

# Psychology GCSE

## Course plan

The course plan below shows the structure of the course and gives an outline of the contents. A sample from the course follows.

### Getting Started

Introduction

GCSE Psychology Course guide

### Introduction to psychology

Topic 1 Are we all psychologists?

Topic 2 Psychology as a science

### Section 1 Research methods Part A

**Topic 1 Asking questions - developing a hypothesis**

Topic 2 Selecting participants

Topic 3 Ethics in psychological research

Topic 4 Describing and evaluating experiments

Assignment 1

### Section 2 Memory

Topic 1 Processes of memory - encoding, storage and retrieval

Topic 2 Structures of memory

Topic 3 Memory as an active process

Assignment 2

## Section 3 Perception

- Topic 1 Sensation and perception
- Topic 2 Visual cues and constancies
- Topic 3 Gibson's direct theory of perception
- Topic 4 Gregory's constructivist theory of perception
- Topic 5 Visual illusions
- Topic 6 Factors affecting perception
- Assignment 3

## Section 4 Development

- Topic 1 Cognitive development
- Topic 2 Learning and development
- Assignment 4

## Section 5 Research methods Part B

- Topic 1 Research procedures
- Topic 2 Data handling
- Assignment 5

## Section 6 Social influence

- Topic 1 Conformity
- Topic 2 Obedience
- Topic 3 Prosocial and antisocial behaviour
- Assignment 6

## Section 7 Language, thought and communication

- Topic 1 Language and thought
- Topic 2 Human and animal communication
- Topic 3 Non-verbal communication
- Assignment 7

## Section 8 Brain and neuropsychology

Topic 1 The nervous system

Topic 2 The brain

Topic 3 Neuropsychology

Assignment 8

## Section 9 Psychological problems

Topic 1 Introducing mental health

Topic 2 Depression

Topic 3 Addiction

Assignment 9

(Topics from Section 4 to Section 9 are subject to change.)

## Sample of the GCSE Psychology Course from Section 1

### Topic 1

# Asking questions – developing a hypothesis

## Introduction

To understand psychology and psychological research, it is important to understand research methods. In this topic we will look more at psychology as a science and at the research methods used to investigate human behaviour.



You will probably need 3 hours to complete this topic.

## Objectives

When you have completed this topic you should be able to:

- explain what is meant by an experiment
- list the main features of experiments
- explain how to formulate a testable hypothesis
- describe what is meant by a null hypothesis
- describe what is meant by an alternative or experimental hypothesis
- explain how we select participants for research studies.

## Features of psychological research

When we are deciding what to study in psychology, we will first have a **theory**. A theory is an idea, a suggestion for behaviour. To test this theory, psychologists will carry out research with the intention of proving or disproving the theory. To test a theory, we have to be very clear about what we are testing.

Most psychological research starts with an **aim**. The aim is to explain the purpose of the study.

For example an aim may be: 'To investigate whether noise affects recall.'

We then need to turn the aim into a **hypothesis**, a testable statement that can be investigated.

Once we have a hypothesis, we can conduct an **experiment**. Simply put, an experiment is a test of a hypothesis. Experiments provide a systematic way of studying the world around us.

The key features of an experiment in psychology are:

- control over variables
- careful measurement of any reaction
- establishing a cause and effect relationship.

The person carrying out the experiment is called the **experimenter**.

There are three main parts to carrying out psychological research:

- the *variables* – anything that can change within an experiment
- the *hypothesis* – in an experiment, a testable statement that one thing will cause another to happen
- the *participants* – the experimenter needs people to take part in the experiment (some psychologists conduct their experiments on animals but most research is done with human participants).

We cannot really decide on the hypothesis until we understand what we are measuring – the variables.

### The variables

In research, we aim to identify the cause and effect of any behaviour. To do this, we look at the factors we think are affecting the person's behaviour and also measure the effect of that behaviour.

A variable is something that alters or can be changed in an experiment.

There are different kinds of variable. We will look at these next.

## Independent variables and dependent variables

The variable that is deliberately changed by the experimenter is called the **independent variable (IV)**. The variable that is measured is called the **dependent variable (DV)**.

In an experiment, the independent variable is deliberately changed to discover whether it has an effect on the dependent variable.

The independent variable (IV) is the thing that we suspect is affecting a person's behaviour. It is the variable you can manipulate in an experiment.

The dependent variable (DV) is what we are measuring.

To test whether the IV affects the DV, a researcher places participants into different **conditions**. Sometimes the condition is known as the group.

Here's a simple example.

I want to know whether people drink more quickly if they have a red cup or a blue cup. The people who have the red cup will be in condition A. The people who have the blue cup will be in condition B. If the experimenter used the term 'group' instead of 'condition', they would say Group A and Group B.

