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Glossary

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Psychologists are interested in many different areas of study, from child development to psychological problems, from investigating the brain to investigating the mind, from focusing on the past to looking at current patterns of behaviour. However, whatever their area of interest, psychologists approach research in a similar way, following certain procedures. These procedures can be divided into three main stages of investigation: planning, doing and analysing research.

### Planning Research

Before psychologists carry out their research, there are certain planning decisions to make, including what they are interested in studying. For example, a psychologist may be interested in what causes stress in people.

#### Hypotheses

There are two main types of hypothesis: an **alternative hypothesis** and a **null hypothesis**. An alternative hypothesis predicts a pattern in results; whether that is a difference or a correlation. To predict a difference, a psychologist needs to set up at least two conditions or compare at least two groups. For example, they could measure participants’ stress levels under noisy conditions and then under silent conditions. The psychologist’s alternative hypothesis could be:

*There will be a significant difference between the heart rates of participants when tested under noisy conditions compared to when tested under silent conditions.*

#### Study Hints

- **STUDY HINT**
  - If you are asked to write a hypothesis, try to be specific about how a variable is measured. Note how this statement refers to heart rates rather than stress in general.

#### Key terms

- **Hypothesis**: A statement predicting the findings of research before it is carried out.
- **Alternative hypothesis**: A statement that predicts a difference or correlation in findings.
- **Null hypothesis**: A statement that predicts no difference or correlation in findings.

#### Study Hints

Study Hints are given throughout to aid understanding.
In a different example, a psychologist could compare the stress levels of people who work in noisy workplaces and people who work in quiet workplaces.

The alternative hypothesis could be:
‘There will be a significant difference in the stress levels that people report, depending on whether they work in a noisy or a quiet workplace.’

Rather than predicting a difference, the psychologist could predict a correlation between two variables.

In this case, the psychologist’s alternative hypothesis could be:
‘There will be a correlation between how loud a sound is and how stressed participants rate themselves on a scale of 1 to 10.’

A null hypothesis is the ‘opposite’ of an alternative hypothesis because it predicts no pattern or trend in results. Put simply, it predicts no difference or correlation. This means that in a piece of research, either the null or alternative hypothesis will be supported. The psychologist’s job is to find out which hypothesis is correct, and reject the one that is not supported.

Using the alternative hypotheses from earlier, the psychologist’s null hypotheses would be:
‘There will be no significant difference between the heart rates of participants when tested under noisy conditions compared to when tested under silent conditions.’

and
‘There will not be a correlation between how loud a sound is played and how stressed participants rate themselves on a scale of 1 to 10.’

**STUDY HINT**

Start your hypothesis with ‘There will be’, and decide whether you are predicting a correlation or a difference. Then describe the variables and make your prediction. When predicting a difference, write the DV before the IV. The order does not matter for correlation predictions.

**STUDY HINT**

Thinking of the word ‘nil’ might help you remember what a null hypothesis is. It predicts no pattern.

**STUDY HINT**

If you are asked to write a hypothesis in the exam, check to see if you are asked to make a null or an alternative hypothesis. If you write the wrong type, you could end up with no marks even if it is really well constructed.

**DIY**

Carry out a piece of research to investigate which of the following hypotheses should be rejected.

Null hypothesis: ‘There will be no difference in the speed at which participants complete a task under noisy and under quiet conditions.’

Alternative hypothesis: ‘There will be a difference in the speed at which participants complete a task under noisy and quiet conditions.’

What is the task going to be? How will you set up the noisy and quiet conditions? What controls will you put into place?

**Check your understanding**

1. What is a hypothesis?
2. What two patterns can an alternative hypothesis predict?
3. What is the difference between a null hypothesis and an alternative hypothesis?

**Extension**

All of the examples of alternative hypotheses given in this section are non-directional. However, often psychologists can predict the direction of their results. What would the alternative hypotheses look like if they were directional?

**Challenge**

1. Put these words in order to form a hypothesis: ‘no in skills men women be of and will difference there the driving’
2. Write a null hypothesis for the following alternative hypothesis. ‘There will be a correlation between time spent in revising and score in a spelling test.’
3. You have been asked to investigate whether height affects how sociable people are. Write a null and an alternative hypothesis for this investigation.
Independent variable
Something the researcher changes or manipulates.

