

From Abstract Concept to Measurement

Overview

In Unit 2 we looked at the main steps in formulating the problem statement. Having accomplished this, you need now to transform that research problem into measurable research questions as the next stage in the research project. In Unit 3 we examine the process of moving from an abstract research problem to measurable questions or hypotheses. In each session, you will be given learning activities to assist in your understanding of the main concepts and stages in the social research process discussed thus far. At the end of this unit, Unit 3, you will be given your first in-course assignment. The overall objective of this course is to have you produce a research proposal for a planned research project/study of your choice. In this first assignment, you will begin to think about a topic that you would like to research and formulate a problem statement and supporting research questions and/or hypotheses relevant to this topic.

This unit has four sessions as follows:

Session 3.1: Conceptualization, operationalization and measurement

Session 3.2: Levels of measurement

Session 3.3: Research questions related to the research problem

Session 3.4: Hypotheses for social research

Unit 3 Learning Objectives

At the end of this unit you will be able to:

1. Describe the relationship between the research problem and research questions.
2. Formulate appropriate research questions for social research.
3. Formulate appropriate hypotheses for social research.
4. Distinguish between research questions and hypotheses.



Readings and Resources

Babbie, E. and J. Mouton. (2001). *The practice of social research*. Cape Town: Oxford University Press.

Cresswell, J.W. (2003). *Research design: Qualitative, quantitative and mixed methods approaches*. (Chapter 6 Research questions and hypotheses). Retrieved at:
http://www.amazon.com/Research-Design-Qualitative-Quantitative-Approaches/dp/0761924426#reader_0761924426

Lunsford, B. (1993). Methodology: Variables and levels of measurement. Retrieved at:
http://www.oandp.org/jpo/library/1993_04_121.asp

Padula & Miller, 1999. In Cresswell, J.W. (2003). *Research design: Qualitative, quantitative and mixed methods approaches*. Retrieved at:

http://books.google.com.jm/books?id=nSVxmN2KWeYC&pg=PA108&lpg=PA108&dq=Padula+%26+Miller,+1999&source=bl&ots=caGX-Co-ai&sig=se-NhGBSFiPBv68Zkzo60fnuLLg&hl=en&sa=X&ei=TCnwUO_aE5HI9QT0zYGYDA&sqi=2&ved=0CEIQ6AEwAw#v=onepage&q=Padula%20%26%20Miller%2C%201999&f=false

Trochim, W. (2006). Research Methods Knowledge Base Recommended Website:
<http://www.socialresearchmethods.net/>

The Writer's Complex, by Cathy Copley, Larry Greenberg, Elaine Handley, Susan Oaks and contributors.
http://www.esc.edu/esonline/across_esc/writerscomplex.nsf/home

"Concept Mapping: How to Start your Term Research Paper" retrieved at:
<http://www.youtube.com/watch?v=KhgxuNvbNrA>

Session 3.1

Conceptualization, Operationalization and Measurement

Developing Your Research Idea

One of the most difficult aspects of research and one of the least discussed is how to develop the idea for the research project. We often think that if we read enough of the research in an area of interest, we will somehow magically be able to produce sensible ideas for further research. Now, that may be true but there is a lot more that goes into conceptualizing or fleshing out the research project. Transforming a research problem into a measurable research project involves the processes of *conceptualization* and *operationalization*.

- Conceptualization is the process of identifying and clarifying concepts; through which we specify what we mean by using certain terms (Babbie and Mouton, 2001)
- Conceptualization means drawing boundaries around terms to make them tangible. Conceptualization involves specifying exactly what we mean by the terms we use in our research

Closely related to conceptualization is operationalization. It is the process of developing operational definitions; that is, a clear step-by-step plan for how to quantitatively measure the concept (that is, to change the concept into a variable with measurable indicators). In other words, operationalization means to add measurable indicators to complex concepts to make them measurable variables.

- The protocol must be specific and precise enough so that someone else could use your operational definition and obtain the same results you did.
- The HDI (Human Development Index) is a good example of a complex concept that is operationalized. It is a comparative measure of life expectancy, literacy, education and standard of living for countries worldwide, where these are the various indicators of HDI.

