**Learning** is the act of acquiring new or modifying and reinforcing existing [knowledge](https://en.wikipedia.org/wiki/Knowledge),  [behaviors](https://en.wikipedia.org/wiki/Behavior),  [skills](https://en.wikipedia.org/wiki/Skill), [values](https://en.wikipedia.org/wiki/Value_(personal_and_cultural)), or [preferences](https://en.wikipedia.org/wiki/Preference) which may lead to a potential change in synthesizing information, depth of the knowledge, attitude or behavior relative to the type and range of experience. Learning offers measurable and relatively permanent change in behavior through experience, instruction, or study.

**Theories of Learning**

**Classical conditioning**

Classical conditioning occurs when a conditioned stimulus (CS) is paired with an unconditioned stimulus (US). Usually, the conditioned stimulus is a neutral stimulus (e.g., the sound of a tuning fork), the unconditioned stimulus is biologically potent (e.g., the taste of food) and the unconditioned response (UR) to the unconditioned stimulus is an unlearned [reflex](https://en.wikipedia.org/wiki/Reflex) response (e.g., salivation). After pairing is repeated (some learning may occur after only one pairing), the organism exhibits a conditioned response (CR) to the conditioned stimulus when the conditioned stimulus is presented alone. The conditioned response is usually similar to the unconditioned response, but unlike the unconditioned response, it must be acquired through experience and is relatively impermanent. In classical conditioning, the conditioned stimulus is not simply connected to the unconditioned response; the conditioned response usually differs in some way from the unconditioned response, sometimes significantly.

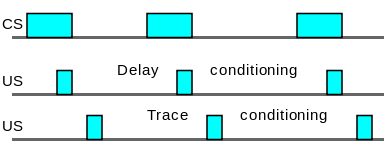
**Pavlov's research**

The best-known and most thorough early work on classical conditioning was done by [Ivan Pavlov](https://en.wikipedia.org/wiki/Ivan_Pavlov), Pavlov noticed that his dogs began to salivate in the presence of the technician who normally fed them, rather than simply salivating in the presence of food. Pavlov called the dogs' anticipatory salivation "psychic secretion". Putting these informal observations to an experimental test, Pavlov presented a stimulus (e.g. the sound of a metronome) and then gave the dog food; after a few repetitions, the dogs started to salivate in response to the stimulus. Pavlov concluded that if a particular stimulus in the dog's surroundings was present when the dog was given food then that stimulus could become associated with food and cause salivation on its own.

Terminology for classical conditional has also been developed. In Pavlov's experiments the **unconditioned stimulus (US)** was the dog food because its effects did not depend on previous experience. Next, the **conditioned stimulus (CS)** (or conditional stimulus) was the metronome's sound because its effects depend on its association with food. Likewise, the responses of the dog follow the same conditioned-versus-unconditioned arrangement. The **conditioned response (CR)** is the response to the conditioned stimulus, whereas the **unconditioned response (UR)** corresponds to the unconditioned stimulus.

**Forward conditioning**

Learning is fastest in forward conditioning. During forward conditioning, the onset of the CS precedes the onset of the US in order to signal that the US will follow. Two common forms of forward conditioning are delay and trace conditioning.



* **Delay conditioning**: In delay conditioning, the CS is presented and is overlapped by the presentation of the US. For example, if a person hears a buzzer for five seconds, during which time air is puffed into their eye, the person will blink. After several pairings of the buzzer and the puff, the person will blink at the sound of the buzzer alone. This is delay conditioning.
* **Trace conditioning**: During trace conditioning, the CS and US do not overlap. Instead, the CS begins and ends before the US is presented. The stimulus-free period is called the *trace interval* or the *conditioning interval*. If in the above buzzer example, the puff came a second after the sound of the buzzer stopped, that would be trace conditioning, with a trace or conditioning interval of one second.

**Simultaneous conditioning**

During simultaneous conditioning, the CS and US are presented and terminated at the same time. For example: If a person hears a bell and has air puffed into their eye at the same time, and repeated pairings like this lead to the person blinking when they hear the bell despite the puff of air being absent, this demonstrates that simultaneous conditioning has occurred.

