

Learning Psychology

What is psychology?

Etymologically, the word psychology is made up of two Greek words '*psyche*' and '*ology*'. "Psyche" means 'breath' or 'inner spirit (life force) or 'soul'; "ology" means the "study-of". Then, psychology is the study of inner spirit. Similar to this meaning, in 1890, William James defined *psychology* as "the science of mental life". This definition became widespread /popular for decades. However, such meaning of psychology was challenged by the behaviorists such as John B. Watson. He defined psychology as the acquisition of information useful to the control of behavior.

Originally, psychology focused on the *mind* only including thoughts, feelings, perceptions, and sensations. These were all internal. The **behavioral** revolution took the lead in the 1920s by such psychologists: Pavlov, Watson, Skinner, and others. They argued that psychology should also be **the study of behavior**.

The current definition of psychology is the study of both mind (internal cognitive and affective processes) and behavior (externally controlled). So, in the present days, psychology is well defined as **the study of mind and behavior**. It is the study of human behavior in relation to the mind. In other words, how behaviours are affected by our mind is the goal of psychology.

Unit 1: Learning Psychology

1.1. Meaning, definition and characteristics of learning

'Learning' is one of the most fundamental concepts in Psychology. It is the central aspect of the psychology. Learning is also defined variously. In general, it is defined as "any relatively permanent or lasting change in behaviour that occurs as a result of practice and experience". Let's study some other definitions of the term 'learning':

"Learning is the relatively permanent change in a person's knowledge or behavior due to experience. This definition has three components: 1) the duration of the change is long-term rather than short-term; 2) the locus of the change is the content and structure of knowledge in memory or the behavior of the learner; 3) the cause of the change is the learner's experience in the environment rather than fatigue, motivation, drugs, physical condition or physiologic intervention."

—From *Learning in Encyclopedia of Educational Research*, Richard E. Mayer

“The process of gaining knowledge and expertise.”

- From *The Adult Learner* by Malcolm Knowles

“Learning is the modification of behavior to meet environmental requirements”.

- Gardner Murphy

“The process by which behavior is organized or changed through practice or training.”

- Kingsley and Garry

“It is the modification of behavior through experience and training.”

- Gates

All these definitions have the common meaning that learning is behavioral change because this “functional” approach is more verifiable and generalizable. Similar functional definitions of learning are most common in disciplines.

Characteristics of Learning

Following are some characteristics of learning:

1. It is the change or adjustment of behavior.
2. It is doing and practice.
3. It is continuous process till death.
4. It is goal directed i.e. to fulfill some basic needs.
5. It is continuous reconstruction i.e. replacing the old with the new experiences.
6. Its outcome may or may not be positive.
7. It is the products of activity.
8. It helps in proper growth and development.
9. It is universal irrespective of color, creed, language etc. (यो विश्वव्यापी हुन्छ , कुनै धर्म रङ्ग र भाषाले असर पार्दैन)

Domains/Areas of Learning

The followings are the three domains of learning.

1. Cognitive Domain

In this domain an individual's thinking, mental, intellectual and intelligence capacities are modified and developed through educational process. There are six sub categories i.e. knowledge, comprehension, application, analysis, synthesis and evaluation.

2. Affective Domain

In this domain an individual feelings, emotional aspects are modified and developed like anger, hate, love, prejudice, phobias etc. Affective domains have five sub categories which are receiving phenomena, respond to phenomena, valuing, organization, and characterization.

3. Psycho-motor domain

In this domain an individual motor abilities (how to play a particular game or run a machine etc.) are modified and developed through training process.

1.2. Philosophical foundations of Learning Theories

The roots of **learning** theory are in an area of **philosophy** called “epistemology”, a field concerned with how we acquire knowledge. Two philosophical traditions emerged from the writings of the ancient Greek philosophers, Plato and Aristotle. Plato introduced the cognitive or nativist or rationalist tradition but Aristotle started behavioral or empiricist traditions in learning theory. These philosophical traditions are still continuing in the debatable form. As a result philosophers are divided into two groups. To say it more clearly, at the philosophical level, there are two opposing schools of thought: empiricism and rationalism.

Empiricism (and behaviorism)

'**Empiricism**' is one philosophical view about knowledge. It says that **all knowledge comes from sense experience**. *Empiricists* have always claimed that sense experience is the ultimate starting point for all our knowledge. This view began with Aristotle. Another well-known philosopher of this thought is the British philosopher John Locke (1632–1704). Empiricist philosophers proposed theories to explain how experience translates into knowledge. The basic process they proposed was **association/connection**. An association is a connection. If two ideas are associated, when you think of one you will automatically think of the other. In fact, **Empiricism** is the belief in sense perception, induction, and that there are no innate ideas. Theoretical tradition based on the empiricism is known as behaviorism. Some famous scholars who developed this thought are: **Aristotle, John Locke, George Berkeley, and David Hume**.

Science uses an empirical approach. **Empiricism** (founded by **John Locke**) states that the only source of knowledge comes through our senses – e.g. sight, hearing etc. This was in contrast to the existing view that **knowledge could be gained solely through the powers of reason and logical argument (known as rationalism)**.

Some beliefs of the empiricism

- We have no source of knowledge other than sense experience.
- Mind is a blank sheet of paper/ a blank slate (it is gradually filled with experiences). Locke is famously attributed with holding the proposition that the human mind is a *tabula rasa*, in Locke's words "white

paper", on which the experiences derived from sense impressions as a person's life proceeds are written. There are two sources of our ideas: sensation and reflection.

- Our knowledge is *posteriori* (*after birth*), dependent upon sense experience
- According to the Empiricist, the innate knowledge is unobservable and ineffective; that is, it does not *do* anything. The knowledge may sit there, never being used.
- Induction (inductive method)
- Pure **science** is founded on empiricist principles.

Rationalism and (cognitivism)

Rationalists have claimed that the ultimate starting point for all knowledge is not the senses but **reason**. They claim that without **prior categories** and principles supplied by reason, we couldn't organize and interpret our sense experience in any way. It rejects other possible sources of knowledge through sensory experience. In fact, **Rationalism** is the belief in innate ideas (ideas got by birth-first ideas), reason, and deduction. Rationalist philosophers have claimed that at the foundations of our knowledge are propositions that are **self-evident**, or self-evidently true. A self-evident proposition is the understanding that something is true without any further checking or special evidence of any kind, we can just intellectually "see" that it is true.

If A is greater than B, and B is greater than C, then A is greater than C. The claim is that, once these statements are understood, it takes no further sense experience whatsoever to see that they are true.

Descartes was a thinker (a great philosopher) who used **skeptical doubt** as a foundation to constructing a rationalist philosophy. He said that all our **beliefs that are founded on the experience of the external senses could be called into doubt**, but that with certain self-evident beliefs, like "I am thinking," there is no room for creating a reasonable doubt.

The rationalists believe that reality has an innately logical structure. Because of this, the rationalists argue that certain truths exist and that the intellect can directly grasp these truths. That is to say, rationalists believe that **certain rational principles exist in logic, mathematics, ethics, and metaphysics** that are so fundamentally true. The rationalists had such a high confidence in reason that empirical proof and physical evidence are unnecessary to determine certain truths. In other words, "our concepts and knowledge are gained independently without sense experience". This theoretical tradition is the base of the cognitivism or cognitive psychology.

Some concepts and contributors (Empiricism)

- The knowledge we gain by intuition (अन्तरस्करण) and deduction(अनुमान) or have innately is **superior to any knowledge** gained by sense experience.
- Superiority of *a priori* knowledge or innate ideas
- Deduction
- Self-evident
- Skeptical doubt (There doubt to the knowledge of sense, but there is no doubt to my thinking)
- Contributors: René Descartes, Chomsky, Robert Mills, Gagné (1916 – 2002), Jerome Bruner (1915-2016)

Behaviorism (ब्यवाहारवाद)

Behaviorism can be defined as a theory of psychology, which states that human and animal behavior can and should be studied in terms of **physical processes** only. This theory of psychology holds the belief that **behaviors are learned through positive and negative reinforcements**. The theory recommends that psychological concepts (such as learning) are to be explained in terms of **observable behaviors** that respond to stimulus. Watson and Skinner rejected the idea that psychological data could be obtained through introspection (चिन्तन मनन) or by an attempt to describe consciousness (चेतना)। According to behaviorists all psychological data is to be derived from the **observation of outward behavior**. This theory explains how an **external event, a stimulus causes a change** in the behavior of an individual (a response) without using concepts like "mind" or "ideas" or any kind of mental behavior.

Behaviorism was an important influence on psychology, education and language teaching. The term 'behaviourism' was coined by John B. Watson (1912) of the early twentieth century (American). So, he is called called the father of behaviorism. Other proponents of behaviorism are:

- i) Nineteenth century Russian, Ivan Pavlov
- iii) Early twentieth century American Edward Thorndike.
- iv) Mid-twentieth century American B.F. skinner.

Three basic behaviorist ideas: -

- 1) Conditioning (प्रत्यावर्तन वा अनुबन्धन)
- 2) Habit formation
- 3) The importance of the 'environment' Pavlov gave the idea of 'conditioning'.

In this idea, learning is seen as question of **developing connections between incidents (events)**. It is also

known as **stimulus response bonds**. This process of developing connections is called **conditioning**. Skinner gave the idea of **habit formation**.

Cognitivism (संज्ञानवाद)

Cognitive psychology is the study of mental processes such as "attention, use, memory, perception, problem solving, creativity, and thinking". It is the study of the mind as an information processor. This theory is also known as mentalism or nativism. This theory mainly stresses the acquisition of knowledge and growth of the mental structure. It focuses on the learning process: how information is received; how information is processed and organized into existing schema; how information is retrieved upon recall.

According to cognitivists, learning is not about the mechanics (यान्त्रीक प्रकृया) of what a learner does, but rather a process depending on what the learner already knows (existing information) and their method of acquiring new knowledge. Knowledge acquisition is an activity consisting of internal codification of mental structures within the student's mind.

Cognitivism is the study in psychology that focuses on mental processes, including how people perceive, think, remember, learn, solve problems, and direct their attention to one stimulus rather than another. The psychologist following the cognitive theories are also grouped as Gestalt psychology.

The fundamental concepts of cognitivism involve how we think and gain knowledge. It involves examining learning, memory, problem solving skills, and intelligence. Cognitive theorists may want to understand how problem solving changes throughout childhood, how cultural differences affect the way we view our own academic achievements, language development, and much more.

Cognitivism focuses on the inner mental activities – opening the “black box” of the human mind is valuable and necessary for understanding how people learn. Mental processes such as thinking, memory, knowing, and problem-solving need to be explored. Knowledge can be seen as schema or symbolic mental constructions. Learning is defined as change in a learner’s schemata.

people are not “programmed animals” that merely respond to environmental stimuli; people are rational beings that require active participation in order to learn, and whose actions are a consequence of thinking. Changes in behavior are observed, but only as an indication of what is occurring in the learner’s head.

Unit 2: Behavioristic Theories

Introduction to Classical Conditioning (Pavlovian conditioning)

Pavlov (1902) started from the idea that **there are some things that a dog does not need to learn**. For example, dogs don't learn to salivate whenever they see food. This reflex (response) is 'hard-wired' into the dog. In behaviorist terms, it is an **unconditioned response** (i.e., a stimulus-response connection that required no learning). In technical terms, we can write:

Unconditioned Stimulus (Food) > **Unconditioned Response** (Salivate)

However, when Pavlov discovered that the dogs learned to **associate** any object or event with food (such as the **lab assistant/bell**) produced the same response. Then, he realized that he had made an important scientific discovery. Thereafter, Pavlov devoted the rest of his career to study this type of learning.

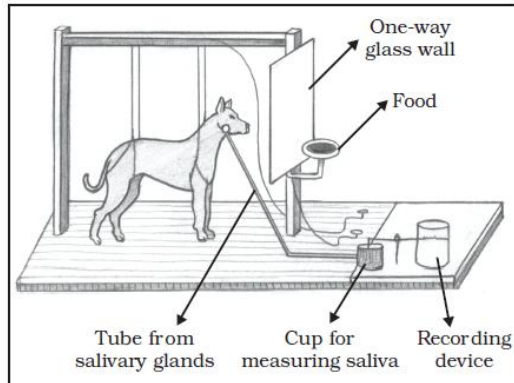
Pavlov knew that somehow, the dogs in his lab had **learned to associate food with his lab assistant**. This must have been learned, because at one point the dogs did not do it, and there came a point where they started, so their behavior changed. A change in the behavior of this type must be the result of learning.

In behaviorist terms, the lab assistant was originally a neutral stimulus. It is called neutral because it produces no response. What had happened was that the neutral stimulus (the lab assistant) had become associated with an unconditioned stimulus (food).

In his experiment, Pavlov used a bell as his neutral stimulus. Whenever he gave food to his dogs, he also rang a bell. After a number of repeats of this procedure, he tried the bell on its own. As you might expect, the bell on its own now caused an increase in salivation. So the dog had learned an association between the bell and the food and a new behavior had been learned. Because this response was learned (or conditioned), it is called a conditioned response. The neutral stimulus has become a conditioned stimulus.

Pavlov's Experiment with Dog

The earliest experiment of classical conditioning was conducted by **Ivan P. Pavlov** in 1901. He was interested in the physiology of digestion for which he conducted his experiment on dog. He did a minor surgery and inserted a tube into dog's jaw so that whenever dog secret saliva, he could come to know about it.



In the experiment, immediately after ringing of bell, food was served to dog and allowed to eat it. This continued for some days. After that, test was conducted in which all the things were same but after ringing of bell no meat powder (food) was served to dog. But surprisingly, dog still salivated. It salivated to the sound of bell, expecting the presentation of meat powder. **Now dog is conditioned to sound of bell connecting it to serving of meat powder.**

Now, salivating to sound of bell became the **conditioned response** of the dog.

Pavlov found that for associations to be made, the two stimuli had to be presented **close together in time**. He called this the **law of temporal contiguity**. If the time between the conditioned stimulus (bell) and unconditioned stimulus (food) is too great, then **learning will not occur**.

Pavlov and his studies of classical conditioning have become famous since his early work between 1890-1930. Classical conditioning is "classical" because it is the **first systematic study of basic laws of learning / conditioning**.

Three Stages of Conditioning

There are three stages of classical conditioning theory . At each stage the stimuli and responses are given special scientific terms:

Stage 1: Before Conditioning:

In this stage, the **unconditioned stimulus (UCS)** produces an **unconditioned response (UCR)** in an organism. In basic terms, this means that **a stimulus in the environment** has produced a behavior / response which is **unlearned (i.e., unconditioned)** and therefore is a natural response which has not been taught. In this respect, no new behavior has been learned. For example, a stomach virus (UCS) would produce a response of nausea (UCR). In another example, a perfume (UCS) could create a response of happiness or desire (UCR).

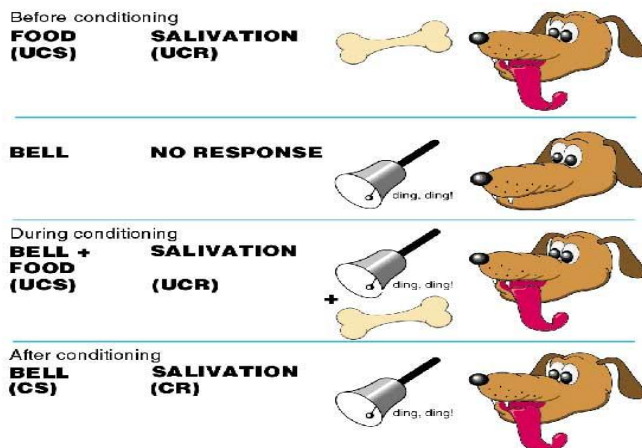
This stage also involves another stimulus which has no effect on a person and is called the **neutral stimulus (NS)**. The NS could be a person, object, place, etc. The neutral stimulus in classical conditioning does not produce a response until it is paired with the unconditioned stimulus.

Stage 2: During Conditioning:

During this stage a stimulus which produces no response (i.e., neutral) is associated with the unconditioned stimulus at which point it now becomes known as the **conditioned stimulus (CS)**. For example, a stomach virus (UCS) might be **associated** with eating a certain food such as chocolate (CS). Also, perfume (UCS) might be **associated** with a specific person (CS). Often during this stage, the UCS must be associated with the CS on a number of occasions, or trials, for learning to take place. However, one trial learning can happen on certain occasions when it is not necessary for an association to be strengthened over time (such as being sick after food poisoning or drinking too much alcohol).

Stage 3: After Conditioning:

Now the conditioned stimulus (CS) has been associated with the unconditioned stimulus (UCS) to create a new conditioned response (CR). For example, a person (CS) who has been associated with nice perfume (UCS) is now found attractive (CR). Also, chocolate (CS) which was eaten before a person was sick with a virus (UCS) now produces a response of nausea (CR).