So I conduct an experiment where people are given a drink in either a red cup or a blue cup. I record the time they spend drinking.

My IV is what I am manipulating – the colour of the cups.

My DV is what I am measuring – how long people take to drink their drinks.

### Activity 1

(Allow 5 minutes)

I have a theory that having an audience will make people throw balls into a hoop better than if they have no audience. I devise an experiment. One group throws 20 balls each into the hoop. I record their scores. They do this alone. The other group throws 20 balls each into a hoop, but they do this in front of an audience of 100 people. I record their scores. What is the IV and what is the DV in this experiment?

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The IV is what is being manipulated – so whether there is an audience or not.

The DV is what is being measured – how many balls go into the hoops.

We can look at this more simply as it can be difficult to understand.

The IV is what you are manipulating. It is the thing that causes a change in the outcome or result.

The DV is what you are measuring.

For example, if you are measuring the effect of watching violent television programmes on aggression levels, your IV will be violent television programmes as this is what you are manipulating – watching violent or non-violent television programmes. Your DV will be aggression, as this is what you are measuring.

Here's another example – are men or women better drivers?

The IV (what you are manipulating) is the gender of the driver – male or female.

The DV is their driving ability.

### **Study hint**

A variable is something that alters or can be changed.

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## **Activity 2**

(Allow 5 minutes)

I conduct a memory experiment to see whether distraction affects recall. Participants are given a list of ten items.

Group 1 is given the list, then they have one minute of silence, then they have to recall the list.

Group 2 is given the list, then they are asked to write down their times tables for one minute, then they are asked to recall the list.

What is the IV and what is the DV?

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The IV is what is being manipulated – so whether the participants are distracted or not during the minute before recall. The DV is what is being measured – so how much they recall.

### Activity 3

(Allow 10 minutes)

How will we know if the IV has an effect on the DV in this experiment?

We are measuring the DV twice, once in condition A and once in condition B. If the IV has an effect on the DV we will find a difference between the results of the two conditions. In other words, there will be a difference in the number of words recalled by participants in the two conditions of the experiment.

### Controlling the variables

When you are conducting an experiment, the only variable that should change between the two conditions is the IV. All other variables should be controlled. They need to be kept the same (constant) between the two conditions.

### Extraneous variables

Other variables that could affect the DV if they are not controlled are called **extraneous variables**.

Supposing we carried out a study on alcohol and driving performance. We found that the average number of mistakes made in the no alcohol condition was 7, and the average number of mistakes in the alcohol condition was 21.

### Activity 4

(Allow 5 minutes)

What could we conclude from these results?

We would conclude that alcohol has an effect on driving performance (it made it worse).



## Activity 5

(Allow 5 minutes)

However, we then found out that when people took the driving test in the alcohol condition, the car had a flat tyre. Why would this be a problem in interpreting the results?

Because of the flat tyre, we would not know whether the difference in driving performance was due to the IV (amount of alcohol) or whether it was due to the other variable, the state of the tyre. We could not now claim with certainty that alcohol alone affected driving performance. So the flat tyre is an example of an extraneous variable.

## Activity 6

(Allow 5 minutes)

What other extraneous variables do you think we should control in this experiment?

You might have thought of some of these extraneous variables that should be controlled:

- we should make sure that the same car is used in both conditions
- the test should be the same in both conditions (or equally difficult)
- the weather should be the same for the two conditions.

We are not suggesting we can control the weather – what is important is that one condition (for example, no alcohol) is not carried out when it is dry and the other condition carried out when it is raining. If this were the case, we could not be sure whether any difference between the two conditions was due to the alcohol or due to the weather. This extraneous variable could have affected the results.

For example, look at Table 1.1.

Table 1.1 Results of experiment when two conditions are carried out under different weather conditions

Condition A	Condition B
No alcohol	Alcohol
Dry weather	Wet weather
Average 7 mistakes	Average 21 mistakes

As you can see, there are more mistakes with alcohol, but also when it is wet. We cannot be sure what caused the higher number of mistakes.

## Activity 7

(Allow 5 minutes)

Think back to the memory experiment in Activity 2. We have already identified the two conditions. Can you suggest any variables that need to be controlled?

Some examples of variables that need to be controlled are:

- time allowed to learn the list
- time allowed to recall the list
- time between learning and recall
- number of words in each list
- length and complexity of the words
- the way the participants are treated by the experimenter.

Another variable that needs to be controlled is the environment.

## Environmental variables

The place where the experiment is carried out can also be important. For example, in the memory test in Activity 2, if participants in Group 1 learn the list of familiar words and recall them in a quiet, well-lit room that has a comfortable temperature, but participants in Group 2 learn the list in a noisy room that is too hot or cold and badly lit, you would have a number of possible extraneous variables.