Conceptualization and operationalization go hand in hand in social research. In order to conceptualize a research project, you need to first define and then operationalize. According to Babbie and Mouton (2001) conceptualization and operationalization of a term would require the following steps:

- Asking people what they mean by the term
- Consulting the experts or going through the literature on the topic and seeing how the term or terms have been defined in the literature. However, even the experts do not always agree on the meanings applied to terms
- Coming to a general agreement on what the terms mean is conceptualization. The result of this process is called the concept or construct
- Applying measurable indicators to the concept. For example, to operationalize socio-economic status we may add the following indicators: level of income and level of educational attainment
- Specifying exactly what you are going to observe
- Describing the operations that will be undertaken to measure the concept

Concept mapping

Social researchers have developed a number of methods and processes that might be useful in helping you to formulate a research project. Concept mapping is a general method that can be used to help any individual or group to describe their ideas about some topic in a pictorial form (Trochim 2006). Although concept mapping is a general method, it is particularly useful for helping social researchers and research teams develop and detail ideas for research. It is a structured process, focused on a topic or construct of interest, involving input from one or more participants, that produces an interpretable pictorial view (concept map) of their ideas and concepts and how these are interrelated.



Learning Activity 3.1

See the video “Concept Mapping: How to Start your Term Research Paper” below:

<http://www.youtube.com/watch?v=KhgxuNvbNrA>

1. You have now watched the video on concept mapping.
2. Can you identify the main concepts involved in the research project?
3. Can you identify which concepts are independent variables and which are dependent variables?
4. Discuss with your peers, making sure to respond to at least two of their responses.

Session 3.2

Levels of Measurement

Introduction

Recall that in Unit 1 we spoke about the two traditions impacting social research today: positivism and post positivism. In the positivist tradition, social research is conducted in much the same way as is research in the natural sciences, so that theory is tested through the collection, observation and analysis of measurable data. When this approach is adopted in social research, the issue of *measurement* becomes important.

Measurement is the process of observing and recording the observations that are collected as part of a research effort. There are two major issues that will be considered here: (1) levels of measurement (nominal, ordinal, interval and ratio) and (2) the theory of reliability.

1. *Levels of Measurement*

There are typically four levels of measurement that are defined:

- Nominal
- Ordinal
- Interval
- Ratio

The level of measurement refers to the relationship among the values that are assigned to the attributes for a variable. What does that mean? Let us look at the variable, in Figure 3.1 “party affiliation”.

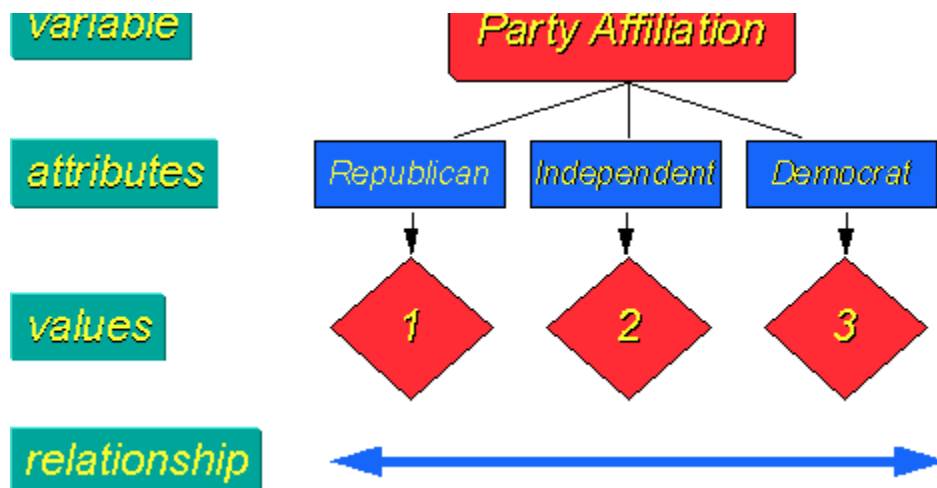


Figure 3.1
(adapted from Trochim 2006)

That variable has a number of attributes. Let's assume that in this particular election context the only relevant attributes are "republican", "democrat", and "independent". For purposes of analyzing the results of this variable, we arbitrarily assign the values 1, 2 and 3 to the three attributes. The level of measurement describes the relationship among these three values. In this case, we simply are using the numbers as shorter placeholders for the lengthier text terms. We don't assume that higher values mean "more" of something and lower numbers signify "less". We don't assume the value of 2 means that democrats are twice something that republicans are. We don't assume that republicans are in first place or have the highest priority just because they have the value of 1. In this case, we only use the values as a shorter name for the attribute. Here, we would describe the level of measurement as "nominal" (Trochim 2006).

Knowing the level of measurement is important because it helps you decide how to interpret the data from that variable. When you know that a measure is nominal (like the one just described above), then you know that the numerical values are just short codes for the longer names.

2. *Reliability*

Reliability has to do with the quality of measurement. It refers to the "consistency" or "repeatability" of your measures in social research.

