

# RESEARCH METHODOLOGY

## EXPERIMENTS

- Done to investigate the causal relationship between variables.
- Experimenters compare data from the control & experimental groups to conclude.
- Conclusions, cause & effect can only be measured if other variables are controlled.
- Experiments have a standardized procedure so all Ps have the same experience for the study's replication.
- Independent variable: variable manipulated by R [cause].
- Dependent variable: variable that changes [& can be measured; effect].

## LABORATORY EXPERIMENTS

Laboratory: any setting/location where the E has a high level of control; eg: temperature, lighting, sound, to ensure any changes in the DV are because of the IV.

## FIELD EXPERIMENT

- Field: real-world setting; lesser control over variables
- One or more IVs are still manipulated to measure the effect on the DV
- Situational variables make it hard to draw accurate conclusions.

	strengths	weaknesses
lab	high validity; the Rs are sure that the IV & no EVs caused the changes in the DV.	low eco val; IRL settings more stressful; P' actions affected by intense emotions
	↑ Standardisation	Ps may display DCs if they're aware of the aim.
	Ethical; P aware of the study [even if they don't know the aim] & the right to withdraw.	
field	Higher eco val	Lesser reliability due to the inability to standardize.
	less likely to show DCs	Unethical; deception used as consent can't be taken.

## EXPERIMENTAL DESIGNS

### INDEPENDENT MEASURES DESIGN

- 2 or more groups [based on levels of the IV] called the experimental & control group. control groups provide a baseline which experimental groups are compared with. This lets the R confirm the results from the study are due to manipulating the IV.
- **Random Allocation:** Rs randomly separate Ps into groups by assigning them numbers & using a random number generator
- **PVs:** Random allocation is important so all Ps have different characteristics
- **DCs:** If P know the aim, they act how they think the E wants them to act. This reduces the spontaneity & genuineness of their actions. This reduces validity.

### REPEATED MEASURES

- The same group of Ps are the experiment & control group; PVs are null because it's the same group doing the study & the comparison is made against themselves.
- DCs & order effects can be problems in this design.
- **Counterbalancing:** P are put into 2 groups; one does the experiment condition first & the other does the control condition first.
- **Practice effect:** group may perform better the second time because they've done it alr
- **Fatigue effect:** group performing better the first time because they're tired
- To reduce the effects of these, Rs leave a gap of time between first & second experiments & use counterbalancing when it's not possible.

### MATCHED PAIRS DESIGN

For every person in the experiment group, there will be someone in the control group who shares the same key variables that would have affected the DV. This nullifies order effects & PVs but it's hard to set up because thorough checks need to be conducted while selecting Ps. [ex: dominant hand, gender, age]

DESIGN	STRENGTHS	WEAKNESSES
IMD	↓ likely to show DC	May be PVs.
	No order effects	More Ps needed than RMD/MPD
	Random alloc: ↓ PV	DC → ↓ validity, ↓ eco validity
	Fewer Ps needed	↓ Mundane realism
RMD	PVs redundant	Practice and fatigue effect
	Counterbalancing= ↓ order effects	↑ DC

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MPD	Ps only know one part of IV → ↓ DC	Sample size may be too small; ↓ external validity
	PVs less likely to affect IV than IMD.	Impossible to match people exactly, → ↓ Internal validity.
	No order effects.	

## SELF REPORTS

### QUESTIONNAIRES

**Open questions:** let people detail & describe their answers, usually beginning with "how"/"why". Allow Rs to understand how much the issue affects the person.

**Closed questions:** Ps can only give a preset/fixed answer, like picking from a scale; ex: Likert's scale. Might not have enough options sometimes; a rating scale is recommended.

Dichotomous questions are often useless, except when wanting to give contingency questions.

When making questionnaires, avoid: 1. double-barreled questions; Don't ask 2 things in 1 question, 2. Ambiguity [be crystal clear; nothing up to interpretation] 3. No technical terms unless your audience will understand them. 4. Emotive language that could sway a P's answer.

Advantages		Disadvantages	
Quick, inexpensive		Less willingness to elaborate when writing long answers, limiting quality	
Answers are more genuine; anonymity lets Ps answer honestly, face to face interaction isn't necessary.		Socially desirable answers are possible	
Q type	Closed	Open	
Adv	Qnt; can be categorized & displayed in graphs.	Qlt; rich & detailed so can be analyzed.	
disadv	↓ choice= ↓ validity; can't freely express opinion	Time-taking & harder to analyze, subjective.	

### INTERVIEWS

- Conducted on smaller sample size because it's time-consuming.
- More open than closed questions can be asked bc ppl likely to elaborate face to face.

format	Features
Structured	Standardized; preset questions asked to all in the same order
Semi-structured	A list of questions to guide the interview can be asked in any order & follow-up questions can be asked.
unstructured	Main topics are preset, a research question that guides the interview but no set list of questions. Questions can be asked about whatever the P is talking about.

Advantages		Disadvantages	
Qlt, deep data collected		Socially desirable answers can be given	
Semi/structured interviews → new perspectives, help get better insight		R bias can interfere due to a lack of structure	
Body language can be read → ↑ validity	Irl interviews can be impractical & ppl won't talk ab sensitive issues irl.		
Phone interviews: faster, cheaper & more effective		Body language can't be read; people may be uncomfortable on the phone & won't elaborate.	

## CASE STUDIES

Detailed investigations of individuals or small groups, often used to study unusual or rare cases. They use triangulation [interviews, observations, & psychometric tests] often gathered over an extended period. Data may be qlt or qnt & may come from various sources. Case studies often begin with a case history, providing rich background info to contextualize current BH.

Advantages		Disadvantages	
Rs focused on one individual, rich, in-depth data taken → validity		Unique case → not generalizable	
↑ eco val as Ps studied in their everyday lives.	R & P bond, → ↓ objectivity of data & analysis → low validity		
Rs gain insights into individual's life by gathering detailed info about them, → enhancing their understanding of the BH.			
High validity by triangulating the data using multiple methods of gathering info.			

## OBSERVATION

**Overt:** Ps are aware that they're being observed

**Covert:** Ps aren't aware that they're being observed.

**P:** observer joins the Ps & interacts with them to get a better understanding of them

**Non-P:** observer does not interact with Ps, can be done overtly or covertly.

**Structured:** a predetermined set of BHs is recorded using a BHal checklist. Each BH is operationalized to avoid ambiguity & tallied every time it occurs. Observers can categorise BHs.

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**Unstructured:** researched records all the BH that's relevant to the study. This data is often qlt; eg: talking into a voice recorder or making notes.

**Naturalistic:** Ps are observed in natural, real-world settings.

**Controlled:** Ps are observed in lab settings where standardization can happen.

TYPE	ADVANTAGES	DISADVANTAGES
Structured	BHs to be recorded decided & operationalised: broken down in components that can be identified & recorded. ensures inter-observer reliability	Subject to observer bias; rely on the observer's judgement as to what BH to record, tf subjective.
Unstructured	Rich qlt data can be collected	Difficult to record every BH; some BHs can be missed
Overt	More ethical	DCs
Covert	No DCs	Unethical
Participant	R gains more knowledge about the reasons for Ps' BHs	R may become too involved, preventing objective analysis.
Non-part.	More objective analysis	Some BHs can be missed
Naturalistic	High eco val	Variables affecting BH can't be controlled.
Controlled	↑ reliable as all Ps get the same environment; easily replicated	DCs, key BHs can be missed

## CORRELATIONS

Scatter graphs useful for analyzing data for correlations, allowing Rs to identify if two variables are correlated or not. Particularly useful when manipulating variables; allows for quick inference of the relationship's direction & strength.

- Positive: as one variable increases, the other increases, [D&K: the number of words used to describe the dream & the length of the dream].
- Negative: as one variable decreases, the other increases [Baron-Cohen et al.: the higher the RET score, the lower the AQ score].
- No correlation: Holzel et al. [time spent on mindfulness activities between sessions & GMC]

The strength of correlations is determined by how close they are to 1, 0 and -1. +0.75= strong positive, +0.2=weak positive, -0.2=weak negative, -0.75= strong negative.

ADVANTAGES	DISADVANTAGES
Can be used to understand if new research areas should be further investigated.	They only tell us the relationship between variables, not the cause & effect.
Allow investigation where variables can't be manipulated.	An unmeasured, third variable may be involved in changing the results.

## LONGITUDINAL STUDIES

Involves following a group of individuals over time, administering tests or tasks at different intervals to observe their thoughts, feelings, & BHs. This method requires standardised testing for reliable comparisons. Triangulation often used. Experiments can also use a longitudinal design [Holzel et al.], where the experiment group is given a treatment & compared over time to the control group. Follow-up sessions let psychologists measure the long-term impact of treatments.

ADVANTAGES	DISADVANTAGES
Better than cross-sectional studies by simultaneously testing sub-samples within a population & comparing change over time, eliminating PVs & focusing on the same group of Ps.	↑ risk of attrition, where Ps drop out due to relocation, disinterest, or changing life circumstances.
Topics which can't be studied using other methods can be studied [eg child development]	May lack temporal validity; by the time the study is over, the results may not be generalizable.
P effects are avoided	

## METHODOLOGICAL CONCEPTS

**AIM:** Main goal of a research project

**Hypothesis:** testable statement that predicts the results of a study.

**Operationalization:** IV & DV are stated & measurable, with units.

The hypothesis should always be operationalised. "Experimental hypothesis" is used in studies with an IV [experimental studies], "Alternative hypothesis" is used where there are variables [correlational/non-experimental studies]. Hypotheses can be directional [one-tailed/two-tailed/null].

### DIRECTIONAL HYPOTHESES

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Predicts whether the experimental group will perform better or worse than control, or whether the correlation is positive or negative [correlational studies]. Usually used in studies which have been previously investigated so R knows what to expect.

## NON-DIRECTIONAL HYPOTHESES

Stated that there will be a difference/correlation, but not in which direction. Used in studies with limited previous investigation so possible outcomes are unpredictable.

## NULL HYPOTHESES

The variables do not affect each other. Normally start with "there will be no difference/correlation..." & end with "any difference that arises is due to chance."

## DATA ANALYSIS

Psychologists use descriptive statistics to analyze qnt data, identifying patterns or trends. Inferential statistics calculates the probability of a significant result if the null hypothesis is true. If the probability is  $\leq 0.05$  (1 in 20), null hypothesis is rejected. If it's  $\geq 0.05$ , it's accepted.

## CONTROLLING VARIABLES

**Standardisation:** Imp for research replication & reliability checks. All research should be standardised. **PVs:** Piliavin's study could have been influenced by PVs, such as background, personality, cognitive abilities & health. However, if these variables systematically varied between experimental & control groups, it would be difficult to determine the impact of victim factors or individual differences. Random allocation of Ps to experimental & control groups can help overcome these effects. Andrade [doodling] used random allocation to ensure that people with naturally good memory weren't in the experimental group. In contrast, Bandura's study on aggression used matched pairs design to match Ps based on factors like age and aggression scores. This approach helps Rs understand the impact of PVs on the results & ensures accurate results.

**Situational variables:** Ps' BH & results are influenced by variables such as temperature, lighting, & noise levels. Rs control these variables to ensure consistency & replication of the research.

**Uncontrolled variables:** The DV being influenced by unmeasured/ uncontrolled factors.

## TYPES OF DATA

### QNT & QLT

	STRENGTHS	WEAKNESSES
QLT	in-depth understanding of feelings, greater validity	Subjective, so risks R bias, less reliable
QNT	easily compared; objective analysis	limits understanding of thoughts & feelings

## SUBJECTIVE & OBJECTIVE

- **Subjective:** data can be influenced by one's thoughts/feelings/opinions.
- **Objective:** unbiased, factual data that don't require interpretation. Another R, unaware of the aim of the study, can be asked to objectively analyze data.

## SAMPLING

**OPPORTUNITY:** Readily available Ps are selected.

**RANDOM:** Ensures equal participation in research for all Ps. A computer program generates a sample, assigning each a number. The psychologist contacts the selected to inquire about their willingness to participate in the study.

**VOLUNTEER:** Rs advertise for Ps in various ways, such as posters, flyers, direct mail, e-shots, newspapers, radio, & online forums.

TECHNIQUE	STRENGTH	WEAKNESS
OPPORTUNITY	Quick, easy, larger sample	Unrep. of target population; not generalisable
RANDOM	Rep; more generalizable findings	Time-consuming & expensive; potential Ps may not want to participate, arrangements to be made for them to come to the location of the study.
VOLUNTEER	Motivated & willing, unlikely to quit, imp for longitudinal studies.	May not rep target population

## RELIABILITY

Consistency of results from each P & the overall findings based on the whole sample. If the same results were obtained again, the study is reliable.

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TEST METHOD	DESCRIPTION
Test-retest	Ps repeat a test after a period of time
Inter-rater	The extent to which 2 Rs agree in their scoring of a test
Inter-observer	The extent to which 2 observers agree in their coding/rating of BHs.

## REPLICABILITY

Imp for Rs to demonstrate reliability of findings, needing a standardized procedure for replication. Ensures consistent results & prevents chance-based inaccuracies in future studies.

## STANDARDISATION

Ensures a study's replicability & consistency in all aspects, except for IV manipulation. Eg: in Bandura, model displayed the same sequence of BHs, toys, & instructions for each P. This high standardisation makes the study easy to replicate & allows for reliability checks of the findings.

## ETHICS -HUMANS

**Minimising harm & maximising benefit:** Rs should minimize harm to Ps' psychological well-being, personal values, privacy, & mental health, & maximize research benefits at all stages, from developing theories to publishing findings & applying them to everyday life.

**Deception:** If Ps know the aim, DCs may be shown. Rs must try all methods before using deception, as it can cause psychological harm. Full debriefing is essential when deception is involved.

**Confidentiality:** Crucial especially for qit data. Ps' names should not be included in their data, & if they return for further research, they should be assigned a code number. Data should be stored in password-protected files or locked cupboards.

**Privacy:** Privacy in observational research requires Ps to be observed in public situations where they might expect to be observed, such as supermarkets or train stations, & consent from the space owner.

**Debriefing:** Post-research process where deception, if any, is revealed & asked questions to ensure they leave feeling the same way they entered, aiming to boost their mood.

## ETHICS- ANIMALS

**Minimise harm & maximise benefit**

**Replacement:** The British Psychological Society advises replacing animals with video footage or computer simulations for training or teaching purposes, whenever possible.

**Species:** Scientifically & ethically suitable animal species should be chosen, considering their natural history, sentience, captivity history, & previous research; species that can suffer minimally while meeting research objectives, discussing these choices with knowledgeable colleagues. Non-human primates should be avoided due to their high sentience level.

**Numbers:** Rs to use the smallest number of animals possible for research purposes. However, this doesn't mean prolonged use, which could prolong suffering. Reducing animal use can be achieved through pilot studies, reliable behaviour measures, good experimental design, & statistical tests. Understanding statistics is crucial for minimizing animal use.

**Pain & distress:** Rs should avoid causing harm to animals, enrich their environment, & balance potential harm with benefits. Pain can only be justified in psychological research when there's no alternative method & significant scientific or educational value. Anaesthesia should be used for surgical procedures & animals should be terminated promptly if necessary.

**Housing:** The study suggests considering the social & natural BH of the animals when housing them to avoid stress & aggression, & to use the same cage for both housing & testing.

**Reward, deprivation & aversive stimuli:** Rs must understand species' normal eating & drinking habits to minimize food deprivation. However, alternative methods should be considered before resorting to deprivation & aversive stimuli. For example, Fagen et al. used bananas as a reinforcer for the elephants.

## VALIDITY

Extent to which R is testing what they claim to be testing. Imp to measure use/meaningfulness.

**eco val:** Extent to which findings would generalise to other situations. Influenced by whether the situation represents the real world effectively & whether the task is relevant to real life.

**SUBJECTIVITY/OBJECTIVITY:** If a R is required to interpret BH or the data collected, there's a risk of subjectivity; Involves the R's interpretation & may be influenced by personal biases,

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[un/consciously] → ↓ validity]. Eg: Milgram needed to interpret BHs of the Ps as they delivered "electric shocks" & decide what data to record.

Objective data- data collection/analysis unaffected by R's thoughts, feelings or opinions.

Scientific equipment [EEGs-D&K & MRIs - Hölzel] is only records what biologically occurs → objective. But images produced by brain scans still need subjective interpretation of Rs. Qnt data is also more objective than qnt as it can be statistically analysed. The less risk the data has of being influenced by another person's interpretation. The more objective, the more valid.

DCs: Features of the research environment which may give away the study's aim- DCs → ↓ validity, so some Rs use deception. Strength of using animals as Ps-don't try to work out the aim.

Tf, DCs are ↓ & ↑ validity. Animals may pick up on subtle cues from Rs, which may affect their BH.

**Generalisability:** Findings should only be generalised to the target population if the sample is rep. This depends on the sampling technique. Random samples-usually ↑ rep than opportunity/volunteer samples. Extent to which findings can be generalised beyond the sample- 'population validity'. Piliavin- can't generalise findings to all cultures because helping BH may differ in other countries, based on cultural values. It took place on a normal subway journey, as part of people's real lives, it is possible to generalise the findings to similar real-life contexts.

**Temporal validity:** Ability of a study's results to be generalized to different time periods, such as the 1960s. Studies like Bandura's may be era-bound due to changes in technology & gender roles, while social psychological research may be more susceptible due to societal norms.

## DATA ANALYSIS

### MEASURES OF CENTRAL TENDENCY

Descriptive statistics that help Rs summarize large sets of individual data points to identify trends & patterns. They provide a single score, [midpoint/average]-helps Rs compare the avg results of an experimental & control group to determine if there is a difference & how large it is.

### MEASURES OF SPREAD

Help Rs identify data points' similarities & variation in a data set. In experiments, mean differences between experimental & control groups don't indicate diversity. The range & standard deviation are essential measures of spread.

Standard deviation: How much the results vary from the mean. Smaller standard deviations - data points clustered more tightly around the mean; larger standard deviation-data points are more diverse. The mean is subtracted from each data point to see how far each score deviates from the mean. Rest of calculation lets R identify the avg amount of deviation from the mean.

**bar charts:** comparing mean, median, or modal values in experimental studies & qnt data from observational & self-report studies, demonstrating relative differences bw groups /conditions.

**HISTOGRAMS:** Used for continuous data, measuring on an infinite scale [time]. Shows the distribution of collected data: x axis = the full range of points & y axis= labelling frequency. The bars should touch, & gaps should be left if no scores exist within a certain range.

**SCATTER GRAPHS:** presents correlational data showing the complete distribution of data collected. Eg: in Baron-Cohen, 'extreme male brain' theory of autism suggests that foetal testosterone exposure may influence autism traits. The Eyes-C Test, a version of the Eyes Test for children, showed a negative correlation between fetal testosterone exposure & child's social sensitivity.

### ABBREVIATIONS

*Participants: Ps, Researchers: Rs, Experimenters: Es, Demand Characteristics: DCs, Therefore: tf  
Qualitative: Qlt, Quantitative: Qnt, Representative: rep*