

Trial and error



Trial and error is an experimental method of problem solving, repair, tuning, or obtaining knowledge. " Learning doesn't happen from failure itself but rather from analyzing the failure, making a change, and then trying again. " This approach can be seen as one of the two basic approaches to problem solving and is contrasted with an approach using insight and theory. However, there are intermediate methods which for example, use theory to guide the method, an approach known as guided empiricism.

The nature of the response is molecular in trial-and-error learning and molar in insightful learning. Practice and repetition are extremely important in trial-and-error learning, while insightful solution is important for insightful learning. Of course, certain amount of trial- and-error occurs before insight takes place. But the trial-and-error form of learning primarily does not involve insight. The physical and motor skills are acquired mostly through trial-and-error.

The insightful learning is of higher order, and is involved in cognitive and verbal learning. The cats in the key experiments conducted by Edward Thorndike were able to learn through operant conditioning. In Thorndike's experiment, cats were placed in a various boxes approximately 20 inches long, 15 inches wide, and 12 inches tall with a door opened by pulling a weight attached to it. The cats were observed to free themselves from the boxes by " trial and error with accidental success.

In one test the cat was shown to have done worse in a later trial than in an earlier one, suggesting that no learning from the previous trials was retained in long-term memory. The scientist considered the cat to have the capacity for learning due to the law of effect, which states that responses followed by

satisfaction (i. e. a reward) become more likely responses to the same stimulus in the future. An experiment was conducted in 2009 where cats could pull on a string to retrieve a treat under a plastic screen. When presented with one string, cats had no trouble getting the treats.

When presented with multiple strings, some of which were not connected to treats, the cats were unable to consistently choose the correct strings, leading to the conclusion that cats do not understand cause and effect in the same way that humans do. Thorndike was skeptical of the presence of intelligence in cats, criticising sources of the contemporary writing of the sentience of animals as "partiality in deductions from facts and more especially in the choice of facts for investigation. Research was made to identify possible observational learning in kittens.

Kittens that were able to observe their mothers performing an experimentally organised act were able to perform the same act sooner than kittens that had observed a non-related adult cat, and sooner than the ones who, being placed in trial and error conditions, observed no other cat performing the act. Experimental investigation of primates show that the chimpanzee possess some limited insight in regard to observational learning (see Köhler), whereas this capacity is wholly absent in the domesticated cat Sultan, one of the brightest of the early chimpanzees used for psychological research, was tested by Gestalt psychologist Wolfgang Köhler.

Sultan is particularly recognized for his insight in solving numerous problems, including stacking or manipulating boxes to reach a reward and use of two sticks as a unit to rake food to a reachable distance. While other Chimpanzees in Köhler's study were also quite adept at problemsolving—

namely, obtaining an out-of-reach fruit suspended above a playground or perched just beyond arm's reach outside the bars of a cage—Sultan proved to be peculiarly advanced.

He and his peers were also known to stack crates to reach the fruit, and even scramble up a hastily balanced stick to grab the banana before falling back down. Chimpanzees helped Köhler to prove that animals are capable of learning beyond simple trial and error, and that, given the right conditions, many species—particularly the more "human" species of primates—will demonstrate a deeper understanding of the constituents of a problem. For example, several chimpanzees who had proven capable of reaching the banana via a stack of crates found that in a crateless room, a table or chair worked to meet the same end.

When nothing else was available, Köhler himself could even be used: " On one occasion, Sultan did something even more impressive: he came over to Köhler, pulled him by the arm until he was under the banana, and then showed that in a pinch even the director of the Prussian anthropoid station would do as a climb-upon-able. " (Gleitman 2004) difference insightful learning involves perception of the whole situation, as the organism has to see the relationship among various stimuli. The nature of the response is molecular in trial-and-error learning and molar in insightful learning.

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learning is of higher order, and is involved in cognitive and verbal learning. The two forms of learning differ with respect to the role of the organism in the learning situation.

Animals lower in the phylogenic scale acquire through trial and error. Their role in the learning situation is only mechanical and passive. The organism's approach in trial-and-error consists of random blind activities and the solution comes by chance. On other hand, the organism in insightful learning, surveys, inspects, observes, and examines various aspects of the problem situation, and thereby takes an active role in learning. Higher- order animals including chimpanzees and human beings are capable of insightful learning.

Both the trial-and-error and the insightful learning differ with respect to the strength of learning. The trial-and-error learning is more or less temporary, depends on continued practice, and weakens when practice is discontinued. The insightful solution, once acquired, stays for a long time and does not easily fade away when the practice is discontinued. Finally, in trial-and-error, the transfer of learning is poor; skills acquired in one situation are not easily transferred to another situation.

On the other hand, learning by insight is easily transferred from one situation to other similar situations. The cat in Thorndike's puzzle box learns to connect a response with a stimulus, which is subsequently rewarded. The learning by trial-and-error is a matter of S-R connection. Kohler's chimpanzee learns to perceive the relationships between various aspects of the stimulus situation. Establishing the relationship between one stimulus and the others forms the core of the insightful learning.

The insightful learning is of S-S type. The trial-and-error learning is gradual. The cat in Thorndike's puzzle box takes a number of trials and learns step-by-step to reach the correct response. The insightful learning occurs all on a sudden. The organism moves from a state of no solution to a state of solution very quickly. While pulling the string in Thorndike's puzzle box, the cat is showing responses to only some specific stimuli. It does not have to attend to the whole stimulus field.