AQA Psychology A-level

Topic 7: Research Methods

Detailed Notes

Experimental Method

The experimental method concerns the **manipulation of an independent variable (IV) to have an effect on the dependent variable (DV), which is measured and stated in results**. These experiments can be: **field, laboratory, quasi or natural.**

Aims

An aim is a general statement made by the researcher which tells us what they plan on investigating, **the purpose of their study.** Aims are developed from theories and develop from reading about other similar research.

Hypotheses

A hypothesis is a precise statement which **clearly states the relationship between the variables being investigated**. The hypothesis can either be non-directional or directional. A directional hypothesis states the direction of the relationship that will be shown between the variables whilst a non-directional hypothesis does not.

E.g. If a researcher is carrying out a study to investigate whether sleep helps memory performance:

- A directional hypothesis for this would be - **"The more sleep a participant has the better their memory performance."**
- A non-directional hypothesis would be - "The difference in the amount of hours of sleep a participant has will have an effect on their memory performance, which will be shown by the difference in the memory test scores of the participants."

A directional hypothesis tends to be used when there has already been a range of research carried out which relates to the aim of the researcher's investigation. The data from this previous research would suggest a particular outcome. However if there has been no previous research carried out which relates to the study's aim or the research is contradictory than a non-directional hypothesis is appropriate.

Independent and dependent variables

The **independent variable** refers to the aspect of the experiment which **has been manipulated by the researcher or simply changes naturally to have an effect on the DV which is then measured.** The **dependent variable** is the aspect of the study which is **measured by the researcher and has been caused by a change to the IV.** All other variables that could affect the DV should be carefully controlled so that the researcher is able to confidently conclude that the effect on the DV was caused by only the IV.

In order to properly test the effect of the IV we need different conditions: the experimental condition and the control condition. You can have various experimental conditions which will allow you to compare the effects of different levels of the IV.

Operationalisation of variables

Operationalisation refers to the act of a researcher **clearly defining the variables in terms of how they are being measured.** This means the variables should be defined and measurable. The hypotheses states should also show this operationalisation e.g. the aforementioned directional hypothesis would be even better if operationalised:

"Participants that get at least four hours of sleep will show better performances on the memory test, shown by them achieving higher scores than the participants that got less than four hours of sleep." It could even be further operationalised when more details of the investigation are given, such as the number of questions in the test, hence the maximum score a participant can achieve.

Control of Variables

Extraneous variables and confounding variables

In an experiment, the only aspect that should affect the DV is the IV. Any other variables that may interfere with the IV or the DV should be **removed from the experiment or well controlled.** Such variables can be confounding or extraneous. An **extraneous variable** refers to **any other variable which is not the IV that affects the DV and does not vary systematically with the IV, they are essentially nuisance variables**. Examples are the lighting in the lab or the age of participants - these variables do not confound the results of a study but just make them harder to detect.

A **confounding variable** is also described as a variable other than the IV which has an effect on the DV. Unlike the extraneous variable, confounding variables **do change systematically with the IV**. With these variables it becomes **difficult for the researcher to be sure of the origin of the impact of the DV** as the confounding variable (not the IV) could have been the cause. An example for the aforementioned sleep study would be time of day the experimental task is done - those who complete the memory test later in the day may be more tired and therefore do worse, obscuring the true relationship between lack of sleep and memory performance. Therefore, potential confounding variables must be identified and controlled; in this case the participants should take the test at the same time of day.

Demand characteristics and Investigator effects

Demand characteristics refer to **any cue the researcher or the research situation may give which makes the participant feel like they can guess the aim of the investigation** . This can cause the participant to act differently within the research situation from how they would usually act. This is as participants from the start of the experiment are trying to figure out what's going on in this new situation they find themselves in - this is known as participant reactivity. They may change their behaviour to fit the situation rather than acting naturally.

They may act in a way they think the researcher wants them to which is known as the **'Please-U effect'** or they may intentionally underperform to sabotage the study's results, the **'screw-U effect'.** This unnatural behaviour then affects the validity of the results, hence demand characteristics provides a problem for research.

Participant reactivity may also lead to **investigator effects** which refers to **any unwanted influence from the researcher's behaviour, either conscious or unconscious, on the DV measured (the research's results)**. This includes a variety of factors :- the design of the study, the selection of participants and the interaction with each participant during the research investigation.

Randomisation and Standardisation

To minimise the effects of extraneous or confounding variables different steps can be taken by the researcher like randomisation and standardisation. **Randomisation** is the **use of chance to**

reduce the effects of bias from investigator effects. This can be done for the design of materials, deciding the order of conditions, the selection of participants e.t.c.

Standardisation describes **using the exact same formalised procedures and instructions for every single participant involved in the research process.** This allows there to eliminate non-standardised instructions as being possible extraneous variables.

Experimental Method: Types of Experiment

Design	Description	Strengths	Limitations
Laboratory	An experiment that takes place in a **special environment** whereby **different variables can be carefully controlled.**	**High degree of control**- experimenters control all variables,the IV has been precisely replicated, leading to greater accuracy. **Replication** - researchers can repeat experiments and check results.	**Experimenter's bias**- this bias can affect results and participants may be influenced by these expectations. **Low ecological validity**- high degree of control makes the situation artificial, unlike real life.
Field	An experiment conducted in a more **natural environment, not in a lab** but with **variables still being well controlled.**	**Naturalistic -** so more natural behaviours hence high ecological validity. **Controlled IV**	**Ethical considerations-** invasion of privacy and likely to have been no informed consent. **Loss of control-** over extraneous variables hence precise replication not possible.
Quasi	An experiment whereby the **IV has not been determined by the researcher**, instead it **naturally exists** e.g gender difference studies.	**Controlled conditions**- hance replicable, likely to have high internal validity.	**Cannot randomly allocate participants-** to conditions so there may be confounding variables presented. This makes it harder to conclude that the IV caused the DV.
Natural	An experiment in which the **IV is not brought about by the researcher** hence would have happened even if the researcher had not been there e.g. if studying reactions to earthquakes.	**Provides opportunities-** for research that would have otherwise been impossible due to practical or ethical reasons. **High external validity**- as you are dealing with real life issues.	**Natural occurring events**- may be rare this means these experiments are not likely to be replicable hence hard to generalise findings. **Very difficult to randomise-** participants into groups so confounding & extraneous variables become a problem.

Sampling

The researcher needs to decide how they select participants to take part in their investigation.The **population** is a group of people from whom the sample is drawn.

E.g. If the sample of participants are taken from the sixth formers going to schools in London, the findings of the study can only be applied for that certain group of people and not all the sixth formers in the UK.