If you think about how we use the word "reliable" in everyday language, you might get a hint. For instance, we often speak about a machine as reliable: "I have a reliable car." Or, news people talk about a "usually reliable source". In both cases, the word reliable means "dependable" or "trustworthy". In research, the term "reliable" also means dependable in a general sense, but that's not a precise enough definition.

What does it mean to have a dependable measure or observation in a research context? The reason “dependable” is not a good enough description is that it can be confused too easily with the idea of a valid measure.

In research, the term reliability means “repeatability” or “consistency”. A measure is considered reliable if it would give us the same result over and over again. Therefore, if you measure the same thing over and over again and under the same conditions you are expected to get the same results.

In Unit 5 we will come back to reliability and discuss it in greater detail but for now some key points from Babbie and Mouton (2001) on reliability are:

- Does it yield the same results every time? Is it stable over time?
- If we measure the variable now and then in half-an-hour, do we get the same reading?
- Maximum reliability depends on the construct – some constructs are unstable, e.g. heart rate
- Reliability is not accuracy
- Reliability suffers when respondents or researchers have to interpret



Learning Activity 3.2

Go to the following link for further reading on variables and levels of measurement:

http://www.oandp.org/jpo/library/1993_04_121.asp

After you are done, discuss this piece with your peers. Can you provide examples of different variables for the various levels of measurement?

Session 3.3

Research Questions Related to the Research Problem

Types of Research Question

There are three basic types of question that research projects can address:

- **Descriptive.** When a study is designed primarily to describe what is going on or what exists. Public opinion polls that seek only to describe the proportion of people who hold various opinions are regarded as descriptive in nature. For instance, if we want to know what percentage of the population would vote for a Democrat or a Republican in the next presidential election in the United States of America, we are simply interested in describing something.
- **Relational.** When a study is designed to look at the relationships between two or more variables. A public opinion poll that compares what proportion of males and females say they would vote for a Democratic or a Republican candidate in the next presidential election in the United States of America is essentially studying the relationship between gender and voting preference.
- **Causal.** When a study is designed to determine whether one or more variables (e.g., a programme or treatment variable) causes or affects one or more outcome variables. If we did a public opinion poll to try to determine whether a recent political advertising campaign changed voter preferences, we would essentially be studying whether the campaign (independent variable) changed the proportion of voters who would vote Democratic or Republican (dependent variable). Also, we can look at the economic performance of a country (independent variable) and how it impacts who the population votes for (dependent variable).

Research questions emerge out of the research problem or research topic and are guided by the objectives of the research project. For instance, a study which examines the extent to which youth employment schemes help alleviate teen pregnancy in inner cities (research topic) would have the following objective:

1. **To assess the impact of youth employment schemes on rate of teen pregnancy**

This would then lead to the following research question:

Are young girls aged 13 to 18 less likely to get pregnant when they are gainfully employed?

Once you identify your interest, there are many possible research topics stemming from it. In developing a research question, it's absolutely essential to develop one that you're interested in or care about in order to focus your research and your paper. For example, researching a broad topic such as "business management" is difficult since there may be hundreds of sources on all aspects of business management. On the other hand, a focused question such as "What are the pros and cons of Japanese management style?" is easier to research and can be covered more fully and in more depth.

How do you develop a usable research question? Choose an appropriate topic or issue for your research, one that actually can be researched. Then list all of the questions that you'd like answered yourself. Choose the best question, one that is neither too broad nor too narrow. Sometimes the number of sources you find will help you discover whether your research question is too broad, too narrow, or okay.

If you know a lot about the topic, you can develop a research question based on your own knowledge. If you feel you don't know much about the topic, think again. For example, if you're assigned a research topic on an issue confronting the ancient Babylonian family, remember, by virtue of your own family life, you already know a great deal about family issues. Once you determine what you do know, then you're ready to do some general reading in a textbook, journal article or the internet in order to develop a usable research question.



Learning Activity 3.3

Read the script below which describes a research problem:

Finders (1996) used ethnographic procedures to document the reading of teen magazines by middle-class European American seventh-grade girls. By examining the reading of teen zines (magazines), the researcher explored how the girls perceive and construct their social roles and relationships as they enter junior high school. (Finders, 1996)

Based on the above research problem:

1. Write one research objective of the research problem.
2. Write a research question that could emerge from the above.

Share your responses with your peers in the discussion forum, making sure to comment on the responses of at least two of your peers.

Session 3.4

Hypotheses for Social Research

The Hypothesis

A *hypothesis* is a specific statement of prediction. It describes in specific and concrete terms what you expect will happen in your study. Not all studies have hypotheses. Sometimes a study is designed to be exploratory, that is to investigate some topic that you don't know much about. In such a case 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. On the other hand, a single study may have one or many hypotheses.

Let's say that you predict that there will be a relationship between two variables in your study. The way we would formally set up the hypothesis test is to formulate two hypothesis statements, one that describes your prediction and one that describes all the other possible outcomes with respect to the hypothesized relationship. Your prediction is that variable A and variable B will be related (this could be a positive or negative relationship). Then the only other possible outcome would be that variable A and variable B are *not* related. Usually, we call the hypothesis that you support (your prediction) the alternative hypothesis, and we call the hypothesis that describes the remaining possible outcomes the null hypothesis. Sometimes we use a notation like H_A or H_1 to represent the alternative hypothesis or your prediction, and H_O or H_0 to represent the null case. You have to be careful here, though. In some studies, your prediction might very well be that there will be no difference or change. In this case, you are essentially trying to find support for the null hypothesis and you are opposed to the alternative.

While research questions inquire about the relationships among variables that you, the researcher, seek to know about, the hypotheses on the other hand are predictions that you make about the expected relationships among variables. A rule of thumb to go by is that the research question is usually written in question form while the hypothesis is written in the form of a statement.

Example of research question:

Padula and Miller (1999) conducted a multiple case study that described the experiences of women who went back to school, after a time away, in a psychology doctoral program at a major Midwestern research university. The intent was to document the women's experiences, providing a gendered and feminist perspective for women in the literature. The authors asked three central questions that guided the inquiry:

1. How do women in a psychology doctoral program describe their decision to return to school?
2. How do women in a psychology doctoral program describe their reentry experiences?
3. How does returning to graduate school change these women's lives?

(Padula & Miller, 1999, p. 328)

Example of hypothesis:

An investigator might examine three types of reinforcement for children with autism: verbal cues, a reward, and no reinforcement. The investigator collects behavioural measures assessing social interaction of the children with their siblings. A null hypothesis might read,

1. There is no significant difference between the effects of verbal cues, rewards, and no reinforcement in terms of social interaction for children with autism and their siblings.



Learning Activity 3.4

Based on the research topic below, write two research objectives of this study and one hypothesis related to the objectives that you have stated:

Is there a link between hours of television viewing and violent behaviour in children aged

Unit Summary

This unit discussed the process of moving the research problem from an abstract idea or topic to measurable research questions and hypotheses for research. This was done through defining the main concepts in the research topic and deconstructing or breaking them down into specific dimensions or indicators. This process is especially useful for research conducted within the positivist tradition where collection, observation, manipulation and analysis of data are done. This is not to say, however, that conceptualization and operationalization cannot be done within post positivist research. Within this research orientation too, it is also important that you the researchers have a clear understanding of the meanings and characteristics of the concepts that form part of your research problem.

References

- Babbie, E. and J. Mouton. (2001). *The practice of social research*. Cape Town: Oxford University Press.
- Cresswell, J.W. (2003). *Research design: Qualitative, quantitative and mixed methods approaches*. (Chapter 6 Research questions and hypotheses). Retrieved at: http://www.amazon.com/Research-Design-Qualitative-Quantitative-Approaches/dp/0761924426#reader_0761924426
- Lunsford, B. (1993). *Methodology: Variables and levels of measurement*. Retrieved at: http://www.oandp.org/jpo/library/1993_04_121.asp
- Padula & Miller, 1999. In Cresswell, J.W. (2003). *Research design: Qualitative, quantitative and mixed methods approaches*. Retrieved at: http://books.google.com.jm/books?id=nSVxmN2KWeYC&pg=PA108&lpg=PA108&dq=Padula+%26+Miller,+1999&source=bl&ots=caGX-Co-ai&sig=se-NhGBSFiPBv68Zkzo60fnuLLg&hl=en&sa=X&ei=TCnwUO_aE5HI9QT0zYGYDA&sqi=2&ved=0CEIQ6AEwAw#v=onepage&q=Padula%20%26%20Miller%2C%201999&f=false
- Trochim, W. (2006). Research Methods Knowledge Base Recommended Website: <http://www.socialresearchmethods.net/>
- The Writer's Complex, by Cathy Copley, Larry Greenberg, Elaine Handley, Susan Oaks and contributors. http://www.esc.edu/esconline/across_esc/writerscomplex.nsf/home
- "Concept Mapping: How to Start your Term Research Paper" retrieved at: <http://www.youtube.com/watch?v=KhgxuNvbNrA>