RESEARCH METHODS
COMPLETE REVIsION
EXPERIMENTAL METHOD
RESEARCH

1. What will you need to measure?
   – This is the **DEPENDENT VARIABLE (DV)**
     • When you decide what you want to measure (e.g. how well someone does on a task); you need to make sure that **ALL** participants are doing the same task and it would need to be a specific task (e.g. a memory test)

2. What are your two conditions?
   – This is the **INDEPENDENT VARIABLE (IV)**
     • This usually involves two conditions (e.g. having the TV on and having the TV off)
     • Having these two conditions (known as different **levels** of the IV) allows a comparison to be made
     • A good hypothesis should always include the two (or more) levels of the IV
3. What will you expect to find?
   – This is the **HYPOTHESIS** which is a statement of what you believe to be true
   – This might be “Students who do a memory task with the TV on produce work which gets fewer marks”
     • This is different to the AIMS of the experiment
     • The AIM are intentions or a research question, whereas a HYPOTHESIS is a statement of the relationship between the IV and DV
     • An AIM may be “To investigate the effect of TV on the work a student produces”
4. What will the participants do?
   — This is where the experimenter works out **STANDARDISED PROCEDURES**
     • This is to ensure that **ALL** the participants do exactly the same thing in each condition (otherwise the results may be affected by the procedures of the experiment rather than the IV)
     • Identical procedures are known as “standardised”

5. What do you need to control?
   — Some **EXTRANEOUS VARIABLES** would have been controlled, such as the time of the day (people may do better on a test in the morning than the afternoon, so all participants should do the test at the same time of day)
The study described in the previous slides is an **EXPERIMENT**

- The main characteristic of an experiment is an IV which is deliberately changed (TV or not) to see if this has any affect on the DV (quality of work)
- This allows us to draw **CAUSAL CONCLUSIONS** (e.g. we can make a statement about whether having the TV on or off causes a change in quality of work that is done because we can compare the effect of the two levels of the IV)
CONTROL OF VARIABLES
CONTROL

• CONFOUNDING VARIABLE = A variable under study that is not the IV but which varies systematically with the IV. Changes in the DV may be due to the confounding variable rather than the IV, and therefore the outcome is meaningless.

• EXTRANEOUS VARIABLES = Do not vary systematically with the IV and therefore do not act as an alternative IV but may have an effect on the DV. They are nuisance variables that muddy the waters and make it more difficult to detect a significant effect.
CONTROL

• RESEARCH AIM: To investigate whether people work just as well with the TV on, or whether their work will suffer as a result
• IV = if the TV is on or not
• DV = participants’ score on a memory test
• The expected outcome is the “TV off” condition should do better due to less distraction
• If all the participants in the “TV off” condition did their memory test in the morning and the “TV on” condition did their memory test in the afternoon
• People are generally more alert in the morning and so the time of the day rather than the lack of noise could change the IV
  – The “Time of the Day” is then regarded as a confounding variable
• If the experimenter states that the IV caused the change in the DV (but it was not, it was the confounding variable) then they would not have tested what they set out to test
CONTROL

- RESEARCH AIM: To investigate whether people work just as well with the TV on, or whether their work will suffer as a result

- Some participants may have better memories than others
- We cannot be certain that all those with good or bad memories are evenly distributed across the two conditions
- Memory ability becomes an Extraneous Variable and makes it more difficult to detect an effect
- Extraneous variables should be controlled if possible as they affect the DV
The aim of psychological studies is to provide information about how people behave in “real life”

If the study is too artificial then participants will not act as they would normally

- E.g. Loftus and Palmer study – watching a film of a car accident is not close to real like

**MUNDANE REALISM** = Refers to how a study mirrors the real world

- So lack of mundane realism = something is not like everyday experience
- If this is the case then the results from such studies may not be useful in terms of understanding behaviour in the real world
REALISM

GENERALISATION

• The point of realism is to be able to generalise the results beyond the unique research setting (i.e. to be able to understand behaviour in real life)

• If the materials used are artificial (like film clips) then the observed behaviour may lack realism

• If the environment is artificial and if the participants are aware that they are being studied then participant behaviour may lack realism

• Even if the materials and environment are “natural” or real (i.e. high realism) a study can still lack generalisability
  – E.g. if the participants were English University students, results may not be able to generalise the findings to the behaviour of all people

• Psychologists are always asking themselves “to what extent can I generalise these findings to everyday life?”
VALIDITY

• VALIDITY = Refers to whether an observed effect is a genuine one (i.e. if it is a true explanation of behaviour)
  – It involves the issues of control, realism and generalisability
• Validity is **NOT** about confirming your expectations
• Validity can be split into two parts:
  – INTERNAL VALIDITY = this is about control and realism
  – EXTERNAL VALIDITY – this is about being able to generalise research to other people and situations
INTERNAL VALIDITY

• This is about what goes on inside the study and is concerned with:
  – Whether the IV produced the change to the DV
  – Whether the researcher tested what they intended to test
  • E.g. if you want to find out if watching TV affects quality of homework, you cannot be sure you are testing “watching the TV” by just having it on as the person may not actually be watching it!
  – Whether the study possessed or lacked mundane realism

• To gain high internal validity, researchers need to design their research carefully, controlling confounding and extraneous variables and making sure they test what they intended to test
EXTERNAL VALIDITY

• External validity is affected by internal validity (you cannot generalise the results of a study that was low in internal validity as the results have no real meaning for the behaviour in question)

• External Validity also concerns the following:
  – The place where the research was conducted (ecological validity)
  – The people who are studied (population validity)
    • E.g. if a study just involves one gender, nationality, etc then findings may not be able to generalise to all people
  – The historical period (historical validity)
    • E.g. a study in the 1950’s may not be appropriate to generalise the findings to people today
The study described in the previous slides is an EXPERIMENT.

- The main characteristic of an experiment is an IV which is deliberately changed (TV or not) to see if this has any affect on the DV (quality of work).
- This allows us to draw CAUSAL CONCLUSIONS (e.g. we can make a statement about whether having the TV on or off CAUSES a change in quality of work that is done because we can compare the effect of the two levels of the IV.
HYPOTHESES, PILOT STUDY AND CONFEDERATES
DIRECTIONAL HYPOTHESIS

• People who have plenty of sleep (an average of 8 or more hours per night over a period of one month) have *better* marks in class tests than people with lower sleep average

• This hypothesis has been operationalised

• This hypothesis is a directional hypothesis as it states the expected direction of the results (i.e. stating that one group will do better than another)
DIRECTIONAL HYPOTHESIS

- People who have plenty of sleep (an average of 8 or more hours per night over a period of one month) have lower marks in class tests than people with lower sleep average.

- This hypothesis is still a Directional Hypothesis but it is stating the results will go in the opposite direction.
People who have plenty of sleep (an average of 8 or more hours per night over a period of one month) have different marks in class tests than people with lower sleep average marks.

This hypothesis has states that there will be a difference between two conditions but does not state the direction of the difference.
WHICH SHOULD BE USED

• Psychologists use a directional hypothesis when past research (a theory or study) suggests that the findings will go in a particular direction.

• Psychologists use a non-directional hypothesis when there is no past research or the past research is contradictory.

• These are also better if studying a new area.
PILOT STUDIES

• Scientists deal with the flaws in research by conducting a **PILOT STUDY** first

• This is a small-scale trial run of a research design before doing the real thing

• It is done to find out if certain parts of the design work or not
  – E.g. if participants understand instructions or if they get bored due to too many tasks

• Researchers try the design out on a few **typical** participants to see what needs to be adjusted without wasting lots of time and money by doing a full scale experiment

• The results of pilot studies are irrelevant. The purpose is not to see the results but to see what needs fine tuning
CONFEDERATES

• Sometimes researchers need to use another person to play a role in an experiment
  – E.g. to see how people act to someone in a suit or not
• In the above example the IV would be if the person was wearing a suit or not and they would be briefed by the experimenter
• This person is known as a CONFEDERATE
• Milgram’s study on obedience used a confederate to play the role of the experimenter and another played a role of the learner
• Confederate’s were also used in Asch’s study on conformity
EXPERIMENTAL DESIGN
EXPERIMENTAL DESIGN

• This is a set of procedures used to control the influence of factors such as participant variables in an experiment.

• These include:
  
  – **Repeated Measures Design**
    • This is where each participant takes part in every condition under test (all participants receive all levels of the IV).
  
  – **Independent Groups Design**
    • Participants are placed into separate (independent) groups they are allocated into two or more groups representing different experimental conditions (allocation is normally done randomly).
  
  – **Matched Pairs Design**
    • Pairs of participants are matched in terms of key variables (e.g. age, IQ, etc). One member of each pair is placed in an experimental group and the other member in the control group.
LIMITATIONS OF REPEATED MEASURES DESIGN

1. One condition may be more difficult than another. E.g. testing at different points in the day (in the morning and afternoon). The first test may be easier than the second test – therefore changes to the DV would be due to extraneous variables rather than the IV.

