Neural Factors in Aggression

Neural Factors in aggression include structures in the brain, as well as the action of neurotransmitters on those structures.

The Amygdala

One brain structure that has been considered important in aggression is the amygdala. Research in hamsters has found that stimulation of the corticomedial amygdala increases aggression and lesioning of this area reduces aggression in hamsters (Potegal et al., 1996).

In humans, Amygdalecctomy (surgical removal of the amygdala) reduces aggression in previously violent individuals; however, a side effect of this type of surgery is the loss of emotion, initiative and enthusiasm (Groves and Schlesinger, 1982). It is possible that the amygdala does not directly cause aggression, but is involved in processing associated emotions, such as anger.

Medial Hypothalamus

Flynn (2006) found that stimulating the lateral area of the hypothalamus in cats led to predatory aggression. Predatory aggression is a hunting behaviour, whereby the cat will quickly and silently catch and kill its prey. Predatory Aggression is very different to rage aggression, which in cats involves arching of the back, teeth baring and hissing.

Flynn found that rage type aggression was elicited by stimulation of the medial hypothalamus. This suggests that different types of aggression are controlled by different brain areas. Nevertheless, in humans it is likely that higher brain areas play a role in aggression, since human aggression appears to be linked to social behaviour and cognition rather than simple responses to stimuli.

Frontal Lobes

The frontal lobes are likely candidates for a role in aggression, as they are known to be involved in many activities requiring decision making, such as social behaviour, motor functions, problem solving, judgement, impulse control and personality.

Evidence that aggression is related to frontal lobe function has been around since the 1800s. In 1848, Phineas Gage had an accident while packing gunpowder into a blasting hole while working on a railroad in Vermont, USA. The tamping iron he was using was propelled through his skull when he accidentally ignited the powder, causing it to explode. The damage to Gage's frontal lobes did not kill him, but it apparently changed his personality, making him more aggressive, obstinate, impatient and impulsive (Harlow, 1868).

The case of Phineas Gage suggests that the frontal lobes may be important in moderating aggressiveness. Nevertheless, it is impossible to find out exactly where Gage's brain was damaged, as it can only be deduced from examination of his skull and this only provides a rough estimate.

Nevertheless, further evidence that the frontal lobes are involved in aggression comes from some of the most violent people in history: serial killers and mass murderers. Many of these ultra-violent individuals, have a history of frontal lobe injury; for example: