Theories of Learning

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INTRODUCTION

What goes in the process of learning? How do we learn? How does a child learn to solve mathematical problems? How does a girl learn to cook food or sew clothes? There are so many questions, the answer to which needs a thorough explanation of the phenomenon of learning. Psychologists have conducted experiments to throw light on the phenomenon of learning and as a result have developed various learning theories. Each theory with its systematic body of knowledge explains the nature and process of learning. These theories represent broad principles and techniques of learning. The set of rules and the laws of learning, having wide applicability, are drawn from these theories. Also, these theories put forth various methods of learning and suggest the teacher and learner to take proper steps for the effective learning.

Modern leaning theories may be broadly classified into two types, namely—

(A) Stimulus responses-associationist type of theories.

(B) Gestalt field or field cognition type of theories.

The former interpret learning in terms of the change in behaviour of the learner brought about by the association of the response to a series of stimuli. The chief exponents of this type of theories are—Edward, L. Thorndike (1874-1949); John B. Watson (1878-1958), Evan Petrovich Pavlov (1949-1935) and Burrhus Frederic Skinner (1904). While the ideas and system propagated by Thorndike is called 'Connectionism', the system presented by Watson and Pavlov is known as 'classical conditioning' and the system given by Skinner is called 'operant conditioning'.

The second type of theories look at learning as the change in the field consisting of the learner and his environment and the learner's perception of the field. These theories emphasize the role of purpose, insight and understanding in the process of learning. The chief exponents of this type of theories are Max-Wertheimer (1880-1943); Wolfgang Kohler (1887-1967), Kurt Koffka (1886-1941) and Kurt Lewin (1890-1947).

As a result of modernization due to computer technology and humanistic trends in education, a new theoretical approach has also evolved on the horizon of theories of learning giving birth to several information processing and humanistic theories.

All these theories belonging to one or the other type represent the viewpoints held by their propagators about the nature and process of learning. None of these theories is said to be complete in all aspects for explaining the phenomenon of learning. Each one of them gives a partial description. For example, one theory is good in explaining the learning process in one situation while the others hold equally good in other different situations. Therefore, it is essential to have a working knowledge of some important theories. Below, we try to analyse some of the most important theories. These are:

1. Thorndike's connectionism or Trial and Error learning
2. Watson's & Pavlov's classical conditioning
3. Skinner's operant conditioning
4. Kohler's Insight Theory
5. Lewin's Field Theory
6. Information Processing Theories
7. Roger's Experiential Learning
8. Maslow's Humanistic Theory

THORNDIKE'S CONNECTIONISM OR TRIAL AND ERROR LEARNING

Thorndike propagated the theory with the help of his experiments performed on chickens, rats and cats. Pierre Flooure (1794-1857) had proposed that conclusions drawn from animal experimentation should be equally applicable to man. This proposition started the chain of experimentation in the field of learning with animals. Thorndike selected chickens, rats and cats for experimentation. He placed them under different learning situations and studied them carefully. With the help of these experiments, he tried to evolve certain laws and propagated his theory of connectionism or trial and error learning. It is interesting to study the type of experiments he performed with these animals. For illustration, below we narrate one of his experiment.

He put a hungry cat in a puzzle box. There was only one door for exit which could be opened by correctly manipulating a latch. A fish was placed outside the box. The smell of the fish worked as a strong motive for the hungry cat to come out of the box. As a result, the cat made every possible effort to come out of the box (see Fig. 17.1).

The situation is described by Thorndike (1911) himself as—*"It tries to squeeze through any opening and claws at everything it reaches"*. In this way, it made a number of random movements. In one of the random movements, by chance the latch was manipulated. The cat came out and got its reward responses. In due course, the cat was able to open the door without any error or in other words, learned the way of opening the door.