Dependent variable
Something that is measured to see if it has changed (after an independent variable has been manipulated).

Co-variable
Something that changes in relation to another variable.

Extraneous variable
A variable, apart from the independent variable, that can affect the dependent variable (unless it is controlled).

Standardisation
A way of controlling extraneous variables, keeping them the same across conditions.

Variables
Research often deals with variables; variables are anything that can change. Making changes or testing for changes is how psychologists and other scientists work out the cause of something, for example, the cause of stress.
Hypotheses that predict a difference contain two key variables: the independent variable (IV) and the dependent variable (DV). The IV is often made up of the two conditions or two groups (e.g. working in a group or working alone). This is what researchers manipulate (e.g. they make participants work in a group and then by themselves). They do this to see whether it has an effect on the DV. Therefore they measure, rather than manipulate, the dependent variable.

Think about it this way: a psychologist will predict that if they do ‘so and so’ then ‘such and such’ will happen. The ‘so and so’ is the IV (the thing the psychologist does). The ‘such and such’ is the DV (what the psychologist predicts).

When researchers predict a correlation, there are no IVs and DVs. This is because correlations do not show cause and effect. Instead, they measure two co-variables to see if there is a relationship between them. For example, a psychologist may investigate whether there is a correlation between people’s blood pressure and anxiety levels. Here, both blood pressure and anxiety levels are co-variables.

The best method to establish whether one variable affects another is to do an experiment. This is because in natural situations it is difficult to isolate a variable and state that it is definitely the cause of something else. Experiments allow psychologists to have control over extraneous variables.

For more information on experiments see page 5

Imagine a psychologist wants to investigate whether working in a noisy workplace causes more stress to workers than working in a quiet workplace. Although the IV is whether the workplace is noisy or quiet, there are lots of other things that could change (or differ) between the workplaces that could affect stress levels of workers, for example, the nature of their work, how many hours they have to work per day, what their manager is like and so on. All of these factors are extraneous variables. A common way to control extraneous variables is to keep them the same across conditions; this is known as standardisation. In the previous example, the psychologist could try to find two workplaces where the same type of work is done for the same number of hours per day. However other extraneous variables may be difficult to control, for example, making sure that managers have the same personality or style.

Check your understanding
1. What is the difference between an IV and a DV?
2. Why do experiments have IVs and DVs?
3. What kind of investigation uses co-variables?
4. What is meant by the term ‘extraneous variable’?
5. How can standardisation be used to control extraneous variables?
Experimental designs

Before a psychologist carries out an experiment, they need to decide on an experimental design. An experimental design refers to how participants are allocated experimental conditions. Many experiments have two conditions, for example, a researcher might be testing whether participants perform better when they are put in a crisis situation or in a calm situation. In terms of experimental design, the psychologist has two main options. The first option is to test all of the participants under both conditions; this is what is known as a repeated measures design. In other words, they would measure participants under one condition and then repeat the test under the other condition, for example, under both calm and crisis conditions. The alternative to this is to test some participants in the calm condition and then the remaining participants in the crisis condition. The researcher could do this by randomly allocating each participant one of the two conditions, or by alternating between the two. The main point is that each condition will have a distinct set of participants. This is known as an independent measures design. The participants in one condition are independent from the participants in the other.

Sometimes a psychologist will not have a choice of experimental designs. For example, if they are comparing people with a mental illness and people without, then this has to be independent measures design. A psychologist cannot randomly allocate people to one condition or the other. Where psychologists do have a choice, it is not straightforward; one experimental design is not better than another. In fact, as the table on page 6 shows, the advantages of one tend to be the disadvantages of the other.

STUDY HINT

If you are asked to identify an extraneous variable, look at the DV and ask yourself what could have an effect on it. However, make sure you don’t come up with the IV! Ask yourself whether it is possible to standardise it or not.

Challenge

Imagine you wanted to carry out an experiment where you test a group of people who have had 8 hours of sleep to compare their ability to solve problems with a group of people who have had 4 hours of sleep.