**Second-order and higher-order conditioning**

Second-order or higher-order conditioning follow a two-step procedure. First a neutral stimulus ("CS1") comes to signal a US through forward conditioning. Then a second neutral stimulus ("CS2") is paired with the first (CS1) and comes to yield its own conditioned response.[[11]](https://en.wikipedia.org/wiki/Classical_conditioning#cite_note-11) For example: A bell might be paired with food until the bell elicits salivation. If a light is then paired with the bell, then the light may come to elicit salivation as well. The bell is the CS1 and the food is the US. The light becomes the CS2 once it is paired with the CS1.

**Backward conditioning**

Backward conditioning occurs when a CS immediately follows a US. Unlike the usual conditioning procedure, in which the CS precedes the US, the conditioned response given to the CS tends to be inhibitory. This presumably happens because the CS serves as a signal that the US has ended, rather than as a signal that the US is about to appear. For example, a puff of air directed at a person's eye could be followed by the sound of a buzzer.

**Temporal conditioning**

In temporal conditioning, a US is presented at regular intervals, for instance every 10 minutes. Conditioning is said to have occurred when the CR tends to occur shortly before each US. This suggests that animals have a biological clock that can serve as a CS. This method has also been used to study timing ability in animals

**Zero contingency procedure**

In this procedure, the CS is paired with the US, but the US also occurs at other times. If this occurs, it is predicted that the US is likely to happen in the absence of the CS. In other words, the CS does not "predict" the US. In this case, conditioning fails and the CS does not come to elicit a CR.[[13]](https://en.wikipedia.org/wiki/Classical_conditioning#cite_note-13) This finding – that *prediction* rather than CS-US pairing is the key to conditioning – greatly influenced subsequent conditioning research and theory.

**Extinction**

In the extinction procedure, the CS is presented repeatedly in the absence of a US. This is done after a CS has been conditioned by one of the methods above. When this is done, the CR frequency eventually returns to pre-training levels. However, extinction does not completely eliminate the effects of the prior conditioning. This is demonstrated by [spontaneous recovery](https://en.wikipedia.org/wiki/Spontaneous_recovery) – when there is a sudden appearance of the (CR) after extinction occurs – and other related phenomena (see "Recovery from extinction" below). These phenomena can be explained by postulating accumulation of inhibition when a weak stimulus is presented.

**Operant conditioning**

**Operant conditioning** (also called "**instrumental conditioning**") is a type of [learning](https://en.wikipedia.org/wiki/Learning) in which the strength of a behavior is modified by the behavior's consequences, such as reward or punishment. Although operant and classical conditioning both involve behaviors controlled by environmental stimuli, they differ in nature. In operant conditioning, stimuli present when a behavior is rewarded or punished come to control that behavior. For example, a child may learn to open a box to get the candy inside, or learn to avoid touching a hot stove; the box and the stove are discriminative stimuli. However, in [classical conditioning](https://en.wikipedia.org/wiki/Classical_conditioning), stimuli that signal significant events produce [reflexive behavior](https://en.wikipedia.org/wiki/Reflexes). For example, the sound of a door slam comes to signal an angry parent, causing a child to tremble.

**Modifying operant behavior: reinforcement and shaping**

Reinforcement and punishment are the core tools through which operant behavior is modified. These terms are defined by their effect on behavior. Either may be positive or negative, as described below.

* Positive reinforcement and negative reinforcement increase the probability of a behavior that they follow, while positive punishment and negative punishment reduce the probability of behaviour that they follow.

There is an additional procedure

* [**Extinction**](https://en.wikipedia.org/wiki/Extinction_(psychology)) occurs when a previously reinforced behavior is no longer reinforced with either positive or negative reinforcement. During extinction the behavior becomes less probable.

