Welcome to Etonbury

A Level Psychology

Introduction and Summer Bridging Work

Introduction and preparation

Before you start in September, you will need:

- At least one large lever arch file to keep your work in at home - please keep this organised with dividers - you will be asked to bring it in for occasional folder checks
- A smaller A4 file to bring into school - you will be expected to have the last two lessons' work with you to refer back to, as well as your homework

This summer work is designed to re-cap (or introduce you to, if you're new to the subject) the basics of research methods, give you a historical overview of psychology as a science, introduce you to the Cornell note-taking method, and give you a chance to conduct and write-up a short experiment at home.

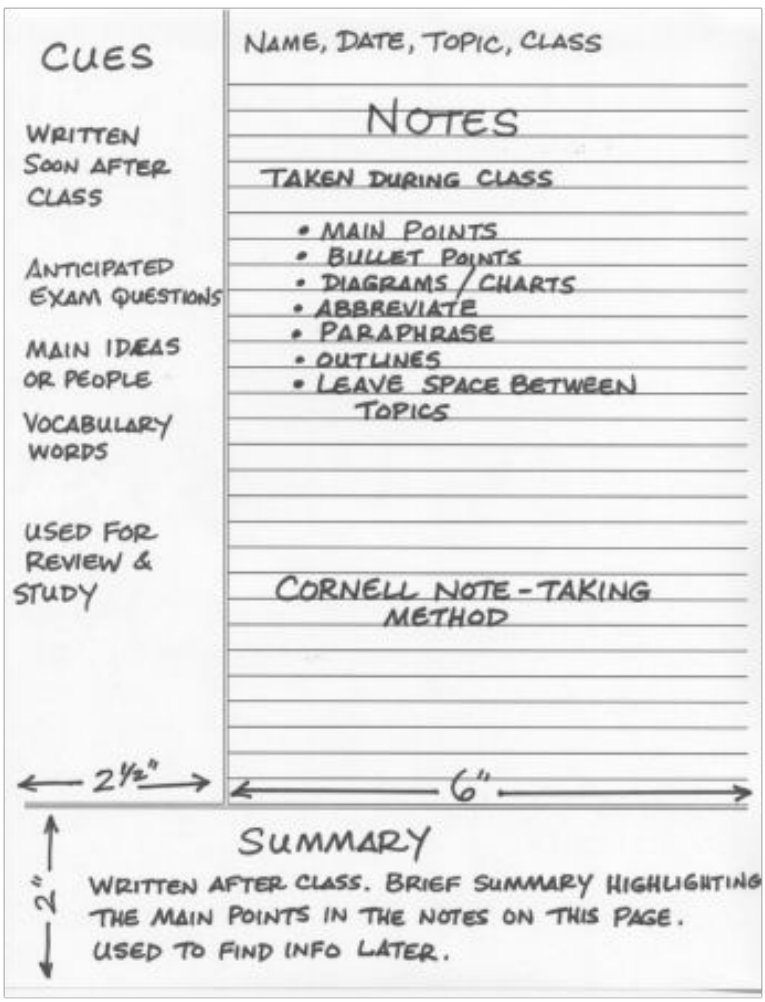
Please bring this completed booklet to your first few lessons in September.

Task 1

Cornell note-taking method

We highly recommend that you learn to use this method when taking notes. It is designed to give you space to make detailed notes, but also to highlight the key points and summarise so that you can quickly find the information you need when you are referring back to them and revising.

It looks like this:



Have a look at the tutorial here https://canvas.cornell.edu/courses/1451/pages/view-cornell-note-taking?module_item_id=28437 or look online - there are lots if you google it.

Task 2

A brief history of psychology

Read through the timeline on this page and answer the questions below.

https://www.learner.org/series/discovering-psychology/explorations/history-of-psychology-contemporary-foundations/

1. In which year, and where, did Wilhelm Wundt open the first psychology laboratory?
2. Who, and when, first introduced the term ‘psychoanalysis’?

1. When was the first general intelligence scale developed - and who did so?
2. Which approach did John B. Watson introduce in 1913?
3. What was the electroencephalogram, and when was it invented?

1. When were drugs first used to treat depression?
2. When were the APA ethical standards first introduced?
3. Who were the two key psychologists associated with the humanistic approach?
4. Which book is mentioned as an early example of the cognitive approach?
5. When was the human genome sequenced - and why do you think this might be relevant to psychology?

Task 3

Hypotheses and variables

Read the textbook pages that are on pages 7 and 8 of this booklet. Make a page of notes using the Cornell method on page 6. Then answer the 'Apply it' questions on this page.

Identify the IVs and DVs in the examples below:

1. Talking to a child will increase their language ability
2. People are more aggressive on hot days
3. Students may be late for school because they stayed up late the night before
4. Watching horror films will make children have nightmares

Decide whether the following hypotheses are directional or non-directional:

1. There is a difference in children's reading ability depending on whether they have blue or brown eyes
2. Dogs that are rewarded with treats sit when told to do so more often than dogs who are not rewarded with treats
3. There is a difference in the psychology grades of students depending on whether they are men or women
4. Teenagers who watch horror films have more friends than teenagers who watch romantic comedies

Write an operationalised directional and non-directional hypotheses for both of the aims below:

To investigate whether high confidence levels in children affect their level of obedience.

To investigate whether yawning is contagious.

Key Points	Details

Summary

The specification says...

Experimental method.

Aims: stating aims, the difference between aims and hypotheses.

Hypotheses: directional and non-directional.

