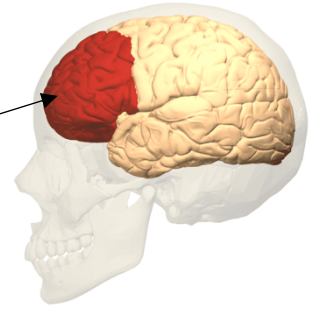


# Biological Theories – Brain Abnormalities

## LO1 – DESCRIBE BIOLOGICAL THEORIES OF CRIMINALITY

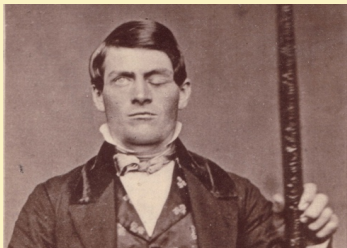
Assessment Criterion	Content	Amplification
AC1.1 Describe Biological Theories of Criminality	<b>Criminal Behaviour</b> <ul style="list-style-type: none"> <li>Genetic Theories</li> <li><b>Physiological Theories</b></li> </ul>	<b>You should have knowledge and understanding of:</b> <ul style="list-style-type: none"> <li>✓ Jacob's XYY Theory</li> <li>✓ Twin and Adoption Studies</li> <li>✓ Lombroso's Physiological Theory</li> <li>✓ Sheldon's Type Theory.</li> <li>✓ <b>Brain Abnormalities</b></li> </ul>

The location of the Prefrontal Cortex in a Human Skull



### THE CASE OF PHINEAS GAGE

Gage was a railroad worker who survived an accident in which a large iron rod went through his head, destroying much of the left frontal lobe of the brain. Gage's personality and behaviour were greatly affected, with friends reporting that he was no longer Gage. He became extravagant and anti-social, used bad language, had bad manners and became a liar.



The part of the brain that he had lost was associated to the mental and emotional functions that had changed. His doctor believed that the balance between his intellectual faculties and animalistic behaviour was destroyed in the accident.

### PET SCANS

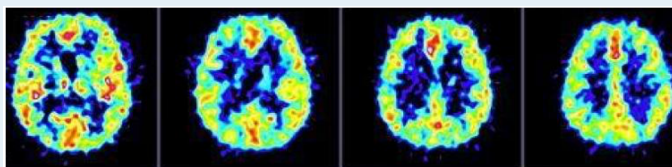
PET Scan – a type of brain imaging where scans are used to produce 3 dimensional images of the brain. PET scans involve the injection of a radioactive tracer; this tracer then appears as a bright colour on the scan, indicating which areas of the brain are most active in metabolising glucose during a task.

### HEAD INJURY RESEARCH

Mc Isaac et al. (2016) found that people who have suffered serious head injuries are twice as likely to end up in prison (0.5% compared to 0.2%). Female prisoners were even more likely to have survived traumatic brain injuries. For women with these injuries, the risk of winding up in a Canadian federal prison was 2.76 times higher than it was for uninjured women.

### THE PREFRONTAL CORTEX AND CRIMINAL BEHAVIOUR

Several research studies have suggested that damage to the pre-frontal cortex of the brain may cause individuals to have an altered behaviour pattern. Becoming more immature and having an increased loss of self-control as well as having an inability to modify behaviour. Raine et al (1994) used PET scans to study the living brains of impulsive killers.



The murders in Raine's study had all pleaded 'not guilty by reason of insanity (NGRI)' to a charge of murder. Raine wanted to see if the findings of studies linking brain structure to aggression in animals could be generalised to humans. Raine found consistent differences in the brains of murders when compared to non-murderers, in particular there was decreased activity in some area of the brain connected to impulse control and thinking. However, he did not find that this pattern of brain activity in all murderers, so was not able to conclude that this was the cause of the murderer's behaviour.

### BIOCHEMICAL EXPLANATIONS

There are a number of biochemical substances that have been linked with criminal behaviour, particularly criminal behaviour related to aggression:

- **Male offending and testosterone:** Males are more aggressive than females, this is true of every mammalian species. One substance that has been linked to male aggression is the sex hormone 'testosterone'. Testosterone peaks in adolescent males before gradually declining with age. It promotes muscle strength and is responsible for the sex drive. Similarly, offending, particularly offences involving aggression or a sexual motive peaks in males in the early 20s before declining.
- **Female offending and Hormones:** Female offending has also been linked with hormones. Both pre-menstrual tension and post-partum depression have been linked to hormonal changes in females and have been accepted as mitigating factors for crimes committed by women.
- **Substances abuse:** Drugs both legal and illegal have been linked with the causes of crime. Alcohol is implicated in over 80% of cases of domestic violence and crack cocaine is known to increase aggression in people of both sexes.