3.2 Empirical research activities

3.2.1 Mazes in a rat – The investigation of learning concepts through a simple performance task

Introduction: Probably the most common image used to stereotype psychological research on learning would be that of rats running through a maze. In such experiments, the rats are placed into the maze and over repeated sessions they demonstrate learning by running the maze in progressively shorter times, mostly to receive a reward of cheese at the end. These times are usually plotted onto a graph known as a learning curve, which clearly represents the learning displayed by the experimental subjects. In this experiment, human subjects will have to negotiate a simple maze to demonstrate their ability to learn.

By altering some components of the procedure, the maze can be used to explore different aspects of learning. The basic format will generate a learning curve to demonstrate how practice should improve the subjects' performance on the task. While there may be an intrinsic reward due to the satisfaction of completing the maze and showing progressive improvement in performance, the addition of external rewards or incentives would vary the task to enable an exploration of the effect of operant conditioning techniques. These rewards could be primary reinforcers, such as food or lollies, or secondary reinforcers, such as approval or privileges. If done in pairs, the process could be further modified to allow a study of the effect of observational learning on the subjects’ performance. Also, as there are several solutions to the maze on the next page, the formation of a ‘learning set’ could be demonstrated if the subjects followed exactly the same path each time they went through the maze.

Note: The maze has been constructed such that:
• the path goes from left to right, which means that right-handed subjects would obscure most of the figure as they progress through the maze, and
• different solutions are possible.

The following experiments are variations on a theme using the maze illustrated. In each case there are minor modifications to the procedure, which will enable you to explore different concepts within this area of study.

Before beginning any of the experiments described, explain the process below to the subject.

"My name is ................................ and I'm a Year 12 Psychology student at ................................
We are researching processes involved in learning as part of our work requirements, and I was wondering if you would mind spending a few minutes performing a simple task, namely completing a simple maze several times to see how your performance changes with practice. Your identity will remain anonymous. When doing the task, normal maze rules will apply. Specifically, you are to begin at the entry (the mouth) and are not to work backwards (from the exit). You are not to lift the pen off the page, and must not cross over any of the lines – if you make an error or go up a blind alley, then you must return to the point where the error was made without lifting your pen off the page. You are to try to perform the task as quickly as possible, and I will time how long you take for each attempt."
Experiment A: Generating a learning curve

Aim

The aim of this experiment is to generate a learning curve to demonstrate the effect of practice on the performance of a simple task.

The desired response is for the participant to correctly negotiate their way through the maze as quickly as possible.

1. Before beginning, formulate an operational hypothesis based on the information in the introduction and the aim.

2. What is the IV?

3. What is the DV?

Method

Materials

At least five copies of the maze for each participant; pen or pencil; a stopwatch or timer.

Procedure

Step 1: Explain the process to the participant (as per the standardised instructions provided at the start of this ERA).

Step 2: Give your subject a copy of the maze and a pen or pencil. Time how long it takes for the participant to complete the maze and record this time in seconds in the table below. Collect the completed maze and cover it up. Ask your participant to briefly describe the process used to find the way out of the maze. What type of learning strategy did he or she apply? (Record this response for discussion later.)

Step 3: Have your participant repeat the maze for the remaining number of trials, collecting the completed maze at the end of each trial and recording the time in seconds in the table below.

Step 4: Once you have recorded the time for the last trial, say, 'Thank you for your participation. It is most appreciated.'

Results

1. Complete the following table (expand it if more than five trials were completed).

<table>
<thead>
<tr>
<th>Trial #</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time taken to complete the maze (seconds)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class data – Mean time taken (seconds)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2 Graph your data.

3 What would the curve have looked like if the trials had been several more trials?

4 What approach to learning is best illustrated within the early trials of this experiment? Explain.

5 Did the participant follow the same path in each trial? If so, what concept would be in evidence? Why would the participant repeat this behaviour pattern, even though there may have been more efficient paths to take?

Discussion

Answer the following questions, which may then form part of your discussion.

1 What did the results show? Did your data support your hypothesis?

2 Did the progress for each subsequent trial indicate gradual learning? How?