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Aptness of a Purposive Behaviourist and an Academic Activist-Tolman

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Abstract

After Kurt Lewin, Tolman is the second important field theorist. His nature of work is different from Lewin as his primary orientation was behaviourism. He was not close to Gestalt school of thought; rather he was having association with behaviourist like John B. Watson. He was influenced by Watson, but he was not his follower. He prepared a bridge between behaviourism and cognitivism. He is being considered as the father of Purposive Behaviourism. Lewin has not developed a learning theory, but Tolman's 'Sign Learning Theory' strengthens the concept of 'Cognitive Field Theory' and glorifies and represents Lewin's initiation. His work and theory are relevant today as well. The world remembers him as a Purposive Behaviourist and an Academic Activist. He forwarded Sign Learning Theory by experimenting and concluding that cognitive structure is being made by the individual in the process of learning. His passion for academic freedom was so towering that the academic world still recalls him as a fighter of Academic Autonomy. His aptness, utility, and relevance as a psychologist and academician is unchallenged due to his concepts like sign learning; Independent, dependent, and intervening variables; purposive behaviourism, etc. His saying that learning is a change in cognitive structure is still valid and useful. His concept of latent learning justifies learning is not due to reinforcement. His learning related concepts like cathexis, equivalence belief, field expectations, field cognition modes, drive discrimination, motor pattern, etc. make him different from other psychologists. His brilliance and uniqueness are praiseworthy. His place learning experiments, reward expectancy experiments, and latent learning experiments make him a universal educationist and a versatile psychologist. Despite some limitations he is aptly useful today and will remain useful further for his unique and excellent works.

Key words

Purposive Behaviourism, Academic Activist, Field Theorist, Sign Learning, Place Learning, Latent Learning, Intervening variables.

Life and Work of Edward Chace Tolman

Edward Chace Tolman was an American Psychologist and a Professor of Psychology at the University of California, Berkely. Tolman started his academic career as a student of Engineering at Massachusetts Institute of Technology. Later he moved towards psychology and got Ph.D. degree in Psychology in 1915 at Harvard university. At Harward he was deeply influenced by Holt. For few years he taught at North-Western University and later in 1918 he joined university of California at Berkely and taught there for his major portion of teaching career. He also served as Psychologist in the Office of Strategic Services (OSS) during World War Second. He became known to his work Purposive Behaviourism. He also promoted the concept of latent learning first coined by Blodgett in 1929. A Review of General Psychology Survey, published in 2002, ranked him as the 45th most cited psychologist of the 20th century. Tolman was one of the leading figures in protecting academic freedom. In recognition of Tolman's contributions to both the development of Psychology and Academic Freedom the Education and Psychology Building on Berkely Campus was named after him as "Tolman Hall".

After reading "Principles of Psychology" of William James he left science and mathematics to join the study of Psychology and Philosophy. Tolman was strongly influenced by Gestalt Psychologists, especially by Kurt Lewin and Kurt Kafka. Tolman's important book, Purposive Behaviour in Animals and Men was published in 1932 in which he outlined his behaviouristic stand in detail. Tolman was

much influenced by Watson's experimental formulation, McDougall's concept of purpose, and Woodworth's S-O-R formula. In 1948 Tolman wrote an article on Kurt Lewin and regarded him along with Sigmund Freud as Psychologists who would be well recognized in the future.

Tolman in his system has employed the Characteristics of Behaviourism and Field Theory both. He is recognized as Behaviourist or more particularly Purposive Behaviourist, and Field Theorist both. In his early years he was deeply influenced by Watson's behaviourism, but he later refused to accept Introspection as a method of study accepted by behaviourists. In the process of developing his system he got inclined to move towards cognition, though he started the journey on behaviourist line. His system departed from traditional behaviouristic principles of Waston and later from a Purposive Behaviourist he became a Field Theorist. He borrowed several concepts from Gestalt Psychology and again from Lewin's system. His contributions as a field theorist are distinct and independent. Cherry, Kendra (2023) writes about his journey as a psychologist , Edword C. Tolman is best known for his influence on cognitive behaviourism, his research on cognitive maps, the theory of latent learning, and the concept of an intervening variable." He stressed that the organism learns a cognitive map of the whole situation. In other world, he states that the organism acquires the knowledge of 'burning situation'. As Tolman deals with concept of cognitive map, which represents a kind of field in the brain of the organism making the organism able to run from one place to another without depending upon bodily movements, he becomes a field psychologist. Later in 1949 Version of his system he talks of six types of relations that the organism can learn. Cathexis was one of them which is equivalent to Lewin's concept of valence. It refers to some acquired relationship between his thirst and a glass of water. Field expectancies are another important type of connection considered by him. These refer to the representations of environment through which latent learning is possible. Field cognition modes are another important type of learning emphasized by Tolman. Singh, AK (2002) aptly and appropriately states, "Although it is not easy to separate Tolman as a behaviourist and Tolman as a field theorist, the use of certain concepts likes cognitive map, cathexes, field expectancies, field cognition model, need system, behaviour space and belief-value matrix in explaining behaviour makes us realize that his contributions as a field theorist are distinct and independent. Tolman has stressed that the organism learns a cognitive map of the whole situation."

