**Experimental Research Designs**

I we will identify all the parts of the research project as:

• Abstract

• Introduction

• Method

• Results

• Discussion

• Conclusion

• Reference List

Abstract

Nonrepresentational: not aiming to depict an object but composed with the focus on internal structure and form

The Introduction

For many students, writing the introduction is the first part of the process, setting down the direction of the paper and laying out exactly what the research paper is trying to achieve.

For others, the introduction is the last thing written, acting as a quick summary of the paper. As long as you have planned a good structure for the parts of a research paper, both methods are equally good and it is a matter of preference.

A good introduction generally consists of three distinct parts, starting with

1. A general presentation of the research problem.

2. You should then lay out exactly what you are trying to achieve with this particular research project.

3. Stating your own position.

PURPOSE

The research problem does not have to be a statement, but must at least imply what you are trying to find.

The thesis statement or hypothesis here, which is perfectly acceptable, but most include it in the last sentences of the introduction, to give the reader a fuller picture.

A the statement of intent from writer

In this section, you look to give a background to the research, including any relevant information learned during your literature review. You are also trying to explain why you chose this area of research, attempting to highlight why it is necessary.

The method

This should be the easiest part of the paper to write, as it is a run-down of the exact design and methodology used to perform the research. Obviously, the exact methodology varies depending upon the exact field and type of experiment.

There is a big methodological difference between the apparatus based research of the physical sciences and the methods and observation methods of social sciences. However, the key is to ensure that another researcher should be able to replicate the experiment exactly, whilst keeping the section concise.

Hypotheses

Hypothesis is a specific statement of prediction. It describes in concrete (rather than theoretical) terms what you expect will happen in your study. Not all studies have hypotheses. Sometimes a study is designed to be exploratory (see inductive research). There is no formal hypothesis, and perhaps the purpose of the study is to explore some area more thoroughly in order to develop some specific hypothesis or prediction that can be tested in future research. A single study may have one or many hypotheses.

If your prediction specifies a direction, and the null therefore is the no difference prediction and the prediction of the opposite direction, we call this a one-tailed hypothesis. For instance, let's imagine that you are investigating the effects of a new employee training program and that you believe one of the outcomes will be that there will be less employee absenteeism. Your two hypotheses might be stated something like this:

The null hypothesis for this study is:

HO: As a result of the XYZ company employee training program, there will either be no significant difference in employee absenteeism or there will be a significant increase. which is tested against the alternative hypothesis:

HA: As a result of the XYZ company employee training program, there will be a significant decrease in employee absenteeism.

A literature review is a body of text that aims to review the critical points of current knowledge including substantive findings as well as theoretical and methodological contributions to a particular topic. Literature reviews are secondary sources, and as such, do not report any new or original experimental work. Also, a literature review can be interpreted as a review of an abstract accomplishment.

Most often associated with academic-oriented literature, such as a thesis, a literature review usually precedes a research proposal and results section. Its main goal is to situate the current study within the body of literature and to provide context for the particular reader.

What is Research Design?

Research Methods

Research methods are generalized and established ways of approaching research questions (e.g., qualitative vs. quantitative methods). Not all methods can be applied to all research questions, so the choice of method is limited by the area of research that you wish to explore.

Research Design

Research design involves determining how your chosen method will be applied to answer your research question. The design of your study can be thought of as a blueprint detailing what will be done and how this will be accomplished. Key aspects of research design include: research methodology; participant/sample collection and assignment (if different conditions are being explored); and data collection procedures and instruments.

Research design can be thought of as the structure of research -- it is the "glue" that holds all of the elements in a research project together. We often describe a design using a concise notation that enables us to summarize a complex design structure efficiently. What are the "elements" that a design includes? They are:

Observations or Measures

These are symbolized by an 'O' in design notation. An O can refer to a single measure (e.g., a measure of body weight),

Treatments or Programs

These are symbolized with an 'X' in design notations. The X can refer to a simple intervention Groups

Each group in a design is given its own line in the design structure. if the design notation has three lines, there are three groups in the design.

