

UNIT-3

LEARNING and Theories of Learning

3.1. Learning

3.1.1. Meaning of Learning

“Learning is defined as **a relatively permanent change** in behavior as a result of experience and training.”

The following points are revealed from this definition

- Learning has **enduring nature**. it results in relatively permanent modification of behavior.
- Learning is a change in knowledge or behavior. This change does not include changes due to **illness, fatigue, intoxication, hunger, maturation** and so on.
- Learning is an **internal mental activity** that cannot be directly observable but manifests in the activities of the individual.
- Learning depends on **experience or practice**. Learning results only those changes that occur as a result of the interaction of a person with his/her environment.

3.1.2. Main Characteristics of Learning

- 1. Learning is growth.** A child grows both mentally and physically through his/her daily activities. Therefore, we can say that learning is growth through experience.
- 2. Learning is adjustment.** Learning helps an individual to adjust himself/herself to the new situations.
- 3. Learning is organizing experience.** Learning is not merely addition to knowledge. It is the reorganization of experience.
- 4. Learning is purposeful.** All true learning is based on purpose. We don't learn anything and everything that comes in our way in a haphazard manner.
- 5. Learning is intelligent.** Meaningless efforts do not produce permanent result. Only efforts made intelligently have lasting effects.

- 6. Learning is active.** Learning does not take place without a purpose and self activity. The principle of learning by doing is the main principle which has been recommended by all modern educationalists.
- 7. Learning is both individual and social.** It is an individual and social activity.
- 8. Learning is the product of environment.** Environment plays an important role in the growth and development of the individual.
- 9. True learning affects the conduct of the learner.** There is a change in the mental structure of the learner after every experience.

3.1.3. Principles of learning

There are important principles that help explaining **how learning occurs** effectively. Some of the most important principles of learning are as follows:

1. Individuals learn best when they are **physically, mentally, and emotionally ready to learn**
2. Students learn best and retain information longer
when they have **meaningful practice and exercise**
3. Learning is strengthened when accompanied by a
pleasant or satisfying feeling, and that learning is weakened when associated with an unpleasant feeling

4. Things learned **first create a strong impression in**

the mind that is difficult to erase.

5. Things most recently learned are best remembered

6. The principle of intensity implies that a student will

learn more from the real thing than from a substitute.

7. Individuals must have some **abilities and skills that**

may help them to learn.

8. Things **freely learned are best learned - the greater**

the freedom enjoyed by individuals, the higher the intellectual and moral advancement.

3.1.4. Factors Influencing Learning

- Some of the factors that affect learning are the following.
 - 1. Motivation:** The learner's motivation matters the effectiveness of learning. The stronger and clearer the motives for learning, the greater are the effort to learn.
 - 2. Maturation:** Neuro-muscular coordination is important for learning a given task. Example, The child has to be mature before she/he is able to learn.
 - 3. Health condition of the learner:** The learner should be in a good health status to learn. Example- Sensory defects, malnutrition, toxic conditions of the body, loss of sleep and fatigue hinder effective learning.
 - 4. Psychological wellbeing of the learner:** individual's psychological states like worries, fears, feelings of loneliness and inferiority hinders learning. Whereas self-respect, self-reliance, and self-confidence are necessary for effective learning.

- 5. Good working conditions:** absence or presence of fresh air, light, comfortable surroundings, moderate temperature, absence of distractions like noise and learning aids determine learning effectiveness.
- 6. Background experiences:** having background experiences affect effectiveness of learning.
- 7. Length of the working period:** Learning periods should neither be too short nor too long. Long learning time sets fatigue and reduces effectiveness in learning.
- 8. Massed and distributed learning:** Learning that spreads across time with reasonable time gaps brings better results compared with crammed learning that occurs at once or within short span of time.

