

Welcome to this module on psychological research, the paper code is PSC109, the title of the unit

is experimental research and module name being essential features of an experiment.

We'll be talking about the essential features of an experiment.

In this module, we will be talking about how do you establish an independent variable? What are the various types of independent variables? Controlling extraneous variables, measuring independent variables and subject variables.

By the end of this module, you should be able to define a manipulated independent variable and be able

to identify examples of situational task and instructional variables. You should also be able to distinguish

between experimental and a control group. Recognize the presence of confounding variables in an experiment and easily be able to identify what is an independent and what is a dependent variable in any research.

So, let's start.

The essential features of an experiment. An experiment is a systematic research study in which

the investigator directly varies some factors or multiple factors, the researcher will hold some factors constant will observe the variations in the result.

The factors under control of the experimenter are called as independent variables. The factors being held constant are the extraneous variables and the behaviors measured are called as the dependent variables.

Now I'm sure you're all familiar with what is an independent variable and what is a dependent variable when you have done your practical.

So, an independent variable is a variable that is controlled

So, let's look at an example, suppose we are trying to determine if watching violent TV causes children to become aggressive. Now watching wailing TV would be the X, aggressiveness in children or aggressive behavior in children would be the Y. If we can determine that every time a child watches violent TV that is X, the result is some sort of aggression that would be Y. So, if a child watches violent TV, then aggression Y occurs.

In other words, if X, then Y if we can also show through the experiment that whenever violent TV is not watched.

So, in other words not X, the child is not aggressive, so not Y.

Then we can say that watching violent TV is necessary in order for aggression to occur.

How do you establish independent variables? Any experiment can be described as a study investigating the effect of X on Y. The X is called as the independent variable. So, in the previous example, watching violent TV was your X or the independent variable. This independent variable is the fact of interest in the experiment; the one that is being studied to see if it will influence behavior.

Sometimes this independent variable is also called as the manipulated variable or the manipulated factor.

Why? because the experimenter has complete control over it and is creating the situations research participants will encounter in their study. Independent variables that are under the experimenter's total control is referred to as manipulated independent variables. All manipulated independent variables

must have a minimum of at least 2 levels, that is, at the very least, an experiment involves a comparison between two conditions or two situations.

For example, suppose a researcher is interested in the effects of caffeine on reaction time. Such a study would require at least two dosage or two levels of caffeine in order to

make a comparison. This study would be described as an experiment with the amount of caffeine consumed as the manipulated independent variable and two different dosages as the two levels of the independent variable. You could also say that the study has two conditions or two dosages. Of course, independent variables can have more than two levels.

What are the varieties of manipulated independent variables?

The range of factors that can be used as manipulated independent variables is limited only by the creative thinking of a researcher. However, independent variables that are manipulated in a study tend to fall into three somewhat overlapping categories. That is, situational variables, task variables and instructional variables.

Now let's look at each in detail. What are situational variables?

Situational variables are features in the environment that participants might encounter. For example,

in a helping behavior study, the researcher interested in studying the effect of the number of bystanders on the chances of help being offered might create a situation in which subjects encounter a person in need of help. Sometimes the participant is alone with the person needing aid, at other times the participant and the victim are accompanied by a group of either three or six bystanders. In this case,

the independent variable is the number of potential helpers on the scene besides the participant, and the levels are 0, 3 and six bystanders. Thus, the experimenter has created three situations.

Sometimes, experimenters try to vary the type of task performed by subjects. One way to manipulate task variables is to give participants different kinds of problems to solve. For example, administering different kinds of logic problems to determine the kinds of errors people tend to make, you have mazes with different kinds of degrees of complexity, different kinds of illusions and so on and so forth.

The third one is instructional variables wherein they are manipulated by telling different groups to perform a particular task in different ways. For example, a memory task where all subjects are shown the same list of words but given different instructions about how to memorize the list.

We have control group. Now the experimental group is the group in which the treatment is presented. The control group is the group in which the treatment is withheld. So, in other words you have the control group can also be called as the comparison group.

Now control groups are not necessary in all kinds of research. However, it is important to control extraneous variables. Control groups occur only in research when it is important to have a comparison with some baseline level of performance.

How do you control extraneous variables after manipulating the independent variables? It is important to control extraneous variables. What are extraneous variables? Extraneous variables are variables that

are of no interest to the researcher, but might influence the behavior being studied if not controlled properly. If a researcher fails to control extraneous variables, they can systematically influence the behavior being measured, and the result is called confounding.

A confound is any uncontrolled extraneous variable that covaries with the independent variable and could provide an alternate explanation of the results. A confounding variable changes in the same way that an independent variable changes. That is, they coco-vary, and consequently its effect cannot be distinguished from the effect of the independent variable.

How do you measure the dependent variable? The behavior that is measured is the outcome of the study example that we did. The effects of TV violence on children's aggressiveness, the dependent variable would be some measure of aggressiveness.

Now there are two problems that occur with poorly chosen dependent variables. One is called as a ceiling effect and the other the floor effect. What is the ceiling effect? The ceiling effect occurs when the average scores of the group in the study are so high that no difference can be determined between conditions.

What is the floor effect? The floor effect happens when all the scores are extremely low, usually because the task is too difficult for everyone, once again failing to produce a difference between conditions.

Now when we're talking about the variables, it is important to remember that a particular construct could be an independent, an extraneous or a dependent variable, depending on the research problem at hand. An experimenter might manipulate a particular construct as an independent variable, try to control it as an extraneous factor or measure it as a dependent variable.

The next type of variables that we will study is called as subject variables. Subject variables are characteristics that an individual already has when he is participating in an experiment. For example, sex, gender, and so on. Subject Variables are also referred to as ex post factor variables or natural group variables or non-manipulated variables or participant variables or subject variables.

These are characteristics that already exist, so for example intelligence, cultural group, socioeconomic status, age and so on and so forth. Only a study using manipulated independent variables can be called as an experiment. Studies using independent variables that are subject variables are called as ex post facto studies, natural group studies or quasi experiments. Studies often include both manipulated and subject independent variables.

For your reference, you can refer to this book, research in psychology methods and designs.

I hope you understood the various variables in an experiment.

Thank you and wish you all the very best.