

**Study Guide for  
Assessment on the Scientific Method  
Introduction to Sociology (SOC 101) Summer Semester 2009**

**Key Terms:**

Theory	Hypothesis	causal model	positivism
Scientific method	dependent variable	verification	independent variable
Pragmatism	value free sociology	cultural relativity	empiricism
Experimental group	control group	natural experiment	measure
Validity	reliability	credibility	research method
Mode	median	mean	average
Correlation	positive correlation	negative correlation	causality
Secondary analysis	quantitative study	qualitative study	experiment
Ethnography	population	sample	survey
Random survey	social science	spurious correlation	replication
Hawthorne effect	social causation	central tendency	data
empirical generalization			

**Important Dead Sociologists:**

Emile Durkheim      Auguste Comte      Max Weber

**Key Concepts:**

*Study Objective:* students should understand sociology uses the *scientific method* to study human social life and behavior, which is systematic, objective, rational, and non-judgmental.

1. The Scientific method involves an assumption of positivism. *Positivism* is a term used by August Comte to refer to the idea that sociology looks at human society like the physical world, which has patterns, regularities, and laws. According to Comte sociologists should be trying to scientifically find out what these laws are and apply those insights to explain social phenomena. This *positivistic assumption* contends social scientists should conduct scientific research such as observation, experimentation in the study of human social life, like natural scientists do with the physical world.

2. *Scientific Research* refers to the process involving gaining concrete evidence and unbiased data (called *empirical information*) through direct and systematic observation of society, and building theories. In sociology *theories* are a set of abstract propositions or statements developed to explain *social phenomena* and human behavior.

3. Techniques used to build theories include several things. A *hypothesis* is a statement about the *cause-effect relationship* between two *variables*, for example: “People with a high level of education are more likely to be involved in politics than those with a low level of education.” In this hypothesis, level of education is the cause variable (*independent variable*) and political involvement is the effect variable (*dependent variable*.) The independent variable (cause) creates dependent variable (effect or affect).

4. A *variable* refers to a factor that has different values (characteristics or meanings) such as gender, age occupation, birthrate, political affiliation, education etc. For example, religion is the independent variable in the hypothesis: “Catholics are more likely to vote for democrats than are Protestants.”

5. A *hypothesis* is capable of being *empirically* tested. When something is *empirical* you it is something that can be observable by the senses. Hypotheses in sociology are built from things we can see and measure from reality. That means you can test your hypothesis in the “real world” that sociology attempts to explain – no “armchair philosophy” should be used as an explanation in sociology. In order to test the hypothesis, the *variables* are to be measured or *operationalized*. When something is “operationalized” it is highly and clearly defined. This involves translating (explaining) the concepts into empirical referents (precise “real world” or empirical understandings). For example, to study intelligence, researchers need to find an empirical indicator such as an IQ score to measure intelligence. The IQ score can be said as the *operational definition*, or measure, of the variable intelligence in the empirical research.

6. Sociologists also need to make sure their research is credible or trustworthy. This can be broken down into two main elements: validity and reliability. *Validity* refers to measuring what you think you are or measuring what you intend to. For example, most social scientists do not accept a person's height in centimeters and millimeters as a measure of her /his intelligence because it lacks validity – recording someone’s height doesn’t measure their intelligence. The measure also has to be reliable. Reliability refers to whether you are measuring accurately what you think you are. This is usually indicated when the scientist gets consistent readings or results during research when she should.

7. Data-collecting techniques include methods such as survey, secondary analysis, experiment, and observation are called research methods. *Secondary analysis* means to use data already collected by other researchers or agencies. The most commonly used method in sociology is the *survey*, which involves getting responses from a population by interview or questionnaire. Researchers draw *representative samples* from a population, usually the best way is to randomly drawn a sample (called a *random sample*) from everyone in the population. For example, a researcher wants to study the admission practices and sports records of colleges to see whether colleges with more lax admissions standards win more games. The "population" of the research in this example would be colleges.

8. Data collected by *qualitative research* are in the form of words, pictures or objects, while data collected by *quantitative research* are in the form of numbers and statistics. Both kinds of data are empirical information which refers to data or evidences gathered directly from society.

9. *Analyzing data* refers to organizing data in a meaningful way. To organize data, researchers often use *frequency*, a statistical term for the numbers in a table to tell how often an event occurs. For example, in a table A, in Green 12 people have a Bachelor’s

degree, 20 have an Associates' degree low income, those numbers ("20" and "12") are the *frequencies* or the amount of occurrence.

10. When calculating percentages, sociologists usually use the *marginal total* (the total for each category, usually on the right side of the table) to calculate. We don't use the grand total, which is often indicated by the letter N. For example in Chart B, N=1108. In other words, in a table "N" is the abbreviation for NUMBER, and N= 1108 means that a total of 1108 people were in the sample described in the chart. We don't use the "N" value to calculate a percentage. For example, approximately 7% of the Green City sample had Bachelor's Degrees (12 divided into 175 = .06857, rounded up that gives us "7").

Table A: Education Attainment in Urban Areas

Location	Education Level				Row Totals
	Bachelor's Degree	Associate Degree	Some College	High School	
Green City	12	20	23	120	175
Orange Town	4	23	47	220	294
Purple Village	9	17	36	187	249
Blue Town	8	10	23	196	237
Plaid City	10	21	29	93	153
Colum Totals	43	91	158	816	1108

N = 1108

11. There are several different central tendency measures. The *mean* is the mathematical average. You obtain the mean by adding up all the numbers and divide that sum by the number of cases. For example: the *mean* for the annual incomes of seven hypothetical families are: \$1,000,000 \$70,000 \$50,000 \$40,000 \$20,000 \$20,000 \$10,000, is 172, 857 is the mean. The *median* or middle number in the example is 40,000. The *mode*, the most frequent number, is 20,000. However, in analyzing data collected for research, the mean can be deceptive (misleading or tricky) because of extremely high and low numbers in responses.

12. *Correlation* means two variables are related in such a way that a change in one variable is accompanied by a change in the other. The highest correlation is 1. Correlations can be positive (+1.0), when the two variables change in the same direction, or negative (-1.0), when the change is in opposite directions. The lowest correlation is 0. This happens when the two variables are not related in the way being measured. Any number larger than 1 or smaller than negative 1 means an error in calculation! For example, -1.78 should be an error. 2.35 is an error.

**Textbook Readings:**

Chapter One: What is Sociology?

Chapter Four: How Do We Know What We Know? The Methods of the Sociologist.

**NOTE:** *You are also responsible for materials covered in class lectures applicable to this survey and your instructor may require additional readings in your text or outside sources.*