3.2. THEORIES OF LEARNING and Their Applications

- **Behavioral views of learning**
- **Social learning theory**
- **Cognitive views of learning**

3.2.1. Behavioral views of learning

S-R theories without reinforcement

- **Pavlov's Classical Theory of Learning**
- **Watson's Theory of Learning**
- **Guthrie's Theory of Learning**

S-R theories with reinforcement

- **Skinner's theory of operant conditioning**
- **Thorndike's Theory of Learning**

3.2.1.1. Pavlov's Classical Conditioning / Respondent/ Conditioning or type 1 Learning/

- **Classical conditioning** theory represents a process in which a natural stimulus pairing with a neutral stimulus, the neutral stimulus acquires all the characteristics of a natural stimulus.
- It is a type of learning in which a neutral stimulus comes to bring about a response after it is paired with a stimulus that naturally brings about that response.
- It is also **called substitution learning** because it involves substituting a neutral stimulus in place of natural stimulus.
- **Stimulus** □ anything in the environment that one can respond to.
- **Responses** □ any behavior or action towards a stimulus.

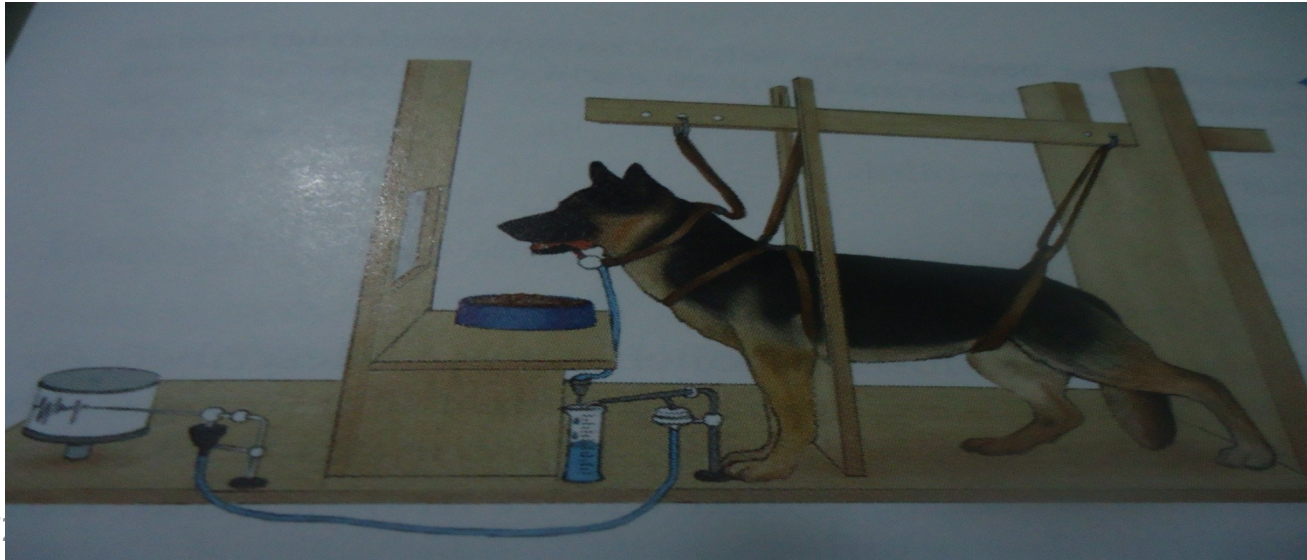
Pavlov's Classical Conditioning Experiment

Before conditioning

- **Bell (Neutral stimulus) or CS** **No**
salivation.
- **Food (natural stimulus) or UCS**
salivation (UCR).

During conditioning

- **Bell (CS) + food (UCS)** **salivation**
(UCR).



Basics of Classical Conditioning

- 1. Neutral Stimulus-** A stimulus that, before conditioning, does not naturally bring about the response of interest
- 2. Unconditioned stimulus (UCS) - is the natural stimulus that triggers a response automatically and reflexively.**
 - It is unlearned, internal and consistently elicits a response.
- 3. Unconditioned response (UCR) - the automatic response to unlearned stimulus (UCS) reflexively but not learned and it works naturally.**
- 4. Conditional stimulus (CS) - Originally neutral stimulus that through association (learning), gains the power of eliciting a response.**
- 5. Conditioned response (CR) - is the response to the CS.**
 - It is process of developing a learned response and it is similar to UCR.

