



10 - 14

Brain research

Experiment guide

Does practice make perfect?

Have you ever wondered whether practicing really helps you get better at something? In this experiment, you can measure for yourself how much practice helps you remember movement sequences.

How does it work?

You have different types of memory, and each is processed by a different part of the brain. When you practice something frequently, specific areas of your brain become active. These include, for example, the basal ganglia and the cerebellum, which are responsible for learning movement sequences. Another part, the hippocampus, is important for consciously remembering things, such as recalling our last vacation. Sometimes, people don't remember exactly how they learned a movement (such as riding a bike or swimming), but they can still perform it and even improve when they practice more.

Interesting Fact

This test is scientifically known as the "Mirror-drawing Test", and it is actually used in memory research. The researcher Brenda Miller conducted this test with a famous patient named Henry Molaison.

A part of Henry's brain, the hippocampus, was removed. With some practice, Henry got better and better at mirror drawing – but he couldn't remember ever having practiced! Each time, he was surprised at how well he performed. This experiment showed that different types of memory are stored in different parts of the brain.

Start the experiment

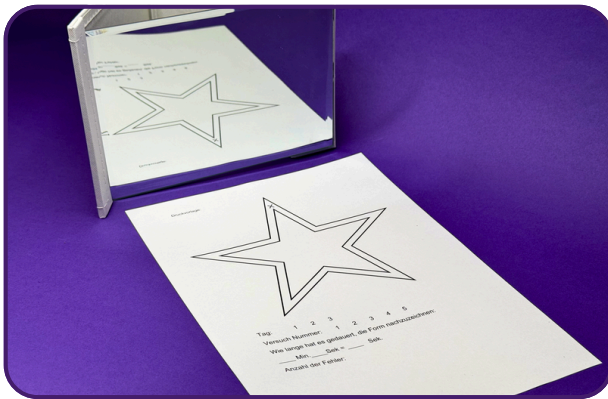
You need:

- Mirror (preferably a small one that can stand on its own)
- Cardboard as a visual barrier
- Printable template: Easy (square) or Advanced (star)
- Stopwatch (e.g., on your phone)
- Well-sharpened pencil, ballpoint pen, or fine-tip marker
- Optional: A helper to assist you :)



Let's go!

Step by step:



1 Place your paper in front of the mirror.



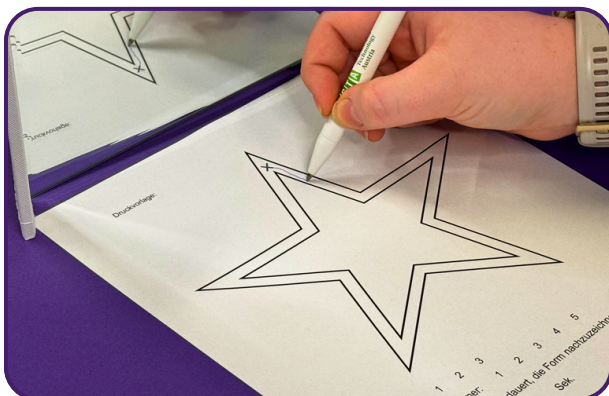
2 Position the cardboard between you and the paper so that you cannot see your hand. Your helper can hold the cardboard.



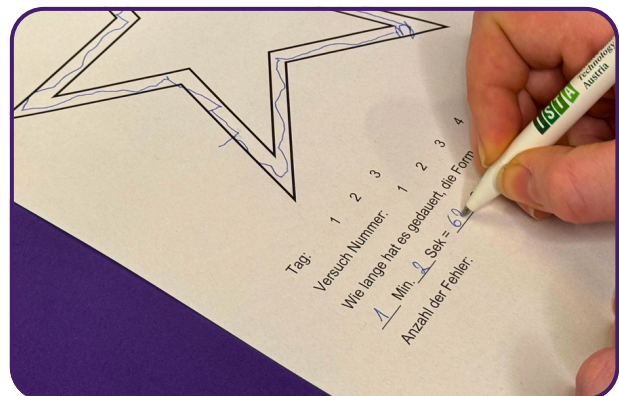
3 Look into the mirror. You should only see your hand and the shape on the template in the mirror. Adjust the mirror's position if needed.



