

Localization of The Brain

localization	<p>Every behaviour is associated with or responsible for a specific brain region</p> <ul style="list-style-type: none"> - Relative localization is when each structure is associated with certain functions e.g Frontal lobe and impulse control - Strict localization is when specific parts of the brain have specific functions e.g amygdala and emotions
How do we find out about localization?	<ol style="list-style-type: none"> 1. Accidental damage 2. Deliberate damage/ lesions 3. Stimulus of the brain using electrodes/ brain scans
Feinstein et al. (2011)	<p>CASE STUDY: Strict localization</p> <p>Aims: to investigate the role of the human amygdala in the induction and experience of fear</p> <p>Procedure:</p> <ul style="list-style-type: none"> - The researchers conducted a study on a rare human patient referred to as SM who had focal bilateral lesions - To provoke SM, the researchers exposed her to live snakes and spiders, took her on a tour of a haunted house, and showed her emotionally evocative films(horror) - SM's fear reactions and self-reported fear levels were assessed through various measures, including self-report questionnaires, real-life experience sampling over three months, and an examination of her life history with traumatic events <p>Findings:</p> <ul style="list-style-type: none"> - SM consistently exhibited an absence of fear manifestations and an overall impoverished experience of fear - Despite her lack of fear, SM was able to exhibit other basic emotions and experience their respective feelings - The findings supported the conclusion that the human amygdala plays a pivotal role in triggering a state of fear, and the absence of such a state precludes the experience of fear itself <p>Conclusion:</p> <p>The study concluded that the human amygdala is crucial in the induction and experience of fear through SM's condition.</p>
Link 1:	<p>The study shows strict lateralization of the brain by studying the relationship between focal bilateral lesions which damage the amygdala and fear response. The study found that the damage to the amygdala was the cause of the lack of fear induction and response in SM as she repeatedly showed lower levels of fear throughout the procedure when she was experiencing</p>

	different 'scary events' in comparison to the control group with individuals who's amygdala had no damage. Therefore highlighting that one of the amygdala's specific roles in the brain is the induction and experience of fear.
Maguire et al (2000)	<p>NATURAL EXPERIMENT: Aim: to examine whether structural changes could be detected in the brains of individuals with extensive experience in spatial navigation, specifically London taxi drivers</p> <p>Procedure:</p> <ul style="list-style-type: none"> - The study involved 16 right handed male london taxi drivers who had been driving for more that one and a hlf years. They were compared to 50 healthy right handed males who were not taxi drivers - Structural MRI scans were abstained for all participants - The mean age did not differ between the two groups - The researcher used voxel- based morphometry and pixel counting techniques to measure the density and volume of grey matter in the hippocampus. - The scans were separated into different slices, focusing on posterior, body, and anterior regions of the hippocampus - The pixel counting was carried out by a researcher who was unaware of the previous results of VBM and the group s to which the scans belong to. <p>Flndings:</p> <ul style="list-style-type: none"> - Increased grey matter volume was found in the brains of the taxi drivers in two brain regions: the right and left hippocampi. The increase in volume was specifically observed in the (rear) posterior of the hippocampi
Link 2:	The study also showed strict localization through comparing the MRI scans of london taxi drivers to those who dont drive taxi's. The study found that the hippocampus of the taxi drivers was bigger and more prevalent in the brain in comparison to the other group. This allowed researchers to conclude that the role of the hippocampus in the human brain was for spatial navigation.

Study	Evaluation	What does this tell us about localisation of function?
Maguire et al	<p>Reliability: The study was not repeated and therefore the may not be reliable as it can not be ensured that the study does not have many anomalous results.</p> <p>Bias: Researcher- Being unaware of which was the control and which was the taxi group, could not have been biased and leaned toward answering in an unbiased manner.</p>	

	<p>But aware of the 50 control and 16 taxi drivers, thus answers may have been given in an estimated amount to not go over 16 (tried to guess correctly)</p> <p>Sampling- Only gathering samples from those who drive a taxi in London. Not an accurate/reliable representation of spatial memory and does not represent other taxi drivers in other regions.</p> <p>Participant- The vast majority of the sample were males, not accurate/representable data.</p> <ul style="list-style-type: none"> - Single-blind → reduce researcher bias since researchers do not know which condition the scans were in <ul style="list-style-type: none"> - if they know they may analyze it differently eg. subconsciously thinking that the posterior hippocampi of taxi drivers are much larger than the control group because that is their thesis - Because they do not know which scan they are looking at, they cannot be biased and they have to analyze the sizes/MRIs of the brains objectively. <p>Application: It offers us good knowledge about the 'Localisation of Function' in the brain, and how spatial memory could be linked to our hippocampus.</p> <p>Methodology:</p> <ul style="list-style-type: none"> - The use of a control group- the pts were 50n right-handed males who did not drive taxis. This allowed for a comparison between the brains of taxi drivers and non-taxi drivers, providing a baseline for analysis - Large sample size- the study included 16 right-handed male london taxi drivers, which is a relatively large sample size for a neuroimaging study. This also therefore increases the generalizability of the study as it allows for the spotting and elimination 	<p>Methodology</p> <ul style="list-style-type: none"> - This showed that the localization of the hippocampus was the spatial memory as the comparison showed that taxi drivers had a larger hippocampus than the control group of non-taxi drivers. - The use of a large sample size for neuroimaging showed a consistent trend in that pts in control group
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	<p>of anomalies providing a clear relationship.</p> <ul style="list-style-type: none"> - Potential confounding variables - while efforts were made to match the age range and handedness of the taxi drivers, and the control group, there still may have been other uncontrollable variables such as differences in education levels or cognitive ability. <p>Ethics: MRI scans were also used, which do very little damage to patients and are still extremely accurate most of the time. This means no harm was done to the participants (psychological or physical). Especially when compared to other psychological experiments such as Milgram or Zumbaed who caused psychological harm to their participants</p>	
Feinstein et al	<p>Validity:</p> <ul style="list-style-type: none"> - Internal Validity is good, as prior to the study on S.M., Feinstein and his team already had access to other cases of seemingly fearless people with amygdala issues, meaning they already had fear in mind for their hypothesis. - External Validity is quite high as well, given that fear is a very important emotion to humans, and also due to the internal validity being high for the same reason, it's clear what the study shows for potential awareness of amygdala damage. - Population Validity is quite well-dealt with as although it's a case study, S.M. is not the only one with an amygdala problem who also had concurrent fearlessness. It's not the best though, as amygdala problems could also be from birth defects rather than disease-caused lesions, so the findings may not necessarily represent ALL problems with the amygdala. - Construct Validity does seem to be quite questionable, given they had no recognized set of measurements used for fear. - Ecological Validity is sufficiently good, as brain damage of any kind is sadly not uncommon in most parts of the world. 	<p>As S.M. was not known to have many other issues with her brain, aside from the amygdala, the case study implies that the amygdala (or lack of its functions) is the main cause behind the issue.</p>

	<p>However, given it's solely the amygdala, we cannot be sure that S.M.'s condition is merely because of amygdala damage, or if ONLY damaging the amygdala gives this reaction in a person.</p> <p>Methodology:</p> <ul style="list-style-type: none"> - The study did not mention any attempts at replication or the use of multiple cases with amygdala damage - Selecting SM was a choice made by the researchers which prvbed valuable ansd it allowed them to compafre her fear repnse to those who's amydlalas were unaffected and allowed them to conclude the rople/ function of the amygdala in the brain and body. 	
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