Thorndike's theory of connectionism

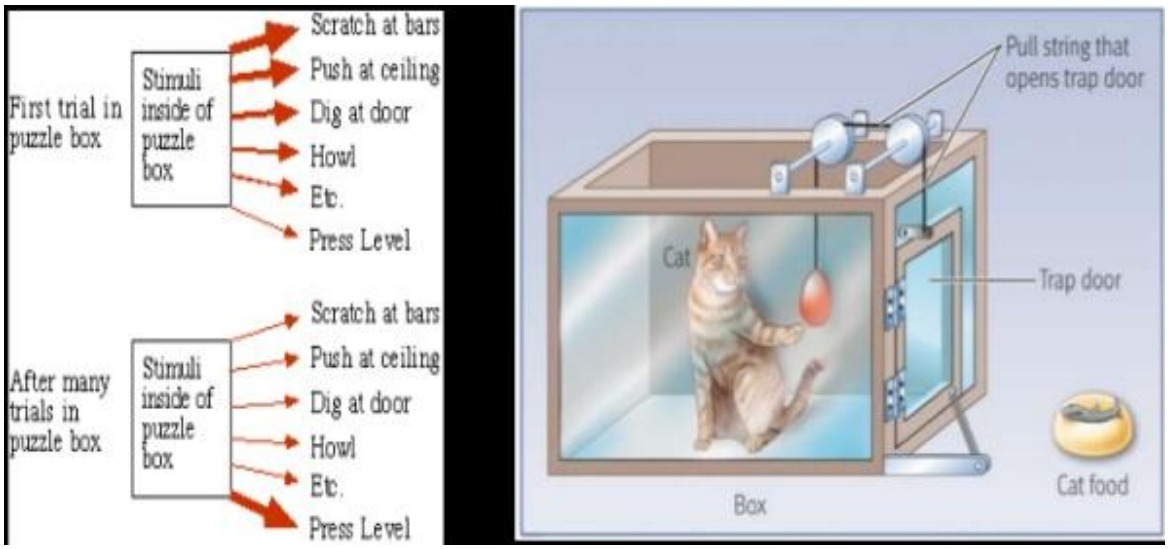
In 1989, Edward Thorndike introduced a theory of learning in his doctoral dissertation "**Animal Intelligence: An Experimental Study of the Associative Processes in Animals**". The theory emphasized the role of experience in the strengthening and weakening of stimulus response connections (bonds). Thorndike 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, 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 motivate 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 this law learning is stronger when it is joined with a pleasing or satisfying feeling. It is weakened when linked with an unpleasant feeling. So, an experience that produces feelings of defeat, anger, etc.is unpleasant for him. The teacher can apply it in the classroom situation by

introducing the principles of **pleasure and pain**, reward and punishment. When the student does something wrong and he is punished for it, he will not do the work again because punishment gives him pain. On the other hand, if the student is rewarded for his success or any good work, it gives him pleasure and he wants to repeat the work, making it permanent.

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.

Law of Readiness: Educational Implication

The teacher should make proper use of this law. Whenever we are physically sick or mentally disturbed and at that time if some thing is taught to us, we cannot pay attention to it and as a result do not learn it.

A person learns best when he has the necessary background, a good aptitude, and is ready to learn. . A clear objective and a good reason for learning sometimes help to motivate students to learn. A student who is usually ready to learn meets the instructor halfway. Outside responsibilities, overcrowded schedules, health, finances, or family affairs can take away a student's desire to learn.

Law of Exercise: Educational Implication-

Educational Implications of the law of exercise is great. It lays importance on the value of repetition, drill and practice for memorizing and mastering of any learnt material. It emphasizes that there should not be a long gap between one practice and the next one because long time disuse may lead to forgetting. Frequent test should be taken to make the students practice the subject learnt.

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.. 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.

Law of effect : Educational Implications-

This law is based on the feelings of the learner. Learning is stronger when joined with a pleasing or satisfying feeling. It is weakened when linked with an unpleasant feeling. An experience that produces feelings of defeat, anger, frustration, futility, or confusion in a student is unpleasant for him. This will decrease his learning capabilities. A student's chance of success is definitely increased if the learning experience is a pleasant one. This law has great educational importance. The teacher can apply it in the classroom situation by introducing the principles of pleasure and pain, reward and punishment. When the student does something wrong and he is punished for it, he will not do the work again because

punishment gives him pain. On the other hand, if the student is rewarded for his success or any good work, it gives him pleasure and he wants to repeat the work, making it permanent.