

MaGuire Taxi Drivers Study



Psychology: “study of the mind and the behavior”

1. Introduction

- Eleanor MaGuire, a neuroscientist at the University College London
- This experiment was about if taxi drivers had a bigger hippocampus than the average person, assumingly because of the need to be able to navigate in their profession
- Conducted in 2000 by MaGuire *et al* on males only



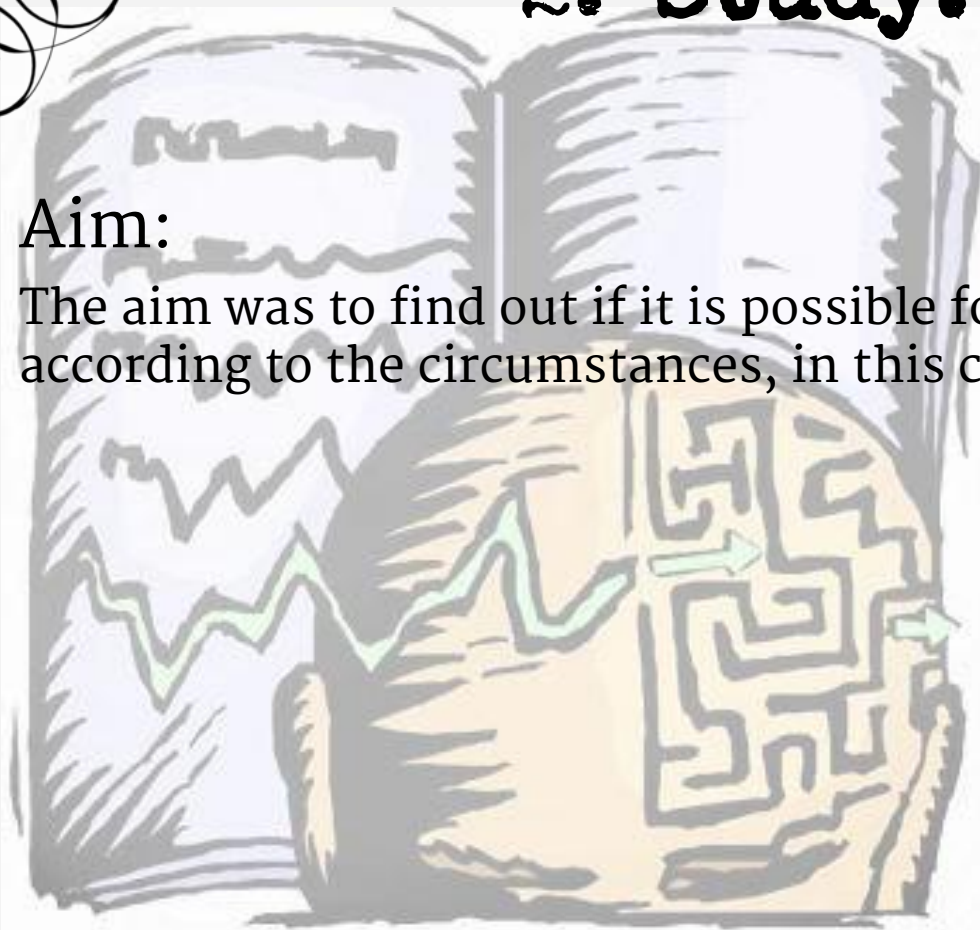
2. Study: aim

Aim:

The aim was to find out if it is possible for the brain to adapt itself according to the circumstances, in this case, to navigate

"Psychology helps to measure the probability that an aim is attainable."

- Edward Thorndike, a psychologist



3. Independent & dependent variables

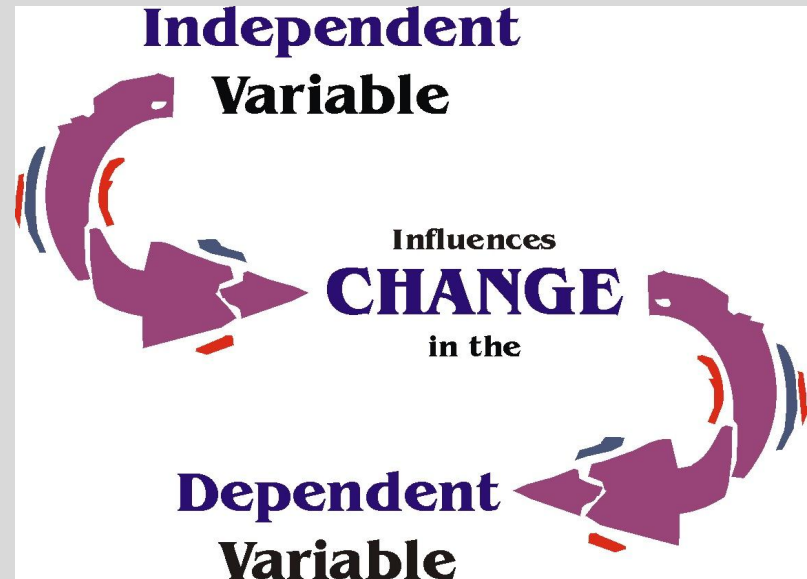
- Independent variable:

The total number of navigational skills tested within two states:

1. Licensed London taxi drivers
2. Non-taxi drivers

- Dependent variable:

The volume of the hippocampus



4. Study: method

Method:

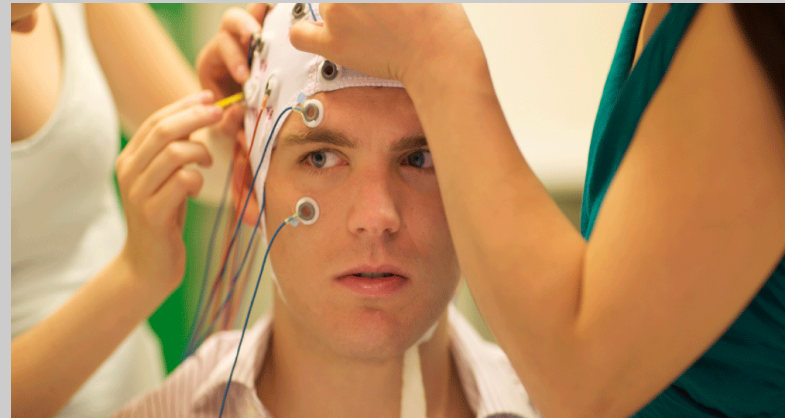
- Natural experiment, conducted in everyday life



5. Study: procedure

Procedure:

- Quantitative research
- Scanning: **structural MRI (magnetic resonance imaging):**
 - **VBM: measures the structure of the brain and the location**
 - **Pixel counting: measures the volume of the brain and the size, done by an experienced observer**



6. Study: findings

Findings:

- **VBM:** taxi drivers had increased grey matter
- **Pixel counting:** the taxi drivers had a significantly larger volume in one part of the hippocampus while the control group in another

Correlations:

Positive between time as taxi driver and right posterior hippocampal volume

Negative for the right anterior section

7. Description of area

- Primitive part of the limbic system
- Handles memory, learning, emotion, spatial learning, spatial navigation
 - transfers information from short-term to long-term memory
- Taxi drivers had bigger hippocampus than normal
 - because of the increase in neurons and the connections between those
 - assumed to literally have a spatial map laid out in their brains, which affects the structure

8. Mapping

TAXI DRIVER'S BRAIN

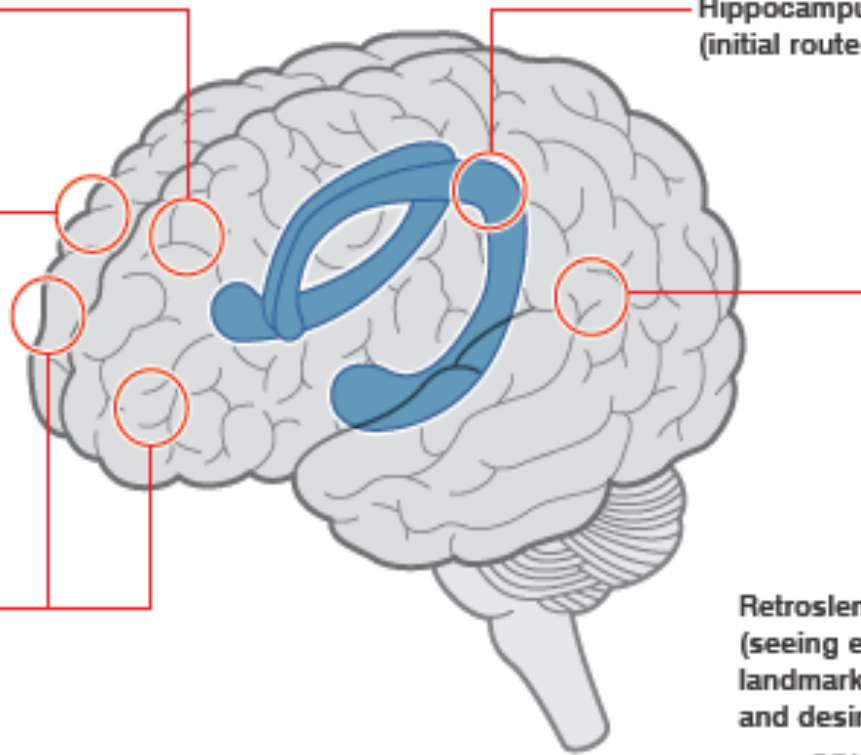
Medial prefrontal cortex
(tracking distance
to destination)