List the extraneous variables you would want to control and outline how you would control each one. State how many of your controls use standardisation.

DIY

Carry out an experiment to test how many words from a list your participants can recall. The IV is whether the words are listed with or without images. The DV is how many words your participants can recall. As part of your planning, identify any potential extraneous variables and describe how you could control these.

Experimental design

The way participants are allocated experimental conditions in an experiment.

Repeated measures design

An experimental design where participants take part in each condition.

Independent measures design

An experimental design where participants are different in each condition.
STUDY HINT
It is not unusual for students to muddle up experiments with experimental designs. Look out for the word ‘design’ to remind you that you should be thinking about how an experiment is designed in terms of its participants and conditions.

Table 1: The strengths and weaknesses of two experimental designs

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repeated measures design</td>
<td>☐ Comparing ‘like with like’ so differences are not due to individual differences between participants.</td>
</tr>
<tr>
<td></td>
<td>☐ Fewer participants need to be recruited, saving time and money.</td>
</tr>
<tr>
<td></td>
<td>☐ Participants may perform worse on the second condition due to the boredom or fatigue effect.</td>
</tr>
<tr>
<td></td>
<td>☐ Participants may perform better on the second condition due to the practice effect.</td>
</tr>
<tr>
<td></td>
<td>☐ Participants may work out the independent variable and change their behaviour accordingly (the effect of demand characteristics).</td>
</tr>
<tr>
<td></td>
<td>☐ The task may need to be changed between conditions, making it an extraneous variable.</td>
</tr>
<tr>
<td>Independent measures design</td>
<td>☐ No order effects (boredom/fatigue effect, practice effect, demand characteristics).</td>
</tr>
<tr>
<td></td>
<td>☐ The same task can be used in both conditions because participants will not be familiar with it.</td>
</tr>
<tr>
<td></td>
<td>☐ Differences between conditions could be due to participant variables.</td>
</tr>
<tr>
<td></td>
<td>☐ Potentially, more participants need to be recruited as they cannot be used more than once per condition.</td>
</tr>
</tbody>
</table>

Challenge
Consider the strengths and weaknesses of the two experimental designs. Can you apply each one to an experiment where participants are tested on their task performance under crisis and calm conditions? For example, in a repeated measures design, the participants could get better at the task with practice.

Extension
The problem of order effects can be reduced when using a repeated measures design if a technique called counterbalancing is used. Investigate what this type of control is. Explain how it would address the issue of order effects in an experiment where crisis and calm conditions are compared.

Check your understanding
1. What is meant by the term ‘experimental design’?
2. What is the difference between a repeated measures design and an independent measures design?
3. What advantages does an independent measures design have over a repeated measures design?
4. What advantages does a repeated measures design have over an independent measures design?
Populations and sampling

As part of their planning, psychologists have to decide who they are going to do their research on. These people are called participants, but as a group they can also be called a sample. A sample is a smaller group drawn from a target population. A target population is everyone that a psychologist is interested in investigating. Sometimes this may be all human beings (as with human memory) or may be more specific, such as children (as with cognitive development) or criminals (as with criminal behaviour).

STUDY HINT
The word sample is used outside of psychology to mean a similar thing. For example, if you sampled a new food product in a supermarket, you would be trying a small bit of it. Hopefully it would tell you what the rest of the product was like; in other words, it would be representative.

Ideally, a sample would be representative of its target population. This means the participants who make up the sample will be a good cross-section of the population, because they represent a range of characteristics, such as gender, age and personality. When a sample is representative it means that research findings have more generalisability. In other words, if a psychologist has a representative sample of adults and finds that most are caused more stress by their home life than their work life, then they can generalise and suggest that this is true of the rest of the adult population.

Sometimes samples are not very representative because of a bias in the sample. For example, if a target population contained both genders (as most do) then a sample made up of only men could be described as unrepresentative. In these circumstances, it would be difficult to make generalisations.

The larger the sample, the more representative of the target population it is likely to be. For example, if a psychologist studies 500 people from a population of 1000, it will be easier to make generalisations about the other 500. Very small samples are often accused of being unrepresentative.

