verywell mind

What Is Classical Conditioning in Psychology?

How It Works, Terms to Know, and Examples

By [redacted] 23

Kendra Cherry, MS, is a psychosocial rehabilitation specialist, psychology educator, and author of the "Everything Psychology Book."

Dis[redacted]lov, classical conditioning is a type of [redacted]arning process creates a conditioned response through associations between an unconditioned stimulus and a neutral stimulus. In simple terms, classical conditioning involves placing a neutral stimulus before a naturally occurring reflex.

One of the best-known examples of classical conditioning is Pavlov's classic experiments with dogs. In these experiments, the neutral signal was the sound of a tone and the naturally occurring reflex was salivating in response to food. By associating the neutral stimulus (sound) with the unconditioned stimulus (food), the sound of the tone alone could produce a salivation response.

Although classical conditioning was not discovered by a psychologist, it has had a tremendous influence over the school of thought in psychology known as behaviorism. Behaviorism assumes that all learning occurs through interactions with the environment and that environment shapes behavior.

Classical Conditioning Definitions

Classical conditioning—also sometimes referred to as Pavlovian conditioning—uses a few different terms to help explain the learning process. Knowing these basics will help you understand classical conditioning.

Unconditioned Stimulus

An unconditioned stimulus is a stimulus or trigger that leads to an automatic response. If a cold breeze makes you shiver, for instance, the cold breeze is an unconditioned stimulus; it produces an involuntary response (the shivering).

Neutral Stimulus

A neutral stimulus is a stimulus that doesn't initially trigger a response on its own. If you hear the sound of a fan but don't feel the breeze, for example, it wouldn't necessarily trigger a response. That would make it a neutral stimulus.

Conditioned Stimulus

A conditioned stimulus is a stimulus that was once neutral (didn't trigger a response) but now leads to a response. If you previously didn't pay attention to dogs, but then got bit by one, and now you feel fear every time you see a dog, the dog has become a conditioned stimulus.

Unconditioned Response

An unconditioned response is an automatic response or a response that occurs without thought when an unconditioned stimulus is present. If you smell your favorite food and your mouth starts watering, the watering is an unconditioned response.

Conditioned Response

A conditioned response is a learned response or a response that is created where no response existed before. Going back to the example of being bit by a dog, the fear you experience after the bite is a conditioned response.

> This video has been medically reviewed by Ann-Louise T. Lockhart, PsyD, ABPP.

How Classical Conditioning Works

Classical conditioning involves forming an association between two stimuli, resulting in a learned response. There are three basic phases of this process.

Phase 1: Before Conditioning

The first part of the classical conditioning process requires a naturally occurring stimulus that will automatically elicit a response. Salivating in response to the smell of food is a good example of a naturally occurring stimulus.

During this phase of the process, the unconditioned stimulus (UCS) results in an unconditioned response (UCR). Presenting food (the UCS) naturally and automatically triggers a salivation response (the UCR).

At this point, there is also a neutral stimulus that produces no effect—yet. It isn't until the neutral stimulus is paired with the UCS that it will come to evoke a response.

Let's take a closer look at the two critical components of this phase of classical conditioning:

- The unconditioned stimulus is one that unconditionally, naturally, and automatically triggers a response. For example, when you smell one of your favorite foods, you may immediately feel hungry. In this example, the smell of the food is the unconditioned stimulus.
- The unconditioned response is the unlearned response that occurs naturally in response to the unconditioned stimulus. In our example, the feeling of hunger in response to the smell of food is the unconditioned response.

> In the **before conditioning** phase, an unconditioned stimulus is paired with an unconditioned response. A neutral stimulus is then introduced.

Phase 2: During Conditioning

During the second phase of the classical conditioning process, the previously neutral stimulus is repeatedly paired with the unconditioned stimulus. As a result of this pairing, an association between the previously neutral stimulus and the UCS is formed.

