The Scientific Attitude

The scientific approach is one that is skeptical and open-minded.

It is essential that researchers possess **critical thinking**: thinking that does not blindly accept things and approaches ideas with skepticism and examines the evidence carefully; one must always be careful of our own individual bias and be open to new perspectives.

The Limits of Intuition and Common Sense

Intuition and our *notions* of common sense have often led us astray.

We tend to use a lot of **hindsight bias** (otherwise known as the "I-knew-it-all-along phenomenon") which is the tendency to believe that one would have known it after the results are shown; the answer is now quite obvious once the answer is known. We often experience it usually when looking back on history; This "hindsight" may cause us to be overconfident, to think that we know more than we actually do.

The Scientific Method

The scientific method begins with a scientific **theory**: an explanation using set of principles to organize and predict observations. A good theory must imply testable predictions called**hypotheses.** Valid experiments can be **replicated** which means that the experiment can be repeated by the same researchers or by a different researcher and it should yield constant results.

A theory is deemed useful if:

(1) it effectively organizes range of observations.

(2) it implies clear predictions.

Research Methods

The following methods are often used in an attempt to carry out psychological studies.

Descriptive (used to observe and record behavior)

1. **Case study**: research method where one person is studied in depth to find universal principles (things that apply to all). One drawback is that the individual being studied could be atypical and not reflect the "normal" population. E.g. an intensive case study

on one particular child who has autism may reveal some general characteristics that might apply to a few or many autistic children. Researchers must be aware that however there may be many behaviors specific to the child being studied.

2. **Survey**: research method to get the ***self-reported*** attitudes/ behaviors of people. Surveys are used in descriptive and correlational studies and tends to look at cases in less depth. They are subject to "**Wording effects"** in that the researcher must be careful as to how the question is asked; some words may seem to have only a subtle difference in their meaning but may drastically alter a persons response to the question.

A researchers sampling technique crucial to a good survey. A **representative sample** of the population by using random sampling is very important especially in an attempt to avoid the**False consensus effect**: tendency to overestimate others agreement with us; e.g. people who do not have asthma and who come from families in which its incidence is low or non-existent will tend to underestimate the prevalence of this condition in the general population whereas asthmatics may tend to overestimate its prevalence.

3. **Naturalistic observation**: Researchers observe and record behavior in natural settings. e.g. Jane Goodalls research on gorillas in their natural habitat. Again, this type of study *does not explain* behavior.

Correlational Studies

When finding a trait that *accompanies* another, we describe this as a **correlation**: the way 2 factors vary together and how well one predicts the other.

Positive correlations indicate a direct relationship where factors increase *or* decrease together. E.g. There is a positive correlation between the amount of television violence that a child watches and the amount of aggressive activity that they display (as one increases, the other increases); A marked decrease in the amount of sleep one gets per night is positively correlated with decreased alertness and a decrease in their ability to perform on moderately difficult tasks (as one decreases, the other decreases).

Negative correlations indicate an inverse relationship where one factor goes up while one goes down. e.g. Increase the dosage of a certain painkiller and there is a decrease in pain symptoms.

NOTE: Correlation does **not** explain cause; it simply shows a relationship (or not) between factors. In order to isolate the cause we must carry out controlled experiments (see below).

Sometimes there is an **Illusory correlation** where a person perceives a correlation when none exist. This occurs when we notice random coincidences as not random, but rather as correlated.

Experimental research

Scientists carry out experiments in an attempt to isolate *cause and effect*. The following components are necessary to a good experiment.

Experimental condition: the condition that exposes subjects to a treatment.

Control condition: the condition that serves as a comparison to see effects of treatment on experimental condition subjects. Here, the subjects are not exposed to manipulation of the independent variable.

The researcher should use **random assignment**: assigning subjects to experimental or control groups randomly to ensure that there is no bias.

Independent variable: the experimental factor being manipulated and studied. For example, when studying the effect of a drug that reduces hyperactivity in children, the independent variable is the administration of the drug. When graphing, this data will be put on the x-axis

Dependent variable: the experimental factor that depends on independent variable and changes in response to the independent variable. For example, when studying the effects of a drug that may reduce hyperactivity in children, the amount of hyperactivity displayed would be the dependent variable. The dependent variable *depends* on the independent variable. When graphing, this data will be put on the y-axis.

Placebo: an inert substance or condition that may be administered instead of a presumed active agent. In drug trials, it is often a sugar pill or an injection of saline causing the patient to *assume*that he is being treated with the active drug. The placebo is used in the control group.

Double-blind procedure: this is a procedure in which both the experimenter and the subject do not know which treatment is given. For example, in a drug trial, it is often preferable to ensure that even the physician is not aware of which patient is receiving the active drug and which is receiving the placebo. Bias on behalf of the physician (he or she may be tempted to give the sicker patients the drug) may skew the results.

Finally, it is important that the evidence is **quantifiable** (can be measured). A researcher must "define the behaviors to be observed and evaluated" and these are called **operational definitions**of the behaviors in question. for example, if we were to to look at how a particular drug affects hyperactive behavior we would need a precise description of the behavior(s) in question and a description of what to consider as mild, moderate and severe behavior.

****** Think about your own ethical opinion on scientific experimentation.....what do you think is right?