A Brief Report on “Maze Learning”

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Daily life can be viewed as a sequence of problems that need to be solved. Some of the problems are well defined; some are ill defined. Psychologists, particularly cognitive psychologists, have been studying how people solve problems for quite some time. One specific type of problem-solving that has been studied involves how people find their way around unfamiliar settings. You may have encountered this type of problem-solving if you have ever tried to find a particular department in an unfamiliar department store or an address in an unfamiliar city.

By studying rats as they find their way around mazes, psychologists have developed two theories that attempt to explain how we navigate our way in unfamiliar settings. The conditioned, or chained, associations (CA) theory is based on the idea that, through classical and operant conditioning, we form “associative links” between stimuli and particular outcomes, namely reinforcements. We then “chain” these associations together. Ludwig (2002) in his online computer module uses an example: “You may visualize your route from home to school as a string of left and right turns in a specific sequence.”

Cognitive psychologists, however, argue that the solution to this type of problem is achieved when the individual forms a
cognitive map (CM)—a mental representation of the layout of the area (Myers, 2002, p.244). They point out that the formation of a cognitive map is not dependent on a reinforcement, noting that rats that are allowed to explore a maze where no reinforcer is present still seem to learn the maze; when a reinforcer is introduced later, these rats will find the reinforcer just as quickly as rats that were reinforced in previous trials—this effect is known as latent learning (Myers, 2002, p.244).

Evidence of the formation of cognitive maps has also been found in studies where rats were passively carried through mazes in baskets; even though they did not have the opportunity to chain associations by actually physically moving through the maze, these rats were able to locate the reward as easily as rats that did have the opportunity to move through the maze on their own (Myers, 2002, p.244).

In an attempt to determine which of these theories, the CA theory or the CM theory, is most reasonable, I will assume the role of a rat in a maze through the use of Ludwig’s (2002) computer program. Because the CM theory seems to have the most research to support it, I hypothesize that my strategy in navigating the mazes to locate a reward will be based on the formation of a cognitive map of the mazes.

Method
I served at the sole participant in this study. I am a 38-year old Caucasian male and am employed as community college professor.

I accessed Ludwig’s (2002) PsychSim (computer simulation) module on “Maze Learning” through the Worth Publisher’s web site (http://www.worthpublishers.com/exploring5e) on the internet. I selected the appropriate title by clicking on it and I read the introductory material.

The narrative in the module then described my task:

This program will let you test your own way-finding ability by taking you on a rat's-eye-view tour of a simple maze. You will be given two runs through the maze. On the first run you may explore the maze in any way you like, but on the second run you should try to reach the goal box with the fewest steps possible. Each run will end when you enter the goal box (marked with cheese). By paying attention to the way you are finding the correct path on the second run, you should be able to decide whether your behavior more closely matches the cognitive map or the chained associations view (Ludwig, 2002).

I was then instructed to begin the maze trials. On the next screen I was give the option of choosing an easy maze or a more complicated maze. For the first trial, I chose the easy
maze. When I clicked on a button to go to the next screen, I was given instructions on how to move the rat through the maze to get to a goal box containing cheese using four buttons at the bottom of the maze screen labeled, FORWARD, BACKWARD, LEFT and RIGHT.

I ran the easy maze twice and the more difficult maze twice. Between each trial, I was asked to reflect on my strategy during the second run to see if it matched either of the theories discussed in the introduction. After completing the runs, my results and some final thoughts regarding the simulation were presented.

**Results**

During trial #1 in the easy maze, I reached the goal box after making 16 moves over a 39 second period. During trial #2, I reached the goal box in 14 moves over 24 seconds time—a noticeable improvement, which, according to information in the simulation, is typical.

In the more complex maze, during trial #1 I reached the goal box in 25 moves over 45 seconds. During trial #2, I made 2 wrong turns for a total of 27 moves, but I decreased my run time to 43 seconds.

Reflecting on my strategy between trials led me to conclude that I was attempting to memorize a sequence of turns to get to the goal box.
Discussion

Although my results were fairly typical, my hypothesis regarding the cognitive map theory was incorrect. The CA strategy seemed to work best from the vantage point of the rat since all that was really visible for me in the maze were walls and turns. After seeing the results of my runs charted on an overhead diagram of the mazes, I felt that if I would have run the mazes a few more times, I may have had more success using the CM approach since the visuals provided me with a general idea of the layout of the mazes.

I do not think this simulation provides a fair method for testing these competing theories—running through a featureless maze cannot compare to navigating through an unfamiliar neighborhood scattered with various landmarks. But perhaps these theories are not competing at all. Maybe people switch between strategies depending on the specific circumstances they are in; or perhaps some individuals prefer to use one strategy to another. More research will need to be done in order to answer questions regarding the CA and CM theories.
References


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