Variables: manipulation of variables including independent and dependent; operationalisation of variables.

Psychologists are able to draw upon a number of different methods as part of their research but one of the most often used is the experimental method.

Go on...it might make you more talkative.

Key terms

Experimental method Involves the manipulation of an independent variable (IV) to measure the effect on the dependent variable (DV). Experiments may be laboratory, field, natural or quasi.

Aim A general statement of what the researcher intends to investigate, the purpose of the study.

Hypothesis A clear, precise, testable statement that states the relationship between the variables to be investigated. Stated at the outset of any study.

Directional hypothesis States the direction of the difference or relationship.

Non-directional hypothesis Does not state the direction of the difference or relationship.

Variables Any 'thing' that can vary or change within an investigation. Variables are generally used in experiments to determine if changes in one thing result in changes to another.

Independent variable (IV) Some aspect of the experimental situation that is manipulated by the researcher – or changes naturally – so the effect on the DV can be measured.

Dependent variable (DV) The variable that is measured by the researcher. Any effect on the DV should be caused by the change in the IV.

Operationalisation Clearly defining variables in terms of how they can be measured.

Experimental method

Aims

We have a theory that energy drinks affect how much people talk. This is based on our understanding (having read a few research studies on the Internet) that energy drinks contain sugar and caffeine, and that these substances increase alertness, making people 'chattier'. As luck would have it, a new energy drink – *SpeedUpp* – has come on to the market and we're keen to know whether it might affect the talkativeness of those who drink it.

Now that we have an initial idea, the next step is to narrow the focus of our research to produce an **aim**. In psychological research, aims are developed from **theories**, like our energy drink theory above, except in psychology the theories tend to be much more sophisticated and are based on many more hours of research! Aims are general statements that describe the purpose of an investigation. In the case of our investigation, the aim would be something along the lines of:

To investigate whether drinking energy drinks makes people more talkative.

Hypotheses

Having written an aim, we now need to formulate a **hypothesis**. A hypothesis is a statement that is made at the start of a study and clearly describes the relationship between variables as stated by the theory. In the case of our investigation this might be:

Drinking SpeedUpp *causes people to become more talkative.*

Hypotheses can be directional or non-directional. In a **directional hypothesis** the researcher makes clear the sort of difference that is anticipated between two conditions or two groups of people. For this reason, directional hypotheses include words like more or less, higher or lower, faster or slower, etc.

People who drink SpeedUpp *become more talkative than people who don't.*

People who drink water are less talkative than people who drink SpeedUpp.

A **non-directional hypothesis** simply states that there is a difference between conditions or groups of people but, unlike in a directional hypothesis, the nature of the difference is not specified.

People who drink SpeedUpp *differ in terms of talkativeness compared with people who don't drink* SpeedUpp.

Doing an experiment

We have decided to test our energy drink theory by using the **experimental method**. Firstly, we are going to gather together two groups of people, let's say ten in each group. Then, starting with the first group, we will give each person (or each *participant* – because that's what you call people in studies) a can of *SpeedUpp* to drink. The participants in the other group will just have a glass of water each. We will then record how many words each participant says in a five-minute period immediately after they have had their drink.

Deciding which type of hypothesis to use

Leaving aside the debate about whether or not this is a 'good' experiment (it's not really – but we are taking the whole design process slowly) and the exact details of how it would work (it probably wouldn't), which type of hypothesis should we choose?

Researchers tend to use a directional hypothesis when a theory or the findings of previous research studies suggest a particular outcome. When there is no theory or previous research, or findings from earlier studies are contradictory, researchers instead decide to use a non-directional hypothesis.

Even though *SpeedUpp* is a new energy drink, the effects of caffeine and sugar on talkativeness are well-documented. Therefore we will opt for a directional hypothesis on this occasion.

Study tip

Writing clear and testable hypotheses is not easy.

When you read your hypothesis back to yourself, make sure (1) the IV and DV are clear and measurable, (2) you have stated the relationship between the IV and DV and not stated an aim, (3) you have selected the appropriate hypothesis, i.e. directional or non-directional, based on the information you have been given in the question.

on pages 64 and 126

Independent and dependent variables

In an experiment, a researcher changes or manipulates the **independent variable** (IV) and records or measures the effect of this change on the **dependent variable** (DV). All other variables that might potentially affect the DV should remain constant in a properly run experiment. This is so the researcher can be confident that any change in the DV was due to the IV, and the IV alone.

Levels of the IV

In order to test the effect of the IV we need different **experimental conditions**. If we simply gave some participants *SpeedUpp*, how would we know how talkative they were? We need a comparison. We could either:

- Compare participants' talkativeness before and after drinking *SpeedUpp*.
- Compare two groups of participants – those who drink *SpeedUpp* with those who drink water (which is the way we have described the study on the facing page).

In either case the two conditions are no *SpeedUpp* or drinking *SpeedUpp*. These are the two levels of the IV: the **control condition** (no *SpeedUpp* / drink of water) and the experimental condition (energy drink).

A well-written hypothesis should make it easy to tell what the IV and DV are. May we proudly unveil the directional hypothesis we have written for our energy drink investigation comparing two groups of participants...

The group that drinks an energy drink will be chattier than the group that drinks water.

Note that this is different from the hypothesis on the facing page – hypotheses come in all shapes and sizes but are still correct as long as they state the operationalised variables and the relationship between them.

Operationalisation of variables

So far, so good – except we have not yet managed to **operationalise** the variables in the hypothesis in order to make it testable.

Many of the things that psychologists are interested in, such as social behaviour, intelligence or thinking, are often a little fuzzy and not easy to define. Thus, in any study, one of the main tasks for the researcher is to ensure that the variables being investigated are as unfuzzy and measurable as possible.

So, a much better hypothesis than the one above would be:

After drinking 300 ml of SpeedUpp, participants say more words in the next five minutes than participants who drink 300 ml of water.

See the difference? Now that our variables are operationalised and our hypothesis is complete, we're free to concentrate on more important things, such as how on earth we're going to count all the words that twenty people say in five minutes.

Are two tails better than one? Sometimes the terms 'two-tailed' and 'one-tailed' are used when describing a hypothesis instead of 'non-directional' and 'directional'. (Though strictly speaking they are not the same – directional is not the same as 'two-tailed'. A directional hypothesis requires a two-tailed test of significance ... to be explained later ...)

Apply it Methods — Directional or non-directional?

Questions

Decide whether the following hypotheses are directional or non-directional. What features/words in each hypothesis are important when making your choice? (*2 marks each*)

1. There is a difference in children's reading ability depending on whether they have blue or brown eyes.
2. Dogs that are rewarded with treats sit when told to do so more often than dogs that are not rewarded with treats.
3. There is a difference in the psychology grades of students depending on whether they are men or women.
4. Teenagers who watch horror films have more friends than teenagers who watch romantic comedies.

Apply it Methods — IVs and DVs

Questions

Identify the IVs and DVs in the examples below. (*2 marks each*)

1. Talking to a child will increase their language ability.
2. People are more aggressive on hot days.
3. Students may be late for school because they stayed up late the night before.
4. Watching horror films will make children have nightmares.
5. People will be rated as more attractive if they wear red.

Apply it Methods — Bringing it all together

Questions

For each of the aims of the investigations below, operationalise the IV and DV, and write a directional and non-directional hypothesis. (*4 marks each*)

1. To investigate whether high confidence levels in children affect their level of obedience.
2. To investigate whether a new drug (*Anxocalm*) reduces anxiety in patients with phobias, as compared with having no treatment.
3. To investigate whether yawning is contagious.
4. To investigate whether owning a goldfish has a positive effect on psychological well-being.
5. To investigate whether grey-haired people have more fun than people with other hair colours.

Check it

1. Explain the difference between an aim and a hypothesis. *[2 marks]*
2. Identify **one** way in which each of the following terms could be operationalised: memory, physical aggression and intelligence. *[3 marks]*
3. Suggest **two** reasons why a psychologist might choose to use a non-directional hypothesis. *[2 marks]*

Task 4

Research issues

As with the previous task - read the textbook pages that are on pages 12 and 13 of this booklet. Make a page of notes using the Cornell method on page 11. Then answer the questions on this and the next page.

1. Extraneous variables can be subdivided into which two types of variables?

1. Match the statements in the two columns:

Extraneous variables	Any individual differences between the people taking part which may affect the outcome
Confounding variables	Variables that do vary systematically with the IV so we can't be sure what has caused the change in the DV
Participant variables	'Nuisance' variables that do not vary systematically with the IV and can often be controlled before the experiment begins
Situational variables	Any aspect of the environment that may interfere with the outcome of the investigation

1. Any unwanted influence of the researcher on the outcome is an investigator effect - true or false?
2. Identify the **false** statement about confounding variables:
   a. They vary systematically with the IV
   b. They mean we can't be sure of the true reason for the change in the DV
   c. They can only be identified after the experiment has finished
   d. They are 'nuisance' variables but fairly easy to control
3. Most extraneous variables are extremely difficult to control - true or false?

Research issues

6. Confounding variables do **not** vary systematically with the IV - true or false?

7. Match the statements in the two columns:

Demand characteristics	Making sure that all participants are subject to the same instructions and experience
Randomisation	Participants interpret cues from the experimenter and research situation. They may change their behaviour as a result.
Standardisation	The use of chance to reduce the researcher's influence on the design of the investigation

8. The effect of the researcher's behaviour (conscious or unconscious) on the design of the study is known as what?

9. Standardised instructions should be given to all participants in an experiment - true or false?

10. Demand characteristics are a form of participant reaction - true or false?

Key Points	Details

Summary

Research issues

The specification says...

Variables: extraneous and confounding.

Demand characteristics and investigator effects.

Control: randomisation and standardisation.

In any experiment, there will always be a number of unwanted factors that can potentially affect the relationship between the independent and dependent variables, spoiling or distorting the results in the process.

Fortunately, psychologists are aware of this issue and have devised several different ways of tackling it, some of which we shall explore here.

Key terms

Extraneous variable (EV) Any variable, other than the independent variable (IV), that may affect the dependent variable (DV) if it is not controlled. EVs are essentially nuisance variables that do not vary systematically with the IV.

Confounding variables A kind of EV but the key feature is that a confounding variable varies systematically with the IV. Therefore we can't tell if any change in the DV is due to the IV or the confounding variable.

Demand characteristics Any cue from the researcher or from the research situation that may be interpreted by participants as revealing the purpose of an investigation. This may lead to a participant changing their behaviour within the research situation.

Investigator effects Any effect of the investigator's behaviour (conscious or unconscious) on the research outcome (the DV). This may include everything from the design of the study to the selection of, and interaction with, participants during the research process.

Randomisation The use of chance methods to control for the effects of bias when designing materials and deciding the order of experimental conditions.

Standardisation Using exactly the same formalised procedures and instructions for all participants in a research study.

Research issues

Extraneous variables

The key to an **experiment** is that an **independent variable** (IV) is manipulated (changed) to see how this affects the **dependent variable** (DV). The only thing that should influence the DV is the IV. Any other variables that might potentially interfere with the IV (or the DV) should be controlled or removed. These additional, unwanted variables are called **extraneous variables** and, where possible, are identified at the start of the study by the researcher, who then takes steps to minimise their influence.

Many extraneous variables are straightforward to control such as the age of the participants, the lighting in the **lab**, etc. These are described as 'nuisance variables' that do not vary systematically with the IV. These may 'muddy' the experimental water so to speak but do not confound the findings of the study. They may just make it harder to detect a result.

Confounding variables

Confounding variables *do* change systematically with the IV. Let us imagine in our energy drink study we have twenty participants in total and decide to use the first ten participants who arrive for the *Speedupp* condition. It happens that these first ten participants are all very excited because they saw Prince William arrive at their school. This meant that there was some delay before further participants arrived and by then people were less excited. This unexpected event means we have ended up with a second unintended IV – being excited or not.

So when we come to analyse our results and find that the *Speedupp* group were chattier we can't be sure if this is because of the drink or the excitement. The problem is that the emotion varied systematically with the IV and this alone could explain changes in the DV.

Demand characteristics

Participants are not passive within experiments and are likely to be spending much of their time trying to make sense of the new situation they find themselves in. As such, **participant reactivity** is a significant extraneous variable in experimental research and one that is very difficult to control.

In the research situation, participants will try to work out what is going on. Certain clues may help them interpret what is going on. These clues (or *cues*) are the **demand characteristics** of the experimental situation and may help a participant to 'second-guess' the experimenter's intentions as well as the aims of the study.

Participants may also look for clues to tell them how they should behave in the experimental situation. They may act in a way that they think is expected and over-perform to please the experimenter (the 'please-U effect'), or, they may deliberately under-perform to sabotage the results of the study (the 'screw-U effect'). Either way, participant behaviour is no longer natural – an extraneous variable that may affect the DV.

Saint or sinner? Some participants try to please the researcher in experiments whereas others try to negatively affect the results. Which type of participant would you be?

Apply it Methods

Extraneous variables

In a properly conducted experiment it is important that potential extraneous variables are identified during the design of the study and appropriate steps are taken to control them.

Questions

1. Come up with *at least ten* extraneous variables that would need to be controlled in the energy drink study. (*10 marks*)
2. Which of the extraneous variables you have listed would be easy to control and which would be more difficult? (*2 marks*)
3. Take *five* of the extraneous variables you have listed and explain what steps you would take to control them. (*5 marks*)

Investigator effects

Participant reactivity also leads to **investigator effects**. Consider this: it is possible that during our energy drink study, as we are recording the words spoken by each participant, we may be inclined to smile more during our interactions with some participants than others. Given that we are *expecting* the energy drink group to speak more than the water group, we may unknowingly – in our unconscious behaviour – *encourage* a greater level of chattiness from the energy drink participants.

This is an example of an investigator effect, which refers to any unwanted influence of the investigator on the research outcome. As Hugh Coolican (2006) points out, this can include expectancy effects and unconscious cues (such as those described above). It might also refer to any actions of the researcher that were related to the study's design, such as the selection of the participants, the materials, the instructions, etc. **Leading questions**, which are discussed in relation to eyewitness testimony on page 58, are a good example of the power of investigator effects.

Randomisation

In any investigation there are simple steps that a researcher can take to minimise the effect of extraneous/confounding variables on the outcome. One of these is **randomisation**, which refers to the use of chance methods to reduce the researcher's unconscious biases when designing an investigation. In short, this is an attempt to control investigator effects.

For example, a memory experiment may involve participants recalling words from a list. The order of the list should be **randomly** generated so that the position of each word is not decided by the researcher.

In an experiment where participants are involved in a number of different conditions, the order of these conditions should be randomly determined. For example, in the energy drink experiment we might want to know what quantity of *SpeedUpp* caused chattiness. We may set up four experimental conditions: drinking water (Condition A), drinking 100 ml of *SpeedUpp* (Condition B), drinking 200 ml of *SpeedUpp* (Condition C), and drinking 300 ml of *SpeedUpp* (Condition D).

If all participants were to take part in all four conditions, the order in which these conditions were completed would need to be randomised for each participant (this is an alternative to **counterbalancing** – discussed on the next spread).

Standardisation

As far as is possible within an investigation, all participants should be subject to the same environment, information and experience. To ensure this, all procedures are **standardised**, in other words there is a list of exactly what will be done in the study. This includes **standardised instructions** that are read to each participant. Such standardisation means that non-standardised changes in procedure do not act as extraneous variables.

The Variable family
Ivy (IV) and Davy (DV) are a happy couple with a good relationship. However, Civy (CV) is often interfering and tries to constantly change Davy much to Ivy's annoyance…

Study tip

Be careful not to refer to ALL investigations as experiments. This is something that students new to psychology tend to do quite often.

If you are not sure whether the piece of research you are talking about involved an experiment then you should use a more general term such as 'investigation' or 'study'.

Note that in research methods, some of the terms and concepts we discuss relate to experiments specifically, but others are also a feature of investigations in general.

Apply it Methods – Participant variables and situational variables

Extraneous variables can be subdivided into participant variables and situational variables. Participant variables are any individual differences between participants that may affect the DV. Situational variables are any features of the experimental situation that may affect the DV.

