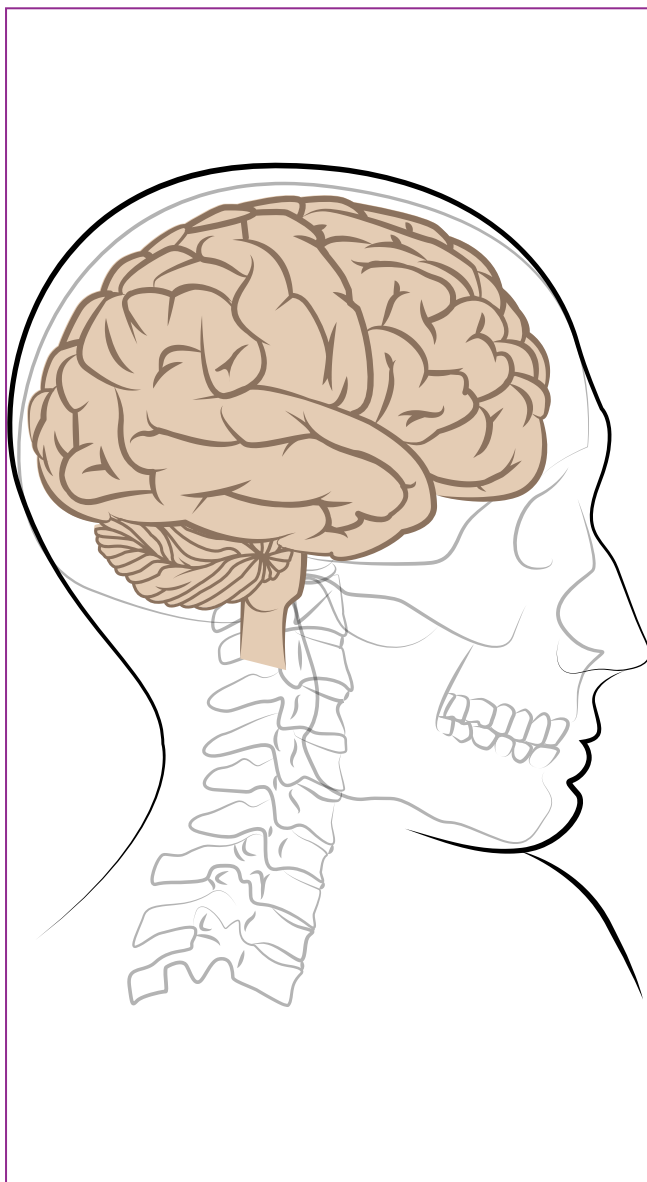


# LESSON 1 UNDERSTANDING THE HUMAN BRAIN

The human brain is an amazing piece of architecture. Weighing in at an average of just 3 pounds, or 1.3kg, our brains have evolved to be the most complex organs on the planet, and they are more organised than the entire cosmos. It is estimated that they contain 100 billion neurons and there are some 100 trillion connections between them. It is perhaps not surprising that studying the brain has been the life's work of so many eminent scientists. Some would argue that given their intricacy, our brains are not even capable of understanding themselves.



## THE BIOLOGY OF THE BRAIN

Although psychologists are primarily concerned with behaviour, an understanding of the biology of the brain and central nervous system can help to unravel why people behave the way they do in given instances. In fact, biological psychology holds that all our behaviours, thoughts and experiences are a direct consequence of activity taking place in our brain. For example, if someone experiences pain because they pick up something hot, they will drop the hot object. This is a simple stimulus and response (or cause and effect) relationship. When this happens nerve pathways in the body pass information to the brain and we act accordingly. Another example is when events inside our bodies cause us to behave in a particular way. For instance, we feel hungry when stores of nutrients are depleted. When this happens, the hypothalamus region of the brain detects changes in hormone levels

### Suggested Tasks: ▼

*Throughout this course you will be provided with suggested tasks and reading to aid with your understanding. These will appear in the right hand column.*

*Remember: these tasks are optional. The more you complete, the more you will learn, but in order to complete the course in 20 hours you will need to manage your time well. We suggest you spend about 10 minutes on each task you attempt, and no more than 20 minutes.*

in the digestive tract and promotes a hunger response. As you can see, much of our behaviour is influenced by our biology and its interactions with the environment.

However, not all causes of behaviour are quite so easy to explain. There are other underlying determinants of behaviour - genetics being one. In fact, we have long known that genetics are a key determinant of how we behave and this can most obviously be seen through studying our nervous systems. Closely linked to genetics is human development. Development is governed by our genes and their interactions with the environment.

As well as linking behaviour to the brain and central nervous system, biological psychology is also concerned with evolution. It suggests that we behave the way we do because of how we have evolved over many thousands of years. Behaviours which were successful can be seen as helping survival and reproduction. Our ancestors developed these types of behaviours whereas others did not and eventually became extinct.

## HOW CAN STUDYING ANIMALS HELP?

Although we consider ourselves to be quite different from other animals there are many similarities. From an evolutionary perspective we have evolved from a simpler life form. We cannot ever be entirely sure how humans evolved but we can use comparisons with animals to try and understand some of our behaviours.