Thus there are a total of five basic consequences -

1. [**Positive reinforcement**](https://en.wikipedia.org/wiki/Positive_reinforcement) (reinforcement): This occurs when a behavior (response) is [rewarding](https://en.wikipedia.org/wiki/Reward_system) or the behavior is followed by another stimulus that is rewarding, increasing the frequency of that behavior. For example, if a rat in a[Skinner box](https://en.wikipedia.org/wiki/Skinner_box) gets food when it presses a lever, its rate of pressing will go up. This procedure is usually called simply*reinforcement*.
2. [**Negative reinforcement**](https://en.wikipedia.org/wiki/Negative_reinforcement) (escape): This occurs when a behavior (response) is followed by the removal of an[aversive](https://en.wikipedia.org/wiki/Aversive) stimulus, thereby increasing that behavior's frequency. In the Skinner box experiment, the aversive stimulus might be a loud noise continuously sounding inside the box; negative reinforcement would happen when the rat presses a lever, turning off the noise.
3. [**Positive punishment**](https://en.wikipedia.org/wiki/Positive_punishment) (also referred to as "punishment by contingent stimulation"): This occurs when a behavior (response) is followed by an aversive stimulus, such as pain from a [spanking](https://en.wikipedia.org/wiki/Spanking), which results in a decrease in that behavior. *Positive punishment* is a rather confusing term, and usually the procedure is simply called "punishment."
4. [**Negative punishment**](https://en.wikipedia.org/wiki/Negative_punishment) (penalty) (also called "punishment by contingent withdrawal"): Occurs when a behavior (response) is followed by the removal of a stimulus, such as taking away a child's toy following an undesired behavior, resulting in a decrease in that behavior.
5. **Extinction**: This occurs when a behavior (response) that had previously been reinforced is no longer effective. For example, a rat is first given food many times for lever presses. Then, in "extinction", no food is given. Typically the rat continues to press more and more slowly and eventually stops, at which time lever pressing is said to be "extinguished."

It is important to note that actors (e.g. rat) are not spoken of as being reinforced, punished, or extinguished; it is the actions (e.g. lever press) that are reinforced, punished, or extinguished. Also, reinforcement, punishment, and extinction are not terms whose use is restricted to the laboratory. Naturally occurring consequences can also reinforce, punish, or extinguish behavior and are not always planned or delivered by people.

**Schedules of reinforcement**

Schedules of reinforcement are rules that control the delivery of reinforcement. The rules specify either the time that reinforcement is to be made available, or the number of responses to be made, or both. Many rules are possible, but the following are the most basic and commonly used

* Fixed interval schedule: Reinforcement occurs following the first response after a fixed time has elapsed after the previous reinforcement.
* Variable interval schedule: Reinforcement occurs following the first response after a variable time has elapsed from the previous reinforcement.
* Fixed ratio schedule: Reinforcement occurs after a fixed number of responses have been emitted since the previous reinforcement.
* Variable ratio schedule: Reinforcement occurs after a variable number of responses have been emitted since the previous reinforcement.
* Continuous reinforcement: Reinforcement occurs after each response.

**Trial and error**

**Trial and error** is a fundamental method of [problem solving](https://en.wikipedia.org/wiki/Problem_solving). It is characterised by repeated, varied attempts which are continued until success or until the agent stops trying.

[Edward Thorndike](https://en.wikipedia.org/wiki/Edward_Thorndike) showed how to manage a trial-and-error experiment in the laboratory. In his famous experiment, a cat was placed in a series of puzzle boxes in order to study the [law of effect](https://en.wikipedia.org/wiki/Law_of_effect) in learning. He plotted learning curves which recorded the timing for each trial. Thorndike's key observation was that learning was promoted by positive results, which was later refined and extended by [B.F. Skinner](https://en.wikipedia.org/wiki/B.F._Skinner)'s [operant conditioning](https://en.wikipedia.org/wiki/Operant_conditioning).

**In brief implications of the Theory are-**

1)      According to this theory the task can be started from the easier aspect towards its difficult side. This approach will benefit the weaker and backward children.

2)      A small child learns some skills through trial and error method only such as sitting, standing, walking, running etc. In teaching also the child rectifies the writing after commiting mistakes.

3)      In this theory more emphasis has been laid on motivation. Thus, before starting teaching in the classroom the students should be properly motivated.

4)      Practice leads a man towards maturity. Practice is the main feature of trial and error method. Practice helps in reducing the errors committed by the child in learning any concept.

5)      Habits are formed as a result of repeitition. With the help of this theory the wrong habits of the children can be modified and the good habits strengthened.

6)      The effects of rewards and punishment also affect the learning of the child. Thus, the theory lays emphasis on the use of reward and punishment in the class by the teacher.

7)      The theory may be found quite helpful in changing the behaviour of the deliquent children. The teacher should cure such children making use of this theory.

8)      With the help of this theory the teacher can control the negative emotions of the children such as anger, jealousy etc.