At this point, the once neutral stimulus becomes known as the conditioned stimulus (CS). The subject has now been conditioned to respond to this stimulus. The conditioned stimulus is a previously neutral stimulus that, after becoming associated with the unconditioned stimulus, eventually comes to trigger a conditioned response.

In our earlier example, suppose that when you smelled your favorite food, you also heard the sound of a whistle. While the whistle is unrelated to the smell of the food, if the sound of the whistle was paired multiple times with the smell, the whistle sound would eventually trigger the conditioned response. In this case, the sound of the whistle is the conditioned stimulus.

> The **during conditioning** phase involves repeatedly pairing a neutral stimulus with an unconditioned stimulus. Eventually, the neutral stimulus becomes the conditioned stimulus.

Phase 3: After Conditioning

Once the association has been made between the UCS and the CS, presenting the conditioned stimulus alone will come to evoke a response—even without the unconditioned stimulus. The resulting response is known as the conditioned response (CR).

The conditioned response is the learned response to the previously neutral stimulus. In our example, the conditioned response would be feeling hungry

when you heard the sound of the whistle.

> In the **after conditioning** phase, the conditioned stimulus alone triggers the conditioned response.

Key Principles of Classical Conditioning in Psychology

Behaviorists have described a number of different phenomena associated with classical conditioning. Some of these elements involve the initial establishment of the response while others describe the disappearance of a response. Here is a closer look at five key principles of classical conditioning.

Acquisition

Acquisition is the initial stage of learning, when a response is first established and gradually strengthened. During the acquisition phase of classical conditioning, a neutral stimulus is repeatedly paired with an unconditioned stimulus.

As you may recall, an unconditioned stimulus is something that naturally and automatically triggers a response without any learning. After an association is made, the subject will begin to emit a behavior in response to the previously neutral stimulus, which is now known as a conditioned stimulus. It is at this point that we can say that the response has been acquired.

Once the response has been established, you can gradually reinforce the response to make sure the behavior is well learned.

Extinction

Extinction is when the occurrences of a conditioned response decrease or disappear. In classical conditioning, this happens when a conditioned stimulus is no longer paired with an unconditioned stimulus.

For example, if the smell of food (the unconditioned stimulus) had been paired with the sound of a whistle (the conditioned stimulus), the sound of the whistle would eventually come to evoke the conditioned response of hunger.

However, if the smell of food were no longer paired with the whistle, eventually the conditioned response (hunger) would disappear.

Spontaneous Recovery

Sometimes a learned response can suddenly reemerge, even after a period of extinction. This is called spontaneous recovery.

For example, imagine that after training a dog to salivate to the sound of a bell, you stop reinforcing the behavior and the response becomes extinct. After a rest period during which the conditioned stimulus is not presented, you ring the bell and the animal spontaneously recovers the previously learned response.

If the conditioned stimulus and unconditioned stimulus are no longer associated, extinction will return very rapidly after a spontaneous recovery.

Generalization

Stimulus generalization is the tendency for a conditioned stimulus to evoke similar responses after the response has been conditioned. For example, if a dog has been conditioned to salivate at the sound of a bell, the animal may also exhibit the same response to a sound that's similar to the bell.

In John B. Watson's famous Little Albert Experiment, for example, a small child was conditioned to fear a white rat. The child demonstrated stimulus generalization by also exhibiting fear in response to other fuzzy white objects, including stuffed toys and Watson's own hair.

Discrimination

Discrimination is the ability to differentiate between a conditioned stimulus and other stimuli that have not been paired with an unconditioned stimulus.

For example, if a bell tone were the conditioned stimulus, discrimination would involve being able to tell the difference between the bell tone and other similar

sounds. Because the subject is able to distinguish between these stimuli, they will only respond when the conditioned stimulus is presented.

What Are Examples of Classical Conditioning?

It can be helpful to look at a few examples of how the classical conditioning process operates both in experimental and real-world settings.

Fear Response

John B. Watson's experiment with Little Albert is an example of the fear response. The child initially showed no fear of a white rat, but after the rat was paired repeatedly with loud, scary sounds, the child began to cry when the rat was present.

