



Operant Conditioning

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What is Operant Conditioning?

Definition: Operant Conditioning is an approach to human learning based on the premise that human intelligence and will operate on the environment rather than merely respond to the environment's stimuli. (In short: that the consequences modify the occurrence and form of behavior.)

Operant conditioning holds that human learning is more complex than the model developed by Ivan Pavlov (1849-1936) and involves human intelligence and will operating (thus its name) on its environment rather than being a slave to stimuli.

B.F. Skinner (1904-1990) elaborated on the Pavlovian model (called 'classical conditioning') concept by introducing the idea of consequences into the behaviorist formula of human learning. Pavlov's classical conditioning explained behavior strictly in terms of stimuli, demonstrating a causal relationship between stimuli and behavior. In Pavlov's model, humans responded to stimuli in specific, predictable ways. According to Skinner, however, behavior is seen as far more complex, allowing for the introduction of choice and free will. With operant conditioning, the likelihood that a behavior will be repeated depends to a great degree on the amount of pleasure (or lack thereof) that behavior has caused or brought about in the past. Skinner also added to the vocabulary of **behaviorism** the concepts of negative and positive reinforcer, and of punishment.

According to Skinner, humans learn behaviors based on a trial and error process whereby they remember what behaviors elicited positive, or pleasurable, responses and which elicited negative ones. He derived these theories from observing the behaviors of rats and pigeons isolated in what have come to be known as "Skinner boxes." For example, inside the boxes, rats that had been deprived of food were presented with a lever that, when pushed, would drop a pellet of food into the cage. Of course, the rat wouldn't know this, and so the first time it hit the lever, it was a purely accidental, the result of what Skinner called random trial and error behavior. Eventually, however, the rat would "learn" that hitting the lever resulted in the appearance of food and it would continue doing so. Receiving the food, then, in the language of operant conditioning, is considered the reinforcer while hitting the lever becomes the "operant", the way the organism operates on its environment.

Skinner's model of operant conditioning broke down reinforcements into four kinds to study the effects these various "schedules of reinforcement" would have on behavior. These schedules are: fixed interval, variable interval, fixed ratio, and variable ratio. In a fixed interval schedule experiment, the lever in the rat's box would only provide food at a specific rate, regardless of how often the rat pulled the lever. In other words, food would be provided every 60 seconds. Eventually, the rat adapts to this schedule, pushing the lever with greater frequency approximately every 60 seconds. In variable interval experiments, the lever becomes active at random intervals. Rats presented with this problem adapt by pressing the lever less frequently but at more regular intervals. An experiment using a fixed ratio schedule uses a lever that becomes active only after the rat pulls it a specific number of times, and in a variable ratio experiment the number of pulls between activity is random. Behavior of the rats adapts to these conditions and is adjusted to provide the most rewards.



The real-world ramifications of operant conditioning experiments are easy to imagine, and many of the experiments described would probably sound very familiar to parents who use such systems of rewards and punishments on a daily basis with their children whether they've ever heard of B.F. Skinner. His model has been used by learning theorists of various sorts to describe all kinds of human behaviors. Since the 1960s, however, behaviorism has taken a back seat to cognitive theories of learning, although few dispute the elementary tenets of operant conditioning and their use in the acquisition of rudimentary adaptive behaviors.

Reinforcement, Punishment, Extinction

It's important to note that organisms are not spoken of as being reinforced, punished, or extinguished; it is the **response** that is reinforced, punished, or extinguished. Additionally, reinforcement, punishment, and extinction are not terms whose use is restricted to the laboratory. Naturally occurring consequences can also be said to reinforce, punish, or extinguish behavior and are not always delivered by people.

Reinforcement: A consequence that causes a behavior to occur with greater frequency.

Punishment: is a consequence that causes a behavior to occur with less frequency.

Extinction: is the lack of any consequence following a behavior. When a behavior is inconsequential, producing neither favorable nor unfavorable consequences, it will occur with less frequency. When a previously reinforced behavior is no longer reinforced with either positive or negative reinforcement, it leads to a decline in the response.

Positive ("add stimulus"), Negative ("subtract stimulus"):

There are four contexts of operant conditioning: Here the terms "*positive*" and "*negative*" are not used in the popular sense, but rather: "*positive*" refers to addition, and "*negative*" refers to subtraction.

What is added or subtracted may be either reinforcement or punishment. Hence **positive punishment** is sometimes a confusing term, as it denotes the **addition** of a stimulus or increase in the intensity of a stimulus that is aversive (such as spanking or an electric shock.) Negative reinforcement can also be a positive experience, as you are REMOVING the aversive stimulus.

Reinforcement, Escape, Punishment, Penalty:

Reinforcement: (aka "**Positive reinforcement**") occurs when a behavior (response) is followed by a favorable stimulus (commonly seen as pleasant) that increases the frequency of that behavior.

Animal example: In the Skinner box experiment, a stimulus such as food or sugar solution can be delivered when the rat engages in a target behavior, such as pressing a lever.

Human example: Any well-timed attaboy from co-worker.

Escape: (aka "**Negative reinforcement**") occurs when a behavior (response) is followed by the removal of an aversive stimulus (commonly seen as unpleasant) thereby increasing that behavior's frequency.

Animal example: In the Skinner box experiment, negative reinforcement can be a loud noise continuously sounding inside the rat's cage until it engages in the target behavior, such as pressing a lever, upon which the loud noise is removed.

Human example: Agree to remove weekly gantt report meetings after first successful Sprint Review.

Punishment: (aka "**Positive punishment**", and also called "Punishment by contingent stimulation") occurs when a behavior (response) is followed by an aversive stimulus.

Animal example: Introducing a shock after the K9 started to chase the geese, resulting in a decrease in that behavior.

Human example: Adding additional status meeting after you were late to a status meeting.



Penalty: (aka “**Negative punishment**”, and also called "Punishment by contingent withdrawal") occurs when a behavior (response) is followed by the removal of a favorable stimulus.

Animal example: K9 chews the leather leash. Replace the leather leash with a chain leash.

Human example: taking away your child's cell phone after you received the bill, resulting in a decrease in that behavior.

Leadership and Operant Conditioning:

Take the yellow stickies and arrange them in the four quadrants of conditioning.

Goal: Increase behavior	Goal: Decrease behavior
Reinforcement (added stimulus)	Penalty (removed stimulus)
Escape (removing aversive stimulus)	Punishment (adding aversive stimulus)

Expected discussions:

What are our desired leader operant conditioning traits?