Sign Learning

General

[Edward Tolman](#)'s *sign theory*, introduced in the 1930s is a neobehaviorist theory that presents a bridge to [cognitivism](#), which is emphasized in its other names: *purposive behaviorism*, *cognitive behaviorism*, *sign-gestalt theory* or *expectancy theory*.[1] Learning, according to Tolman, is **acquisition of knowledge through meaningful behavior**. Still, Tolman believed that

- "...*everything important in psychology... can be investigated in essence through the continued experimental and theoretical analysis of the determiners of rat behavior at a choice-point in a maze.*"[2]

What is sign learning?

Tolman was doing active research on learning in the first half of 20th century and although he appreciated behaviorism for its scientific approach, his views are partly derived from behaviorist views but moved more towards [gestalt psychology](#) or cognitivism. In his words,

- *The stimuli which are allowed in are not connected by just simple one-to-one switches to the outgoing responses. Rather the incoming impulses are usually worked over and elaborated in the central control room into a tentative cognitive-like map of the environment. And it is this tentative map, indicating routes and paths and environmental relationships, which finally determines what responses, if any, the animal will finally make.*[3]

Instead of observing behaviors on molecular level (behaviors split into simple yet often meaningless elements), Tolman suggested **studying** them on the **molar level** (**whole, purposeful, goal-directed behaviors**). Molar behaviors are *docile*, which means characterized by *teachableness*. Mechanical behaviors like reflexes belong to the molecular level.[4]

In his attempts to explain behavior, Tolman introduced a set of environmental and individual difference variables. Individual difference variables are heredity, age, previous training and special endocrine, drug or vitamin conditions (also called *HATE* variables).[5] This variables offer a rarely seen broad view over the theory of learning.

Based on conducted rats experiments, Tolman introduced the term of ***latent learning***.[6] This type of learning does not require motivation or reinforcement. In one experiment, Tolman put two groups of rats in a maze with a reward hidden in it. Later, he changed the place where rats were put in the maze, but so that the second group of rats had to perform the same set of turns in order to reach food. The first group was more successful, showing that learning was not just a raw set of movements. Tolman offered an explanation that rats created a **"cognitive map"** of the maze and used it to solve the problem. He confirmed this finding in some later experiments as well, but never tried to investigate this cognitive map.

What Tolman also concluded based on other experiments with rats is that **rewards** or **punishments** can only be used as **motivators for performance** of a learned behavior, but not as the initiators of learning. Tolman saw animals not just as simple mechanisms, but as intelligent organisms testing

hypotheses based on their prior experience and capable of cognitive processes.

According to Tolman, learning occurs as learners **following signs** (stimuli) **to a goal**. Learning was about finding a way and **meanings instead of reproducing behaviors**. Organisms learn behavior route and relations rather than behavior patterns. There is no need for reinforcement when speaking about learning since the behavior is driven by a meaning.

In the end Tolman, influenced by Guthrie, Freud and reinforcement theorists, concluded there are **six forms of learning**, each with its own characteristics:[7)8)]

- **Cathexis**[9)] - learned tendency to **associate certain objects with certain drives**. In example, vegans tend to satisfy their hunger with non-animal products (positive cathexis), and not meat (negative cathexis).
- **Equivalence Beliefs** - a feeling that a **"subgoal"** has the same **value as the main goal**. If a sport achievement temporarily reduces a competitor's need for love, the achievement has served as an equivalence belief.
- **Field Expectancies** - learning in which the organism learns what **action** leads to what **outcome**. Field expectancies are formed for example when one learns what tools can be used for what task, or the way from one place to another. Field expectancies form cognitive maps. Unlike the first two mentioned kinds of learning (cathexis and equivalence beliefs), this kind of learning does not directly depend on reinforcements and suggests Tolman is at least partly cognitive theorist.
- **Field Cognition Modes** - Tolman offers very little explanations on this type of learning, yet it should present a way of approaching a problem-solving situation through arranging the perceptual field with certain configuration. For example **using language** when learning a maze solution in laboratory conditions. A person is likely to learn the solution as a verbal sequence of right and left turns.
- **Drive Discrimination** - learning to discriminate between drives in accordance with desired outcomes, like learning to satisfy hunger with food and thirst with water in animals. This type of learning is very similar to cathexis and it is not quite clear why Tolman introduced a new category for it.
- **Motor Patterns** - learning the association between **stimuli and movements**. Tolman suggested this kind of learning is similar to Guthrie's S-R connections formed by temporal contiguity.

What is the practical meaning of sign learning?

Tolman intended to apply his theory to human learning, but most of his experiments were conducted only on rats. An important conclusion of his researches is that **reinforcement** (for example food found after finding solution to a maze) may serve as **motivation**, but is not a crucial factor affecting learning.

Criticisms

Tolman was often criticized for **lack of explanations** of the **cognitive learning** he included in his theory. Still, his views on learning and usage of learned knowledge in a flexible manner instead of learning conditioned responses triggered by external stimuli started to outgrow behaviorist learning

by **moving** more **towards cognitivist perspectives**.

Keywords and most important names

- **Sign learning**, **purposive behaviorism**, **cognitive behaviorism**, **sign-gestalt theory**, **expectancy theory**, **molar level**, **latent learning**
- Edward Tolman

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Term taken from Freud's psychoanalytic theory of motivation