Tolman as a Field Theorist

Tolman, as a field theorist, is much influenced by Kurt Lewin. On the pattern of Lewin system, Tolman accepted three important classes on intervening variables as under:

The Need System: This system is closely related to drive notion that is Physiological or Psychological. This stand of Tolman is like Lewin. Tolman, however differs from Lewin as he does not emphasize anything like quasi- needs.

The Behaviour Space: This concept is closely related to Lewin's concept of Life space. Tolman has said that behaviour space is the space in which locomotion, that is, the person's movement takes place. Any object in the behaviour space might attract or repel the person.

The Belief-Value Matrix: This is like a kind of inferred state of motivation or some preference for attaining some positive goals or tendency for being repelled from some negative goals. This is much like Lewin's belief that objects have positive or negative valence.

Tolman received many awards and honors. He was president of the American Psychological Association (APA) in 1937, and Chairman of Lewin's Society for the Psychological Study of Social Issues in 1940. He was a member of the society of Experimental Psychologists, the United States National Academy of Sciences, and the American Philosophical Society. APA gave him an award in 1957 for his distinguished contributions. He was elected a Fellow of the American Academy of Arts and Sciences in 1949. Tolman has much experimental research to support his stand as a cognitive field theorist. His Reward Expectancy Phenomena, Latent Learning, Place or Goal Learning have been supported by many other psychologists, through experiment. These works find him as a field theorist. Tolman Position as a field theorist is around Kurt Lewin. His intervening variables deserve the same comment and criticisms as those of Lewinian concept. Like Lewin's concepts, any of these concepts cannot be tested because they contain the element of subjectivism like the concepts of

Gestalt Psychologist and Lewin.

Tolman is well- known in psychology for his theory of learning. His theory and system are unique in the sense that he tried to combine best of the both approaches of learning Stimulus- Response and Stimulus-Sign/ Stimulus (S-R and S-S). He tried to formulate a theory of learning that closely resembles to stimulus- response theory, but at the same time he explained it by non- observable set of intervening variables. The use of intervening variables goes against the spirit of behaviourism. Still, he regarded his interpretation as behaviouristic. By providing a molar analysis of behaviour he distinguished himself from other behaviourists like Watson, Guthrie, and Hull. On the other side his molar interpretation helped him in establishing as a purposive behaviourist. He is regarded as behaviourist as he ultimately favoured Stimulus- Response interpretation by defining stimulus and response in his own way. For him, stimulus is a kind of perception of environmental events which are processed and influenced by organism's history. Again, for Tolman response is not collections of muscle twitches or glandular secretions, but is behaviour defined in terms of end results or goal. In nutshell, Tolman is not a pure Behaviourist rather a Purposive Behaviourist who makes it explicit that learnt behaviour is always directed and oriented towards some end or goal. Edward Tolman rejected the idea of introspection as a method of studying human behaviour and believed in objective method of collecting data. He expressed that we do not only respond to the stimulus, but we act on beliefs, and express attitudes. He believed that behaviour can be modified by experience and training. Tolman's theory combines the advantages of Stimulus- Response Theories and Cognitive Field Theories. Singh, AK (2002) correctly asserts about Tolman's experimenting journey, "He adhered to Watsonian principles and also tried to modify them in explaining psychological phenomena with a molar perspective. In this sense, he considered himself as a purpose behaviourist. But as he developed his system, he felt inclined to include cognition (that is, how a person perceives the field or situation) in his explanation by departing from traditional behaviouristic principles of Watson. Then from a purposive behaviourist, he became a field theorist."