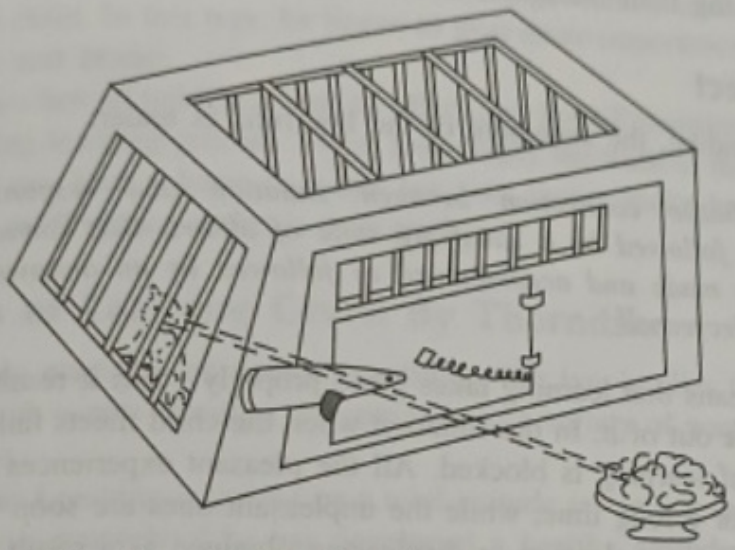

Fig. 17.1 Thorndike's cat is trying to come out of the box.

Thorndike named the learning of his experimental cat as "Trial and Error Learning". He maintained that learning is nothing but the stamping in of the correct responses and stamping out of the incorrect responses though trial and error. In trying for the correct solution, the cat made so many vain attempts. It committed errors and errors before getting success. On subsequent trials, it tried to avoid the erroneous ways and repeat the correct ways of manipulating the latch.

Thorndike called it *"Learning by selecting and connecting"* as it provides an opportunity for the selection of the proper responses and connect or associate them with adequate stimuli. In this reference, Thorndike has written—*"Learning is connecting. The mind is man's connection system"* (1931, p. 122).

As a result, learning is caused by the formation of connection in the nervous system between stimuli and responses. There is a definite association between sense impression and impulses to action. This association can be known as a bond or connection. Since it is these bonds or connection, which become strengthened or weakened in the making and breaking of habits, Thorndike's system is sometimes called "bond psychology" or simply "connectionism".

Thorndike propounded the following laws of learning on the basis of his theory :-

The Law of Readiness

The statement runs as under

> *When any conduction unit is ready to conduct, for it to do so is satisfying. When any condition unit is not in readiness to conduct, for it to conduct is annoying. When any condition unit is in readiness to conduct, for it not to do so is annoying.*

This law is indicative of the learner's state to participate in the learning process. Readiness, according to Thorndike, is preparation for action. It is very essential for learning. If a child is ready

to learn he learns more quickly, effectively and with greater satisfaction than if he is not ready to learn. It warns us not to make the child learn till he is ready and also not to miss any opportunity of providing learning experience if the child is already prepared to learn. The right movements concerning the learning situation and the learner's state of mind should be very well-recognized and maximum use of this knowledge should be made by the teacher. He should also attempt to motivate his students by arousing their attention, interest and curiosity.

The Law of Effect

In the words of Thorndike, the statement of the law runs as under:

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

In simple words, it means that learning takes place properly when it results in satisfaction and the learner derives pleasure out of it. In the situation when the child meets failure or is dissatisfied, the progress on the path of learning is blocked. All the pleasant experiences have a lasting influence and are remembered for a long time, while the unpleasant ones are soon forgotten. Therefore, the satisfaction or dissatisfaction, pleasure or displeasure obtained as a result of some learning ensure the degree of effectiveness of that learning.

In other words, this law emphasizes the role of rewards and punishment in the process of learning. Getting reward as a result of some learning motivates and encourages the child to proceed on the same path with more intensity and enthusiasm while punishment of any sort discourages him and creates distaste and repulsion towards that learning.