Hippocampus
(initial route planning)

Right lateral
prefrontal cortex
(seeing unexpected
features, eg blocked
off road)

Anterior prefrontal cortex
(spontaneous route
planning - eg if need to
make a diversion)

Retroslenial cortex
(seeing expected
landmarks, streets
and desinations)



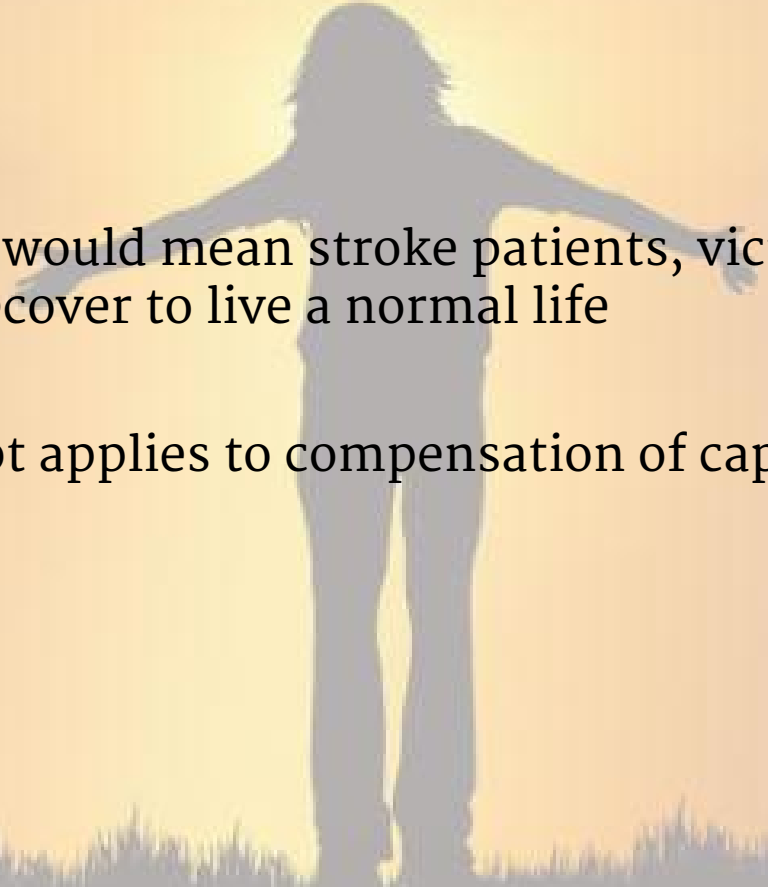
SOURCE: UCL

9. Ethics, validity & reliability

- Ethics:
 - Informed consent
 - Debriefing
 - Confidentiality
- Validity
 - High internal validity
 - Low external validity
 - High ecological validity
 - Low cross-cultural validity
- Reliability
 - High reliability -> replicable



10. Conclusion/Discussion

A silhouette of a person standing with their arms outstretched, set against a warm, orange-hued background that resembles a sunset or sunrise. The person is positioned centrally, and their shadow is cast onto the ground below. The overall mood is one of freedom and hope.

- Results of experience would mean stroke patients, victims of brain damage, etc., could recover to live a normal life
- Brain's ability to adapt applies to compensation of capacity loss as well

References

- Slide 1: [MaGuire et al. \(2000\)](http://en.wikipedia.org/wiki/Eleanor_Maguire), http://en.wikipedia.org/wiki/Eleanor_Maguire
- Slide 2: [MaGuire et al. \(2000\)](http://www.holah.co.uk/study/maguire/), <http://www.holah.co.uk/study/maguire/>
- Slide 3: [MaGuire et al. \(2000\)](#)
- Slide 4: [MaGuire et al. \(2000\)](#)
- Slide 5: [MaGuire et al. \(2000\)](#)



References

- Slide 6: [MaGuire et al. \(2000\)](#)
- Slide 7: <http://video.nationalgeographic.com/video/london-taxi-sci>, http://psychology.about.com/od/memory/ss/ten-facts-about-memory_2.htm
- Slide 8: <http://www.ucl.ac.uk/>
- Slide 9: [MaGuire et al. \(2000\)](#)
- Slide 10: <http://video.nationalgeographic.com/video/london-taxi-sci>

