Research Methods

# Chapter 20 : Planning and Conducting Psychological Research

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| Scientific Research | * Rooted in observation, experimentation and knowledge acquisition through a process of objective reasoning and logic, testing a hypothesis * Empirical and measurable data is gathered and replication possible through the scientific method/ experiments * Empirical evidence or data collected allows researchers to draw valid conclusions based on experiments |
| Non-Scientific Research | * Ways of obtaining knowledge and finding out why involves things like common sense, philosophy and gut feelings * Not based on science and are often labelled ‘pseudoscience’ to indicate their lack of scientific foundation * explain and even predict human behaviour * Example: in astrology movement of stars predicts personality/ behaviour |
| Experimental | * Involves variables that investigate a cause and effect relationship, between two or more variables that is whether a change in one thing has an impact on another * For example: one might be interested in finding out if eating a lot of pizza (one variable) causes a change in person’s weight |
| Non-experimental | * Involves variables that are not manipulated by the researcher and instead are studied as they exist * Involve observation: the collection of data by carefully watching and recording the behaviours of others * For example: observation can be used in classrooms if you want to conduct research into children’s interactions during collaborative learning activities |
| Sample | A group of participants selected from a population of interest   * It is important that participants in a sample are representative of the population so the findings can be confidentially applied to the population * If the sample is biased and not representative then the findings cannot be applied to the population * Used in experiments, observational studies, interviews |
| Population | A group of people belonging to a particular category (have similar characteristics).   * In research it is a large group of interest from which a sample would be drawn |
| Difference between population and sample | Researchers refer to the large group of interest to whom their findings apply to as the population. The sample is a group which is a smaller subset of the population. It is important that the sample accurately reflects the population of study at interest.   * For example: if a psychologist wanted to investigate the relationship between violence on TV and aggressive playground behaviour in Western Australia children aged to eight to 11 years. It would be impossible to study all children in WA of this age so the researcher has to obtain a sample of children to represent the larger group. |
| The Scientific Method | * Involves a systematic approach to the planning, conducting and reporting of research usually in the form of experiments |

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| Why do we use non-experimental design methods | * Many variables of interest in social psychology cannot be manipulated because they are naturally occurring and are generally unchangeable variables * Examples: personal characteristics such as gender, socioeconomic status and learning styles * In some cases it is unethical to randomly assign individuals to different treatment conditions * Example: You cannot observe the effects of smoking by randomly assigning individuals to a smoking and non-smoking group for a given number of years. Therefore the only ethical way to investigate the potential effects of smoking would be to identify a group of current smokers and a group of non-current smokers and compare their differences in current state of health. Other variables should also be taken to consideration |
| Examples of Non-Experimental (descriptive) research methods | * Case Studies * Surveys * Archival Research * Correlational Studies |
| Case Studies | * An in depth, direct behavioural observation of a single person, individual or situation which can then be used to related to the population * Robson (2011) ‘ provide opportunity the opportunity for detailed knowledge about a single case or a number of related cases’ * No fixed experimental design or any hypothesis that guide the research * Involve a single case or situation (individual or group of interest) * The case is studied in context and uses a variety of data collection techniques like observation and interview * For example: the study of Phineas Gage allowed us to learn the relationship between parts of the brain and behaviour |
| Surveys | * Gather information about individuals, can be conducted fact to face, over the telephone or via the internet with tools such as survey monkey can be written or interview * They provide quick answers about people’s attitudes to and preferences for various goods and services and are often used to provide feedback to manufacturers * May focus on factual information about the individual or it aim to collect the opinions of the survey takers * Long psychological surveys take time to prepare and implement because they involve careful planning and decision making, well organised implementation and coding and analysis * Disadvantages to surveys: a low response rate (not many people complete or are prepared) and data can be affected by the predisposition or mode of respondent * Examples: questionnaires with fixed choice answers, 0-10 point Likert Scale |
| Steps in carrying out a small scale survey which produces valid and meaningful information | 1. Developing the research question, the study design (sample selection and pre testing and main study) and the initial draft of questionnaire = 30 days 2. Informal testing of draft questionnaire = 5 days 3. Revising draft questionnaire= 3 days 4. Pre-testing the revised draft using interviews= 3 days 5. Revising the questionnaire again (revision of study design and main study sample ) = 3 days 6. Carrying out the main data collection interview= approx. 30 but depends on sample size, telephone or via internet and travelling time between 7. Coding the data and preparing data files = 10 days 8. Analysing the data and writing the report= depends on the size of data and size of report |
| Archival Research | * Study of old existing data which is gathered, compared and analysed to answer the intended research questions * Usually written material found in places like libraries, universities, courts * Often used by historians and writers who reanalyse records to better understand the events that happened in the past * Not as widespread in psychology * Advantages: cheaper to use than collect new data * Disadvantage: time needed to find appropriate data sets and obtain permission to use them * Examples: public documents and official records held by hospitals or private documents such as diaries and letters |
| Correlational Studies | * Look at the relationships between different variables such as whether boys and girls do better at maths in school * Correlation does not mean cause and effect * Research process in the same for experimental studies (question and idea of the variables and what the relationship is) * Used in cross-sectional studies looking at a number of variables at a single point in time or used in prediction times such as academic scores from one time to another |
| Behavioural Variables (not independent or dependent) in Correlational Studies | * CS investigate the relationship between two or more variables that involve assessing the degree and type of relationship between these variables * Often conducted when experimental ones are inappropriate * Example: investigating the relationship between low birth weight and academic performance in school, it would be impractical to vary infants birth weight so existing information is used to explore the relationship * Behaviour Variables are thus often those that pre-exist and cannot be carried out as an IV * Relationships are then described as a correlation coefficient which indicates the strength of the relationship * Score of +1= very strong positive correlation * -1 strong negative relationship * Positive Correlation = high scores on variable are associated with high scores of the other variable * Negative correlation= score is high on variable and low on the other * Example: correlation between the amount of lead in a pencil and time writing but the type of lead and pressure by writer may also effect the amount left |

