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EXAM NOTES

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Exam Notes for

Research Methods

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AS LEVEL SPECIFICATION	A LEVEL SPECIFICATION
3.3.2 Research methods Students should demonstrate knowledge and understanding of the following research methods, scientific processes and techniques of data handling and analysis, be familiar with their use and be aware of their strengths and limitations: • Experimental method. Types of experiment, laboratory and field experiments; natural and quasi experiments. • Observational techniques. Types of observation: naturalistic and controlled observation; covert and overt observation; participant and non-participant observation. • Self-report techniques. Questionnaires; interviews, structured and unstructured. • Correlations. Analysis of the relationship between co-variables. The difference between correlations and experiments.	**4.2.3 Research methods** Students should demonstrate knowledge and understanding of the following research methods, scientific processes and techniques of data handling and analysis, be familiar with their use and be aware of their strengths and limitations: • Experimental method. Types of experiment, laboratory and field experiments; natural and quasi experiments. • Observational techniques. Types of observation: naturalistic and controlled observation; covert and overt observation; participant and non-participant observation. • Self-report techniques. Questionnaires; interviews, structured and unstructured. • Correlations. Analysis of the relationship between co-variables. The difference between correlations and experiments. • Content analysis • Case studies
3.2.3.1 Scientific processes • Aims: stating aims, the difference between aims and hypotheses. • Hypotheses: directional and non-directional. • Sampling: the difference between population and sample; sampling techniques including: random, systematic, stratified, opportunity and volunteer; implications of sampling techniques, including bias and generalisation. • Pilot studies and the aims of piloting. • Experimental designs: repeated measures, independent groups, matched pairs. • Observational design: behavioural categories; event sampling; time sampling. • Questionnaire construction, including use of open and closed questions; design of interviews. • Variables: manipulation and control of variables, including independent, dependent, extraneous, confounding; operationalisation of variables. • Control: random allocation and counterbalancing, randomisation and standardisation. • Demand characteristics and investigator effects. • Ethics, including the role of the British Psychological Society's code of ethics; ethical issues in the design and conduct of psychological studies; dealing with ethical issues in research. • The role of peer review in the scientific process. • The implications of psychological research for the economy.	**4.2.3.1 Scientific processes** • Aims: stating aims, the difference between aims and hypotheses. • Hypotheses: directional and non-directional. • Sampling: the difference between population and sample; sampling techniques including: random, systematic, stratified, opportunity and volunteer; implications of sampling techniques, including bias and generalisation. • Pilot studies and the aims of piloting. • Experimental designs: repeated measures, independent groups, matched pairs. • Observational design: behavioural categories; event sampling; time sampling. • Questionnaire construction, including use of open and closed questions; design of interviews. • Variables: manipulation and control of variables, including independent, dependent, extraneous, confounding; operationalisation of variables. • Control: random allocation and counterbalancing, randomisation and standardisation. • Demand characteristics and investigator effects. • Ethics, including the role of the British Psychological Society's code of ethics; ethical issues in the design and conduct of psychological studies; dealing with ethical issues in research. • The role of peer review in the scientific process. • The implications of psychological research for the economy. • Reliability across all methods of investigation. Ways of assessing reliability: test-retest and inter-observer; improving reliability. • Types of validity across all methods of investigation: face validity, concurrent validity, ecological validity and temporal validity. Assessment of validity. Improving validity. • Features of science: objectivity and the empirical method; replicability and falsifiability; theory construction and hypothesis testing; paradigms and paradigm shifts. • Reporting psychological investigations. Sections of a scientific report: abstract, introduction, method, results, discussion and referencing.

