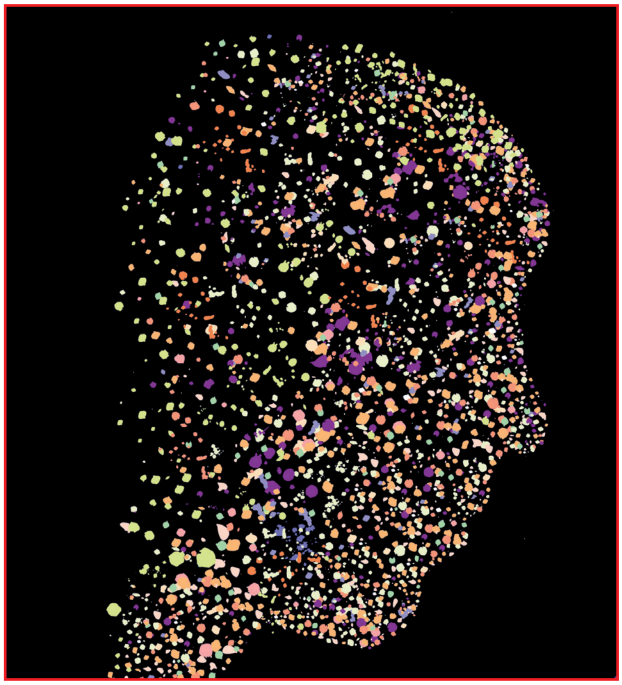

AS Level
WJEC Psychology

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The Biological Approach

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Classic research (Raine et al., 1997)

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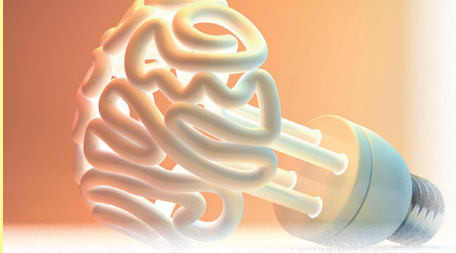


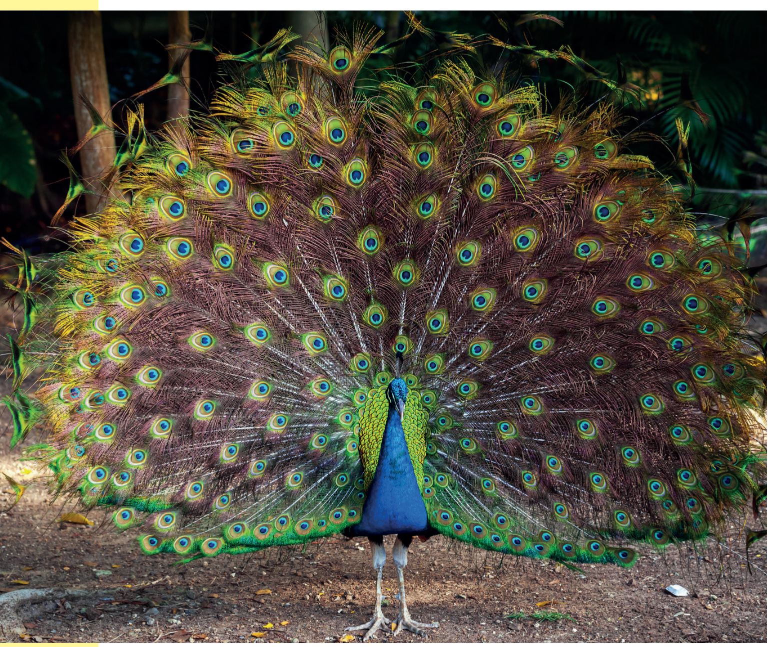
INTRODUCTION

Biology influences behaviour. We know this from the way that changes in brain chemicals affect moods, and from how brain trauma can radically alter the ways in which we think and act. Also, behaviour influences biology. This can be seen in the stressful effects the environments we find ourselves in have on us, the way that mood influences immune system functioning, and the effects of the recreational drugs that we choose to take, such as tobacco and alcohol, on our psychology and physiology. Clearly, biology and behaviour are inextricably interwoven. Changes in one bring about changes in the other, and we cannot truly understand either without some understanding of both.

THE ASSUMPTIONS OF THE BIOLOGICAL APPROACH

1. Evolutionary influences

The basic premise of *evolution* theory is rather simple and elegant. Animals produce many more young than could possibly survive. Offspring are often very slightly different from either parent and these variations (or mutations) sometimes enable animals to cope better with environmental demands and reach maturity. The ones that do reach adulthood are the strongest of their generation, and when they breed they pass on to their young the characteristics that helped them survive. Those with traits that help them survive are more likely to reproduce themselves (i.e. they are selected by the process of evolution for their 'fitness'), and so the cycle continues. As many generations go by, the traits (or *adaptations*) that have aided survival and reproductive fitness are passed on and become widespread in the population. Such a process involves changes to both physiology and behaviour, so that the end result can be an animal that bears little resemblance to its ancestors in looks or behaviour. This is the principle of *natural selection*. A special kind of natural selection is *sexual selection*. This theory says that the characteristics of an animal that increase mating success are more likely to result in reproduction, passing on that characteristic to offspring, and thus also increasing their chances of mating success. A consequence of this is often exaggerated characteristics which appear, on the face of it, to disadvantage an animal in terms of survival chances – take the male peacock's tail for example. The more flamboyant the display, the more likely a male is to attract a female.