There are various methods that a researcher can use to select participants:

Sampling Method	Explanation	Strengths	Limitations
Opportunity sampling	Participants **happen to be available** at the time which the study is being carried out so are **recruited conveniently.**	Easy method of recruitment which is **time saving and less costly.**	**Not representative** of the whole population hence lacks generalisability. **Researcher bias** is presented as they control who they want to select.
Random sampling	This is when all members of the population have the same **equal chances of being the one that is selected.** The method used is :- each member of the population is assigned a number then either **a random number table or a random number generator or the lottery method** is used to randomly choose a partner.	**No researcher bias**- researcher has no influence of who is picked.	**Time consuming-** need to have a list of members of the population (sampling frame) and then contacting them takes time. **Volunteer bias-** participants can refuse to take part so can end up with an unrepresentative sample.
Systematic sampling	A predetermined system is used whereby **every nth member is selected from the sampling frame.** This numerical selection is applied consistently.	Avoids researcher bias and **usually fairly representative** of population.	**Not truly unbiased** unless you use a random number generator and then start the systematic sample.

Stratified sampling	With this method the **composition of the sample reflects the varying proportions of people in particular subgroups (strata) within the wider population**. Firstly you identify strat. Then you calculate the required proportion needed for each stratum based on the target population. Then select sample at random from each stratum using a random selection method.	**No researcher bias-** the selection within each stratum is done randomly. Produces **representative data due to the proportional strata** hence generalisation is possible.	**Time consuming** to identify strata and contact people from each. A complete representation of the target population is not possible as the **identified strata cannot reflect all the differences between the people of the wider population.**
Volunteer sampling	Involves **self selection** whereby the participant offers to take part either in response to an advert or when asked to.	Quick access to willing participants which makes it e**asy and not time consuming.** As participants are willing to take part they are **more likely to cooperate in the study.**	**Volunteer bias**- they study may **attract a particular profile of a person**. This means generalisability is then affected. **Motivations like money** could be driving participation so participants **may not take study seriously,** influencing the results.

Experimental Design

Design	Description	Strengths	Limitations	Solution
Independent groups design	The participants only perform in **one condition of the independent variable (IV).**	-There are **no order effects** presented. - Participants are less likely to guess the aims of the study (**demand characteristics are eliminated**).	- No control over **participant variables** whereby different abilities of participants in the various conditions can cause changes to the DV.. -You need more participants than other designs to gather the same amount of data.	**Random allocation** solves the first limitation mentioned.This is as it ensures that each participant has the same chance of being in one condition of the IV as another.
Repeated measures	The **same participants take part in all conditions of the IV.**	- Eliminates **participant variables.** - Fewer participants needed, so **not as time consuming** finding and using them.	- **Order effects** presented e.g. boredom may mean in second condition done participant does not do as well on task.	**Counterbalancing** - this is when half of the participants do conditions in one order and the other half do it in an opposite order.
Matched pairs	**Pairs of participants** are **first matched on some variable** that has been found to affect the dependent variable (DV), then **one member of each pair does one condition and the other does another.**	- **No order effects.** - **Demand characteristics** are **less** of a problem.	- **Time consuming and expensive to match** participants. - A **large pool of potential participants is needed** which can be hard to get. - Difficult to know **which variables are appropriate** for the participants to be matched.	

Pilot Studies

A **pilot study** is a **small-scale version of an investigation which is done before the real investigation is undertaken**. They are carried out to allow potential problems of the study to be identified and the procedure to be modified to deal with these. This also allows money and time to be saved in the long run.

Single-Blind and Double-Blind Procedures

Single-blind procedure

A research method in which the researchers do not tell the participants if they are being given a test treatment or a control treatment. This is done in order to ensure that participants do not bias the results by acting in ways they "think" they should act-**avoids demand characteristics.**

Double-blind procedure

A research procedure in which neither the participants nor the experimenter knows who is receiving a particular treatment. This procedure is utilised to prevent bias in research results.

Double blind studies are particularly useful for preventing bias due to demand characteristics or the placebo effect. Gives a way to reduce the investigator effects as the investigator is unable to unconsciously give participants clues as to which condition they are in.

Control group/condition - **sets a baseline** whereby **results from the experimental condition can be compared to results from this one.** If there is a significantly greater change in the experimental group compared to the control than the researcher is able to conclude that the cause of effect was the IV.

Observational Techniques

Type of observation and description	Strengths	Limitations
Naturalistic- watching and recording behaviour in the **setting where it would normally take place.**	- High ecological validity -**High external validity** as done in a natural environment	- Low ecological validity if participants become aware that the are being watched. - Replication can be difficult. - Uncontrolled confounding and extraneous variables are presented.
Controlled- Watching and recording behaviour in a **structured environment e.g. lab setting.**	- Researcher is able to focus on a particular aspect of behaviour. - There is more control over extraneous and confounding variables - Easy replication.	- More likely to be observing **unnatural behaviour** as takes place in an unnatural environment. - **Low mundane realism so low ecological validity.** - Demand characteristics presented.
Overt- participants are watched and their behaviour is	- **Ethically acceptable** as informed consent is given.	- More likely to be recording unnatural behaviour as

recorded with them **knowing they are being watched.**		participants know they are being watched. -Demand characteristics likely which reduces validity of findings.
Covert- the participants are **unaware that their behaviour is being watched and recorded.**	-**Natural behaviour** recorded hence high internal validity of results. -removes problem of participant reactivity whereby participants try to make sense of the situation they are in, which makes them more likely to guess the aim of the study.	- **Ethical issues presented** as no informed consent given. Also could be invading the privacy of the participants.
Participant- The researcher who is observing **is part of the group that is being observed.**	- Can be **more insightful** which increases the validity of the findings.	-There's always the possibility that behaviour may change if the participants were to find out they are being watched. - Researcher **may lose objectivity** as may start to identify too strongly with the participants.
Non-participant- The researcher observes **from a distance so is not part of the group being observed.**	- Researcher **can be more objective** as less likely to identify with participants since watching from outside of the group.	- Open to observer bias for example of stereotypes the observer is aware of. - Researchers may **lose some valuable insight.**

Observational Designs

One problem with carrying out observations is that **observer bias** is easily presented. This is when **an observer's reports are biased by what they expect to see.** A solution to this problem is checking the **inter observer reliability** of the observation. This is done by many researchers conducting the observational study , their reports are then compared and a score calculated using the formula :-

Total number of agreements / total number of observations x 100 .

The score that shows high inter observer reliability is **any score above 80%.**

There are different types of observational designs and each has their strengths and weaknesses :-

Design and description	Strengths	Limitations
Unstructured- consists of **continuous recording** where	- More **richness** and **depth of detail.**	- Produces qualitative data which is **more difficult to**

the researcher writes everything they see during the observation		**record & analyse.** - Greater risk of **observer bias** e.g. only record **'catch the eye' behaviours.**
Structured- Here the researcher **quantifies** what they are observing using **predetermined list of behaviours and sampling methods.**	- **Easier** as is more systematic. - Quantitative data is collected which is **easy to analyse and compare with other data.** - There is **less risk of observer bias.**	- Not much **depth of detail.** - Difficult to achieve **high inter observer reliability** as filling the predetermined lists in is subjective.

