

Lesson One : Experiments

The five main research methods

The five main research methods include experiments, self-reports, case studies, observations and correlations. This section will describe each in turn, before summarising their strengths and weaknesses.

Three types of experiment

There are three different types of experiment: laboratory experiment, field experiment and natural (or quasi-) experiment. In both a laboratory and field experiment, the researcher manipulates the IV and controls any variables extraneous (or irrelevant) to the study. In a natural experiment, which may be conducted in a laboratory, the IV varies naturally, without the researcher's intervention, for example if people who are left-handed are compared with people who are right-handed.

Laboratory experiments

A **laboratory experiment** takes place in a laboratory where conditions are controlled and IVs manipulated in order to discover cause and effect. It is probably the method psychologists use most often to conduct research. There is an IV, all extraneous variables are controlled and the DV is measured.

Advantages of laboratory experiments

- The manipulation of one IV while controlling irrelevant variables means that cause and effect are much more likely to be shown.
- They allow for control over many extraneous variables, e.g. temperature and noise levels.
- Standardised procedures mean that replication is possible.
- In a laboratory, participants must have given some degree of consent, but not necessarily informed consent, to take part.

Disadvantages of laboratory experiments

- The results may be biased by sampling, demand characteristics or experimenter bias.
- Some people regard the process as dehumanising, with participants being treated like laboratory rats by having *something done to them*.
- Controlling variables is reductionist as it is unlikely that any behaviour would exist in isolation from other behaviours.

- Artificial conditions (setting and task) can produce unnatural behaviour, which means that the research lacks ecological validity.
- For the IV to be isolated, participants might be deceived about the true nature of the study. There may be other ethical issues.
- It is more likely that the data will be snapshot.

The field experiment

A **field experiment** takes place in a natural or normal environment for the behaviour being studied. For example, to conduct a field experiment about how children learn, the logical place to do this is in a classroom.

Advantages of field experiments

- There is greater ecological validity because the surroundings are natural.
- There is less likelihood of demand characteristics (if people are unaware of the research taking place).
- The features of an experiment (IV, DV etc.) are retained.
- The behaviour is natural and so tells us how people behave in real life.

Disadvantages of field experiments

- There might be difficulties in controlling the situation, and therefore more possibility of influence from extraneous variables.
- The experiment might be difficult to replicate exactly.
- There might be problems of access to where the study is to be done; such as consent from a company.
- There might be ethical issues of consent, deception etc.

The natural experiment

In a **natural experiment** the conditions of the IV happen by themselves. For example, we might be interested in whether males or females are more likely to choose science or humanities subjects. The IV is gender – male or female. This cannot be ‘manipulated’ by the experimenter – it happens independently.

QUESTIONS :

1 Give **one** similarity and **one** difference between a laboratory experiment and a field experiment.

Similarity :.....

Difference ;.....

2 Give **two** disadvantages of conducting a study in a laboratory.

A.....B
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3 Give **two** advantages of conducting a field experiment.

A.....

B.....

Lesson Two : Experimental designs

Experimental designs

Because many of the core studies are experiments (field or laboratory), we need to look in more detail at how an experiment works – its design.

There are three types of design: repeated measures, independent measures and matched pairs/groups.

Repeated measures

A **repeated measures** (or related samples) **design** is where each participant takes part in *all* conditions of the IV. For example:

Condition 1	Condition 2
Participant A	Same participant A
Participant B	Same participant B
Participant C	Same participant C

Advantages of repeated measures designs

- This design is best for the control of participant variables, because the same people do both conditions and their level of intelligence, motivation and many other factors remain the same throughout.
- Although much less important, it means that only half the number of participants are needed than for other designs because each participant ‘scores’ in both conditions.

Disadvantages of repeated measures designs

- Some experiments are impossible to do as a repeated measures design, e.g. a participant cannot be both left-handed and right-handed or both male and female.
- If a participant completes both conditions then it may be necessary to duplicate apparatus, such as word lists. But how can the lists be balanced so they are of equal difficulty? It may be better to use a different type of design. A major flaw is that the design can create **order effects**. If a participant performs an activity twice, they may become tired or bored the second time (known as the **fatigue effect**) and the result is different from the first time. It might be that the second result is much better than the first because the participant knew what to expect or treated the first as a practice. This is simply known as the **practice effect**.

