A DESCRIPTIVE STUDY OF MAZE LEARNING

AILENE MORRIS, University of Oklahoma, Norman

Our experiments at the University of Oklahoma are performed in the Introspective Laboratory. This laboratory consists of two rooms: in one, the Control Room, is the master switch board for regulating the conditions of the experiment; in the other, the Observation Room, which is partially lightproof and soundproof, are facilities for giving visual, auditory, and tactual stimuli. There is also a dictaphone for recording the reports of the observers. The Observation Room is where the experiments are actually carried on.

In this maze-learning experiment the maze to be learned was concealed in a box so it would not be seen by the observer and so the experimenter could change mazes without the knowledge of the observer. There were four mazes to be learned. The simplest one was given first, the others in order of their increasing complexity. The mazes, the box enclosing them, and the dictaphone were the only pieces of apparatus used in this experiment.

In studying psychology the method of introspective experimentation comes nearer satisfying our needs than any other method tried. In the Introspective Laboratory the experimenter can not only note evidence of sensory experience, but ask for and get an almost complete description of this sensory experience. In an experiment, by giving a set of specific instructions, you can have all the observers doing about the same thing; thus, you have control over conditions to a certain degree.

The observer was to run the maze by means of a stylus held in the hand. He could stop at any moment and report on his sensory experience. It is from these descriptions that we drew our conclusions.

We function in terms of two things—sensory experience and organic organization. The only way we can get any knowledge of sensory experience is by observation. Sensory experience is not the whole determiner but it is about all you can report on. From these reports we can make inferences and psychology can rely on these inferences. Since sensory experience is, in part, a product of our organic organization we have, in these descriptions, a great part of the picture.

Many studies have been made on behavior. Since bodily adjustment precedes this final functional product, one can get a much more complete description and a clearer picture at the psychological level.

In reviewing the reports one finds that, as learning advances, the only change is in the description of the adjustments. At the beginning of the experiment the adjustment is described as a "pattern of pressure, pretty widespread throughout the body." This uncertainty and lack of any definite adjustment is further described by the following excerpt from a report. "I am not very completely and adequately adjusted for this point. There is a good deal of experience in the throat—a kind of incipient verbal questioning. There is some pressure in the eyes but it is a kind of wandering back and forth with no direction to it. Neither is there general stability to the pressure in the body and arms . . . There is no familiarity to the feel of the arm. I felt that I was getting farther away in terms of pressures in the arm, and getting off in the right direction but as to going right or left, I have no experience to guide me."

This indefiniteness ends when the observer recalls what he believes to be the correct turn or when he decides which direction he will try. When he comes to a portion he knows well there seems to be nothing more than carry-

ing out the adjustment that arises after the last point where there was still uncertainty is passed. It is just a matter of following along the walls to hit the right openings.

At first the observer reports only a general all-over determination for the activity. As the maze becomes a little more familiar the adjustment increases in amount and complexity. At the beginning of the second observation one observer said: "I am already adjusted for the first part of the task. The pressures are a little in the eyes, as if following the course I will pursue. The more specific pressure pattern seems to be in the eyes and the arm."

If the observer is adjusted to go in a certain direction and a turn to the right, then the moment that turn is made, or shortly afterwards, the adjustment for the next turn arises in slight incipient vocal pressures followed immediately by a shift of pressures in the arm and a little in the eyes.

The arm seems to be more the seat of adjustment for the task itself. The guidance was in terms of eye and throat pressures; the eyes having to do with direction, the throat, with shifting from one side of the alley to the other.

There is a general muscular tension which seems to be associated with carrying on the activity but there are specific experiences which seem to function in getting through the particular runway. It is a kind of cooperative activity between the arm, eye, and throat pressures. The position of the arm gives the initial set for starting. The pressures in the arm give the meaning of the position as it approaches the end of the run. The shift of pressure in the eyes indicates the direction of turn. All of this seems to be anticipated by throat pressures which check the turn as it is made.

In later trials the observer reports: "I can hold the eyes fairly steady once I get started and simply rely on the pressures in the set of the arm and body for holding to the particular side of the maze which will lead me into the correct alley. It was as if one could, after a little bit, dispense with that eye pressure once you are started on the right side. . . . Also as the learning becomes more and more perfected there is less and less experience from the throat. The throat does a lot of checking up but when things are running smoothly there is no need for check. You can go through several turns without readjusting."

Whereas at first the adjustment was extremely simple (merely a general determination for activity and to move forward), as the trials progressed the adjustment became extremely complex, including muscles of the eyes, throat, arm, trunk, and even legs. There is a great deal of shifting and muscular activity. Later, as the maze became what we call learned, the adjustment was again simple. Not simple in the same sense that the first adjustment was but rather a condensation and combination of all those extra adjustments into one good adjustment for the whole task. Of course, specific, precise adjustments must be rendered for each of the runs. Out of that total organized pattern he can adjust specifically for each direction, less definitely for each distance, as he comes to it.

By the time this stage in the learning process has been reached there is developed what we call organic organization. To some degree this seems to result automatically in the correct succession of adjustments for the runs and turns. However, the fact that it is not completely automatic is shown by the dependence of the subject upon contact with the walls and the position of the arm. If a bit of uncertainty arises the activity in the region of the eyes and throat comes in again.

The observer uses contact with the sides of the alleys of the maze in shaping up all these adjustments. If the general adjustment for the maze is

present then the proper adjustment will always be aroused at the proper time with the perception of the contact with the wall. Actually there is almost complete dependence upon the contact. In one maze there was one point where both sides were open; in other words, there was a blind alley extending in either direction from the pathway. All observers experienced a great deal of trouble in learning to traverse that open area. At the end of the experiment the observers were asked to draw the mazes. In all cases they misjudged the lengths, especially the width of this open area which seemed so difficult. It seems that due to the grossly inaccurate adjustments in the arm it was impossible to judge the length of the runs without the perception of the contact with the walls present to give the cut. So it seems that the perception of this contact is much more important to accurate running of the maze than the muscular adjustments of the arm.

In learning the maze the observers did not develop adjustments adequate for all the runs at once but more or less in order. First they learned the runs nearest the starting point and the ones nearest the goal, then any peculiar twist in the maze (to serve as a land mark and orientation point) and last of all the runs of the middle section.

All these adjustments are not discrete, nor separate little segments; they are all closely interrelated. When the experiment was nearly completed a mixup occurred accidentally which proved to be very revealing. At the thirteenth observation the experimenter mentioned to one of the observers that there might be something new for the next time. At the next observation there was not enough time to set up the new procedure so the old mazes were given, beginning with the simplest maze first as always. The observer was not adjusted for familiar mazes. He went about learning the maze as if it were a new one. His reports show that he went from the simple general bodily adjustments for the activity to the complex pattern of pressures always present while in the learning process and lastly to the final total organized adjustment for a learned maze. So if one starts off with the wrong general adjustment for a certain maze, the proper one does not arise no matter how far you go in the process.

CONCLUSIONS

Learning is merely a process of developing the proper adjustment and proper determination in conjunction with a particular situation.

One begins with a simple adjustment during the early part of learning. There is a considerable increase in the adjustment both in complexity and in amount. This later integrates and reduces as learning is effected.

The nature of the adjustment varies according to the stage in the learning process.

In developing adjustments and determinations the subject utilizes experience from the arm, eyes, and throat.

If the wrong general adjustment for the activity is present, any specific adjustment previously developed under the proper general adjustment will not arise as the subject goes through the task.

No matter how well the maze is learned, the subject is never able to dispense with sensory guidance.

There is throughout this type of functioning a close cooperation between sensory and motor adjustments.