CONCEPTUAL FRAMEWORK OF LEARNING THEORIES

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DEFINITION

Learning has been defined by psychologists in the following ways:

1. It is the acquisition of new behaviour or the strengthening or weakening of old behaviour as the result of experience – Henry P. Smith
2. It is a relatively permanent change in behaviour brought about by experience- Rod Plotnik
3. Learning is the acquisition of habits, knowledge and attitude – Crow and Crow
4. It is the name given to a small number of demonstrable relationship between environmental factors and behavioural changes- E.C. Tolman

To summarize the fundamental idea of learning in psychology, it may be said that learning is the process of accumulating and maintaining a range of behaviour (skills, knowledge, cognition) through direct and indirect experiences gained by an organism. The nature and characteristics of learning have been outlined below:

1. It is a continuous process across the life span of an organism from birth to death.
2. It is characterized in behavioural change.
3. Learning is universal that is found in all living species and cultures.
4. The change in behaviour is purposeful and goal-directed.
5. Learning is an active process of development and progress.
6. It is an organized relationship between stimulus and response.
7. Learning is transferable i.e. learning in a specified set of conditions helps in facilitation of learning in other similar conditions.
8. It helps individuals to classify their experiences and apply them in relevant situations.

CLASSICAL CONDITIONING

Several theories of learning have been proposed to help explain the nature and process of learning in organisms, the first of which was the Classical Conditioning (Respondent Conditioning). The theory dates back to the early 1900s when a Russian physiologist, Ivan Petrovich Pavlov, demonstrated learning as an association between a conditioned stimulus and an unconditioned stimulus. It is a form of learning in which the respondent generates the same response to a conditioned stimulus as generated naturally by an unconditioned stimulus.

PAVLOV'S EXPERIMENT

Pavlov conducted an experiment to elucidate the phenomenon of classical conditioning. He created an artificial laboratory set up to measure the amount of salivation by a dog on presentation of food. He then paired the food presentation with the sound of a bell which was rung prior to the presentation of food. Initially, the dog salivated at food only. But when the trials were repeated for multiple days, Pavlov observed that the dog salivated at the sound of the ring even when the food was not ready to be given. In other words, the bell had acquired the properties of the food.

ILLUSTRATION OF CLASSICAL CONDITIONING

The basic idea of classical conditioning is to pair a stimulus that elicits natural reflexive responses with a neutral stimulus multiple number of times and eventually developing a learned response in the learner. The discipline of Behaviourism flourished as a school of thought by drawing heavily upon the idea of Classical Conditioning. J.B. Watson and Rosalie Raynor carried out an experiment on an 11 month old baby called Albert. Albert was presented with a white rat and a loud noise was made with it every time that scared him. After this procedure was repeated for several times, it was seen that the baby expressed fear whenever the rat was presented (in the absence of the sound). Later, the baby began to show fear responses at the sight of anything white and furry like a rat. It can be therefore said that the baby's fear became a learnt response as a result of the association between the rat and the sound.

There are three basic phases of this process:

Phase 1: Before Conditioning [UCS ---------> UCR]

The first part of the classical conditioning process requires a naturally occurring stimulus that will involuntarily elicit a reaction. [Eg: Salivating in response to the smell of food]. During this phase of the process, the unconditioned stimulus or food (UCS) results in an unconditioned response or salivation (UCR).

Note: An <u>unconditioned stimulus</u> is a stimulus that will naturally and unconditionally evoke an appropriate response. The <u>unconditioned response</u> is the unlearned response that occurs naturally in response to the unconditioned stimulus.

.**Phase 2: During Conditioning [NEUTRAL STIMULUS + UCS = UCR]**

During the second phase of the classical conditioning process, a neutral stimulus is repeatedly paired with the unconditioned stimulus. As a result of this pairing, an association between the previously neutral stimulus and the UCS is formed. At this point, the once neutral stimulus (bell sound) becomes known as the conditioned stimulus (CS). The subject has now been conditioned to respond to this stimulus.

Note: The <u>conditioned stimulus</u> is previously neutral stimulus that, after becoming associated with the unconditioned stimulus, comes to trigger a <u>conditioned response</u>.

Phase 3: After Conditioning [CS ---------> CR]

Once the association has been made between the UCS and the CS, presenting the conditioned stimulus alone will come to evoke a response. The resulting response is known as the conditioned response (CR) [Eg: Salivating to the sound of bell in the absence of food]

Note: The <u>conditioned response</u> is the learned response to the previously neutral stimulus. The above illustration may be used to explain the reason behind residents of a boys' hostel feeling hungry at the sound of a bell purported to give a wakeup call at breakfast time.
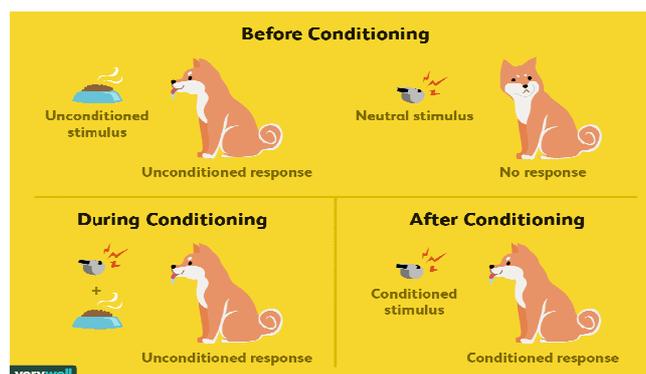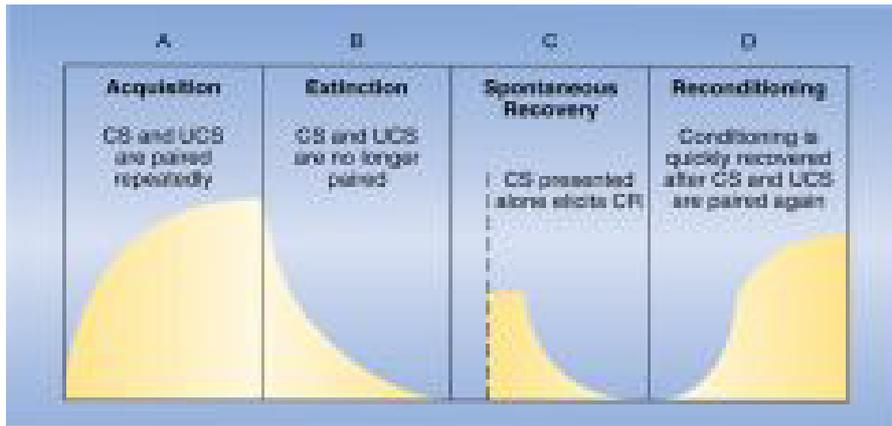
KEY PRINCIPLES OF CLASSICAL CONDITIONING

Behaviourists have described different phenomena underlying classical conditioning. Some of these elements involve the initial formation of the response while others describe the loss of a response. These elements are as follows:

1. Acquisition: Acquisition is the initial stage of learning when a response is first established and gradually strengthened by repeated pairing of the two stimuli until the subject is conditioned to respond without the natural stimulus.

2. Extinction: Extinction is when the occurrences of a conditioned response declines as a result of the conditioned stimulus no longer being paired with an unconditioned stimulus. For example, if the food is not given after calling the hostel boys by ringing the bell for days, the boys will stop feeling hungry after hearing the bell.

3. Spontaneous Recovery: Sometimes a learned response can suddenly emerge back even after a period of extinction. Spontaneous recovery is the reappearance of the conditioned response after a rest period.
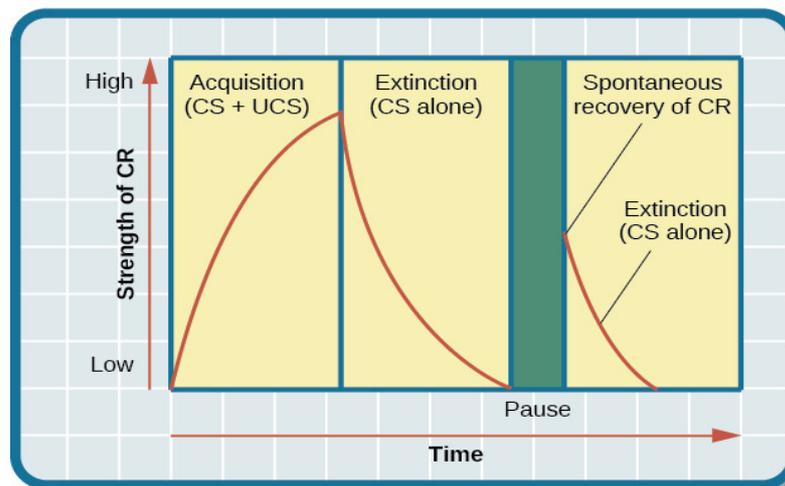