Key Principles/Characteristics of Classical Conditioning

Behaviorists have described a number of different phenomena associated with classical conditioning. These elements are important in understanding the classical conditioning process. Let's take a closer look at five (or six) key principles of classical conditioning:

1. **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. At this point, we can say that the response has been acquired.

For example, imagine that you are conditioning a dog to salivate in response to the sound of a bell. You repeatedly pair the food with the sound of the bell. You can say the response has been acquired as soon as the dog begins to salivate in response to the bell tone. Once the response has been established, you can gradually reinforce the salivation response to make sure the behavior is well learned.

2. Stimulus Generalization: In the conditioning process, stimulus generalization is the tendency for the conditioned stimulus to evoke similar responses after the response has been conditioned. For example, if a child has been conditioned to fear with a white rabbit, it will also fear with white objects such as a white toy rat. In the classic Little Albert experiment, researchers John B. Watson and Rayner conditioned a little boy to fear a white rat.

The researchers observed that the boy experienced stimulus generalization by showing fear in response to similar stimuli including a dog, a rabbit, a fur coat, a white Santa Claus beard, and even Watson's own hair. Instead of distinguishing between the fear object and similar stimuli, the little boy became fearful of objects that were similar in appearance to the white rat.

3. Stimulus 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, he or she will only respond when the conditioned stimulus is presented.

- 4. Extinction:** In classical conditioning, when a conditioned stimulus is presented alone without an unconditioned stimulus, the conditioned response will eventually cease (stop). For example, in Pavlov's classic experiment, a dog was conditioned to salivate to the sound of a bell. When the bell was repeatedly presented without the presentation of food, the response eventually became extinct.
- 5. Inhibition:** Inhibition is the opposite of facilitation and refers to a mental state in which there is interference in the conditioned response (CR). It is the cause of extinction. It is claimed that the inhibition is not a temporary process. There are a number of inhibitions (causes of extinction/interferences for CR).
- a) **Conditioned inhibition:** It is the process the inhibition of the CR is permanent. The long term inhibition prevents for the spontaneous recovery.
 - b) **External inhibition:** It is the process of interference caused by external stimulus. In Pavlov's experiment a noisy truck passed by outside Pavlov's lab. His interpretation was that such unusual stimuli distract the dog from the CS and hence cause a decreased flow of conditioned saliva.

- d) **Latent inhibition:** The basic idea of latent inhibition is that it is often easier to learn something new than to unlearn something familiar. If something is already known, it interferes to learn differently because the earlier learning interferes later learning. A familiar stimulus takes longer to acquire meaning (as a signal or conditioned stimulus) than a new stimulus. It is also understood as L1 effect.
- e) **Disinhibition:** A novel situation or stimulus can make an extinguished CS effective again. This is known as disinhibition.

6. Spontaneous Recovery: It refers to the re-emergence of a previously extinguished conditioned response after a delay. Sometimes, the CR suddenly reappears even after then link between CS and UCS has been broken down, or to put in another words, the organism has stopped eliciting CR in response to CS. In Pavlov's experiment, when the dog had completely stopped eliciting CR (Saliva) in response to CS (bell sound), the dog still responded with saliva at the sound of the bell. This sudden reappearance of saliva (CR) was referred as 'spontaneous recovery' by Pavlov.

This principle can be used to explain why "cured" alcohol and drug addicts again "relapse to addiction". When the cured addicts confront with the substance, the irresistible urge to use the substance again may resurface because of the strong connection to the drug previously. This can be termed as Spontaneous Recovery.

7. Latency: The time difference between the conditioned stimulus and the unconditioned stimulus is referred to as latency. First of all, note that the conditioned stimulus must come first. For example, if Pavlov always sounded the tone after the dog got meat powder, the tone, in the absence of the meat powder, would signal was that the dog somehow missed getting it's meet powder so, in fact, it might as well not salivate. Given that the conditioned stimulus does precede the unconditioned stimulus, the general rule of thumb is that the shorter the latency the more likely it is that the conditioning will occur

Implications (of Classical conditioning theory) in teaching and learning

This theory can facilitate teachers and learners for teaching learning development in a number of ways.

The following ways can be some implied for teaching and learning:

1. The classical conditioning theory implies that one must be able to practice and master a task effectively before going on another one (एउटा सिकेर मात्र अर्को सिक्न सकिन्छ) . This means that a student needs to be able to respond to a particular stimulus (information) before he/she can be associated with a new one.
2. Teachers **should know how to motivate their students to learn**. They should be resourceful with various strategies that can enhance effective participation of the students in the teaching learning activities.

3. Most of the emotional responses can be learned through classical conditioning (classical condition को माध्यम बाट संबेगात्मक सिकाइ सिक्न सकिन्छ) A negative or positive response comes through the stimulus being paired with. For example, providing the necessary school material for primary school pupils will develop good feelings about school and learning in them, while, punishment will discourage them from attending the school.
4. The Learners develop hatred towards Maths ('subject' for example) due to teacher's behavior (शिक्षकको व्यवहारले गर्दा कुनै विषय प्रति नै घृणा जाग्न सक्छ) . But, a good method and loving behavior of the teacher can bring desirable impacts upon the Learners. The Learners may like the boring subject because of teacher's role.
5. In teaching **audio-visual aids** (श्रव्य दृष्य सामग्री र सहयोगी सामग्री को भूमिका) role is vital .When a teacher wants to teach 'a cat', he or she shows the picture of the cat along with the spellings. When teacher shows picture at the same time he or she spell out the spellings, after a while when only picture is shown and the Learners spell the word cat.
6. **Emphasis on behaviour:** Students should be active respondents to learning, and in the learning process. They should be given an opportunity to actually behave or demonstrate learning. Secondly students should be assessed by observing behaviour, we can never assume that students are learning unless we can observe that behaviour is changing.
7. **Drill and practice:** the repetition of stimulus response habits can strengthen those habits. For example, some believe that the best way to improve reading is to have students read more and more. Practice is important.
8. To break a bad habit, a learner must **replace one S-R connection** with another one .In order to break habits, that teacher needs to lead an individual to make a new response to this same old stimulus.
9. Link learning with positive emotions. Arrange repeated pairing of positive feelings with certain kinds of learning, especially subjects that are anxiety provoking.
10. Teach students to generalize and discriminate appropriately.

3.2. Operant Conditioning (Skinnerian Conditioning)

Basic process of operant conditioning and experiment on a rat

Perhaps the most important of the behaviourists was Burrhus Frederic Skinner. He is more commonly known as B.F. Skinner. His views were slightly less extreme than those of Watson (1913). Skinner believed that **we have such a thing as a mind**, but that **it is simply more productive to study observable behavior rather than internal mental event**.

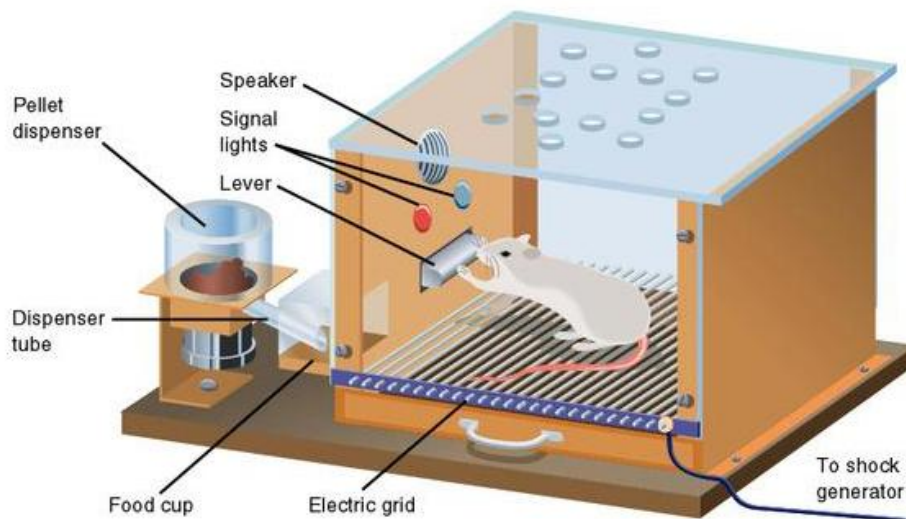
Skinner believed that classical conditioning was too simplistic to be used to describe something as complex as human behavior. Operant conditioning, in his opinion, better describes human behavior since it examines causes and effects of intentional behavior. To implement his empirical approach, Skinner invented the operant conditioning chamber, or "*Skinner Box*", in which subjects such as pigeons and rats were isolated and could be exposed to carefully controlled stimuli.

Operant Conditioning deals with operant - intentional actions that have an effect on the surrounding environment. Skinner set out to identify the processes which made certain operant behaviors more or less likely to occur.

Skinner, first time, got the idea that most of the responses could not be attributed to the known stimuli. He defined two types of responses—the one “elicited” by known stimuli which he called as “respondent behaviour” and the other “emitted” by the unknown stimuli which he called as “**operant behaviour**”.

Operant conditioning is a type of learning where **behavior is controlled by consequences**. Key concepts in operant conditioning are positive reinforcement, negative reinforcement, positive punishment and negative punishment. It (sometimes referred to as **instrumental conditioning**) is a method of learning that occurs through rewards and punishments for behavior. Through operant conditioning, **an association is made between a behavior and a consequence for that behavior**. For example, when a lab rat presses a blue button, he receives a food pellet as a reward, but when he presses the red button, he receives a mild electric shock. As a result, he learns to press the blue button but avoids the red button.

Skinner's work was based on Thorndike's (1905) law of effect. 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. But, his first experiment was done upon rat. He placed the rat in a *box (called 'Skinner Box')* which was similar to Thorndike's 'puzzle box'.



Experiments

B. F. Skinner used a Skinner box to study operant learning. The box contains a bar or key that the organism can press to receive food and water, and a device that records the organism's responses.

The most basic of Skinner's experiments was quite similar to Thorndike's research with cats. A rat placed in the chamber reacted as one might expect, scurrying about the box and sniffing and clawing at the floor and walls. Eventually the rat chanced upon a lever, which it pressed to release pellets of food. The next time around, the rat took a little less time to press the lever, and on successive trials, the time it took to press the lever became shorter and shorter. Soon the rat was pressing the lever as fast as it could eat the food that appeared. As predicted by the law of effect, the rat had learned to repeat the action that brought about the food and cease the actions that did not.

B.F. Skinner (1938) coined the term operant conditioning; it means roughly **changing of behavior by the use of reinforcement which is given after the desired response**. 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.

Types of Reinforcement

In operant conditioning, there are two different types of reinforcement. Both of these forms of reinforcement influence behavior, but they do so in different ways.

Positive Reinforcement

In operant conditioning, positive reinforcement involves the addition of a reinforcing stimulus following a behavior that makes it more likely that the behavior will occur again in the future. When a favorable outcome, event, or reward occurs after an action, that particular response or behavior will be strengthened. One of the easiest ways to remember positive reinforcement is to think of it as something being *added*.

By thinking of it in these terms, you may find it easier to identify real-world examples of positive reinforcement.

Sometimes positive reinforcement occurs quite naturally. For example, when you hold the door open for someone you might receive praise and a thank you. That affirmation serves as positive reinforcement and may make it more likely that you will hold the door open for people again in the future.

In other cases, someone might choose to use positive reinforcement very deliberately in order to train and maintain a specific behavior. An animal trainer, for example, might reward a dog with a treat every time the animal shakes the trainer's hand.

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, and 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

Negative reinforcement is a term described by B. F. Skinner in his theory of operant conditioning. In negative reinforcement, a response or behavior is strengthened by stopping, removing, or avoiding a negative outcome or aversive stimulus.

Negative reinforcement occurs when something already present is removed (taken away) as a result of a behaviour and the behaviour that led to this removal will increase in the future because it created a favourable outcome.

Aversive stimuli tend to involve some type of discomfort, either physical or psychological. Behaviors are negatively reinforced when they allow you to escape from aversive stimuli that are already present or allow you to completely avoid the aversive stimuli before they happen.

Deciding to take an antacid before you indulge in a spicy meal is an example of negative reinforcement. You engage in an action in order to avoid a negative result. One of the best ways to remember negative reinforcement is to think of it as something being *subtracted* from the situation. When you look at it in this way, it may be easier to identify examples of negative reinforcement in the real-world.

Examples of Negative Reinforcement

Example: Thomas has wet hands after washing them. He rubs them in the towel and the water is now removed from them. He knows that every time he doesn't want his hands to remain wet he can use a towel to get rid of the water. He now uses a towel every time he wants to remove the water from his hands.

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*.

The removal of an unpleasant reinforce 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.

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:

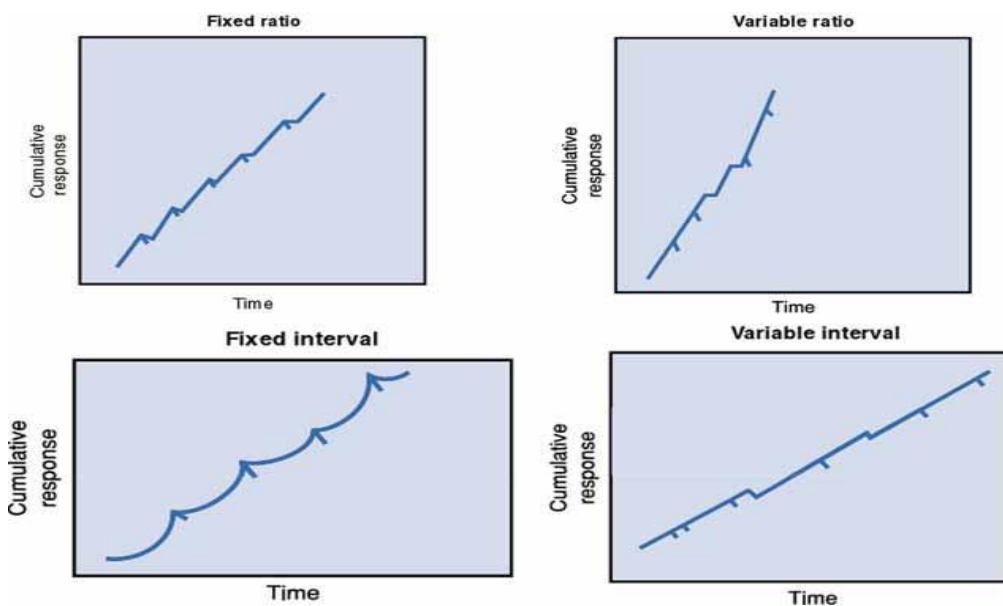
- Punished behavior is not forgotten, it's suppressed - behavior returns when punishment is no longer present.
- Causes increased aggression - shows that aggression is a way to cope with problems.

- 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.

Schedules of Reinforcement

Skinner also found that when and how often behaviors were reinforced played a role in the speed and strength of acquisition. He identified several different schedules of reinforcement:

1. **Continuous reinforcement** involves delivery a reinforcement every time a response occurs. Learning tends to occur relatively quickly, yet the response rate is quite low. Extinction also occurs very quickly once reinforcement is halted.
2. **Fixed-ratio schedules** are a type of partial reinforcement. Responses are reinforced only after a specific number of responses have occurred. This typically leads to a fairly steady response rate.
3. **Fixed-interval schedules** are another form of partial reinforcement. Reinforcement occurs only after a certain interval of time has elapsed. Response rates remain fairly steady and start to increase as the reinforcement time draws near, but slow immediately after the reinforcement has been delivered.
4. **Variable-ratio schedules** are also a type of partial reinforcement that involve reinforcing behavior after a varied number of responses. This leads to both a high response rate and slow extinction rates.
5. **Variable-interval schedules** are the final form of partial reinforcement Skinner described. This schedule involves delivering reinforcement after a variable amount of time has elapsed. This also tends to lead to a fast response rate and slow extinction rate.



Variable Ratio

► 1:1 / 7:1 / 4:1 / 12:1 / 8:1 / 19:1 / 3:1 / 2:1 / 2:1 / 5:1 / 16:1 / 11:1 / 3:1 / 8:1 / 4:1

Fixed Ratio

- ▶ 7:1 / 7:1 / 7:1 / 7:1 / 7:1,.... 15 times

Fixed Interval

- ▶ 10 sec:1 / 10 sec:1 / 10 sec:1 / ,... 15 times

Variable Interval

- ▶ 6 sec:1 / 8 sec:1 / 10 sec:1 / 3 sec:1 / 7 sec:1 / 14 sec:1 / 15 sec:1 / 8 sec:1 / 5 sec:1 / 12 sec:1 /
6 sec:1 / 9 sec:1 / 13 sec:1/15 sec:1 / 8 sec:1

Behavior Shaping

The concept of behavior shaping was first developed and used by B.F Skinner as an application of learning behaviors through reinforcement. Behaviour shaping is the **process of reinforcing behaviors that are closer to the target behavior (expected behavior)**, also known as successive approximations.