Question

Decide which of the variables below are participant variables and which are situational variables. *(4 marks)*

Noise	*Age*	*Motivation*	*Weather*
Personality	*Temperature*	*Intelligence*	*Concentration*
Time of day	*Gender*	*Instructions*	

Apply it Methods – Maths test

A teacher wanted to see how the investigator effect would influence performance on a maths test. She gave 20 of her sixth form class the same maths test but told half of the class the test was suitable for year 10 students and the other half that it was suitable for degree students. When the results of the test were analysed, the group that were told it was suitable for year 10s had performed significantly better on average.

Questions

1. Identify the **IV** and the **DV** within this experiment. *(2 marks)*
2. Identify *one* possible **extraneous variable** in this experiment and briefly explain how it may have affected the DV. *(3 marks)*
3. Explain how the results of this experiment could be used to support the investigator effect. *(3 marks)*

Check it

1. Outline what is meant by 'demand characteristics'. *[2 marks]*
2. Explain the difference between an extraneous variable and a confounding variable. *[2 marks]*
3. Suggest **one** example of how randomisation could be used within psychological research. *[2 marks]*
4. Outline what is meant by 'investigator effects' **and** explain why it is important to control for these when conducting research. *[4 marks]*

Task 5

Experimental designs

As before - read the textbook pages that are on pages 16 and 17 of this booklet. Make a page of notes using the Cornell method on page 16. Then answer the questions on this page.

1. Identify whether the following are examples of independent groups, repeated measures or matched pairs:
    a. Depressed participants were assigned to receive either cognitive or behavioural therapy. A standardised test for depression was administered and participants were matched according to the severity of their symptoms.
    b. A researcher randomly assigned participants to one of two conditions. Those in condition 1 were asked to recall a list of words grouped into meaningful categories; those in condition 2 were asked to recall the same words grouped randomly.
    c. To find out if students are more alert in the morning or afternoon, all students were given a hazard perception test before school and at the end of the day.

2. Identify the limitation of a matched pairs design:

    a. Lower risk of participant variables than independent groups
    b. Lower risk of demand characteristics than repeated measures
    c. Less economical to carry out than other designs
    d. Lower risk of order effects than repeated measures

3. Which of the following is not a type of order effect?

    a. Fatigue
    b. Intelligence
    c. Practice
    d. Boredom

4. Which design completely removes the problem of participant variables?

    a. Independent groups
    b. Matched pairs
    c. Repeated measures

Key Points	Details

Summary

Experimental designs

The specification says...

Experimental designs: repeated measures, independent groups, matched pairs.

Control: random allocation and counterbalancing.

In order to find out whether the independent variable (IV) affects the dependent variable (DV), we need something to compare it with – a comparison condition – a different level of the IV.

This leads us to three types of experimental design, each with different strengths and limitations.

Key terms

Experimental design The different ways in which participants can be organised in relation to the experimental conditions.

Independent groups design Participants are allocated to different groups where each group represents one experimental condition.

Repeated measures All participants take part in all conditions of the experiment.

Matched pairs design Pairs of participants are first matched on some variable(s) that may affect the dependent variable. Then one member of the pair is assigned to Condition A and the other to Condition B.

Random allocation An attempt to control for participant variables in an independent groups design which ensures that each participant has the same chance of being in one condition as any other.

Counterbalancing An attempt to control for the effects of order in a repeated measures design: half the participants experience the conditions in one order, and the other half in the opposite order.

Study tip

Don't confuse experimental 'designs' with 'types' of experiment (as in lab, field, natural and quasi – covered on the next spread). It's easily done so make sure you're aware of the difference!

Experimental designs

Experimental design refers to the way in which participants are used in **experiments**. By 'used' we do not mean taking them out for dinner and never calling them again, we mean how participants are *arranged* in relation to the different experimental conditions.

Independent groups

An independent groups design is when two separate groups of participants experience two different conditions of the experiment. If there are two levels of the **independent variable** (IV) this means that all participants experience one level of the IV only. In our *SpeedUpp* energy drink investigation this would involve:

- One group of participants (group 1) drinking the energy drink (let's call this condition A, the **experimental condition**).
- A different group of participants (group 2) drinking the water (let's call this condition B, the **control condition**).

The performance of the two groups would then be compared. In this case, we would compare the difference in the **mean** number of words spoken in the five-minute period after drinking for each group/condition.

Repeated measures

Another way of carrying out the energy drink investigation would be to use a repeated measures design – all participants experience *both* conditions of the experiment.

- Each participant would first, for example, experience condition A (the energy drink condition, the experimental condition).
- Each participant would then later be tested again in condition B (the glass of water condition, the control condition).

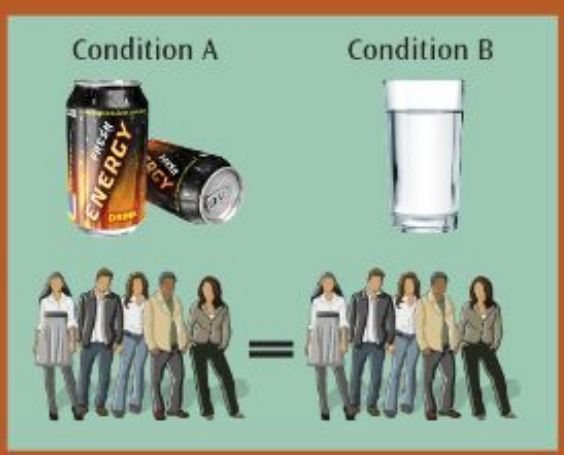
Following this, the two mean scores from both conditions would be compared to see if there was a difference.