## Activity 8

(Allow 5 minutes)

How would you control these environmental variables?

**Environmental variables** are controlled by making sure that all participants perform all trials in the same environment (if possible). So variables such as background noise, temperature and lighting must be controlled.

## Experimenter effect

The **experimenter effect** is also a variable. Two or more experimenters are sometimes involved in an experiment. Each experimenter may treat participants differently. For example, one experimenter may help participants to relax, while another may make them feel nervous. This difference could affect how participants perform. This effect, called the experimenter effect, could then become an extraneous variable.

## Activity 9

(Allow 5 minutes)

Suggest how you could avoid the experimenter effect.

The best way to avoid the experimenter effect is to have standardised procedures so that all participants are treated the same. This would include a set of standardised instructions to be used by all experimenters with all participants. However, even with only one experimenter, there may be experimenter effects.

### Study hint

If you ever need to make a report of an experiment you have carried out, you will need to explain how you designed the experiment. Identify the IV and DV as well as any important extraneous variables that have been controlled, including how they have been controlled. For example, 'environmental variables were

controlled by having all participants perform the experiment in the same room at the same time of day'.

## Controlling the experiment

The experiment – again like all the other scientific techniques – involves observing what is going on. In an experiment, however, the experimenter not only observes, but also actively controls what is happening to the participants. The experimenter is not just passively observing something that is occurring naturally; they are manipulating or changing the factor being investigated to see what its effect is on the participants' behaviour or performance.

In our example from Activity 2, we would manipulate the factor of noise to see its effect on people's concentration, measured by giving them a list to recall. You might think that this is a rather artificial situation, but experiments are always artificial to some extent. In other words, they can be said to lack **ecological validity**.

Ecological validity is the extent to which the findings from research can be generalised to the real world.

For example, you want to know if people become anxious when they see a car accident because anxiety is thought to affect what we recall as a witness. You ask people to watch a cartoon of a car crash and record their anxiety levels. This experiment would lack ecological validity, because in the real world the participants would not be seeing a cartoon of a car accident, but real people and real cars, so their anxiety levels would probably be different.

## The hypothesis

We've looked at the independent variable (IV) and the dependent variable (DV) in research. We need these to develop our hypothesis.

The plural of hypothesis is *hypotheses*.

A hypothesis is a testable statement of what researchers predict will be the outcome of a study or experiment. It is usually written in the form of a statement rather than a question. For example, I might have a question: does noise interfere with learning? If I wanted to write this as a hypothesis, it would normally be written as 'Noise will interfere with learning'. I will then conduct an experiment to test whether noise interferes with learning or not.

For example, there may be two groups of children. Group 1 are asked to sit in a quiet room and learn a poem. Group 2 are asked to sit in a room with loud music playing and learn the same poem.

I would then check whether Group 1 or Group 2 recalled the poem better. If I found that Group 1 (silence group) learnt the poem better, I would have shown that my hypothesis was correct. If I found that Group 2 (loud music) learnt the poem better, this would have disproved my hypothesis.

In research, the hypothesis is usually written in two forms:

- the null hypothesis
- the alternative hypothesis (this is called the **experimental hypothesis** if we are carrying out an experiment).

## Null hypothesis

The null hypothesis will state that there is no relationship between two variables, so one variable does not affect the other. So, going back to our hypothesis that noise will affect learning, we might have a null hypothesis of:

There will be no significant difference in the amount of the poem recalled between the silent group and the loud music group.

or

There will be no significant difference in the amount of the poem recalled whether noise is present or not.

So, this hypothesis suggests that any differences found between the silent group and the noise group will be due to chance and nothing to do with whether they are in the silent or noise group.

## The alternative/experimental hypothesis

The alternative (or experimental) hypothesis states that there is a relationship between the two variables and that any results are not due to chance. So, with our experiment on noise and recall, if one group learns more of the poem than the other group, this has to be affected by the silence or noise, it won't be due to chance.

So, the noise or lack of noise will have an impact on learning of the poem.

The alternative hypothesis might therefore be:

Noise will affect the amount of the poem recalled by participants.

## Why do we need the null hypothesis?

We can never prove the alternative/experimental hypothesis 100 per cent. We can instead try to disprove or reject the null

hypothesis. If we can't reject the null hypothesis, it doesn't mean the alternative hypothesis is correct, but it does provide more support for the alternative/experimental hypothesis.

## Writing a null hypothesis or an alternative/experimental hypothesis

A good hypothesis is short and clear. It should also be **operationalised**.

To write a null hypothesis or an alternative/experimental hypothesis, we need to know the key variables in the study.