The theory involves reinforcing behavior that are successively closer and closer to the approximations of the desired, or targeted, behavior. The process of shaping is vital because **it's not always likely that an organism should display the exact target behavior spontaneously**. However, by reinforcing the behavior that is closer and closer to the desired behavior, the required behavior can be taught/learned. The step by step procedure of reinforcing different behaviors until the target behavior is achieved is called **Successive Approximations**.

One of the first **experiments** conducted by B.F Skinner on shaping involved teaching pigeons how to bowl, where the pigeons were gradually taught to sideswipe the ball with its beak down the alley towards the pins.

In his experiment where he taught a rat how to press the lever for food, it wasn't a sudden spontaneous behavior rat performed out of guess. The target behavior for the rat was to press the lever, in which case, it would be rewarded with food. But, of course, the rat wasn't going to spontaneously press the lever. So, the trainer, initially, even gave rewards to crude (simple/rough/ basic) approximations of the target behavior. **For example**, even a single step taken in the right direction was reinforced. Then, another step was reinforced, and likewise Skinner would reward the rat for standing on its hind legs, then even the slightest touch on the lever was rewarded, until the rat finally pressed the lever.

The crucial aspect of this procedure is to only **reward new behaviors that are closer to the targeted behavior**. **For instance**, in the experiment with the rat, once the rat touched the lever, it wasn't rewarded for standing on its hind legs. And, when the targeted behavior is achieved, successive approximations leading towards the targeted behavior weren't rewarded anymore. In this way, shaping uses principles of **operant conditioning** to train a subject to learn a behavior by reinforcing proper behaviors and **discouraging unwanted behaviors**.

Steps involved in the process of Shaping

The following steps are involved in behavior shaping:

- i. For start, reinforce any behavior that is even remotely close to the desired, target behavior.
- ii. Next step, reinforce the behavior that is closer to the target behavior. Also, you shouldn't reinforce the previous behavior.
- iii. Keep reinforcing the responses/behaviors that resembles the target behavior even more closely.
Continue reinforcing the successive approximations until the target behavior is achieved.
- iv. Once the target behavior is achieved, only reinforce the final response.

Educational Implications or Significance of Operant Conditioning:

1. **Successive approximation:** The theory suggests the great potentiality of the shaping procedure for behaviour modification. Operant conditioning can be used for shaping behaviour of children by appropriate use of reinforcement or rewards. Behaviour can be shaped through successive approximation in terms of small steps. Successive approximation is a process which means that complicated behaviour patterns are learned gradually through successive steps which are rewarding for the learner. Every successful step of the child must be rewarded by the teacher.
2. **Eliminating negative behaviour through extinction:** When a learned response is repeated without reinforcement, the strength of the tendency to perform that response undergoes a progressive decrease. Extinction procedures can be successfully used by the class-room teacher in eliminating negative behaviour of students.
3. **Reinforcement:** Operant conditioning has valuable implications for reinforcement techniques in the class-room. The schools can use the principles of operant conditioning to eliminate the element of fear from school atmosphere by using positive reinforcement. Positive reinforcement is perhaps the most widely used behavioural technique in the school setting. This technique simply involves providing a reward for positive behaviour. The reward can be a high grade, a pen, a smile, a verbal compliment.
4. **Behaviour modification/shaping:** Shaping may be used as a successful technique for making individual learn difficult and complex behaviour. Operant conditioning technique also implies the use of behaviour modification programmes to shape desirable behaviour and to eliminate undesirable behaviour. A teacher needs to identify the student's strengths and weaknesses around a specific skill, and then break the skill into a series of steps that lead a child toward that target. If the targeted skill is being able to write with a pencil, a child might have difficulty holding a pencil. An appropriate assistive step-wise strategy might start with the teacher placing her hand over the child's hand, demonstrating to the child the correct pencil grasp. Once the child achieves this step, she is rewarded and the next step is undertaken.

5. **Basis for programmed instruction:** The theory provides the basis for programmed instruction. Programmed instruction is a kind of learning experience in which a programme takes the place of tutor for the students and leads him through a set of specified behaviours. The principles originating from operant conditioning have revolutionised the training and learning programmes. Consequently, mechanical learning in the form of teaching machines and computer-assisted instructions have replaced usual classroom instructions. The use of programmed material in the form of a book or machine makes provision for immediate reinforcement.
6. **Behaviour therapy: Managing Problem Behaviour:** Two types of behaviour is seen in the classroom viz. undesired behaviour and problematic behaviour. Operant conditioning is a behaviour therapy technique that shape students behaviour. For this teacher should admit positive incidents like praise, encouragement etc. for learning. One should not admit negative contingencies. (student will run away from the dull and dreary classes).

Unit-3

Thorndike's theory of connectionism

In 1989, Edward Thorndike introduced a theory of learning in his doctoral dissertation "**Animal Intelligence: An Experimental Study of the Associative Processes in Animals**". The theory emphasized the role of experience in the strengthening and weakening of stimulus response connections (bonds). Thorndike named this perspective **connectionism**. His learning theory is also known as '**Trial and Error Learning**'. The central feature of connectionism (like all behavioral theory) was that learning could be adequately explained without referring to any unobservable internal states.

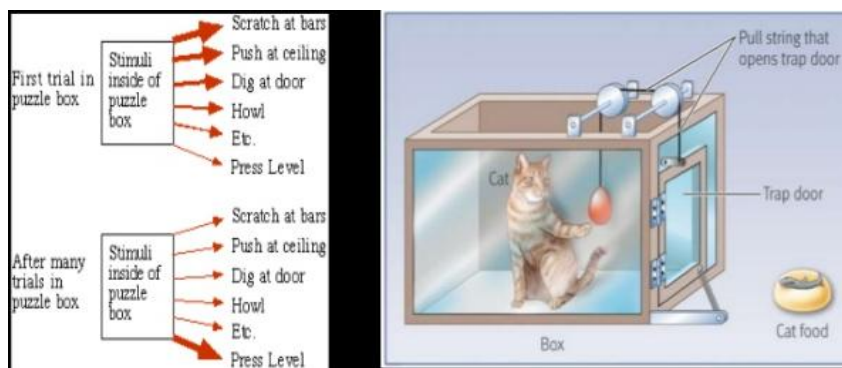
Fundamental Experiment

Thorndike experimented on a variety of animals like cats, fishes, chicks and monkeys. But, his classic experiment was done upon a **hungry cat**. **In the experiment, the cat was the subject, a piece of fish was the reward, and a puzzle box was the instrument.** The door of the puzzle box is closed by a simple latch/ switch (छेस्कनी).

Just outside the box is a piece of salmon (fish) on a dish. The cat moves around the cage, sniffing at its corners. Suddenly, it sees the salmon, moves to the part of the cage closest to it. Then, it begins extending its paws through the bars toward the fish. The fish is just out of its reach. The cat tries to reach more and more strongly, and begins scratching (चिथोर्दै) at the bars. It wanders restlessly and meows, but did not know how to escape. After a while these responses cease, and the cat begins to actively move around the cage. A few minutes later, it bumps (hits or kicks) against the latch. The door opens and the cat hurriedly runs out

and eats the fish. The cat is placed back in the box and a new piece of fish is placed on the dish. The cat goes through the same responses as before and eventually, kicks into the latch once more. At the second time also the cat escapes in less time than previously. Thorndike continued to place the cat in the box, and the cat continued to demonstrate seemingly random behavior, but could escape within shorter and shorter time periods.

This is repeated again and again. Gradually the cat stops extending its paws through the bars and spends more and more of its time near the latch. Next, the cat begins to direct almost all of its activity near the latch. Ultimately, the cat develops a quick and efficient series of movements for opening the latch.



Concepts of useful terms

Stimulus- Stimulus can be any object (organism) affecting the senses or an idea/ thought. Its nature is purely individualistic that means it differ from organism to organism from time to time from situation to situation and from place to place

1. Something causing a response.
2. An agent, action, or condition that elicits or accelerates a physiological or psychological activity or response.
3. Something that incites or rouses to action; an incentive:

Response- The Reaction is always in the form of Attraction or Repulsion .Response can be positive or negative, weak or strong, overt or hidden, right or wrong.

