VCE Psychology Research Methods

INDEPENDENT AND DEPENDENT VARIABLES

- An **experiment** is a **study** that investigates a **cause-and-effect** relationship between two or more variables; whether a **change** in one thing has an **impact** on another
- a **variable** is any **condition** that can **change**
- an experiment measures the **effect** that the **independent variable** has on the **dependent variable**

- **independent variable** - **condition** that an experimenter systematically **manipulates**, **changes** or **varies** in order to **measure** its **effect** on another variable
- the independent variable is that which is **different** between the groups involved in the study
- if we have two groups of participants in an experiment, one group would be exposed to the independent variable and the other wouldn't
- researcher can then see **differences** between **results** of each group and potentially **make inferences** about whether the **independent variable caused** that **difference**
- independent variable is identified by looking at what is **different between** the **experimental conditions**

- **dependent variable** - what is **measured** in an experiment
- **measures** the **effects** that the **manipulation** of the **independent variable** has had on behaviour
- e.g. measures of performance, test scores, number of goals etc

- once you can identify IVs and DVs in experiments you need to **operationalise** them
- an **operationalised variable explains** what each **variable** is and how it will be **measured**
- research involves **assessing** the **effect** of the **independent** variable on the **dependent** variable,
- important to **operationalise both** of these variables is that you can see in detail **what** is actually **manipulated** and to **what degree**, and **what** is actually **measured** and **how** it is **measured**

FORMULATING A HYPOTHESIS

- once a researcher has identified the **variables** at play in investigating a research question, they need to make an **educated guess** about the **relationship between** these **two variables**
- a **hypothesis** is a **statement** or **testable prediction**, about the **likely outcome** of an experiment
- a **research hypothesis** is a **general prediction** about the **direction** of **interaction** between the **independent variable** and the **dependent variable**
- also includes the **population** from which the **sample** is drawn
- when the IV is manipulated, does the DV increase or decrease?
- an **operational hypothesis**, is a **testable prediction** that explains exactly how the **variables** will be **measured** and **manipulated**, as well as the **population** from which the sample is drawn
- an operational hypothesis is a **workable**, **testable** and **repeatable** hypothesis
- all hypothesis must include:
- a **testable prediction** about the **direction** of **interaction** between **variables** (i.e. higher, lower, increased, decreased etc),
- the **population** from which the sample is drawn
- the **independent variable** (that which is **manipulated**); operationalised if it is an operational hypothesis
- the **dependent variable** (that which is **measured**); operationalised if it is an operational hypothesis

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POPULATION AND SAMPLE

- **experimentation** is the most widely used research method for learning about human behaviour
- the **people** used in an experiment are called **participants**
- the **participants** in a study are a **selection**, or **sample**, or people chosen from a **particular population** of **research interest**

Population

- the entire group of people belonging to a particular category (e.g. all university students or all AFL footballers)
- experimental terms - **larger group** of **research interest** from which a **sample** is to be **drawn**
- in this context, population does not refer to the number of people living in a particular area, but rather a **group of people** with **similar characteristics** that are of **interest to** the **researcher**

Sample

- the **collective group** of **participants** in a research study
- **group** of **participants selected** from, and **representative** of a **population** of **research interest**
- must **represent** the **population** from which it is drawn in order for **inferences** to be made about that population
- **process** of **choosing participants** from the **population** for use in a study is called **participant selection** or **sampling**
- a sample is a **subsection** of a population - a **smaller group** than the population itself
- ideally, psychologist would like to examine all members of the population to obtain the most accurate results; however this is impossible (too long, too expensive etc)
- this is why samples are taken from the population, commonly **obtained randomly**

Participant allocation

- once participants have been selected for an experiment, they must be **allocated** to **groups** within the experiment
- as with sampling, the **allocation** (or **assignment**) of participants must be done in a **systematic** and **carefully planned manner** to ensure that participants' **individual personality characteristics** are **evenly distributed** among the groups, done with random allocation
- **random allocation** - technique that ensures that every member of the sample has an equal chance of being assigned to either the control or experimental group

Experimental group

- group **exposed** to the **experimental condition**(s); where the **independent variable** being manipulated is **present**
- sometimes it's necessary to have **different levels** on the **independent variable** under investigation (e.g. strength of drug trialled) in this case you may see **multiple experimental** groups

Control group

- group **exposed** to the **control condition**(s); where the **independent variable** under investigation is **absent**
- e.g. in a test of the effects of a new drug, the control group is often given no treatment or is given a sugar pill or a fake treatment (placebo) rather than the new drug
- control group provides a **basis of comparison** so that the performance of the experimental group can be **compared** with a **base level**
- allows the researcher to determine if the **independent variable** has had an **effect** on the **experimental groups behaviour** (dependent variable)
- without control group, an experimenter would've had **no idea** if the IV has had an **effect** on the DV or if the change would have **occurred naturally**, or due to **other factors** altogether

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EXTRANEOUS VARIABLES

- experiments aim to **investigate** whether a **relationship** exists between two **specific** variables
- determining this can often be **difficult** as **other variables** may **impact** on the results

- **extraneous variable** - any variable **other than** the **independent variable** that **causes** a **change** in the **results,** therefore, has an **unwanted effect** on the experiment
- extraneous variables often **interfere** with the **causal link** between **independent** variables and **dependent** variables
- make it **difficult** to **determine** whether **independent** variable **made** a **change** in **dependent** variable, or whether **extraneous** variable is **responsible** for **change** in result
- necessary for researchers to try and **prevent extraneous variables** occurring
- can be done in the **planning**, **data collection** and **collation stages**
- **main intentions** of an experiment - ensure that, aside from the independent variable, the **control** and **experimental** groups are **identical** in their **characteristics**, **conditions** and **procedures**
- **different types** of EV **prevent** two groups from **being comparable** in every way

Individual participant differences

- **differences among research participants** between the two groups (e.g. differences in terms of memory, mood, motivation, personality, expectations, ability)

Experimenter effects

- **differences** in how the **experimenter treats** the **participants**

Situational variables

- **differences** in **how** the **participants react** to the **experimental environment**

- experimenter's job to **ensure** that **extraneous variables** are **minimised**
- consider **how** a **sample** is **obtained** and **how participants** are **allocated** to **control** and **experimental groups**
- consider the **experimental design** that is to be used and consider **how** to **minimise** the **effect** of **participant** and **experimenter expectations**
- extraneous variables may be present without researcher knowing, may not be identified until after experiment is complete, if at all
- if extraneous variables are **not controlled** for, may have so much of an **impact** that they have a **confounding effect** on the **interpretation** of **results**
- this would mean that an **extraneous variable**, **rather than** the **independent** variable, **causes** a **change** in the results
- when an **extraneous variable** has a **confounding effect on** the **results** it is known as a **confounding variable**
- confounding variable - an **uncontrolled variable** (i.e. **not** the specified **independent variable**) that has **caused** a **change** in the **dependent variable**
- its **effects** on the **results** may be **confused with** the **effects** of the **independent variable**
- we know **independent** variable **alone hasn't caused** the **change** in the **dependent** variable

- e.g. when conducting a study to investigate **whether boys** or **girls** are better at maths, a researcher may take a **sample** of **girls aged 16-17** and a **sample** of **boys aged 14-15**. in this case the **age** of the students is a **confounding variable**. the **difference between** the **participants** in the two groups **should be consistent** in as many ways as possible **so** that the **effect of** the **independent variable** (in this case, gender) can be **examined**. as the two groups also different in age, **age** itself may **cause one group to perform better**, instead of the intended variable (gender), thus, **age becomes** a **confounding variable**

Non-standardised procedures

- **differences** in the way that a **test** is **delivered** or **administered** to participants
- **important** to **standardise** each **test** and its **procedures** - ensuring that the **test** and **all test conditions** are the **same each time** the test is administered
- e.g. testing two groups on basketball shooting ability, make sure that both groups shoot in the same weather conditions, otherwise wind or another weather condition (rather than the intended independent variable) may affect shooting accuracy
- **experimenter** needs to ensure they **give standardised instructions** to both groups as well

Artificiality

- the **unnatural environment** in which an **experiment** is **conducted**, as well as a **range** of **extraneous variables** that **arise** as a **result** of **participants behaving** in a way that is **unnatural** to their behaviour
- e.g changing their behaviour or response to one that they believe the experimenter wants, or to that which is more socially desirable

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PLACEBOS AND PROCEDURES

- in experimentation - important to **prevent extraneous variables** from interfering with the study
- **participant expectations** is an **extraneous variable** that can interfere with results as **expectations** can **alter participants behaviour**
- participants may try harder than they usually would, they could vary their responses to please an experimenter, or they may be too nervous to perform at their typical ability level
- for **ethical reasons**, participants are **mostly aware they** are **being studied**, but it is best they **know as little as possible** about the study

Placebos and the placebo effect

- to **counteract** the **effect** of **participant expectations**, **both** the **control** and **experimental** groups will typically **receive** some sort of **treatment**
- however, the **experimental** group will receive the **actual treatment** (e.g. new drug) and the **control** group will receive a **placebo** (e.g. a sugar pill)
- a **placebo** is a **fake** or **false treatment** used so that **no participants know whether** they are being **exposed** to the **experimental condition**
- using a placebo **minimises** the **impact** of the **placebo effect** on the results
- **placebo effect** occurs when there is a **change** in a **participant's behaviour due to** their **expectation** about the **treatment**

- e.g. if **experimenter gives experimental group** a **pill** and **not control** group, participants in **experimental** group may **believe their headache** has **improved**, and therefore **report** it has **improved simply because** they received **treatment**. experimenter wouldn't be able to tell whether the reported **improvement** is **due to** the **effect** of the **drug** or the **placebo effect**. but if **both groups** receive a **pill** every participant will believe they are receiving treatment which **minimises** the **placebo effect** as they have **equivalent expectations**

Single blind procedures

- when the **participants** are **unaware** whether they are in the **control** or **experimental** group
- **placebos** are **used**, **participants unaware** whether they are **receiving** the **placebo** (**control** group) or the **actual drug** (**experimental** group)
- **reduces/balances** the **impact** of **participant expectations** on the **results**
- however **experimenters** themselves still **know which group is which**, their **behaviour towards** these **groups** (e.g. body language, verbal cues and preferential treatment) may also **influence** the **results** of the study - **experimenter effect**

Double blind procedures

- **neither** the **participants** or the **experimenter know** which **participants** have been **allocated** to the **control** and **experimental** groups
- **involves another person knowing** which **group** is **receiving** the experimental **treatment**, this person **isn't directly involved** with the **participants**, and **can't influence** them

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TYPES OF SAMPLING

- psychologist use a number of different methods to **sample participants** for a research study
- **sample step** is very important as the main aim at the conclusion of the study is to **apply** the **results** from the **sample** to the **larger population** from which it was drawn
- important that the **sample** is **representative** of the **population**
- sampling appropriately can also help to **minimise** the **impact** of **extraneous variables** on the **dependent variable**

Convenience sampling

- **quick** and **easy** way of selecting participants, involves **selecting participants** based on the **researcher's accessibility** to them, or to the **participant's availability**
- e.g. sampling only one class in a school, or going to the local supermarket and surveying the people found there
- **main advantage** is **convenience**, **doesn't require forward planning, quick** to **administer**
- although, can be **highly biased**
- participants may **not necessarily be representative** of **population** - likely to **share** a **particular quality**, or be **likely** to **act** in a **particular** way
- e.g. if you wanted to study personality of school students but you sampled only a drama class at a school, those particular students may be more creative or outgoing than the rest of the school's population, so the sample doesn't represent the underlying population accurately

Random sampling

- employs a **carefully planned** and **systematic method** of selecting participants for a study
- ensures that **every member** of a **population** has an **equal chance** of being **selected**
- two common methods - **pulling names out** of a container, **allocating** a **number** to each person in the population and then using a **random number generator** to **select** the **sample**
- **main advantages** is that it is **very quick** and it is **inexpensive**, not difficult to set up
- **not biased**, **every member** of the population has an **equal chance** of being **selected**
- much **more likely** to be **representative** of the **population** than convenience sampling
- however, **chance** that sample obtained through random sampling may not be representative of the population of research interest, may turn out that the sample is **biased in one direction**
- e.g. entirely made up of men, or only people over 45 years old

Stratified sampling

- involves **breaking population** into '**strata**' or **groups**, **based on characteristics** they share
- e.g. divide a secondary school into year levels (the strata) then **select** participants **randomly** from **each strata** in the **same proportions** that they **appear in** the **population**
- should be **representative** of the **population**, should be **equal quantities** of **members** from **each strata** in the **ratio** in which it **appears in** the **population**
- e.g. if there are more boys than girls in a school, a stratified sample of this population would also include more boys than girls
- however, this type of sampling can be **time-consuming** to undertake, as we **need info** about the **population's characteristics** before sampling can begin

EXPERIMENTAL RESEARCH DESIGNS

- random allocation to control and experimental groups is not the only method that can be used to distribute participants to each group
- **experimental design** that will be used within a study is an **important consideration** in **minimising potential extraneous variables** that may occur within a specific piece of research

Independent-group design

- involves **randomly allocating** the members of the **sample** to either the control or experimental group
- independent-groups design is a **very quick** and **easy design to administer**, therefore a **popular** technique in experimentation
- the two groups in an independent-groups design should be **free from bias**, but **due to** the **random nature** of group assignment, there may be **participant differences** between the two groups
- e.g. members of one group may by chance be naturally more intelligent than members of the other group
- this design **doesn't effectively minimise differences** in **participant characteristics** between the two groups

Matched-participants design

- seeks to **eradicate** (get rid of) **participant differences**
- involves **pairing** each participant **based on** a **certain characteristic they share**
- e.g. you may **pair** the **two** smartest students or two most experienced netballers. once matched, **randomly allocate** one to the control group and one to the experimental group
- helps to achieve an **even spread** of **participant characteristics** between the two groups
- **minimises extraneous variables due** to participant differences
- important that **matched characteristics** is one that is **relevant to the study** and has **potential** to **influence results** if it is **featured more prevalently** in **one group** over the other
- identical twins are often ideal candidates for a matched-participant design
- one **limitation** of this design is that it **involves a pre-test** to **match participants** on particular characterises - **time consuming**
- during experimentation, one participant may drop out causing the other member of the pair to have to be removed from the study
- although this design **seeks** to ensure **both groups** are **equal** in **participant characteristics**, it does still **use different participants** - therefore they're **not identical** in **all** characteristics, abilities and motivation

Repeated-measures design

- implemented by using only **one group** of **participants** and **exposing** that group to **both** the **control** and **experimental conditions**
- as the **same participants** used in the control and experimental conditions, they're obviously **identical** in **characteristics** and **abilities**
- **eliminates impact** of **participant differences** as an extraneous variable but does **create** a different problem known as **order effect**

Order effect

- occurs when there is a **change in results due** to the **sequence** in which **two tasks** are **completed**; **order** in which **participants complete** the **control** and **experimental conditions**
- change in results may be an **increase** in **performance** due to **knowledge** or **experience** in a task, or may be a **decrease** in **performance** due to **boredom** or **fatigue** with carrying out a task more than once
- an **individual's experience** may therefore have an **impact** on the **results** of the study and this would be an **extraneous variable**

- e.g. investigating how different bathers affect swimming speed. you undertake the control condition first, in which you wear your normal bathers, and the experimental condition second, in which you wear a special swimming suit. the **independent variable** is supposed to be the type of swimming suit worn, but your **performance** in the **experimental condition** may **be altered** because you have already **completed** the **control condition.** may be enhanced because you had a warmup swim, or may be hindered because the first swim exhausted you. in this case, swimming performance may be due to **other factors other than** the type of swimming suit (**independent variable**)

Counterbalancing

- is a way to minimise the impact of order effect
- involves **dividing** the **group of participants** in **half** and **arranging** the **order** of the **conditions** so that **each condition occurs equally** as often in each position
- exposing half of the participants to the control condition first and the experimental condition second, and the other half to the experimental condition first and the control condition second
- **counterbalances** the **potential impact** of **order effects** on the results
- e.g. half of the participants would swim in their own bathers first and the new swimming suit first, whilst the other half would swim in the new bathers first and their own bathers second
- counterbalances **doesn't eliminate order effects occurring**, but it **removes** the **influence** that **order effects** have on the **results**

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DATA COLLECTION

- in their search for **accurate** information, psychologists gather **evidence** in many ways
- sometimes they use **experimental techniques**, sometimes they use other, **non experimental**, **techniques**
- an experiment seeks to establish a **cause and effect relationship** between two variables

Case studies

- an **in-depth** or **detailed study** on a **single person** or **small group** of people
- allows researchers to gain very **specific info** about a **particular occurrence** or **phenomenon**
- not an ideal research technique as they can be **time-consuming** and it is **difficult** to **generalise findings** from one person to the wider population
- twins provide an excellent basis for case study research in psychology
- identical twins provide fascinating **insight** into the debate of **nature vs nurture**
- e.g. case studies of twins who are reared apart, such as through adoption, allow insight into the impact of the environment on a child's development
- case studies are often conducted by **investigating** a group of people **over a period of time** in a **longitudinal study**

Observational studies

- involves an **individual observing** another **individual** or a **group** of people in a **natural environment**, and **recording observations** about the **behaviour** they witness
- the observer only records behaviour they can see
- can **eliminate** the **extraneous variable** of **artificiality** (the effect of an **unnatural environment**) however, they **rely** on the **observer's interpretation** of events
- subject to **observer bias** - where the observer sees what they want or expect to see, may result in a **biased representation** of the **behaviour**
- are often **cross-sectional studies** - where a researcher seeks to **investigate two or more samples** of participants at a **particular point in time**
- advantageous for looking at a **range of variables** at any one point
- **doesn't take into consideration** what has happened **before** that point in time, or **after**, whereas a longitudinal study does

Self reports

- when individuals are asked to **comment** on **their own thoughts**, **emotions** and **beliefs** by **answering** a series of **questions** of a particular topic
- allow researchers to **collect subjective data** that **cannot be** overtly **seen** or **measured**
- hence, **gain insight** into the **explanations behind behaviours**
- can make it **difficult** to **compare data** between participants due to their subjective nature
- many different types of self reports - **survey** and **questionnaire**, participants **respond** to a series of **verbal** or **written questions**
- these questions can be **open-ended** (where participants are **free to comment without limitation**) or **close-ended** (where participants may **choose an answer** from alternatives or are **restricted** in their choices)
- a **rating scale** involves individuals **choosing** the **statement** or the **rating** that **best describes** their **opinion** or **attitude** on a particular topic (close-ended format)
- e.g. **Likert scale** - participants are asked to **choose** a **response** to a statement on a scale from '**strongly agree**' to '**strongly disagree**'
- **interview** - face-to-face or telephone contact in which **questions** are **asked** and **answered**
- may be **structured** (asking a **planned series** of questions) or **unstructured** (**conversation-like** and open to change)
- **not very time efficient** as execution of the **interview** and **subsequent collation** of **data** can take a long time, however, they are an excellent way to gain **detailed responses** that can be **explored in greater depth**

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TYPES OF DATA

- once the **participants** have been **sampled** and the **experiment** has been **designed**, the experimenter is ready to start the **experimentation phase** and gather data
- **data** - **observable facts** that psychologists **systematically** collect
- aka **empirical evidence** - **info** psychologists **gain** from **direct observation** and **measurement**
- **primary data** - sourced through **fieldwork** or **experimentation**
- **secondary data** - data from **other people's work** - sourced through journals or articles
- data is used as **evidence** to **support researchers findings** or to **formulate predictions** about future studies

Subjective data

- collected through **observations** of **behaviour**, or info **based** on **participants**' **self-reports**
- subjective data is often **biased** because they require **personal info** (opinions or attitudes) to be given, can be **difficult** to **statistically analyse**
- e.g. observing children's behaviour on a playground, forming your own info about children throwing balls at each other being aggressive
- data collected in such situation is **based only on** the **observers interpretation**
- subjective data from a **participant's self-report** (e.g. reported feeling of pain) is only **based** on their own **personal scale**, so it is difficult to compare to someone else's experience
- e.g. if one person of a depression scale says they are feeling a 4 out of 10 and another person says they are feeling a 6 out of 10, we cannot assume that the individual with the lower rating is more depressed
- **limitations** - can **provide great insight into** a person's **opinions** and **beliefs** but researchers need to be aware that it is **difficult to compare with other data**

Objective data

- collected under **controlled conditions**, **easily measured** and **compared** with other data
- **often numerical** and can be **statistically analysed**
- advantage as it **minimises** many **biases** encountered in research
- e.g. running speed, height or number of siblings
- **limitations** - easy to compare, but **do not always provide reasoning behind** the **score** because **external factors** are **not taken into account**
- e.g. in a 100 meter running race, person A may record a faster time than person B, and we could conclude from the objective data (time recorded) that person A is faster, however the objective data doesn't take into account for other factors that may have contributed to person B's result, such as injury or exhaustion

Qualitative data

- describes **changes** in the **quality** of behaviour, often **expressed** in **words**
- difficult to **categorise** or **statistically analyse** because responses could take a wide variety of forms and are **open** to personal, observer or researcher biases
- e.g. participant's description of a film they had seen, **this info is difficult to quantify**
- **similar** to **subjective data** as they both are **opinion-based**
- participants can be completely **unrestricted** in their responses and can provide great **insight** into why they feel a particular way
- however is often **difficult** to **summarise** or **compare** with other data

Quantitative data

- **numbers** or **categories**, can be **statistically analysed** and readily **measured** and **compared** with other data
- e.g. number of words recalled correctly from a list, or a score on an IQ test
- **similar** to **objective data** in that researchers can **easily draw conclusions** from them and use them to make **comparisons** with other data
- however, **quantitative data** also **restricts participants** from **providing explanations** and leave little scope for participants to elaborate on their response

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DESCRIPTIVE STATISTICS

- used to **organise**, **summarise** and **describe** the **data** that has been obtained from the sample (**raw data**)
- allows data to be **interpreted** more easily, **can't** be used to **draw conclusions** to be applied to the wider population
- allows researchers to present research in a way that **others** can **view** and **understand** so **patterns** or **trends** in the data can be identified
- aim is to **discover** something **within the sample selected**, with a view to **applying** the findings to a **wider population**
- e.g. researcher studying the effects of a new therapy on a small group of people suffering from depression would like to know if the therapy holds promise for all people with depression
- **doesn't establish** whether there is a **cause-and-effect relationship** between the **variables**

Percentage
- illustrates **proportion** of the sample that displays a particular behaviour

Measures of central tendency
- involve a **calculation** that shows how **typical** scores, or a **majority** of scores fall in a data set

Mean
- commonly used measure where all scores in a data set are added together and divided by the total number of pieces of data
- represents the **average** score in a data set
- mean score is an example of a **sample statistic**
- limitation of using mean is it can be greatly **influenced by** a very large/small score **outlier**
- outliers **skew** the representation of the data

Sample statistic
- numbers that describe the behaviour or characteristics of a sample drawn from a larger population

Median
- it is the **middle number** in a data set, is not affected by outliers
- calculated by arranging all of the data in order from smallest to largest then selecting the middle piece of data

Mode
- most **commonly occurring** number within a data set, useful in seeing which score occurs most often but is unreliable measure for small samples

Spread of scores
- how data is spread, **variability:**
- **range**, calculated by subtracting lowest score from highest
- **standard deviation -** how far each **individual piece** of data **differs**/ **deviates** from **mean**
- low standard deviation = scores clustered around mean = low variability

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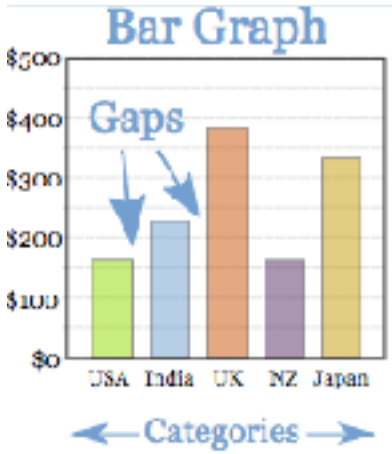
VISUAL REPRESENTATION OF DATA

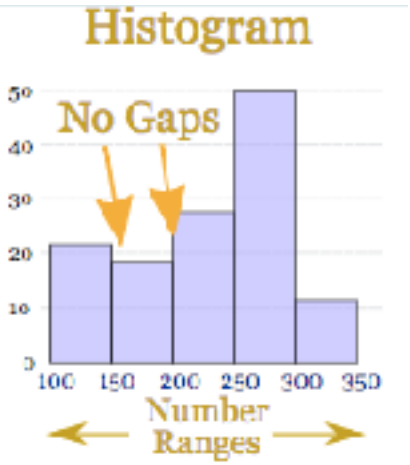
Sorting data

- **frequency distribution table** - the categories being compared are placed in one column of the table
- if there are several different categories, you can put them in groups or **class intervals**, and then count how many rimes a piece of data fits in each interval (**frequency**)

Class (Hrs.)	Tally Marks	Frequency (Students)
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
Total		[illegible]

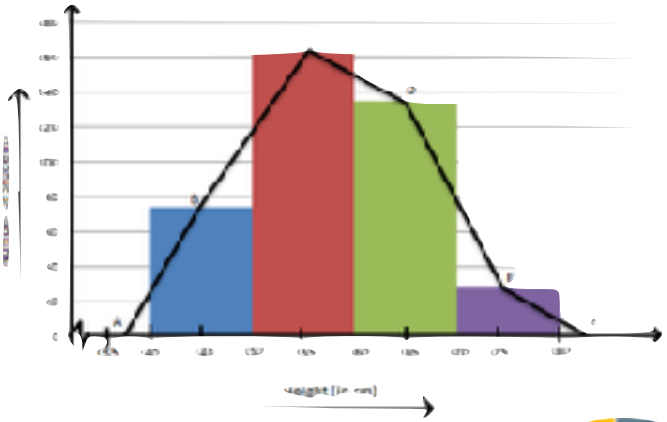
^ frequency distribution table



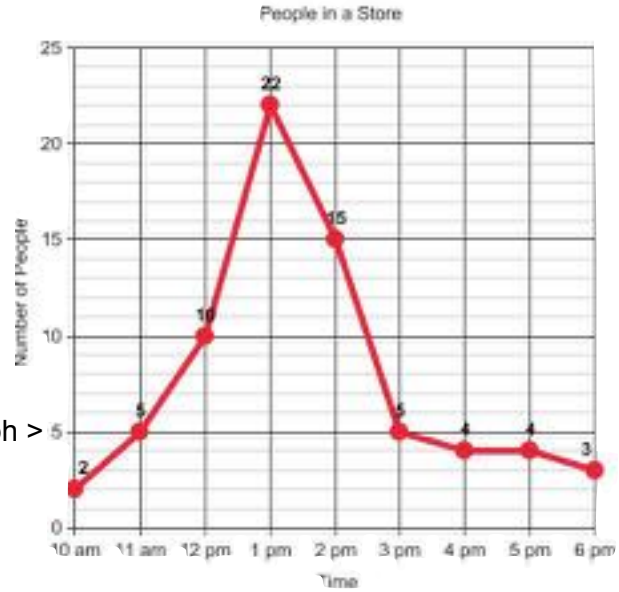


Graphing data

- a **graph** enables large amounts of info to be neatly **organised** and **summarised**, and can show how one variable **relates** to another
- a **histogram** is a type of graph made by placing **class intervals** on the **horizontal** x axis and the **frequency** on the **vertical** y axis
- used to represent data that is **continuous**, each piece of data is related to the next
- a histogram can be adapted into a **frequency polygon** - type of line graph
- **line graph** - any single **line** that **connects points** that relate one variable to another
- **frequency polygon** - graph of **frequency distribution** in which number of scores falling into each category is plotted as a point on the graph with lines being drawn to connect the points
- joins the **mid points** of a **histogram,** begins and ends with a point on the x-axis unlike some other line graph
- **discrete data** - **not continuous data**, no two methods have a relationship - **bar graph**
- **pie chart** - shows the **representative characteristics** or **opinions** of **subsets** of a **sample** as a **proportion** of the entire population - convert data into **%** of sample then **degrees** of a circle



frequency polygon ^



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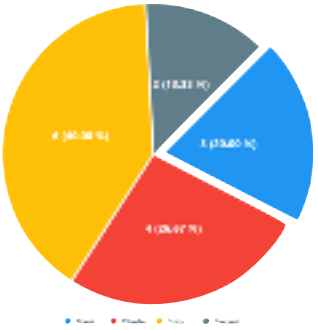


Psychology ATAR

INFERENTIAL STATISTICS

Inferential statistics

- allows us to make **inferences** about results of an experiment; to form **conclusions**, and to **generalise findings** to the population
- allows researchers to **apply findings** about the behaviour of **small groups (samples)** to the **larger groups** they represent **(populations)**
- crucial that both **sampling method** and **sample size** is **representative** of the **population** in order for these findings to be more widely applied
- do not describe data set
- looks for **probability** that the data obtained is a result of **manipulation** of the **independent variable** in an experiment
- used to **determine** whether or not results that have been obtained are **due to the independent variable or due to chance**
- allows us to determine whether **other factors** could've **contributed** to the results
- e.g. class, time of day, difficulty etc
- if **difference** in results is found to be **due to** the **independent variable**, results are said to be **statistically significant**
- allows us to **infer** a **cause-and-effect relationship between two variables** and **draw conclusions** from the research; something that descriptive statistics don't allow