Whilst conducting structured observations, **behavioural categories** can be used. This is when a **target behaviour which is being observed is broken up into more precise components which are observable and measurable e.g. aggressive behaviour can be broken down to - shouting, punching, swearing etc.** When forming a behavioural categories list, it is important to make sure that behaviours do not overlap with other behaviours, so very similar behaviours should not be listed e.g. grin and smile. They should be clearly operationalised. During structured interviews there are different types of sampling methods:

Method and description	Strengths	Limitations
Time sampling- this is the recording of behaviour within **a timeframe that is pre-established** before the observational study.	- It **reduces the number of observations t**hat has to made so it is less time consuming.	- The small amount of data that you collect within that time frame ends up being **unrepresentative of the observation as a whole.**
Event sampling- this involves the **counting of the number of times a particular behaviour is carried out** by the target group or individual you are watching.	- It is **good for infrequent behaviours** that are likely to be missed if time sampling was used.	- If complex behaviour is being observed, **important details of the behaviour may be overlooked** by the observer. - If the behaviour is very frequent, there could be **counting errors.** - It is difficult to **judge the beginning and ending of a behaviour.**

Correlations

A **correlation** is a **mathematical technique that is used to investigate an association between two variables** which are called **co-variables**. Correlations differ to experiments as :-

- The variables are simply measured, **not manipulated** like in experiments.

- Only an association is found, **no cause-and-effect relationship found** hence the terms DV and IV are not used.

During correlational studies **correlation coefficients** are calculated. This value determines the strength and the relationship between two variables. This doesn't necessarily mean that one variable is causing another, but that there is a relationship of some sort.

There are various relationships which can be shown between the co-variables :-

- **Negative correlation** - when one variable increases the other decreases. When the data is presented on a scattergram the line of best fit has a negative gradient. It has a correlation coefficient of **less than 0.**
- **Positive correlation -** when one variable increases the other also increases. When the data is presented on a scattergram the line of best fit has a positive gradient.It has a correlation coefficient of **more than 0.**
- **Zero correlation -** no relationship is found between the co-variables. When the data i s presented on a scattergram, no line of best fit can be drawn as the points on the scattergram are random. It has a correlation coefficient **equal to 0.**

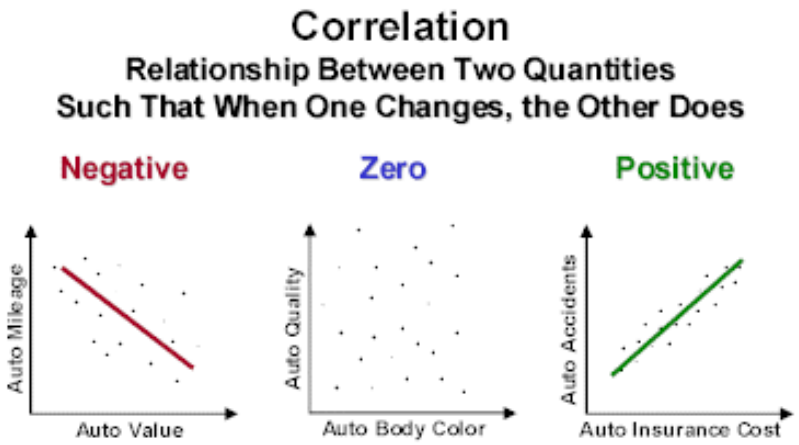


Image Source

- **Curvilinear relationship-** as one variable increases, so does the other but only up to a certain point after which as one variable continues to increase the other begins to decrease. Ona graph this forms an inverted U shape. An example of such a relationship is shown by the **Yerkes-Dodson Law from the topic of Memory which shows how anxiety affects eyewitness testimony.**

Just as you have hypotheses for experiments researchers also state hypothesis for correlational studies. **A directional hypothesis states whether there will be a negative or positive correlation between the co-variables being studies whilst a non-directional hypothesis only states there will be a correlation but the type is unknown.**

Strengths and Limitations of Correlations:

Strengths	Limitations
- They can be used as **starting points** to assess patterns between co-variables before committing to conducting an experimental study. - **Quick and economical** to carry out. - **Secondary data** can be used in the correlational study which makes it **even less time consuming.**	- It is **difficult to establish a cause and effect relationship,** really only an association is found. -The **third variable problem** is presented - this is when there is a chance that there is another variable, **a third variable which the researcher is unaware of that is responsible for the relationship between the co-variables.** - Lastly, correlations tend to be **misused or misinterpreted** especially when made public by the media - correlation is often presented as causation.

Data Analysis: Types of Data

Type and description	Strengths	Limitations
Qualitative data- data which is **displayed in words , is non-numerical.**	- More richness and depth of detail. - Allows participants to further develop their opinions hence has greater external validity. - A more meaningful insight into the participants' views is achieved.	- Difficult to analyse. - Difficult to make comparisons with other data. - Researcher bias presented as conclusions rely on the subjective interpretations of the researcher (interpretative bias).
Quantitative data- data that is **displayed numerically, not in words.**	- Can be analysed statistically so converted to graphs or charts. - This makes it easy to make comparisons with other data.	- Lack of depth in detail. - No meaningful insight into participants' views. - As participants are not able to develop their opinions the results have low external validity.
Primary data - this is when information is **obtained first hand by the researcher** for an investigation.	-Targets the exact information which the researcher needs, so the data fits their aims and objectives.	- Requires time and effort. - Can be expensive.
Secondary data - this is when information is collected by someone else other than the researcher yet is used by the	- Expensive - Data is accessed so requires minimal effort to collect.	- It may be likely that the data is outdated or incomplete. - The data may not be reliable- the researcher was

researcher for their investigation. Also known as **'desk research'.**		not there when the study was conducted so is likely to be unsure of the validity of the results.
Meta-analysis - this is when a researcher **combines results from many different studies** and uses all the data to form an overall view of the subject they are investigating.	- More **generalisability** is possible as a larger amount of data is studied. - The researcher is able to view the evidence with more confidence as there is a lot of it.	- Publication bias such as the **file drawer problem** may be presented- this is when the researcher intentionally does not publish all the data from the relevant studies but instead chooses to leave out the negative results. This gives a false representation of what the researcher was investigating.

Data Analysis: Descriptive Statistics

Descriptive statistics are the use of tables, graphs, and summary statistics to analyse data.

Measures of central tendency

These measures refer to **any measure which calculates an average value within a set of data.**

Measure	Calculation method	Strengths	Limitations
Mean- arithmetic average.	Total of all values in a set of data is divided by the number of values.	- Makes use of all values. - Good for interval data.	- It is influenced by outliers (extreme scores) so it can be unrepresentative.
Median	Arrange data from lowest to highest then find the central value.	- Not affected by extreme scores. - Good for ordinal data.	- Not as sensitive as mean, does not use all data.
Mode	The most frequently occurring value in a set of data.	- Useful for nominal data (data in categories).	- Is not useful when there are several modes.

Measures of dispersion

These measures refer to **any measure that calculates the variation in a set of data.**

Measure	Calculation method	Strengths	Limitations
Range	Minus the lowest score from the highest score.	- Easy to calculate.	- Affected by extreme values. - Does not use all data.
Standard Deviation (SD)	The square root of the variance calculates SD. A low SD means that more data is clustered close to the mean hence there is less data spread	- Precise measure where all data values are taken into account.	- Difficult to calculate. - Affected by extreme values.