Prior to the conditioning, the white rat was a neutral stimulus. The unconditioned stimulus was the loud, clanging sounds, and the unconditioned response was the fear response created by the noise.

By repeatedly pairing the rat with the unconditioned stimulus, the white rat (now the conditioned stimulus) came to evoke the fear response (now the conditioned response).

This experiment illustrates how phobias can form through classical conditioning. In many cases, a single pairing of a neutral stimulus (a dog, for example) and a frightening experience (being bitten by the dog) can lead to a lasting phobia (being afraid of dogs).

Taste Aversions

Another example of classical conditioning is the development of conditioned taste aversions. Researchers John Garcia and Bob Koelling first noticed this phenomenon when they observed how rats that had been exposed to nausea-causing radiation developed an aversion to flavored water after the radiation and water were presented together.

In this example, the radiation represents the unconditioned stimulus and nausea represents the unconditioned response. After the pairing of the two, the flavored water is the conditioned stimulus, while nausea that formed when exposed to the water alone is the conditioned response.

Later research demonstrated that such classically conditioned aversions could be produced through a single pairing of the conditioned stimulus and the unconditioned stimulus.

> Researchers also found that such aversions can even develop if the conditioned stimulus (the taste of the food) is presented several hours before the unconditioned stimulus (the nausea-causing stimulus).

Why do such associations develop so quickly? Forming such associations can have survival benefits. If an animal eats something that makes it ill, it needs to avoid eating the same food in the future to avoid sickness or even death.

This is an example of biological preparedness. Some associations form more readily because they aid in survival.

> In one famous field study, researchers injected sheep carcasses with a poison that would make coyotes sick but not kill them. The goal was to help sheep ranchers reduce the number of sheep lost to coyote killings.
>
> Not only did the experiment work by lowering the number of sheep killed, it also caused some of the coyotes to develop such a strong aversion to sheep that they would actually run away at the scent or sight of a sheep.

Organizational Behavior

Classical conditioning can also have applications in business and marketing. For example, it can be used to help people form favorable attitudes toward products, businesses, or brands.

While there may not be a direct link between the item and the consumer

response, creating this association may help motivate people to purchase certain products because they have developed a favorable opinion of them due to classical conditioning.

What Is the Difference Between Classical Conditioning and Operant Conditioning?

Operant conditioning is a learning method in which a specific behavior is associated with either a positive or negative consequence. This form of learning links voluntary actions with receiving either a reward or punishment, often to strengthen or weaken those voluntary behaviors.

Classical conditioning is a learning process focused more on involuntary behaviors, using associations with neutral stimuli to evoke a specific involuntary response.

Criticisms of Classical Conditioning

Some psychologists maintain that classical conditioning represents a reductive, mechanical explanation for some behaviors. Some other criticisms of classical conditioning center on the fact that:

- Classical conditioning does not take human individuality and free will into account
- It generally does not predict human behavior; people can form associations but still not act upon them
- Many different factors can impact the associations and outcomes
- People can choose to not act on the associations they have made through classical conditioning

However, the approach still holds great fascination for researchers and relevance in modern psychology.

In reality, people do not respond exactly like Pavlov's dogs. There are, however, numerous real-world applications for classical conditioning. For example, many dog trainers use classical conditioning techniques to help people train their pets.

These techniques are also useful for helping people cope with phobias or anxiety problems. Therapists might, for example, repeatedly pair something that provokes anxiety with relaxation techniques in order to create an association.

Teachers can apply classical conditioning in the class by creating a positive classroom environment to help students overcome anxiety or fear. Pairing an anxiety-provoking situation, such as performing in front of a group, with pleasant surroundings helps the student learn new associations. Instead of feeling anxious and tense in these situations, the child will learn to stay relaxed and calm.

FREQUENTLY ASKED QUESTIONS

- ### Who discovered classical conditioning?