Tolman and His Purposive Behaviourism

Tolman is known for his Purposive Behaviourism and Sign Learning. In his book Purposive Behaviour in Animals and Men published in 1937 he has outlined his book system. He stressed psychology as the study of behaviour and accepted the definition of behaviour as stimulus -response behaviour, though he rejected Watson's ways of interpreting behaviour by what he called premature neurologizing. Behaviour for him is goal-directed, i e, Purposive. Due to this reason, he named his system as "An Objective Behaviouristic Purposivism". His theory is also known as Sign-Gestalt, Sign-Significate, Cognitive or Expectancy Theory. Dutt, Santi (2007) writes, "Tolman E. C. (1886-1959) emphasizes sign learning. He points out that the law of effect is unnecessary to cause latent learning, behaviour modification can take place without reward or other reinforcement." He derived idea of Purposive Behaviour from McDougall's Psychology, but at the same time he rejected McDougall's Theory of Instinct. He also related his theory to Gestalt theory as he felt that behaviour was molar and meaningful. His theory was also influenced by Lewin's field theory. Tolman's system is purposive behaviourism because it emphasizes upon the study of observable behaviour which is purposive. It is Gestaltism in the interpretation of learning. Wolman wisely concluded that Tolman has combined Watsonian behaviourism and Pavlov's conditioning with Thorndike's law of effect and McDougall's purposivism and the Gestalt Theory of Perception coloured by Lewin's field theory. Woodworth S-O-R formula is also employed by Tolman.

Tolman's system can be explained by dividing it into four parts–Independent Variables, Dependent Variables, Intervening Variables and Theory of Learning.

> **1. Independent Variables:** Tolman in his system identified some independent variables as the major causative factors of behaviour. These variables are manipulated and measured by the experimenter. Initially he recognized five such variables and considered that behaviour is the function of these five variables. He wrote an equation i.e. B = f (S, D, H, T, A) i.e. Behaviour is the function of SDHTA; where S-Environmental Stimulus, D- Physiological Drive, H-Heredity, T- Previous Training, A- Age & B = Behaviour.
>
> S and D variables were called as releasing variables because they started the behaviour of the

organism. H, T, and A Variables were called as guiding variables because ultimately, they determine final shape of the behaviour initiated by releasing variables. Later, Tolman revised this list of independent variables' and categorized them as Individual Difference Variables and Maintenance Variables. Important Individual Difference Variables were H, A, T and E; Popularly Known as HATE Variables. E variable includes organs factors such as Endocrine and Vitamin Conditions. Important Individual Difference Variables were Goal Object (G), the Stimuli (S), Motor Response required by the Experimental Design (R), Pattern of Preceding and Succeeding Maze Units (P) that represent the Experimental Tools. It is GSRP. Tolman's concern with these various variables demonstrate that for him there were several determinants of behaviour.

2.Dependent Variables: Tolman defined dependent variables as those behaviours which are observable. For him, the behaviour of the organism is not passive rather active and selective. Tolman's observation was that a rat in the maze receive stimuli actively not passively, and the rat select the significant stimuli actively. He considered observable behaviour as nothing but a stimulus- response affair and not a mechanistic stimulus-response relationship as perceived by Watson, Hull, etc. He divided such behaviour into two types- Simple Reflex or Tropism; and Docile behaviour. The Tolman was exclusively concerned with Docile behaviour. The docility of behaviour simply means that a behaviour is adaptable to changing circumstances and that the way a goal or end will be achieved tends to vary depending upon the means available before the organism. Docile behaviour has many characteristics. It is Molar, Purposive, Cognitive, and Plastic.

3.Intervening Variables: Tolman is credited with the first psychologist to introduce the concept of Intervening Variables in Psychology. They are a set of inferred and non- observed variables that intervene between the observable independent variables and observable dependent variables. In fact, such variables cannot be directly observed but they can be inferred from the behaviour. In 1938 Tolman gave a list of six intervening variables. They were demand for food, appetite, differentiation, motor skill, hypotheses, and biases. In 1952 he revised this list and reduced it to three as Need System, Belief Value Matrix, and Behaviour Space. The need system referred to some kind of inferred state of physiological or psychological drive. The belief value matrix refers to the preference for a particular motive or in other words some inferred motives. The behaviour space is like Lewin's life space. It is a space in which behaviour of the organism takes place. When the person moves in this space, some objects attract him, and some repel him. the former is said to have positive valence and the latter is said to have negative valence.