1. The act of responding
2. A reply or an answer.
3. A reaction, as that of an organism or a mechanism, to a specific stimulus

Bond- Bond represents the connection in between the stimulus and response.

Strength of connection- The strength of the connection depends upon the reaction time. (The time taken by an organism in giving response after receiving stimulus) the strength of the bond/ connection is inversely proportional

to the reaction time. The less the reaction time the more will be the strength of the bond/ connection or vice-versa.

Thorndike first presented his theory in his book 'Animal Learning' published in 1968. Connectionism Theory or simply S-R or Stimulus-Response Theory by Thorndike is actually one of the most applied theories of learning. **It gave three laws of learning in which is, most widely used theory in education.** This theory states that **learning is the outcome of the relationships or bonds between stimuli and responses.** These relationships become habits and may be strengthened or weakened depending on the nature and the frequency of stimuli and responses themselves. These connections become strong and can be further explained by Thorndike's **Three Laws of Learning.**

1. Law of Exercise.
2. Law of Readiness.
3. Law of Effect.

1. Law of Exercise.

Practice makes perfect. This means that the more the practice of a certain behavior is, the more it will be strengthened. Those things most often repeated are the best learned. This is the basis for practice and drill. The mind rarely retains, evaluates, and applies new concepts or practices after only one exposure. A student learns by applying what he has been taught. Every time he practices, his learning continues. There are many types of repetitions. These include student recall, review and summary and manual drill and physical applications. All of these serve to create learning habits. Connections become strong with practice, and it becomes weak when practice is discontinued. Laws of exercise are mainly those of respective habits, as in rote memorizing or the acquiring of muscular skills. Law of exercise has two sub-laws: (a) Law of use and (b) Law of disuse.

- a) **Law of use** –“ When a modifiable connection is made between a situation and a response keeping other things equal, the strength of that connect is increased”. Connections between a stimulus and a response are strengthened as they are used.
- b) **Law of disuse** –“ When a modifiable connection is not made between a situation and a response over a period of time keeping other things equal, the strength of that connection is decreased” . Connections between a stimulus and a response are weakened as they are not used.

2. Law of Readiness.

Proper mind set is the key word in this law. This law states that the more “ready” an individual to respond to a stimulus, the stronger will be the bond between them. And, if an individual is ready to respond but is not made to respond, it becomes frustrating and annoying to that person.

In Thorndike words “When a bond is ready to act, to act gives satisfaction and not to act gives annoyance and when a bond is not ready to act and is made to act annoyance is caused”. In Thorndike’s view, the law of readiness is active in three following conditions:

1. When a conducting unit is prepared to go into action, its work is quite satisfactory because nothing is done to alter its working.
2. When a conduction unit is forced to act while it is not prepared to do so its behaviour is of a nature calculated to excite anger.
3. The inactivity of a conduction unit which is ready to behave, may be unsatisfactory and any reaction may arise is connection with that deficiency.

Thus a series of responses can be chained together to satisfy some goal which will result in annoyance if blocked Interference with goal directed behaviour causes frustration and causing someone to do something they do not want to do is also frustrating. It means that-

- a. When someone is ready to perform some act, to do so is satisfying.
- b. When someone is ready to perform some act, not to do so is annoying.
- c. When someone is not ready to perform some act and is forced to do so, it is annoying.

3. Law of Effect.

This law says that **learning takes place properly if the result is satisfactory and pleasurable**. On the other hand, if the learner feels failure or dissatisfaction, the progress of learning is troubled. For example: When a child solves questions correctly, he feels encouraged to do more. But if he fails repeatedly, he is unwilling (uninterested) to make following attempts.

This law is based on the feelings of the learner. Learning is stronger when there is pleasing or satisfying feeling. It is weakened when there is an unpleasant feeling. An experience that produces feelings of defeat, anger, frustration, futility, or confusion is unpleasant. This will decrease his learning capabilities.

According to Thorndike “Those acts which give us satisfaction are tends to be repeated and set and fixed in our nervous system and those acts which gives us annoyance are not repeated and so do not fixed.”

There are two key aspects of the law of effect:

1. **Behaviors immediately followed by favorable consequences are more likely to occur again.** For example, if the boss praises when the worker comes early it is more likely that the behavior would be repeated.
2. **Behaviors followed by unfavorable consequences are less likely to occur again.** If you show up late for work and miss an important meeting, you will probably be less likely to show up late again in the future. Because you view the missed meeting as a negative outcome, the behavior is less likely to be repeated.

Educational Implications

1. This theory suggests teachers that a small child learns some skills through trial and error method only such as sitting, standing, walking, running etc. In the same way, the teacher need to understand that the child learns from mistakes. Making mistakes means the child is learning.
2. The law of readiness draws the attention of teacher to the motivation of the child before teaching a lesson.
3. This law (readiness) also implies that the teacher must consider the psycho-biological readiness (mental and physical) of the students to ensure successful learning. For example, a four-year-old child is not physically ready to learn to ride on motorbike. In the similar way, the child is not mentally ready to learn political rights.
4. The law of readiness also informs the teachers that curriculum/learning experiences should be according to the mental level of maturity of the child. If this is not so, there will be poor comprehension.
5. This theory also suggests that a person learns best when he has the necessary background, and a good ability (aptitude) to learn. For example, a child who has background knowledge of alphabets (A, B, C, D.....) can read letters well.
6. A clear objective and a good reason for learning sometimes help to motivate students to learn.
7. Law of exercise suggests that practice leads a man towards perfection (Practice makes a man perfect). Practice is the main feature of trial and error method.
8. It also suggests that practice helps in reducing the errors committed by the child in learning any concept.
9. Habits are formed as a result of repetition (repeated practice or exercise). With the help of this theory the wrong habits of the children can be modified and the good habits strengthened.
10. The teacher can improve his/her teaching methods by using this theory. He/ She must observe the effects of his teaching methods on the students and should not hesitate to make necessary changes in them if required. (She should reflect her teaching).

11. According to the law of effect, learning is stronger when it is joined with a pleasing or satisfying feeling. The teacher can apply it in the classroom situation by introducing the principles of **pleasure and pain**, reward and punishment.
12. The trial and error learning theory may be found quite helpful in changing the behaviour of the delinquent children. The teacher should cure such children making use of this theory.

Unit 4: Cognitive Theories

4.1 Kohler's Insightful Learning

Cognitivism is the study in psychology that focuses on mental processes, including how people perceive, think, remember, learn, solve problems, and direct their attention to one stimulus rather than another. The psychologist following the cognitive theories are also grouped as Gestalt psychology. The fundamental concepts of cognitivism involve how we think and gain knowledge. It involves examining learning, memory, problem solving skills, and intelligence.

One of the well known cognitive theories of learning is Gestalt theory. Gestalt theory was developed by a group of German psychologists.

- Max Wertheimer (father of Gestalt theory) - Wolfgang Kohler
- Kurt Koffka - Kurt Lewin

‘Gestalt’ is a German word which means ‘whole’ or total pattern. This school (knowledge group) believes that the ‘whole’ is more important than the parts. So learning also takes place as a whole’. One of the active members of the Gestalt group was Wolfgang Kohler. Based on the experiments, he developed a theory of learning which is called Insightful learning.

This group of psychologists expressed their dissatisfaction with the behaviourist approach of learning. They thought that '**learning is a more conscious effort of the individual rather than a mere product of habit formation or a machine-like stimulus-response connection**'. According to them, the learner does not only respond to a stimulus, but he or she mentally processes what he receives or perceives. So, **learning is a purposive, explorative and creative activity** instead of **trial and error**. According to them, things cannot be understood by the study of its component parts only, but actually it is understood only by perceiving it as a totality or whole.

Gestalt theory focused on the mind's understanding. The word ‘Gestalt’ has no direct translation in English, but refers to “placed, or put together”. Gestalt theorists followed the basic principle that the **whole is greater than the sum of its parts**. In other words, the whole (a picture, a car) carries together a greater meaning than its individual components.

Wolfgang Köhler (1887-1967) is one of German Gestalt psychologists. He is one of the founders of psychological school (a group) called Gestalt psychology. Other members of the group were Wertheimer, and Koffka.

Kohler's Experiments



Kohler conducted many experiments with his chimpanzee 'Sultan' at island of Teneriffa in Africa'. These experiments are the illustration of Learning by Insight.

His studies, "The Mentality of Apes", were published in 1917. In this study, Köhler almost spent all his time on a group composed of nine monkeys. They were kept in a cage for the purpose of research.