E.g. we can take white rat (CS),
Loud noise (UCS) and fear of the
child called **“Little Albert”**

- White rat leads to No response
- Loud sound elicit UCR (fear)
- White rat + loud noise with several

fear



Principle of classical conditioning

- . **Acquisition:** process of developing learned response.
- . **Extinction:** is the diminishing of learned response, when the UCS does not follow a CS.
- . **Spontaneous Recovery:** The reappearance of the CR after a rest period suddenly stimulated by the CS.

Generalization and Discrimination

- ❖ Despite differences in color and shape, to most of us a rose is a rose is a rose. The pleasure we experience at the beauty, smell, and grace of the flower is similar for different types of roses.
- ❖ Pavlov noticed a similar phenomenon. His dogs often salivated not only at the ringing of the bell that was used during their original conditioning but at the sound of a buzzer as well.

- Such behavior is the result of stimulus generalization. **Stimulus generalization** occurs when a conditioned response follows a stimulus that is similar to the original conditioned stimulus. The greater the similarity between two stimuli, the greater the likelihood of stimulus generalization. Little Albert, who, as we mentioned earlier, was conditioned to be fearful of white rats, grew afraid of other furry white things as well.
- However, according to the principle of stimulus generalization, it is unlikely that he would have been afraid of a black dog, because its color would have differentiated it sufficiently from the original fear-evoking stimulus.

- The conditioned response elicited by the new stimulus is usually not as intense as the original conditioned response, although the more similar the new stimulus is to the old one, the more similar the new response will be.
- On the other hand, **stimulus discrimination** occurs if two stimuli are sufficiently distinct from one another that one evokes a conditioned response but the other does not. Stimulus discrimination provides the ability to differentiate between stimuli.
- For example, our ability to discriminate between the behavior of a growling dog and that of one whose tail is wagging can lead to adaptive behavior—avoiding the growling dog and petting the friendly one.

To make conditioning effective;

- The time laps between the presentations of the two stimuli (CS & UCS) should be small ranging from half to a few seconds.
- The CS should present before the presentation of the UCS (sometimes simultaneously).
- Different types of conditioning can be employed in classical conditioning based on time and order of CS and UCS.

a) Delayed conditioning: refers to presenting the CS first and letting to remain at least until the onset of the UCS. **It produces strong conditioning.**

Cont.

- b. Trace conditioning:*** refers to presenting the conditioned stimulus first and ending before the onset of the UCS. It produces **moderately strong conditioning.**
- c. Simultaneous conditioning:*** refers to beginning and ending of the CS and the UCS together. It **produces weak conditioning.**
- d. Backward conditioning:*** is a conditioning in which the onset of the UCS precedes the onset of the CS. It is **mostly unsuccessful principle.**

- **Operant conditioning** is learning in which a voluntary response is strengthened or weakened, depending on its favorable or unfavorable consequences. When we say that a response has been strengthened or weakened, we mean that it has been made more or less likely to recur regularly.
- Unlike classical conditioning, in which the original behaviors are the natural, biological responses to the presence of a stimulus such as food, water, or pain, operant conditioning applies to voluntary responses, which an organism performs deliberately to produce a desirable outcome.
- The term *operant* emphasizes this point: The organism *operates* on its environment to produce a desirable result. Operant conditioning is at work when we learn that toiling industriously can bring about a raise or that studying hard results in good grades.

Reinforcement: the central concept of operant conditioning

- **Reinforcement** is the process by which a stimulus increases the probability that a preceding behavior will be repeated.
- A **reinforcer** is any stimulus that increases the probability that a preceding behavior will occur again.
- Hence, food is a reinforcer because it increases the probability that the behavior will take place.
- What kind of stimuli can act as reinforcers? Bonuses, toys, and good grades can serve as reinforcers—if they strengthen the probability of the response that occurred before their introduction.