2. When participants do the second test they may guess the purpose of the study, which may affect their behaviour.

3. The order of the condition may affect performance (order effect). Participants may do better in the second test due to practice or being less anxious OR do worse due to boredom.
DEALING WITH THE LIMITATIONS OF REPEATED MEASURES DESIGN

1. Make sure the tests are equivalent
2. Use a cover story about the purpose of the test to prevent participants guessing what it is about (single bind – see key terms)
3. Use counterbalancing (see key terms)
LIMITATIONS OF INDEPENDENT GROUPS DESIGN

1. No control of participant variables (i.e. different abilities or characteristics of each person). E.g. people in group one may have better memories than those in group two.

2. Twice as many participants are needed for this design (compared to repeated measures).
DEALING WITH THE LIMITATIONS OF INDEPENDENT GROUPS DESIGN

1. Randomly allocate participants to conditions which distributes participant variables evenly.

2. Be prepared to spend more time and money.
LIMITATIONS OF MATCHED PAIRS DESIGN

1. Very time-consuming to match participants on key variables. Probably need to have a large group of participants to start with to ensure matched pairs can be obtained.

2. May not control all participant variables as you can only match on variables known to be relevant.
DEALING WITH THE LIMITATIONS OF MATCHED PAIRS DESIGN

1. Restrict matching variables to make it easier
2. Conduct a pilot study to consider key variables
KEY TERMS

• **ORDER EFFECT** – in a repeated measures design, an extraneous variable arising from the order in which conditions are presented (e.g. practice effect or fatigue effect)

• **SINGLE BIND** – a type of research design which the participant is not aware of the research aims or of which condition of the experiment they are receiving

• **COUNTERBALANCING** – an experimental technique used to overcome order effects. It ensures that each condition is tested first or second in equal amounts
  – E.g. Group 1 does test A in the morning then test B in the afternoon. Group 2 does test B in the morning then test A in the afternoon

• **RANDOM ALLOCATION** – allocating participants to experimental groups or conditions using random techniques
LABORATORY, FIELD AND NATURAL EXPERIMENTS
LABORATORY EXPERIMENTS

• These are conducted in a special environment where variables can be carefully controlled
• So this is not like every day life – described as being low in mundane realism (their behaviour does not reflect what they would “normally” do)
• Participants are aware that they are taking part in an experiment, though they may not know the true aims of the study
• As participants know they are being studied this is likely to affect their behaviour
• The IV or DV may be operationalised in a way that does not represent everyday experiences
FIELD EXPERIMENTS

• These are controlled experiments outside a laboratory
• It is an experiment conducted in a more natural environment (i.e. in the field = anywhere outside a laboratory)
• So it is more difficult to control extraneous variables
• The IV is still deliberately manipulated by the researcher, therefore this will lack realism
• Participants often not aware that they are part of an experiment
• This means there are ethical issues (deception and it is difficult to debrief participants)
LAB OR FIELD EXPERIMENTS?

• Lab experiments tend to make control easier, but tend to be less natural (as participants are aware they are being studied)
• Field experiments tend to be more natural and more representative of everyday life but means less control and greater ethical problems
ADVANTAGES OF LAB EXPERIMENTS

• Well controlled so extraneous variables are minimised (so a higher internal validity)
• High internal validity as we can be more certain that the change in DV is due to the IV
• Can be easily replicated to check if the same results occur which supports the external validity of the results
WEAKNESSES OF LAB EXPERIMENTS

• Artificial situations – so participants may not behave as they do in everyday life due to a lack of mundane realism, participant effects, investigator effects and demand characteristics (this reduces internal validity)

• Has low ecological validity

• IV and DV may be operationalised in a way that does not represent real life (e.g. using film clips to test EWT)
ADVANTAGES OF FIELD EXPERIMENTS

• Less artificial, usually higher mundane realism and so higher internal validity
• Avoids participant effects (as participants not aware of the study taking place), which may increase internal validity
WEAKNESSES OF FIELD EXPERIMENTS

• Extraneous variables less easy to control because the experiment is in a more natural setting, therefore reducing internal validity
• May still be demand characteristics (e.g. the way the IV is operationalised may convey the experimental hypothesis to the participants, i.e. may lack realism)
• Ethical issues as participants do not know they are being studied
NATURAL EXPERIMENTS

• Here the environment is natural as in a field experiment, but the change in the IV is also “natural” (the experimenter makes use of an IV that would vary anyway instead of manipulating it)

• The experimenter still observes the DV and IV but it is possible that extraneous variables are not controlled (see example of Charlton et al, 2000, on the next slide)

• Conclusions from natural experiments may be problematic as:
  – Participants are not randomly allocated to conditions which means there may be biases in different groups e.g. IQ, motivation etc (these factors would act as extraneous variables)
  – The sample studied may have unique characteristics meaning the findings cannot be generalised to other cultures
CHARLTON ET AL (2000)

- **AIM:** To see if the introduction of television (and so aggressive role models) to a community would affect the aggressive behaviour of children

- **METHOD:** For two years after the island of St. Helena first received television transmissions, the behaviour of the children was monitored

- **RESULTS:** The children did not show an increase in aggressive behaviour (DV) after television (IV) was introduced compared to before it was introduced

- **CONCLUSION:** Merely watching aggressive role models will not be sufficient to make children copy aggressive behaviour
QUASI-EXPERIMENTS

• Studies that are “almost” experiments but lack one or more features of a true experiment, such as full experimenter control over the IV and random allocation of participants to conditions. This means that they cannot claim to demonstrate causal relationships

• IV is naturally occurring and the DV may be measured in a lab

• Key feature is that the IV has not been made to vary by anyone
QUASI-EXPERIMENTS EXAMPLE

• Sheridan and King (1972)
  – Tested obedience by asking participants to give genuine electric shocks of increasing strength to a puppy
  – 54% males delivered the maximum (non-fatal) shock
  – 100% females delivered maximum shock (were more obedient)
  – The IV is gender (a difference that cannot be manipulated and so is not a “true” IV)
ADVANTAGES OF NATURAL EXPERIMENTS AND QUASI-EXPERIMENTS

• Allows research where the IV cannot be manipulated
• Enables psychologists to study “real” problems (which increases mundane realism and validity)
• Quasi-experiments allow comparisons to be made between types of people (e.g. gender)
WEAKNESSES OF NATURAL EXPERIMENTS AND QUASI-EXPERIMENTS

• Cannot demonstrate causal relationships because IV not directly manipulated
• There are many extraneous variables (e.g. lack of random allocation) which are a threat to validity
• Can only be used where conditions vary naturally
• Participants may be aware of being studied causing participant effects, investigator effects and demand characteristics
• The sample studied have unique characteristics and so findings cannot be generalised to other groups of people
PROBLEMS WITH EXPERIMENTS
DEMAND CHARACTERISTICS

• Definition:

• “a cue that makes participants unconsciously aware of the aims of the study or helps participants work out what the researcher expects to find”
DEMAND CHARACTERISTICS

• Participants want to be helpful and so they pay attention to cues in the experimental situation that may guide their behaviour

• Everyday Demand Characteristics:
  – When you are watching a sporting match at home you may be fairly quiet, but in a stadium you may join in with chanting and jumping up and down
    • Both situations create different expectations and “demand” different behaviours

• Experimental Demand Characteristics
  – In an experiment, participants do not always know what to do and so they actively look for clues as to how they should behave in that situation (these clues are demand characteristics
  – If participants are given two tests on memory, they may work out the aims of the study and try to do better in the second study. The participants change their behaviour due to the cues
  – Therefore, the demand characteristics act as a confounding variable
INVESTIGATOR EFFECTS

• Also known as investigator or experimenter bias

• Definition:
  – “anything that an investigator does that has an effect on a participant’s performance in a study other than what was intended. This includes direct effects (as a consequence of the investigator interacting with the participant) and indirect effects (as a consequence of the investigator designing the study).”
  – They may act as confounding or extraneous variables
INVESTIGATOR EFFECTS

• Theses are any cues (apart from the IV) from an investigator that encourage certain behaviours in the participants (which might lead to fulfilling the investigator’s expectations)

• Study by Rosenthal and Fode (1963)
  – Two groups of participants training rats (one told they had “fast learners”, other group told they had “slow learners”; but there was no difference)
  – Participants with “fast learners” described their rats as smarter

• Investigators unconsciously encourage participants by spending more time with one group or being more positive with them

• Investigators may ask leading questions which lead participants to give an answer the investigator “wants”

• Indirect Investigator Effects
  – This is where something with the design of the study (measurement of variables or vague/unclear standardised procedures) leaves the results to be influenced by the experimenter
DEALING WITH THESE PROBLEMS

