UNDERGRADUATE COURSE

SUBJECT: Psychology

Paper: Basic Psychological Processes

TOPIC: Research Methods

LESSON: Experimental and Quasi-experimental Methods



*Research Methods: Experimental & Quasi-experimental Methods*

Introduction

Psychologists gather evidence and test hypotheses in many ways: They observe behavior as it unfolds in natural settings **(naturalistic observation);** they make measurements to discover relationships between events **(correlational method);** they use the powerful technique of controlled experimentation **(experimental method);** they study psychological problems and therapies in clinical settings **(clinical method);** and they use questionnaires to poll large groups of people **(survey method).** In this section, we will examine two basic procedure used by psychologists in their systematic study of human behavior (Remember: behavior means everything people do, feel, experience, or think.): experimental and quasi-experimental methods.

**What is experimental method?**

In the experimental method, investigators directly explore cause-and-effect relationships by manipulating certain variables, called independent variables, and observing their effects on certain outcomes called dependent variables. Independent variables are manipulated, and their effects on the dependent variable or variables are measured. Dependent variables are so called because measures of these variables depend on the independent, or manipulated, variable. Experimenters attempt to hold constant all other factors or conditions to ensure that the independent variable alone is the cause of the observed effects on the dependent variable.

**Variables and Groups**

A **variable** is any condition that can change and that might affect the outcome of the experiment. Identifying causes and effects in an experiment involves three types of variables:

1. **Independent variables** are conditions altered or varied by the experimenter, who sets their size, amount, or value. Independent variables are suspected *causes* for differences in behavior.
2. **Dependent variables** measure the results of the experiment. That is, they reveal the *effects* that independent variables have on *behavior.* Such effects are often revealed by measures of performance, such as test scores.
3. **Extraneous variables** are conditions that a researcher wishes to prevent from affecting the outcome of the experiment.

We can apply these terms to a hypothetical hunger/memory experiment in this way: Hunger is the independent variable—we want to know if hunger affects memory. Memory (defined by scores on the memory test) is the dependent variable—we want to know if the ability to memorize depends, on how hungry a person is. All other conditions that could affect memory scores are extraneous. Examples are the number of hours slept the night before the test, intelligence, or difficulty of the questions.

In a controlled experiment, an **experimental group** is the group of subjects exposed to the independent variable or experimental condition.

In a controlled experiment, a **control group** is the group of subjects exposed to all experimental conditions or variables *except* the independent variable.

Let us examine another simple experiment. Suppose you notice that, you seem to study better while listening to music. This suggests the hypothesis that music improves learning. We could test this idea by forming an experimental group that studies with music. A control group would study without music. Then we could compare their scores on a test. Without a control group, it would be impossible to tell if music had any effect on learning. The control group provides a *point of reference* for comparison with scores of the experimental group. If the average test score of the experimental group is higher than the average of the control group, we can conclude that music improves learning. If there is no difference, it is obvious that the independent variable had no effect on learning.

**Experimentation: Two Requirements for Its Success**

The first involves what is termed **random assignment of participants to experimental conditions.** This means that all participants in an experiment must have an equal chance of being exposed to each level of the independent variable. The reason for this rule is simple: If participants are notrandomly assigned to each condition, it may later be impossible to determine whether differences in their behavior stem from differences they brought with them to the study, from the impact of the independent variable, or both.

The second condition essential for successful experimentation is as follows: Insofar as possible**, all factors other than the independent variable that might also affect participants’ behavior must be held constant**.

In order to satisfy the second condition or control extraneous variables, experimenters use several control techniques. Some illustrations are as follows:

* Since the goal of an experiment is to minimise extraneous variables, the best way to handle this problem is to **eliminate** them from the experimental setting.
* Elimination is not always possible. In such instances, effort should be made to hold them **constant** so that their effect remains the same throughout the experiment.
* **Matching**, a procedure in which the extraneous variables between the groups are equated or held constant by taking matching pairs across conditions of the experiment.
* **Counter-balancing** technique is used to minimise the sequence effects.

**Strengths and weaknesses of experimental method**

The strength of a well-designed experiment is that it can provide, relatively speaking, a convincing evidence of a cause-effect relationship between two or more variables. However, experiments are often conducted in a highly controlled laboratory situation. In this sense, they only simulate situations that exist in the outside world. They are frequently criticized for this reason. The experiments may produce results that do not generalize well, or apply to real situations. In other words, they have low external/ecological validity. Another limitation of experimental method is that it is not always feasible to study a particular phenomenon experimentally. The third problem is that it is difficult to know and control all the relevant variables.

**What is quasi-experimental method?**

Many variables cannot be manipulated in the laboratory settings. For example, if you want to study the effect of an earthquake on children who lost their parents, you cannot create this condition artificially in the laboratory. In such situations, the researcher adopts the method of *quasi* (the Latin word meaning “as if”) experimentation.

In quasi-experimental studies the independent variable is not (or cannot be) manipulated as such, and so assignment to experimental groups cannot be random. The fact that no manipulation occurs interferes dramatically with our ability to make conclusive causal inferences. Examples of independent variables that cannot be manipulated by an experimenter include gender and age. Obviously, experimenters cannot change the gender or age of participants, but they can compare the responses of groups of people with different ages or of different genders.

Compared to the experimental method, there is no real control over the independent variable; therefore, we cannot conclude that it is necessarily responsible for any change in the dependent variable. On this basis, the quasi-experimental method actually has more in common with survey methodology than with the experimental method. It has all the weaknesses of the experimental method, but it lacks the main strength. In practice, it is often conducted in conjunction with the experimental method.

Conclusion

The experimental method helps in establishing cause-effect relationship. The effect of the presence of independent variable on the dependent variable is studied using experimental and control groups. Whereas a quasi-experiment is an attempt to simulate the true experiment and, therefore, has been called a *compromise design*.