desired target behavior by rewarding exact segments of behavior.

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