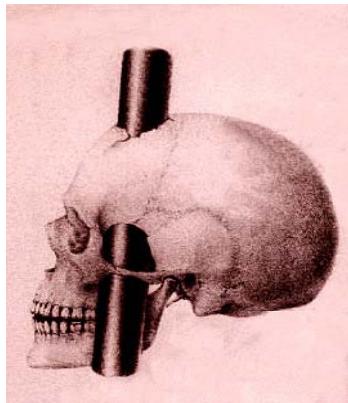


Outline principles that define the biological level of analysis

Explain how these principles can be demonstrated in research

1. All behavior has a physiological basis

The biological level of analysis focuses on the many physiological factors that play a role in behaviour – brain processes, neurotransmitters, hormones and genes. Biological researchers therefore take a reductionist approach to the study of behavior – breaking complex human behavior into its smallest part e.g. focusing on the role of a gene, a neurotransmitter, or a localized part of the brain.



This can be seen in the case studies of Phineas Gage and David (Bruce / Brenda Reimer). Phineas Gage was a railroad worker who suffered a personality change after an iron rod shot through his brain. Damasio et al (1994) used imaging techniques to reconstruct the exact path of the iron rod. They were able to create a three-dimensional model of Gage's skull that showed that the iron bar went through prefrontal areas of the brain, thus showing a link between a specific part of the brain and social and emotional reasoning.

Similarly the case of David (Bruce/Brenda Reimer. 1974) born an intersexed boy, shows the influence of physiology. The gender-neutral theory of John Money meant the boy was reassigned and raised as a girl, but the experiment did not go according to plan as David's behavior remained masculinised. Such a case demonstrates that psychosexual development is not determined by external genitalia and socialisation but by chromosomes and hormones. This case raised a number ethical issues.

However behaviour is not the result of biological systems alone, it is also important to consider how the environment and cognition may interact with biological systems and affect physiology. This relationship is bidirectional i.e. biology can affect cognition and cognition can affect biology. This can be seen in the case of hippocampal damage and memory impairment, and emotions and cognition.

2. Behavior can be inherited



The biological level of analysis assumes that individuals may have a genetic predisposition towards certain behaviors. Human cell division may lead to changes in DNA sequences, change the genetic code and therefore cause genetic mutations. Genetic mutations may lead to variations in human physical and mental capacities.

Although researchers are not able to identify the role of specific genes in specific behaviours numerous studies have shown a link between genes and behavior. Two keys ways of researching this link are through correlational (twin and adoption studies) and linkage studies.

One of most well known and largest studies into twins is the Minnesota Twin Study (Bouchard et al, 1990), a longitudinal study that has been ongoing since 1979, conducted at the University of Minnesota. The study tracks down separated twins from across the world and participants complete approximately 50 hours of medical and psychological assessments including personality traits, occupational interests and mental ability. He found that an identical twin reared away from his or her co-twin seems to have about an equal chance of being similar to the co-twin in terms of personality, interests, and attitudes as one who has been reared with his or her co-twin. This leads to the conclusion that the similarities between twins are due to genes, not environment, since the differences between twins reared apart must mainly be due to the environment

Grove et al (1990) studied 32 sets of MZ twins who were separated and raised apart shortly after birth. A continuous score for anti-social behavior in both childhood and adulthood was derived by interviewing each subject with a standardised interview schedule; as such this assessment of antisocial behavior was a self-report measure. Statistically significant heritabilities were obtained for anti-social behavior in both childhood (0.41) and adulthood (0.28)

Brunner's (1993) linkage study found the same genetic mutation in 28 members of a Dutch family all with a history of anti-social behavior. Over the course of four years Brunner and his colleagues analyzed the X chromosomes of all men and found a mutation in the gene for MAOA, a neurochemical in the brain. A MAOA deficiency is associated with impulsive, aggressive behavior . The same mutation was not found in any of the control group of 'non-aggressive' males.

3. Behaviour may be influenced by evolutionary processes



If we accept the principle that behavior is innate – genetically based – then it is logical to believe that evolutionary processes may have played a key role in genetic mutations and transmissions.

Evolutionary processes include Darwin's theory of natural selection – natural selection is the process by which species adapt to their environment. Natural selection leads to evolutionary change when individuals with certain characteristics (adaptations) have a greater survival or reproductive rate than other individuals in a population

and pass on these inheritable genetic characteristics to their offspring

Evolutionary psychology applies this process to human behavior - for example adaptations which would have promoted survival and reproduction such as aggression might be understood as an adaptive necessity in the competition for limited resources. This is widely demonstrated in research.

For example, a study by Chartrand & Bargh (1999) examined the chameleon effect in humans. The chameleon effect is the natural tendency to imitate each other's body postures, hand gestures, speaking accents, and other behaviours. Their study showed that people who engaged in more imitative behavior rated the person they imitated higher in terms of likeability, suggesting that mimicry (imitation) facilitated social interaction and bonding, an important adaptive behavior for the success of the group.

Sexual selection is a type of natural selection but refer to selective pressures to choose the right mate. Evolutionary psychologists argued that men and women faced different adaptive problems in mate selection, which explain sex differences in reproductive strategies and mate selection. One example is sex differences in jealousy. David Buss (1992) carried out a "self-report" study where male and female participants were asked to imagine a romantic relationship where their partner is either having sex with someone else, or falling in love with someone else" and say which of the two would cause them the greatest distress. Female participants reported they would be more upset by the emotional infidelity more often than male participants, while sexual infidelity tended to be more upsetting for males than females.

4. Animal studies provide insight into human behaviour



About 7-8% of psychological research involves the use of animals. Although the range of species that have been used in various studies in psychology is broad, 90% of the animals used have been rodents and birds, principally rats, mice, and pigeons. Only about 5% of the animals are monkeys and other primates. Use of dogs or cats is rare. There are no basic differences between the physiologies of lab animals and humans. Both control their internal biochemistry by releasing the same endocrine hormones, both send out similar chemical transmitters from neurons in the CNS and PNS and both react in the same way to infection or tissue damage.

Experiments on animals have made an important contribution to advances in medicine and psychology that have brought major improvements in the health and well being of humans and animals. Studies that we look at (have looked at) using animals include;

Martinez & Kesner (1991) the role of acetylcholine on memory (rats)

Rosenzweig and Bennett (1972) effects of deprivation on brain development (rats)

Matsuzawa (2007) Spatial memory (chimpanzees)

Zola-Morgan et al (2000) Hippocampal damage and memory (monkeys)

Harlow (1962) Love in infant monkeys

However the use of animals in psychological research raises huge ethical issues about the use and treatment of animals in research.