If the conditioned stimulus and unconditioned stimulus are no longer associated, extinction will occur very rapidly after a spontaneous recovery.

4. Reconditioning: In classical conditioning, reconditioning refers to the repairing of the CS and the UCS after extinction has taken place. During reconditioning, an organism learns more quickly than it during acquisition that the CS predicts the occurrence of the UCS.

5. Stimulus Discrimination: Discrimination is the ability to differentiate between a conditioned stimulus and other stimuli. So the subject responds when the CS is present. For example: Boys at the hostel feeling hungry only to the wakeup bell and not any other bell like sound.

6. Higher Order Conditioning: Also called Second order conditioning, it is the phenomenon by which a neutral stimulus precedes and is paired with a conditioned stimulus (which already evokes a conditioned response). So, the neutral stimulus now becomes a second, usually weaker, conditioned stimulus evoking the same conditioned response (CR) as originally evoked by the CS. For example: Feeling hungry while taking the road that houses our favourite restaurant (road being the second order conditioned stimulus after the restaurant).

Acquisition	Extinction	Spontaneous Recovery	Reconditioning
CS and UCS are paired repeatedly	CS and UCS are no longer paired	CS presented alone elicits CR	Conditioning is quickly recovered after CS and UCS are paired again

Types of conditioning:

1. Forward conditioning (CS precedes UCS)
2. Backward conditioning (UCS precedes CS)
3. Simultaneous conditioning (CS and UCS occurring at the same time)
4. Trace conditioning (UCS following the complete presentation of CS)
5. Delay conditioning (UCS occurring while the CS is still being presented)

SIMPLE CONDITIONING PROCEDURES
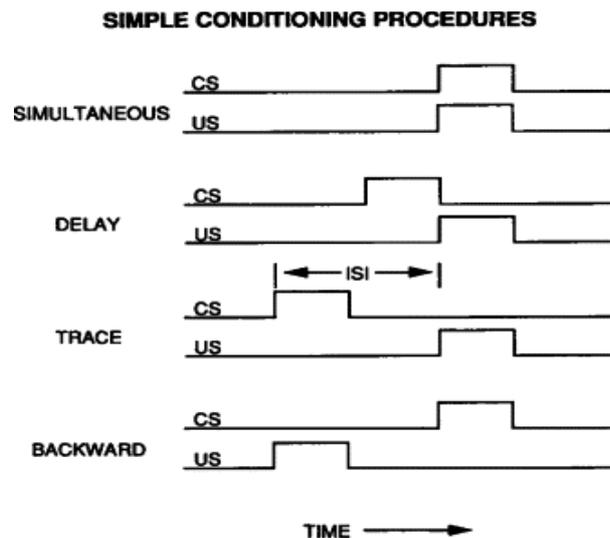
CLASSICAL CONDITIONING EXAMPLES

Classical Conditioning of a Fear Response (Phobia)

The experiment on Little Albert was a classic example of development of phobia through classical conditioning. Phobias are mostly formed due to association from single pairing between a neutral stimulus and a frightening experience. For example: Fear of maths is a phobia developed through association between mathematics (neutral stimulus) and teacher's harsh criticism (negative experience).

Classical Conditioning of Taste Aversions

Another example of classical conditioning can be seen in the development of conditioned taste aversions. Researchers John Garcia and Bob Koelling first noticed that rats developed an aversion to flavoured water after the water was paired with electrical radiation causing nausea. The radiation represents the unconditioned stimulus and the nausea represents the unconditioned response. After the pairing of the two, the flavored water is the conditioned stimulus. Forming such associations has survival benefits for the organism as they learn to avoid food that can cause them illness. This is known as biological preparedness.

APPLICATIONS OF CLASSICAL CONDITIONING

Classical conditioning explains many aspects of human behaviour. It plays an important role in generating emotional responses, advertising, addiction, psychotherapy, hunger etc. Classical conditioning also finds its application at school, post traumatic disorders etc. These are explained as follows:

1. **Advertising:** Advertising is a field where classical conditioning is used the most. Companies' use various models for this purpose like cartoon characters for kids' commercials, female models for fairness ads and sports personalities to target the male population as the use of such models are associated with positive learnt responses in the respective samples.

2. **Addiction:** People addicted with caffeine and nicotine found in tea, coffee or painkillers feel relaxation even before its intake and develop an urge to depend on the substances.

3. **Psychotherapy:** Classical conditioning also finds its application in psychotherapy. It is often used in systematic desensitization to treat phobias or fears. Aversive therapy is also one of the applications of classical conditioning. In this therapy, behaviour is modified by combining a nauseatic substance with the unwanted behaviour or habit (smoking/ alcoholism) which causes vomiting or makes one feel unpleasant. In this way, the unwanted behaviour is made to decline.

4. **Post-Traumatic Disorders:** Sometimes people, who have experienced a war or accident or disaster, often feel a rush of fear and anxiety when they see a small fight or are stuck in a situation similar in nature.

5. **Education:** If the environment at school is very strict, children might associate fear with school or might give birth to school phobia. In the same way, if the environment of school is very friendly and pleasant, a feeling of attraction or comfort can be developed motivating them to study.

TRIAL AND ERROR LEARNING

Other theories of learning also gained momentum after Pavlov's theory failed to justify the learning phenomenon of voluntary and conscious behaviours that are more complex in nature. Behaviourist pioneers E.L Thorndike and B.F. Skinner performed experiments with animals to understand this aspect.

Thorndike's theory focussed on stimulus-response (S-R) bonds and observed learning as a function of this bond. He emphasized on learning by selection of the successful variant when a ready-made solution is not available to the learner and proposed the method of "Trial and Error Learning" (1913) as the subject adopts different possibilities of reaching the solution.

THORNDIKE'S EXPRIMENT

Thorndike used a hungry cat inside puzzle-boxes to demonstrate this phenomenon. The cat made frantic efforts to escape the puzzle box and tried every behavioural attempt to open the box. It tried one solution upon the failure of which it

eliminated that response and tried another. In this way, it could finally select the effective behavioural response that hit the bar and released the food. With every passing trial, the cat mastered the activity faster than before and took lesser time to reach the food by making lesser errors and selecting the correct responses.

Based on this theory, Thorndike postulated three laws that are still highly relevant in today's times.

1. Law of effect: The S-R bond is likely to increase if it leads to satisfying consequences and decreases if it leads to dissatisfaction or pain.
2. Law of readiness: Learner's physical and mental state are important factors in learning whereby learning is facilitated when the learner is both physically ready and mentally motivated to acquire it.
3. Law of exercise: A modifiable S-R connection is strengthened if it is repeatedly applied while it is possibly weakened if the S-R connection is not made over a length of time.

The above laws find real-life applications in classroom learning that may be strategically used to improve students' performance.

OPERANT CONDITIONING

Skinner was inspired by Thorndike's theory and he went on to conduct experiments in the same line. He called his approach to the analysis of behaviour radical behaviourism. He gave a systematic account of the way in which environmental variables shape and control behaviour and his theory is known as Operant Conditioning.

SKINNER'S EXPERIMENT

Skinner created a chamber known as "Skinner Box" where he placed a rat. The way to reach the pellet of food was by pressing a lever that eventually opened the chamber to produce food. The rat made efforts to explore the box and finally discovered a lever to release the food. The rat pressed the lever upon finding it and satiated its hunger. It was also observed that with repeated trials, the time taken to press the lever reduced. However, the rat experienced an electrical shock if it made an incorrect response. This type of learning is referred to as "instrumental conditioning" as the behaviour is instrumental in reaching the goal (reinforcement).