The male peacock's tail is an example of exaggerated physical characteristics evolving in order to increase chances of reproductive success.

2. Localisation of brain function

This assumption of the *biological approach* draws on research which has shown that particular areas of the brain are specialised for certain functions or tasks. The brain has two hemispheres (or halves). Each hemisphere has regions specialised for particular things (i.e. they have *localised* functions). The cortex of each hemisphere consists of four areas called lobes. The large *frontal lobes* are involved in higher functions e.g. thinking, speech and motor control and coordinating information from other lobes. Behind the frontal lobes sit the *parietal lobes* which receive and interpret sensory information. Visual information is received and processed at the back of the brain by the *occipital lobes*. Finally, at the sides of the brain are the *temporal lobes* which process auditory information and are also important for memory. The areas of the cortex directly responsible for sensory information are called *primary areas*. All other cortical areas are collectively known as *association areas*. The *neurons* in the association areas appear to be less specific in what they do, are more flexible in their functions and adapt to experience, much more so than neurons in the primary areas. This makes some sense in that they are involved in integrating and using information from the primary areas in high level functions such as perception, decision making and planning.

Language is a good example of localisation of function. In 1861, physician Paul Broca exhibited the brain of a patient who, before dying the year before, had lost the ability to say anything other than 'tan'. The brain showed clear damage to the left frontal cortex, an area now called Broca's area, which is important for guiding the muscles in the mouth into the right shapes to make speech sounds. In 1874, Carl Wernicke described a patient who, following damage to the left temporal cortex, had great difficulty understanding speech. This area is now known as Wernicke's area. Since then a number of other locations have been discovered in the brain that are important for language, and for the vast number of people these are in the left hemisphere.

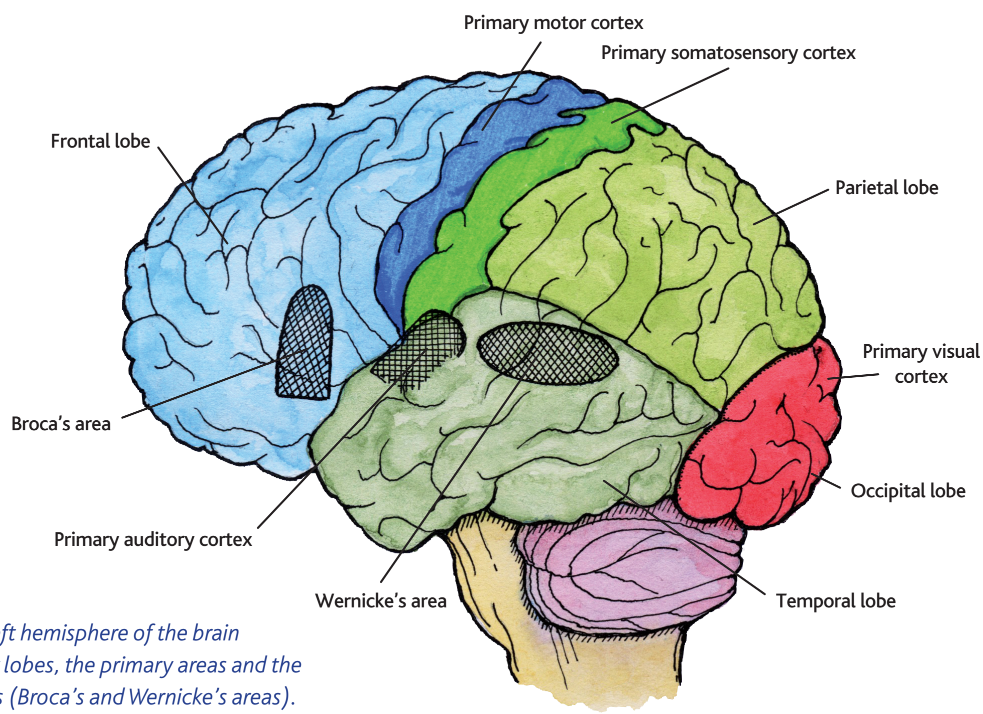


Figure 1.1: The left hemisphere of the brain showing the four lobes, the primary areas and the language centres (Broca's and Wernicke's areas).

3. Neurotransmitters

The brain is made up of billions of cells called neurons. These communicate with one another using electrical and chemical signals. The chemical used in this communication is called a neurotransmitter. When a neuron receives messages from others neurons, it is stimulated to pass messages on to other neurons with which it is associated. These messages occur at synapses – tiny gaps between neurons used for communication (see Figure 1.2). A neuron sends molecules of neurotransmitter across the synapse to another neuron. This communication causes either *excitation* or *inhibition* in the receiving neuron. Excitation occurs when neurotransmitter messages make it more likely that receiving neurons will themselves send the message on to other neurons. As the name suggests, inhibition makes passing the message on less likely to happen. This process occurs in the brain many millions of times every second, resulting in the regulation of thinking and behaviour.