Tolman's Learning Theory

Tolman is known for his learning theory named as Sign Learning. His theory has come as an alternative to S-R learning theory. His learning theory can be divided into two parts-the "1932 version" and the "1949 version". The 1932 version proposed that the organism learns by Signs. What an organism learns is not a series of muscular or glandular movements. The organism learns is sign-significates, relations, or sign- gestalts. Hilgard, ER; Atkinson, RC; and Atkinson, RL (1975) explain it as, “Because what is learned is a set of expectations or a cognitive map of the environment rather than specific responses, sign learning classifies as learning with understanding rather than as conditioning.” In the simple language it may be concluded that the organism learns a behavioural route to goal or end. Gradually the organism learns a relationship between clues or stimuli in the environment and own expectations. NCERT (2017) while dealing with sign learning and latent learning concludes, “Tolman made an early contribution to the concept of latent learning…….. Tolman contented 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 provided. Instead, the rats developed a cognitive map of the maze, i.e., a mental representation of the spatial locations and directions, which they needed to reach their goal.” Tolman explained this with an observation made in maze learning. In a maze there are several choice points. In other words, there are many stimuli. At each choice point a certain expectancy is built up. If an organism takes an appropriate and correct choice at a choice point, its expectancy is strengthened. By strengthening or

confirming several choices, it develops a cognitive map of the whole maze. For Tolman, learning is nothing but development of the cognitive map. This map is a kind of field in the brain which enables the animal (rat in the experiment) to move from one place to another without depending upon a set of bodily movements. In the interpretation presented by the Tolman, there is no significance of reward or reinforcement. In his learning theory or experiment reinforcement or reward is not a significant variable as we find in the theory or experiment of Pavlov, Thorndike, Skinner, Hull, etc. In Sign learning theory there is significance of goal object to strengthen or confirm the expectancy of the animal. when these expectations are confirmed, learning is also said to be complete.

In 1949 version Tolman added six types of new learning or components in his theory. In explaining these six types of learning, he took the help of concepts enunciated by Freud and Lewin. These six types of learning are Cathexis; Equivalence Beliefs; Field Expectancies; Field Cognition Modes; Drive Discrimination; and Moter Patterns.

1. Cathexis: The Concept of Cathexis has been taken from Freudian terminology and is somewhat equivalent to Lewin's conception of valence. For Tolman, Cathexis is a tendency to seek goal rather than some other goals when experiencing a particular drive. Whenever a particular goal object satisfies a particular drive, a Cathexis of that drive on that goal object is formed or learnt. It is perhaps due to this reason a child develops a relationship (Cathexis) between his hunger and biscuits. Cathexis may be positive or negative.

+ □ Hungry child wants bread.

□ □A burned child dreads a burning candle.

Tolman borrowed the term Cathexis from Freudian Psychoanalytic theory, where it refers to the investment of Psychic energy in an object or idea. For Tolman, Cathexis refers to the learned tendency to associate specific objects or ideas with a particular drive or need. It is an investment of mental or emotional energy towards something that satisfies a need.

2. Equivalence Beliefs: This is a kind of belief that not only reward or punishment will be given in a particular situation but also the belief that the situation itself is equivalent to that reward or punishment. It is a kind of secondary reinforcement. As for example a student receiving gold medal from the university thinks it to be equivalent to receiving special honour and prestige for his merit. This is about believing a non-goal object equivalent to a primary goal object.

Tolman's concept goes beyond simply learning to associate a primary goal (like food) with a drive (like hunger). It also involves learning about subgoals and their relationship to the main goal. Equivalence beliefs are about understanding that different stimuli can be functionally equivalent, meaning they can achieve the same drive. As for example if a rat learns that turning left at a particular point in a maze leads to finding food, the left turn becomes a subgoal with equivalence to the food.

3. Field Expectations: These are cognitions about what leads to what. This is exactly what Tolman earlier called Sign-Gestalt Expectations. When the organism learns route to go from one phase to another or learns which tool can be used for which purposes, field expectancies are said to be formed. Cognitive maps are said to be formed of field expectancies. This is not S-R connections, but S-S connection or Sign-Sign Learning.

Field expectancies refer to the learning of relationships between stimuli in the environment, essentially forming a "cognitive map" of the environment and anticipating outcomes. It is the understanding that certain cues or actions will lead to specific consequences, rather than simply associating a stimulus with a reward. As for example if a person learns that a specific route to work involves taking the bus and then transferring to the subway, they are developing field expectancies. They expect that taking the bus will lead to a transfer point, where they can then catch the subway, ultimately getting them to work.

4. Field Cognition Modes: Field cognition modes are higher order modes or expectancy and refer to inclination to learn certain things more readily than others. Such inclination is partly

innate and partly latent. The best example of field cognition mode is our ability to use language in a variety of learning situations. A field cognition mode represents a readiness to acquire field expectations. This type of learning involves the learning of a strategy by arranging the perceptual field in a specific way. It is a new mode of remembering and perceiving the objects of the environment.

Field cognition modes refer to how an organism perceives and structures its environment, essentially forming a mental map or understanding of spatial and temporal relationships. This involves learning the layout and organization of the environment, including both physical and social contexts. It is a cognitive process where the organism develops a "Perceptual field" that includes their surroundings, beliefs, and emotional state. As for example rat exploring a maze does not just learn a sequence of movements but develops a cognitive map of the maze that it can use to find its way to the goal, even if the path is blocked.

