

Strategies for problem solving: theory analysis



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One type of problem is known as well-defined problem which usually have a correct answer; this certain procedure will end in a solution. The other type of problem is known as an ill-defined problem which is more common and does not have a clear defined answer or solution.

The Gestalt psychologist's laws of perceptual organization were interested in perception, learning, problem solving and even attitudes and beliefs. The Gestalt approach to problem solving is based upon the foundations of the mind's representation of the problem and the reorganization of the problem's resolution in the mind. The central idea of the Gestalt approach dissects a problem and the route to solution characterized in the person's mind. The solution to Gestalt's experiment showed that the solution requires first understanding the object and translating it into the brain in a more understandable form. This reformation of the problem's representation is referred to as restructuring.

Restructuring also introduced the idea of insight, the abrupt recognition of a problem's solution. This sudden realization involves discovering a crucial element that opens the doors to the resolution.

Although insight does offer problem solving resolution, there are several obstacles to problem solving like fixation. Fixation is an individual's habit of giving attention to one aspect or specific characteristic of the problem that keeps them solving the problem more quickly. Furthermore, the theory of functional fixedness is the brain's confining of the use of an object to its most acquainted functions. The textbook refers to an example of function

fixedness in “ The candle problem” to hinder problem solving. Another demonstration of functional fixedness is provided by Maier’s “ two-string problem” in which the participants’ task was to tie together two strings that were hanging from the ceiling. The brain’s habitual mistake of reasoning with functional fixation had to be overcome before the patients were able to come to a conclusion by restructuring their accustomed use of the pliers and achieved the solution easily. Both examples are referred to as mental sets, or a preconceived notion and habit when attempting to tackle a problem, usually a mental set is highly influenced by a previous personal experience of what has worked in the past.

Newell and Simon saw problems in terms of initial state, or the primary conditions at the foundation of the problem and a goal state, or the solution of the problem. Their experiments had a number of possible ways to resolve the problem. Newell and Simon saw problem solving as a series of choices into the probably solution. With each creating an intermediate state, this problem space or the initial, goal and all feasible intermediate states for each individual problem. They developed a strategy called the “ means-end analysis” to find a solution through one way of directly approach the search for a solution using strategies. The primary goal of the strategy of “ means-end analysis” is the reduction of the difference of number of steps between the initial and goal states. This goal is achieved by using sub goals, or transitional states that are closer to the goal.

Newell and Simon’s approach to problem solving is that it provided a way to identify the potential routes from the initial to goal states. Research has shown that there is more to problem solving than specifying the problem

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space. This research has shown that two problems with the same problem space can vary greatly in difficulty.

Several techniques were studied like the “ think-aloud protocol” where participants are asked to do a problem, meanwhile, project out loud to the researchers their thoughts as occurring during the intermediate states of comprehension to solve the problem. The goal of the “ think-aloud protocol” is to decipher the important information and necessary thoughts leading to the solution of the problem.

Often we use analogies to solve problems. The starting point of this research is to establish the connection of transferring an experience with solving one problem and the attribution of that experience to a different but similar problem. The transfer of experience is referred to as the analogical transfer and is studied to try and solve a target problem or source problem that share similarities with the target problem. Another technique would be the analogical encoding, which demonstrates participants applying a single principle to two different problems. Researchers in analogical encoding strive to find the underlying structure of the principle behind the encoding. The final analogy is the strategy of contingency, which uses negotiation to compare source stories as a strategy to train the brain to use key structural features to activate a response to a quicker more enhanced route of getting to the conclusion.

Real world analogies involve problem solving illustration that Kevin Dunbar referred to as analogical paradox. Dunbar concluded that people that is analogy problems, his patients showed consistent use of surface features

helping to solve the problem but in the real world they actually use deeper connections in structure. Dunbar came to this conclusion using in-vivo research is the study of real-world situations and patients reactions and decisions made in these situations. Dunbar's team of researchers videotaped molecular biologists and immunologists during their lab meetings, and found that researchers used analogies from 3 to 15 times in a 1-hour laboratory meeting. In designing new products and in scientific problem solving, Dunbar concluded that analogies are relevant and highly useful.

Compared to the average human mind, experts in particular field possess more knowledge about their field and the organization of the knowledge in their brain is more easily accessed when needed to work on a particular problem. The problems and knowledge are sorted based on structural features, such as their surface features and their deep structure. Often, experts even get to a slow start on a problem because they take additional time to understand and formulate a strategy on how to solve the particular problem.

There are two types of creativity that can come into play with problem solving. The first being divergent thinking, is open-ended and involves a large number of potential solutions without any correct answer. The opposite would then be convergent thinking, the problem with a specific solution and a correct answer needing to be found. The thoughts and processes involved in creativity, and the use of creativity has very limited information available to be studied. From the research available, proof is shown that fixation does have a large effect on the ability to creatively solve a problem and when analogical thinking is used this constraint is lessened.

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