There are many different kinds of neurotransmitters, and research into these substances has told us a great deal about the origins of both normal and abnormal behaviour. For example, reduced levels of the neurotransmitter dopamine lie behind the symptoms of Parkinson's disease, and increasing levels of dopamine can help reduce these symptoms. Increased levels of dopamine are associated with schizophrenia, and antipsychotic drugs can help some individuals by reducing these levels and thus controlling symptoms.

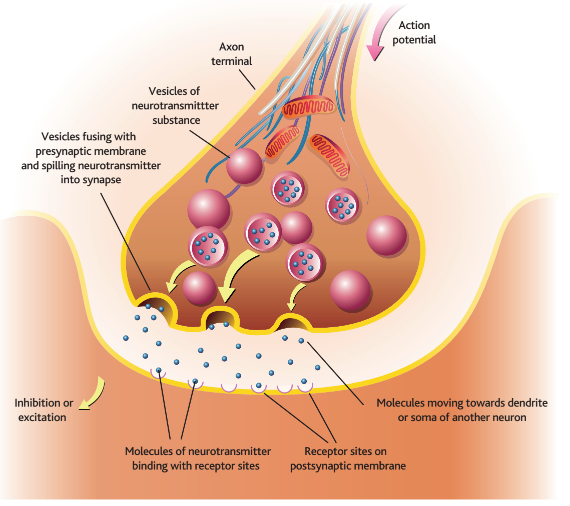


Figure 1.2: Neurons communicate with each other by releasing neurotransmitters into a synapse (a small gap between neurons).

Neurotransmitters are made up of quite simple chemicals and are readily manufactured by the body. For example, acetylcholine is produced from choline-rich foods such as egg yolks and vegetables, serotonin from tryptophan-containing foods like bananas and gamma-aminobutyric acid (GABA) from natural protein foods. Mechanisms in the brain ensure that the amount of neurotransmitter available for use is always, in the normally functioning brain, limited to just the right amount.

NEUROTRANSMITTER	FUNCTION
Dopamine	Increases addictive effects of reinforcement, contributes to control of movement; linked with schizophrenia, Parkinson's disease, addiction.
Serotonin	Associated with mood, eating, arousal (including sleep); linked with depression, aggression, OCD, eating disorders.
Noradrenaline	Increases arousal, attentiveness, sexual behaviour; released as a hormone during stress; linked with depression.
GABA	One of the most widespread neurotransmitters in the brain, it contributes to motor control and helps regulate anxiety.

Table 1.1: Some behaviours associated with neurotransmitters.

Have you ever felt better after a cup of coffee? Lots of things that we eat and drink contain chemicals that affect neurotransmitters. Caffeine, for example, blocks the effects of adenosine, a neurotransmitter that not only makes us sleepy but also influences other major neurotransmitters, such as dopamine, serotonin and noradrenaline – three neurotransmitters closely associated with mood.

EVALUATION OF THE BIOLOGICAL APPROACH

	STRENGTH	WEAKNESS
Scientific research methods can be used	A person's biology can be studied scientifically, so this approach is perhaps the most objective way to investigate human behaviour.	It is not always clear that behaviour is determined solely by a person's biology; it is not always clear whether biology influences psychology or whether psychology influences biology.
The biological approach is reductionist	Lots of research indicates that behaviour can be explained in terms of altered neurochemistry, hormones and changes to brain structure.	Reducing behaviour to biological origins runs the risk of underestimating the importance of things like social and cultural influences on behaviour.
The use of animals in research	Using animals in research to test the effect of altering certain biological systems or processes means that we do not have to do this to humans. It protects individuals from harm but also allows us to develop an understanding of our own biology, and therefore further psychology and medicine.	Although animals do share some similar body systems, it is not known if these systems always work in the same way as they do in humans. Therefore, the findings and conclusions from research on animals may not be generalisable to humans.

This beautifully designed, easy-to-use textbook comprehensively covers everything students need to know for the WJEC AS level specification and offers exam hints and questions to aid study.

- Evaluation of key studies, to encourage reflection and critical analysis, aid understanding and give context
- Explanations of the different psychological approaches and comparisons between them
- Evaluation of contemporary debates, including their economic, social and ethical implications
- Detailed exploration of research methods, including experimental design, research methodologies, analysing and reporting data and dealing with ethical issues

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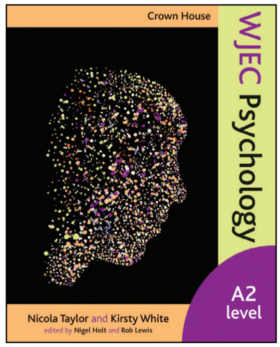
ALSO AVAILABLE



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