AS LEVEL SPECIFICATION	A LEVEL SPECIFICATION
3.2.3.2 Data handling and analysis Quantitative and qualitative data; the distinction between qualitative and quantitative data collection techniques. • Primary and secondary data, including meta-analysis. • Descriptive statistics: measures of central tendency – mean, median, mode; calculation of mean, median and mode; measures of dispersion; range and standard deviation; calculation of range; calculation of percentages; positive, negative and zero correlations. • Presentation and display of quantitative data: graphs, tables, scattergrams, bar charts. • Distributions: normal and skewed distributions; characteristics of normal and skewed distributions. • Introduction to statistical testing; the sign test.	**4.2.3.2 Data handling and analysis** Quantitative and qualitative data; the distinction between qualitative and quantitative data collection techniques. • Primary and secondary data, including meta-analysis. • Descriptive statistics: measures of central tendency – mean, median, mode; calculation of mean, median and mode; measures of dispersion; range and standard deviation; calculation of range; calculation of percentages; positive, negative and zero correlations. • Presentation and display of quantitative data: graphs, tables, scattergrams, bar charts. • Distributions: normal and skewed distributions; characteristics of normal and skewed distributions. • Analysis and interpretation of correlation, including correlation coefficients. • Levels of measurement: nominal, ordinal and interval. • Content analysis and coding. Thematic analysis.
	3.2.3.3 Inferential testing Students should demonstrate knowledge and understanding of inferential testing and be familiar with the use of inferential tests. • Introduction to statistical testing; the sign test. • Probability and significance: use of statistical tables and critical values in interpretation of significance; Type I and Type II errors. • Factors affecting the choice of statistical test, including level of measurement and experimental design. When to use the following tests: Spearman's rho, Pearson's r, Wilcoxon, Mann-Whitney, related t-test, unrelated t-test and Chi-Squared test.

The writing in red is the additional information you are required to know if you are taking the A Level two-year course (so you need to know all the exam notes in this study book). If you are taking the AS level course, then you only need to learn the information that is written in blue on the specification.

EXAM NOTES 1 Experimental Methods

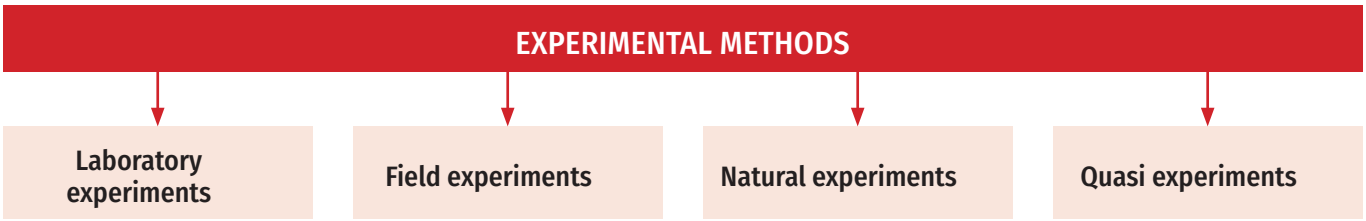
The AQA specification

The exam requires that you are able to:

- Describe, identify and apply your knowledge of the different experimental methods.
- Give one advantage and two weaknesses associated with each of these different types of experimental methods.

Introduction

Experimental methods are commonly used in psychological research. There are different types of experiments:



Laboratory experiments

A **laboratory experiment** (or true experiment) is seen as the most scientific psychological method a researcher can use when investigating human behaviour. It is a tightly **controlled** research method conducted in an **artificial environment** in order to test a hypothesis.

The purpose of conducting a laboratory experiment is to see if one variable called the ***independent variable (IV)*** has an effect on or changes another variable called the ***dependent variable (DV)***, with the aim of discovering a **cause-and-effect relationship** (or causal relationship) between the two variables, that is, the change in the IV has an effect on the DV.

The three main characteristics of a laboratory experiment therefore are:

- **Manipulation of the independent variable** – The experimenter manipulates the first variable, the IV to observe what affect it has on the second variable, the DV.
- **Experimental control** – The experimenter ensures, as far as possible, that all other unwanted factors (variables) are controlled (held constant or eliminated). These potential unwanted variables are known as extraneous variables.
- **Randomisation** – A laboratory experiment allows the researcher to randomly allocate the participants to the different experimental conditions.

Independent and dependent variables

An important feature of experimental research is what we call **variables**. In a simple psychology experiment there are usually two variables; the **independent variable (IV)** and the **dependent variable (DV)**. The IV is the one that is *manipulated* and the DV is the one that is *measured* by the experimenter. To understand the difference let us take this hypothesis:

- **Independent variable (IV)** – This is the variable that is **manipulated** by the experimenter to see what effect it has on the *dependent* variable. In the example above, *hunger* would be our independent variable. In a research experiment, a group of participants went without food for a day (i.e. the *hungry* lot = the experimental group). The other group of participants had eaten (i.e. the *not-hungry* lot = control group). The two groups can be compared to see what effect hunger has on memory recall (e.g. remembering words). This is what is meant by manipulating the independent variable (i.e. anything that can be varied such as behaviour, items, events, sizes or amounts).
- **Dependent variable (DV)** – This is the variable that is **measured** (a result or score) by the experimenter. We measure the effects that the independent variable may have on the dependent variable. In our example above, memory recall would be our DV because we are measuring how good memory recall is (e.g. the number of words remembered) when someone is hungry or not hungry.

Experimental control

In order to establish a cause-and-effect relationship between hunger and memory, the experimenter must *control* – or *eliminate* – other 'interfering variables' known as **extraneous variables (EV)** that may influence the participant's memory recall.

Extraneous variables can be defined as any *unwanted* variable (other than the IV) that may potentially affect the results (DV) of the study. If an extraneous variable does affect the results, then we say it has confounded (confused) the results. This is known as a **confounding variable (CV)** and it describes a factor in the experiment that was *not* controlled and that affected the research findings. If this occurs, it reduces the validity of the results, which means we can't trust the research findings. Note that some CVs are easier to identify than others!

Two main types of extraneous variables that can affect the validity of an experiment are:

- **Participant variables** – These refer to individual differences and behaviours of the participants themselves that could influence the results of the experiment, such as age, intelligence, gender, ethnicity, social class, experiences, skills, tiredness, mood and motivation. They can all (unintentionally) influence the outcome of the results. This is only an issue if the experimental design is an *independent group design*. *(See Exam Notes 10)*
- **Situational variables** – These relate to the situational setting of the research, which may affect the participants' behaviour. There might be *environmental factors*, such as the instructions given, the material used, noise levels or temperature, light level and time of day and even weather conditions! Situational variables could also be features of the experiment that leads participants to behave in a particular way called *demand characteristics* and *investigator effect (See Exam Notes 13)*. There is also the *order effect*, whereby the type of *experimental design* can affect the results of the research *(See Exam Notes 2)*.

Example of a study with extraneous variables

In the above example on hunger and memory, the potential situational and participant EVs could be the number of hours they slept the night before the test, their intelligence, and the time of day the test was taken. Let's say we tested the participants at different times of the day, perhaps one group in the morning and the other in the afternoon – the results would then be confounded (i.e. confused). We cannot be sure if the IV (hunger) or the time of day (EV) was the cause of any difference in memory scores among the participants. The time of day would be a confounding variable.

Experimental groups and the control group

In order to see if the IV has an effect on the DV, an experiment must have at least *two groups* (conditions) – one group receives the IV and the other group does not. Then we can compare the results.

- The **experimental** group is exposed to the IV.
- The **control group** is not exposed to the IV.

If the results differ between the two groups, and we have assured ourselves that we have controlled any EVs, then we can conclude that any difference in the participants was due to the IV. For example, in a study on *Revising for an exam while listening to music effects memory recall :*

- The participants in the *experimental group* attempt to learn a psychological theory while listening to music.
- The participants in the *control group* learn a psychological theory without listening to music.

The control group is really important because without them it would be impossible to tell whether the music had any effect on learning. With a control group as a comparison, and if the average score of the experimental group is higher than the average score of the control group, we can conclude that music improves learning. If there were no differences between the groups, then we can conclude that that the IV (listening to music) made no difference.

Randomisation

In the above example, participant EVs would relate to *individual differences*, that is personal characteristics of the participants. It is possible, for example, to assign more participants who are more intelligent to one group than the other. If this occurs, their individual differences will confound the results.

- A way to reduce the effect of personal differences is to use **random assignment** (or randomisation). This is based on the laws of chance. This means that the participants have equal chance of being selected *either* in the experimental group or in the control group.
- The process of *random sampling* (e.g. tossing a coin or running a computer program to generate random numbers) for each participant will determine which group they go into. This means that any personal differences of the participants would be to some extent equally balanced out between the two groups, and this will increase the internal validity of the study.

✓✗ Evaluation

✓ **High levels of control.**
A laboratory experiment allows a high level of control over the research environment. This is done by controlling EVs, which means that the researcher can be confident about establishing a *causal* relationship between the IV and the DV.

✓ **High in reliability.**
Laboratory experiments are easier to replicate than many other research methods. This means that the original experiment can be repeated by other researchers, under the same conditions and following the same procedures, to see whether they obtain similar results. The ability to be replicated is important for checking other researchers' work. If the findings are similar, we can be confident that the original results have internal validity and reliability.

✗ **Artificiality.**
Laboratory experiments have been criticised for being highly artificial, that is they lack mundane realism (because it is not like real-life setting). This means that the results obtained in a laboratory experiment may not be valid because they bear little resemblance to the real world. Therefore research findings from laboratory experiments are difficult to generalise to the real world.

✗ **Demand characteristics.**
In a laboratory experiment the participants may show demand characteristics because they know they are taking part in the experiment. Participants naturally will be curious and try to guess what the study is about. Any features of the experiment (e.g. tasks, resources, equipment, video clips), and from the experimenter themselves will act as a clue to what the study maybe about. The participants may unconsciously respond to such cues and will then change their behaviour. This will affect the validity of the findings, because the participants are not behaving as they normally would.

Field experiments

Sometimes experiments are not carried out in an artificial laboratory setting, but in a **real-life environment** where people are in engaged in everyday normal behaviour. Experiments might be conducted in schools or shopping malls, or on the streets or in a workplace. Often, the participants do not know they are taking part in a study. Such experiments are called **field experiments**. In field experiments, the researcher is still able to manipulate the IV in a natural setting, to see the effect it has on the DV.

Example of a field experiment

Sissons (1979) investigated the effect that social class can have on 'helping behaviour ' from strangers (helping others out). The confederate (an actor) stood outside Paddington rail station in London and asked people for directions to Hyde Park. In the first part of the experiment the actor was dressed professionally, in a suit and wearing a bowler hat, and he spoke with a middle-class accent. In the other half of the experiment, he changed his clothes into those of a working class labourer and spoke in a working-class accent. He asked passers-by the same question as before. The findings indicated that people were more helpful towards the man who was smartly dressed, with a middle-class accent, than the labourer, implying that people's perception of each other can alter their responses – in this case, how helpful they were.

✓✗ Evaluation

✓ **Ecological validity.**
Field experiments are conducted in the real world, where the participants are often not aware they are taking part in a study, so there is no influence of the experimenter effect or demand characteristics. This means that findings of field experiments are often more realistic and true to life than laboratory experiments, and therefore they are high in ecological validity. Therefore findings from field experiments can be generalised to the real world – something laboratory experiments cannot.

✗ **Lack of control of variables.**
A problem with field experiments is that the researcher has less control over the natural environment. This means that any unwanted variables (EVs) may be influencing the DV rather than the IV. This reduces the ability to establish a cause-and-effect relationship, which reduces the validity of the research findings.

✗ **Issue of reliability.**
Field experiments are less reliable than laboratory experiments, because they are carried out in a natural environment where it is difficult to replicate the study under conditions that are the same as the original. This makes the findings from different field experiments difficult to compare.

✗ **Ethical issues.**
Field experiments have ethical weaknesses. If the participants are unaware they are taking part in a study, this means they have not agreed to take part (lack of informed consent). In such instances, the researchers should, if possible, attempt to debrief the participant. This means telling the participants at the end of the study, the purpose of the experiment, to reassure them that the information collected will be kept confidential, and have the right to withdraw the data collected on them to be destroyed (if they were not happy being part of the research!).

Natural experiments

Natural experiments, like field experiments, are carried out in a **real-life environment**. The difference is that in a natural experiment the researcher cannot manipulate the IV (whereas in a field experiment they can). All the researcher can do is *observe* a **naturally occurring event** (which is the IV) and measure the naturally occurring effects it produces (the DV). The researcher often looks at data taken *before* and *after* the naturally occurring event and compares them.

Natural experiments are referred to as **quasi-experiments** rather than true experiments, because the researcher cannot manipulate the IV and cannot randomly allocate the participants into different experimental conditions, like in a true experiment.

Example of a natural experiment

Charlton et al. (2002) investigated whether increased exposure to media such as the television increases antisocial behaviours like aggression. He studied a small island called St Helena (a remote island in the South Atlantic Ocean) where television was introduced to the island only recently – in 1995 – to see whether levels of aggression had increased. After five years of television viewing, there was no increase in the children's physical or verbal aggression. Another example of a natural experiment is that by Hodges and Tizard, who studied the effects of privation on children. They wanted to see how privation affects a child's development. To do this, they compared a group of children in institutionalised care with a group of children who were living at home with their families and assessed each child's development (see page 56).

