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Course > Producing Data: Designing Studies > Experiments with One Explanatory Variable > Blind and Double-Blind Experiments

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## Blind and Double-Blind Experiments

**Learning Objective: Identify the design of a study (controlled experiment vs. observational study) and other features of the study design (randomized, blind etc.).**

**Learning Objective: Explain how the study design impacts the types of conclusions that can be drawn.**

### Blind and Double-Blind Experiments

Suppose the experiment about methods for quitting smoking were carried out with randomized assignments of subjects to the four treatments, and researchers determined that the percentage succeeding with the combination drug/therapy method was highest, and the percentage succeeding with no drugs or therapy was lowest. In other words, suppose there is clear evidence of an association between method used and success rate. Could it be concluded that the drug/therapy method causes success more than trying to quit without using drugs or therapy? Perhaps.

Although randomized controlled experiments do give us a better chance of pinning down the effects of the explanatory variable of interest, they are not completely problem-free. For example, suppose that the manufacturers of the smoking cessation drug had just launched a very high-profile advertising campaign with the goal of convincing people that their drug is extremely effective as a method of quitting. Even with a randomized assignment to treatments, there would be an important difference among subjects in the four groups: those in the drug and combination drug/therapy groups would perceive their treatment as being a promising one, and may be more likely to succeed just because of

added confidence in the success of their assigned method. Therefore, the ideal circumstance is for the subjects to be unaware of which treatment is being administered to them: in other words, subjects in an experiment should be (if possible) **blind** to which treatment they received.

How could researchers arrange for subjects to be blind when the treatment involved is a drug? They could administer a **placebo** pill to the control group, so that there are no psychological differences between those who receive the drug and those who do not. The word "placebo" is derived from a Latin word that means "to please." It is so named because of the natural tendency of human subjects to improve just because of the "pleasing" idea of being treated, regardless of the benefits of the treatment itself. When patients improve because they are told they are receiving treatment, even though they are not actually receiving treatment, this is known as the **placebo effect**.

Next, how could researchers arrange for subjects to be blind when the treatment involved is a type of therapy? This is more problematic. Clearly, subjects must be aware of whether they are undergoing some type of therapy or not. There is no practical way to administer a "placebo" therapy to some subjects. Thus, the relative success of the drug/therapy treatment may be due to subjects' enhanced confidence in the success of the method they happened to be assigned. We may feel fairly certain that the method itself causes success in quitting, but we cannot be absolutely sure.

When the response of interest is fairly straightforward, such as giving up cigarettes or not, then recording its values is a simple process in which researchers need not use their own judgment in making an assessment. There are many experiments where the response of interest is less definite, such as whether or not a cancer patient has improved, or whether or not a psychiatric patient is less depressed. In such cases, it is important for researchers who evaluate the response to be **blind** to which treatment the subject received, in order to prevent the **experimenter effect** from influencing their assessments. If neither the subjects nor the researchers know who was assigned what treatment, then the experiment is called **double-blind**.

The most reliable way to determine whether the explanatory variable is actually causing changes in the response variable is to carry out a **randomized controlled double-blind experiment**. Depending on the variables of interest, such a design may not be entirely feasible, but the closer researchers get to achieving this ideal design, the more convincing their claims of causation (or lack thereof) are.

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## Did I Get This

1/1 point (graded)

Students in a large statistics class were randomly divided into two groups. The first group took the midterm exam with soft music playing in the background, while the second group took the exam with no music playing. The scores of the two groups on the exam were compared. Which of the following is a reason this experiment is NOT blind?

- ☐ Students were allowed to keep their eyes open while taking the exam.

☐ The exam was too long.

☒ The students know whether or not music was playing while they were taking the exam. ✓

☐ Some of the students did not study for the exam.

☐ Students were randomized into the two groups.

### Answer

Correct:

Indeed, in a blind experiment, the subjects are not aware of which treatment is administered to them and, in this example, they obviously were aware.

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### Did I Get This

1/1 point (graded)

In an experiment to see if aspirin reduces the chance of having a heart attack, a placebo is:

☐ the place where the subjects go when they have a heart attack.

☒ probably administered to the control group. ✓

☐ a procedure for deciding who is going to get the aspirin treatment.

☐ the randomization procedure.

### Answer

Correct:

Indeed, a placebo is a dummy pill or treatment that looks like the treatment being administered in the study, but has no active ingredients.

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