Matched pairs

In a matched pairs design, participants are paired together on a variable or variables relevant to the experiment. For instance, in a memory study participants might be matched on their IQ, as this might be a good indicator of their ability to recall information. The two participants with the first and second highest IQ scores would be paired together, as would the participants with the third and fourth highest, and so on. Then one participant from each pair would be allocated to a different condition of the experiment. This is an attempt to control for the **confounding variable** of **participant variables** and often necessitates the use of a pre-test if matching is to be effective.

So back to our *SpeedUpp* study, we might observe participants interacting in a room before the experiment begins and select the two people that appear to be the chattiest. One of the pair would be placed in condition A and the other in condition B. We would then do the same with the third and fourth most talkative participants, and so on. The experiment would then be run in the same way as an independent groups design (see above).

In an independent groups design (left) the participants in each condition are different...but they are the same in a repeated measures design (right).



Evaluation

Independent groups

The biggest issue with an independent groups design is that the participants who occupy the different groups are not the same in terms of participant variables. If a researcher finds a mean difference between the groups on the **dependent variable** (DV) this may be more to do with participant variables than the effects of the IV. These differences may act as a confounding variable, reducing the **validity** of the findings. To deal with this problem researchers use random allocation (see right).

Independent groups designs are less economical than repeated measures as each participant contributes a single result only. Twice as many participants would be needed to produce equivalent data to that collected in a repeated measures design. This increases the time/money spent on recruiting participants.

The strengths of using independent groups are that **order effects** are not a problem whereas they are a problem for repeated measures designs. Participants also are less likely to guess the aims.

Repeated measures

The biggest issue for repeated measures is that each participant has to do at least two tasks and the order of these tasks may be significant (i.e. there are order effects). In the energy drink example, having the energy drink first may have a continuing effect when a participant drinks water afterwards. To deal with this, researchers use counterbalancing (see right).

Order effects also arise because repeating two tasks could create boredom or fatigue that might cause deterioration in performance on the second task, so it matters what order the tasks are in. Alternatively, participants' performance may improve through the effects of practice, especially on a skill-based task – in this case participants would perform better on the second task. Order acts as a confounding variable.

It is also more likely that participants will work out the aim of the study when they experience all conditions of the experiment. For this reason, **demand characteristics** tend to be more of a feature of repeated measures designs than independent groups.

The strengths of using repeated measures are that participant variables are controlled (therefore higher validity) and fewer participants are needed (therefore less time spent recruiting them).

Matched pairs

Participants only take part in a single condition so order effects and demand characteristics are less of a problem.

Although there is some attempt to reduce participant variables in this design, participants can never be matched exactly. Even when identical twins are used as matched pairs, there will still be important differences between them that may affect the DV.

Matching may be time-consuming and expensive, particularly if a pre-test is required, so this is less economical than other designs.

Apply it Methods

Which design?

Questions

Which of the following is an independent groups design, a repeated measures design or a matched pairs design? (*1 mark each*)

1. Depressed participants were assigned to receive either cognitive therapy or behaviour therapy for a 12-week period. A standardised test for depression was administered and participants were paired on the severity of their symptoms.
2. A researcher randomly assigned student volunteers to two conditions. Those in condition 1 attempted to recall a list of words that were organised into meaningful categories; those in condition 2 attempted to recall the same words, randomly grouped on the page.
3. To investigate whether students are more alert in the morning or the afternoon, each student is given a hazard perception test before school and at the end of the day.

Apply it Methods

Random allocation

To address the problem of participant variables in an independent groups design, participants should be randomly allocated to the different experimental conditions. Random allocation attempts to evenly distribute participant characteristics across the conditions of the experiment using random techniques – for example pieces of paper with A or B written on them are placed in a 'hat' and the researcher selects them one at a time to assign participants to groups.

Question

Explain *one* way in which we could have randomly allocated participants to the two conditions in the energy drink study. (*3 marks*)

Apply it Methods

Counterbalancing

Counterbalancing is an attempt to control order effects in a repeated measures design. In counterbalancing, half the participants take part in condition A then B, and the other half take part in condition B then A as follows:

Participant 1	A–B
Participant 2	B–A
Participant 3	A–B and so on.

Counterbalancing is sometimes referred to as the ABBA technique for obvious reasons i.e. where every participant does four trials, A, B, B then A.

Note (as with random allocation in relation to participant variables), counterbalancing does not remove or prevent the problem, but *attempts* to balance out the effects.

Question

Explain how, if we had used a repeated measures design in the energy drink study, we could have counterbalanced the two conditions. (*3 marks*)

Apply it Methods

Rat-man

Look at the Bugelski and Alampay rat-man study on page 113. Explain why a repeated measures design would not have been suitable for this investigation. (*2 marks*)

It's a little known fact that the Swedish pop group ABBA took their name from a way of reducing order effects in a repeated measures design experiment.

Check it

1. Outline what is meant by 'random allocation' **and** outline **one** way in which this could be carried out. *[3 marks]*
2. Explain **one** limitation of a repeated measures design. *[3 marks]*
3. Outline what is meant by a 'matched pairs design'. *[2 marks]*

Task 6

Experiment types

As before - read the textbook pages that are on pages 20 and 21 of this booklet. Make a page of notes using the Cornell method on page 16. Then answer the questions on this page.