5. Drive Discrimination: Drive discrimination refers to our ability to distinguish among different types of drives. It is not so important type of learning and is related to the learning of Cathexis. Tolman has derived this concept from the work of Hull and Leeper.

Drive discrimination is the ability of an organism to differentiate between various drives (like hunger, thirst, fear) and respond accordingly. It is about learning to associate specific responses with internal states, allowing for more targeted and efficient behaviour. As for example, suppose a rat is learning to press a lever to get food when the rat is hungry, but not when the rat is not hungry. This demonstrates drive discrimination, as the rat is learning to differentiate between the hunger drive and the satiated state.

6. Motor Patterns: The motor patterns or muscular skills was never a major concern for Tolman, but he recognized this to be an important aspect of learning theory. Accordingly, he suggested that analysis of such skills by Guthrie in terms of stimulus-response connections was certainly important ones. In this type of learning, the motor patterns are conditioned by behaviour as explained by Gutherie. Tolman admits that motor patterns are conditioned.

The concept motor patterns refer to the learned associations between stimuli and movements, emphasizing the development of specific sequences of muscle actions to achieve goals. This learning process is like that of Guthrie's S-R (Stimulus-response) connections but with a focus on the purposeful and goal directed nature of behaviour. Tolman believed that through experience, individuals learn to associate certain stimuli with specific motor actions that lead to desired outcomes. As for example, suppose that a person is learning to ride a bike. In the process he/she learns to associate specific pedal movements with maintaining balance and steering in a particular direction.

Tolman's Experiments

Tolman's theory of learning proved so important that it generated several research. Three lines of experimental evidence are frequently cited as against Tolman's 1932 version of theory, though there is not any contradiction with 1949 version. This experimental evidence are as follows:

(A) Place Learning Experiments: Tolman's learning theory clearly states that animals learn cognitions or in another way they learn by insight. They do not learn the fixed sequence of movements as claimed by Hull. Tolman with Honzik (1936) conducted an experiment to demonstrate this fact. A special maze was constructed for the experiment, it is called black-path maze by some psychologists. This maze is constructed in the way it has three paths from start box to goal box. The path is numbered as 1, 2, and 3. Path-1 is arranged as shortest, whereas path -3 as longest. Path-2 is of intermediate nature, i.e., shorter than-3 and longer than 1. There are two Blocks- A and B in the experimental arrangements. When Block–A was imposed only Path-1 was blocked. When block-B was imposed, both path-1 and part-2 was blocked. This was done as path-1 and path-2 had a common segment leading to the goal box. Some preliminary trails were given to rats for making them acquainted with the maze related details. A preference in order of path 1, 2 and 3 was established depending upon which paths were blocked.

The result of the experiment revealed that when block B was made active, rats took a direct route through path-3 without going to path-2, and in this process, they did not commit any error. From the experiments it was confirmed that the hypothesis forwarded by Tolman about cognitive map is right as rats were behaving according to the insight that the rats have developed into the whole situation.

Experiments on rats by Tolman and his associates show that there is place learning ability among rats. In one of the experiments, a T- maze was used. The response-learning groups starting randomly from either P_1, or P_2 always found food by turning to the right. But the place learning group always went to the same place for food. This group was more successful than the response-learning group. The experiment shows that the animals learn places and not according to blind habit.

(B) Reward Expectancy Experiments: In Tolman's theory expectancy is one of the important intervening variables. Tolman claims that the organism in the process of learning build certain expectation. The confirmation of this expectancy forms the base for development of cognitive map. Thinlepacegh (1928) conducted an experiment to show that role of expectancy in the learning process. He placed banana under one of the two containers while the monkey was watching the same. After some time, the monkey was allowed to act and found the container having banana very easily. Later the experimenter placed a lettuce leaf (less preferred food) under the same container. It was found that the monkey rejected lettuce leaf and showed a disruptive behaviour. This disruptive behaviour was because he was expecting banana, and not lettuce leaf.

The experiment reveals that our learning behaviour is goal directed and purposive. If we do not get what expected or less than our expectations, we get frustrated and behave abnormally. The experiment also slow that animals have some sort of expectancy of specific goal objects and other goal objects naturally produce signs of behaviour disruption. Such behaviour of the animal indicates that the theory of sign learning is quite appropriate.

(C) Latent Learning Experiments: Tolman with Honzik (1930) conducted an experiment to latent learning. In the experiment rats ran the same maze in three different groups separately. One group was not given reward after running in the goal box. Another group was given food in the goal box after completion of each run. One other group ran in the goal box without food for the first ten days. From eleventh day and onwards this group was given food in the goal box after each run. Results revealed that non-rewarded group showed little improvement in its performance. The continuously rewarded group demonstrated gradual improvement. Both the errors and the running time reduced considerably. The delayed rewarded group did not show appreciable improvement in the first ten days. But on the eleventh day its performance suddenly improved and, in a few days, became equivalent to the performance of the continuously rewarded group. MacCorquodale, K, and Meehl, P.E (1954) raises questions and explained diversified nature of latent learning, “If we ignore the question of whether such facts are accounted for by Tolman’s theory as it stands, we can note that the data of the latent learning studies are the kind which Tolman intends to account for, and for which he believes S-R and S-R reinforcement theories are inadequate. The experimental designs which are used to test for latent learning are very diversified.”

Tolman and Honzik believes that the improved performance of the delayed rewarded group was due to the group latent learning of the spatial relations in the maze. Where food was given to the group on eleventh day, rats expressed those learnt spatial relations by employing their already attained cognitive maps. The stimulus-response reinforcement theorists find it difficult to explain such results. Dutt, N.K (1974) by saying that Tolman synthesizes two opposing theories of learning, the connectionist and cognitive rightly conclude, “Learning consists of the formation of cognitive maps. The rat is not just learning a fixed sequence of behaviour by process of reinforcement. Rather the rat ‘knows’ his way. Rewards, punishment, conditioning, and reinforcements are regarded as ‘sign’ telling the rat to go this way rather than that, but not ‘agents’ which ‘stamps in’ or ‘inhibit’ the behaviour associated with them.”

Hull, Thorndike, Skinner, etc. argue that there is no reinforcement indicates no learning. Tolman made a distinction between learning and performance. He argued that learning is there in absence of reinforcement, but this is latent. To translate this latent learning into performance, reinforcement is however needed. Performance is the overt expression of what has been learnt. We see through this concept Tolman did not out rightly reject the role of reinforcement in learning. He stood in a behaviouristic group and made himself distinct from others.

His molar interpretation of behaviour, many varieties of latent learning experiments and place learning experiments had proved him a distinguished psychologist. Wikipedia (2025) states about place learning and latent learning as, "Tolman assessed both response learning and place learning behaviour of rats in mazes. Response learning is when the rat knows that the response of going a certain way in the maze will always lead to food; place learning is when the rats learn to associate the food in a specific spot each time. In his trials he observed that all of the rats in the place learning maze learned to run the correct path within eight trials and that none of the response-learning rats learned that quickly and some did not even learn it at all after seventy-two trials."

Tolman's Criticism

Tolman's system has been criticized by many psychologists on certain grounds. Important among them are as:

- Tolman is not a true behaviourits, rather dualist. His different types of intervening variables, as the critics suggest, are not objectively observed, and not experimentally studied. His system has represented a bitter dualism.
- Tolman has not presented a logically integrated theory. Too many variables have been introduced which find too many questions unanswered.
- Tolman has emphasized upon overt behaviour and at the same time he has also talked about so many covert variables.
- He never adhered to a single explanation of behaviour.

Despite these criticisms Tolman left a great impact on psychology. On the matter of reinforcement his stand has got sound experimental support. A group of behaviourists accepted his viewpoint that the role of intervening variables is useful in understanding learning.

Key Aspects of Tolman's Theory

Tolman's Purposive Behaviourism or Sign Learning Theory emphasizes that learning is goal- directed and involves the formation of cognitive maps. It leaves strict behaviourism and incorporate cognitive processes in learning. He concludes that learning can take place without immediate reinforcement. His concept that 'performance and learning are different, and learning is not performance only' is very important and far reaching. Following are some key aspects of Tolman's Theory:

1. Only Goal Directed Behaviour can achieve the specific goal.
2. Learning is caused by Formation of Cognitive Maps .
3. Latent Learning indicates Occurrence of Learning without Immediate Reinforcement or Motivation.
4. Role of Reinforcement in Learning is as a Motivator, not as Necessary Element.
5. Sign-Gestalt Theory Emphasizes the Relationships between Stimuli (Signs) and their Meanings (Significates) in a Larger Context.

Other Psychological Work of Tolman

Besides his learning theory as purposive behaviourism and latent learning he wrote article on learning, and worked involving psychology, sociology, and anthropology. He was having concerned for

psychology application in solving human problems. He wrote a book called "Drives Towards War". In one of his papers "A Theoretical Analysis of the Relations between Psychology and Sociology" he takes independent, dependent, and intervening variables under the context of psychology and sociology, then he puts them together and show the interrelations between the two subjects in terms of variables and research.

