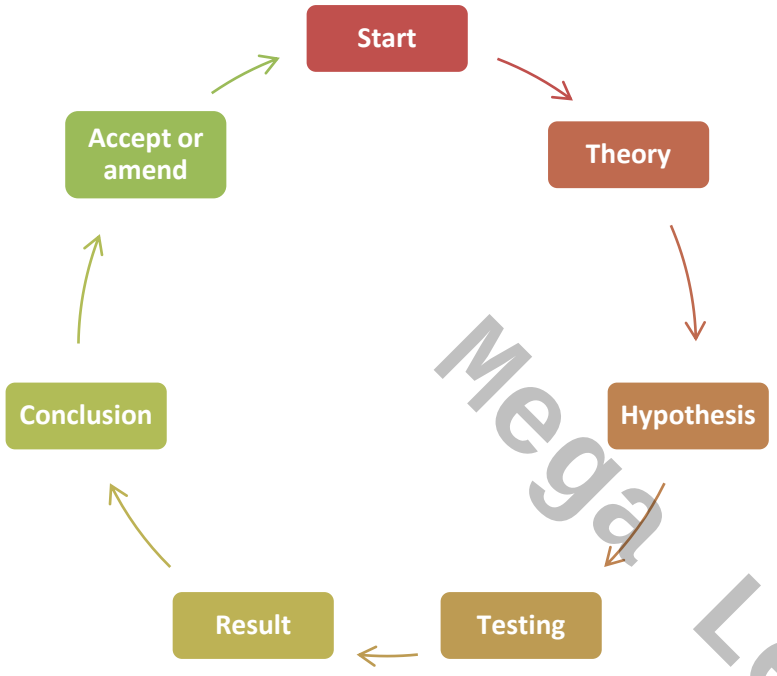
M4 Scientific Testing

The process of scientific testing in psychology | *Cognitive Approach*

Science involves developing theories which explain events.

A theory must be scientifically tested in order to be approved and accepted. Psychological theories on any of the approaches to psychology have been tested by scientific methods, trying to prove them false.



Science involves taking the theory and generating hypotheses from it, which can be scientifically tested. They are tested against reality to see whether the hypothesis is false, or if the findings support the prediction.

Theory - an idea about why something happens, based on research

Hypothesis - a statement about what the theory predicts

It is important to use strong controls when testing scientifically, to avoid bias. Concepts have to be measurable and produce quantitative data.

Science should also be **objective**. This means not letting personal (**subjective**) opinions affect the data. When a study has strong controls, objectivity and **operationalised** variables (measurable concepts), the results should be *replicable*. They can be shown to be *reliable* by repeating the study to find similar results.

Operationalisation - operationalisation of variables is making them practically measurable

It the results are reliable and support the hypothesis, the theory is supported by the study. Otherwise, the theory has to be amended, or abandoned, should the results show the theory as false. Then further hypotheses are generated.

Hypotheses

From a theory, an **experimental hypothesis** is generated (also called the **alternative hypothesis**). This is a statement of what is expected to come of the results. The **null hypothesis** states that any relationships or patterns displayed in the results will be down to chance, so this hypothesis predicts no relationship. When using statistical tests, it is the null hypothesis which is being tested.

Directional Hypothesis - hypotheses which predict a specific direction of the results

Non-directional Hypothesis - hypotheses which do not predict the specific outcome direction of results

A hypothesis can also predict the direction that the results are going to take. For example, a **directional** (**one-tailed**) **hypothesis** might be "Chewing gum will produce higher recall of a list of words from the participants" as it states the specific direction which the results are predicted to go by. A **non-directional** (**two-tailed**) **hypothesis** might be "Chewing gum will affect participants' ability to recall a list of words" as it does not state the specific direction, it could either improve or reduce their recall.

VARIABLES

A variable is anything which is likely to affect the experiment. The **independent variable** (**IV**) is the variable which is changed or manipulated by the experimenter. This is to see what effect it has on the **dependent variable** (**DV**). This is what is being measured by the researcher. The DV changes as the experimenter manipulates the IV. Both of these variables must be *measurable*, this means **operationalising** them.

An **extraneous variable** is any other variable which affects the results. Experiments have strong controls to decrease the number of extraneous variables, which affect the results as well as, or instead of, the IV. There are two main extraneous variables:

- **participant variables** – for example age, gender, experience and mood of the participants
- **situational variables** – for example temperature, background noise, interruptions and lighting conditions

Extraneous variables should be controlled, but any which are not controlled and affect the results are called **confounding variables**.

EXPERIMENTAL CONTROLS

In any experiment, it is important that every variable should be controlled (apart from the IV). This is because the aim of the experiment is to test how the change of the IV affects the DV. Therefore, all extraneous variables should try to be controlled. Below are some examples of experimental controls to ensure of this:

standardised instructions	Each participant is given the same set of standardised instructions before the experiment begins, to ensure all participants have the same information
experimenter effects	Cues or signals which come from the experimenter which can affect the responses of the participant

Experimenter effects occur when the experimenter gives certain cues or signals which might affect the participant's responses. These can be tone of voice, or non-verbal, such as facial expression. The most common way to avoid such effects is to have someone other than the experimental designer carry out the experiment. In a **double-blind technique**, the participants are not aware which group they are in or what the study is about, and the study is carried out by someone other than the person who knows who is doing what. Neither the participants nor the person running the study know exactly what is to be expected. In a **single-blind technique**, the participants are not aware of what is expected but the person running the study is. This technique stops the participants' expectations from affecting the results – but it does not prevent experimenter effects. The double-blind technique is preferable from the two.