✓✗ Evaluation

✓ **Ecological validity.**
Natural experiments take place in a natural setting, which means that the results gathered are high in ecological validity. The findings can, therefore, be generalised to similar real-life situations.

✓ **Avoid experimenter effects and demand characteristics.**
Like field experiments, the participants are unaware that they are taking part in a natural experiment study. This means that their behaviour will be more normal and not subject to experimenter effects and demand characteristics. Again, this increases the ecological validity of the study, which means that the findings can be generalised to the real world.

✓ **Only possible method.**
Natural experiments allow the psychologists to investigate phenomena that would be impractical or unethical to carry out in a controlled laboratory setting or in a field experiment. For example, a researcher investigating the effects of teenage smoking cannot randomly assign people to groups of smokers and non-smokers to see whether they develop cancer (for obvious ethical reasons!).

✗ **Lack of control of variables.**
Like field experiments, in natural experiments the researcher has less control over the natural environment. This means that any unwanted variables (EVs) may be influencing the DV rather than the IV. This reduces the ability to establish a cause-and-effect relationship, which reduces the validity of the research findings.

✗ **Difficult to replicate.**
Natural experiments tend to investigate a phenomenon that is often a unique, one-off situation. This makes it extremely difficult to verify the research findings because it is extremely unlikely that a researcher can replicate the study using the same setting and conditions. Therefore, it is difficult to check the reliability and validity of the results.

Quasi experiments

There are some studies that resemble a true experiment, whereby the IV seems to be manipulated in a controlled setting in which the extraneous variables are held constant. However, they may have share similar characteristics of a true experiment design, but they are not. These are known as **quasi experiments.** Difference between true experiments and quasi-experiments are:

- In a true experiment, the IV is manipulated in a controlled way, the participants have an equal chance of being randomly assigned to either the experimental group or the controlled group. In a quasi-experiment, the participants are not assigned randomly into into the different groups. The experimenter does manipulate the IV.

- The reason why participants cannot be randomly allocated to the experimental/control group is because in a quasi experiment, the IV is already established and cannot be manipulated. For instance, if the IV is gender, age or ethnicity this obviously cannot be changed by the researcher for the purpose for the experiment. Usually this happens when the independent variable in question is something that is an innate characteristic of the participants involved. This also means natural experiments are deemed as quasi-experiments.

Example

An experimenter wants to see the difference in the reliability of memory recall of female and male participants after watching a crime scene, the researcher cannot manipulate the sex of the participants to randomly allocate them either to be male or female (remember the IV will be the sex; of the participants and DV will be the reliability of information recalled). Female and males are simply assigned to one group or the other – depending whether they are male or female (this is the pre-existing variable).

A psychologist wants to see if personality traits 'extrovert' and 'introvert' has on intelligence. The personality factors are the independent variable. Personality traits are inherent to each person, so random assignment cannot be used. Participants would initially be assigned to one of the groups based on their personality assessment scores.

✓✗ Evaluation

Strength

✓ **Comparison can be made.**
It allows us to study the effects of variables the psychologists are interested where they cannot manipulate or change the behaviour such as sex, ethnicity etc. This allows comparison between different types of people or behaviours to be made.

Limitation

✓ **Cause-effect relationship cannot be inferred.**
Because in a quasi-experiment there is no random allocation, this means there is no control over the participants. This means that individual differences (social background, IQ, education, experience etc.) leaves open the possibility this might explain the difference in the results between the experimental groups, therefore we cannot be confident in inferring a cause and effect relationship.

Exam Questions

1. Explain what is meant by the term 'laboratory experiment'. . . . . **(2 marks)**
2. Give one advantage of using laboratory experiments in psychological research. . . . . **(2 marks)**
3. Give two weaknesses of using laboratory experiments in psychological research. . . . . **(2+2 marks)**
4. Explain what is meant by the term 'field experiment'. . . . . **(2marks)**
5. Give one advantage of using field experiments in psychological research.. . . . . **(2 marks)**
6. Give two weaknesses of using field experiments in psychological research. . . . . **(2+2 marks)**
7. Explain what is meant by the term 'natural experiment'. . . . . **(2 marks)**
8. Give one advantage of using natural experiments in psychological research. . . . . **(2 marks)**
9. Give two weaknesses of using natural experiments in psychological research. . . . . **(2+2 marks)**