There are a number of methods that psychologists can use to select a sample. Three key methods are random sampling, opportunity sampling and self-selected sampling.

Something to think about
Are large samples always better than small samples? Think about that example again. If the sample of 500 contained no women but the sample of 50 contained both genders, which sample would be more representative?

STUDY HINT
When evaluating sampling methods, try to use the words ‘representative,’ ‘generalise’ and ‘bias’. Appropriate use of psychological terms can sometimes get you higher marks in the exam, and is better than writing things like ‘it applies to other people’ or ‘it is not a fair sample’.

Target population
The entire a set of people psychologists want to research.

Sample
A group selected from a larger population.

Generalisability
The ability to draw conclusions that apply to a larger group.

Bias
When certain types of people are over-represented while others are under-represented.
**Random sample**
A sample selected using chance.

**Opportunity sample**
A sample selected by convenience.

**Self-selected sample**
A sample selected through volunteers.

**STUDY HINT**
There are many other sampling methods used by psychologists, but only the three listed are on the OCR specification. This means these are the only ones that you can be asked about in the exam. However, when you are asked to design your own investigation in the exam, you can get credit for writing about other methods that you may know about from elsewhere.

**STUDY HINT**
In the exam, make sure you can distinguish between questions that ask you to describe or define a sampling method, and those that ask you how a particular sampling method could be carried out.

**STUDY HINT**
Students sometimes say things like ‘random sampling is grabbing whoever is around’. Although this sounds quite ‘random’, you now know it is not. ‘Grabbing whoever’ sounds much more like opportunity sampling. Random sampling is much more technical than this.

### Calculations
Copy out the following table. Calculate the percentage of the target population represented in each sample. The first one is done for you.

<table>
<thead>
<tr>
<th>Target Population (N)</th>
<th>Sample (n)</th>
<th>Calculations</th>
<th>Percentage of population in sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000</td>
<td>100</td>
<td>100/1000 x 100</td>
<td>10%</td>
</tr>
<tr>
<td>200</td>
<td>40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13755</td>
<td>60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>677</td>
<td>50</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Decide which sample is most likely to give a representative sample. Justify your answer.

### Sample strengths and weaknesses
One strength of **random sampling** compared to the other two methods is that it is very likely to give a representative sample. This is because there is no bias in the selection and it is left to chance. Most types of people will be represented in the right proportions. However, there is a small chance of a freak sample where certain types of people are over-represented and others are under-represented or missing from the sample.

One strength of **opportunity sampling** is that it is quick and convenient, particularly when you compare it with random sampling, which takes some effort to set up. However, a weakness is that it tends to be biased (and unrepresentative) for a number of reasons. For example, studying people who live close by may result in a group of similar people, in terms of age, education, ethnic group or social class.

One strength of **self-selected sampling** is that the psychologist does not have to put much effort into finding participants as they volunteer themselves. The psychologist can also be sure that they have the full consent of the participants as they’ve come forward willingly. However, a weakness is that it tends to be biased as certain types of people are more likely to volunteer to take part in psychological research and therefore will be over-represented in the sample.

### Check your understanding
1. What is meant by the term ‘sample’?
2. What is meant by the term ‘target population’?
3. What is the link between representativeness and generalisability?
4. Define the following sample methods.
   - random sampling
   - opportunity sampling
   - self-selected sampling
5. Identify a strength and a weakness of each of the sampling methods listed in Question 4.
Challenge

Copy and complete the table below by filling in the last column using the examples listed here:
- Putting the names of a target population into a hat and drawing out the required number for the sample.
- Using family or friends because the researcher has regular contact with them.
- Using random number generator software and choosing people whose numbers correspond to those selected.
- Advertising for participants (e.g. in a magazine or newspaper, through posters on a university campus).
- Using people that are in the vicinity, for example, university students, work colleagues or local residents.
- Posting a survey online to see who will respond.