Statistical significance

- refers to the **significance** of the **difference between two scores**
- whether we can **attribute** the results to the **independent variable** or to **chance** alone

P-value

- there is always a percentage of **error** in any research as it is **impossible** to **eliminate** all **extraneous (unrelated)** variables
- before conducting experiment, researchers set a p-value
- p-value is the **level of probability** that the **results** are **due to chance** alone
- **margin** of **error** that an experimenter will accept
- in psychology, typical to set a p-value at **$p < 0.05$**
- means for the **results** of a study to be **statistically significant**, the **probability** that the **results** are **due to chance must be less than 5%**
- we still accept that the results occurred due to **manipulation** of the **independent variable**, with **no more than** a **5% influence** from **other factors**
- **p-value** must be set lower (for example, at $p < 0.01$) for very important studies such as trialling medical drugs

Psychology ATAR

VALIDITY AND RELIABILITY

- many factors to consider before results of one experiment can be applied to broader population
- researcher responsibility - ensure **methods** used to **test** and **assess** the **impact** of the **independent variable** on the **dependent variable** are **valid** and **reliable**
- research that doesn't have **validity** and **reliability** can produce **false** or **misleading** results
- **validity** - **extent** to which an **assessment tool** actually **measures** what it is **designed** to measure
- e.g. if research claims to measure intelligence it can't actually be testing memory
- valid research produces **authentic** results that allows researchers to **examine cause** and **effect relationships between variables**
- **reliability** - **extent** to which an assessment tool **measures** what it is **supposed to** measure, **consistently**, each time it is used
- e.g. if a person takes the same IQ test multiple times they would achieve the same score each time if it is reliable
- research is important for **advancing scientific fields** and **knowledge**
- being able to **replicate** or **repeat**, the same findings **strengthens original findings** and **enables further investigation**

Comparing/ testing validity and reliability

- e.g. a test with **high validity** and **low reliability** can be resembled to hitting a dartboard with all the darts but not hitting it in the same spot. the test is **doing what it aims to** but the **results are inconsistent**
- e.g. a test with **high reliability** and **low validity** can be resembled to hitting the wall in the exact same spot with each dart but missing the dartboard all together. the test is **not doing what it is supposed to** but it is **getting the same result repeatedly**.
- many different ways of assessing validity and reliability
- high **validity** - IQ test, scores obtained from two tests are **same**, appear to actually **measure IQ**
- high **reliability** - IQ test, person gets same score on different day with different administrator, **same results in different conditions**
- research investigations can have **internal** validity and reliability (the **instruments** and **research tools being used** within an investigation)
- or **external** validity and reliability (applying findings to, and using tools on, the population)

CONCLUSIONS AND GENERALISATIONS

- one of the main intentions of conducting research is to **apply** what has been learned to the **population**
- **conclusion** - a **decision** or **judgement** about the research result
- conclusion **addresses** the **hypothesis** in research
- before making conclusion - consider the **statistical significance** of the results
- important - researcher confident that the **change** in the **dependent variable** is **due to** the **independent variable** within the stated population
- if a conclusion has been made and the research **meets other certain criteria**, research findings can be **applied to broader population** or the **wider group of interest**
- **generalisation** - when we apply research findings to the wider population
- criteria for generalisation - results are **statistically significant**
- the sample is **representative** of the **population**
- the **method of sampling** is appropriate
- wherever possible, **extraneous**, **unrelated** and **confusing** variables have been **controlled**
- e.g. researcher may find statistically significant link between listening to music and enhancement of memory but if the sample only contained 16yr olds, the link cant be generalised to other age groups
- **generalising results** to the population is one of the **main goals** of psychological research
- experimenters don't often endeavour to discover something for only a small group of people
- they **seek** to **discover** something that can be **applied to a large group** of people, or to an entire population

Psychology ATAR

ETHICAL CONSIDERATIONS IN PSYCHOLOGICAL RESEARCH

- **Ethics** - **moral principles** and **codes of behaviour** that apply to all psychologists, regardless of which field in which they work
- Australian Psychological Society **APS** - developed **Code of Ethics** (2007) and Ethical Guidelines (2010)
- **Ethical guidelines** - outlines ethical guidelines that **govern** psychologists' behaviour, regularly updates, guidelines becoming stricter
- Before research, researcher submits a **research plan** to an **ethics committee** for approval
- ensures participants **welfare** is considered by medical/non medical professionals
- ethics committee investigates **potential benefits** of research to **society**, weighed against potential **risks** or **discomfort** to participants

Role of the experimenter

- **protect** participants' **physical** and **psychological** welfare
- cannot conduct study that causes severe distress to participants
- if participant encounters **unexpected distress**, researcher must **stop** immediately and provide participant with access to counselling
- experimenter must - act **professionally** and with **integrity** at all times, being **fair** and **just** to all participants
- consider whether **risks** to participants **outweigh** the **benefit** to society when applying to conduct research
- consider all relevant **occupational health** and **safety procedures** relevant to the **industry**, **location** and **type** of experiment being conducted

Participants' rights

- researchers must **respect** the **rights** of the individual participant
- researchers should **adhere** to any **relevant ethical guidelines**
- six main principles when considering a participants rights

Confidentiality

- participants' **right to privacy** in terms of **access**, **storage** and **disposal** of info collected about them related to research
- participants' **involvement** in and **results** from an experiment **cannot be disclosed** to anyone else **unless written consent** has been obtained

Voluntary participation

- ensures participant **willingly** decides to take part in an experiment
- must not experience any **pressure** or **persuasion** using **force** or **threats** to participate
- must not be threatened with any **negative consequences** if they don't participate

Withdrawal rights

- right of the participant to **cease their participation** in a study at anytime without **negative consequences** or **pressure** to continue
- guideline must be adhered to **during** and **after** an experiment
- if a person feels **uncomfortable** during any **follow up** activities they are involved in or wishes to **remove their results** from being used in the study, these rights ensure they can do this

Informed consent

- needs to be obtained before an experiment commences
- researcher must obtain **written**, **informed permission** from **each participant** in the study
- states that they **consent** to participating in the study and have been **informed** of all necessary info
- consent form must inform participants about their **rights**, as well as any possible **physical** or **psychological harm** that may be encountered in the experiment
- if possible and reasonable, participants must be informed abut the **research procedures employed** in the study
- if participant is **under age 18**, or legally **unable to give consent**, participant's **parent** or **guardian** should complete consent form

Deception

- deception in research shouldn't occur unless necessary
- used in some cases - giving participant's info about an experiment beforehand might **influence** their **behaviour** during study - **affect accuracy** of results
- must be used with **caution** and researcher must ensure that all **participants** are **thoroughly debriefed**

Debriefing

- where participants are **informed** of the **study's true purpose** once the experiment has ended
- during debriefing, a researcher must also **correct** any **mistaken attitudes** or **beliefs** held by participants, and **explain all deception** related to the conducting of the experiment
- experimenter must also **provide** an **opportunity** for participants to **gain access** to **info** about the study, including **procedures**, **results** and **conclusions**
- also provide access to additional support through **counselling**, as required

PSYCHOLOGY WA ATAR Unit 1

Chapter 1 - Introduction

SUMMARY

- Psychology is a **science**
- based on a **scientific attitude** and **scientific methods**
- **Scientific attitude** - involves being curious, trying to understand without being misled, looking for **evidence** to back up all conclusions
- **Pop psychology** - uses the language and ideas of psychology to try and convince the reader that the information is based on science
- **Psychiatrist** are **medical** practitioners who have completed a medical degree
- **Psychologists** are concerned with the whole range of human thinking, emotion and behaviour

TYPES OF PSYCHOLOGY

- **Clinical neuropsychology** - concerned with how **brain injuries/ illness** affect a person's thinking, emotions and behaviour
- **Clinical psychology** - concerned with the assessment and treatment of mental disorders and psychological problems in adults and children
- **Community psychology** - concerned with helping improve people's wellbeing as members of communities
- **Counselling psychology** - concerned with assisting individuals, groups and organisations in areas such as personal wellbeing, relationships, health and crisis
- **Educational and developmental psychology** - concerned with understanding and supporting the development and learning of people throughout their lives
- **Forensic psychology** - involved with applying psychological understandings to the legal and criminal justice system
- **Health psychology** - focuses on understanding processes that are relevant to health and illness and on improving health at an individual and societal level
- **Organisational psychology** - concerned with understanding complex relationships in workplaces to improve an organisation's effectiveness and productivity
- **Sport and exercise psychology** - deals with what affects a person's participation and performance levels in sport and physical exercise.