4 Have your helper measure the time, or start the stopwatch yourself.



5 Trace the star, starting from the marked starting point (indicated by a cross). Try your best not to touch the printed lines.

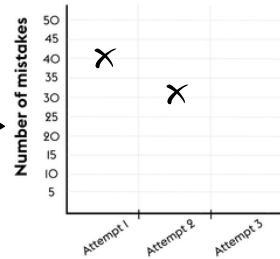


6 Once you reach the starting point again, stop the stopwatch (or your partner stops it). Write down the time under the drawing

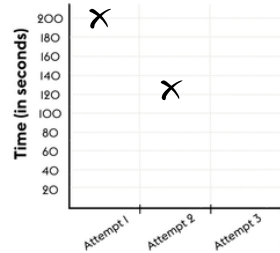
Analysis

Circle all the places where you touched the edge of the star. Count how many times this happened – that's the number of mistakes. Record your results in the charts.

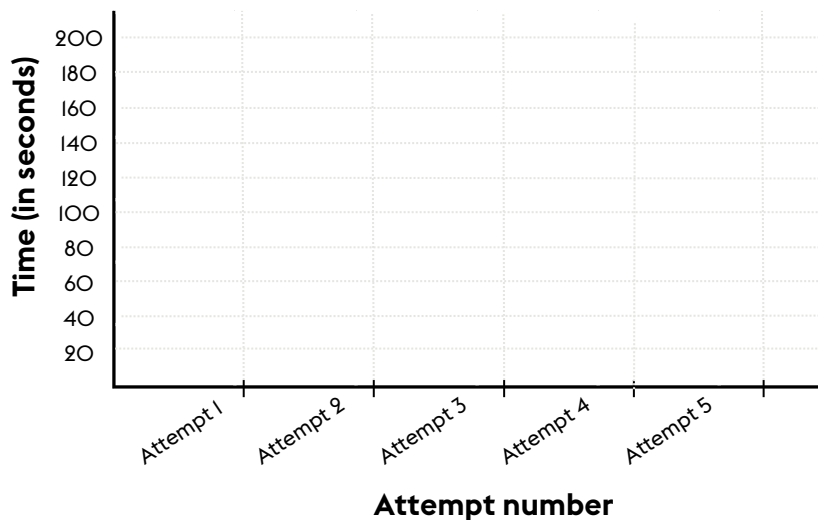
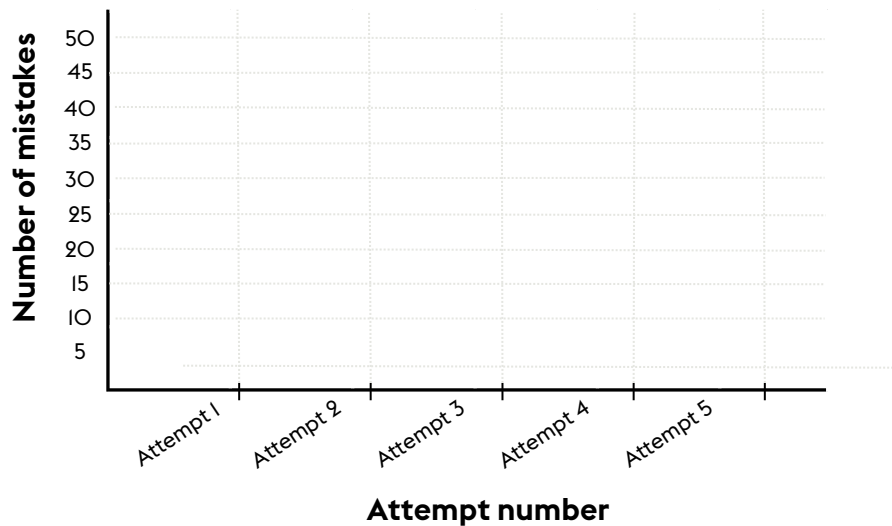
- First chart: Mark an "X" at the number of mistakes you made. Example: If you made 40 mistakes on the first attempt and only 32 on the second, the chart should look like this



- Second chart: Mark an "X" at the time (in seconds) it took you. Example: If your first attempt took 200 seconds and your second attempt took 125 seconds, the chart should reflect this.



What do you notice? How can you tell if you improved with repeated attempts?



Keep exploring!