Positive Reinforcers, Negative Reinforcers, and Punishment

- In many respects, reinforcers can be thought of in terms of rewards; both a reinforcer and a reward increase the probability that a preceding response will occur again.
- But the term *reward* is limited to *positive* occurrences, and this is where it differs from a reinforcer—for it turns out that reinforcers can be positive or negative.
- A **positive reinforcer** is a stimulus *added* to the environment that brings about an increase in a preceding response. If food, water, money, or praise is provided after a response, it is more likely that that response will occur again in the future.
- The paychecks that workers get at the end of the week, for example, increase the likelihood that they will return to their jobs the following week.

- In contrast, a **negative reinforcer** refers to an unpleasant stimulus whose removal leads to an increase in the probability that a preceding response will be repeated in the future.
- For example, if you have an itchy rash (an unpleasant stimulus) that is relieved when you apply a certain brand of ointment, you are more likely to use that ointment the next time you have an itchy rash. Using the ointment, then, is negatively reinforcing, because it removes the unpleasant itch. Similarly, if your iPod volume is so loud that it hurts your ears when you first turn it on, you are likely to reduce the volume level. Lowering the volume is negatively reinforcing, and you are more apt to repeat the action in the future when you first turn it on.

- Negative reinforcement, then, teaches the individual that taking an action removes a negative condition that exists in the environment.
- Like positive reinforcers, negative reinforcers increase the likelihood that preceding behaviors will be repeated.
- Note that negative reinforcement is not the same as punishment.
- **Punishment** refers to a stimulus that *decreases* the probability that a prior behavior will occur again.
- There are two types of punishment: positive punishment and negative punishment, just as there are positive reinforcement and negative reinforcement. (In both cases, “positive” means adding something, and “negative” means removing something.)

- *Positive punishment* weakens a response through the application of an unpleasant stimulus. For instance, spanking a child for misbehaving or spending ten years in jail for committing a crime is positive punishment.
- In contrast, *negative punishment* consists of the removal of something pleasant. For instance, when a teenager is told she is “grounded” and will no longer be able to use the family car because of her poor grades, or when an employee is informed that he has been demoted with a cut in pay because of a poor job evaluation, negative punishment is being administered.
- Both positive and negative punishment result in a decrease in the likelihood that a prior behavior will be repeated.

Schedules of reinforcement: timing life's rewards

- The world would be a different place if poker players never played cards again after the first losing hand, fishermen returned to shore as soon as they missed a catch, or telemarketers never made another phone call after their first hang-up. The fact that such unreinforced behaviors continue, often with great frequency and persistence, illustrates that reinforcement need not be received continually for behavior to be learned and maintained.
- In fact, behavior that is reinforced only occasionally can ultimately be learned better than can behavior that is always reinforced.

- When we refer to the frequency and timing of reinforcement that follows desired behavior, we are talking about **schedules of reinforcement**.
- Behavior that is reinforced every time it occurs is said to be on a **continuous reinforcement schedule**;
- If it is reinforced some but not all of the time, it is on a **partial** (or **intermittent**) **reinforcement schedule**.
- Although learning occurs more rapidly under a continuous reinforcement schedule, behavior lasts longer after reinforcement stops when it is learned under a partial reinforcement schedule

- Although many different partial reinforcement schedules have been examined, they can most readily be put into two categories:
- Schedules that consider the *number of responses* made before reinforcement is given, called fixed-ratio and variable-ratio schedules, and those that consider the *amount of time* that elapses before reinforcement is provided, called fixed-interval and variable-interval schedules.

Fixed- and Variable-Ratio Schedules

- In a **fixed-ratio schedule**, reinforcement is given only after a specific number of responses. For instance, a rat might receive a food pellet every tenth time it pressed a lever; here, the ratio would be 1:10. Similarly, garment workers are generally paid on fixed-ratio schedules: They receive a specific number of dollars for every blouse they sew. Because a greater rate of production means more reinforcement, people on fixed-ratio schedules are apt to work as quickly as possible.

- In a **variable-ratio schedule**, reinforcement occurs after a varying number of responses rather than after a fixed number. Although the specific number of responses necessary to receive reinforcement varies, the number of responses usually hovers around a specific average. Gambling and begging are the two examples of variable ratio schedule, which lead to a high rate of response and resistance to extinction.