The Law of Exercise

The law of exercise has two sub-parts—law of use and law of disuse which may be defined as:

Law of Use

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

Law of Disuse

When a modifiable connection is not made between a situation and response, during a length of time, that connection's strength is decreased.

Thus, law of use refers to the strengthening of connection with practice while the law of disuse refers to the weakening of connection or forgetting when the practice is discontinued. In brief, it can be said that the law of exercise as a whole emphasizes the need of repetition, practice and drill work in the process of learning.

Revised Second and Third Laws

In the later years of his life, Thorndike changed his stand on the laws of exercise and effect.

He experimented upon a blindfolded man who was asked to draw a line of 3 inches in length. Mere repetition did not bring any change or improvement. So, he concluded that practice without

rewarding the response was meaningless, which follows that in the process of learning, connections get strengthened by being rewarded and not by just occurring.

Regarding the law of effect, he concluded that rewards and punishment were not equal and opposite in effect. Though rewards strengthen the connection considerably, punishment does not weaken the connection to the same degree. The intensity and speed of reward in casting influence upon learning is greater than that of punishment. It also brings healthy and desirable improvement in the personality of the child. In this way, he began to give more importance to rewards and praise in place of punishment and blame.

All these three laws—law of readiness, law of effect and law of exercise—have a wide field of application in the teaching-learning process. These laws imply the truth of the well-known proverbs and maxims like "You can lead a horse to water but you cannot make him drink," or "Nothing succeeds like success," or "Practice makes a man perfect."

Some More Laws of Learning Given By Thorndike

(i) **Law of multiple response or varied reactions:** The law implies that when an individual is confronted with a new situation, he responds in a variety of ways before arriving at the correct response.

(ii) **Law of attitude:** Learning is guided by a total attitude or 'set' of the organism. The learner performs the task properly if he has developed a healthy attitude towards the task.

(iii) **Law of analogy:** An individual responds to a new situation on the basis of the responses made by him in similar situations in the past. He makes responses by comparison or analogy.

(iv) **Law of associative shifting:** The law states: "*We can get any response from the learner of which he is capable, associated with any situation to which he is sensitive.*"

In other words, any response, which is possible, can be linked with any stimulus. Thorndike clarified his stand through one of his experiments in which he demonstrated how a cat can be trained to stand up at command. He explained that first of all, a bit of fish is dangled before the cat while you say "Stand up". After enough trials, there will be a stage when you would not need the help of the fish. The verbal signal or command will alone evoke the response. The idea put through this law gave birth to a new theory of learning known as the Theory of Conditioning.

Educational Implications of Thorndike's Theory and His Various Laws of Learning

Thorndike's theory of trial and error has enough educational significance. It tries to explain the process of learning carefully on the basis of actual experiments performed. Not only the animals but human learning also, to a great extent, follow the path of trial and error. A child while confronted with a mathematical problem tries many possibilities of its solution before he arrives at the correct one. Even the discoveries and inventions in the various fields of knowledge are the results of the trial and error process.

For example, let us take the discovery made by Archimedes that is today a well-known principle. He was confronted with a problem given by his emperor. There was a *Drive* that he would be beheaded if he could not get the solution of the problem. There was a *Block*, as he could not think of any solution. The problem was difficult. He went on experimenting and made a number

of attempts (trials) to find the solution. One day while taking his bath, he got *Chance success in* one of his attempts that led to the formulation of the law of floating bodies.

However, excessive use of the trial and error method, without caring for the development of understanding should not be encouraged in any circumstances. We cannot reduce human learning as mechanical and blindfolded as advocated by this theory. It must be supported by reason, understanding and insight. Trials and practice coupled with insight will make the process of learning more effective than either of the methods adopted alone.

As far as the Thorndike's laws of learning are concerned, it goes without saying that Thorndike has done a valuable service to the field of learning and teaching by providing these laws. These laws imply the following things in general:

1. In the process of teaching and learning, the main task of the teacher is to see what things he wants his students to remember or forget. After this, he must try to strengthen the bonds or connections between the stimuli and responses of those things, which are to be remembered, through repetition, drill and reward. For forgetting, the connections should be weakened through disuse and annoying results.
2. The child must be made ready to learn. His interest, attitude and mental preparation is essential for the smooth sailing in the teaching-learning process.
3. It is also emphasized that past experiences and learning give an adequate base for new learning. Therefore, the teacher should try to make use of the previous knowledge and experiences of the students. The child must also be encouraged to see similarities and dissimilarities between the different kinds of responses to stimuli and with the help of comparison and contrast should try to apply the learning of something in one situation to other similar situations.
4. The child should be encouraged to do his work independently. He must try the various solutions of the problem before arriving at a correct one. But every care should be taken to see that he does not waste his time and energy. He should not be allowed to repeat his mistakes and proceed blindly without using his reasoning and thinking powers and utilizing the past experiences.

In short, Thorndike's theory and laws of learning have contributed a lot to the educational theory and practice. It has made learning purposeful and goal-directed and has brought motivation in the forefront. It has also given impetus to the work of practice, drill and repetition and realized the psychological importance of rewards and praise in the process of teaching and learning.

WATSON & PAVLOV'S CLASSICAL CONDITIONING

After performing various experiments on subjects like dogs, rats and cats, psychologists like Watson and Pavlov gave birth to a new theory of learning known as Conditioned Response Theory or simply as Learning by Conditioning. To understand 'conditioning' and what implies this theory, it is desirable to have an idea of the type of experiments performed by these psychologists.

Experiment by Pavlov: In one of the experiments, Pavlov kept a dog hungry for a night and then tied him on to the experimental table which was fitted with certain mechanically controlled devices as shown in Fig. 17.2. The dog was made comfortable and distractions were excluded as far as possible. The observer kept himself hidden from the view of the dog but was able to view the experiment by means of a set of mirrors. Arrangement was made to give food to the dog through

automatic devices. According to the arrangement, every time the food was presented before the dog, a bell also rang. When the food was put before the dog and the bell was rung, there was automatic secretion of saliva from the dog's mouth. The activity of presenting the food accompanied with ringing of bell was repeated several times and the amount of saliva secreted measured.