  Ivan Pavlov discovered classical conditioning. Pavlov was passionate about physiology, even earning gold medals for his work in this field. It was in his position as director of a physiological laboratory that he began to connect physiological research with reflex response and regulation.

- ### Why is classical conditioning considered a form of implicit memory?

  Implicit memory is a memory that you can recall effortlessly or without thought. Classical conditioning uses this automatic memory to create associations with a neutral stimulus. The association is learned without conscious awareness.

- ## Which therapies are based on the principles of classical conditioning?

  Behavioral therapies use the principles of classical conditioning to help people change negative behaviors. The thought behind these therapies is that we learn from our environment. Cognitive behavioral therapy and exposure therapy are two types of behavioral therapy.

14 Sources

Verywell Mind uses only high-quality sources, including peer-reviewed studies, to support the facts within our articles. Read our editorial process to learn more about how we fact-check and keep our content accurate, reliable, and trustworthy.

1. Wolpe J, Plaud JJ. Pavlov's contributions to behavior therapy. The obvious and not so obvious. *Am Psychol.* 1997;52(9):966-72.
2. Windholz G. Pavlov on the conditioned reflex method and its limitations. *Am J Psychol.* 1995;108(4):575-88.
3. Holland JG. Behaviorism: Part of the problem or part of the solution. *J Appl Behav Anal.* 1978;11(1):163-74. doi:10.1901/jaba.1978.11-163
4. Rouleau N, Karbowski LM, Persinger MA. Experimental evidence of classical conditioning and microscopic engrams in an electroconductive material. *PLoS ONE.* 2016;11(10):e0165269. doi:10.1371/journal.pone.0165269
5. Morè L, Jensen G. Acquisition of conditioned responding in a multiple schedule depends on the reinforcement's temporal contingency with each stimulus. *Learn Mem.* 2014;21(5):258-62. doi: 10.1101/lm.034231.113
6. Lattal KM, Lattal KA. Facets of Pavlovian and operant extinction. *Behav Processes.* 2012;90(1):1-8. doi:10.1016/j.beproc.2012.03.009
7. Thanellou A, Green JT. Spontaneous recovery but not reinstatement of the extinguished

conditioned eyeblink response in the rat. *Behav Neurosci.* 2011;125(4):613-25. doi:10.1037/a0023582

8. Dunsmoor JE, Mitroff SR, Labar KS. Generalization of conditioned fear along a dimension of increasing fear intensity. *Learn Mem.* 2009;16(7):460-9. doi:10.1101/lm.1431609
9. Murray JE, Li C, Palmatier MI, Bevins RA. The interoceptive Pavlovian stimulus effects of caffeine. *Pharmacol Biochem Behav.* 2007;86(4):838-46. doi:10.1016/j.pbb.2007.03.013
10. Hofmann SG. Cognitive processes during fear acquisition and extinction in animals and humans: implications for exposure therapy of anxiety disorders. *Clin Psychol Rev.* 2008;28(2):199-210. doi:10.1016/j.cpr.2007.04.009
11. Lin JY, Arthurs J, Reilly S. Conditioned taste aversion, drugs of abuse and palatability. *Neurosci Biobehav Rev*. 2014;45:28-45. doi:10.1016/j.neubiorev.2014.05.001
12. Åhs F, Rosén J, Kastrati G, Fredrikson M, Agren T, Lundström JN. Biological preparedness and resistance to extinction of skin conductance responses conditioned to fear relevant animal pictures: A systematic review. *Neurosci Biobehav Rev.* 2018;95:430-437. doi:10.1016/j.neubiorev.2018.10.017
13. Griffiths Jr R, Connolly G, Burns R, Sterner R. Coyotes, sheep and lithium chloride. *Proceed 8th Vertebrate Pest Conf*. 1978:23.
14. The Nobel Prize. Ivan Pavlov biographical.

Additional Reading

- Breedlove SM. Principles of Psychology. Oxford University Press.
- Nevid JS. Psychology: Concepts and Applications. Wadsworth Cengage Learning.