In another publication Tolman takes Physiology, Psychology and Sociology and show they are interrelated and to suggest that they must be looked as a whole. Tolman developed a two-level theory of Instinct. Instinct was broken down into two parts: determining or driving adjustments and subordinate acts. Adjustments are motivations or purposes behind subordinate acts, while the subordinate acts fulfill that purpose.

Impact of Tolman's Theory

The impact of Tolman is visible and distinct. Some major impact of Tolman are as:

- Tolman's Theory combines the advantages of stimulus response theories and cognitive field theories. Tolman's work significantly influenced the shift from strict behaviourism towards cognitive psychology. It highlighted the importance of internal mental processes in learning.
- His Latent Learning challenged the dominant behaviourist view that learning is solely dependent on reinforcement.
- Tolman's theory has bearing on education and suggests for goal-oriented learning and encourages for problem solving approaches.

Limitations of Tolman System

No doubt Tolman system has many groundbreaking works like latent learning and purposive learning, but it has many limitations as well:

- It has Measurement Challenges: Latent Learning is not immediately observable.
- It has Over-reliance on Animal Studies: It is heavily relying on experiments with rats. It is not always accurate to extrapolate findings from animal behaviour to human behaviour.
- It has Limited Scope: It does not provide comprehensive explanation for all learning processes or address why some learned behaviour are displayed immediately while others are not. This is in relation to latent learning and reinforcement.
- It has Ambiguity in Cognitive Mechanisms: It does not fully explain the cognitive processes that cause latent learning. Some experts suggest that it is unclear how the brain stores and retrieves information learned without immediate reinforcement.

Educational Implications Tolman's Work

Following are the educational implications of Tolman's learning system:

(A) (1) Capacity: The learning of a task depends upon the capacity of the learner.

(2) Practice: Tolman believes that practice or exercise cannot help the learner in the initial selection of a right response. Mere frequency without belongingness does not establish a connection.

(3) Motivation: Motivation does not help in learning something new. It simply encourages the performance as such.

(4) Understanding: Tolman believes in learning by creative inference, inventive ideation and so on. Insightful learning is emphasized.

(5) Transfer: Transfer of training depends upon applicability of the essential relationship perceived by the learner in one situation to some other situation.

(6) Forgetting: Repression and ratio- active inhibition cause forgetting. Tolman attributes

forgetting to the resistance of cathexis (relationship between drive and object) also.

(7) Tolman Stated the Following Laws of Learning:

(a) Law of Capacity: This relates to characteristics, traits, and aptitudes of the learner to be mastered.

(b) Law of Stimulus: It is about conditions inherent in the material itself such as belongingness of its parts and how successfully it leads to insightful solution.

(c) Law of Manner: It is concerned with the manner of presentation of material such as frequency of presentation, distribution of practice and use of rewards.

(B) Tolman's approach has following aspects applicable to facilitate teaching and learning:

—It focuses on understanding, not just memorization.

— It encourages exploration and problem solving.

— It creates meaningful learning experiences.

— It suggests for encouraging latent learning. It states that no learning is a wastage.

— It promotes higher order thinking.

— It suggests using real-world examples and simulation to help students connect abstract concepts to their experiences and build stronger cognitive maps.

— It emphasizes for reducing rote learning.

— It recognizes the role of individual differences in learning.

— It stresses the importance of purposive learning.

— It emphasizes adaptive, creative, and intelligent aspect of learning.

— It highlights the role of intervening variables in learning and teaching.

— It suggests combining the advantages of two families of learning theory.

— It opposes the mechanistic approach of learning in S-R form.

— It stresses on intrinsic value (not on external award) of learning, not finds reinforcement as essential principle of learning.

Aptness of a Versatile Psychologist- Tolman

Aptness or utility of Tolman in the field of psychology and education is unchallenged. He not only prepared a bridge between cognitive and behaviourist schools of thought, rather he employed the useful concepts of behaviourism to develop his learning theory. He is rightly called as cognitive behaviourist or purposive behaviourist. Tolman argued that behaviour is goal directed and driven by the expectations of an organism and his/her mental maps. For him behaviour is not merely a knee-jerk reaction to a stimulus as reflected through S-R theory of learning. Tolman incorporated expectations and purpose in the study of internal cognitive processes. He focused on molar behaviour, not on Watson's molecular behaviour. Chauhan, S.S (1998) writes about Tolman, "He rejected the molecular approach to behaviour developed by Watson. He developed molar approach to behaviour and held that an act of behaviour has distinctive properties of its own, to be identified and described irrespective of the underlying muscular, glandular, and neural processes. Molar behaviour is goal seeking and purposive. His system of behaviour is organized and regulated in accordance with objectively determinable goals." He defined molar behaviour as unified, purposeful, and goal directed. He shown that learning can occur without reinforcement and purposed latent learning. He shown through experiments on rats that cognitive maps of the learning environment of an individual makes the person capable to solve problems. These concepts of Tolman justify his aptness as an educationist and psychologists today as well. His aptness is also because his ideas served as a link between traditional behaviourism and the later development of cognitive psychology. His work