9)      The teacher can improve his teaching methods making use of this theory. He must observe the effects of his teaching methods on the students and should not hesitate to make necessary changes in them, if required.

10)   The theory pays more emphasis on oral drill work. Thus, a teacher should conduct oral drill of the taught contents. This help in strengthening the learning more.

**Theory of Insight Learning**

The theory of Insight Learning was first proposed by German-American psychologist, one of the founders of Gestalt psychology, Wolfgang Köhler. Insight learning is among various methods of Behavioral learning process, which is a fundamental aspect of [Behavioral Psychology](https://www.psychestudy.com/behavioral).

* Insight learning refers to the sudden realization of the solution of any problem without repeated trials or continuous practices. To further elaborate on its definition, insight learning is the type of learning, in which one draws on previous experience and also seems to involve a new way of perceiving logical and cause-and-effect relationship.
* Insight is an awareness of key relationships between cause and effect, which comes after
* assembling the relevant information and
* either overt or covert testing of possibilities.

**Characteristics of Insight  Learning**

* insight represents seeing clearly into the heart or essence of a situation,
* Not by a step-by-step process, but partially by unconscious processes.
* Although insight learning suggests sudden realization of a solution, insight is not a process that occurs out of the blue.
* First part of the path comes from intense research or work pertaining to some domain, which is termed as the pre-solution period.
* The time of idleness in which the idea or concept seems to spontaneously pop up.
* Having the idea or concept is not enough;
* needs to be taken back to the thinking and working stage so that it can be materialized.
* There needs to be a certain basis for insight to appear.
* insight depends upon the time and events that take place in order for the material to be transformed from initial stimuli into insightful thought.
* Insight leads to change in perception.
* Insight is sudden.
* With insight, the organism tends to perceive a pattern or organization (that helps in learning).
* Understanding plays important role n insight learning.
* Insight is related with higher order animals and not with inferior animals.
* Age influences insight learning. Adults are better learner than children.
* Past experience and perceptual organization is important in perception.
* Some psychologists also relate insight learning with associative learning.

**Programmed learning**

* The [learning material](https://en.wikipedia.org/w/index.php?title=Learning_material&action=edit&redlink=1) is in a kind of [textbook](https://en.wikipedia.org/wiki/Textbook) or [teaching machine](https://en.wikipedia.org/wiki/Teaching_machine) or [computer](https://en.wikipedia.org/wiki/Computer).
* The [medium](https://en.wikipedia.org/wiki/Media_(communication)) presents the material in a logical and tested sequence.
* The text is in small steps or larger chunks.
* After each step, learners are given a question to test their comprehension.
* Then immediately the correct answer is shown.
* This means the learner at all stages makes responses, and is given immediate [knowledge of results](https://en.wikipedia.org/wiki/Knowledge_of_results)

**Stages of a complete system**

* The aims of the course are stated in terms which are objective, and can be measured.
* A pre-test is given, or the initial behaviour is stated.
* A post-test is provided.
* The materials have been tried out and revised according to results (developmental testing).
* The materials are constructed according to a predetermined scheme (stimulus control).
* The material is arranged in appropriate steps.
* The learner has to respond actively (not necessarily overtly).
* Arrangements are made for responses to be confirmed (knowledge of results).
* The teaching medium is appropriate for the subject-matter and the students.
* The materials are self-paced or presented in a manner which suits the learner.

**Two main systems of programmed learning**

One was by [Norman Crowder](https://en.wikipedia.org/w/index.php?title=Norman_Crowder_(psychologist)&action=edit&redlink=1)

* set multiple choice questions in the text,
* provide feedback for each of the alternatives
* alternatives offered in questions were chosen to cover mistakes which students were likely to make
* "intrinsic programming", was better known as "branching programming" on account of its multiple-choice alternatives

As proposed by the [behaviourist](https://en.wikipedia.org/wiki/Behaviourist) [B.F. Skinner](https://en.wikipedia.org/wiki/B.F._Skinner)

* present the material as part of a "schedule of [reinforcement](https://en.wikipedia.org/wiki/Reinforcement)" in typical behaviourist manner.
* There is a simple job to be done.
* The task can be stated in concrete terms.
* The necessary techniques are known.
* The equipment can easily be provided.
* Nothing stands in the way except cultural inertia
* Clear idea about reinforcement, i.e. gain or loss

**Laws of Learning**

**Law of Exercise, Primary Laws of Learning:**

This law is also called ‘Law of Use and Disuse’.