<table>
<thead>
<tr>
<th>Name of method</th>
<th>Definition</th>
<th>How it could be done</th>
</tr>
</thead>
<tbody>
<tr>
<td>Random</td>
<td>Where everyone in the target population has an equal chance of being selected.</td>
<td></td>
</tr>
<tr>
<td>Opportunity</td>
<td>Where participants are chosen because they are easily available.</td>
<td></td>
</tr>
<tr>
<td>Self-selected</td>
<td>Where participants nominate themselves for a study without being directly approached.</td>
<td></td>
</tr>
</tbody>
</table>

DIY

Use your classmates to test how often random sampling gives a representative sample compared to a freak sample.

Your classmates are the target population, so first you need to choose three or four characteristics that you can use to divide them up, (for example: gender, month they were born, tutor group or what area they live in) and record these. Find out the percentage of each characteristic, for example, females to males may be 60% and 40%.

Now, write your classmates’ names and the groups they belong to on separate pieces of paper. Put all of these names into a container and draw out half of them so that your sample is 50% of the target population. Analyse how well the different groups are represented.

Carry out this test at least five times. Remember to put the names back in each time!

What conclusions can you draw? Do you tend to get a representative sample most of the time? How common are freak samples?

STUDY HINT

In the exam, you may have to evaluate a sample that a psychologist has used. The strengths and weaknesses you have learned about here would be your starting point but you will also earn marks by applying them to the particular study being referred to. For example, as well as saying that an opportunity sample tends to biased, you will need to look at study to see what types of people were selected and how that would impact on the findings specifically.

Extension

Review the samples used in core studies that you have learned about so far. See if you can rank them from the most representative samples to the least. Justify the decisions that you make.

Something to think about

What types of people do you think are more or less likely to be in a self-selected sample and why?
**Ethical guidelines**

Recommendations that consider the welfare of participants.

**Psychological harm**

An ethical issue that relates to protecting participants from distress, discomfort and embarrassment.

**Deception**

An ethical issue that relates to being honest with participants about the purpose and process of research.

**Lack of informed consent**

An ethical issue that relates to participants agreeing to take part in research, not knowing what the research is about.

**Ethical guidelines**

An important issue to consider before carrying out research is how participants will be personally affected by taking part. Psychologists should ensure that participants are treated appropriately, and there are ethical guidelines to help them to do this.

**Ethical issues**

There are a number of issues that can arise in research that psychologists should try to avoid, unless it can be justified.

**Psychological harm**

Psychological research can potentially have an effect on people's minds and behaviour. Although it is not possible to guarantee that there will be no effect on the participant from taking part in research, psychologists should not cause participants distress, discomfort or embarrassment (psychological harm). Participants should generally leave a study in the same state as they entered it. Not all psychologists agree with the last point because they argue that participants may actually benefit from taking part in their study.

**Deception**

Psychologists should not unnecessarily deceive participants, by misleading them about the aim of a piece of research or making them think they have done something that they have not. This would be called deception. However, sometimes this can be justified. If participants know the true aim of a study they could behave differently, meaning to 'help' the researcher.

**Lack of informed consent**

Informed consent describes the situation in which participants have not only agreed to take part in a study ('consent') but also know what they study is about and what they are going to be expected to do ('informed'). As outlined above, it is not always appropriate to inform the participants of what is happening in a study, as they may not share their real thoughts or show their true behaviour. There are times when a participant may be under investigation without knowing it, so they cannot have given consent.

**STUDY HINT**

In the exam, you may be asked to identify an ethical issue arising in a piece of research and how you would deal with it. It is important that you identify an issue that you know you can deal with.

---

**SUMMARY**

This chapter has shown that there are number of factors involved in conducting research. Firstly, there is a range of methods that a psychologist can choose to collect their data; from experiments to case studies, from observations to questionnaires. Each method will have its own strengths and weaknesses. The choice of method depends on a psychologist’s priorities and what they are investigating. Secondly, psychologists have to make decisions about features such as the sample, and how they are going to measure and control variables. In experiments psychologists have to choose their experimental design. Finally, psychologists need to start their research with a hypothesis: a prediction of what they think will happen. When planning research, ethical guidelines need to be considered.