A variable is operationalised when it is turned into something that we can measure. For example, memory is a variable, but it is easy to measure. We could ask how many items on a list a participant can remember ten minutes later – this would be operationalising memory as we are specifically measuring something.

Aggression might be a variable, but it is difficult to measure. So, we might say that we are going to measure how many aggressive acts a person performs in a one-hour period.

Suppose we want to know whether students work better in the day or the night.

Our IV (what we are manipulating) is when the students study – day or night.

Our DV (what we are measuring) is their standard of work.

We set up an experiment where we ask the students to study for one hour at night or one hour during the day. After they have studied, we test their immediate recall of the information they have learnt. So we have operationalised this because we are able to measure what they have learnt by how much they have recalled.

The experimental hypothesis (remember, in an experiment the alternative hypothesis is called the experimental hypothesis) will state that students will recall significantly more information during the day than at night.

The null hypothesis will state that there is no significant difference between the information recalled during the day or at night. Any difference will be due to chance or other factors.

## Self check

(Allow 15 minutes)

- 1 The variable we are measuring in an experiment is known as:
  - (a) the dependent variable (DV)
  - (b) the independent variable (IV)
- 2 The independent variable is the factor we suspect is affecting a person's behaviour.  
True/False
- 3 Seeing greenery is thought to improve concentration and mood. I conduct an experiment to see whether studying near trees improves a person's mood. I ask 10 people to study all day in a room facing a brick wall. I ask another 10 people to study all day in a room with lots of windows and views of trees. At the end of the day I ask all participants to answer one question: 'How happy do you feel now?' 10 is very happy and 1 is very unhappy.  
What is the IV for this experiment?  
What is the DV for this experiment?
- 4 What is a hypothesis?
  - (a) a testable statement
  - (b) an aim

You will find feedback to self checks at the end of the section.

## Summary

- In research, we use our aim to develop a null hypothesis and an alternative/experimental hypothesis.
- Because we can never prove the alternative/experimental hypothesis totally, instead we try to disprove or reject the null hypothesis.
- We determine the independent variable or IV (what we are manipulating in our research) and the dependent variable or DV (what we are measuring).
- In an experiment, the only variable that should change is the IV. Extraneous variables including environmental variables and the experimenter effect must be controlled.

- A variable is operationalised when it is turned into something that we can measure.

## Key terms

**aim:** the purpose of a study

**alternative hypothesis:** states there is a relationship between the two variables being studied in research – if the study is an experiment, it is known as an experimental hypothesis

**condition:** participants in a psychological experiment are placed into separate groups or conditions to test how the IV affects the DV

**dependent variable (DV):** in an experiment, the variable that might be affected by the manipulation of an independent variable

**ecological validity:** being relevant to real-life situations

**environmental variable:** factor to do with surroundings that can interfere with an experiment, such as heating, lighting and background noise

**experiment:** test of a hypothesis

**experimental hypothesis:** states there is a relationship between the two variables being studied in an experiment – if the study is not an experiment, it is known as the alternative hypothesis

**experimenter effect:** where more than one experimenter is used in an experiment, there may be variations in the way they treat participants; even the same experimenter can treat different participants in different ways (the experimenter effect can be reduced or controlled by using standardised procedures)

**extraneous variable (EV):** variable other than the IV that could affect the DV, such as noise, overcrowding, environmental conditions

**group:** participants in a psychological experiment are placed into separate groups or conditions to test how the IV affects the DV

**hypothesis:** testable, predictive statement made at the beginning of an investigation

**independent variable (IV):** variable that is deliberately changed or manipulated in an experiment in order to see what effect it has on a dependent variable

**null hypothesis:** states there is no relationship between the two variables being studied, so one variable does not affect the other

**operationalised:** measurable, a variable is operationalised when it can be measured



**participant:** person/animal taking part in an experiment or psychological study

**theory:** idea or suggestion for someone's behaviour



## What next?

We hope this sample has helped you to decide whether this course is right for you.

If you have any further questions, please do not hesitate to contact us using the details below.

### **If you are ready to enrol, you have different options:**

- **enrol online** – for many courses you can enrol online through our website. Just choose your course, click 'enrol now' and then checkout
- **enrol by telephone** – just call our course advice team free on 0800 389 2839 and we can take your details over the telephone
- **pay in full** – you can pay in full with a credit or debit card
- **pay in instalments** – if spreading the cost would be useful, we can arrange that for you. Just call our course advice team to organise this.

## Contact us

There are many ways to get in touch if you have any more questions.

**Freephone:** 0800 389 2839

**Email us:** [info@nec.ac.uk](mailto:info@nec.ac.uk)

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