**(i) Law of Use:**

When a modifiable connection is made between a situation and a response, that connection’s strength is other things being equal, increased’.

**(ii) Law of Disuse:**

When a modifiable connection is not made between a situation and a response over a length of time, that connection’s strength, other things being equal, decrease.

In brief, we may say that repetition and drill helps learning, and its absence causes forgetfulness. We also believe in the common proverb, practice makes a man perfect’. Drill is based on the principle that repetition fixes the facts to be learnt. That is the reason why the pupils have to repeat arithmetical tables, formulae, spelling lists and definitions in order to establish these.

In all skill lessons, say handwriting, dance, music, craft and drawing repetition is necessary. Lack of practice or exercise causes the memory of the learned material to weaken. Lack of practice causes forgetfulness. We forget because subsequent experiences tend to rule out what has been learnt.

**Law of Effect:**

Thorndike defines it as follows:

**“When a modifiable connection between a situation and response is made and is accompanied or followed by a satisfying state of affairs that connection’s strength is increased, but when made and accompanied by an annoying state of affairs its strength is decreased”.**

In simpler words, it means that a response which gives achievement of the goal and thus provides satisfaction, will be stamped in, while those which are accompanied by dissatisfaction will be stamped out. In short, the feeling or the emotional state affects learning.

For instance, when the child solve, questions correctly he feels encouraged to do more. But if he fails repeatedly, he does not make subsequent attempt. Some students fail one or two times in the Matriculation Examination.

The stagnate and do not succeed at all. It is commonly said, ‘nothing succeeds like success’. The boy who stands for school council election and succeeds, gets motivated to stand again and again. Another pupil failing in the elections twice may not stand again. This success and failure condition the learner to a large degree.

**Law of Readiness:**

“When a person feels ready to act or to learn, he acts or learns more effectively and with greater satisfaction than when not ready’. Before actual learning, one must be mentally prepared; one’s mind, must be mentally-set.

 Besides these three basic laws, Throndike also refer to five subordinate laws which further help to explain the learning process. These are-

4)      Law of Multiple – Response-

According to it the organism varies or changes its response till an appropriate behaviour is hit upon. Without varying the responses, the correspondence for the solution might never be elicited. If the individual wants to solve a puzzle, he is to try in different ways rather than mechanically persisting in the same way. Throndike’s cat in the puzzle box moved about and tried many ways to come out till finally it hit the latch with her paw which opened the door and it jumped out.

5)      The Law of Set or Attitude-

Learning is guided by a total set or attitude of the organism, which determines not only what the person will do but what will satisfy or annoy him. For instance, unless the cricketer sets himself to make a century, he will not be able to score more runs. A student, similarly, unless he sets to get first position and has the attitude of being at the top, would while away the time and would not learn much. Hence, learning is affected more in the individual if he is set to learn more or to excel.

6)      Pre- potency of Elements:-

According to this law, the learner reacts selectively to the important or essential in the situation and neglects the other features or elements which may be irrelevant or non- essential. The ability to deal with the essential or the relevant part of the situation, makes analytical and insightful learning possible. In this law of pre-potency of elements, Thorndike is really anticipating insight in learning which was more emphasized by the Gestaltions.

7)      Law of  Response by Analogy-

According to this law, the individual makes use of old experiences or acquisitions while learning a new situation. There is a tendency to utilise common elements in the new situation as existed in a similar past situation. The learning of driving a car, for instance, is facilitated by the earlier acquired skill of driving a motor cycle or even riding a bicycle because the perspective or maintaining a balance and controlling the handle helps in stearing the car.

8)      The Law of Associative Shifting-

According to this law we may get an response, of which a learner is capable, associated with any other situation to which he is sensitive. Thorndike illustrated this by the act of teaching a cat to stand up at a command. A fish was dangled before the cat while he said ‘ stand up’. After a number trails by presenting the fish after uttering the command ‘stand up’, he later ousted the fish and the over all command of ‘stand up’ was found sufficient to evoke the response in the cat by standing up or her hind legs.