UNDERLYING PRINCIPLES OF OPERANT CONDITIONING

1. Shaping: It is the process by which gross and closer but successive approximations of a complex behaviour are individually reinforced at every step before the final behaviour is reinforced. In this case, the rat choosing the correct path to the lever, raising its leg to hit the lever and other approximations to the desired behaviour were reinforced by Skinner. For example: A child learning to utter the English alphabets can be reinforced after every correct pronunciation of A, B, C and so on.

2. Chaining: It involves the use of one response giving leads to the occurrence of the next response that sequentially proceeds to give rise to the reinforcement thus forming a series of related behaviours. Example: A child learning to speak all the alphabets in the correct sequence where 'A' provides cue to the next letter 'B'.

3. Stimulus generalization: The tendency to emit responses that produce reinforcements similar to rewards experienced previously is stimulus generalization. Example: Going to a Chinese restaurant because one likes Chinese food.

4. Operant discrimination: It is the ability to discriminate between reinforcements from their differential level of satisfaction. This usually comes from one's past history and experience of reinforcements.

5. Extinction: It is defined as the tendency of a previously learnt response to weaken progressively for non-reinforcement. For example: A child who was previously given chocolates for doing his regular studies will stop studying if chocolates are not given for a very long period of time.

Shaping and chaining are both important processes in operant conditioning that may be successfully used to train animals in circus shows or even children having autism or developmental disorders to do regular day-to-day activities.

According to Skinner, there are three important conditions, the relationship/contingencies among which determine the rate of operant conditioning and that which emits the operant's behaviour:

1. Antecedent: It is the given environment of the learner in which he operates to reach the goal.
2. Operant behaviour: It is the behaviour that the learner is capable of producing in the given environment.
3. Consequence: It is the reinforcement or reward that follows the behavioural response.

CONCEPT OF REINFORCEMENT AND PUNISHEMENT

➢ Reinforcement is any agent or event that strengthens the probability of a desired behaviour. It could be positive (addition of stimulus) and negative (removal of stimulus).

1. Positive Reinforcement is the strengthening of behaviour by adding a pleasant stimulus. Example: Reading out fairy tales after the successful completion of homework by a child.

2. Negative Reinforcement is the process by which behaviour is strengthened by withdrawing a negative outcome from the person. Example: A child doing his homework to avoid the pain of teacher's criticism.

Anxiety is a negative reinforcer and behaviours like drinking, smoking and lying are mostly used to avoid the negative and unpleasant experience of anxiety.

Eating is both positively and negatively reinforcing. As eating provides the pleasure of taste and satiation of hunger, it is a positively reinforcing behaviour. Also, eating reduces the pangs of hunger which is painful and therefore, it is a negatively reinforcing behaviour.

➢ Punishment is any agent or event that is used to reduce or remove the probability of an undesirable behaviour. Punishment can be both positive (addition of stimulus) and negative (removal of stimulus).

1. Positive Punishment is simply using an obnoxious/aversive stimulus like beating or criticising to reduce behaviour.

2. Negative Punishment is the process by which behaviour is discouraged by taking away or stopping a pleasant experience. Example: Depriving a child of his food for being disobedient. It is also called Omission Training.

Aversive Conditioning is a process that involves the use of classical conditioning and punishment to eliminate behaviour by associating it with discomfort or pain. For example: Theatres showing gross visuals of cancer patients to develop aversion towards tobacco use.

Characteristics of Punishment:

1. It is not an effective mode of disciplining as it does not give any direction to the right form of behaviour. Thus, it should be paired with positive reinforcement for showing the correct behaviour.

2. It induces negative affect through the principle of classical conditioning by associating the aversive stimulus with the punished behaviour.

3. It's effect may be spread and any stimulus associated with punishment may be suppressed or avoided.

- Conditioned and Generalized reinforcers are reinforcers that have been classically conditioned with primary reinforcers like food, water, physical touch, pain avoidance. Skinner recognized five such reinforcers that motivate human behaviour: attention, approval, affection, submission of others and tokens (money). These secondary reinforcers are mainly acquired through childhood experiences and evolution.