1. Identify which type of experiment all of the scenarios below are - either lab, field, natural or quasi.
    a. Measuring the ability of three groups of children to put a comic strip in the right order - one group has a diagnosis of autism, one group has Down syndrome, and the third has no diagnosis.
    b. Measuring the number of bystanders who helped a man collapsed on a subway when he was smartly dressed with a stick compared to when he was dressed shabbily and smelled of alcohol.
    c. Measuring aggression levels of children in a Canadian town before and after television was introduced to the area.
    d. Measuring participant ratings of how bright and appealing pictures of food appeared to them; one group had been deprived of food for 4 hours beforehand, the other had eaten normally.
    e. Measuring the stress levels of town residents before and after a zombie invasion
    f. Comparing the performance of a group of humans and a group of zombies on a video game.
    g. Measuring the response of zombies to a range of stimuli, e.g. bright lights and electric shocks.
    h. Counting how many people refuse to enter a lift when there is one zombie in it compared to when there are three zombies in it.

2. Identify the advantage of a lab experiment:

    a. High in external validity
    b. Lack control of extraneous variables
    c. Standardised procedure makes them easy to replicate

3. There is higher realism in a field experiment than a lab experiment - true or false?

4. Quasi experiments can't be conducted in a lab - true or false?

Key Points	Details

Summary

Types of experiment

The specification says...

Types of experiment, laboratory and field experiments; natural and quasi-experiments.

All experiments involve a change in an independent variable, with the researcher recording or measuring the subsequent effects on the dependent variable.

How the IV changes, and *under what circumstances*, varies from one type of experiment to another. There are four different types of experiment used in psychology, each with its own strengths and limitations.

Key terms

Laboratory (lab) experiment An experiment that takes place in a controlled environment within which the researcher manipulates the IV and records the effect on the DV, whilst maintaining strict control of extraneous variables.

Field experiment An experiment that takes place in a natural setting within which the researcher manipulates the IV and records the effect on the DV.

Natural experiment An experiment where the change in the IV is not brought about by the researcher but would have happened even if the researcher had not been there. The researcher records the effect on a DV they have decided on.

Quasi-experiment A study that is almost an experiment but lacks key ingredients. The IV has not been determined by anyone (the researcher or any other person) – the 'variables' simply exist, such as being old or young. Strictly speaking this is not an experiment.

Good enough to eat?
If a researcher had deprived you of food for four hours you might perceive this cake as being brighter than if you had just eaten, but would you have been involved in a lab, field, natural or quasi-experiment?

Laboratory experiments

Laboratory experiments are conducted in highly controlled environments. This is not always a laboratory (**lab**) – it could, for example, be a classroom where conditions can be well-controlled.

Strengths

Lab experiments have high control over **confounding** (CVs) and **extraneous variables** (EVs). This means that the researcher can ensure that any effect on the **dependent variable** (DV) is likely to be the result of manipulation of the **independent variable** (IV). Thus, we can be more certain about demonstrating cause and effect (high **internal validity**).

Replication is more possible than in other types of experiment because of the high level of control. This ensures that new extraneous variables are not introduced when repeating an experiment. Replication is vital to check the results of any study to see whether the finding is **valid** and not just a one-off.

Limitations

Lab experiments may lack **generalisability**. The lab environment may be rather artificial and not like everyday life. In an unfamiliar context participants may behave in unusual ways so their behaviour cannot always be generalised beyond the research setting (low **external validity**).

As well as this, participants are usually aware they are being tested in a lab experiment (though they may not know why) and this may also give rise to 'unnatural' behaviour (see **demand characteristics** described on page 170).

Furthermore, the tasks participants are asked to carry out in a lab experiment may not represent everyday experience; for instance, recalling unconnected lists of words as part of a memory experiment (low **mundane realism**).

Field experiments

In **field experiments** the IV is manipulated in a natural, more everyday setting (in *the* field). The researcher goes to the participants' usual environment rather than, in a lab experiment, participants going to a researcher's lab.

Strengths

Field experiments have higher mundane realism than lab experiments because the environment is more natural. Thus field experiments may produce behaviour that is more valid and authentic. This is especially the case as participants may be unaware they are being studied (high external validity).

Limitations

However, there is a price to pay for increased realism due to the loss of control of CVs and EVs. This means cause and effect between the IV and the DV in field studies may be much more difficult to establish and precise replication is often not possible.

There are also important **ethical issues**. If participants are unaware they are being studied they cannot **consent** to being studied and such research might constitute an invasion of **privacy**.

Apply it
Methods

Lab, field, natural or quasi? You decide

Questions

Which of the four investigations below is the lab experiment, the field experiment, the natural experiment and the quasi-experiment? (*1 mark each*)

1. Three groups were recruited – autistic children, children with Down syndrome and a control group (*no diagnosis*). The autistic children did significantly worse on a task involving putting a comic strip in the right order (Baron-Cohen *et al.* 1986).
2. An experiment was conducted on a busy New York subway in which a researcher pretended to collapse. It was found more people helped when the victim was carrying a walking stick than when they smelt of alcohol (Piliavin *et al.* 1969).
3. The behaviour of children aged 6–11 in a Canadian town was monitored before and after television was first introduced. Increases in levels of aggression were observed after the children had access to television (Williams 1986).
4. Participants were deprived of food and water for four hours and then shown pictures of food. These participants rated the pictures of food as being brighter than the control group who had not been food-deprived (Gilchrist and Nesburg 1952).