revealed that learning is not a mechanical process as presented by stimulus-response learning theory. Refection of Tolman is also in our national education policy where NEP (2020) recommends, "Emphasis on conceptual understanding rather than rote learning and -for- exams." He pointed out that learning involves internal, and goal directed cognitive factors. He believed that learning is a mental presentation and his work prepared foundation for modern cognitive psychology. In fact, Tolman done the work of bridging between behaviourism and cognitivism. He employed objective and observable animal behaviour in his experimental works. He identified the involvement of mental maps, expectations, and purpose in the process of learning to show that learning is a cognitive process which is goal directed and purposeful. He found the role of internal variables like expectancy and motivation in shaping behaviour. Researchers in neuroscience use Tolman's framework of study as the neural basis of spatial navigation and memory. It investigates how the brain encodes and organizes information. The Artificial Intelligence (AI)is based on the idea of creating and using internal cognitive maps. Concepts of talent learning helps educators to know that students can absorb information in a class without immediate rewards. NCF (2005) has reflection of Tolman's work in its recommendations, "The teacher's own role in children's cognition would be enhanced if they assume a more active role in relation to the process of knowledge construction in which children are engaged. A child constructs her/his knowledge while engaged in the process of learning."

His concepts of cognitive map, latent learning, intervening variables, Sign-Gestalt theory certify his presence felt today in education and psychology. Kumar, L (2025) asserts, "Tolman through his Sign Learning stresses that organism learns a cognitive map of the whole situation which is relevant for ever to understand human learning and its pattern." Concepts like cathexis, equivalence beliefs, field expectations, field cognition modes, drive discrimination, motor patterns, etc. have influenced learning; and these concepts are meaningful as types of learning today as well. His three experiments have universal value. Place learning experiments present that place can be learned by animals and human beings. Reward expectancy has its bearing on learning, and related experiments have yield many useful facts for the day as well. Latent learning experiments show how reward and reinforcement has indirect role in learning. His comprehensive work justifies his aptness today in the field of psychology and education. His approach about the difference and relationship between performance and learning have bearing on teaching and learning processes.

Purposive behaviourism of Tolman reflects to focus on goal, encourage active learning and connect educational content to student's personal goal and interests. Aptness of his Purposive Behaviourism is reflected through the fact that it humanizes behavioural study and emphasises adaptation. The concept of cognitive maps promotes deeper understanding, focus on problem solving over rote memorization, and support spatial thinking. NCFSE (2000) presents similar view in its statement, "Effective learning takes place when teachers are able to involve the students in the process of learning, by taking them beyond the process of listening to that of thinking, reasoning and doing." The aptness of cognitive map is validated by modern neuroscience, it explains flexible behaviour through mental map, and explains how human develops mental maps. Latent learning reflects that learning is not always immediately apparent, it values intrinsic curiosity and stresses that reward can reveal knowledge. Aptness of latent learning is because it challenges strict behaviourism, explains observational learning, and supports complex problem solving. Due to his role of bridging the gap between traditional behaviourism and cognitive psychology he remains highly relevant and influential in modern psychology. His aptness as psychologist and educationist is still safe and secured. He recognized the role of internal variables like motivation and expectancy in shaping behaviour and this is like universal truth in terms of behaviour. Tolman's theories laid the groundwork and initiated cognitive revolution in psychology. His shifting of focus from external behaviour to internal mental processes is a milestone work. His work provides crucial insights for modern educators on how to structure classrooms and lessons to present deep, purposeful, and self & goal-directed learning. This goes beyond the simple memorization and surface memory level teaching and superficial knowledge attainment. There are five aims of school education identified in the NCFSE (2023). The first aim is focused on the learning approach of cognitivist and Tolman, and i.e., rational thought and independent thinking or autonomy. The NCFSE (2023) states, "Making choices based on rational analysis, creativity, and grounded understanding of the world, and acting on those choices, is an exercise of autonomy. This indicates that the individual has gained the capacity for rational reasoning, critical thinking, knowledge with both breadth and depth, and discernment to understand and improve the

world around them."

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