Section 3.1: Experimental Versus Non-Experimental Research
Research Methods in Psychology

WHAT ARE YOU STUDYING?

This section starts off by reconsidering experiments – which seems curious for a chapter on non-experimental designs (especially when the last chapter was all about experiments), but we do this to contrast the non-experimental research methods with experiments.

In the last chapter, we spent a long time describing experimental design - but we didn’t look at why experiments are so common, or why experiments are used more than many other types of research design. Studies in psychology can be divided into two types – experimental studies and non-experimental studies. The distinction is important: take care not to use the word ‘experiment’ when you mean ‘research study.’ We will begin this chapter by having a reminder of what we mean by experimental design, and then we will have a look at the advantages of the experimental method. However, all is not rosy in the world of experiments, and we will have a look at some of the problems associated with experiments, and some of the alternative designs.

Experiments

Crucial concept: An **experiment** in psychology is carried out to investigate the causal effect of one or more variables (the independent variables) on another variable (the dependent variable).

To do an experiment the researcher changes an independent variable, and then measures the effect of this change on dependent variable. Seeking out naturally occurring variations in the independent variables is one way to do a study, but studying naturally occurring variations is not an experiment.

An experiment usually, but not always, takes place in a laboratory.

Often an independent variable will have two values, or levels although sometimes an experiment may involve an independent variable with more than two levels. Sometimes one of the levels will be described as being a control group. This control group will act as a baseline to which the other groups can be compared. A control group may be used with one or more experimental groups, but not every experiment has a control group.

Experiments may also have more than one independent variables.

**[edit]**Cause and Effect: The Advantage of Experiments

The great advantage of experiments over other study designs that, with an experimental design, you can demonstrate cause and effect relationships. A psychological experiment involves two or more equivalent groups of people. First, each group
undergoes some sort of procedure, and then a measurement is then taken of the effect of the procedures on the groups. After the experiment, any differences between the groups must be caused either by the procedure that we carried out, or because of chance. If we did the experiment properly, there is no other explanation. If we eliminate or at least minimise chance, we are left with the explanation that the differences between the groups were caused by the differences between the procedure that we carried out on each respective group.

You find this precise relationship between cause and effect causal relationship only by carrying out an experiment. (Actually, this isn’t the whole truth, if you want to know more, see the digression box.)

A digression box of some sort about causality.

Unfortunately for you, the student, the whole issue of causality is surprisingly complex. Philosophers have argued for a long time about precisely what is meant by the term 'cause', and authors of some statistics (and philosophy) books have tried to avoid the problem by never using the word “cause” in their texts. To make life even more difficult, different researchers, and different tutors do not agree about this issue. You need to be aware that some people take a very strict line, and say that without an experiment, statements about cause and effect can never be justly made. Others take a less strict line, and say that statements about cause and effect relationships can be made occasionally, if care is taken (yes, you do not get any less strict than that). I hold that causal statements can be made, if care is taken and appropriate techniques are used, but your tutors may not agree. Your tutors are the ones who assess your work, so while you are a student, you should take care to follow whatever they say. We don’t have the space here to go into when you can and cannot make causal statements. If you would like to know more about the arguments, see Cook and Campbell (1979), Miles and Shevlin (2001), Chapter 5, or Pearl (2000). (Cook and Campbell is the definitive book on these issues, Miles and Shevlin give an overview of some of the issues, from the perspective of correlational designs, and Pearl is a somewhat dense and mathematical, but informative, treatment of the issues. Cook and Campbell is another of these books that everyone knows is important, and is often cited, but is read less often.)

Alternatives to Experiments

You should not underestimate the usefulness of the experimental method in determining cause and effect relationships. However, an experiment is not always the most appropriate approach, as we shall see. Sometimes it is not possible to carry out a true
experiment because for practical reasons or for ethical reasons it is impossible to manipulate the independent variable. Sometimes an experiment is not a useful way to answer the question that we are asking.

We will have a look at some examples of studies that could not be carried out using experiments.

Recently, researchers (e.g. Wareing, Fisk & Murphy, 2000) have been studying the psychological effects of long-term ecstasy use. Whilst it would be nice to do an experiment, it is not possible. We would have to take a large group of people, and ask some of them to take ecstasy on a regular basis, and the other half to abstain from taking ecstasy. However, if we do not do this, it is very hard to say that any difference between people who have taken ecstasy, and people who have not taken ecstasy is caused by the ecstasy. There may have been other differences between the users and the non-users that determined whether they would become ecstasy users. However, just because we cannot do an experiment does not mean that we cannot try to answer the questions we might have about the psychological consequences of ecstasy.

A second example of a situation where we would be unable to carry out an experiment would occur if we were interested in examining the effects of personality and individual differences – what kind of people are more (or less) likely to do certain things. Many studies have been carried out which have examined the reasons for the use, and non-use, of condoms by young people. Suppose we are interested in examining the relationship between personality and condom use. An experiment would be impossible: we cannot alter some people's personalities and then see how the alteration affects their use of condoms. Instead, we must study many individuals to discover their condom use habits and their personalities, and then analyse our findings to see if there is any relationship between these two (as done by Wulfert, Safren, Brown & Wan, 1999).

There are occasions an experiment would not answer the question of interest. If research is at an early stage, it might be difficult to precisely formulate the hypotheses of interest. When Piaget was interested in studying the moral development of children, he used a non-experimental approach to explore the kinds of hypotheses that he might want to test later. He started by playing games with children. Whilst he was playing games, he would start to deliberately break the rules to see how the children reacted. From their reactions, he was able to formulate precise hypotheses, which he could then test experimentally.

Sometimes an event or an individual may be of a rare type or even unique. In this case, the individual might be the subject of a test of a hypothesis, but but the test cannot take the form of an experiment. Polledri (1997) describes a case study of a course of therapy with a ‘potential serial killer,’ (who was being held in a regional secure unit, having murdered his mother whilst an adolescent). Attempts were made to change the patient’s behaviour by changing his beliefs and attitudes and. Working with this individual in
considerable depth provided greater understanding of that individual, and hopefully, of potential murderers in general.

Section Summary

In this section, we have considered experimental designs, and particularly looked at their main advantage - the ability to make causal inferences from experimental research. We have also looked at some occasions when experiments are not appropriate, either because it is not possible to carry out an experiment, or because an experiment would not allow us to answer the questions that we are interested in.