• **Single-blind Design**
  – The participants are not aware of the research aims and/or which condition of the experiment they are receiving (this prevents them from seeking cues about the aims and reacting to them)

• **Double-blind Design**
  – Both the participants and the person conducting the experiment are “blind” to the aims and/or hypotheses. So the person conducting the investigation is less likely to produce cues about what he/she expects
  – Or when neither the participants nor experimenter know what condition each participant is receiving (e.g. drug/placebo)

• **Experimental Realism**
  – If the researcher makes an experimental task sufficiently engaging then the participants will pay attention to the task and not the fact that they are being observed
SAMPLING
TARGET POPULATIONS AND SAMPLE

• Psychologists cannot test every person to find out how people behave in certain situations
• Instead they use small groups of people
• People who take part in an investigation are the participants and as a group they are the sample for the study
• The small sample of participants will be selected from a much larger group called the target population
TARGET POPULATIONS AND SAMPLE

• It is important that the sample of people in a study is **representative** of the target population
• If they are then the researcher can assume the behaviour of the sample matches the behaviour of the target population
• This means the results of the study can be **generalised** in that the results can be said to apply to not only the sample but to the target population as a whole
SELECTION OF PARTICIPANTS

• For observations, researchers tend to use some method of sampling to reduce the number of observations.

• It would be impossible to conduct a study for all school children in Britain, therefore, the researcher would select a sample from this target population.

• Sampling includes:
  – **OPPORTUNITY SAMPLING** – people that are around at the time.
  – **VOLUNTEER SAMPLING** – people volunteering themselves for a study.
  – **RANDOM SAMPLING** – people randomly selected (this is the least biased out of these three).
  – **SYSTEMATIC SAMPLING** – people selected from every nth number.
  – **STRATIFIED SAMPLING** – people selected after a calculation of each sub-groups frequency in the target population.
OPPORTUNITY SAMPLING

• This is done by recruiting people who are most convenient or most available
  – E.g. people walking by on the street

• These people are chosen from the target population and are available and willing to take part
RANDOM SAMPLING

• Every member of the target population has an equal chance of being selected for the sample
• The researcher must identify all members of the target population, and complete one “random technique”
  – This is either “the lottery method” (drawing names out of a hat); “random number table”; “random number generator” (electronic generator)
• If the target population is small then all numbers can go into a hat to be drawn out; if it is large then a computer programme can do this
VOLUNTEER SAMPLING

• The experimenter will place an advert in a newspaper/on the internet/on a notice board etc.

• Participants respond to this advert and take part in the study
SYSTEMATIC SAMPLING

• This involves selecting every “nth” member of the target population
• E.g. if the researcher decides that “n” will be 7, then every 7\textsuperscript{th} person in the target population is selected
• The numerical interval is applied consistently
STRATIFIED SAMPLING

• The researcher must identify the subgroups in the target population and work out what proportion of that target population each group represents

• E.g. in a school there are several subgroups (teachers, other staff, students in each year, etc)
  – If teachers make up 10% of the whole school target population then 10% of the sample must be teachers
  – This is repeated for each subgroup

• Once the researcher knows what proportion needs to be selected for the sample, a random sample of each subgroup is taken
## ADVANTAGES AND DISADVANTAGES OF SAMPLING METHODS

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<thead>
<tr>
<th>SAMPLING METHOD</th>
<th>STRENGTHS</th>
<th>LIMITATIONS</th>
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</table>
| **Opportunity** | • Quick and easiest method as you use the first suitable participants you can find | • Investigator bias as sample is drawn from a small part of the target population  
• So it is not likely to be representative |
| **Random** | • Unbiased as all of the members of the target population have an equal chance of being selected  
• Likely to be representative | • Time-consuming as you need to have a list of all members of the target population and then contact those selected |
| **Systematic** | • Unbiased as the participants are selected using an objective system | • Not truly unbiased unless you select a number using a random method  
• Sample may not be representative |
# ADVANTAGES AND DISADVANTAGES OF SAMPLING METHODS

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<tbody>
<tr>
<td>Volunteer</td>
<td>• Gives access to a variety of participants which may make the sample more representative and less biased</td>
<td>• Sample is biased in other ways as participants are likely to be more highly motivated and have more time on their hands</td>
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<td></td>
<td></td>
<td>• Being highly motivated or needing money offered to take part may lead to Volunteer Bias</td>
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<tr>
<td>Stratified</td>
<td>• Very representative than other methods as there is a proportional and random selected representation of sub-groups</td>
<td>• Very time-consuming to identify subgroups and then randomly select participants and then contact them</td>
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ETHICAL ISSUES
THE BRITISH PSYCHOLOGICAL SOCIETY (BPS)

• In order to carry out any investigations Psychologists in the UK are advised by the BPS
• The BPS designed the Code of Ethics and Conduct (BPS, 2009) which identifies 4 principles:

  1. **RESPECT** – respect for the dignity and worth of all persons (including *privacy, confidentiality, informed consent and right to withdraw*). Deception may be needed and acceptable

  2. **COMPETENCE** – maintaining high standards in their work

  3. **RESPONSIBILITY** – responsibility to the participants (including *protection from physical and psychological harm* and debriefing them)

  4. **INTEGRITY** – being honest and accurate
ETHICAL ISSUES

• These are conflicts between two points of view and what is acceptable
• In psychological research this is the conflict between what the researcher needs to conduct a useful and meaningful study and the rights of the participant
• There are 6 ethical issues within psychological research:
  – Informed consent, Deception, The right to withdraw, Protection from physical and psychological harm, Confidentiality and Privacy
INFORMED CONSENT

RESEARCHER’S POINT OF VIEW

• This is where the researcher will tell the participants the true aims of the study or what is going to happen

• This may lead to the participants guessing what the aims of the study are and so this might change the way they behave during the study

PARTICIPANT’S POINT OF VIEW

• Participants need to know what will be required from them so they can make a decision to participate or not

• Experimenters need participants to give informed consent before they take part

• Some participants still do not understand fully what they had agreed to take part in

• Experimenters are not always able to predict risks of taking part in a study, which is problematic for informed consent
DECEPTION

RESEARCHER’S POINT OF VIEW
• It may be necessary to deceive participants about the true aims of the study otherwise results could be affected (this is reasonably acceptable)
• However, there needs to be a distinction made between withholding some of the details of the research aims (reasonably acceptable) and deliberately providing false information (less acceptable)

PARTICIPANT’S POINT OF VIEW
• Deception is unethical and so researches should not do this without good cause
• Deception prevents participants from giving informed consent (as they do not really know what they are going to do, which could lead to them feeling distressed)
• Deception could lead to negative views of participants to psychologists and so they would not want to take part in further studies
THE RIGHT TO WITHDRAW

RESEARCHER’S POINT OF VIEW
• If a participant withdraws from a study it may cause the results to be biased as the participants who stayed are likely to be more obedient and more hardy – leading to a biased sample

PARTICIPANT’S POINT OF VIEW
• If a participant begins to feel uncomfortable or distressed they should be able to withdraw from the study (especially if they have been deceived about the aims/procedures)
• Payment to the participants within a study may affect the right to withdraw as they may feel less able to withdraw
PROTECTION FROM PHYSICAL AND PSYCHOLOGICAL HARM

RESEARCHER’S POINT OF VIEW

• Some psychological studies (about important questions) may involve a degree of distress of the participants

• It is difficult to guarantee protection from harm in some studies (Stanford Prison Experiment) as outcomes can be difficult to predict

PARTICIPANT’S POINT OF VIEW

• It is considered acceptable if the risk of harm is no greater than in ordinary life. There are different ways to cause harm:
  – Physical e.g. getting them to smoke or drink excess coffee
  – Psychological e.g. making them feel inadequate or embarrassing them

• Participants should be in the same state after the experiment as they were before (unless informed consent has been given to be treated otherwise)
CONFIDENTIALITY

RESEARCHER’S POINT OF VIEW
• It may be difficult to protect confidentiality as the researcher may wish to publish findings
• They may guarantee anonymity by withholding the participants’ names but it may still be obvious who has been involved in the study (e.g. in a small town/community)

PARTICIPANT’S POINT OF VIEW
• Confidentiality is a legal right (Data Protection Act) and personal data can only be published if it is put in a form that cannot identify the participants
DEALING WITH ETHICAL ISSUES
ETHICAL GUIDELINES

- The British Psychological Society (BPS) updates its ethical guidelines regularly (most recent is the “Code of Ethics and Conduct (2009))
- The guidelines tells psychologists the behaviours that are not acceptable and guide how to deal with ethical dilemmas

EVALUATION

- Canadians present a series of hypothetical dilemmas and invite psychologists to discuss these
- This encourages discussion whereas the BPS and APA (American Psychological Association) closes off discussions about what is right or wrong as the answers are provided
- If psychologists follow the guidelines provided by the BPS the responsibility is on the BPS for any problems or issues not the psychologist
COST-BENEFIT ANALYSIS

• If we judge the cost and benefits from a participants point of view we take into account distress and loss of time compared to payment they receive and the feeling of contributing to scientific research

• If we judge the cost and benefits in terms of society as a whole, we take into account the value in improving people’s lives against the possibility that individuals may be harmed in the process

• Cost/benefit can be compared for a group (e.g. cultural differences). The research may not harm the individual, but findings may lead to biased treatment of the individual’s cultural group (good or bad)
COST-BENEFIT ANALYSIS EVALUATION

• The problem with cost-benefit decisions is it is difficult to predict both cost and benefit prior to the study (or even after the study)
• Baumrind (1959) suggests the cost/benefit approach solves nothing as it exchanges one set of dilemmas for another set
• She also suggests it can legitimise unethical practices (deception and harm are acceptable in some situations if the benefits are great enough)
ETHICS COMMITTEES

• All institutes where research takes place have an ethics committee and this committee must approve any study before it begins.