Presentation and Display of Quantitative Data

There are various ways of representing data:

Summarising data in a table

One of these ways is summarising data in a table. This is usually not in the form of raw scores but the **data has been converted into descriptive statistics** for example of the form below :-

Table showing the mean and mode of scores of a memory test

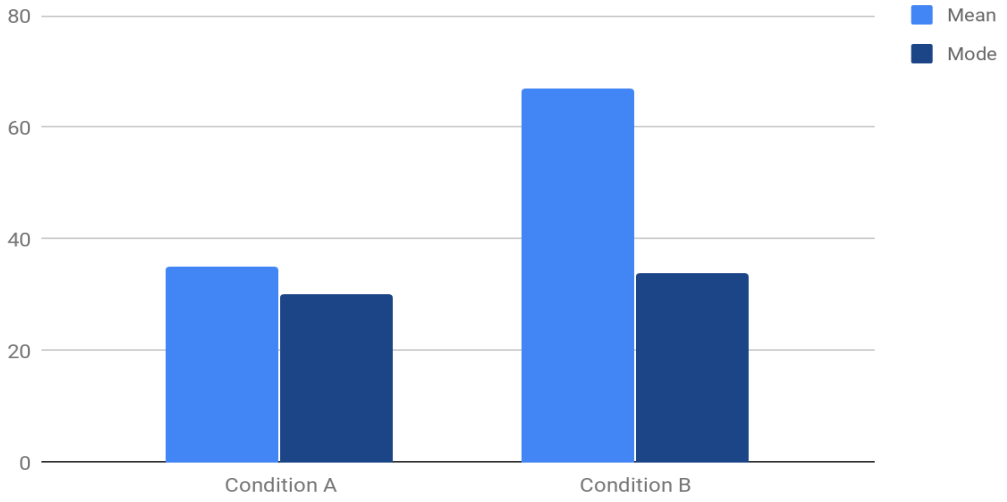
	Condition A	Condition B
Mean	35	67
Mode	30	34

Below the table there is usually a description of what the table's data means.

Bar Charts

This way of representing data allows for differences in data to be seen more clearly. They are used for **discrete data**, which describes **data that has been divided into categories.** The bars **do not touch each other which shows that we are dealing with separate conditions**.The amount of frequency for each category is plotted on the y-axis (vertical axis) whilst the categories (below these are condition A and B) are plotted on the x-axis (horizontal axis).

Table showing the mean and mode of scores of a memory test



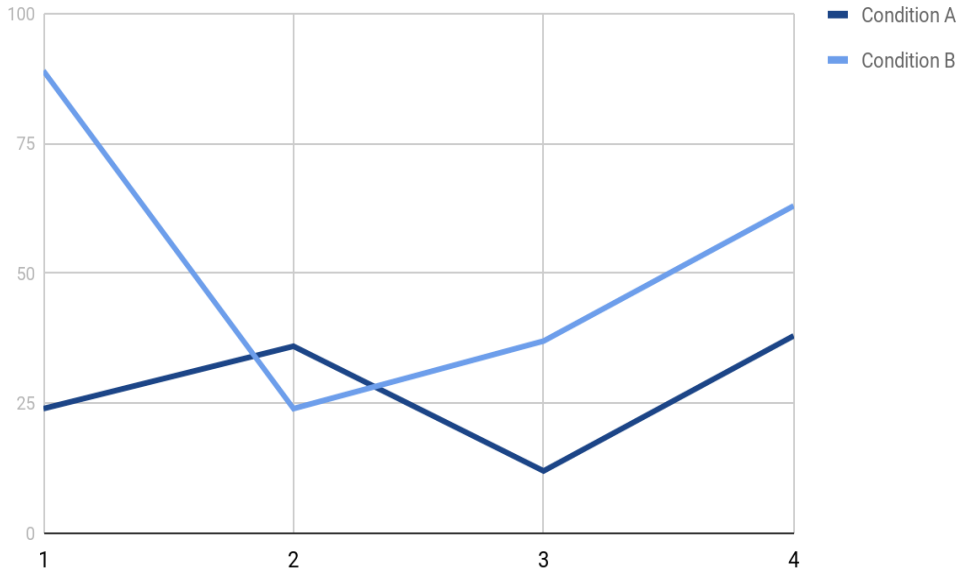
Histograms

In this form, **the bars touch each other unlike in bar charts and this represents that we are dealing with continuous data rather than discrete.** Therefore the x-axis has equal sized intervals of one category (e.g. scores of an english test in intervals 0-10, 11-21, 22-32, etc.) whilst the y-axis represents the frequency (the number of people that score each mark).

Line graphs

This form also represents continuous data , whereby **points are connected by lines to show the change of values**. As per usual, the IV is plotted on the x-axis while the DV is plotted on the y-axis

Memory test scores over a month



Scattergrams

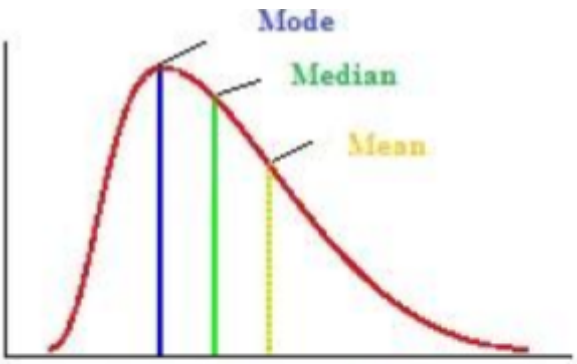
These are used to show **associations** between co-variables **rather than differences hence we came across them in the correlations topic.** Either of the co-variables can occupy the x-axis or the y-axis, and each point displayed on the graph coincides with the x and y position of the co-variables.

Distributions

Normal distribution is **a symmetrical pattern of frequency data that forms a bell-shaped pattern.**

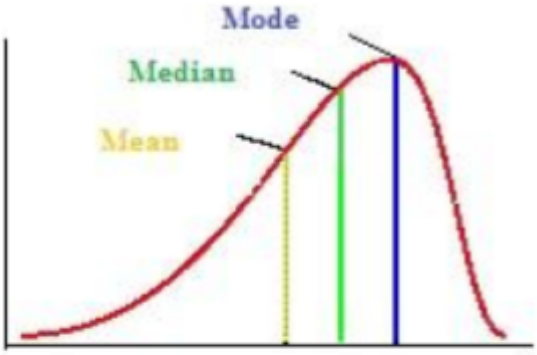
A **skewed distribution** is **a spread of frequency data that is not symmetrical, instead the data all clusters to one end.** There are two types of these :-

- **Positive skew** whereby most of the distribution of data is concentrated on the right.



Right-Skewed (Positive Skewness)

- **Negative skew** whereby most of the data distribution is concentrated on the left.



Left-Skewed (Negative Skewness)

Peer Review

AO1

Peer review is **the assessment of scientific work by experts in the same field**, it is done to make sure that all research intended to eventually be published is of **high quality**.