**Also covered in this chapter:**

- ways of dealing with ethical issues
- doing research
- analysing research.
Practice questions
A psychologist carried out an experiment to investigate the effect on perception of two different types of adverts: one that used a celebrity and one that used an ordinary person. The adverts were produced in the same way, used the same script and had the same duration.

The psychologist used a self-selected sample who signed up for the study while doing their supermarket shopping. While in store, they were taken to a booth to view one of the two adverts. An independent groups design was used where 30 participants were shown the first advert, and another 30 were shown the second. Afterwards, they were asked whether they would be likely to buy the product, a new brand of crisps, with the choice being 'yes' or 'no'.

The results of the study are shown in the bar graph below.

1 Write a hypothesis for this study. [2 marks]

There will be a difference in whether participants want to buy a product or not, depending on whether they have seen an advert featuring a celebrity or an ordinary person.

The candidate has the choice of writing a null or alternative hypothesis and has gone for the alternative hypothesis. Importantly, they recognise that it is an experiment and therefore is investigating a difference (as opposed to a correlation). One mark is awarded for the first part of the hypothesis (the stem) and then a second mark for correctly identifying the variables being tested. Here, the IV and DV are clearly stated. Overall, the hypothesis is well written and easily understood, so both marks would be given.

A bar graph to show the percentage of participants who would and would not buy the product after viewing their advert.
2 Identify the dependent variable. [1 mark]

Perception of a product.

The candidate knows what the dependent variable is in a broad sense – it is something to do with the product rather than the advert. However, because it is the DV they have been asked for, they need to be precise about how it was measured. Perception of the product was actually measured in terms of whether participants would buy it or not. This is what the candidate needs to state to get the mark. No marks would be awarded here.

3 Identify one control used in the study and explain why it was important. [3 marks]

The adverts were the same length. If they were different lengths, this would have been an extraneous variable. If one advert was longer than another, the participants might have got bored and this is why they may have not wanted to buy the product.

The question relies on the candidate knowing what a ‘control’ is, and they demonstrate this by correctly identifying one of the variables standardised in the experiment: the length of the advert. This is where the first mark comes from. The explanation easily earns the remaining two marks by referring to extraneous variables, which shows good psychological knowledge. Then the explanation continues in the context of the study by considering how the results could have been affected by this extraneous variable. This response would definitely be worth full marks.

4 Outline one strength of using a self-selected sample in this study. [2 marks]

A strength of a self-selected sample is that participants willingly come forward, so the psychologist does not have to put in as much effort as they would do with other methods.

The candidate gives a detailed response, which shows that they understand a strength of the sampling method. However, the question says ‘in this study’ and the candidate does not refer explicitly enough to it. Just using the words ‘the psychologist’ does not really make it relevant to the study. For example, they could have written about how the participants’ willingness to take part might mean they are likely to watch the whole advert and not drop out. Consequently, this answer would earn one of the two available marks.

5 Explain one limitation of using an independent groups design in this study. [3 marks]

A limitation is that the difference in results may be due to participant variables because the psychologist did not compare ‘like with like’. For example, one group of participants may be more health-conscious than average and this could be why they did not choose to buy crisps, rather than because of the advert.

This is a good answer. The first mark is for knowing a general limitation of the experimental design: the problem of participant variables. The candidate then applies this to the study by identifying a way in which participants may vary from each other, earning another mark. The final mark is given because the candidate considers how the limitation may impact on the findings. The candidate would earn all three marks.
Practice questions

Questions in the practice questions pages of this textbook have been written by the authors, Mark Billingham and Helen Kitching. They have not been produced by OCR.

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Help students to build their subject knowledge and understanding with activities, guidance and assessment preparation tailored to the 2017 OCR specification and brought to you by subject experts and OCR’s Publishing Partner for GCSE Psychology.

- Prepare students for assessment with skills-building activities and practice questions developed for the new specification.
- Progressively develop students’ subject knowledge through accessible diagrams and key content summaries that aid understanding and help weaker students access the main points.
- Build conceptual understanding and critical thinking skills with a wealth of targeted activities.
- Extend learning and enhance responses with extension questions, stimulus material and suggestions for further reading.

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Textbook subject to change based on Ofqual feedback.