Extension Activities

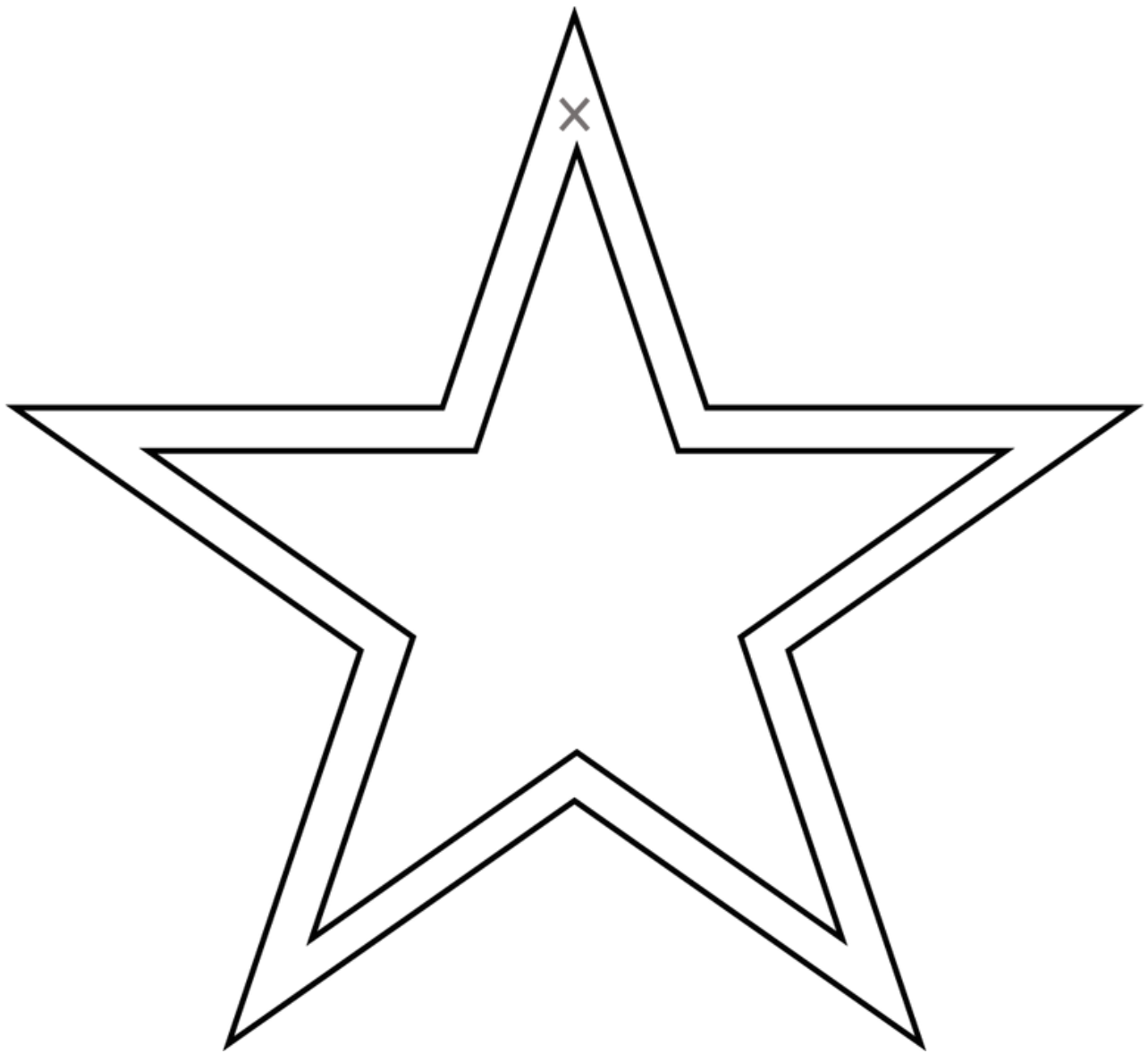
- Repeat the experiment the next day 3-5 more times. Record your results in the charts again. What changed? Do you notice a difference from the previous day's results? Does the graph show that you practiced? Or does it show that you forgot?
- Invite others to try the test and compare your results. Are there big differences or similarities? Why might that be?
- Does practicing with a simple shape help you draw more complicated shapes in the mirror? How could you test this?
- Create your own shape and try to trace it!