• It looks at possible ethical issues in any proposal and how the researcher plans to deal with these issues (weighing up the benefits of the research against the cost to the participants).

• If the cost-benefit balance means the costs are too great or the benefits are too low then the research may not be allowed to be carried out.
PUNISHMENT

• If a psychologist behaves in an unethical manner and conducts unacceptable research, they can be banned from practising as a psychologist by the BPS
  – But they won’t be sent to prison as it is not a legal matter
DEALING WITH ETHICAL ISSUES – Informed Consent

HOW TO DEAL WITH IT

• Participants asked to formally agree to participate, based on comprehensive information about the nature of the study and their role in it

• An alternative is to gain presumptive consent (by gaining consent from others e.g. by asking a group of people if they feel the study is acceptable. We then presume that the participants would have felt the same if they had been given the opportunity to say so)

• Researchers can offer the right to withdraw
DEALING WITH ETHICAL ISSUES –
Informed Consent

LIMITATIONS

• By giving the participants the full information about the study, this may invalidate the purpose of the study

• Getting informed consent does not guarantee participants really understand what they are required to do

• The problem with presumptive consent is what people expect that they will/will not mind can be different from actually experiencing it (e.g. Milgrim’s study)
DEALING WITH ETHICAL ISSUES – Deception

HOW TO DEAL WITH IT

• The need for deception needs to be approved by an ethics committee, weighing up benefits of the study against costs to the participants

• Participants have should be fully debriefed after the study and given the opportunity to withhold their data

• Debrief – Inform participants of the true nature of the study, offer the opportunity to discuss concerns they may have and withdraw their data from the study if the wish to. Researchers can also use this to ask participants further questions (e.g. why did they behave in a certain way)
DEALING WITH ETHICAL ISSUES – Deception

LIMITATIONS

• Cost-benefit decisions are flawed as they involve subjective judgements and so the costs and/or benefits are not always clear until after the study

• Debriefing cannot turn the clock back (participants may be left embarrassed or have lowered self-esteem)
DEALING WITH ETHICAL ISSUES – The Right to Withdraw

HOW TO DEAL WITH IT

• Participants should be informed at the start of the study that they have the right to withdraw from the study at any point (even after the study is complete)

LIMITATIONS

• Participants may feel they shouldn’t withdraw as it will spoil the study
• Participants may feel they cannot withdraw if there is a reward or payment involved
DEALING WITH ETHICAL ISSUES – Protection from Harm

HOW TO DEAL WITH IT

• Researchers should ensure participants avoid any risks greater than everyday life
• If they experience these risks the study must be stopped immediately (e.g. Stanford prison experiment)

LIMITATIONS

• Researchers are not always able to accurately predict the risks of taking part in a study
• Harm may not be apparent at the time of the study and only judged so later with hindsight
DEALING WITH ETHICAL ISSUES – Confidentiality

HOW TO DEAL WITH IT

• Researchers should not record the names of any participants (should use numbers or false names)

LIMITATIONS

• It is sometimes possible to work out who the participants were based on the information provided (e.g. geographical location of a school/university)
PRIVACY

RESEARCHER’S POINT OF VIEW

• It is difficult to avoid invasion of privacy when studying participants without their awareness (e.g. in a field experiment)

PARTICIPANT’S POINT OF VIEW

• People do not expect to be observed by others in certain situation (e.g. in their own home), but they might expect it when in a public place (e.g. on a park bench)
DEALING WITH ETHICAL ISSUES – Privacy

HOW TO DEAL WITH IT

• Do not observe anyone without their informed consent unless it is in a public place and public behaviour (i.e. not an intimate moment)

• Participants may be asked to give their retrospective consent (giving consent after the study has taken place) or withhold their data

LIMITATIONS

• There is no universal agreement about what is a public space
OBSERVATIONAL TECHNIQUES
NATURALISTIC AND CONTROLLED OBSERVATIONS

NATURALISTIC OBSERVATIONS

• Behaviour is studied in a natural situation where everything has been left as it is normally (researcher does not interfere with what is happening)
  – E.g. watching infants play at their nursery/observing animals in a zoo

CONTROLLED OBSERVATIONS

• Some variables in the environment are regulated by the researcher (reducing the “naturalness” of the environment and the behaviour being studied)
• They allow researchers to investigate the effects of certain things on behaviour (e.g. Bandura’s study of SLT, which was an experiment but observations were used to assess the DV)
OVERT AND COVERT OBSERVATIONS

OVERT OBSERVATIONS

• This is an observation when the person/people being observed are aware of the observation

• These have an effect on the naturalness of participants’ behaviour, observers try to be as discreet as possible (e.g. by using one-way mirrors), but they are still aware that they are being observed

COVERT OBSERVATIONS

• This is an observation where participants do not have any knowledge of being observed (not before or during, but maybe after)
PARTICIPANT AND NON-PARTICIPANT OBSERVATIONS

NON-PARTICIPANT OBSERVATIONS

• In most cases the observer observes from a distance and does not interact with the participants (they watch or listen to the behaviour of the participants)

PARTICIPANT OBSERVATIONS

• Here the observer is part of the group being observed, i.e. part of the group being observed (unbeknown to the participants)
EVALUATION OF OBSERVATIONAL STUDIES

• Observations give a different take on behaviour than other research methods; as they are able to capture spontaneous and unexpected behaviour

• However, there is an issue of OBSERVER BIAS
  – This is due to what people observe being distorted by their expectations of what is likely or what they would hope to see. This reduces the validity of the observations
  – This can be reduced by using more than one observer

• Observations provide us with information about what people actually do, but not about what they think or feel
EVALUATION OF NATURALISTIC AND CONTROLLED OBSERVATIONS

√ A naturalistic observation gives a realistic picture of natural, spontaneous behaviour (so is likely to be high in ecological validity; but less if they know they are being observed)

× There is little control over the other things that are happening in a naturalistic observations (which means that something unknown to the observer may account for the behaviour observed)

√ In a controlled observation the observer can focus on particular aspects of behaviour

× However, control means the environment will be unnatural and so participants’ behaviour is also less natural (meaning these observations lack validity)
EVALUATION OF OVERT AND COVERT OBSERVATIONS

√ In **covert observations**, participants are unaware that they are being observed and so their behaviour is more natural

• However, there are important ethical issues related to **covert observations** (it is acceptable to observe people in a public place as long as behaviours being observed are not private ones; e.g. kissing)

√ As participants are aware of them being observed in **overt observations**, their behaviour will be less natural
EVALUATION OF PARTICIPANT AND NON-PARTICIPANT OBSERVATIONS

√ Non-participant observers are likely to be more objective as they are not part of the group being observed

√ However, participant observations may provide special insights into behaviour from the “inside” that may not otherwise be gained

× Participant observations are more likely to be overt and so participants are aware about being observed

× If it is covert then there are ethical issues
UNSTRUCTURED AND STRUCTURED OBSERVATIONS

• Making observations is difficult for 2 main reasons
  – It is difficult to work out what to record and what not to record
  – It is difficult to record everything that is happening even if you have selected what to record

UNSTRUCTURED OBSERVATIONS

• The researcher records all relevant behaviour but has no system
• The behaviour to be studied is unpredictable
• The obvious problem with this method is that there is too much information to record
• Another problem is that behaviours recorded will be those most visible, not always the most important or relevant behaviours
• Researchers sometimes use this for pilot studies to see what behaviour might be recorded using a structured system

STRUCTURED OBSERVATIONS

• In order to be objective and rigorous, researchers would use structured observations
• The researcher uses various “systems” to organise observations
  – The two main ways are using behaviour categories and sampling procedures
BEHAVIOUR CATEGORIES AND SAMPLING PROCEDURES