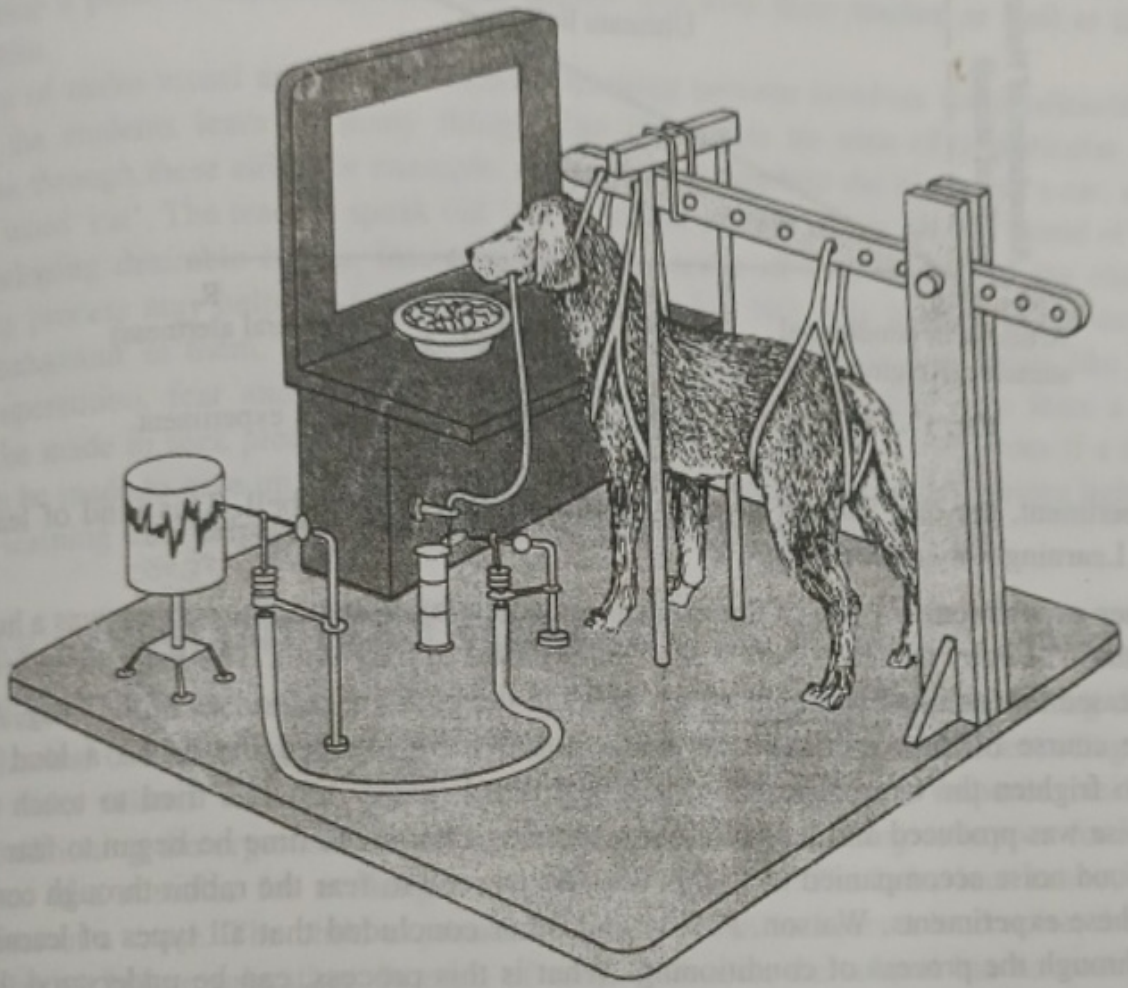

Fig. 17.2 Diagramatic view of the experiment conducted by Pavlov.

After several trials, the dog was given no food but the bell was rung. In this case also, the amount of saliva secreted was recorded and measured. It was found that even in the absence of food (the neutral stimulus), the ringing of the bell (an artificial stimulus) caused the dog to secrete the saliva (natural response).

On the basis of such experiments, Pavlov considered learning as a habit formation based on the principle of association and substitution. It is simply a stimulus-response type of learning where in place of a natural stimulus like food, water, sexual contact etc, artificial stimulus like sound of the bell, sight of light of a definite colour etc. can evoke a natural response. When both the artificial or neutral stimulus (ringing of the bell) and natural stimulus (food) are brought together, several times, the dog becomes habituated or conditioned to respond to this situation. There becomes perfect association between the types of stimuli presented together. As a result, after some time natural stimulus can be substituted or replaced by an artificial stimulus and this artificial stimulus is able to evoke the natural response.