One way to eliminate order effects is to **counterbalance**. This is where participant 1 performs in condition 1 first and then condition 2, participant 2 performs in condition 2 and then condition 1, and so on. As a result, both practice and fatigue effects are controlled.

Independent measures

An **independent measures design** is where each participant is in just one condition of the IV. For example:

<i>Condition 1</i>	<i>Condition 2</i>
Participant A	Participant B
Participant C	Participant D
Participant E	Participant F

Advantages of independent measures designs

- Participants only perform in one condition of the IV and so there are no order effects.
- Only one word list (or test) is needed for participants.
- Each participant only experiences one condition so it might stop them guessing what the study is all about and so reduce demand characteristics.

Disadvantages of independent measures designs

- Twice as many participants are needed as for a repeated measures design.
- This design does not always adequately control for participant variables. The researcher may end up with participants in one group who are all somehow ‘naturally’ better at the DV than the participants in the other group – more intelligent, or more suited to the condition to which they have been allocated.

One way to try to eliminate participant variables is to randomly allocate participants to conditions. Random allocation is done by (for example) tossing a coin for each participant, giving them a 50/50 chance of doing Condition 1 or Condition 2 first. For this design, it does not matter if there are unequal numbers of participants in each condition. Note that random allocation is very different from a random sample.

Matched pairs/groups

A **matched groups design** is where the experimenter tries to match as many aspects as possible on which two (or more) *groups* of participants may differ. The aim is that overall the two (or more) groups are the same. A special case of

this is **matched pairs**, where each pair of participants in the whole group are matched. For example, twins have many things in common so using pairs of twins is ideal.

The aim of this design is to control participant variables (see page 49) and so it is sometimes used to reduce participant variables in an independent groups design. There is no need to use this for a repeated measures design because the same participant is in the two (or more) conditions.

Advantages of matched designs

- Participant variables are controlled because participants are matched across the conditions of the IV.
- There are no problems with **order effects**.

Disadvantages of matched designs

- This design is only as good as the experimenter's ability to match participants, and it is questionable whether *all* relevant variables can be matched.
- It can be difficult (and time consuming) to find and match participants.

QUESTIONS :

4 What is meant by the term 'repeated measures design'?

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5 Suggest **one** way in which order effects can be overcome.

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6 What is meant by the 'random allocation' of participants to conditions?

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Lesson Three : Experimental controls

Experimental controls

In order to make sure that it is the manipulation of the IV that is *causing* the change in the DV, it is important for the researcher to **control** any **confounding variables**. These are factors apart from the IV that may affect the DV.

Confounding variables

There are three main types of confounding variable that need to be controlled:

1 Situational variables concern the environment or situation in which the experimental and control groups are participating in the experiment. If one group is tested in one environment and another group in a different environment, then this might cause the result to be different.

2 Experimenter variables are where the presence of the researchers themselves may affect the outcome of the experiment. This can happen in two different ways:

a The mere presence of the experimenter may cause **demand characteristics**. The one way to control demand characteristics is by using a **single blind** design, in which the participant is unaware of the behaviour that is expected of them (i.e. they are not told whether they are in the experimental or the control group, or they are not told what behaviour is being measured, or why).

b Experimenter bias occurs when an experimenter who wants to achieve a particular outcome gives different ‘signals’ to participants, for example smiling if a participant is doing what is desired or encouraging them if they are not. This can be controlled by using a **double blind** design, in which not only is the participant unaware of the behaviour that is expected of them but also the experimenter does not know whether the participant is in the experimental or the control group. Experimenter bias can also be reduced by giving all participants the same **standardised instructions**.

3 Participant variables are individual differences between participants, such as level of motivation, eyesight, intelligence or memory. One solution is to have two very large groups (to minimise the effect of a rogue individual or an ‘outlier’) and to allocate participants to the two groups randomly. Another solution is to match the groups of participants, so extraneous variables are equally distributed across the two (or more) groups.

Advantages of controlling variables

- More control over irrelevant/extraneous variables means that the DV is

more likely to be due to the IV; cause and effect are much more likely to be shown.