**BEHAVIOUR CATEGORIES**

• How to record the behaviour that you are interested in
  – Difficulty deciding categories of behaviours (as we tend to see a continuous stream of behaviour not a series of separate behaviours)
  – Systematic observations should split up behaviour into different categories
    • Behavioural categories should be **OBJECTIVE**, **COVER ALL POSSIBLE BEHAVIOURS**, **BE MUTUALLY EXCLUSIVE** (not have to mark 2 categories at the same time)

**SAMPLING PROCEDURES**

• The observer should record every instance of the behaviour in as much detail as possible
  – However, continuous observations are not always possible as there would be too much data to record, therefore, there should be a systematic method of sampling observations:
    • **EVENT SAMPLING** – counting the amount of times a certain behaviour occurs
    • **TIME SAMPLING** – recording behaviours in a given time frame
SELF-REPORT TECHNIQUES
QUESTIONNAIRES

• These are sets of pre-determined questions designed to collect information about topics
• Questions allow the researcher to find out what people think and feel
• They can be an objective and scientific way of conducting research but it needs to be designed effectively
STRUCTURED INTERVIEWS

• These have pre-determined questions like a questionnaire, but it is delivered face-to-face or over the phone without deviation from the original questions

• It is completed in real-time (the interviewer asks a question then the interviewee responds)
INTERVIEWS

UNSTRUCTURED INTERVIEWS

• These have less structure

• New questions are developed during the course of the interview

• It will begin with general aims and possibly a few pre-determined questions, but subsequent questions develop based on the answers given by the interviewee
EVALUATION OF SELF-REPORT TECHNIQUES

✓ These techniques allow access to what people think and feel and their experiences and attitudes

✗ They may not supply truthful answers
   – This is that they may not lie but provide an answer in a socially desirable way (social desirability bias) in order to make themselves seen in a better light

✗ People sometimes don’t know what they think or feel, so the answers lack validity

✗ The sample of people used in any study using self-report, may lack representativeness and so data cannot be generalised
EVALUATION OF QUESTIONNAIRES

✓ Once designed and tested; they can be distributed to large numbers of people cheaply and quickly
  – So a researcher can collect data from a large sample of people

✓ Respondents may feel more willing to reveal personal/confidential information than in an interview

✓ The impersonal nature of a questionnaire may also reduce social desirability bias compared to an interview

✗ Data collected from questionnaires are only filled in by people who can read and write and who are also willing to spend time filling them in (therefore the sample is biased)
EVALUATION OF STRUCTURED INTERVIEWS

✔ They can be **easily repeated** because the questions are standardised
  – So answers from different people can be compared
  – They are easier to analyse than unstructured interviews as answers are more predictable

✗ The **interviewer’s expectations may influence the answers the interviewee gives**
  – This is known as **interviewer bias**
  – All interviewers have to be skilled to prevent interviewer bias
EVALUATION OF UNSTRUCTURED INTERVIEWS

✓ More detailed information can be obtained from each respondent than a structured interview
  - As the interviewer tailors the questions to the specific responses and can get deeper insights into the respondent’s feelings and thoughts

× They require interviewers with more skill than structured interview as they have to develop questions on the spot
  - These questions may lack objectivity than predetermined ones

× Needing the interviewers to be well-trained means unstructured interviews are more expensive than structured interviews
SELF-REPORT DESIGN
There are 3 guiding principles:

- **CLARITY** – make sure the question is understood and there is no ambiguity.
- **BIAS** – do not involve leading questions that lead to bias (and therefore leading the respondent into giving a particular answer). Respondents prefer to give answers that make them look more attractive/nicer/etc. rather than being truthful (social desirability bias).
- **ANALYSIS** – questions need to be written so they can be easily analysed (including **OPEN** and **CLOSED QUESTIONS**).

With closed questions, the respondent is restricted to give a particular answer but the data is very easy to analyse.
QUESTIONNAIRE CONSTRUCTION

WRITING GOOD QUESTIONNAIRES

• A good questionnaire should include:
  – **FILLER QUESTIONS** – irrelevant questions to distract the respondent away from the purpose of the study (this may reduce demand characteristics)
  – **SEQUENCE FOR THE QUESTIONS** – start with easier ones to help relax for the more complex questions later on
  – **SAMPLING TECHNIQUE** – how to select the respondents (often stratified sampling is used)
  – **PILOT STUDY** – questions tested on small groups to help refine them
DESIGN OF INTERVIEWS

RECORDING THE INTERVIEW

• An interviewer may take notes throughout the interview to document answers, but this will interfere with their listening skills
  – The interviewer may not be able to write everything down and so the respondent may feel that what they said was not valuable

• Interviews may also be audio recorded or video recorded
DESIGN OF INTERVIEWS

THE EFFECT OF THE INTERVIEWER

• The presence of the interviewer who is interested in the respondent’s answers may increase the amount of information provided.

• This means that interviewers need to be aware of behaviours that demonstrate their “interest”. These include:
  
  – **Non-verbal communication** – various behaviours like sitting with arms crossed and frowning communicate disinterest and disapproval; whereas head nodding and leaning forward may encourage the respondent to speak.

  – **Listening skills** – the interviewer needs to know when and how to speak. Not interrupting too often and when they do they need to say something encouraging.
DESIGN OF INTERVIEWS

QUESTIONING SKILLS IN AN UNSTRUCTURED INTERVIEW

• Here there are special skills to be learned about what kind of follow-up questions should be asked
• They need to be aware of previous questions so that they are not repeated
• Too much probing or asking “why?” should be avoided
• It is better to ask more focused questions
EVALUATION

OPEN QUESTIONS

✓ Respondents can expand on their answers, which increases the amount and detail of the information given

✓ They provide unexpected answers, allowing researchers to gain insights into people’s feelings and attitudes

✗ Respondents who are less literate may find open questions difficult and may avoid giving lengthy complex answers (so they may not provide detailed extra information)

✗ Open questions produce qualitative data which are more difficult to summarise as there is likely to be a wide range of responses
EVALUATION

CLOSED QUESTIONS

✗ These have a limited range of answers
✓ They produce **quantitative data** and therefore this makes the answers easier to analyse using graphs and measures like the mean

✗ Respondents may be forced to select answers that do not represent their real thoughts or behaviour (so data collected lacks validity)

✗ Participants may select “don’t know” or have a preference to answer yes and so the data collected is not informative/useful
CORRELATIONS
CORRELATIONAL ANALYSIS

• CORRELATION – this is a relationship between two variables

• POSITIVE CORRELATION – this is where both variables increase together

• NEGATIVE CORRELATION – this is where one variable increases and the other decreases

• ZERO CORRELATION – this is where there no correlation/relationship between the two variables

• NOTE: when conducting a study using correlational analysis, a correlational hypothesis is needed (stating the expected relationship between the two co-variables)
KEY WORDS

- Correlation/Correlational Analysis
- Positive/Negative/Zero Correlation
- Linear and Curvilinear
- Correlation Coefficient
- Intervening Variable – A variable that comes between two other variables which is used to explain the relationship between those two variables
- Scattergram
- Significance – A statistical term indicating that the research findings are sufficiently strong for us to accept the research hypothesis under test
CORRELATIONAL HYPOTHESIS

• A correlational hypothesis is needed when using correlational analysis
• This states the expected association between the co-variables
• E.g.
  – Age and beauty are positively correlated (positive correlation, directional hypothesis)
  – As people get older they are rated as more beautiful (positive correlation, directional hypothesis)
  – As people get older their beauty decreases (negative correlation, directional hypothesis)
  – Age and beauty are correlated (positive or negative correlation, non-directional hypothesis)
  – Age and beauty are not correlated (zero correlation, non-directional hypothesis)
SCATTERGRAMS

• Correlation can be shown through plotting a Scattergram.

• Two scores are obtained and used to plot one dot on a graph (where the variable on the x axis and the variable on the y axis meet).

• The scatter of dots indicates the degree of correlation between the co-variables.

• Co-variables could be age and accuracy of EWT.
POSITIVE, NEGATIVE OR ZERO CORRELATION?
POSITIVE, NEGATIVE OR ZERO CORRELATION?
POSITIVE, NEGATIVE OR ZERO CORRELATION?
CORRELATION COEFFICIENT

- This is a statistical test used to measure the extent of correlation that exists between two co-variables.
- Correlation Coefficient is a number with a maximum value of 1 (+1 is perfect positive correlation and -1 is perfect negative correlation).
- The + means there is a positive correlation and the – means there is a negative correlation.
- The coefficient (number) tells us how closely the co-variables are related (-.43 is just as closely related as +.43).
- Once a correlation coefficient is decided, we need to find out if it is significant.
- We do this by looking at a table of significance (like the one on page 206) which tells us how big the coefficient needs to be in order for the correlation to count as significant (meaningful).
EVALUATION - DIFFERENCE BETWEEN CORRELATIONS AND EXPERIMENTS

• In an experiment the investigator deliberately changes the IV in order to observe the effect on the DV. Without this deliberate change, no causal conclusions can be drawn.

• In a correlation the variables are simply measured (no deliberate change is made). Therefore, no conclusion can be made about one co-variable causing the other.)
ADVANTAGES OF USING CORRELATIONAL ANALYSIS IN STUDIES

• They can be used to investigate trends in data
• This can be used when it would be unethical or impractical to manipulate variables and can make use of existing data
• If correlation is significant, then further investigation is justified
• If correlation is not significant, then you can probably rule out a causal relationship
• The procedures can be repeated again which means that the findings can be confirmed
LIMITATIONS OF USING CORRELATIONAL ANALYSIS IN STUDIES

• People often misinterpret correlations and assume that a cause and effect have been found, whereas this is not possible
  – This could lead to people designing programmes for improvement based on false information
  – E.g. if a headteacher wrongly believed that higher attendance caused better academic achievement; they may mistakenly expect that by improving attendance would improve exam results

• There may be other, unknown variables (intervening variables) that can explain why the co-variables being studied are linked
  – In the above example, it might be the students who do not attend are the ones that dislike school and their dislike of school also impacts on exam performance. Dislike of school is the more important intervening variable (there may be others)

• A correlation may lack internal/external validity

• The sample used may lack generalisability
OTHER RESEARCH METHODS
SYSTEMATIC REVIEW

• A review of research involves identifying an aim and then searching for research studies that have addressed similar aims and hypothesis

• This is done by looking through various databases which hold the details of research published in academic journals

• A decision will be made about the criteria (deciding on what kind of study will be included/excluded)
META-ANALYSIS

• This is where a researcher or team of researchers combine the results of several studies that have addressed similar aims/hypotheses

• The researcher(s) use effect size (a measure of the strength of the relationship between two variables) as the DV to assess overall trends

• Effect size is used in everyday lives (e.g. a weight loss programme may boast that it leads to an average weight loss of 30 pounds – this is the size of the effect)
META-ANALYSIS

Advantages

• Reviewing the results from a group of studies rather than one can increase the validity of conclusions drawn as they are based on a wider sample of participants

• Studies often produce contradictory results and so a meta-analysis allows for an overall conclusion by having a statistic to represent the findings of different studies

Limitations

• Research designs between the different studies may vary considerably, which means they are not truly comparable and so conclusions are not always valid
MATHEMATICAL SKILLS
FRACTIONS

• A fraction is a part of a whole number
• We may want to present the results from a study as a fraction
  – E.g. if there were 120 participants in a study and 40 of them were in Condition A to work out the fraction of participants this was you would do the following:
    – Divide 40 by 120 (40/120)
• To make the fraction more comprehensible we reduce the fraction by dividing the top number (the numerator) and the bottom number (the denominator) by the lowest number that divides evenly between both (the lowest common denominator)
  – In this case that number is 40 = 1/3
PERCENTAGES

• “Per cent” means “out of 100”
• So 5% means 5 out of 100 OR 5/100 (we have converted the fraction to a percent)
• We can reduce the fraction of 5/100 to 1/20
• Or we can write 5/100 as a decimal (0.05 because the first decimal place is out of 10 and the second is out of 100)
• The decimal 0.5 would be 5 out of 10 not 5 out of 100
• To change the fraction into a percentage, divide the numerator by the denominator (for 19/36 = 0.52777778)
• Then multiply this number by 100 (move the decimal place two places to the right = 52.777778% )
RATIOS

• A ratio says how much there is of one thing compared to another thing
• They are used in betting, so if you are betting odds are given like 4 to 1 (4:1) which means that out of a total of five events you would expect to lose four times and win once
• There are two ways to express a ratio
  – 4:1 is called a part-to-part ratio
  – A part-to-whole ratio would be expressed as 4:5 (meaning 4 losses out of 5 occurrences)
• A part-to-whole ratio can easily be changed to a fraction (4:5 is 4/5)
• Ratios can be reduced to a lowest form in the same way that fractions are
  – So 10:15 would more simply be 2:3 (both parts of the fraction have been divided by 5)
ESTIMATE RESULTS

• When doing any calculations it helps to estimate what the result is likely to be because then you can detect if you made a mistake

• Consider the fraction $19/36$, it is fairly close to $18/36$ which is 50% (so the answer should be slightly more than half)

• The same thing could be done when dealing with big numbers
  – E.g. to estimate the product of $185,363$ times $46,208$ I could round up to $185,363$ to $200,000$ and $46,208$ to $50,000$
  – Then multiply $5 \times 2$ and add the nine zero’s = $10,000,000,000$
  – I know the actual answer will be smaller as we had rounded both numbers up (the actual answer is $8,565,253,504$)
SIGNIFICANT FIGURES

• Estimating results can produce a lot of digits
• In the example before, it would be a lot more simple if we said the answer was about 8 billion (8,000,000,000)
• Here the answer is given to one significant figure and all the rest are zero’s for less distraction
• The problem is that it is not quite right. We cannot just remove all the remaining figures without considering whether we have to round up
  – In the previous example 8,500,000,000 would be half way between 8 and 9 billion, so 8,565,253,504 should be rounded up to 9 billion (1 significant figure), but 2 significant figures would be 8,600,000,000
SIGNIFICANT FIGURES

• The percentage used before (52.777778) is another awkward number

• We might give this two significant figures which would be 53% (removing all but the first two figures and rounding up as the third figure is greater than five)

• If this number was given to three significant figure then it would be 52.8%

• If the number was 52.034267% then three significant figures would be 52.0%
ORDER OF MAGNITUDE

• When dealing with very large numbers it is sometimes clearer to just give two significant figures and then say how many zero’s there are (focusing on the order of magnitude)

• The convention for doing this for 8,600,000,000 is 8.6 \times 10^9 where 9 represents how many places we have moved the decimal point
  – To convert 0.00045 we write 4.5 \times 10^{-4}
## MATHEMATICAL SYMBOLS

- Below are the symbols you need to be able to use:

<table>
<thead>
<tr>
<th>= and ~</th>
<th>&lt; and &lt;&lt;</th>
<th>&gt; and &gt;&gt;</th>
<th>≤</th>
<th>≥</th>
<th>∞</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equal and approximately equal</td>
<td>Less than and much less than</td>
<td>More than and much more than</td>
<td>Less than or equal to</td>
<td>More than or equal to</td>
<td>Proportional to</td>
</tr>
</tbody>
</table>
MEASURES OF CENTRAL TENDENCY AND DISPERSION
MEASURES OF CENTRAL TENDENCY

• These inform us about central (or middle) values for a set of data. They are “averages” (way of calculating a typical value). The average can be calculated in different ways, each appropriate to different situations.

LEVELS OF MEASUREMENT

• There are three types of levels of measurement:
  – Nominal (data in separate categories, e.g. tall, short)
  – Ordinal (data ordered in some way e.g. people placed into height order from shortest to tallest)
  – Interval (data measured using units of equal intervals e.g. people who are 5’0”-5’6”; 5’7”-6’0”; 6’1”-6’6”, etc)
  – Ratio (there is a true zero point as in most measures of physical quantities)
MEASURES OF CENTRAL TENDENCY - MEAN

• The mean is calculated by adding together all the values in a set of scores and then dividing the total by the number of values in the set
  – It can only be used with ratio and interval level data
MEASURES OF CENTRAL TENDENCY - MEDIAN

• The median is the middle value in an ordered list. To find the median you must arrange all of the values in order from lowest to highest. Then you must find the middle value which is the median
  – If there is no middle value because you have even an number of values, then find the midpoint of the two middle values by adding them together and dividing it by two
  – The median can only be used with ratio, interval and ordinal data
MEASURES OF CENTRAL TENDENCY - MODE

• The **mode** is the most frequently occurring value in a set of scores. With nominal data it is the category that has the highest frequency count. With interval and ordinal data it is the data item that occurs most frequently. To identify the mode, the data needs to be arranged in order. The modal group is the group with the greatest frequency. If two categories or data items have the same frequency the data will have two modes (bi-modal)
MEASURES OF DISPERSION - RANGE

• A set of data can also be described in terms of how dispersed or spread out the data items are
• The range is the arithmetic distance between the top and the bottom values in a set of data
• It is customary to add 1
• So:
  – 3, 5, 8, 8, 9, 10, 12, 12, 13, 15. Mean = 9.5; Range = 13 (15-3+1)
  – 1, 5, 8, 8, 9, 10, 12, 12, 13, 17. Mean = 9.5; Range = 17 (17-1+1)
  – These both have the same mean, but a different range, so the range is helpful as a further method of describing the data
  – If we just used the mean, the data would appear to be the same
This is a more precise method of expressing dispersion.

This is a measure of the average distance between each data item above and below the mean, ignoring plus or minus values.

It is usually worked out using a calculator.

You will not need to work this out in the exam.
EVALUATING MEASURES OF CENTRAL TENDENCY

**MEAN**

- This is the most sensitive measure of central tendency as it takes into account the exact distance between all the values of all the data.
- This means that it can easily be distorted by one or more extreme values and so end up being misrepresentative of the data as a whole.
- It cannot be used with nominal data, nor does it make sense to use when you have discrete values like the average number of legs.
EVALUATING MEASURES OF CENTRAL TENDENCY

MEDIAN

• The median is not affected by extreme scores so can be useful if there are any
• It is appropriate for ordinal data and can be easily calculated
• However, it is not as “sensitive” as the mean because the exact values are not reflected in the median
EVALUATING MEASURES OF CENTRAL TENDENCY

MODE

• This is unaffected by extreme values and is much more useful for discrete data and is the only method that can be used when the data are in categories i.e. nominal data

• It is not a useful way of describing data when there are several modes
EVALUATING MEASURES OF DISPERSION

RANGE

• This is easy to calculate but is affected by extreme values

• It also fails to take account of the distribution of the numbers, i.e. it does not indicate if the numbers are closely grouped around the mean or spread out evenly
EVALUATING MEASURES OF DISPERSION

STANDARD DEVIATION

• This is a precise measure of dispersion as it takes all the exact values into account
• It is not difficult to calculate if you have a calculator
• It may hide some of the characteristics of the data set (e.g. extreme values)
DISPLAYS OF QUANTITATIVE DATA AND DATA DISTRIBUTIONS
DISPLAY OF QUANTITATIVE DATA

**TABLES**

- The measurements collected in research are referred to as “raw data” (numbers that have not had any descriptive statistics carried out on)
- These can be set out in a table and/or summarised using measures of central tendency and dispersion
- Summary tables are more helpful for interpreting data

**BAR CHART**

- The height of each bar represents the frequency of each item
- They are especially suitable for data that is not continuous (no particular order)
- In a bar chart a space is left between each bar to indicate the lack of continuity
DISPLAY OF QUANTITATIVE DATA

HISTOGRAM
• This is similar to a bar chart but the area within the bars must be proportional to the frequencies represented
• In practice this means that the vertical axis (frequency) must start at zero. The horizontal axis must be continuous (so you cannot draw a histogram with data in categories)
• There should be no gaps between the bars

LINE GRAPH
• This has to be continuous data on the x-axis and there is a dot to mark the middle top of where each bar would be and each dot is connected by a line

SCATTERGRAM
• This is a graph used when doing a correlational analysis
DATA DISTRIBUTION

NORMAL DISTRIBUTION

• This is a classic bell-shaped curve
• It is the predicted distribution when considering equally likely set of results
• Many human characteristics are normally distributed like shoe size or intelligence
• A normal distribution has certain defining features:
  – The mean, median and mode are all in the exact mid-point
  – The distribution is symmetrical around the mid-point
  – The dispersion scores or measurements either side of the mid-point is consistent and can be expressed in standard deviations
• Normally distributed data will show 34.13% of people lie within one standard deviation below the mean and 34.13% above, to 68.26% will lie within one SD above or below the mean
• So, 95.44% of people will lie within two SD above or below the mean, leaving 4.56% outside of this
DATA DISTRIBUTION

SKEWED DISTRIBUTION

• This is where in some populations scores are not evenly distributed around the mean

• Positive Skewed Distribution = most of the scores are bunched towards the left. The mode is to the left of the mean as the mean is affected by extreme scores tailing off to the right

• Negative Skewed Distribution = most of the scores are bunched towards the right. The mode is to the right of the mean as the mean is affected by extreme scores tailing off to the left
TYPES OF DATA
QUANTITATIVE DATA

• Quantitative data represents how much, how long, how many, etc. there are of something (i.e. behaviour is measured in numbers or quantities)

• The DV in an experiment is quantitative

• Closed questions in questionnaires collect quantitative data (numerical information about your age, how many hours you work in a week, how high you rate different TV programmes)

• In an observational study a tally of behavioural categories is quantitative
QUALITATIVE DATA

• Qualitative data cannot be counted or quantified but it can be turned into quantitative data by placing the data into categories and then counting the frequency

• Sometimes people define qualitative data as being what people think and feel, but quantitative questions can also be about what people think and feel

• Open questions in questionnaires may collect qualitative data (data that expresses “quality” of things, including descriptions, words, meanings, etc.)

• In an observational study researchers can describe what they see and this would be qualitative data
EVALUATING QUANTITATIVE AND QUALITATIVE DATA

QUANTITATIVE DATA

• It is easy to analyse, using descriptive statistics and statistical tests
• This enables conclusions to be easily drawn
• However, this data may oversimplify reality (closed questions may force people to tick an answer that does not represent their feelings so conclusions may become meaningless)

QUALITATIVE DATA

• This provides detailed information which can provide unexpected insights into thoughts and behaviour because the answers are not restricted by previous expectations
• This complexity makes it more difficult to analyse this type of data and draw conclusions
PRIMARY DATA

• This is information observed or collected directly from first-hand experience (i.e. from the researcher of a study)

• The collection of primary data would involve designing the study, gaining ethical approval, piloting the study, recruiting and testing participants, and finally analysing the data collected and drawing conclusions

• The study could be an experiment with a questionnaire, and/or an observational element to measure the DV

• Or the study could just be a with an observation or questionnaire

• The data collected would specifically related to the aims and/or hypothesis of the study
SECONDARY DATA

• This is information that was collected for the a purpose other than the current one
• The researcher could use data collected by themselves but for a different study or collected by another researcher
• The researcher might make use of government statistics (e.g. information about mental illnesses in the UK)
• A correlation study often uses secondary data and review studies use secondary data, conducting a meta-analysis on this type of data
EVALUATING PRIMARY AND SECONDARY DATA

PRIMARY DATA

• The researcher has great control over the data
• The data can be designed so it fits the aims and hypothesis of the study
• The limitation is that it is very lengthy and so an expensive process
• Simply designing a study takes a lot of time and then time spent recruiting participants, conducting the study and analysing the data

SECONDARY DATA

• It is simpler and cheaper to access someone else’s data as less time and equipment is needed
• This data may have been subject to statistical testing and so it is known if it is significant
• The limitation is that the data may not exactly fit the needs of the study
INTRODUCTION TO STATISTICAL TESTING

THE SIGN TEST
WHEN TO USE A SIGN TEST

• This is a test that is used when looking at paired or related data

• The two related pieces of data could come from a repeated measures design (i.e. the same person is tested twice)

• The sign test can also be used with matched pairs design because the participants are paired and therefore count, for the purposes of statistics, as one person is tested twice
HOW TO DO THE SIGN TEST

• If we wanted to know if people were happier after they had a holiday then we could rate their happiness on a scale of 1 – 10 (1 being unhappy and 10 being very happy) before their holiday and again two weeks after they return

• **STEP 1: State the Hypothesis**
  – “People are happier after going on holiday than they were beforehand”
  – This is a directional hypothesis and so requires a one-tailed test (a two-tailed test would be used on a non-directional hypothesis)

• **STEP 2: Record the Data and Work of the Sign**
  – Each pair of data is recorded with a + for happier after and a – for happier before

• **STEP 3: Find Calculated Value**
  – “S” is the symbol for the test statistic that we are calculating
  – It is calculated by adding up + and adding up the – and selecting the smaller value of the two (i.e. the least frequent sign)
  – In the example on the next slide there are 10 + and 3 – so the less frequent is – so $S = 3$
  – This is the calculated value (as we calculated it)
HOW TO DO THE SIGN TEST – Calculated Value

<table>
<thead>
<tr>
<th>Participant</th>
<th>Happiness Score Before</th>
<th>Happiness Score After</th>
<th>Difference (before-after)</th>
<th>Sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6</td>
<td>7</td>
<td>1</td>
<td>+</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
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<td>1</td>
<td>+</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>6</td>
<td>2</td>
<td>+</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
<td>6</td>
<td>-2</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
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</tr>
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<td>10</td>
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<td>-</td>
</tr>
<tr>
<td>11</td>
<td>4</td>
<td>4</td>
<td>0</td>
<td>Omitted</td>
</tr>
<tr>
<td>12</td>
<td>8</td>
<td>9</td>
<td>1</td>
<td>+</td>
</tr>
<tr>
<td>13</td>
<td>6</td>
<td>7</td>
<td>1</td>
<td>+</td>
</tr>
<tr>
<td>14</td>
<td>5</td>
<td>6</td>
<td>1</td>
<td>+</td>
</tr>
</tbody>
</table>
HOW TO DO THE SIGN TEST

• STEP 4: Find the Critical Value of S
  – N = the total number of scores (ignoring zero values)
  – In the previous slide N = 13 (as one score was zero and so was omitted)
  – The hypothesis is directional so a one-tailed test is used
  – Now we use the Table of Critical Values on the next slide and locate the column headed 0.05 for a one-tailed test and the row that matches our N value
  – From the table on the next slide you can see that the Critical Value of S = 3
### HOW TO DO THE SIGN TEST – Critical Value

<table>
<thead>
<tr>
<th>Level of significance for a one-tailed test</th>
<th>0.05</th>
<th>0.01</th>
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</thead>
<tbody>
<tr>
<td><strong>Level of significance for a two-tailed test</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td></td>
<td></td>
</tr>
<tr>
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<td>0</td>
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<td>6</td>
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<td>7</td>
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<td>9</td>
</tr>
<tr>
<td>35</td>
<td>12</td>
<td>11</td>
</tr>
</tbody>
</table>
HOW TO DO THE SIGN TEST

• STEP 5: Is the Result in the Right Direction?
  – If the hypothesis is directional we have to check that the result is in the expected direction
  – In this case we expect people to be happier after a holiday and should therefore have more + than –
  – This was the case and therefore we can accept the hypothesis
HOW TO REPORT THE CONCLUSION THAT CAN BE DRAWN

• If the calculated value is equal to or less than the critical value our result is **significant**
• In the example before, it is significant
• As the calculated value is significant we can conclude that people are happier after going on holiday than they were before
• However, a statistical test only gives the probability that a particular set of data did not occur by chance
• The level of significance we selected was **0.05**
  – This means that there is a 0.05 or 5% probability that the result would have occurred even if holidays had no effects
  – Sometimes researchers wish to be more certain and so use 0.01 (this would be used when testing drugs, etc)
THE SCIENTIFIC PROCESS AND
THE ROLE OF PEER REVIEW
The role of peer review

The scientific process

- The scientific methods is not the same as “doing an experiment” as it may involve an observation or self-report, not just an experiment
- Science is a process which enables us to get closer to understanding how the world, and people in it, function
- Many elements of this process have evolved over the centuries to ensure that we uncover facts that can be relied on to build bridges, treat disease, raise psychological healthy children, etc.
- On part of this process is peer review
THE ROLE OF PEER REVIEW

PEER REVIEW

• Peer Review
  – Also known as “refereeing” is the assessment of scientific work by others who are experts in the same field
  – The purpose is to ensure research is conducted and published of a high quality
  – There are a number of reviewers for each application/article
  – They then report to a panel on its quality
  – There are three main purposes of a peer review:
    • Allocation of Research Funding
    • Publication of Research in Scientific Journals and Books
    • Assessing the Research Rating of University Departments
THE ROLE OF PEER REVIEW

PEER REVIEW

• Allocation of Research Funding
  – Research is paid for by the government and charitable bodies
  – The overall budget for science research in 2015-16 was £5.8 billion
  – The organisations have a duty to spend this money responsibly
  – So public bodies require reviews so they can decide which research is likely to be worthwhile to fund

• Publication of Research in Scientific Journals and Books
  – Scientific /academic journals provide scientists with the opportunity to share their results
  – Peer review has not always been used to prevent incorrect/faulty data entering the public domain (before research was just published)

• Assessing the Research Rating of University Departments
  – All University science departments are expected to conduct research and this is assessed in terms of quality (Research Excellence Framework, REF)
  – Future funding for the department depends on receiving good ratings from the REF peer review
THE ROLE OF PEER REVIEW

PEER REVIEW AND THE INTERNET

• Lots of information is available on the internet which means new solutions are needed to maintain the quality of information
• Sources of information are policed by “wisdom of crowds” approach (where readers decide if it is valid or not and post comments about it)
• Online journals ask readers to rate articles
EVALUATION OF PEER REVIEW

• Finding an Expert
  – Not always possible to find an appropriate expert so poor research may be passed as the reviewer didn’t really understand it

• Anonymity (of Peer Review)
  – Usually practiced for honesty and objectivity
  – Some Psychologists use anonymity to settle scores with rivals/rival research (when reviewing their research)
  – Social relationships inevitably affect objectivity

• Publication Bias
  – Journals tend to publish positive results as it will affect their the standing of their Journal
  – This leads to a bias in published research that leads to misperception of true facts
  – Journals appear to avoid publishing straight replications of studies

• Preserving the Status Quo
  – There is a preference for research that goes with existing theories rather than unconventional work

• Cannot deal with already published research
  – Once research is published, the results remain in the public view (even if it is fraudulent or poor research practices were undertaken)
PSYCHOLOGY AND THE ECONOMY
PSYCHOLOGY AND THE ECONOMY

• Economics and psychology seek to a better understanding of people’s behaviour in their economic lives

• This is also known as “behaviour economics” where researchers investigate the effects of social, cognitive and emotional factors on economic decisions

• This field is primarily concerned with the rationality (or irrationality) of decisions relating to economics
IRRATIONAL THINKING

• Irrational thinking is found in those suffering depression for example
• However, irrational thinking does happen in all of us
• Kahneman led the field of research into everyday irrational thinking and uncovered, and explained many interesting aspects of this behaviour
AVAILABILITY HEURISTIC

- Availability of heuristic (heuristic = the rule)
- People typically overestimate the likelihood of dying in a plane accident
  - However the reason for this irrational thinking is because we read about these types of accidents and so they are more available when making a probability judgement about the likelihood of there being such an accident
  - The availability heuristic is the rule that the likelihood of selecting something is related to its “availability”
THE FRAMING EFFECT

• People’s decisions differ depending on whether a choice is presented as a gain or a loss.

• Tversky and Kahneman (1986) asked participants to choose between two treatments that were going to be used with 600 people suffering from a deadly disease.

• Two groups were given the same facts about the success and failure of the treatment, but the facts were “framed” differently.
  – One group were told that Treatment A would result in 400 deaths, whereas Treatment B would have a 33% chance that no one would die and a 66% chance that all would die.
  – The second group were told that Treatment A would save 200 lives, whereas Treatment B had a 33% chance of saving everyone and a 66% chance of saving no one.

• The first example is positive framing and when participants were given this description 72% selected Treatment A.

• When the participants were given the same scenario but in a negative frame then only 22% selected Treatment A.
It is important to understand the systematic biases caused by irrational thinking in improving our personal lives as well as the fabric/material of society.

Layard (2014), an economist, says that Kahneman’s work on understanding irrational thinking has transformed business.

- His ideas have been applied to almost any endeavour you can think of (e.g. decision-making in juries, treatment of mental health problems, financial advice, government programmes, etc).
APPLYING THE TOPICS IN THIS BOOK

SOCIAL CHANGE

• Understanding social influence has been used to improve behaviour

• E.g. the campaign to reduce drink driving was discussed where attitudes and behaviour was changed by making people aware of social norms (similar ideas have been used to reduce social stereotypes and smoking)

• These practices have the potential to bring about positive changes that will impact on the economy (however, this is limited to tasks where behaviour is moderated by social criteria)
IMPROVING MEMORY

• The Cognitive Interview is a technique based on psychological research that has improved the amount of accurate information collected from eyewitnesses

• EWT as a whole topic is focused on improving crime detection

• The implication for the economy is to be able to reduce expenses on wrongful arrests and to ensure that criminals are caught
APPLYING THE TOPICS IN THIS BOOK

ATTACHMENT

• Bowlby’s theory and related research on attachment opened the eyes of the world to the importance of emotional care in early child development

• Unicef indicate the continuing influence this has on developmental policies in ensuring the healthy development of children to becoming productive members of society and so improving world economy

• Before Bowlby’s research people believed that physical care was all that was necessary
MENTAL HEALTH

• The McCrone Report (McCrone et al, 2008) estimated the direct costs of mental health in England at around £22.5 billion a year (including spending in health and social care and a variety of other agencies, but not the indirect costs of the impact on the criminal justice system and in lost employment).

• There is a concern in the projected rise in dementia and a growing population of older people
  – Psychologists are increasing their attention to research into dementia.

• The McCrone Report commented on the use of drugs vs psychotherapies
  – The number of people receiving medication provides a much greater economic gain than psychological therapies (which produce similar benefits but are far more expensive).

• Evidence-based research on effective drug therapies is important in reducing costs and helping people return to work.
BIOSPYPCHOLOGY

• Neuroscience offers the possibility of revolutionising our understanding of the human brain.

• An American government report suggested that this may have practical economic benefits in the area of “smart” machines (i.e. artificial intelligence).

• This does not mean building human-like robots but just money-saving intelligent machines to deal with things like questions on the telephone or recognising faces at airports.