Main purposes of peer review:

- To know which research is **worthwhile hence funding can be allocated to it.**
- To **validate the relevance and quality of research**. This is important to prevent fraudulent research from being released to the public.
- To suggest possible **improvements or amendments** to the research study.

AO3

- **Anonymity is a problem;** reviewers sometimes use it to settle old scores or bury rivals, especially if they're competing for funds. This means that **anonymity affects the objectivity of reviewers.** Due to this, some journals have started doing **open reviewing** to avoid this problem.

- **There is publication bias involved in peer review.** Editors tend to prefer to publish **'headline grabbing' findings and positive results**. This brings about the file drawer problem whereby negative results are intentionally not published. All this causes there to be **a misconception of the current state of psychology.**

- **It can be difficult to find an expert.** Smith (1999) argues that because of this a lot of poor research is passed as the reviewer didn't really understand the work.

- **In peer review, any research that opposes mainstream theories tends to be suppressed.** This means that established scientists' work is more likely to be published and the new and challenging ideas are usually rejected. This means that the **rate of change in scientific fields is slowed down.**

- **Fraudulent research can be long-lasting which is a large problem.** An example of this is when the **MMR vaccine link to autism was found by Andrew Wakefield (1998).** This finding had implications as caused the number of measles cases to increase. It was later found that the research was fraudulent but even now there are still many people aware of these said risks and still anti-vaccine for MMR.

The Implications of Psychological Research for the Economy

The **implications** that research has refers to **how what we learn from psychological research influences our country's economic prosperity**. The **economy** is the **state of the region's activities of producing or consuming goods & services**. Absence from work costs the economy an estimate of **15 billion pounds** a year and this absence is mainly due to **mental illness** e.g. stress, anxiety. For such problems, psychology research has been able to present solutions to them and this expresses why psychology research is important for the economy.

From the various AS and A2 topics we have learnt , research in these topics has had implications for the economy:

Topic	Links to specific areas	Economy
Psychopathology	**Treatments** - Cognitive Behavioural Therapy and Rational Emotive Behavioural Therapy for depression, drug therapy for OCD.	- Workers able to return to work.
Attachment	**Role of the father -** Tiffany Field (1978) found that fathers can take on the role of being a primary caregiver.	- Mothers can return to work. - More flexible working arrangements within families. - Can maximise their income and effectively contribute to the economy.
Social Influence	**Social influence leading to social change -** Minority influence, appealing to NSI, disobedient models.	- Health campaigns. - Unions strike- make working conditions better. - Environmental campaigns- like getting companies to reduce their waste and use of non-renewable energy.
Memory	**Eyewitness testimony** - How leading questions or post event discussion can affect eyewitness testimony.	- Led to police using the cognitive interview which reduces wrongful convictions hence reduces waste of money and space in jail.

Case Studies

A **case study** is a **detailed study into the life of a person which covers great detail into their background**. It looks at the past and present behaviour of an individual to build up a **case history hence provides qualitative data.**

Examples from psychology topics we have learnt :-

- **The case study of HM from the memory topic**. HM knew how to tie shoelaces but couldn't remember stroking a dog. This showed us his procedural memory was intact but

his episodic memory wasn't. This showed us that there are different types of long term memory and these are stored in different parts of the brain.

- **Little Hans case study from the approaches topic**, in particular the psychodynamic approach. Freud used his case study as evidence for the Oedipus complex.

Strengths	Limitations
- Detailed so able to gain in depth insight. - Forms basis for future research. - From studying unusual cases you are able to infer things about normal usual behaviour of humans. - Permits investigation of situations that would be otherwise unethical or impractical.	- Not generalisable to wider populations as data is only gathered from one person. - Various interviewer biases are presented like social desirability bias (from the unique person's side) and interpretative bias (from the researcher's side). - Retrospective studies may rely on memory which can be inaccurate. - They are time consuming and difficult to replicate.

Content Analysis

Conducting a **content analysis** involves **studying human behaviour indirectly by studying things that we produce e.g. TV adverts, newspapers.** This allows us to have insight into the structured values, beliefs and prejudices of our society.

How to conduct a content analysis :

- Identify hypothesis that you will investigate.
- Create a **coding system** depending on what you are investigating e.g. 1= male, 2= female.
- Gather resources.
- Conduct content analysis and record data in a table.
- Analyse data which is descriptive and qualitative e.g. using **'thematic analysis'**- allows themes, patterns and trends to emerge in data.
- Write up a report in the format of a scientific report.

Strengths	Limitations
- Strong external validity as the data is already in the real world so it has high mundane realism. - Produces large data set of both quantitative and qualitative data that is easy to analyse. - Easy replication. - Ethical issues like 'right of privacy, confidentiality, informed consent' are avoided as data is already in the public domain.	- Observer bias is presented but it can be eliminated by achieving inter-observer reliability. - Content of choice to analyse can be biased by researcher. - Interpretative bias - the researcher may ignore some things but pay extra attention to others.

Levels of Measurement

Quantitative data can be divided into different levels of measurement, either - **nominal, ordinal or interval.**

Nominal data refers to a type of data that is **in the form of categories.** It is **discrete**- one item can only appear in one category. It **does not enable sensitive analysis** as it does not yield a numerical result for each participant.

Ordinal data refers to data which is **represented in a ranking form** e.g. 1= hates maths, 10= loves maths. There are **no equal intervals** between each unit. A weakness of it is that it **lacks precision as is based on the subjective opinion of people.**

Interval data refers to the type of data that is **based on numerical scales which include equal units of precisely defined size.** This is the most sophisticated form of data as it is based on objective measures. It is needed for the use of a parametric test.

Appropriate measures for each level of data:

Level of data	Measures of central tendency	Measures of dispersion
Nominal	Mode	n/a
Ordinal	Median	Range
Interval	Mean	Standard Deviation

Reporting Psychological Investigations: Scientific Report

Psychologists use a particular format to write up their research for publication which is known as a **scientific report.** A scientific report consists of various sections:

- **Abstract -** this part includes a summary of all the **key details of the research report.** These key details include the aim, hypothesis, method, results and conclusion. It is usually about 150-200 words long and is the part that is supposed to be read to know **whether the research study is worth examining any further.**
- **Introduction** - This includes **information of past research on a similar topic whereby relevant theories, studies and concepts are mentioned.** At the beginning it tends to be broad but as it continues towards the end the information becomes more specific until the aims and hypotheses of the study are presented.
- **Method -** This part includes **a description of what the researchers exactly did when they undertook the study**. This includes the design, sample collected (specific details e.g. target population, sampling method, demographic data of participants), materials used , procedure (specific e.g. standardised instructions for each participant), ethics etc. There should be **sufficient detail included so that any other person is able to read this part of the report and replicate the investigation precisely.**

- **Results** - This includes **all the findings from the study, presented even with inferential and descriptive statistics**. If qualitative data is collected then this section may include a thematic analysis.
- **Discussion** - This is where the researcher **considers what the findings exactly mean for us and for psychological theories**. Usually the findings are summarised here then they are discussed in context to the introduction. Limitations thus ways of improving the study and the wider implications it may have for society may also be discussed here.
- **Referencing -** This is the last part of the scientific report which is basically **a list of all the sources that were quoted or referred to in the report**. These can vary - journal articles, websites, books- and full details are given so that a reader is able to find the exact source the researcher was referring to.

  Books are referenced differently from journals:
  - Books are referenced in this order: **author(s), date, title of book (in italics or underlined), place of publication, publisher.**
    E.g. Flanagan, C. and Berry, D.(2016). *A level Psychology Year 2*. Chettenham: Illuminate Publishing.
  - Journals are referenced in this order: **author(s), date, title of article, journal name, journal volume, issue number (all appear in italics or underlined apart from author, date and title of journal article), page range.**
    E.g. Gupta,S.(1991). Effects of time of day and personality on intelligence test score. *Personality and individual differences, 12 (11)*. 1227-1231.

Introduction to Statistical Testing: Use of the Sign Test

Statistical testing provides **a way of determining whether hypotheses should be rejected or accepted.** It can tell us whether differences or relationships between variables that have been found during experiments **are statistically significant or if they have only occurred due to chance**.

An example of a statistical test is the **sign test**. A sign test can only be used for a study that :-

- Looked for a difference not an association.
- Used a related experimental design- repeated measures design.
- Collected nominal data.

How to conduct a sign test:

- **Step 1** - State the hypotheses- this includes both the alternative and the null hypothesis.
- **Step 2 -** Record data and work out the sign. For example, the sign will be negative (-) if the value has decreased in the second condition but positive (+) if it has increased. If the value has stayed the same , this value will be ignored and the N adjusted to exclude it.
- **Step 3**- Find the calculated value for the sign test, S, which is the number of times the less frequent sign occurs.

- **Step 4** - Find the critical value of S - use the calculated N value (which is the total number of values with the ignored values excluded) and $p \leq 0.05$ which means there's a less than 5% probability that the results occurred by chance.
  If S ≤ critical value- reject the null hypothesis, there is a significant difference.
  If S ≥ critical value - accept the null hypothesis, there is no significant difference.
- **Step 5 -** State conclusion whereby you refer back to the hypothesis mentioning the IV and Dv and support your conclusion with the exact values of -the critical value, S, N and what p value you used.

Choosing an Inferential Statistical Test

When choosing an inferential statistical test you have to think about **three factors**:

- **The design of the study** - Did it involve an **unrelated design** which is of the independent groups design? Did it involve a **related design** which could be either using the repeated measures or matched pair experimental design?
- **The level of data** collected during the study - either **ordinal, nominal or interval.**
- **Whether a difference or correlation is being measured**

These factors have been summarised into the table below which shows which statistical tests to use in different situations:

Type of data	**Test of difference**		**Test of association/ correlation**
	Unrelated	**Related**	
Nominal	Chi-square	Sign test	Chi-square
Ordinal	Mann-whitney	Wilcoxon	Spearman's Rho
Interval	Unrelated t-test	Related t-test	Pearson's R

Remembering the table above will help you answer exam questions which can either ask you why a student may decide to use a particular test after providing you with a stem of a research study or may ask you which statistical test is appropriate to use for that study.

Use of statistical tests

Statistical tests are used to determine **whether a significant difference or correlation exists.** This is discovered using the **calculated value** (the result obtained from the statistical test) and the **critical value** (**the numerical boundary that stands between accepting or rejecting the null hypothesis when a hypothesis is being tested**). The critical value is worked out from a table of **probability values** and depends on various factors: **whether it was a one or two tailed test, the P value and either the N value or the degrees of freedom value.**

Rule of R - **If there is an R in the name of the statistical test the calculated value has to be g*R*eater or equal to the critical value for the result to be significant.** If this is the case then the

null hypothesis can be rejected and the alternative hypothesis is supported. If there is no R in the test's name then the calculated value has to be less than or equal to the critical value for it to be significant.

Probability and Significance

Significance is a statistical term which lets us know **how sure we are about a correlation or difference existing**. If significant, we reject the null hypothesis and accept the alternative hypothesis. The difference between these two types of hypotheses is the **null (H0)** one states **'there is no difference or correlation between the conditions'** whilst the **alternative (H1)** one states **'there is a difference between the conditions'.**

Probability is a calculation of **how likely it is for an event to happen** - **0= statistical impossibility and 1= statistical certainty.** The usual level of significant in psychology is 0.05. Therefore the **p value is usually equal to or less than 0.05 (5%)** which means that the probability of the difference in the study's findings being **due to chance is 5% or less so researchers have a 95% confidence level in their results**. If there is any risk attached to the research like a 'human cost' e.g. with clinical drug trials then the **p values is set at 0.01 (1%)** instead.

Type I and Type II errors

When researchers conduct inferential statistical tests they can make either of two types of errors when forming a conclusion from the test:-

- **Type I (optimistic) error** is the **incorrect rejection of a null hypothesis which is actually true.** Researchers claim to have found a significant difference when there actually isn't any **(a false positive)**.
- **Type II (pessimistic)** error is the **failure to reject the null hypothesis that is false**. Researchers claim that there is no significant difference when there actually is one **(a false negative).**

Features of a Science

Paradigms & paradigm shifts

A **paradigm** is a **set of shared ideas and assumptions within a scientific discipline**. A **paradigm shift** is **a significant change in these central assumptions within a scientific discipline, resulting from a scientific revolution.** Kuhn (1962) suggests that paradigms are what separate scientific disciplines from non-scientific disciplines. Kuhn also believes that paradigm shifts show progress within a science. In respect to this feature, psychology has **too much disagreement and conflicting approaches** (e.g.is behaviour biological from genes or from conditioning experiences?) so isn't able to qualify as a science. It is referred to as a **pre-science.**

Theory construction & hypothesis testing

A **theory** refers to **a set of general principles and laws which can be used to explain specific events or behaviours. Theory construction** takes place through **gathering evidence from direct observation during investigations**. You should be able to make different hypotheses from a theory, then when the hypothesis is supported the theory is strengthened. If it is not then the theory may need to be revised. **Deduction** refers to the process of **deriving new hypotheses from an already existing theory** e.g. Baddeley and Hitch modified the Working Memory Model in 2000 as they added the episodic buffer to the model.

Falsifiability

Falsifiability is the principle that states a **theory cannot be considered scientific unless it allows itself to be proven untrue**. Popper (1934) argues that this is a key criterion for a scientific theory. Popper proposed the theory of falsification which **states that successful theories that have been constantly tested and supported simply haven't been proven false yet**. Sciences that can't be proven wrong are known as **'pseudosciences'**- a good example is Freud's concepts from the psychodynamic approach like the Oedipus's Complex.

Theories which survive more falsify attempts are seen as the strongest. This theory of falsification explains why when stating hypotheses for an investigation **the alternative hypothesis is always accompanied by the null hypothesis.** This also explains why we never use the word 'proves' in investigations even if the results support the researcher's hypothesis. The **hypothesis-deductive method** refers to the process of **formulating hypotheses that can either be proved or disproved by experimentation.**

Replicability

Replicability refers to **the extent to which scientific methods and their results can be repeated by other researchers across other contexts and circumstances**. It is used to assess validity and reliability of results from a research study.

Objectivity & the empirical method

Objectivity is when **all possible biases from the researcher are minimised so that they don't influence or distort the research process. The empirical method** is when evidence is collected through **making direct observations and through direct experiences**. A theory is not able to be scientific unless it can be empirically tested and verified using either the empirical experimental or observational method.

Psychology as a science:

Supporting arguments	Against
- Produces intuitive results which are against	- Experiment interpretations can be subjective.

common sense. - Scientific methods are used in many research studies giving them scientific credibility. - Findings from studies do positively impact society & individuals e.g. Cognitive behavioural Therapy to treat depression.	- Not all research is generalisable e.g. from case studies. - Psychologists do often make inferences of behaviour rather than directly measuring it , for example this is usual for cognitive psychologists that infer about cognitive processes from brain scans (Memory topic link here).

Ethical Issues & Ways of Dealing with Them

Issue	Explanation	Solution
Informed consent	Participants must be told the purpose of the investigation (their aims) and about any potential risks they may be subject to when taking part in it. This allows them to make an informed decision on whether they want to participate in the research study. Researchers don't always wish to disclose this information as it could lead to demand characteristics being presented hence result bias.	There are various methods of dealing with informed consent: - **Prior general consent-** participants give permission to take part in many studies whereby one of them involves deception so effectively they are consenting to getting deceived, - **Presumptive consent-** when a researcher gathers opinions from a group like the participants in the study but does not inform the actual participants. Allows demand characteristics to be eliminated. - **Retrospective**- this is when the participants are asked for consent after they have participated in the study.
Deception	This is the act of deliberately withholding information from participants or misleading them during the research study. This is only seen as acceptable when the participants knowing the true nature could guess the aims of the investigation or when the deception will not cause distress.	- **Debriefing**- all participants would be debriefed after the study, it can be a written or verbal debrief. During the debrief the true nature of the study must be said and the participants should be told what their data will be used for. After the debrief participants have the right to choose to withhold or withdraw their data.
Protection of harm	Participants must be protected	- If the participants have been

	from physical and psychological harm. It is the job of the researcher to make sure of this. All through the investigation, participants are also reminded that they do have the right to withdraw, especially if the study is causing them harm.	subject to any stress or psychological harm, the researcher should provide counselling if it is required. - **A Cost-Benefit Analysis** should be done before a study is carried out. This is done by the ethics committee whereby the pros and cons of the study are weighed up to determine whether the study will be ethical. This can be difficult and an example of where this was done but went wrong is for Zimabardo's Stanford Prison Experiment in 1973 (Social Influence topic).
Privacy and confidentiality	**Right of privacy** refers to the right that participants have to controlling information about themselves- how much is released and how it is used. It can be difficult to avoid invading a participant's privacy for example if it is a field study- these are done in natural environments. The right of privacy can extend to the location of the study whereby the institution is not named. **Confidentiality** refers to the right participants have which concerns any personal data of theirs being protected.	- Anonymity can be maintained. This is achieved by the researchers not recording any personal details of their participants so that none of the results data can be traced back to them. Instead the researchers can refer to the participants using numbers or initials when writing up the investigation e.g. HM case study. -The participant should be reminded during both the briefing and debriefing of the investigation that their data will be protected

Self-Report Techniques & Design

Self-report techniques refer to any sort of method where a person is asked to give their opinions, feelings, experiences and behaviours in relation to a particular topic. There are two types of these non-experimental investigations:

- **Questionnaires** - These assess **a person's thoughts or experiences through a number of different written questions.**
- **Interviews -** This involves a live encounter where **a set of questions is asked by an interviewer to an interviewee to assess their thoughts or experiences.**

Questionnaires

There are two types of questionnaires:

Type and description	Strengths	Limitations
Open Question - This is when the questions are phrased in a way that the participant is free to answer however they like, there are no restrictions. This type collects qualitative data.	- Rich in depth and detail. - Useful for sensitive topics as participants can elaborate on their answers.	- Difficult to convert to statistical data hence more difficult to analyse.
Closed Question - In contrast, this type of questionnaire consists of questions which restrict you to a fixed number of responses. This type collects quantitative data. Examples: - **Likert scale**- the respondent indicates agreement with a statement, ranges from agree to strongly agree. - **Rating scales**- a rating scale works in a similar way but gets respondents to identify a value that represents their strength of feeling about a particular topic. - **Fixed choice scales**- the question includes a list of possible options and respondents are required to indicate those that apply to them.	-Easy to analyse data and compare with data from elsewhere.	- Lack of depth and detail. - Can be limiting which can be frustrating for participants.

There are various strengths and limitations of questionnaires:

Strengths	Limitations
- Cost-effective. - Gathers large amounts of data quickly. - The researcher does not need to be present. - They are easy to analyse. - As responses can be anonymous this usually means participants are more open.	- Difficult to know whether the target population it was intended for answered it e.g. if it is online. - They take a long time to design. - It is difficult to assess the validity as biases such as social desirability bias (when the participant wants to present themselves in a positive light so is not truthful) are presented. - Participant bias presented from factors such as time, age, gender. - Response bias presented e.g. acquiescence bias whereby participants simply agree with all the questions, instead of putting effort into considering an answer for each question.

Construction of questionnaires:

There are various factors that need to be thought about when designing questionnaires :-

- **Clarity** - the questions should be phrased in such a way that it is clear for the respondent on what answer is needed from them.
- **Avoid overuse of jargon, emotive language, double-barrelled questions, double negatives and leading questions**. All these can cause biases which affects the validity of the results.
- **Sequencing questions** - easy ones can be first then followed by the harder ones. This allows a build up of confidence in each participant.
- **Filler questions** - these are questions which have nothing to do with the aims of the investigation and are put in to distract the participant from guessing the real aim of the study. Therefore these eliminate demand characteristics.
- **Pilot study** - can be carried out to ensure that the questionnaire is suitable and if not amendments and improvements can be made.

Interviews

There are two main types of interviews:

Type and description	Strengths	Limitations
Structured - Involves **a set of predetermined questions being asked during the interview.** The interviewer asks the questions and for each waits for a suitable	- Standardisation is possible. - Easily replicable. - Can make comparisons between participants easily which is a strong	- Interviewer bias which can be presented through aspects such as body language, listening skills, when to ask a question and interpretative bias (how answers are recorded).

response.	benefit for job interviews.	- Social desirability bias. - Not being able to elaborate can be frustrating for participants.
Unstructured - There are **no predetermined questions , instead questions develop as the interview goes on.** This allows for questions be **tailored to individuals and is more free flowing.**	- Lots of data is collected with more depth and detail. - As can be tailored to individuals they can provide more insight.	- Skilled interviewers needed. - Interviewer bias also presented. - Social desirability bias. - Difficult to make comparisons between participants. - The analysis of data is difficult as may have to sift through a lot of irrelevant data.

There can also be semi-structured interviews whereby most of the questions are already set up but the interviewer is free to ask any follow up questions on certain answers.

Construction and design of interviews:

- **Recording information** - this can be done in various ways e.g. writing down answers, using a video recorder, using an audio recorder.
- **Ethical issues** - Informed consent is needed from the participant for the researcher to obtain and keep the data. The participant should be reminded that their answers will be kept confidential.
- **Location** - A quiet room away from other people is the most appropriate as this location is likely to get the participant to feel comfortable and open up.
- **Neutral questions** - These are usually started with to make the participant feel relaxed and help establish a rapport.

Reliability Across all Methods of Investigation

Reliability is a measure of **how consistent the findings from an investigation are**. Why is it important?

- To ensure the DV is being measured accurately.
- To ensure that over periods of time, the outcome is still the same.
- To ensure that all the conclusions made are accurate and valid as if not can have implications for theory development.

There are various types and ways of assessing each:

Type and description	Ways of assessing
Internal reliability- describes how consistent something is within itself.	**- Split half method -** Randomly select half of the questions and put them in one form then do the same for others. Theses two forms of the same test are then done separately and should yield the same score,have a correlation coefficient of ≥ 0.80

External reliability- this is when consistent results are produced regardless of when the investigation is used or who administers it.	-**Test-retest method** - the researcher administers the same test on the same person on different occasions. The results should yield a correlation coefficient of ≥ 0.80. Sufficient time should be left between the test and retest so participants cannot recall their answers, and this time in between should not be too long as the person's attitudes may change. **- Inter-observer reliability** - refers to the extent to which there is agreement between two or more observers involved in observing behaviour. This eliminates subjectivity bias and may either be carried out in a pilot study or reported at the end of the study. It is calculated by the formula: $\frac{\text{Total number of agreements}}{\text{Total number of observations}}$ ≥ 0.80 = High inter observer reliability

Ways of improving reliability in:

Questionnaires

A questionnaire that produces low test-retest reliability may require some of the items to be **'deselected' or rewritten**. One solution might be to replace some of the open questions where there may be more room for misinterpretation, with closed, fixed choice alternatives which may be less ambiguous.

Interviews

For interviews, probably the best way of ensuring reliability is to use the same interviewer each time. If this is not practical or possible, all interviewers must be properly trained, **so for example, the interviewer should not ask leading or ambiguous questions.**

They should all be able to structure their interviews in a 'certain manner' which can be followed by all to ensure that everything is similar. This is more easily avoided in a **structured interview** where the interviewer's behaviour is more controlled by the fixed questions. Interviews that are unstructured and more 'free-flowing' are less likely to be reliable.

Experiments

Lab experiments are often described as being 'reliable' because the researcher **can exert strict control over many aspects of the procedure, such as the instructions that participants receive and the conditions within which they are tested**. This control allows for the experiment to be designed to be replicable, so that if someone else were to repeat it, they would get similar findings (ideally).

Such control is often more achievable **in a lab than in the field,** since in the field variables are much more difficult to control and the researcher doesn't have access to it throughout the procedure, so they just have to 'make-do' with the situation in hand.

This is more about precise replication of a particular method rather than demonstrating the reliability of a finding. One thing that might affect the reliability of a finding is, if participants were tested under slightly different conditions each time they were tested.

Observations

The reliability of observations can be improved by making sure that behavioural categories have been properly operationalised, and that they are measurable and self-evident.

For instance, the category 'pushing' is much less open to interpretation than 'aggression'.

Categories should **not** overlap for example, 'hugging' and 'cuddling' and all possible behaviours should be covered on the checklist.

If the categories are not operationalised well, are overlapping, or absent different observers have to make their own judgements of what to record where, and may well end up with differing inconsistent records.

Validity

Validity refers to the extent to which results of a research study are **legitimate**. There are various types of validity and ways of assessing them:

Types and description	Ways of assessing
Internal validity - this is **whether the outcomes observed in an experiment are due to the manipulation of the IV and not any other factor.** It is influenced by :- • Confounding and extraneous variables. • Participant variables and demand characteristics. • Investigator bias. **External validity** - This relates to factors outside the investigation - **is it generalisable to other settings, populations & eras**. There are different forms of external validity: • **Ecological validity**- This is the extent to which findings can be generalised to other situations and settings. • **Temporal validity** - Generalisability to other historical times and eras • **Population validity** - Generalisability to different populations of various ages,	- **Face Validity** - this is when a measure is **scrutinised to determine whether it appears to measure what it is supposed to**. This can be done either through simply looking at it or passing it to an expert to check. - **Concurrent validity-** this refers to **the extent to which a psychological measure compares to a similar existing measure**. The results obtained should either match or be closely similar to the results of the well established and recognised test. - **Predictive validity**- this refers to **how well a test can predict future events or behaviours** E.g. how childhood attachment measured using the strange situation are able to predict how the child will grow up to behave in adulthood (from Attachment topic).

genders and cultures	

Ways of improving validity in:

Experimental research

Using a **control group** in experimental research means that the researcher is better able to assess whether changes in the dependent variable were due to the effect of the independent variable.

For example, in a study looking at the effectiveness of a therapy, a control group who did not receive therapy means that the researcher can have greater confidence that improvements were due to the effects of the therapy rather than, say, the passage of time.

- Experimenters may also standardise procedures to minimise the impact of participant reactivity and investigator effects on the validity of the outcome
- The use of **single-blind and double-blind procedures** are designed to achieve the same aim
- In a **single-blind procedure** participants are not made aware of the aims of the study until they have taken part (to reduce the effect of demand characteristics on their behaviour)
- In a **double-blind study,** a third party conducts the investigation without knowing its main purpose either (which reduces both demand characteristics and investigator effects and thus improves validity)

Questionnaires

Many questionnaires and psychological tests incorporate a lie scale within the questions in order to assess the consistency of a respondent's response and to control for the effects of **social desirability bias.**

Validity may be further enhanced by assuring respondents, that all data submitted will remain **anonymous.**

Observations

Observational research may produce findings that have high ecological validity as there may be minimal intervention by the researcher. This is especially the case if the observer remains undetected, as in **covert observations,** meaning that the behaviour of those observed is likely to be natural and authentic.

In addition, behavioural categories that are too broad, overlapping or ambiguous may have a negative impact on the validity of the data collected.

Qualitative methods

Qualitative methods of research are usually thought of as having higher ecological validity than more quantitative, less interpretative methods of research. This is because the depth and detail associated with case studies and interviews, for instance, is better able to reflect the participant's reality.

However, the researcher may still have to demonstrate the **interpretative validity** of their conclusions – **this is the extent to which the researcher's interpretation of events matches those of their participants.**

This can be demonstrated through such things as the coherence of the researcher's reporting and the inclusion of direct quotes from participants within the report.

Validity is further enhanced through **triangulation** – **the use of a number of different sources as evidence** for example, data compiled through interviews with friends and family, personal diaries, observations etc.