• Assignment to Group

Assignment to group is designated by a letter at the beginning of each line (i.e., group) that describes how the group was assigned. The major types of assignment are:

• R = random assignment

• N = nonequivalent groups

• C = assignment by cutoff

• Time

Time moves from left to right. Elements that are listed on the left occur before elements that are listed on the right.

The Results

When you record the results of a scientific experiment, you record what happens as you follow your procedure. Results should be data that is measurable rather than general observations and it should relate directly to your research question and hypothesis. For example, if your experiment involves growing plants, the results will be data about one aspect of the plants' growth, such as how much each plant grows over a particular period of time or which seed sprouts first. The results should also include notations of any variations in the conditions of the experiment, which in this case might be an unexpected overnight freeze or which seed received the most water. In some case the test In many ways, conclusion validity is the most important of the four validity types because it is relevant whenever we are trying to decide if there is a relationship in our observations. A good way to assess surveys is in terms of their validity and reliability. Reliability refers to the consistency of the survey results--in other words, if the test were repeated, would it give the same results? Validity, by contrast, asks whether the survey measured what it was supposed to measure

The Conclusion

After all the data is organized in a form that relates it to your hypothesis, then you can interpret it and reach a conclusion about the experiment. The conclusion is simply a report about what you learned based on whether the results agree or disagree with your hypothesis. It usually contains a summary of the actual procedure and makes note of anything unexpected that happened during the experiment. Your conclusion should consider all possible explanations of the data, including any errors you might have made, such as forgetting to water the plants one day. It can also give you a point from which to create further hypotheses relating to the experiment.

The Reference list

No paper is complete without a reference list, documenting all of the sources that you used for your research. This should be laid out according to APA, MLA or other specified format, allowing any interested researcher to follow up on the research.

Accordingly, I will argue that correlation is a necessary but not a sufficient condition to make causal inferences with reasonable confidence. Also necessary is an appropriate method of data collection. To make such causal inferences one must gather the data by experimental means, controlling extraneous variables which might confound the results. Having gathered the data in this fashion, if one can establish that the experimentally manipulated variable is correlated with the dependent variable (and that correlation does not need to be linear), then one should be (somewhat) comfortable in making a causal inference. That is, when the data have been gathered by experimental means and confounds have been eliminated, correlation does imply causation.

Correlation research design:

A research design in which data are collected to describe the statistical association between two or more variables. A correlational research design is used to describe the statistical association between two or more variables. For example, a researcher measures the student-teacher ratio in each classroom in a school district and measures the average student achievement on the state assessment in each of these same classrooms. Next the researcher uses statistical techniques to measure whether the student-teacher ratio and student achievement in the school district are connected numerically; for example, when the student-teacher ratio changes in value, so does student achievement. The researcher can then use the student-teacher ratio to predict student achievement, a technique called regression analysis. When there is more than one predictor variable, the technique of multiple regression analysis produces a multiple correlation that is used for prediction.

Example:

Correlation:

In School District X, a researcher collects data on beginning teachers’ scores on the state licensing test (variable 1) and data on the achievement gains of each teacher’s students (variable 2). The researcher then uses correlational statistics to measure the association between the two variables.

While

Experimental research

Is used to answer causal research questions: Does something cause an effect? For example, does a low student-teacher ratio cause higher student achievement? In experimental research, the researcher manipulates or varies an independent variable and measures its effects on one or more dependent variables. In a true experimental design, the researcher randomly assigns the participants who are being studied (also called the subjects) to two or more comparison groups. Sometimes the comparison groups are referred to as treatment and control groups. Participants in the treatment group receive some type of treatment, such as a special reading program. Participants in the control group do not receive the treatment.

For example, at the beginning of a school year, a researcher randomly assigns all classes in a school district to have either a low student-teacher ratio (small class, the treatment group) or a normal student-teacher ratio (large class, the control group). At the end of the school year, the researcher measures each student’s achievement using the state assessment and compares the average achievement of students in the two sizes of classes. In this example, class size is the independent variable because class size is being varied or manipulated. Student achievement is the dependent variable because student achievement is being measured.