Chapter 2 - Biological bases of behaviour

Key knowledge and understanding

The nervous system

Major parts of the brain and their function

- The hindbrain
- The midbrain
- The forebrain
- Lobes

Structure of the neuron

Methods for investigating brain function

- People with brain injuries
- External recoding techniques
- Scanning techniques

Factors that affect behaviour, emotion and thought

- Physical activity
- Drug effects

THE NERVOUS SYSTEM

- Vast, complex communication system
- **Receives** messages about our environment, **monitors** our body, **sends** messages to control and **direct** all that we do
- Two main sections - central nervous system **CNS**, peripheral nervous system **PNS**
- **CNS** - brain, spinal cord
- **PNS** - **autonomic** (automatically controls action of internal organs and glands)
- **PNS** - **somatic** (controls **voluntary** movements of skeletal muscles)
- Two systems form an integrated whole, built of nerve cells called neurons

Psychology ATAR

MAJOR PARTS OF THE BRAIN AND THEIR FUNCTION

Hindbrain

- at **base of brain** near back of skull
- **controls vital activities** over which we have **no conscious control** - e.g. breathing, coordinating voluntary muscle movements, reflex actions
- made up of several structures

- **Cerebellum** - receives information from **sensory systems**, **spinal cord** and other parts of brain
- uses this info to **regulate posture** and **balance** and **coordinates fine muscle movement**
- smaller than cerebral hemisphere but has as many neurons as the hemispheres combined
- has extensive connections with the **cerebral cortex** and **spinal cord**
- is affected by alcohol consumption
- if cerebellum is injured you may walk as if you were drunk

- **Medulla** - at the **base of hindbrain** in front of cerebellum
- **controls vital functions** - e.g. heart rate, breathing, digestion and swallowing
- **damage** to medulla is likely to lead to an individual being placed on **life support** machine to regulate breathing and heart function
- if damage is too severe the person will be pronounced '**brain dead**', and when life support is turned off, they will die

Midbrain

- sits **on top of hindbrain** under cerebral hemisphere
- functions are extremely diverse
- acts like **brain's sensory switchboard** passing info from **spinal cord** to **forebrain** and vice versa
- **receives messages** from all senses (except smell) **sends them on to higher brain regions** that deal with senses
- also **receives replies** - directs to places such as cerebellum
- e.g. if your mobile rings the sound registers in your midbrain which then triggers muscles in your neck to turn your head in direction of sound
- **does not** deal with **complex motor coordination** of type carried out by cerebellum

- **Reticular formation** - through **centre of midbrain** running from **forebrain** to **hindbrain**
- **network of nerves** about thickness of a finger
- **screens incoming info** so higher brain centres can attend to important info and not be overloaded with less important info
- role in **controlling sleeping, waking** and our level of **alertness**
- brain's arousal system
- reticular activating system **RAS** is part of the reticular formation
- has both **ascending pathways** that extend to **cerebral cortex** and **descending pathways** that extend to the **spinal cord**
- RAS **increases/dampens down arousal level** and **muscle tone** in response to feedback from brain
- e.g. when our RAS activity is low, we go to sleep

Forebrain

- **most highly developed** and **largest part** of brain
- plays major role in how we **think**, **feel** and **behave**
- many **neural pathways** in forebrain **connect** with parts of midbrain and hindbrain to **coordinate** and **regulate** brain function
- consists of various structures, most important being the hypothalamus, thalamus and cerebral cortex

- **Thalamus** - in line with our ears, in the **middle of our head**
- about **3cm in length**
- made up of **two oval parts** that sit side by side in the two hemispheres
- **filters info** from all senses (except the nose) **passes it on** to appropriate part of brain for **processing**
- acts as a **relay system**
- damage can result in **reduced** sense of **touch**, or **visual** or **hearing** impairment
- also plays an important role in **regulating** level of **arousal**, how **awake**, **energetic** and **attentive** we feel, through its connection to the **RAS**
- damaged = **arousal reduced** = **lethargy** or even **coma**

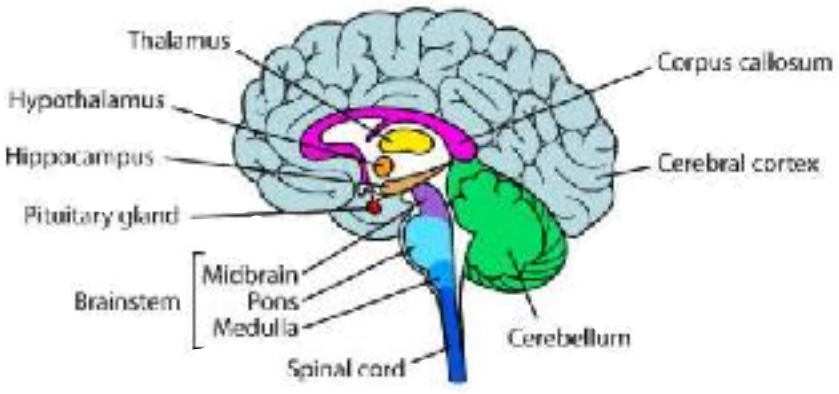
- **Hypothalamus** - located just **below the thalamus**
- **small**, size of a grape
- regulates **release of hormones** - controlling **body temperature**, our **biological clock**, **sex drive** and **thirst** and **hunger** needs

- **Cerebrum** - comprises most of forebrain
- lies **above** and in front of **cerebellum**
- consists of an **outer layer** - **cerebral cortex**, as well as **masses of neural tissue** where nerves form connections
- has **two halves/ hemispheres** (including cerebral cortex) that is **separated** by a **deep groove**

- **Cerebral cortex** - (simply cortex) - **wrinkled** like a walnut, in a healthy living brain is **soft** and **pinkish grey** in colour
- located **over and around** most of the other brain structures
- both hemisphere are almost symmetrical and has sensory and motor functions
- two hemispheres are **joined** by a **thick band of fibres** called the **corpus callosum**

- **Corpus callosum** - **sends messages** from one hemisphere to the other
- reception and processing of sensation of the other side of the body
- control of voluntary movement of the other side of the body
- **left** hemisphere gets info from **right** side of the body, mainly controls the movement of the right side of the body and vice versa

Left hemisphere specialisation	**Right hemisphere specialisation**
language-based tasks (speaking, reading, writing)	visual-spatial tasks (reading a map, completing a jigsaw puzzle)
analytical thinking	appreciation of art and music
sequential processing	detection and expression of emotion
logical reasoning	recognition of faces and patterns



Lobes of the cerebral cortex

- hemispheres of cortex can be further subdivided into **lobes**
- these are areas defined by **deep grooves** (or fissures) **in the cortex** as well as by having **seperate functions**
- each cerebral lobe has **four lobes** - frontal, temporal, occipital and parietal

- **Frontal lobes** - located in **upper front half** of each hemisphere and are **largest** of the four pairs of lobes
- associated with **higher mental ability** and the **control of movement**
- also associated with **regulation of emotion**, **self awareness** and ability to **inhibit inappropriate actions**
- damage - personality may change significantly and capacity for reasoning and problem solving is reduced

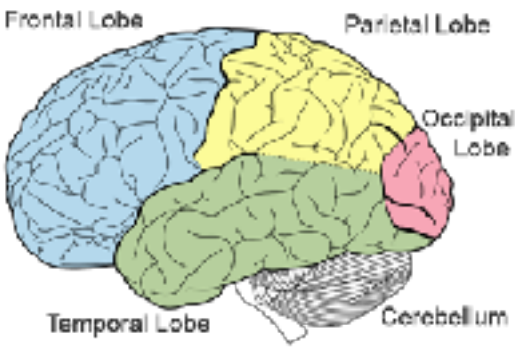
- **Temporal lobes** - **receives auditory** (sound based) **info** and are the main site for **processing** this info
- play a critical role in our ability to **interpret different sorts of sounds** and **understand speech**
- damage - affects a person's language ability

- **Occipital lobes** - at **back** of brain
- responsible for **vision**, or seeing
- damage - affects vision even if eyes and their connecting nerves to the brain are normal

- **Parietal lobes** - located on **top** of cortex
- **receives info** about **touch** and **temperature** from the skin as well as info about body's **position in space** and **muscle movement**
- damage - leads to a reduction in bodily feelings

- **cortical areas (association areas)** - make up the frontal lobes, cover front of each lobe
- **don't have a specific motor** or **sensory role** but **combines info received** from other brain structures, giving it meaning and leading to appropriate responses

Lobes of the cerebral cortex	Location	Major functions
Frontal lobe	front of each hemisphere, in front of parietal lobe and above temporal lobe	control of voluntary movement abstract thinking regulation of emotional behaviour personality
Temporal lobe	on each side of the brain under the cerebral hemisphere	receive and process auditory info, both verbal (language) and non verbal (door shutting)
Parietal lobe	above occipital love and behind frontal lobe	combines sensory info relating to touch, temperature, position in space and muscle movement
Occipital lobe	back of brain above cerebellum	receive and process visual info such as colour, shape and motion



lobes of the brain

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STRUCTURE OF THE NEURON

Neurons

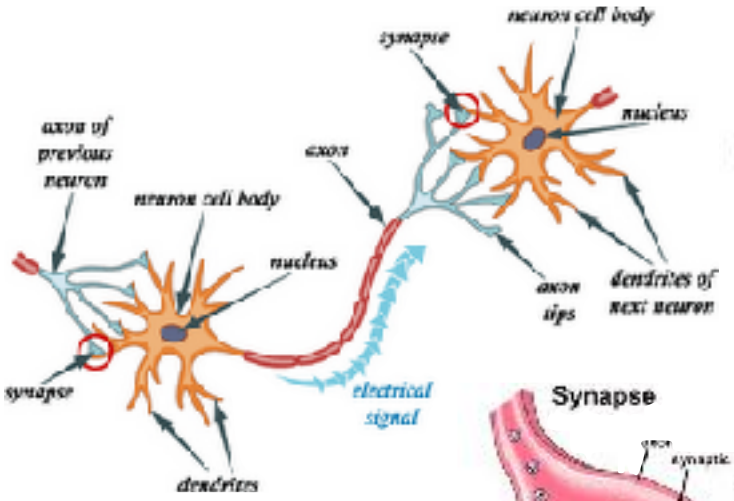
- brain is made up of billions of **nerve cells** called **neurons**
- neuron is a type of cell that is **specialised** to **receive**, **transmit** and **process** info
- providing **connections between neurons** are trillions of **synapses**
- synapses **enable messages** to be **transmitted** from one neuron to another throughout body
- many different types, although most have a **cell body**, **dendrites**, an **axon** and a **myelin sheath** in common

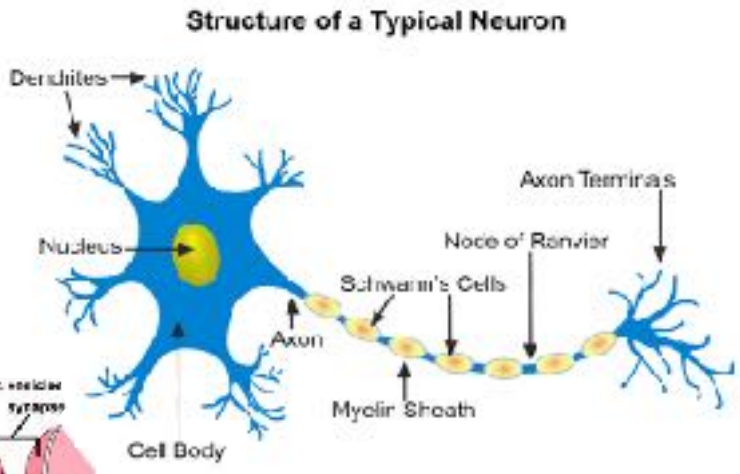
- **cell body (**or **soma)** - contains a nucleus - controls maintenance and function of cell
- at one end it has an **axon**
- other end - thousands of **dendrites** protrude from the cell
- cell body **combines info** received from many **dendrites** and **passes** it to the **axon**
- **energy needed** for processes such as growth or repair is provided by the **mitochondria** in cell body and dendrites

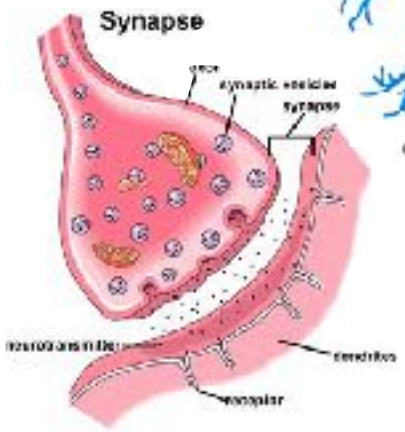
- **dendrites** - **fine branches** from cell body that **receives incoming info** from other neurons and **transmits** it to cell body
- the more dendrites a neuron has, the more info it can take in

- **axon** - a structure only found in neurons, highly specialised for **transferring info over distance** in nervous system
- info is **passed** from **cell body** to **other neurons** or to **cells in glands** and **muscles**
- most neurons only have one axon, many axons have **branches** (**collaterals**) that allow info to be passed to multiple cells

- in motor and sensory neurons, axon is surrounded by a fatty **myelin sheath** that is interrupted periodically
- **nodes of ranvier** - gaps where membrane of the axon is exposed
- they **speed the transmission** of **electrical signal**
- allow **nutrients** to enter the **axon** and **waste products** to leave
- this transmission of impulses occur at the **synapses** - tiny gap between axon terminal and a dendrite (**synaptic gap**)







Psychology ATAR

METHODS FOR INVESTIGATING BRAIN FUNCTION

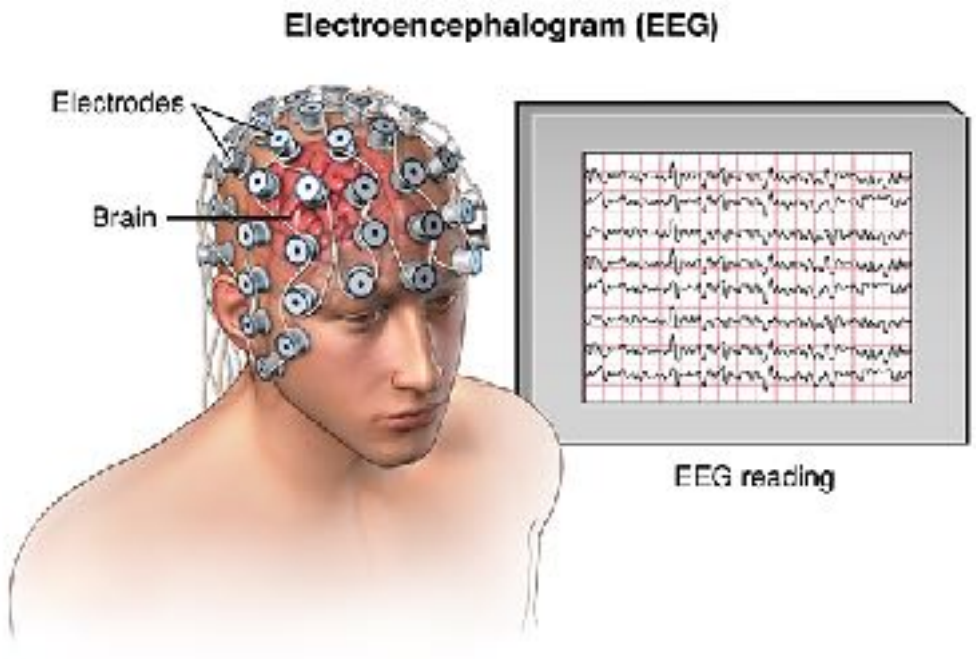
- much of what we know about the brain today is the result of **technological advances**
- e.g. magnetic resonance imaging **MRI** and computed tomography **CT** scans

People with brain injuries

- case study - an **intensive study** of an individual
- **Phineas Gage** - one of the earliest case of people with brain injury
- his and other cases - enabled psychologists to look for **changes in behaviour**, **personality** and **intelligence** as a result of the damage
- help understand **relationship** between **brain structure** and **function**
- his accident involved a rod being shot through his left cheek and out the top of his skull causing major damage to his **frontal lobe**
- he **recovered** from the accident, was able to **talk sensibly** and soon **regained full strength**
- his **personality completely changed**; from polite and pleasant to loud, moody and dishonest
- frontal lobes were damaged - important for **planning**, **self control** and **personality**
- studies of people with '**split brain**' - people who have had surgery to r**educe severe epileptic seizures**
- **corpus callosum cut** to **stop brain activity associated with seizures** and from spreading from one hemisphere to the other
- with a cut corpus callosum - visual info **could not be sent** from the **right** to the **left** hemisphere and vice versa

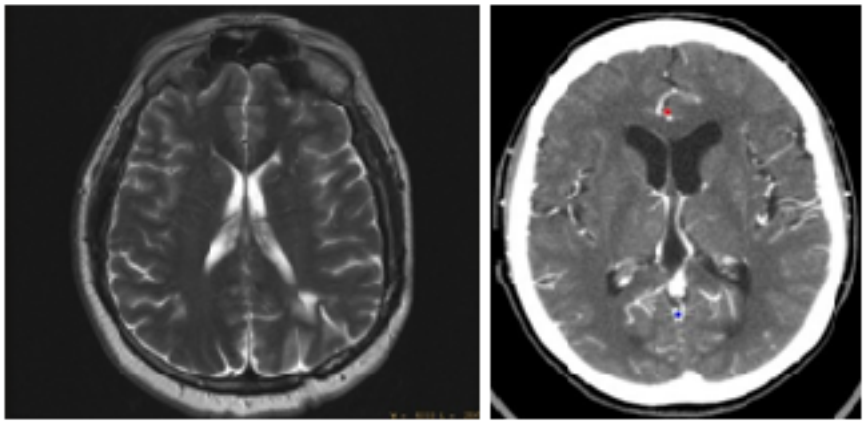
External recording techniques

- **electroencephalograph** or **EEG** - used to investigate **whole brain** rather than its parts, can **provide** this **info without being invasive**
- EEG **detects**, **amplifies** and **records brain waves** (**electrical activity** in brain)
- brain waves detected by **multiple electrodes fastened to scalp**, often using an EEG cap
- brain waves can **vary in frequency** - **number** of **brainwaves** per second - and in **amplitude** or **intensity**
- **amplitude** of brain wave judged by **size of peaks** and **troughs around baseline** of **zero** when there is **no activity**
- these are **recorded** on a **chart**
- **different patterns** of **brain waves** can **indicate problems with brain** such as epilepsy or tumours
- major **limitation** of EEG - **cannot provide info** from **deep within brain** or **details about parts** of brain activated



Scanning techniques - still pictures

- **computerised scanning technology** has **advanced study** of the **brain**, **brain injury** and **disease** and their **relationship with behaviour**
- **scanning** provides us with **pictures** of the **brain** and its **activity**
- **computed tomography** (CT) or **computed axial tomography** (CAT) scan is a **type of X-ray**
- involves sending a series of **narrow beams** through the head
- **CT** scanner scans through **180 degrees** and takes a **measurement every one degree**
- when **info** is **fed through computer** and **appropriate calculations** are **made**, a **cross-sectional picture** of the brain is produced
- **cross-sectional** '**slice**' can be at **any level** of **brain** and **angle** desired
- images produced this way are **clear**, unlike an **X-ray** - **produces fairly poor image** of brain because of its **density**
- CT scans aid in **detection** of **tumours**, **strokes** and other **injuries** - can help in finding out **reasons** in **changed behaviour** and **personality**
- also **detect areas** of brain that may have **shrunk** (**atrophied**) due, e.g, to Alzheimer's disease



MRI brain CT brain

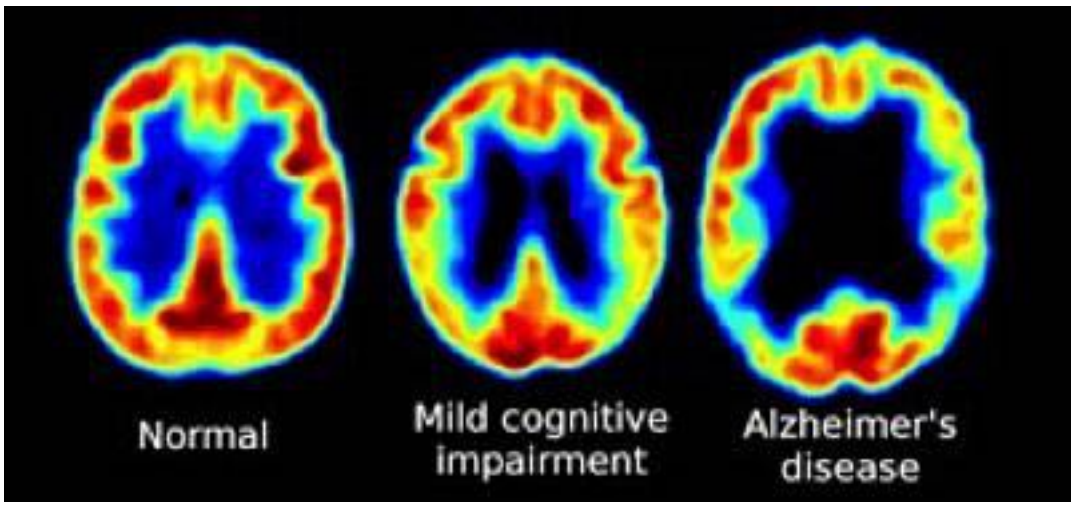
- **magnetic resonance imaging** (MRI) produces **static images**
- however, unlike CT scanner, **MRI** uses a **strong magnetic field**, **radio frequency pulses** and **computers** to produce its images
- patient is placed in a **tunnel** surrounded by a **large magnet** that produces **powerful magnetic field**
- when the **part of body** examined is placed in this **magnetic field** and **exposed** to a **certain radio frequency pulse**, the **body tissues emit signal** that can be **measured**
- as with CT scanner, hundreds of thousands of **measurements** can be **combined** by **computer**
- resulting image is a **computer-enhanced**, **3D picture** of the brain (or body), from which a **2D 'slice**' can be **selected** and **displayed**, **rotated** or **enlarged**
- images are usually **superior** to **those produced by CT** scanner
- this procedure enables the **detection** of **tumours** and **other abnormalities**
- vital to make sure patient and staff near has no magnetic objects on or in them