In one experiment Köhler placed a banana outside the cage of a hungry chimpanzee, Sultan (the smartest ape). There were two bamboo sticks left inside. Sultan made many attempts to obtain the banana but it failed. It sat down in despair. But, after sometime it suddenly got up with **a sudden bright idea**. So, the chimpanzee tried to reach the banana by joining the two sticks. Although left, Sultan accidentally joined the sticks, observed the result, and immediately ran with the longer tool to retrieve the banana. When the experiment was repeated, Sultan joined the two sticks and solved the problem immediately.

In an experiment, the chimpanzee was shut up in a room with unsalable walls. A banana was hanging with the ceiling. The animal was hungry. He jumped at the fruit but it was too high. He left the efforts and sat down. There was a box lying in the corner of the room. The animal began to play with the box. **He then suddenly got up** and pushed the box to the centre of the room below the banana, jumped from it and got the fruit. The apes solved the problem of reaching the bananas hanging on the ceiling by means of putting boxes as a pile and climbing on this pile to get the bananas.

In another experiment Kohler made this problem a little more complicated that two or three boxes were required to reach the banana.

4.1. Insightful learning (अन्तरदृष्टि सिकाई)

From the experiments, Kohler found that chimpanzees could use **insight learning** instead of trial-and-error to solve problems. The experiments demonstrated the role of **intelligence** and **cognitive abilities** in **higher learning** and **problem solving** situations. Based on his observations, Kohler concluded that apes (monkeys) did not carry out these missions through trial and error, but they used "introspection" and he explained the behaviour of apes' **problem solving** in terms of cognitive processes. According to Kohler, these animals can learn how to solve problem just like humans. These behaviours of apes are carried out

through a mental process. One of the most important contributions of Gestalt theory to education is the application of **introspective problem solving and productive thinking**.

According to Kohler, Learning by conditioning is common to all animals and human beings and useful for early education. But learning by insight is suitable only for **intelligent creatures both human and animals and useful for higher learning**. It is a kind of learning done by observation, by perceiving the relationship and understanding the situation.

When an individual or intelligent animal faces a problem, he thinks and looks over the whole situation and tries to find out solutions. He tries to get some clues to solve the problem, uses methods to follow and finds a general awareness of the results of his actions. Then suddenly, he arrives at a solution through his mental exercises. But for this, the total view of the situation should be exposed to the individual who must feel urgency of the problem and its solution.

Kohler said that insightful learning is a type of learning or problem solving that happens all-of-a-sudden through understanding the relationships of various parts of a problem rather than through trial and error. Insightful learning is also known as Gestalt learning which means that learning is concerned with the **whole individual** and arises from the interaction of an individual with his situations or environment. Through this interaction emerge new forms of perception, imagination and ideas which altogether constitute insight.

Characteristics of insightful learning

The common features of the experiments on insightful learning are as follows:

1. The nature of the experimental situation is very important for insightful learning. The organism must be able to perceive the relationships among all relevant parts of the problem before insight can occur.
2. The organism reacts to the whole situation, not to its component parts.
3. The organism perceives the relationships between means and the goal, and restructures the perceptual field.
4. Insight follows a period of trial and error behavior. In the trial-and-error period, the organism does not, however/exhibit blind and random attacks as shown by Thorndike's cat. On the other hand, it tests behavioral hypotheses in the form of accepting some and discarding others.
5. The insightful solution comes all on a sudden.
6. Once the insightful solution is reached, the organism shows high degree of retention and transfer to similar problems.
7. Insight is closely related to the organism's capacity to learn. The capacity for insightful learning depends on age, experience, and individual differences.

8. Understanding plays important role in insight learning.
9. Insight is related with higher order animals and not with inferior animals.
10. Age influences insight learning. Adults are better learner than children.
11. Past experience and perceptual organization is important in perception.

Educational Implications of (Insight learning) Gestalt Theory

- 1.**Problem Solving Approach:** This theory emphasizes that as the learner is able to solve problems by his insight, meaningful learning, learning by understanding, reasoning, etc. must be encouraged in the school.
- 2.**From Whole to Part:** The teacher should present the subject matter as a whole to facilitate insight learning.
- 3.**Integrated Approach:** While planning curriculum, gestalt principles should be given due consideration. A particular subject should not be treated as the mere collection of isolated facts. It should be closely integrated into a whole.
- 4.**Importance of Motivation:** the teacher should arouse the child's curiosity, interest and motivation. He should gain full attention of the whole class before teaching.
- 5.**Goal Orientation:** As learning is a purposeful and goal oriented task, the learner has to be well acquainted with these objectives. He should be fully familiar with the goals and purposes of every task.
- 6.**Emphasis on Understanding:** It has made learning an intelligent task requiring mental abilities than a stimulus – response association. So the learner must be given opportunities for using his mental abilities.
- 7.**Checking of Previous Experiences:** As insight depends upon the previous experiences of the learner, the teacher must check the previous experiences of the child and relate them with the new learning situation.
8. Student should be exposed to all elements of a problem in order to acquire introspective problem solving behaviour. The appropriate atmosphere should be prepared for the student to understand the nature of the problem, explore the relations between its elements and organize the possible ways of solution. For this purpose, curiosity of the student is moved.
9. According to Gestalt theorists, an individual perceives the whole as a meaningful and organized whole, not through separating the whole into parts. Then, he/she discovers the relations between parts and the whole. Moreover, relations of simplicity, similarity, proximity, and continuity, shape-base are important in perception. In this case, the teacher should give the basic framework of the lesson as an organized and meaningful whole to the students at the beginning of the term, and then should go into details. Thus, the teacher can help students to understand the function of the lesson and relations between the units as a whole.

4.2 Information Processing Theory

Information processing model/theory involves the study of **how facts, concepts, principles and skills are attended to, how they enter the memory banks, how they are retrieved, and how they may be forgotten**. In general, this theory discusses the cognitive mechanisms through which learning occurs. Specifically, it focuses on aspects of memory encoding and retrieval. The main contributors for the development of this theory are:

- George A. Miller (1920-2012)
- **Atkinson and Shiffrin (1968)**
- Craik and Lockhart (1972)
- Bransford (1979)
- Rumelhart and McClelland (1986)

Cognitive psychology sees the individual has a **processor of information**. In much the same way that a computer takes in information and follows a program to produce an output, human mind does the similar process in the utilization of the information. According to this group of psychologists, information is gathered from the senses (input), it is stored and processed by the brain, and finally brings about a behavioral response (output).

In the development of information processing models, Atkinson and Shiffrin's '**stage theory (Model)**,' or a sequential method is much influential. According to the Atkinson & Shiffrin (1968) model, the human being is considered as in information processing system that senses, stores and retrieves information much as a computer does. The systems discussed under this model are hypothetical (काल्पनिक). These systems are the memory systems that explain how learning occurs.

Basic Assumptions

The information processing approach is based on a number of assumptions:

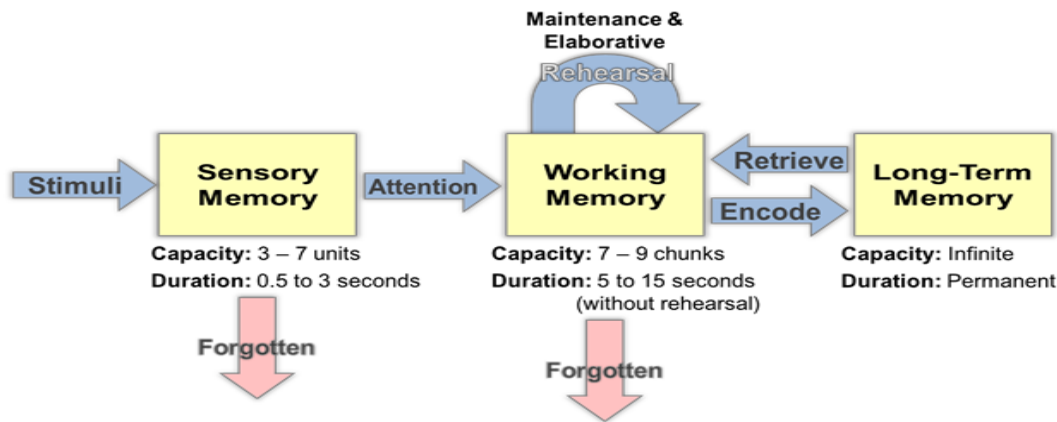
- (1) information made available by the environment is processed by a series of processing systems (e.g. attention, perception, short-term memory);
- (2) these processing systems transform or alter the information in systematic ways;
- (3) the aim of research is to specify the processes and structures that underlie cognitive performance;
- (4) information processing in humans resembles that in computers.