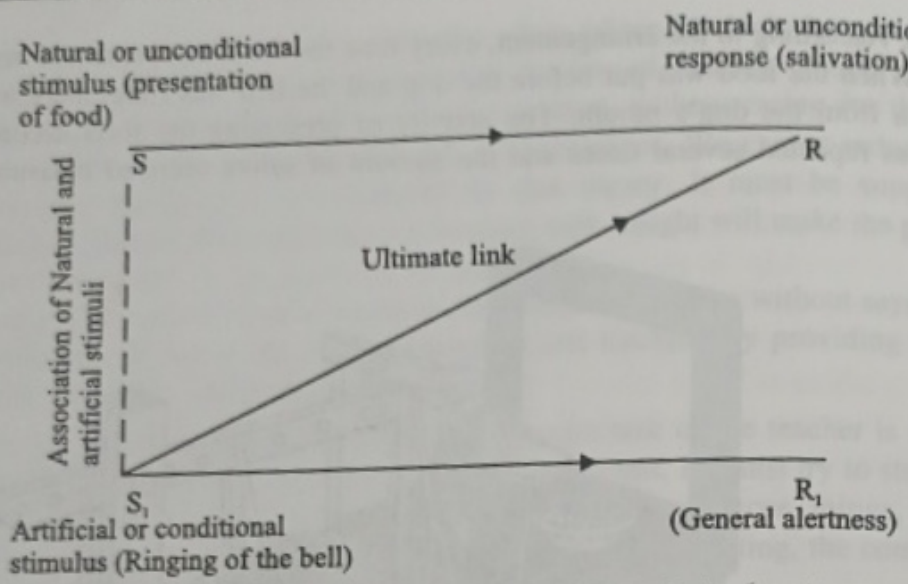

Fig. 17.3 Diagrammatic presentation of the Pavlov's experiment.

In this experiment, the dog learned to salivate at the sound of the bell. This kind of learning was named as Learning by conditioning.

Another experiment: In one of the experiments done by Watson, the subject was a human baby of 11 months. The baby named Albert was given a rabbit to play with. The baby liked it very much and was pleased to touch its fur. He carefully watched the pleasant responses of the baby. After some time in the course of the experiment, as soon as the baby touched the rabbit a loud noise was produced to frighten the baby. The baby was frightened. Every time he tried to touch the rabbit, the loud noise was produced and he gave fear response. After some time he began to fear the rabbit, even if no loud noise accompanied it. In this way, he learned to fear the rabbit through conditioning.

From these experiments, Watson, Pavlov and other concluded that all types of learning can be explained through the process of conditioning. What is this process, can be understood through the following conclusion:

It is a learning process whereby an artificial stimulus is able to behave like a natural stimulus when both natural and artificial stimuli are presented together. In this kind of learning, association plays a great role since the individual responds to an artificial stimulus because he associates it with the natural stimulus.

The conditioning theory of learning put forward by Watson and Pavlov actually involves the conditioning of the respondent behaviour through a process of stimulus association and substitution. Here the responses of the learner become so much conditioned—behaving in the same way or responding similarly to a similar situation—that he does not care for the natural stimuli for evoking the related natural response. As a result the new substituted stimulus behaves like original stimulus and is able to evoke the desired response.

Educational Implications of the Theory of Conditioning

The phenomenon of conditioning does not limit itself to such laboratory experiments only. The day-to-day learning at home, school etc. consists of plenty of examples where a child learns through conditioning.

Fear, love and hatred towards different subjects are created through conditioning. A mathematics teacher, with his defective methods of teaching or improper behaviour, may be disliked

by students or by a particular student. If he, without caring to know the basic reason, always rebukes and punishes the child while assessing his assignments, the child gradually begins to fear home assignments of any sort. He also develops a distaste and hatred towards the subject mathematics.

On the contrary, sympathetic treatment given by a teacher and his interesting and effective methodology can have a desirable impact on the students through the process of conditioning. They would develop a positive attitude towards the subject and love their teacher as well as the subject taught by him.

The use of audio-visual aids in the teaching-learning process involves the conditioning theory in making the students learn so many things. The child gets an idea of a particular object or phenomenon through these aids. For example, the teacher shows him the picture of a cat, along with the written word 'cat'. The teacher speak out 'cat' with the picture of the cat and sound of the word.

In developing desirable habits, interests, attitudes, sense of appreciation in the children, the conditioning process may help the teachers and parents a lot. Not only it helps in the development of proper behaviour in them, but is also helpful in removing so many bad habits like unhealthy attitudes, superstition, fear and phobias, through de-conditioning. A child who fears a particular object can be made to seek pleasure from it. Another child who thinks it dangerous if a cat crosses his way can be made to give up his belief. In this way, the conditioning theory throws light on many aspects of learning and helps the teacher and the parents in their task.