...and 205

Natural experiments

Natural experiments are like a lab or field experiment insofar as the researcher measures the effect of an IV on a DV. However, what distinguishes a natural experiment is the researcher has no control over the IV and cannot change it – someone or something else causes the IV to vary. For example, before and after a natural disaster or whether a child is in hospital at age 5 or 10.

Note that it is the IV that is natural, not necessarily the setting – participants may be tested in a lab. The DV may also be naturally occurring (e.g. exam results) or may be devised by the experimenter and then measured in the field or a lab.

Strengths

Natural experiments provide opportunities for research that may not otherwise be undertaken for practical or ethical reasons, such as the studies of institutionalised Romanian orphans (Rutter *et al.*, see page 92).

Natural experiments often have high external validity because they involve the study of real-world issues and problems as they happen, such as the effects of a natural disaster on stress levels.

Limitations

A naturally occurring event may only happen very rarely, reducing the opportunities for research. This also may limit the scope for generalising findings to other similar situations.

Another issue is that participants may not be **randomly allocated** to **experimental conditions** (note that this only applies when there is an **independent groups design**). This means the researcher might be less sure whether the IV affected the DV. For example, in the study of Romanian orphans, the IV was whether children were adopted early or late. However, there were lots of other differences between these groups, such as those who were adopted late may also have been less sociable than some of the other children which may have made them less appealing for prospective parents.

Such research may be conducted in a lab and therefore may lack realism and demand characteristics may be an issue.

Quasi-experiments

Quasi-experiments have an IV that is based on an existing difference between people (for instance, age or gender). No one has manipulated this variable, it simply exists and, unlike in a natural experiment, the 'independent variable' cannot be changed. For instance, if the anxiety levels of phobic and non-phobic patients were compared, the IV of 'having a phobia' would not have come about through any experimental manipulation.

As with a natural experiment, the DV may be naturally occurring (e.g. exam results) or may be devised by the experimenter and measured in the field or a lab.

Strengths and limitations

Quasi-experiments are often carried out under controlled conditions and therefore share some strengths of a lab experiment (e.g. replication).

Quasi-experiments, like natural experiments, cannot randomly allocate participants to conditions and therefore there may be **confounding variables**.

In addition, in both quasi-experiments and natural experiments, the IV is not deliberately changed by the researcher and therefore we cannot claim that the IV has caused any observed change.

We might expect a rise in people's stress levels as a result of a zombie outbreak, but what type of experiment would measure this?

Apply it Methods — Experiments with zombies

Questions

1. Identify the type of **experiment** (lab, field, natural or quasi) described below. *(1 mark each)*
   a) Measuring the change in stress levels in the local residents of a town following a zombie invasion.
   b) Comparing the performance of a group of 20 humans and a group of 20 zombies on a video game that requires divided attention and multitasking.
   c) Measuring the physiological response of zombies to a range of stimuli including bright light, loud noise and mild electric shocks.
   d) Recording the number of people who refuse to enter a lift when one zombie is in there compared to when there are three zombies in there.
2. What are the strengths *and* limitations of each of the experiments described above? *(2 marks each)*

Apply it Methods — 'True' experiments

In a true experiment the IV is under the direct control of the researcher who manipulates it and records the effect on the DV. From this perspective, only lab and field experiments are true experiments as they involve manipulation of the IV by the researcher.

Questions

1. Explain why natural and quasi-experiments cannot be classified as 'true' experiments. *(2 marks)*
2. Decide which of the following studies would be classed as true experiments and which would not. *(1 mark each)*
   a) Comparing the attitudes of psychology and sociology students towards independent study.
   b) Comparing the recall of students who learned a psychology theory in groups and those who learned on their own.
   c) Comparing the exam results of men and women.
   d) Comparing the progress of students who were randomly assigned at the beginning of the year to either a group taught using traditional methods or a group taught using contemporary methods.

Study tip

Internal validity is about what goes on inside an experiment. Was it poorly controlled? Was the task really mundane? If so, the findings are probably meaningless.

External validity is about generalising the findings from a study to other situations, such as everyday life. That's the whole point of doing research!

Students often think that lab studies don't tell us much about everyday life because they are artificial but that's not always true – often it is the task that is artificial (low mundane realism) and this can be true in a field experiment – reducing external validity.

Check it

1. Explain what is meant by a 'laboratory experiment'. *[3 marks]*
2. Explain **one** strength **and one** limitation of a field experiment. *[2 marks + 2 marks]*
3. Explain the difference between a field experiment and a natural experiment. *[4 marks]*

Task 1

Memory experiment

I would like you to find three people who are willing to act as participants in a short memory experiment. You are going to test the 'serial position effect' - which predicts that people will remember more words from the start and end of a list than those in the middle.

You will need to generate a list of 21 words. There are word generators online to help you.

You will need to read out, or ask them to read the list of words. Then test them on the list of words and record how often each word in the list was recalled.

When you have results from all three people, you can calculate and compare the mean recall scores for words in the first seven, middle seven, and last seven words.

I will be looking for a well-standardised experiment - this means you are ensuring that each of the three participants is exposed to the same instructions, stimuli, and procedure.

I would like you to briefly write up your experiment in the following sections:

AIM - what you were trying to find out

METHOD - What you did. Split this into participants, materials used, and procedure, including how you standardised everythng

RESULTS - your final data, presented in graph form

DISCUSSION - what went well, what you would do differently next time, how you might follow this experiment up and take it further.

Please type this up (if possible, if not hand-write) and bring it to your first psychology lesson in September.