The Stage Model of information processing

Traditionally, the most widely used model of information processing is the stage theory model, based on the work of Atkinson and Shiffrin (1968). The key elements of this model are that it views learning and memory as discontinuous and multi-staged. The stage theory of **information processing** model recognizes

three types or stages of memory: **sensory memory (Sensory register)**, **short-term or working memory**, and **long-term memory**.

Figure 1: stage model of memory

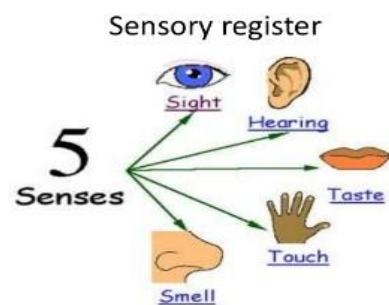
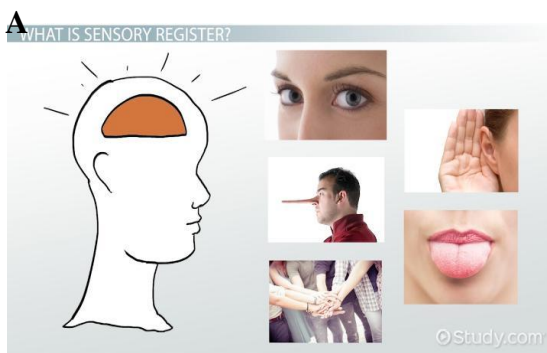


Information Processing Theory Model (Explanation)

Information processing is a cognitive process (mental process) which explains how the mind functions in the learning process. In this theory emphasis is on **how the information is processed** rather than **how learning happens**. The theory has three basic components which are;

1. Sensory register(SR)
2. Short term memory (STM) or working memory
3. Long term memory (LTM)

A) Sensory register



According to this model information first enters the human information system (nervous system and brain) through senses. Due to the great amount of information that constantly bombards the human senses, sensory information is stored in sensory memory just long enough to be transferred to short-term memory (It means information remains here for very short time until it is transferred or deleted). The information represented in SM is the "raw data" which provides a snapshot of a person's overall sensory experience. So, the **sensory register** is our ultra-short-term memory that takes in **sensory** information through your five senses (sight, hearing, smell, taste and touch) and holds it

for no more than a few seconds. **Sensory** information is stored in **sensory memory** just long enough to be transferred to short-term **memory**.

There are two main parts of the sensory register: a) visual memory (also called **iconic memory**), and b) auditory memory (also called **echoic memory**). These senses take in most of the stimuli you are exposed to. Visual memory holds images we see for less than a second before it fades. Auditory memory holds sound for a little longer. You have also sensory register for touch (tactile), smell (olfactory) and taste (gustatory). Sensory memory is also categorized as the following:

1. **Iconic memory**: The mental representation of the visual stimuli are referred to as icons (fleeting images.).
2. **Echoic memory** : Echoic memory represents SM for the auditory sense of hearing. Auditory information travels as sound waves which are sensed by hair cells in the ears. The echoic sensory store holds information for 2–3 seconds to allow for proper processing.
3. **Haptic memory**: Haptic memory represents SM for the tactile sense of touch. Sensory receptors all over the body detect sensations such as pressure, itching, and pain. Information from receptors travel through afferent neurons in the spinal cord to the post central gyrus of the parietal lobe in the brain.

B.) Short term memory

Short-term memory (STM) is the second stage of the multi-store memory model proposed by the Atkinson-Shiffrin. It is the "smallest" part of memory, because it cannot hold much information at any one time. Its size can be estimated by measuring memory span (or span of attention). It is assumed that the information registered at SR is then shunted/pushed to the short term memory, where its storage is facilitated by process called chunking and rehearsal. If chunking and rehearsing does not occur within limited seconds (15-30 seconds), then the information will be lost. In other words, short-term memory is the very short time that you keep something in mind before either dismissing it or transferring it to long-term memory. A person can repeat separate items or chunks immediately without error. Most people can repeat 6 or 7 digits or letters perfectly almost every time, but few can consistently repeat more than 7. The duration of STM seems to be between 15 and 30 seconds. Short term memory has three key aspects:

1. **limited capacity** (only about 7 items can be stored at a time)
2. **limited duration** (storage is very fragile and information can be lost with distraction or passage of time)
3. **encoding** (primarily acoustic, even translating visual information into sounds).

The Magic number 7 (plus or minus two) provides evidence for the capacity of short term memory. Most adults can store between 5 and 9 items in their short-term memory. This idea was put forward by Miller (1956) and he called it the magic number 7. He thought that short term memory could hold 7 (plus or minus 2 items) because it only had a certain number of “slots” in which items could be stored.

C) Long term memory

Long-term memory (LTM) is the stage of the Atkinson–Shiffrin memory model where information (knowledge and skills) lasts longer period of time. It is described in contrast to short-term and working memory, where information lasts for only about 18 to 30 seconds. Theoretically, the capacity of the long-term memory could be unlimited. Duration might be a few minutes or a lifetime.

Long-term memory houses (= keeps) all previous perceptions, knowledge, and information learned by an individual, but it is not a static file system that is used only for information retrieval. Abbot (2002) suggests that long-term memory “is that more permanent store in which information can reside in a dormant state – out of mind and unused – until you fetch it back into consciousness” (p. 1). In order to incorporate new information, long-term memory must be in communication with short-term memory and must be dynamic.

Long-term memory is commonly labelled as **explicit** memory (declarative) and **implicit** memory (procedural memory).

Explicit memory: Explicit memory (declarative memory) refers to all memories that are consciously available. This memory has three major subdivisions:

- i) **Episodic memory:** Episodic memory refers to memory for specific events in time, as well as supporting their formation and retrieval. Some examples of episodic memory would be remembering someone's name and what happened at your last interaction with each other. Episodic memory is a part of the long-term memory responsible for storing information about events (i.e. episodes) that we have experienced in our lives. It involves conscious thought and is declarative. An example would be a memory of our 1st day at school. Experiments conducted by Spaniol and colleagues indicated that older adults have worse episodic memories than younger adults.
- ii) **Semantic memory:** Semantic memory refers to knowledge about factual information, such as the meaning of words. This includes knowledge about the meaning of words, as well as general knowledge. For example, London is the capital of England. It involves conscious thought and is declarative. In contrast with episodic memory, older adults and younger adults do not show much of a difference in semantic memory.

iii) Autobiographical memory: Autobiographical memory refers to knowledge about events and personal experiences from an individual's own life. Though similar to episodic memory, it differs in that it contains only those experiences which directly pertain to the individual, from across their lifespan.

Implicit memory: Implicit memory (procedural memory) refers to the use of objects or movements of the body, such as how exactly to use a pencil, drive a car, or ride a bicycle. Procedural memory is a part of the long-term memory which is responsible for knowing how to do things, i.e. memory of motor skills. It does not involve conscious (i.e. it's unconscious - automatic) thought and is not declarative.

Implications for teaching and learning

Information-processing theory has definite educational implications for students with learning and behavior problems. The teacher can modify his/her teaching and learning environment to facilitate directing a student's attention and perception of the incoming information, make suggestions about students using metacognitive strategies, teach skills to stay active in working memory and ways to storage the information in LTM.

- i. This theory suggests teachers for organizing properly the process of teaching and learning to make sure that processing of information goes smoothly.
- ii. Teachers should help students develop learning skills that include visual imagery and other memory-aiding techniques. Visual imagery is easier to recall than abstractions (भावत्मक प्रस्तुती).
- iii. The theory also shows that curriculum should be organized in a sequence so that the content at one level is built on the basis of the previous one.
- iv. The theory also suggests that procedural knowledge needs more emphasis and time than declarative knowledge.
- v. If change is to take place, new information must be transferred into long-term memory. Therefore, repetition and maintenance rehearsal are not sufficient to produce a lasting effect. Information must be presented in such a way that it can be incorporated into the memory structure.
- vi. Get their attention!
- vii. Teach kids to organize information to remember it through Images and Stories
- viii. Make teaching learning meaningful! (Context)
- ix. Get information attended – the teacher should try to encourage learners to pay attention.
- x. Get information rehearsed
- xi. Get learned material stored in long term memory