- Escape and Avoidance Learning: Escape learning is a behaviour that is used to stop the experience of an aversive stimulus (Running to the emergency exit to stop the experience of fire) whereas Avoidance learning is the behaviour that is used to avoid an aversive stimulus (Running when the fire alarm goes off) that is signalled by a conditioned stimulus presented prior to it. Thus, a conditioned stimulus plays an important role in avoidance learning.

- Premack Principle: It is the strategy used to reinforce low probability behaviours with the provision of high probability behaviours. Low probability behaviours are activities that are less preferred by us and high probability behaviours are the activities that are mostly preferred. Example: Small children are motivated to eat vegetables by promising them to give pasta or chips after finishing their meals.

SCHEDULES OF REINFORCEMENT

Reinforcements may be organized in different patterns to make learning effective. Reinforcement may follow behaviour on a continuous schedule wherein every correct response is reinforced or reinforcement may be intermittent wherein reinforcements are paced at different timings for a specified rate of behaviour. Skinner has recognized this form to be the most effective form of learning. Therefore, intermittent reinforcement may be of four types:

1. Fixed Ratio: Reinforcement acquired after a fixed number of responses are achieved. (Example: Incentives given on selling a fixed number of products)
2. Variable Ratio: Reinforcement acquired after an irregular number of responses are emitted. (Example: Playing slot machines)
3. Fixed Interval: Reinforcement is provided after a fixed duration. (Example: Salary system in organizations)
4. Variable Interval: Reinforcement is provided after varying periods. (Example: Surprise class tests)

Skinner's idea of different kinds of reinforcements and their varying combinations finds implication in applied behaviour analysis and classroom teaching-learning processes for students.

SOCIAL COGNITIVE LEARNING

The importance of human cognition was brought about by Albert Bandura (1986) in the learning of behaviours, skills and attitudes. Bandura stresses the role of observation (modelling) in learning. He postulated a theory that was based on an integrated and holistic interplay of three basic elements: Person (P=set of cognition), Environment (E) and Behaviour (B), where all the three are interrelated with each other in a triadic reciprocal causation model. The reciprocal causation represents a reciprocal relationship between P, E and B stating that humans can exercise a measure of control over their environment and environment is capable of fostering changes at the cognitive level.
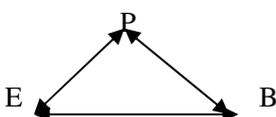
Where: P= Person, E= Environment, B = Behaviour

PRINCIPLES OF SOCIAL LEARNING

1. Observation (Vicarious experience): It is the act of closely monitoring an agent (model) in the environment and re-enacting or reproducing his behaviour. Therefore, learning is acquired through indirect or vicarious experiences. Observation involves judicious selection of behaviour by adding or subtracting behaviour during re-enactment and subsequently generalizing the behaviour to most similar situations. Observational learning or modelling depends on three factors: (a) perception of power, status and competence of the model, (b) characteristics of the observer and (c) consequences of the modelled behaviour. Example: Boys modelling sportsmen or superheroes, girls modelling their mothers and teachers.

   There are four basic steps in observation:
   (a) Attention: Selection of the specific behaviour to be modelled.
   (b) Symbolic representation: Cognitive representation of the information in verbal or visual form.
   (c) Behavioural production: Conversion of the cognitive codes into behavioural operations.
   (d) Motivation: The satisfying or dissatisfying results obtained from the behavioural production forms the crux of the motivational process.

2. Enactive learning: This is direct learning that is achieved through personal experiences. The effect of enactive learning on the person's environment, anticipatory value of an enacted behaviour and consequences of such behaviour serve as the adaptive functions of direct learning. Almost all behaviours in our daily lives are a product of some sort of enactive or vicarious learning. For example: We know that going out in the open during lightning and thunderstorms is dangerous because of past experience either by observing others who have died or by simply experiencing the threat of staying outdoor during a thunderstorm.