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| Seven Steps in Psychological Research | 1. Identify a research issue or problem to investigate: decision about the topic or question to study and explore, might test a theory, develop a theory or find answers to a problem 2. Formulate a hypothesis: Making a prediction about the relationship between the two variables that can be tested this can be made based on previous work or a knowledgeable hunch. The hypothesis is what you test in and experiment 3. Choose a research design and method: Process/es used to collect data can be experiment, observation, correlation, survey, interview 4. Collect the data: Gathering evidence through observation, surveys, recording psychological responses or examining archival files 5. Examine the evidence: use of statistical techniques to analyse and summarise the numerical data obtained 6. Interpret the results: The meaning of findings. Is hypothesis supported? Question answered? Findings apply to whom? Suggestions for further research? 7. Communicate your findings: Scientists write reports/journals or talking such as conferences or feedback to interested parties so the theoretical implications and practical applications of research are known to working in the same area as well as the general public and other interested parties |
| Representative Sampling | * Sample selection must reflect the characteristics of the population at interest and are being studied * Studies with children samples must reflect issues that may be important in the interpretation of results such as age, gender, school attended and family structure * Variables taken into account when determine the type of sample and size required if all variables are to be studied * RS the same as or equivalent to the population from which it is drawn |
| Random Sampling | * Ensures every member of the study population has an equal chance of being selected to participate in the study to establish an unbiased sample * Electoral Roll: identify all people in a geographical area and names are selected from the roll using a lottery procedure that often involves a numerical sequence * A sequence of random numbers can be generated and applied to a list to obtain a sample * Not easy to obtain so much research is limited in its ability to be generalised to the population |
| Stratified Sampling | * Important to ensure that a particular group in a population of interest appears in proportion representative of that population * Divides population to be sampled into distinct subgroups or strata then selecting a separate sample from each stratum in the same proportions as they occur in the target population * Example: IQ, sex,religion, cultural background, education |
| Convenience Sampling | * Quick and easy way of selecting participants * Selected based on accessibility. * E.g. at University, so many hours of participation need to be completed during undergraduate to be eligible for 4th year. * E.g. local school, supermarket etc etc |
| Independent Variable | * The independent variable is the variable which is systematically manipulated or changes in some way by the experimenter in order to determine its effect (on the dependent variable). * It is changed so that the experimenter can see whether it affects another variable and what those effects are. * Can cause changes that might occur to the second variable |
| Dependent Variable | * variable which is measured and is the variable expected to change as a result of manipulation of the independent variable. * May or may not change as a result of the manipulation of IV. * Effect caused by the changes in IV * Usually a numerical value * For example: varying the presentation time of an object on a screen to which a person may respond quickly as possible may lead to changes in speed of reaction * IV: variation in the time of object presentation * DV: speed of reacting (milliseconds) * Give info about how quickly people react to changes in environment and have implications for driving behaviour |
| Operational Hypothesis | * Is a testable prediction that explains exactly how the variables will be measured and manipulated as well as the populations from which the sample is drawn. Therefore an operational hypothesis is Workable, Testable and Repeatable as it contains: * Variables (IV and DV) * Sample * Measurement tool * Guide research and predicted answers to a proposed research question based on a theory that provides basis for predicted answer * We test it by way of experiment can never be fully proved as something may occur to intervene that affects action of IV * A single negative effect can disapprove a hypothesis * Both cases refine experimental method before discarding |

