



**Prize Winner**

# Scientific Inquiry

## Year 3-4

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## Rat Race - scientific inquiry

By Abigail Atkinson

### Aim

To test the rat's intelligence and memory.

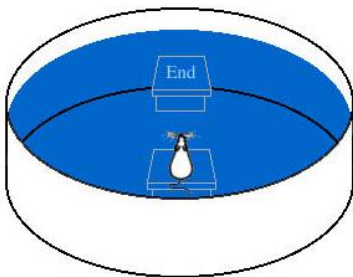
### Prediction/hypothesis

I think that the rats will get faster after more attempts at the maze

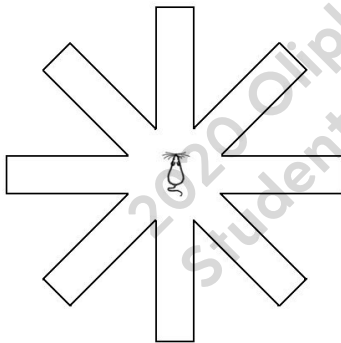
### Research

Rat mazes have been used by scientists to research rat memory and intelligence since the earliest 20<sup>th</sup> century. There are many types of mazes used to test rats, here are some examples

- T maze – is a T shaped maze, it is used to test if rats have one side they prefer to go to more than the other
- The Morris water maze - has platforms hidden under murky water to test how they remember the direction to go



- The radial arm maze – this maze tests rats short term memory



The results from testing rats in mazes has helped scientists understand different ways of learning that can also be useful for humans.

<http://www.ratbehavior.org/RatsAndMazes.htm>

### Background

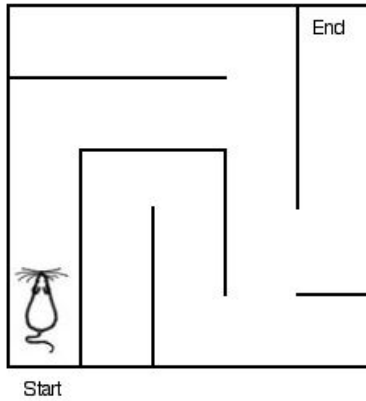
I chose to test the rats using a classic maze as this is a simple maze is used to test memory.

The maze is the same for every attempt, I will also be using the same rats for each attempt at the maze. Both the rats are girls. I will use the same amount of food and the same food. I will use the same way to put them in the maze and when they poke their nose out the hole at the end to time them.

## Equipment used

- Rat x 2
- Maze, made from cardboard, sticky tape, hot glue, contact, (classic maze design)

### Classic Maze design



### My Classic Maze (I had a different start and end spot)

Start



- Camera on a stand to film them.
- Food samples, choc chip biscuits (they love chocolate, but they can't have lots)

## Possible risks

- Some rats can bite, I used my own rats that I know are friendly so the risk of being bitten is low.
- If they did bite, they would need to be told off, then wash the bite and a bandaid.
- Another risk is rat droppings because they smell and have germs, I will make sure to have clean up materials and wash my hands before eating anything. Plastic bags to put any mess in.
- If anyone is allergic, they won't be able to help and handle the rats, or wear gloves or get a hairless rat

## Method

Step 1: decide which maze will be suitable for the experiment

Step 2: build maze and set up camera to film the maze

Step 3: place food at the exit of the maze

Step 4: put rat in entry of maze

Step 5: watch the camera footage, record how long it takes for the rat to make it from the entry to the exit

Step 6: repeat step 3- 5 two more times and write down each time

Step 7: Repeat steps 3-6 with another rat

## Result table

Rat	Run 1	Run 2	Run 3	change	Notes
DJ	1.02 (plus 1.33 not counted cleaning itself)	0.04	Climbed up out of the maze straight away and went straight to the corner with the food (see video footage at the link)	0.57 faster between run 1 and 2	Stopped and cleaned her face for over 1 ½ minutes. I didn't count this as part of the time taken in the first run. Second run she was really fast Then she climbed up on the walls and cut across to the food on the third try
Snowflake	1.29	0.23	Sniffed around for a while and then climbed up	1.06 faster between run 1 and 2	The first run it looked like it was exploring. On the second run she went the right way but didn't put her head through the hole to get the food straight away. On the third run I think it could smell that DJ had climbed out because she did the same

## Conclusion

After three timed attempts at the maze the rat got faster each time, except when they both learnt to climb over the walls on attempt 3. The rats did get faster as they attempted the maze the second time. That matched my prediction.

## Analysis

### Rat 1

On the first trial, the rat just sat and groomed herself for 1.33 and did not seem interested in doing the maze.

On the second trial it was really fast. Ran straight to the food area

On the last trial, the rat cheated by climbing the wall and walking across the top of the maze. I didn't count that trail.

### Rat 2 (Snowflake)

Took lots of wrong turns in the first trial, like it was learning it's way around the maze and exploring.

Run 2 went straight to the food area but didn't want the food straight away so it took a bit longer before I could stop the time  
On the last trial she also climbed up on the walls

### **Possible problems with my experiment**

The way the time is chosen for them to put their nose through the hole is hard to tell sometimes.

The rats are not always hungry so they might not want to go to the food as much. I could do the test before they have lunch, make the treat really small and then they can do the second run straight away or I could do the second run the next day before lunch.

The rats might be more tired on one run than another. They could do the maze at the same time before lunch each day.

If one rat poos in my maze, it might change the way the next rat goes in the maze. Line the maze with plastic and replace it for the next rat to get rid of any smells.

Getting distracted. Make sure the dog doesn't come and look at them during the test.

### **Improvements**

To stop the rat from climbing out I could cover the maze with a lid and time until the rat exits the maze. This could be plastic with holes or any see through cardboard.

I could improve my experiment by putting a food trail, this might make it more interested in exploring the maze and help guide the rat to the end.

I could do the test with more rats and see if they all get faster. I could go to pet shop and test 100 rats.

### **What next?**

In the future I would like to try a T maze to investigate the rat's attraction to different food. I would make a simple T shaped maze and have different food to see which end it goes to and which food it prefers.

I would also like to test them in the classic maze in a few months time to see if they remember how to find their way through it or if they have to learn their way around again by exploring the maze on the first runs.

### **How could what we have learnt from this experiment be useful?**

I learnt rats are smart and I should give them toys or a new house to live in every week. This will make them happy.

If your friends say they don't think a rat can complete a maze, I can now tell them they can.

### **Thank you for reading my report.**

If you want to know more about my rat maze experiment, please watch my video about my experiment at [https://www.youtube.com/watch?v=pJ04Kh8Ku\\_w](https://www.youtube.com/watch?v=pJ04Kh8Ku_w)