For instance, both humans and animals have some behavioural responses which are regarded as being inbuilt or instinctive. Other animals also display behaviour which can be regarded as intelligent. As such, we can learn a great deal about our own behaviour through comparative studies of animals.

## WHO IS INTERESTED IN THE BRAIN?

As well as biopsychologists, others who are interested in the brain include neuropsychologists, neurologists, neuroscientists, geneticists, psychopharmacologists - in fact many other people in a variety of roles seek to obtain some understanding of the brain, its functioning and its role in behaviour. We'll briefly review some of those now.

### Biopsychology

This is the branch of psychology which is focussed on the relationship between biology and psychology. It is primarily concerned with a) How our thoughts, experiences and behaviour can be linked to brain activity and events in the nervous system, and b) How evolution has impacted on the way we process information. Biopsychology can be broken down into many areas.

### Neuropsychology

This field is concerned with the psychological outcomes of brain damage. Much of the data collected to advance the understanding of this area comes from case studies

## LEARN MORE >>>

### Suggested Tasks

To understand the importance and impact hormones have on the brain, research and read about the effect that insulin has on brain function.

of individuals who have been affected by brain damage through accidents or disease. Brain surgery also provides important insights. Neuropsychologists use a battery of psychological tests to determine deficits to particular brain processes and consequently they can be important in determining effective treatment and management programmes.

## Psychopharmacology

The key focus here is on manipulating the nervous system with medications and thereby altering behaviour. Psychopharmacologists are interested in how medications can be used to alleviate symptoms associated with mental illness and brain damage as well as the impacts of illicit and prescription drugs on the nervous system and how to reduce drug abuse.

## Psychology

Psychologists of all specialties are interested in the workings of the brain. Some may not be so concerned with brain biology because their work is focussed on the here and now of patient problems. Others do take a greater interest in brain biology. In fact, many areas of study in psychology are not isolated from biological psychology. For instance, social psychology and biological psychology are often intertwined in their explanations of behaviour.

## Psychiatry

Psychiatrists are physicians that specialize in the diagnosis and treatment of mental health disorders. They have a similar role to psychologists. Where a psychologist will help patients to find mental strategies to help them deal with mental health issues and problems, a psychiatrist will prescribe medication if they believe it to be in the best interests of the patient. Many psychiatrists also offer some forms of behavioural therapy.

## Cognitive Neuroscience

Aside from biopsychology and neuropsychology, cognitive psychologists and cognitive neuroscientists are particularly interested in models of information processing associated with cognition. Cognition includes higher brain functions such as perception, attention and memory. Memory systems and other cognitive processes are linked to brain biology through recording electrical activity in neurons inside the brain. This is done using non-invasive techniques like MRIs, CT (CAT) scans and electrodes placed on the outside of the skull.

Given that we each have a brain, it's hardly surprising that studying the brain and understanding its impact on behaviour is of interest to all kinds of people - whether for professional or personal reasons. Perhaps the most frustrating thing is that the more you understand, the more questions you are likely to ask and the more you realise that we just don't have all the answers. Some people may be dissuaded by this apparent void in our knowledge, for others it poses a challenge.

# THE MIND-BRAIN PROBLEM

The mind-brain problem, or mind-body problem as it is sometimes called, is an age old one. It refers to the relationship between the physical and the mental and has been debated by philosophers since the times of Plato in ancient Greece. Does the mind influence behaviour or is it the brain and biological processes which determine how we act? Is there some sort of relationship between them? Theories which have been put forward generally fall into the classifications of monism, dualism, and compromises.

## Monism

This is the view that there is only one kind of existence or reality.

**Mentalism (Idealism, Subjective Idealism)** - this view states that only the mental world exists. The physical world is only in existence in our minds, a bit like a dream. Although it is impossible to disprove this view, it is not appealing to scientists.

**Materialism** - this view claims that only the physical world exists. Reductive materialism holds that mental states are the result of physical events.

**Phenomenalism** - this perspective implies that neither the mind nor body are able to be substantiated and so only ideas exist.

Several other forms of monism exist which tend to debate how mind and consciousness may exist as part of

the properties of physical matter but ultimately being the same thing.

## Dualism

This is the view that the mind and the brain are separate entities. Physical and mental substances are fundamentally different.

**Interactionism** - this view holds that although mind and brain are separate they interact and thereby influence each other. The brain could influence mental states and mental states could influence physical events. It emerged from the French philosopher, Descartes. The problem is how can there be a non-physical substance - a mental substance - which controls the brain? Many scientists struggle to accept this could be the case because it defies scientific truths.

**Parallelism (psychophysicalism)** - this is the standpoint that whilst the mind and brain are separate, they are correlated. However, this agreement is predetermined and they do not influence each other. It emerged from the views of the Dutch philosopher, Spinoza. The problem is that should a person experience brain damage e.g. in a car accident, does this mean that this was always going to happen at this precise moment?

## Compromises

These combine some monist and dualist ideas.

**Double aspectism** - this is the view that neither the mind nor the body are