



# TWIN AND ADOPTION STUDIES

Using twins and adoptive families as the subjects of experiments

Biological Approach

## The Nature-Nurture Debate

When we talk about the **nature-nurture debate**, we mean 'nature' as in what people are born with, and 'nurture' is what is learned through interaction with various environments. Therefore nature refers to what is inherited, and nurture refers to what is picked up or learned

A **twin study** can be used to look into the nature-nurture debate. This is because nature is *what we are born with* and what is controlled by our inherited genes. This can be compared to the nurture, i.e. what we develop. There are two types of twin which are studied in the Biological Approach.

**Identical twins** are **monozygotic (MZ twins)**, meaning they come from only one fertilised egg. Their DNA is always 100% shared and so they are also always the same sex. Anything which is totally genetic and is inherited by one twin will also be inherited by the other twin. No characteristic is entirely genetic though, as environment is a depending factor on everything, no matter how small its effect. Features of MZ twins:

- MZ twins do not always share the same environments, even in the womb, so they will develop somewhat differently in certain respects, even though they share 100% of their DNA
- there are a few physical differences between MZ twins, including their different fingerprints
- some genetic characteristics are triggered by environment, and so MZ twins may become less identical over time

**Non-identical twins** are **dizygotic (DZ twins)**, which means they come from two different fertilised eggs. This means that the DNA is never 100% the same, but is only as similar as that of any sibling pair. DZ twins are expected to share an inherited characteristic to only an extent, not as much as MZ twins.

A twin study compares certain characteristics possessed by both MZ and DZ twins. This is to see if it is genes which influence whether or not they share certain characteristics, or environment. If two MZ twins share the same characteristic, but only one DZ twin does (the other doesn't), it is likely to be an inherited characteristic. When two twins share a characteristic, there is said to be a **concordance rate**. For example, if the concordance rate for schizophrenia in MZ twins is 70% then studies have found that of those tested, 70% of MZ twins both developed schizophrenia when one twin had it. Only 30% would have had the condition in only one twin. Concordance rates are studied in both types of twin for things such as schizophrenia, alcoholism, IQ, depression and anorexia.

- ✓ Both MZ and DZ twins are born at the same time and share the same environment, but MZ twins have identical DNA, whereas DZ twins only share 50% so they help to identify how inheritance of genes influence certain characteristics
- ✓ There should not be significant environmental differences with regards to treatment of twins, because generally, most people will treat all twins as twins, not separately
- ✗ MZ twins are the same sex and identical, therefore are more likely to be treated alike than DZ twins
- ✗ Although the variation between MZ and DZ twins are useful for finding differences, but **epigenetic modification** can also have an effect on the findings (this is the term to describe how over time different environmental influences affect which genes are switched on and off)

Because the environment is not the same as their biological parents', **adoption studies** are used studying adopted children in their adoptive families. These are useful because they share their genetic information with their parents, even though the environment is different. This could be used to study, for example, schizophrenia. If a parent of a child has schizophrenia and they are adopted (brought up in another environment) you can study the likelihood of the child having schizophrenia later in life – again, finding out the extreme that genes or environment affect it.

- ✓ Adoption studies are the best way of separating genes from environment so the two can be tested
- ✓ The studies are **longitudinal** and so developmental trends can be identified from them
- ✗ It is possible that the environment of the adoptive families is not as different as it could be from the biological family's
- ✗ Children requiring adoption are often placed with families similar to their own, so the differences are

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Many studies have looked at MZ twins **reared apart** (separated at birth). This is useful for looking at two or more twins which are identical, and share 100% of their DNA, and grow up in separate environments. This is usually down to adoptions, where an adoptive parent(s) do not want all twins.

When two twins are identical and brought up in separate environments, we can draw conclusions based on whether or not they share characteristics. For example, when the twins share one certain characteristic, it is most likely going to be down to a genetic basis, because they are still growing up in separate environments. When they don't share a characteristic, but only one twin does have it, it will be most likely down to the environment they are growing up in.

- ✓ Environmental conditions are controlled, and because their environments are controlled to be different, reliable conclusions can be drawn stating if concordance is more likely down to genes or environment
- ✗ Not many MZ twins are reared apart, so the number of studies which can be conducted of this type are minimal and so the conclusions may not be as strong as they could be

Mega Lecture