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| Hypothesis | * A general research prediction about the direct interaction between the IV and the DV and the population from which the sample is drawn. That is, in the presence of different levels of the IV, does the DV increase or decrease? * NULL hypothesis = predict that there will be NO difference between populations. IV doesn’t impact DV * Experimental/ Alternative Hypothesis: predicts that change or difference will occur as a result of the manipulation of IV |
| Controlled Variables | * variables that are the same for both the control and experimental groups so that the changes observed in an experiment can be explained by the IV, nothing else. * Example: same size computer screen |
| Uncontrolled Variables | * **those that don’t need to be controlled (can stay random) as they would not have any impact on the results** * **For example: different eye colours of participants do not have an effect on the results** |
| Extraneous Variables | * example: red bull, drugs, coke, stress which all elevate heart rate) * **is a variable *other than the IV* that can influence the results (DV).** * **Extraneous variables are unwanted and should be identified and controlled if possible** |
| Experimental Group | * **The group that is exposed to the IV (the experimental condition) in an experiment.** * **The purpose of the experimental group is to determine the effect of the IV on the participant’s response.** |
| Controlled Group | * The group that is not exposed to the IV (control condition), but treated exactly the same as the experimental group in all other respects. * It provides a standard against the behaviour of the experimental group can be compared in order to assess if the IV has had an effect or caused a change on DV * Needs to be as similar as possible in characteristics with the experimental group (such as age) * Groups are treated the same except for the application of IV to experimental group * Sometimes the same people act as both the experimental and control groups = experimental and control condition and the results are compared under the two conditions |
| Experimental Group | **The group that is exposed to the IV (the experimental condition) in an experiment. The purpose of the experimental group is to determine the effect of the IV on the participant’s response.** |
| Placebo | * Defined as a dummy pill or harmless substance given if It were a treatment * Substance with no known medical effects as it is a neutral substance = sugar pill * Sometimes given to a control group that is blind to its status and thinks it is receiving treatment * For example: in medical research two groups were each given pill; experimental to the researchers the other is the placebo * Used to control the effects of participant expectation |

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| Placebo Effect | * Refers to the phenomenon in which some people experience some type of benefit after the administration of a placebo. * Participant expectation is a form of extraneous variable * Can potentially affect both the changes in the DV and outcome of IV * Why does the placebo effect occur? * Personal characteristics, self-presentation or desire to look good/ perform appropriately and them demand of what it expected from the experimenter * Expectations of the patient can play an important role in the placebo effect; the more a person expects the treatment to work, the more likely they are to exhibit a placebo response. * E.g. some patients in a medical study administered a placebo while other participants receive the actual treatment. This is to determine whether or not the treatment has an *actual* effect. If participants taking the actual drug demonstrate a *significant* improvement over those taking the placebo, the study can help support **the claim for the drug's effectiveness.** |
| Single Blind Procedures | * When the participants do not know whether they have been assigned to the control or experimental group * Placebos are used and participants unaware if they have real treatment or placebo * Reduces the effects that participants expectations may have on the results |
| The Experimenter Effect | * Experimenter’s own personal variables as well as his or her expectations and behaviours that may bias results due to inaccurate observation, recording or interpretation of data or there may be simple bias in the way the experiment is presented to participants * The experimenters behaviour, body language, verbal cues and prompts, preferential treatment of one group over another etc may also influence the results of the study! |
| Double Blind Procedure | * *Experimenter effect!!* To eliminate and increase reliability and validity of results = Use *Double Blind procedure …* * Participants and experimenters do not know which participants have been allocated to the control and experimental groups. * This involves a 3rd party to be privy to which group is receiving the experimental treatment, however they are not directly involved with the participants in any way and cannot have any influence over them. * OR computer may also be used. |
| Reliability | * Conclusions are consistent or stable over time * Reliability of a measure is the extent to which you would get the same result if the same measured were to be given to the same individual again under the same circumstance * Example: taking the same IQ test multiple times and get the same score * Statistical measures of reliability are often used in research studies and reliability scores are used in training manuals |
| Types of Reliability | Internal Reliability  - Assesses the consistency of results across items within a test.  - Tested via Split Half method - Score on one half of the questionnaire should match/correlate with score on the other half of the questionnaire.  External Reliability  - Refers to the extent to which a measure varies from one use to another.  - Tested via Test Re-test method - Scores should be the same on questionnaires administered some time apart |
| Validity | * Refers to the extent to which the results reflect what the measurement instrument designed/claims to measure * Measures what it claims to measure so accurate conclusions can be drawn * Example: much of the debate in the measurement of personality relates to the validity of the tests designed to measure it |
| Types of Validity | * **Face –** If a test appears to measure what it claims * **Construct –** If a test or tool measures the constructs (exact topic) that it was designed to measure * **Concurrent –** If the test correlates/compares with a previously validated measure/test. * **Predictive** - Is the extent to which a score on a scale or test predicts scores on some criterion measure. |

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| Cross Sectional Research | * A research design that compares groups of people at different ages at one point in time. * Used in developmental psychology to overcome the problem of children growing and developing and showing changes in behaviour as they come more socially, emotionally and mentally skilled * Method takes into account age related developmental changes by comparing children of different ages * For example: Kohlberg’s study of presenting dilemmas to children of different ages were asked to respond to the issue= older children more likely to reason at a higher level than younger children * Limitations: in the above study we cannot predict if the children in the youngest age group will reason like the children in the oldest age group when they are that age * Participants at each age group are different people who come from different cohorts * Advantages: Method is frequently used because it is quick and easy especially when there are time and financial limits |
| Longitudinal Methods | * A research design that follows the development of a group of individuals across their lifespan, testing them at different points in time. * The total time period may be very brief, over a period of months but in developmental research is it often over a period of years * Example: Ann Colby and her colleagues followed the moral development of 36 males over 20 years * Individuals were followed across time we do not have to be concerned about possible cohort effects * Limitations: * Expensive * Researchers also run the risk of losing participants as they move or die * Practice effects can distort the findings as the question of participants getting better because they have carried out the same task numerous times? * Cross-generational problem: drawn from one cohort and may have different experiences at each point in their lifespan from those children in earlier of later generation |
| Longitudinal Sequential Design | * Combines features of both the cross-sectional and longitudinal design in an attempt to overcome the limitations of each * Groups of participants are followed over time but at each measurement point a new group is added that is the same age as the first group in the first measurement point * Allows us to look for changes in individuals across time as in longitudinal design * Lets us look for age differences in behaviour as in a cross sectional design and it lets us check for cohort effects * Limitations: complex and expensive and requires a well-organised research team to track the data |
| Qualitative Data | * Techniques that use words or texts to describe or summarise what people feel, think, say or do in relation to particular entities to reflect their attitudes. * Cannot be analysed statistically * Include: observations, recordings, notes, self-reports, INTERVIEWS |
| 3 Types of Interviews | * Interviews are the most common method when it comes to collecting qualitative data usually involves a researcher asking a series of questions and receiving answers to these questions * **STRUCTURED INTERVIEW** : * Involves pre-determined questions in a pre-set order with fixed wording * **SEMI-STRUCTURED INTERVIEW** * Involves pre-determined questions but the order of asking them can be varied by the researcher depending on the circumstances and the answers being elicited * Wording of the questions can be varied and explanations given if needed * Questions can be omitted or even new ones added if required * **UNSTRUCTURED INTERVIEW:** * Involves a conversation around a researcher’s general area of interest * It is informal and casual but often in depth |
| Qualitative Interviews are suitable in the following circumstances | * Study focuses on the meaning of a particular phenomenon to the participants * Prospective processes are to be introduced for example: in an organisation perceptions of possible change are needed * Study wishes to obtain historical perspectives on a phenomenon * Explanatory work is required prior to an experimental study to ascertain the validity of research * Qualitative data are required to validate the results of a quantitative study and help elucidate interpretation of the results |
| Data | ***DATA -* information that is collected in research.**  **Data can take different forms. It can be expressed as written descriptions or in numerical values.**  **Two types:**  **1. Qualitative**  **2. Quantitative (subjective and objective)** |
| Quantitative Data | * **Numerical information about the quantity or amount of what is being studied.** * **The use of numerical data makes it easier to summarise and interpret information and therefore it can be analysed statistically.** * **Can be either:**   **a. Subjective Data**  **b. Objective Data** |

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| Objective Quantitative Methods | * the results are based on facts and do not **influenced by personal feelings/opinions** * **Provides actual data and is not bias or controlled directly by participant.** * Example: brain waves, heart rate, body temperature and conductivity of the skin |
| Subjective Quantitative Methods | * Rely on self reported measures provided by the participants which are all based on personal   feelings/opinions  Rely on opinion and the participant being honest   * eg. Checklists, rating scales * Limitations: * **Relies on people being honest!** * **Often not possible to gather subjective data:** * People with a disability * Young children |
| Rating Scales | * Regarded as versions of questionnaires or interviews * Provide a scale on which an individual’s standing on an issue can be measured and they are commonly used for attitude measurement * Commonly have a range of statements typically used to which a person rates their attitude * The statements/ items are carefully composed so they are related to the attitude being measured and they also need to have the assignment of numbers to particular answers so that meaningful conclusions can be reached. * Most Common: Likert Scale: where a pool of items or statements are related to the issue your are researching and reflect both positive and negative views on the issue. The responses can be categorised through:   + 1=strongly disagree,   + 2=disagree,   + 3=neutral,   + 4=agree,   + 5=strongly agree |

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| Role of the Experimenter | * In experiments researchers tend to work with aggregated data: results represent the group average rather than the individual scores * Non- experimental studies: report averages or percentages. Group averages enable researchers to identify trends and patterns that help describe and predict behaviour although they do not capture individual complexities * Single Case studies: are an exception as they report quantitative data or the behaviour of a single person * Experiments assume that the experimenter will be objective to ensure that the researcher has no effect on the behaviour being observed or recorded on the results * To counter the experimenter effect it is common practice for researchers to acknowledge any expectations and potential biases and to put in place strategies to minimise these as far as possible through physical and emotion distance from the study = this is easier in experimental studies than in qualitative interview studies. |
| Participants Rights | * Privacy * Anonymity * Confidentiality * Voluntary Participation * Withdrawal Rights |
| Privacy | * The right of protection from unwanted intrusion by the government or other people into one’s personal affairs * Refers to the collection, storage and sharing of personal information * Privacy Laws in Australia protect any personal information given to a medical practitioner in the course of seeking treatment to maintain privacy = Commonwealth Act of 1988 * Light Touch: privacy legislation is not controlling and deals mainly with collection, storage and use of personal information and a person’s right to amend the factual details if they are incorrect |
| Anonymity | * The protection of people’s identity through not disclosing their name or now knowing it   Example: Survey Collection: the people complete the questionnaire often do not put their name or any other identifying information on them. |
| Confidentiality | * Resides in the relationship between a professional (such as psychologist) and their patient and refers to the degree of secrecy attached to the information given by the patient of client * Based on trust and is a cornerstone legal and ethical concept in the establishment and maintenance of a therapeutic relationship * Based on the understanding that information given by the patient will not be disclosed to anyone unless the patient consents to the disclosure and under exceptional and usually legal circumstances * Similar provision applies to data collection particularly on health conditions where there is the potential to identify participants |
| Informed Consent | * Those taking part in any study should know why it is being carried out and what they will be expected to do so the nature and purpose of the experiment * If explaining the true purpose before the study is carried out defeats the purpose of the study then the researcher must make sure participants do not experience any distress and they must be fully informed of the purpose of the study after it is completed * Must be appropriately documented * Participants who cannot give informed consent because they are too young (U18) or do not have the intellectual ability to understand what they are being told then consent must be obtained from those legally responsible for them. |
| Voluntary Participation | * Participants must agree to participate in research studies of their own accord * Participants must not be forced into an experiment or be coerced into consenting to participate through bribery, offers or threats such as failure on a course |
| Withdrawal Rights | * Participants must be informed that they have the right to withdraw from a study at any time and for any reason (with out questioning), during the research if they wish to at any time without penalty and will suffer no disadvantage and do not give a reason |

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| Deception in Research | * In some circumstances researchers may use deception in an experiment where they hide the real reason for research in order to reduce the likelihood that participants will behave differently * Ethics committees ensure that deception is only used when necessary and that participants will not be stressed/distressed or embarrassed by deception |
| Debriefing | * At the end of a study the researcher must inform participants about the true nature, purpose results and conclusions of the study to correct any misleading ideas and impressions they have about the study * Researcher must also provide information on the services available to help treat any stress resulting from the study |
| Professional Conduct | * Any psychological, medical or scientific research in Australia must comply with the ‘National Statement on Ethical Conduct in Human Research 2007’ (Updated May 2015) and the ‘Australian Psychological Society’s Code of Ethics’ * Both documents explain the professional code of conduct required of psychologists as they undertake research in Australia * Both documents make clear that scientific research with humans in beneficial and should not be of any hard as the benefits should outweigh any risks and therefore the welfare of humans must not be compromised * All institutions where research with humans in undertaken have Human Research Ethics Committees which analyse research proposals and approve all research involving humans to ensure no harm is done * Detailed applications submitted with the benefit and risks need to be justified before approval * The same/different committee will also deal with applications to conduct research with animals which also governed by various codes of ethics. |

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| Ethics | * Moral principles and codes of behaviour that apply to all psychologists regardless of which field they work in and are important to ensure the protection of the participants and must be followed * Different countries have different customs and guidelines |

# CHAPTER 21: Processing and Evaluating Psychological Research

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| Why Research/ Experiment | * To discover if there is a casual relationship between variables * Does the IV cause a change in the DV? * We need to conduct analysis of the data draw conclusions about the hypothesis * Results and conclusions need to be explained as to why were they obtained and what do they mean? |
| Statistics | * Researchers used statistics to analyse quantitative data these are mathematical procedures used in psychological research to summarise, describe and interpret results * Descriptive Statistics: used to summarise and describe results * Allow numbers to be organised and understood and represent important aspects of data with a single number   e.g: mean, mode, median   * Inferential Statistics : used to indicate whether the results obtained are meaningful/ significant and if the data supports the hypothesis being tested |
| Data Analysis | * Needs to be considered at the experimental design stage so that meaningful data are collected and subsequent analysis are made as simple as possible |
| Data Sets | * Are usually organised into rows and columns where the rows represent a case and the columns are the variables under different conditions of their responses * Each separated entry is a cell containing data and the data set is a matrix * This can be done: * Automatically if the experiment is being conducted and data collected via a computer * Through the creation of a file that can be imported through a software program * Or analysed by hand through a simple manual entry * In most cases before formal statistical analyses, initial exploration of the data is useful as it gives you a feel for the data and what they represent |
| Methods of Displaying Quantitative Data | * Tables: used to organise data in columns and rows. * Tables should always be numbered, have a title, and each column and row should be identified using a sub-title. * Graphs: also used to display data. * Graphs should always have a title and both axes be clearly labelled. Units should be used where appropriate. * Diagrams: are images and should have a title be labelled and drawn in pencil * All of these visually summarise data |
| Frequency Table | 1. List the values and organise them from lowest to highest 2. On the other side right the amount of times a particular value occurs ( the frequency) |
| Bar Graph | * **Bar charts/graphs** areused to display discrete data (NOT continuous) * x-axis :   + data represented in distinct categories   + bars are separate (don’t touch)   + y-axis: (height)   + the frequency of each category   + the bars can be either horizontal or vertical. |
| Histogram | * Shows the frequency of a particular score (or range of scores) in a set of data. * X-axis:   + individual scores or intervals   + the bars touch   + data is continuous   + data is usually numerical * Y-axis: (height)   + the frequency of each score * Data for more than one group of participants can be described on the same histogram. |

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| Frequency Polygon | * Graphs the frequency of scores/responses using a line * X-axis: * individual scores * Y-axis: * Frequency * Dots are plotted at the intersection of the X and Y axes to indicate individual scores. * Could graph: * The amount of time you spend sleeping, being at school, watching tv, doing homework, and other   Single points are placed for total values and a line is drawn between the points   * Differs from line graph as it only shows information about frequency (how often something occurs) * Advantage over histogram: several sets of data can be used in one graph as a legend can show what different lines represent |
| Pie Chart | * **Pie graph:** circular and shows the proportions of values or scores for different categories of data * Is best used to compare different parts of the same whole |
| Line Graph | * Represents the relationship between *two* variables in an experiment. * X - axis :   + Has the IV plotted on it   + The value increases from left to right.   + The variable on x-axis is continuous   + Y - axis :   + Has the DV plotted on it |
| Diagrams | Should:   * have a title * be labelled * be drawn in pencil |
| Measures of Central Tendency | * **Mean** – Average: add all scores together, and divide by *n* * **Median** – The mid-point of a set of ordered scores * **Mode** – The most frequently occurring score in a set of scores * **Range** – the difference between highest and lowest score and describes the spread of values * not used very often as it is a crude amount and does not take clumps of scores into account although it is used in measures of dispersion |
| Measures of Dispersion | * **Frequency Distribution -** Looks at the results and shows how they are spread across the possible results.   \*\***Normal curve –** display of the ideal distribution of variables, based on the mean and standard deviation.   * **Variance –** the spread of variable around the mean. * **Standard deviation –** square root of variance. **AVERAGE** spread of variable around the mean. |
| Distribution | * **Normal Distribution –** a bell shaped curve * **Positively Skewed Distribution** – scores cluster around the lower end of the graph * **Negatively Skewed Distribution** – scores cluster around the higher end of the graph * **Bimodal Distribution** – the data have two modes |
| Variance | * Describes spread of scores around the mean. Lower variance = limited spread * Calculated:  1. Subtract the mean from each score to give each score’s deviation score from the mean 2. Multiply each deviation score by its self 3. Add up all the squared deviations 4. Divide the total by the number of scores  * A variance of zero indicates no spread * Not often used since we do not usually think about the spread of scores in terms of their squared value we usually think about the scores as the values we have been given |

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| Standard Deviation | * describes the spread of a group of scores and represents the average amount by which scores differ from the mean * Square root of the variance * Calculated by:  1. X= each score and M = Mean 2. The score minus the mean (x-m) 3. This calculation is squared 4. All of these scores are added together € 5. Divided by the number of scores (N)  * Used in psychological research as an expression of the distribution of scores |
| Normal Distribution (Bell Curve) | * Many psychological tests assume a distribution where the majority of scores are in the middle of the distribution and fewer are at the extremes * Describes the data in a better description then the range * A normal distribution because of its standard shape of a bell curve can assume the mathematical properties with: * 34% of values fall 1 SD above and 34% of values fall 1 SD below the mean * 14% of values then fall between 1 and 2 SD’s above and below the mean * 2 % fall between 2 and 3 SD’s above and below the mean * There fore 68% of scores are between 1SD above and below the mean making a very useful statistical property |
| Variability | * **Variability** – The spread of scores * **Measure of Variability** - indicates how widely scores are spread around the central point * **Low Variability** – tightly packed spread * **High Variability** – wide spread |
| Probability | * PROBABILITY – indicates the likelihood of an event occuring. Higher the probability the more likely something will occur. Always between 0-1 |
| Statistical Significance | * Refers to the *significance* of the difference between two scores * That is, whether we can attribute the results to the IV or to merely chance alone. * Provides statistical *proof* of a causal relationship, yes the IV does cause the DV to change! * Something which descriptive stats *do not* do! * Indicates whether results are due to chance or occurred for a reason. The closer a value is to the mean the more statistically significant it is. If there is a greater that 5 % chance of a event occurring at random then the results are **not statistically significant** * Statistical Significance is represented by a “**p value**” * If P ≤ 0.05 = statistically significant |
| P Values | < is less than  > is greater than  ≤ is less than or equal too  ≥ is more than or equal too   * p ≤ 0.05 means that for the results of a study to be statistically significant, the probability that the results are due to chance alone **must** be **less than 5%.** * Results are statistically significant * Results are highly likely to be due to the IV * Hypothesis accepted; conclusions may be drawn. * If the p value is > than 0.05 means the probability that the results are due to chance alone most be MORE than 5% * The results **are not statistically significant** and the results are likely to be due to **chance**and not the IV. * Therefore the hypothesis IS rejected! No conclusions can be drawn. |
| The Concept of Statistical Significance and Probability | * In Normal Distribution we know that around 2% of the population for a particular behaviour under examination falls between 2 and 3 SDS above the mean * This results in a probability of 0.02 or 2% that the score will fall in their region for a single person * There is however a probability of 0.68 that the score of a single person will fall between 1SD above and 1SD below the mean = high probability * When testing for SS these are the comparisons we make between the distribution of scores and that of the wider (assumed) population * If More extreme results (at either end of distribution) than those assumed by a normal distribution or by chance than we conclude our results are statically significant * Also used to indicate whether difference between a control and experimental group is real that is due to the independent variable and not by chance * Researchers use tests of statically significance to compare the mean scores of the groups and in general accept that difference is due to the independent variable when the probability is due to a chance in 5 time or fewer in 100 repetition of the study. This would be a result in a pvalue of 0.05 (5%) that the difference in scores was due to chance |
| Correlation | * Non-experimental research method used to investigate the relationship between 2 or more variables. * It does not tell us if one causes the other to occur but it tells us **if there is a relationship between the 2 variables**. * Measures of correlation are referred to as correlation coefficients which describe the strength and direction of the co-relationship between two variables |

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| Correlation + and - | * **Positive correlation** – Two variables move in the same direction   + That is, they both increase or both decrease   + For example, chocolate and Ms Keating’s happiness * **Negative correlation** – Two variables move in opposite directions   + That is, one increases while the other decreases, and vice versa   + For example, marking and Ms Keating’s happiness * The **Correlation Coefficient** shows the strength and direction of the relationship (between +1 and -1) |
| Correlation Coefficient | * The closer the correlation coefficient is to -1 or +1, the stronger negative or positive the relationship is (respectively) * The closer the correlation coefficient is to 0, the weaker the relationship is: * Strong positive relationship: r between 0.75-0.99 * Moderate Positive= 0.5 and 0.74 * Weak positive = 0.26 and 0.49 * No relationship= -0.24 and +0.24 * Weak negative= -0.25 and -0.49 * Moderate Negative= -0.5 and -.74 * Strong Negative= -0.75 and -0.99 |
| Scatter Plots | * A **scatter plot** is a graph of scores showing correlational data * The **spread** of the dots indicates the strength of the relationship. * The **closer** the dots, the stronger the relationship * The **slope** of the dots indicates the direction of the relationship. * **Sloping up** shows a positive relationship * **Sloping down** shows a negative relationship |
| Types of Correlation | * Bivariate Correlation – when two variables are considered * Multivariate Correlation – when more than two variables are considered |
| Validity | .**Validity** – the degree to which the variables measure what they are intended to measure, and so lead to an accurate conclusion. For something to be valid, it has to actually measure what it claims to measure.   * For example, a test that claims to measure self-esteem but actually measures a liking for the colour blue is not really valid. |
| Reliability | * **Reliability** – the quality of a measure relating to its relative consistency in measurement. If something is reliable, it means that the result we obtain is repeatable. * For example, if we took a test that measured our IQ, for example, and the first time you took it your IQ was 110 and the next time you took it your IQ was 150, the test is probably unreliable. |
| Sources of Error and ways to Reduce | 1. Chose the correct sampling method. Methods/Options  2. Use of placebo reduces the placebo effect  3. Double blind studies reduces experimental bias  4. Randomized controlled trials |
| Sampling Methods | * Random Allocation of participants in groups - randomly allocate numbers to participants = lotto draw ensures each participant has an equal chance of being selected to be in experimental or control group and also makes all possible combinations of people for a particular sample size equally likely to reduce differences between experimental and control groups * Stratified random sampling – a way of selecting participants for a study by dividing them into groups (stratas) based on characteristics (eg. Sex – males and females) and then randomly allocating them * Proportionate sampling – different sample sizes based on representation of groups in the population * Disproportionate sampling – oversampling of small/rare groups to ensure there is a some representation of them in a study * Snowball sampling – researcher identifies participants of interest for a study. Participants are interviewed and then pass on details of other people of interest in the population. Used in qualitative research * These sample techniques reduce sources of data error and reduce likelihood of error when generalising the results from sample to wide population |

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| Evaluating and Improving Research | * Evaluation of Research at whatever level can lead to improvement in research weather it is in the design and the variable included, analysis of data or interpretation of results   Before any research is conducted a proposal must be developed to get approval for the research.   * Thought must go into considering prior research and then a plan to make improvements for future research must be made. When planning for future research considering factors such as the below is important: * The aim and significance of the research you want to conduct * The research method and design that will be used * How the analysis and interpretation of the data will occur * The discussion implications and applications of research * Evaluating research systematically and critically better research can be developed thus ensuring psychology remains rooted in scientific tradition but also contributing to our knowledge of how behaviour and mental processes work and how to predict human behaviour |
| Peer Review of Applications for Funding | * Conducted by experts in the same field of research and are familiar with the theory, content, method, analysis and interpretation of data * People whom the researcher has collaborated with or competitors * Recognised way of getting one’s research evaluated and funded or published |