Scanning techniques - dynamic pictures

- main **limitation** of **EEGs, CT scans and MRIs** is that they only produce **static images -** though **useful** in **examining** brain **structure**
- more recent techniques - **functional MRI** and **positron emission tomography** (PET) make it possible to **examine changes** in **brain activity** associated with **functions**, such as **planning** and **execution** of specific tasks

- **Functional magnetic resonance imaging** (fMRI) - most recent form of MRI
- in fMRI, MRI is used to **measure activity** in brain when **neurons** are **consuming oxygen**
- when **part of brain** is **active**, it **contains more oxygen-rich blood**, levels can be **measured** though magnetic resonance
- **higher levels** of **oxygen** means **higher levels** of **oxyhaemoglobin**, which indicates **higher activity**
- **haemoglobin** and **oxyhaemoglobin contain iron** in different forms that **affect MRI signal** differently, **enabling relative amounts** of each to be **measured**
- this is termed the **BOLD signal** - **blood oxygenation level dependent** signal
- **higher BOLD signal** means **increased oxygen levels**
- **fMRI** proving very **useful** in **psychology**
- **psychophysical studies** can use **precise brain measurements** as **correlates** of **different types of behaviour** such as visual processing, reading and other cognitive activities

- **Positron emission tomography** (PET) scans are based on **glucose consumption** of brain
- **glucose** containing **harmless radioactive tracer**, which **decays** by **emitting** a **positron**, is **injected** into blood vessels **or taken** orally
- when in **bloodstream** it **travels to brain**
- PET **scan** can show **which areas** of brain are **using more energy** or **consuming more glucose**
- **higher glucose levels** reflect **higher brain activity**
- by placing **positron detectors** around brain and **picking up activity**, computer generates **pictures** with **distinct colours** showing **different amounts** of **neutral activity**
- variety of **brain problems** such as **epilepsy**, **brain tumours** and **blood clots**, can be identified by **comparing brains** of those thought to have neurological problems with those of healthy people
- psychologists are also using PET scans to provide **specific info** about **areas of the brain** that can be **linked to particular activities** such as reading or solving mathematical problems



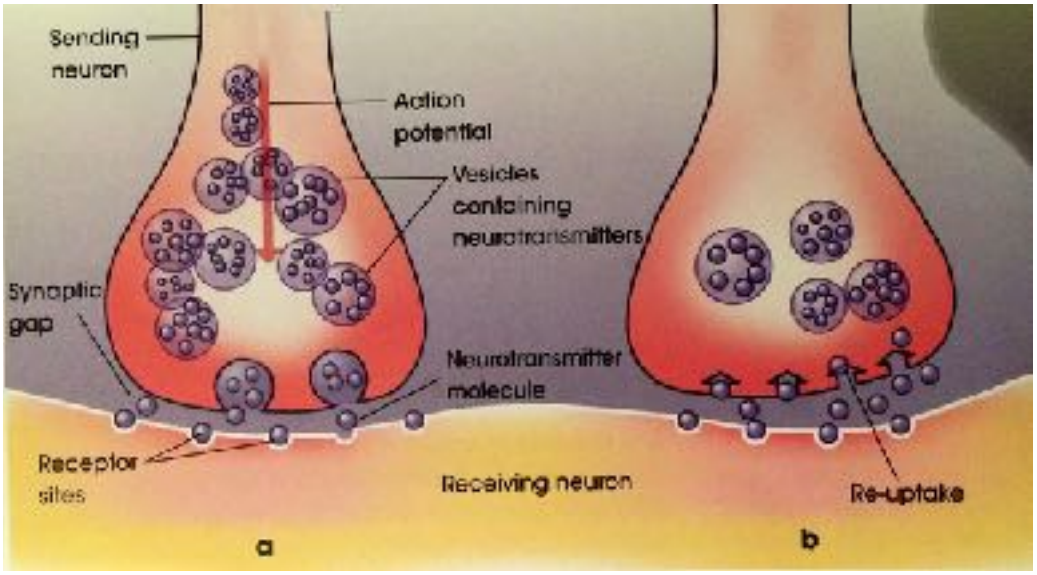
Technique	Measurement type	Method	Use and limitations
EEG	External Does not use imaging techniques	Uses electrodes fastened to scalp to detect and amplify electrical activity in the brain, which is recorded as a series of peaks and troughs on a chart	Investigates activity in the whole brain Has been used to study different states of consciousness e.g. awake, sleeping, dreaming Different patterns can also indicate epilepsy or tumours Does not produce images and cannot detect information from deep in the brain
CAT	Static imaging, i.e. produces still pictures	Type of X-ray, scans the brain at different angles Information is fed into computer leading to cross-sectional pictures of 'slices' through the brain	Aids in detecting tumours, strokes, etc and atrophy of areas Used in research to look at possible abnormalities in brain structures associated with mental illnesses Images only show brain structure, and images are of inferior quality to those from MRI
MRI	Static imaging, i.e. produces still pictures	Uses a strong magnetic field, radio frequency pulses and computers to produce 3D images from which 2D 'slices' can be displayed	Used in detection of tumours and other abnormalities Does not require X-irradiation and images superior to CAT scan, but MRI cannot be used if the patient's body contains any magnetic objects in them (e.g. pacemakers)
fMRI	Dynamic imaging Produces colour images of brain structure, activity and function	Most recent form of MRI. Measures activity in brain when neurons consume oxygen Higher levels of oxygen indicate higher level of activity Colour variations indicate level of activity	Enables observation and measurement of changes in the brain during activity Scans can be made rapidly, they have good spatial resolution, are non-invasive and do not expose patient to radioactive tracers Less expensive than PET scans
PET	Dynamic imaging Produces colour images of brain structure, activity and function	Scans provide images of brain in action by tracking a glucose solution that contains a short-lived radioactive tracer Records are based of glucose consumption in the brain Different colours indicates areas of high or low activity	Does not provide an image of the health level of the brain but problems (e.g. epilepsy, blood clots, can be identified by comparing patient brain with those of healthy people) Used in research to show specific areas activated during activities such as reading, speaking, thinking Images are not as detailed as those from fMRI and are more expensive

FACTORS THAT AFFECT BEHAVIOUR, EMOTION AND THOUGHT

Physical activity

- **exercise** is **not only good for** our **physical health**, halving the risks of heart attacks and adding two years to life expectancy, but it also **makes us feel better**
- **Statistics Canada** (**1999**) reports that 1-in-4 Canadians who exercise regularly also reported feeling **more energetic**, **less depressed** and **tired less** often than those who exercised infrequently
- although **correlation doesn't equal causation**, there is **research** that **addresses this debate**
- In **1984**, **Lisa McCann** and **David Holmes** carried out **study** with **mildly depressed college students**
- assigned a third to **relaxation** group, a third to a program of **aerobic exercise** and the control group received **no treatment**
- before treatment - **no significant difference** between three groups
- ten weeks later - **exercise** group **most improvement**, **control** made **little improvement**
- **Cooney and colleagues** (**2013**) conducted **meta-analyses** to see how well results of these early studies held up
- concluded that **exercise** is moderately **more effective than no intervention** but **comparable** to **psychological** and **pharmacological therapies** in **reducing depression**
- exercise often considered **more acceptable** to patients, also **cheaper**, increasingly being **recommended for treatment** of depression and other mental health disorders
- exercise might have positive effects - **strengthens heart**, **increases blood flow** and **lowers blood pressure** and **blood pressure reaction to stress**
- provides **mastery experiences** that help **promote perceived ability** to **cope** with **depression**
- **increases production** of **mood-boosting neurotransmitters** - noradrenaline, serotonin and endorphins

- **Neurotransmitters** - **chemicals** that affect way **messages** are **passed** from one **neuron** to another
- neurotransmitters **carry message** from a **sending neuron** across a **synapse** to **receptor sites** on a **receiving neuron**
- **sending neuron** usually **reabsorbs** any **excess neurotransmitter molecules** in a process called **re-uptake**
- if **excess** of neurotransmitters is **produced**, individual experiences a **mood boost**
- thought to explain **'runner's high'** that many people report after vigorous aerobic exercise
- researchers also found **exercise leads** to **higher levels** of **physical self-concept** - we feel better about our bodies, sleep better and have a sense of accomplishment
- exercise could **indirectly contribute** to us **feeling** and **thinking better**
- likely that **relationship between exercise** and **mental health** is **complex** and may **vary** on **factors** such as **age**, **gender** and **lifestyle preferences**



If there are **too many neurotransmitter molecules** to be taken in by the **receiving neuron**, or for **re-uptake** by a **sending neuron**, then the individual experiences a '**high**'

Drug effect

- drugs affect our **body chemistry** and how we **think**, **feel** and **behave**
- some drugs used **therapeutically**, others used **recreationally**
- users of **recreational drugs** usual give far **less thought** to the **effects** of **dosage** and **timing**, **unwanted side effects** and possible **long-term consequences**
- 3 main types of drugs
- **depressants** - or 'downers', **calm** the activity of the **nervous system** and **slow body function**
- **stimulants** - or 'uppers', **excite** the **nervous system** and **arouse body functions**
- **hallucinogens** - **changes** our **perceptions** and gives us **sensory images without input** from the senses

- **alcohol** - most commonly used **recreational drug** in Australia - a **depressant**
- **lowers inhibitions**, **reducing ability** to **stop and think** about what we are doing and the **effect** of our **behaviour** on other people
- **reduces** feelings of **self-consciousness** and **promotes relaxation**
- can lead us to **behave** in **ways** we **wouldn't behave** when **sober** - **disinhibition**
- disinhibition leads to some **normally placid** people **becoming aggressive**, even when **unprovoked**
- alcohol also affects **motor control**, **slowing ability** to **respond quickly** and **coordinate movement**
- young people - **fewer episodes** of drinking overall than older people - more likely to consume at **riskier levels** each time
- 2012-2013 - 1 in 8 **deaths** of Australians under 25 yrs old directly attributable to **alcohol consumption** - injury, drink driving, accidents, assault and violent

- **cannabis** - marijuana, made from cannabis plant, is a **depressant**
- **slows down activity** of **central** nervous **system** and **rate** at which **messages pass** from brain to body
- **effects** of cannabis **vary** from person to person **depending on factors** such as person's **size** and **health**, and whether they have **used** the **drug before**
- effects may include **loss of inhibition**, **spontaneous laughter, altered perceptions** of **sound** and **colour**, but also **confusion**, **anxiety** and **altered memory**
- most often used **recreationally** as a **psychoactive drug**, is also used **medicinally** in some parts of the world
- june 2014, **24 states** in **America** approved **medicinal uses** of marijuana
- february 2017, **Australia** also **approved companies** being given **permission** to **legally import**, **store** and **sell** the drug until much time as local producers can met the demand
- **strict rules** and **regulations** relating to **who may prescribe** it and who may **use** it remain in place
- **clinical trials** underway to **investigate** its **potential** to **treat** some severe forms of epilepsy
- groups such as Cancer Council NSW, supported its use, under supervision of doctors, to **reduce pain** and **nausea** in **cancer patients** undergoing chemotherapy, and to **stimulate appetite**

- most commonly used stimulants in our society are **caffeine** and **nicotine**
- stimulants **increase heart** and **breathing rates**
- **appetite decreases** because **blood sugar rises**; **energy** and **self-confidence** get a **boost**
- people use stimulants to **stay awake**, **lose weight** or **boost athletic performance**

- **amphetamines** - more **powerful stimulants** than coffee and nicotine
- they **increase neurotransmitter activity**, **speeding up body functions** such as **heart rate** and **breathing rate**, hence the name '**speed**'
- come in variety of forms - **powder**, **tablets**, **capsules** or **crystals**
- can **improve performance** on **difficult** or **boring tasks** - some students use when studying
- also used to **raise mood** and make you feel **more energetic**
- as with other drugs, their use also has a **downside** - after **effect wears off**, user is likely to experience **headaches**, **tiredness** and **irritability**
- **high dosages** can also have **negative effect** on **working memory** and **cognitive control**
- like depressants, stimulants can become **addictive**

- **Crystal methamphetamines** (ice) - **more potent** than **other forms** of **amphetamines, more dangerous**
- **immediate effects** include feelings of **excitement**, **wellbeing, increased confidence** and **energy**, but also **tremors**, **increased rate** of **breathing, blood pressure, irregular heartbeat**
- as **effects wear off**, person may experience big **mood swings**, **tension**, **exhaustion** and **uncontrollable violence**
- it is **powerfully addictive**, **prolonged use** leads to **rapid physical** and **mental decline**
- however, amphetamines also used **medicinally** for those diagnosed with **attention deficit hyperactivity disorder** ADHD
- **symptoms** of ADHD include **hyperactivity**, **impulsivity** and **poor attention**
- most common **treatment** involves prescription of a **stimulant**: **dexamphetamine** and **methylphenidate** (sold as Ritalin)
- strange to administer **stimulant** to someone who is **hyperactive** and impulsive, these stimulants have **noticeably calming** and **focusing effect** on about 70% of those with ADHD
- research using **positron emission tomography** PET indicates these drugs **increase levels** of neurotransmitter **dopamine** - likely to **improve attention** and **focus** in individuals whose dopamine levels are week - thought to be case with ADHD
- parents worry child will become **dependent** on **stimulant medication**
- research shown that individuals with ADHD **don't become addicted** if medication is taken in **dosage** and **form prescribed** by doctor
- **Biederman's** (2003) **longitudinal study** suggests children with ADHD who have been **prescribed stimulant medication** have **reduced risk** of **subsequent drug** and **alcohol abuse**

Drug	Physiological response	Possible psychological response
Alcohol	Depressant Slows activity of CNS and rate at which messages pass from brain to body	Reduces inhibition and self-consciousness Can lead to reduction in clarity of though, control of behaviour and aggression
Cannabis	Depressant Slows activity of CNS and rate at which messages pass from brain to body	Reduces inhibition Can lead to spontaneous laughter, altered perception of sound and colour, altered memory, confusion and anxiety
Caffeine	Stimulant Heart and breathing rate increases Blood sugar rises	Reduces appetite Increases energy and self-confidence
Amphetamines	Stimulant Heart and breathing rate increases Blood sugar rises	Raises mood and increases energy When effect wears off, headaches and irritability increases and cognitive control and working memory deteriorate

Psychology ATAR

CHAPTER SUMMARY - BIOLOGICAL BASES OF BEHAVIOUR

The nervous system

- Peripheral nervous system (PNS)
  - Autonomic
  - Somatic
- Central nervous system (CNS)
  - Brain
  - Spinal cord

Major parts of the brain and their functions

- Hindbrain (brain stem)
  - Cerebellum
  - Medulla
- Midbrain
  - Reticular formation
- Forebrain
  - Thalamus
  - Hypothalamus
  - Cerebral cortex
    - Left hemisphere
    - Right hemisphere
    - Corpus callosum
- Lobes of the cerebral cortex
  - Frontal
  - Temporal
  - Occipital
  - Parietal

Structure of the neuron

- Cell body
- Dendrites
- Axon
- Myelin sheath

Methods for investigating brain function

- People with brain injuries
  - Phineas Gage - a case study
- External recording techniques
  - Electrical stimulation
  - EEG
- Scanning techniques
  - Still pictures
    - CT
    - MRI
- Dynamic pictures
  - fMRI
  - PET

Factors that affect behaviour, emotion and thoughts

- Physical activity
- Drug effects
  - Depressants
  - Stimulants

Psychology ATAR

CHAPTER REVIEW - UNIT 1 CHAPTER 2

Terminology

Define the following terms:

1. Neuron

A type of cell specialised to receive, transmit and process information

2. Dendrite

Fine branches from the cell body that receives information from other neurons and transmits it to cell body

3. Case study

Intensive study of an individual

4. Hallucinogens

Substance that changes our perceptions and gives us sensory images without input from the senses

5. Disinhibition

Loss of normal inhibitions, changes our normal behaviour

Multiple-choice questions

1. The hindbrain:

a. is the most highly developed part of the brain
b. controls heart rate, breathing, sleeping and reflex actions
c. sits on top of the brainstem under the cerebral hemispheres
d. is divided into two halves or hemispheres

2. A runner's high is due to:

a. self-satisfaction at exercising
b. running with friends
c. an increase in the production of neurotransmitters
d. running while on drugs

3. In most people, the left hemisphere is important in:

a. spatial tasks
b. appreciation of music
c. verbal functions
d. face recognition

4. An EEG is used when we want to investigate the:

a. whole of the brain
b. cerebellum
c. right hemisphere
d. frontal lobes

5. Cannabis (marijuana)

a. is a depressant
b. affects different people differently
c. may reduce pain and nausea in people undergoing chemotherapy
d. all of the above

Short-answer questions

1. Describe how brain injuries and disease and help is to understand how the brain works

Brain injuries and disease helps us understand the relationship between brain structure and its functions. Those with brain injuries or diseases behaviour usually changes. By looking at what has changed we can associate that behaviour with the part of the brain that has been affected

2. Indicate the main differences between an EEG and a CT scan in terms of how they work and what they are used for

An EEG only measures the brain as a whole and uses electrodes fastened to the scalp to detect and amplify electrical activity in the brain, which is recorded as a series of peaks and troughs on a chart - doesn't show an image, whereas a CT scan scans parts of the brain at different angles like an x-ray and information is fed into computer leading to cross-sectional pictures of 'slices' through the brain - shows a still image.

3. Outline three reasons psychologists have suggested for why people feel better after exercise

Psychologists have suggested that exercise releases mood-boosting neurotransmitters such as dopamine which makes you feel better, it strengthens the heart, increases blood flow and lowers blood pressure reaction to stress, it also provides mastery experiences that help promote perceived ability to cope with depression.

4. Indicate what are likely tp be the major consequences of severing the corpus callosum

Severing the corpus callosum stops communication between the two hemispheres of the brain.

Complete the table

Copy and complete the table below by naming four scanning recording techniques used to provide information about the brain's structure and function. Indicate one use and one limitation of each technique.

Scanning technique	Use	Limitation
EEG	Used to investigate brain activity e.g. states of consciousness	Does not produce images and cannot detect information from deep in the brain
CT	Used to detect possible abnormalities in brain structure	Image only shows the structure of the brain, image quality is inferior to MRI
MRI	Used in detection of tumours and other abnormalities	Cannot be used if the patient's body contains any magnetic objects in them (e.g. pacemakers)
PET	Used in research to show specific areas activated during activities such as reading, speaking, thinking	Does not provide an image of the health level of the brain but problems