Fixed- and Variable-Interval Schedules: The Passage of Time

- In contrast to fixed- and variable-ratio schedules, in which the crucial factor is the number of responses, *fixed-interval* and *variable-interval* schedules focus on the amount of time that has elapsed since a person or animal was rewarded.
- ◆ One example of a fixed interval schedule is a weekly paycheck. For people who receive regular, weekly paychecks, it typically makes relatively little difference exactly how much they produce in a given week. Because a **fixed-interval schedule** provides reinforcement for a response only if a fixed time period has elapsed, overall rates of response are relatively low. This is especially true in the period just after reinforcement, when the time before another reinforcement is relatively great. Students' study habits often exemplify this reality. If the periods between exams are relatively long (meaning that the opportunity for reinforcement for good performance is given fairly infrequently), students often study minimally or not at all until the day of the exam draws near. Just before the exam, however, students begin to cram for it, signaling a rapid increase in the rate of their studying response. As you might expect, immediately after the exam there is a rapid decline in the rate of responding, with few people opening a book the day after a test.

- One way to decrease the delay in responding that occurs just after reinforcement, and to maintain the desired behavior more consistently throughout an interval, is to use a variable-interval schedule. In a **variable-interval schedule**, the time between reinforcements varies around some average rather than being fixed. For example, a professor who gives surprise quizzes that vary from one every three days to one every three weeks, averaging one every two weeks, is using a variable-interval schedule.
- ✓ Compared to the study habits we observed with a fixed-interval schedule, students' study habits under such a variable-interval schedule would most likely be very different. Students would be apt to study more regularly because they would never know when the next surprise quiz was coming. Variable-interval schedules, in general, are more likely to produce relatively steady rates of responding than are fixed-interval schedules, with responses that take longer to extinguish after reinforcement ends.

Implications of Operant Conditioning

- ✓ Use reinforcers periodically to extend the desired behavior
- ✓ Give reinforcers immediately for a desired br of students.
- ✓ Use praise and ignore- means praising students who follow rules and ignore rule breakers.
- ✓ Carefully and systematically praise students.
- ✓ Use the **Premack principle** (using bait exchange high for low) to reinforce.
- ✓ Use **shaping - successive** approximation, which involves reinforcing progress instead of waiting for perfection.
- ✓ Reinforce improvement in accuracy, longer periods of performance and participation to persist the br.
- ✓ Use guidelines when reinforce and punish students.
- ✓ Use appropriate schedule of reinforcement to persist behavior.

3.2.2. Observational /Social/ Learning Theory

- **Albert Bandura** is the prime proponent of this theory.
- Learning takes place through **observation, imitation, modeling, mimicking or watching others.**
- **Vicarious learning** - learning by seeing the consequence of another persons br.
- observing reinforcing consequences **(vicarious reinforcement)** for that br.
 - observing a punitive consequence **(Vicarious punishment).**
- ❖ Children do not always immediately display behavior learned from models.
- ❖ This is the evidence that **acquisition & performance** are not identical.

Steps of observational learning

- **Bandura mentions four conditions that are necessary before an individual can successfully model the behavior of someone else:**
 - 1. Attention** - first paying attention to the model
 - 2. Retention** - mentally represent to the model's action in some ways as verbal or visual images or both.
 - 3. Production** - showing /acting out/ or performing the behavior
 - 4. Motivation and reinforcement** - learners must want to demonstrate what they have learned from the model.
- **Remember that since these four conditions vary among individuals, different people will reproduce the same behavior differently.**

Assumptions of Social Learning Theory

- u Reciprocal determinism refers to the interaction of the person, person's behavior and physical environment.**
- u** People have **an agency or ability** to influence their own behavior and the environment in a purposeful, goal-directed fashion as opposed to **environmental determinism of behaviorism**
- u** Learning can occur without an immediate change in behavior or more broadly that learning and the demonstration of what has been learned are distinct processes.
- ◆** It also means that students can learn but not demonstrate that learning **until motivated to do so.**

