

## Maguire *et al.* (2000)

### Structural Changes In The Brain

This study is used to answer questions on:

Brain scanning (MRI)  
Localisation  
Neuroplasticity

### Abstract

This study aimed to examine structural changes in the brains of taxi drivers. 16 right-handed taxi drivers (mean age 44) were given MRI scans. The scans were compared to 50 non-taxi drivers to look for any structural changes. The researchers found that the hippocampi of the taxi drivers were more developed than the non-taxi drivers (a larger volume of grey matter).

However, they also found that the non-taxi drivers had other areas of the brain with more development than the taxi drivers. The researchers concluded that by continually using the area of the brain responsible for spatial awareness, the brain of the taxi drivers had redistributed grey matter in order to develop this skill.



## Aim

- To investigate if extensive use of the area of the brain responsible for spatial awareness causes structural changes in the brain

## Method

### Participants

16 right-handed male taxi drivers (mean age 44) participated in the study. They had been working as taxi drivers for an average of 14 years. 50 non-taxi drivers were used as a comparison (a control group).

### Procedure

All the participants were given an MRI scan. The scans were then compared to look for any structural differences between the taxi drivers and non-taxi drivers.

## Results

There was increased volume of grey matter in the right and left hippocampi in the taxi drivers.

The volume of the right hippocampi increased and the length of time driving a taxi increased (a positive correlation between the two factors).

Non-taxi drivers had a greater volume of grey matter in other areas of the brain, suggesting that the grey matter in the taxi drivers had been redistributed.

## Conclusion

The brain changes structure in response to environmental demands



## Evaluation

### Generalisability

- There was a sample of just 16 taxi drivers which is a small amount.
- All the drivers were male, so the effect may not be true for females.

### Reliability

- Maguire conducted another study using PET scans and found that the areas responsible for spatial awareness were more active and developed when the taxi drivers were asked to describe navigation routes.
- A scientific method (MRI scan) was used to collect the data.

### Application to life

- Knowing that the brain can change and redistribute matter could be useful in developing programmes to help people with brain damage.

### Validity

- Real taxi drivers were used in the study.

### Ethics

- Participants were not asked to partake in any activity that could be damaging to them.



