

EXPERIMENTAL CONFOUNDS OR BIASES AND WHAT TO DO ABOUT THEM

There are certain systematic problems that can appear in psychological -- and any other type of -- research. Several major forms of bias are listed below along with a description of the methods used to remove them or reduce their impact on the results of the study. In all cases, the problem is that a change may occur in the behaviour of the subject -- i.e., in the dependent variable -- for some reason other than as a consequence of changes in the factor whose effects you are interested in examining -- i.e., the independent variable.

EXPERIMENTER BIAS (also called E-bias)

Changes in the behaviour of the subject may occur as a result of the **expectancy of the experimenter**. In such cases the experimenter inadvertently and unintentionally influences the outcome of the experiment by subtly influencing the performance of the subject. For example, in one famous study (often referred to as "Pygmalion in the Classroom"), Robert Rosenthal told teachers that certain of their students would undergo an "intellectual growth spurt" over the academic year. They would, therefore, improve academically -- although there was in fact no reason to believe that this was actually true (a case of experimental deception being used intentionally). At the end of the year Rosenthal found that those students, as compared with others in the same classes, actually showed gains both in IQ scores and in academic performance. He concluded that the only possible cause of these results was that the teachers in some way influenced the performance of the students during the year (for example by taking an interest in them and paying more attention to them) and that this, in turn, resulted in improved student performance. The expectancy of the students, influenced by Rosenthal's deception, in some fashion had an impact on student behaviour and, consequently, performance.

The experimenter bias may be controlled by hiring a research assistant to collect the data who is not informed before testing the subjects of important details of the experiment, particularly in relation to what the hypothesis is. If a double-blind procedure is also used (where neither the subject nor the data collector knows whether a subject is a member of the control or the experimental group), the experimenter cannot unintentionally influence a subject.

HAWTHORNE EFFECT

Another form of expectation that can influence the results of a study involves bias on the part of the subjects in the experiments. Some changes in behaviour of subjects, for example, occur as a consequence of the very fact of their being aware that they are experimental subjects. Simply put, you may act differently merely because you know you are being observed. The Hawthorne Effect -- so named because the effect was first observed while Elton Mayo was carrying out pioneer research in industrial psychology at the Hawthorne plant of Northern Electric -- may be avoided by using a control group which is also under observation but which does not receive the manipulation of the independent variable.

PLACEBO EFFECT (also called S-Bias)

Another form of bias affecting the results of an experiment is the so-called S-Bias. In the E-bias effect described above, the expectancies of the experimenter are communicated to the subject. The expectancies of the subject can also influence his or her behaviour, however. It has often been found in medicine, for example, that patients will respond positively to a new treatment because they expect it to work, although later on it may be proven that the treatment is actually entirely ineffective. The patient has responded not to the drug itself but to his or her belief that the drug will work.

The way to control for the placebo effect is to run a "blind" study in which the experimental subjects receive the experimental manipulation (e.g., a drug) while control subjects receive a "treatment" which isn't real -- it is a placebo (e.g., a sugar-coated pill). Subjects are aware that they are in an experiment but do not know whether they are in the control or the experimental group. Very often a double-blind design will be used so that neither the subject nor the doctor (i.e., experimenter) is aware of who are experimental and who are control subjects, thus avoiding both the experimenter and placebo effects at the same time.

ORDER EFFECTS

Changes in behaviour of subjects may also occur as a result of the same material being presented more than once, something that often happens in experiments (e.g., in before-after designs). If, for example, you wish to study the effects of noise on learning, you may give a test at the beginning of the study, after two hours of noise, and again after four hours of noise. The subject may do better or poorer not because of anything else except practice or boredom. This is called an order effect.

To avoid order effects due to practice or boredom at having to do the same test repeatedly, you would use a control group the members of which will be administered the repeated tests but not given the experimental manipulation of exposure to noise. Any change in the behaviour of the experimental group above and beyond that which occurs in the control group (i.e., the **base rate**) could be attributed to the effects of the independent variable (i.e., noise).

Another technique sometimes used to avoid order effects is called counterbalancing. To avoid boredom or practice effects stemming from repetitions of a given measure, you might choose to develop more than one form of that measure. In counterbalancing, one half of the subjects would be given Form A of the test first and then be given Form B on the repeat; the other half of the subjects would be administered Form B and then Form A.

NONRANDOM ASSIGNMENT OF SUBJECTS

It is crucial, in any experimental study, that subjects be assigned randomly to the control and the experimental groups: that is, a given subject should have an equal probability of being assigned to either group. If this is not the case, systematic biases may be introduced. A famous example of subjects being assigned nonrandomly to groups occurred in Brady's (1958) executive monkey study.

"Who gets more stomach ulcers, individuals with a great deal of responsibility or individuals who have little responsibility? To decide this, four 'executive' monkeys learned to lever press in order to avoid shock both for themselves and for their yoked partners (Brady, 1958). In a **yoking** procedure, both experimental and control groups receive exactly the same physical events (shocks), but only the experimental group influences these events by its responses. In the case of the executive monkeys, those in the experimental group could avoid the shocks by pressing the lever. The yoked controls, on the other hand, received exactly the same shock but had no responsibility for turning it off; they were helpless since no response they made enabled them to avoid the shock. The study showed that the 'executives' developed stomach ulcers and died, while their helpless partners remained healthy. Many readers drew the conclusion that executives run a higher risk of psychosomatic illness than more powerless individuals. Only years later did other scientists notice that the monkeys had not been randomly assigned to the two groups. When the experiment began, all eight of the monkeys were shocked, and the first four to start pressing the lever were assigned to the 'executive' group. We now realize that the more emotional the monkey was or the more the shock hurt him, the sooner he started banging the lever. As it turned out, the four most emotionally reactive monkeys became the executives and the four most stolid became the yoked controls. Not surprisingly, the emotional 'executives' died with ulcers, and the stolid but helpless monkeys stayed healthy. When the experiment was repeated thirteen years later, this time with randomly assigned subjects, the helpless animals developed more ulcers than the executives (Weiss, 1971)."