Educational Implications of Social Learning Theory

- **Social learning theory has numerous implications for classroom use**
 - 1. Students often learn a great deal simply by observing other people**
 - 2. Describing the consequences of behavior can effectively increase the appropriate behaviors and decrease inappropriate ones**
 - 3. Modeling provides an alternative to shaping for teaching new behaviors**
- **However, modeling can provide a faster, more efficient means for teaching new behavior than shaping in operant conditioning**

4. Teachers and parents must **model appropriate behaviors** and take care that they do not model inappropriate behaviors
5. Teachers should expose students to a variety of other models.
 - This technique is especially important to break down traditional stereotypes
6. Students must believe that they are capable of accomplishing school tasks
 - Thus it is very important to develop **a sense of self-efficacy** for students.
7. Teachers should help students set realistic expectations for their academic accomplishments

3.2.3. Cognitive Learning Theory

- ❖ **Cognitive learning theorists believe that thought processes have an important effect on learning. Humans often use mental or cognitive abilities when they interact with their environment.**
- ❖ **People can manipulate, alter, or change things mentally to examine possible outcomes before they actually do anything.**
- ❖ **Developed approaches that focus on the unseen mental processes that occur during learning, rather than concentrating solely on external stimuli, responses, and reinforcements.**

3.2.3.1. Latent Learning

- Evidence for the importance of cognitive processes comes **from a series of animal experiments** that revealed a type of cognitive learning **called latent learning**.
- ‘Latent’ means hidden and thus latent learning is learning that occurs but is not evident in behavior until later, **when conditions for its appearance are favorable/rewarded**.
- It is said to occur **without reinforcement** of particular responses and seems to involve changes in the way information is processed.
- In a classic experiment, Tolman and Honzic (1930) placed three groups of rats in mazes and observed their behavior each day for more than two weeks.

- The rats in Group 1 always found food at the end of the maze. Group 2 never found food. Group 3 found no food for ten days but then received food on the eleventh.
- The Group 1 rats quickly learned to head straight the end of the maze without going blind alleys, whereas Group 2 rats did not learn to go to the end. But, Group 3 rats were different.
- For ten days they appeared to follow no particular route. Then, on the eleventh day they quickly learned to run to the end of the maze. By the next day, they were doing, as well as group one, which had been rewarded from the beginning.
- Group three rats had demonstrated **latent learning**, learning that is not immediately expressed. A great deal of human learning also remains latent **until circumstances allow or require it to be expressed.**

- To cognitive theorists, it seemed clear that the **unrewarded rats had learned the layout** of the maze early in their explorations; they just **never displayed their latent learning until the reinforcement was offered**.
- Instead, those rats seemed to develop a **cognitive map** of the maze—a mental representation of spatial locations and directions.
- People, too, develop cognitive maps of their surroundings.
- For example, latent learning may permit you to know the location of a kitchenware store at a local mall you've frequently visited, even though you've never entered the store and don't even like to cook.

3.2.3.2. Insight Learning

- **It is a cognitive process whereby we reorganize our **perception of a problem.****
- **It's learning to solve a problem by understanding various parts of the problem.**
- **It doesn't depend on conditioning of particular behaviors for its occurrence.**
- **Sometimes, for example, people even wake up from sleep with a solution to a problem that they had not been able to solve during the day.**
- **In a typical insight situation where a problem is posed, a period follows during which no apparent progress is made, and then the solution comes suddenly.**
- **What has been learned in insight learning can also be applied easily to other similar situations.**

- **Human beings who solve a problem insightfully usually experience a good feeling called **an 'aha' experience.****
- **Wolfgang Kohler studied insight learning in chimpanzees**
- **Kohler placed chimpanzees in certain situations and watched them solve the problems**
Ex. Hanging a banana out of the chimpanzee's reach-
Solution: Monkeys stacked boxes on top of one another to get to the banana
- **Kohler believed that the monkeys could not have come to the solution **without a cognitive understanding of how to solve the problem.****