Background Information

When you learn through repetition, the connections between brain cells (=neurons) in your brain change – this is called **neural plasticity**.

The Jonas Group at ISTA is researching exactly how this process works. They study how neurons in the hippocampus transmit signals using tiny glass electrodes and specialized microscopy techniques to observe even the smallest changes in the brain.

Print templates



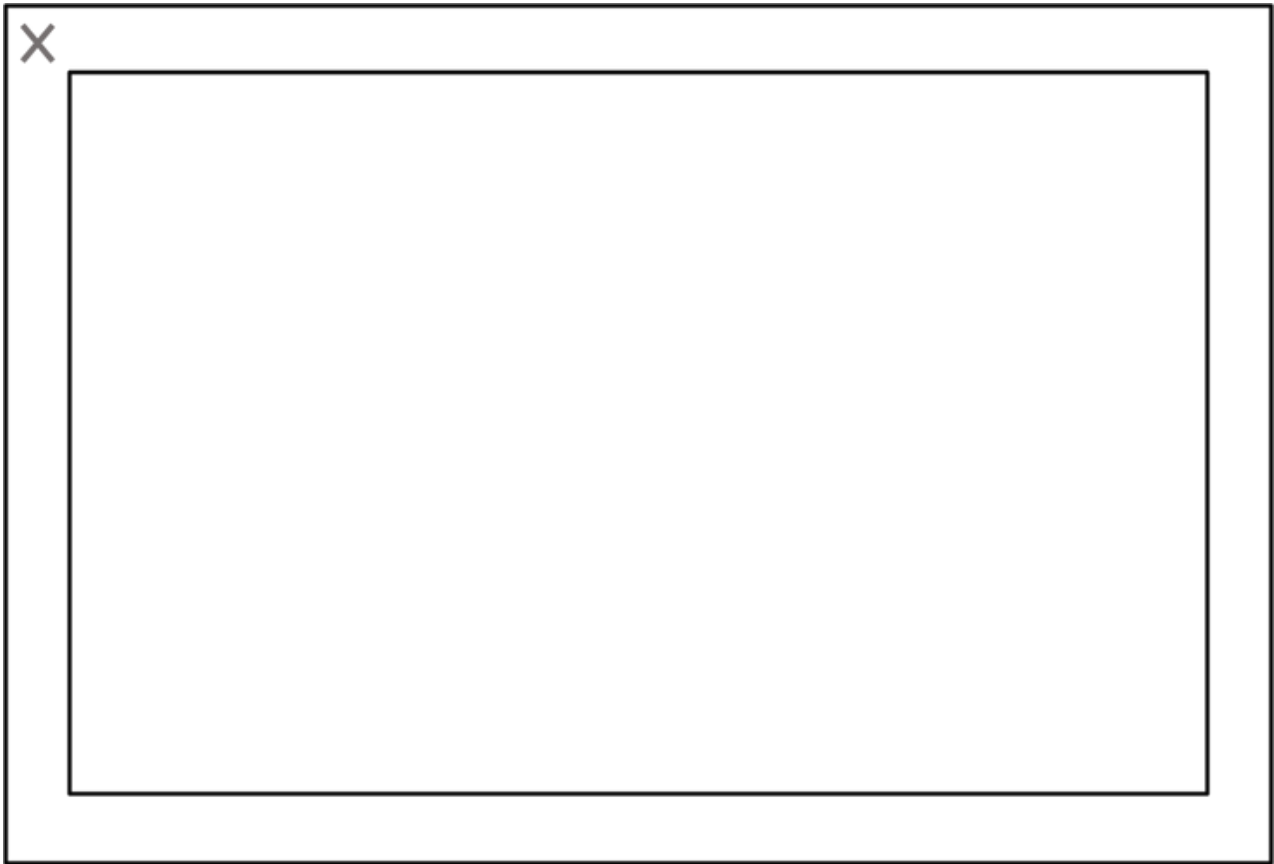
Day: 1 2 3

Attempt number: 1 2 3 4 5

How long did it take to trace the shape:

_____ Min. _____ Sek = _____ Sek.

Number of errors:



Day: 1 2 3

Attempt number: 1 2 3 4 5

How long did it take to trace the shape:

____ Min. ____ Sek = ____ Sek.

Number of errors: