

The background is a complex, abstract geometric pattern composed of numerous triangles of various sizes and colors. The colors include shades of yellow, orange, red, pink, light blue, teal, purple, and grey. The pattern is dense and fills the entire frame. On the right side, there is a solid pink horizontal line.

1. Research Questions, Theory and Hypotheses

What is a theory?

- A theory is based upon a hypothesis and backed by evidence.
- A theory presents a concept or idea that is testable. In science, a theory is not merely a guess. A theory is a fact-based framework for describing a phenomenon.
- A psychological theory has two key components:
 - (1) it must describe a behaviour
 - (2) make predictions about future behaviours.

Falsifiability...?

Not only must a theory be testable, it must also be capable of being proved wrong.

This is known as *falsifiability*.

Karl Popper argued that no matter how many times a theory predicted result occurs – there might still be another theory that is the true one.

Thus we can never **prove** a theory, we can only become 'more confident' of its applicability.



e.g., Black swans. Just because you see white swan after white swan, that doesn't mean that all swans are white. This theory can be falsified by seeing a black swan.



Research Questions



- The problem being addressed should be able to be stated in the form of a *question*

What is the effect of On

Is there a difference in between
Groups?

Can predict behaviour?

- A research question defines the area of interest (but is NOT a declarative statement – this would be a hypothesis)

Hypothesis

- A hypothesis is a precise, testable statement of what researchers predict will be the outcome of a study
- An '*if – then*' prediction: 'if the theory is true, then under these conditions, this will happen'

e.g., If it is true that children are more hyperactive when they eat chocolate, then if I give a group of children chocolate, they should become more hyperactive.

Hypotheses



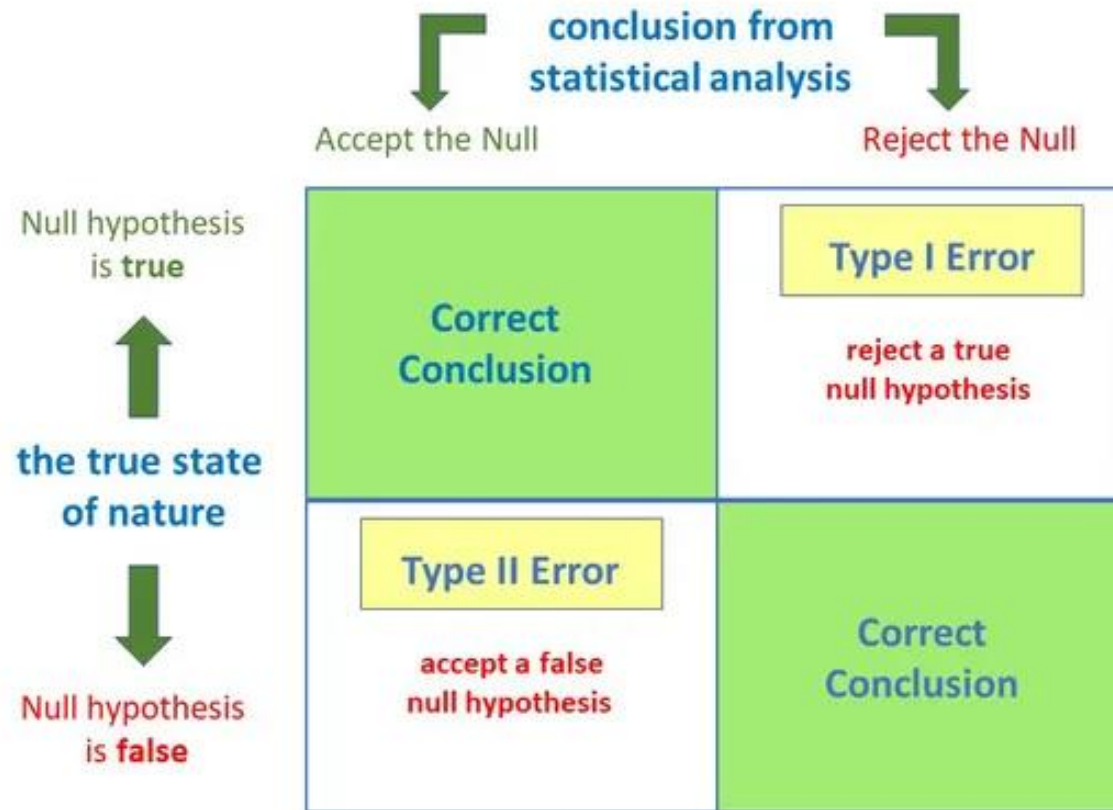
- In research, the convention is that the hypothesis can take two forms:

- **The null hypothesis**

- A statement of no relationship/effect amongst the variables
- This is often implicit – it is always a statement of no effect
- We have to determine whether to reject the null hypothesis (i.e., our results DO show an effect) or fail to reject it (i.e., there is nothing being observed)

- **The alternative hypothesis (experimental hypothesis if an experiment is being conducted)**

- A statement indicating that there will be a relationship / effect, etc between the variables being studied
-



Errors

- Type I error

Concluding that the null hypothesis is false when it is actually true
Thinking we have observed an effect when we have not

- Type II error

Concluding that the null hypothesis is true when it is actually false
Not realising that an effect is there

Hypotheses

One-tailed / Directional

- A hypothesis that makes a prediction about the direction in which results are expected

e.g., males are more aggressive than females



Two-tailed / Non-directional

- A statement that something will be occurring, but no statement of the direction

e.g., there will be a difference in aggression scores between males and females





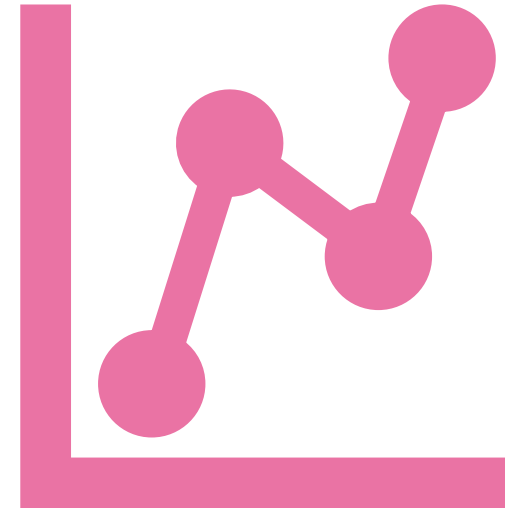
Variables

Experimental Research

- Used when looking for differences between two or more groups
- Important when exploring cause and effect
Can identify whether one thing affects another
- The experiment is generally assumed to be the most reliable and effective method for demonstrating that one *variable* has an effect on another *variable* to change
- The term **VARIABLE** is used to describe the empirical object or phenomenon that we are observing

Variables

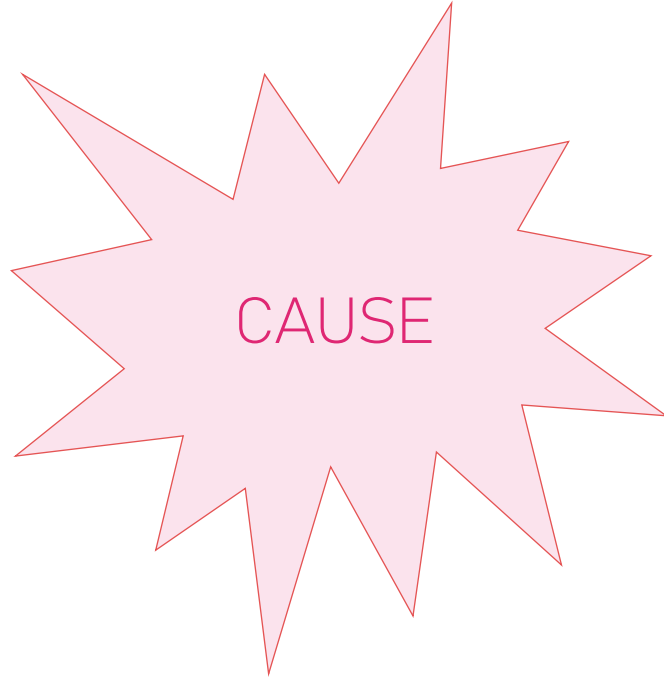
- A variable is anything that varies – in psychology this usually refers to phenomenon for which an objective measure has been provided.



Measuring Variables

- The essence of studying anything is the observation of changes in variables.
- The essence of scientific research is to relate these changes in variables to changes in other variables.
- The first step is to **quantify** variables and find a way to measure them.
- In Psychology, if we are to work with variables such as attitudes or anxiety, we must be able to precisely specify them for accuracy and communication purposes.





Independent Variable



The factor that is manipulated or controlled by the researcher in order to determine their effect on a given behaviour



A variable that influences a certain behaviour OR accounts for differences in a certain behaviour



The IV should **NOT** be influenced by anything else in your study!

Independent Variable (IV)

- Examples of IV's:

Gender

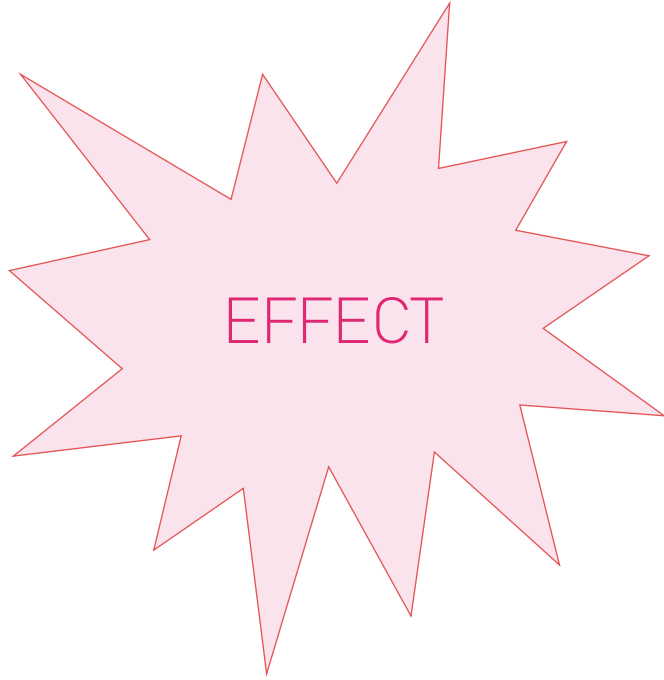
Age

Personality type

Level of anxiety

Drug or placebo

Researcher chooses what
manipulations to put in
place in experiment



Dependent Variable



The factor that is measured by the researcher



The variable that may be influenced by the independent variable



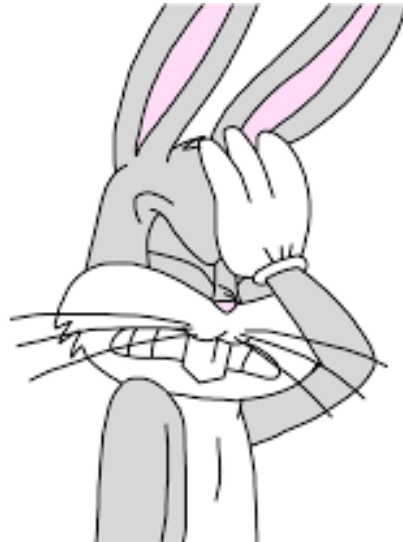
The DV *depends upon* the IV!

But – also need to consider extraneous and confounding variables

1. Extraneous variables...

Other variables which are present during the study that could affect the DV

e.g., noise level,
temperature, lighting...



2. Confounding variables...

Other variables which we should have controlled for but didn't... and that could actually explain the outcome of your experiment or study (can provide alternative explanations of change in the DV)

e.g., age, socio-economic status...

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Types of Design

Participants and design



- We need to consider how our participants/sample are allocated – this determines (in the most part) the design of the study
- How?

Are all participants doing all conditions?

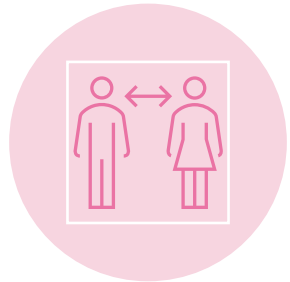
Are some participants doing specific conditions?

Are there two distinct groups that we need to keep separate?

Design depends upon these considerations

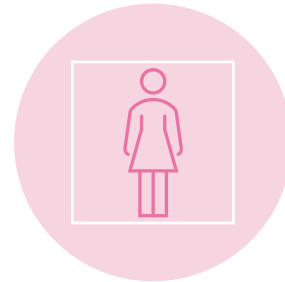
Types of Design

Two main types of design:



Between subjects

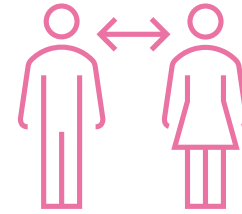
Also called:
Unrelated design
Independent measures design



Within subjects

Also called:
Related design
Repeated measures design

Between-subjects design



Are you exploring differences between two (or more) groups?

E.g., a research study exploring differences in perceptions of body image between males and females.

Participants are allocated to **either** one group or another group

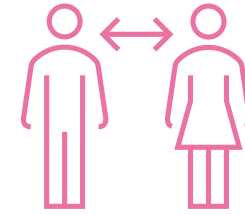
MALE

OR

FEMALE

Often randomly assigned to one group or another (not the case with certain demographics such as gender, age, etc)

Between-subjects design



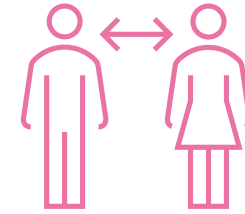
Experimental groups:

- Those who receive a particular manipulation
- To assess whether the manipulation has altered behaviour/outcome in any way, another group who do not receive the manipulation is needed to compare..

Control groups:

- Used as a **baseline** measure of the behaviour/outcome without the manipulation
- E.g., an experimental group are given caffeine to assess memory whilst the control group are not given caffeine – performance is then compared.

Between-subjects design



- Knowing you are in a control group can lead to unwanted psychological expectations

Placebo groups

- Experience exactly the same conditions as the experimental groups, except that they only **think** they are receiving the manipulation when actually they are not

They don't receive nothing – they receive *something* that is like the manipulation but is ineffective

- E.g., decaff coffee

But – consideration of ethics required, specifically element of deception

Within-subjects design



Are you exploring changes within one group of participants?

- Either over time or before/after experimental manipulation or intervention

E.g., a research study exploring changes in people's attitudes towards gambling when given an editorial article on gambling in society

The same (one group) participants take part in **all conditions**

BEFORE

AND

AFTER

Within-subjects design



- Also called **Repeated-Measures**

Main Issues:

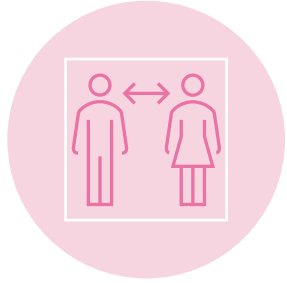
Order / Practice effects

Order in which the conditions are completed can naturally influence outcome due to practice

Solution?

COUNTERBALANCING

Random order of conditions assigned to participants
E.g., with two conditions;
Half of participants complete condition 1 and then 2
The other half complete condition 2 and then 1



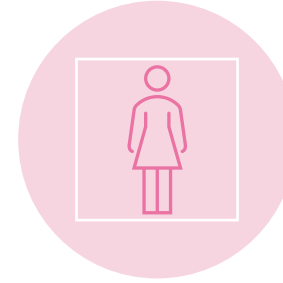
Between subjects

Advantages:

- Eliminates practice effects and fatigue effects
- Shorter duration

Limitations:

- Requires more participants
- Individual differences can threaten validity



Within subjects

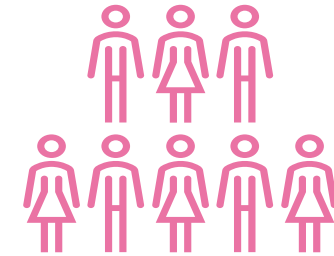
Advantages:

- Requires fewer participants
- Eliminates participant variables (individual differences are not an issue)

Limitations:

- Time consuming / more for participants to do
- Higher drop out rates
- Practice/order effects

Matched-pairs design



Advantages:

Participant variables unlikely to affect results

Limitations:

Expensive and time consuming

Dropout of one participant mean the other in the 'pair' has to be removed, also