Biological level of analysis Syllabus

Introduction

At the most basic level of analysis, human beings are biological systems. Our cognitions, emotions and behaviours are products of the anatomy and physiology of our nervous and endocrine systems. Over the last few centuries, discoveries have shown that:

• the nature of the nervous system is electrical in part (Galvani)
• different areas of the brain carry out different functions (Broca)
• small gaps exist between nerve cells that require the action of chemicals to carry neural transmissions across these gaps
• hormones play an important role in our psychological functioning.

Since the 1960s, with the invention and development of brain imaging technologies (for example, CAT (computerized axial tomography), PET (positron emission tomography), fMRI (functional magnetic resonance imaging)) it has become possible to directly study living brains in action as various tasks are performed, and to correlate specific areas of brain damage with specific changes in a person's personality or cognitive abilities. Advances in psychopharmacology—the field of medicine that addresses the balance of chemicals in the brain—have led to the development of new medications for problems as diverse as depression, anxiety disorders and Alzheimer's disease.

After Darwin published his theory of evolution through natural selection, animals came to be studied in order to shed light on human behaviour. With the completion of the human genome project, the chimpanzee genome project, and with other species having the full structure of their DNA mapped, the contribution of genes to our cognitions, emotions and behaviour is becoming better understood. Behavioural genetics takes the skills of biological analysis used to study the differences between species and applies these skills to studying individual differences in humans. These are the components at the biological level of analysis needed to understand our complex biological system and the psychological functions it supports.

Learning outcomes

General learning outcomes

• Outline principles that define the biological level of analysis *(for example, patterns of behaviour can be inherited; animal research may inform our understanding of human behaviour; cognitions, emotions and behaviours are products of the anatomy and physiology of our nervous and endocrine systems)*.
• Explain how principles that define the biological level of analysis may be demonstrated in research.
• Discuss how and why particular research methods are used at the biological level of analysis *(for example, experiments, observations, correlational studies)*.
• Discuss ethical considerations related to research studies at the biological level of analysis.

Physiology and behavior

• Explain one study related to localization of function in the brain *(for example, Wernicke, Broca,Gazzaniga and Sperry)*.
• Using one or more examples, explain effects of neurotransmission on human behaviour *(for example, the effect of noradrenaline on depression)*.
• Using one or more examples, explain functions of two hormones in human behaviour.
• Discuss two effects of the environment on physiological processes *(for example, effects of jet lag on bodily rhythms, effects of deprivation on neuroplasticity, effects of environmental stressors on reproductive mechanisms)*.
• Examine one interaction between cognition and physiology in terms of behaviour *(for example, agnosia, anosognosia, prosapagnosia, amnesia)*. Evaluate two relevant studies.
• Discuss the use of brain imaging technologies *(for example, CAT, PET, fMRI)* in investigating the relationship between biological factors and behaviour.

Genetics and behavior

• With reference to relevant research studies, to what extent does genetic inheritance influence behaviour?
• Examine one evolutionary explanation of behaviour.
• Discuss ethical considerations in research into genetic influences on behaviour.