3. Human agency: Social cognitive theory proposed an agentic perspective which highlights modes of exercising control over environment. The four main properties of human agency are:
   (a) Intentionality: The individual's purpose and goal and plans to reach the goal
   (b) Forethought: Anticipation of the outcomes related to the goal depending on realistic goal-setting
   (c) Self-reactiveness: Evaluation and scrutiny of the behaviours to achieve the goal
   (d) Self-reflectiveness: Regulation of behaviours that produce self-efficacy

4. Self-efficacy: It is the belief in one's own capability to perform a specific task successfully against all obstacles and limitations through perseverance. Therefore, self-efficacy is situation-specific. Self-esteem, on the other hand, is a generalized feeling of confidence and competence. It is fostered in the following ways:
   (a) Mastery experience or past performance that has been accomplished in relatively challenging tasks without too much dependence or help from others
   (b) Modelling or identification with a person with high self-efficacious behaviours (Eg: A child modelling a famous Indian batsman like Tendulkar, acquiring self-efficacy)
   (c) Social persuasion by credible persuaders (teachers, parents, doctors)
   (d) Adaptive physical and emotional states (devoid of anxiety, stress, phobia)

5. Collective efficacy: As humans have to function in groups and societies, they have to rely on proxy agencies to fulfil their goals and interests. Collective efficacy is the shared belief that the group can successfully and efficiently master a task. Example: People relying on outsourced help for household management.

As Bandura puts maximum weight on the credibility of observation in a social setting, his theory can be used to understand imitated aggressive and bully behaviours in children and effects of mass media on viewers.

<u>OTHER THEORIES OF LEARNING</u>

INSIGHT LEARNING

Gestalt Psychologist Wolfgang Kohler introduced the term 'insight' in the process of learning following the tenets of the Gestalt school of Psychology that emphasizes on "whole being greater than sum of its parts". He performed experiments with a chimpanzee named Sultan (1913-1917) who was given sticks and boxes inside a cage that had a banana hanging from the ceiling of the cage. The chimp contemplated for some time on how to access the banana. All of a sudden, the chimp got up and, while playing with the sticks, joined the sticks to pull the banana down in one instance and stacked the boxes on top of one another to reach the banana in another instance. This was a clear indication of insight learning where the solution of a problem is suddenly reached by rearrangement of perceptual elements. Insight learning takes place successfully when the learner is able to recognize the relationship among the parts of a problem and perceives it as a whole instead of a simple summation of the parts. This sudden appearance of an idea is referred to as "aha" experience. It is also called discovery learning as the subject discovers the solution of a problem accidentally through use of intelligence and creative exploration.

PLACE LEARNING

Tolman (1922) proposed the concept of latent learning by performing experimental studies on rats. Rats were placed inside a maze with food at some place and they had to manoeuvre their way through to the food. While one group of rats was given food at some point, another group was deprived of such food (reward). He observed that the first group of rats could easily locate the food after a few trials which indicated the presence of a meditational process between the stimulus and the response while the other group took greater time to manoeuvre their way out of the maze. This meditational process was the development of "cognitive maps" that helped in locating food easily. Cognitive maps were believed to be mental imagery of the places, thus being referred to as place learning in Tolman's cognitive learning theory. This theory can be generalized to understand human functioning as most of our behaviours are facilitated by place learning like knowing where to go in the kitchen to have water, where to look for the keys etc.

LEWIN'S FIELD/CHANGE THEORY

Kurt Lewin was considered the father of Social Psychology. He conceptualized the existence of a person within a physical and psychological environment consisting of vectors (i.e driving and restraining forces) and barriers between the person and his goal. The boundary of this environment was termed as 'life space' by Lewin. According to him, driving forces are forces that cause change to occur by pushing individuals towards a desirable direction and restraining forces are the counter-driving forces that oppose change to occur as they push the individuals towards the opposite direction. Equilibrium is a state of being in which driving forces equal restraining forces which is duly achieved through change. According to Lewin's theory, change can be facilitated by a three-stage model of 'unfreezing, changing and refreezing'. Unfreezing is letting go of old counterproductive habits or patterns of behaviour, changing is acquiring new behaviours and feelings and refreezing is establishing the acquired patterns of thinking and behaviour as a new habit to live a productive life.

REFERENCES

1. Psychology, 3rd Edition (2006) by Saundra K.Ciccarelli & J. Noland White
2. Introduction to Psychology, 7th Edition (1993) by Morgan, King, Weisz & Schopler
3. Theories of Personality, 7th Edition by Feist & Feist
4. www.wikipedia.org