- Participants are more likely to behave in predictable ways – particularly ways in which the experimenter wants them to behave.
- Controls act as a benchmark of ‘normality’ against which things can be compared. This is most likely through using an experimental group and a control group, where nothing is done to the control group and a measure of their ‘normal’ behaviour is recorded.

Disadvantages of controlling variables

- Controlling variables is reductionist – it is unlikely that any behaviour would exist in isolation from others.
- The more controls, the more artificial the situation becomes and the more participants are likely to respond to demand characteristics. They are less likely to behave naturally. This lowers the ecological validity of the study.
- Attempting to control variables for many different trials can lead to participants becoming suspicious.

QUESTIONS ;

7 Why do psychologists try to control extraneous variables?

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8 Identify **three** types of extraneous variable that experimenters should try to control.

A.....
B.....
C.....

Lesson Four : Self Reports

A **self-report** simply means asking participants about something so they can report on it themselves. There are three main components to take into account:

- the specific **method** (questionnaire or interview) used to ask questions and gather data (the answers)
- the format or structure of the **questions** themselves
- the way in which participants will provide **answers** to the questions

Questionnaires

How questions are asked in a **questionnaire** depends on what type of response or data the researcher is looking for. Data can be quantitative (in the form of numbers) or they can be qualitative (in the form of words). There are advantages and disadvantages to both these types of data.

We can ask **open-ended questions**, which are simply questions that ask the participant to give a response in his or her own words, with no pre-determined way to answer. **Closed questions**, on the other hand, require the participant to choose from a range of pre-determined answers. There are several forms of predetermined answer:

- a simple yes/no
- a choice from a range of categories such as 0–6, 7–12, 13–18 etc.
- a choice of number on a scale, with or without descriptor words at either end, such as: strongly agree 1 2 3 4 5 strongly disagree.

A rating scale like this is often known as a Likert scale and can be 5-point (as in the example above) or 7-point, or it could be 4-point. If a scale is 5-point, it gives the participant a chance to opt out, to be neutral. In the example above, the mid-point of the 5-point scale would be neutral or ‘neither agree nor disagree’. This may well be the case depending on what question is asked. But what if every participant responded like this? There would be no useful data. Using a 4-point scale, with a fixed/forced choice, means the participant must commit to either agreeing or disagreeing. Think about the advantages and disadvantages of using each type of scale.

Interviews

Interviews can be:

- **structured**, where the questions are pre-prepared and every participant receives the same questions in the same order without variation

- **unstructured**, where there is no pre-preparation of questions and questions are asked depending on the direction in which the discussion goes, or questions are open-ended
- **semi-structured**, where there are some structured questions and some unstructured/open-ended questions.

An interview that is **face-to-face** is not anonymous and neither is a **telephone interview**, even if it is not face-to-face. A medical practitioner can conduct a clinical interview.

Advantages of self-reports

- Participants are given an opportunity to express a range of feelings and explain their behaviour.
- The data obtained may be 'rich' and detailed, especially with open questions.
- Data are often qualitative, but may also be quantitative depending on the types of question that are asked.
- Closed/forced-choice questions are easier to score/analyse.
- Relatively large numbers of participants can be questioned relatively quickly, which can increase representativeness and generalisability of the results.
- Questionnaires are relatively easy to replicate.

Disadvantages of self-reports

- Closed questions often do not give the participant the opportunity to say why they behaved or answered a question in a particular way.
- Participants might provide socially desirable responses, not give truthful answers or respond to demand characteristics.
- Closed/forced-choice questions might force people into choosing answers that do not reflect their true opinion, and therefore may lower the validity.
- Researchers have to be careful about the use of leading questions; it could affect the validity of the data collected.
- Open-ended questions can be time-consuming to categorise/analyse.
- If a telephone interview is conducted, a participant can easily withdraw, or might find it difficult to understand how to respond if the questions being asked cannot be seen.

QUESTIONS :

10 Describe the two main types of question that can be included on a questionnaire.

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11 Describe what is meant by a ‘forced-choice’ questionnaire. Give an advantage of this type of questionnaire.

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12 Describe the **three** main types of interview.

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13 Outline **two** ways in which interviews can be conducted.

A.....

B.....

14 Describe **three** disadvantages of self-reports.

A.....

B.....

C.....