

**THEORY AND MEASUREMENT
IN SOCIOLOGY**

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CHAPTER 1

MEASUREMENT AND THEORY

Sociologists usually focus on the systematic character of social life. They perceive human group life as constituting a system. A system is a boundary maintained entity which is composed of interrelated and interdependent parts. When the sociologist examines social settings, small groups, organizations, communities or societies as systems, he describes the component parts of the systems and then analyzes how these parts are interrelated and interdependent. The sociologist calls this a description of the *social structure* of a system.

We are going to view sociology as a system. Theory and research are parts of this system. They are, further, systems themselves, sub-systems of sociology. In this chapter, we will examine how they are interrelated and interdependent.

One goal of sociology is to create a body of theory which will describe and account for regularities of human behavior. From where does this theory come? Theories come from measurements of the real world, whether those measurements be formal and systematic or not. Theories are the articulated observations of men who detect regularities in human group life. The perception of these regularities involves objective or subjective measurement, inasmuch as regularities are seen as occurring with some degree of frequency, relative to other behavior which is seen as being more random. Theories are born out of a man's observation of statistical regularity. Theories come from measurement and research.

Once they exist, they are tested and evaluated by means of measurement and research. Theories are only useful if they accurately describe and predict human behavior. They must continuously be tested and evaluated to assess the degree to which they are accurate and thus useful.

When one does social research, the kinds of measurements taken always have some theoretical relevance. How does one know what is important to measure and what is not important to measure? How does one know who should and who should not be included as respondents in a study? How does one know how to analyze data once it is collected? The answers to these questions are given in the structure of the theory one is evaluating. The logic and strategy of social research has a theoretical base. Research is only meaningful in a theoretical context; one comes to understand why research takes the form that it does rather than some other form only when conceptual definitions and hypotheses, which are parts of theories, are taken into account.

THE COMPONENTS OF THEORY

We have been discussing the term "theory" rather loosely. To fully understand how theory and measurement are linked, it is important to know what theory is. The word theory is used in many different ways by sociologists. It is sometimes used to refer to a theoretical model, a way of perceiving reality, which imposes a perceptual framework or structure on that reality. This is a kind of social philosophy which is sometimes labeled "theory". Social evolutionary theory, structural-functional theory, symbolic interaction theory are examples of such theoretical models which are used by sociologists.

But this is not the kind of theory we will be discussing in this book. The kind of theory we will discuss is called axiomatic theory. *Sociological axiomatic theory consists of logically related, logically consistent, and logically complete definitions and propositions about human group life.* In analyzing the structure of axiomatic theory, we will examine the component parts of such theories and then show how these parts are interrelated. It is only when we understand what theory is that we can comprehend how theory and measurement are linked.

TERMS: Theories are made of words or terms. Terms which are common to sociology include "norms", "values", "society", "social class", "social role", "mores", "folkways", and so forth. Terms are words used to label or signify some concept or idea.

CONCEPTS: A concept is a mental abstraction, an idea, in the mind of a man. Though "norms", "values", "society", "social class", and "social role" are words, they also signify an idea, a conceptualization of

what that word means. What "society" means to a sociologist, the mental image which is evoked by this word, is the sociologist's concept of society. The term "society" is only a label for the mental image of what societies are. We could call the concept anything we chose; terms are arbitrary. The mental abstraction itself, however, has meaning.

Concepts enable man to categorize, interpret, structure, and thus make some sense of the world. The everyday man on the street structures his world with concepts of trees, birds, occupations, sex, money and so forth. The concepts we employ in everyday life to structure and categorize the world are part of what we call "culture".

The sociologist structures his world with concepts which differ from those of the man on the street. Usually the sociologist cannot use the concepts of everyday life because these concepts are too vague for his needs. The goals of the sociologist and the man on the street are different. The man on the street wants to survive or succeed. The sociologist has to describe this desire for survival or success and, further, seek both the cause of it and the functions or consequences of it. Because the goals of the sociologist are, in a sense, more demanding, his concepts must be more precise.

Though the use of special concepts may be fruitful for the sociologist, it poses some serious problems for him. If he uses the concepts of the average man on the street, he might better come to reflect exactly how people view their world. By using the concepts of those they study, sociologists would be better able to transmit how people interpret events and objects with which they deal. This would give the sociologist better understanding of why people behave as they do.*

In using their own concepts, sociologists risk interpreting the reality of those they study quite differently than does the man being studied. The sociologist risks creating a fictional world, which has no relevance or meaning to the average citizen.

This does not dismay many sociologists, because they are not concerned with whether concepts are relevant or irrelevant to the man in the street. Most sociologists are concerned with the utility of concepts. They

* Understanding is used here in the tradition of Max Weber, who meant by the German word "verstehen" more than just a cognitive understanding. It more importantly also involves an affective understanding; it involves empathy. To understand another means that you can come to completely take the role of the other so that you know what he knows, feel what he feels, see the world as he sees it, and define elements of reality as he defines them. Understanding is thus more than a "head trip"; it is a "heart trip" also.

are concerned with whether concepts enable them to understand and predict behavior. If a concept works, in that it helps them make sense of behavior or predict behavior, then this justifies its existence, whether or not the general public recognizes the concept. There may, in fact, be no such thing as a social class, but if the idea that classes exist enables the sociologist to categorize styles of life, patterns of thought, and perceptions, and if it enables the sociologist to accurately predict patterns of mobility, election results, or revolution, then the sociologist will use the concept and view the world as if social classes existed.

The sociologist claims that by using concepts that differ from those used by the man on the street, he gets not only a different perspective on the world, but a better one for understanding and predicting patterns of behavior. Because of his more precise concepts, the sociologist believes he is in a better position to anticipate consequences of action and predict coming events. The use of special concepts which may not be grounded in reality creates a lively issue in contemporary sociology. Some sociologists believe that the use of special concepts is justified. Others believe that the use of concepts of those observed is the only way to accurately depict their phenomenological world.

The concepts sociologists use—social class, norms, values, society—exist in the sociologist's head. They are not real phenomena in the world, but are the sociologist's mental constructs which he abstracts from the real world. They are his tools for discussing regularities he sees.

When one uses concepts which are not inherent in reality, it is very important to speak of them as mental abstractions and not to pass them off as being part of the observed world. The analyst must not speak of social classes, for instance, as if they in fact existed.*

When abstract analytic concepts are used as if they in fact exist in reality, we call this *reification*.

VARIABLES: Concepts can be constant or variable; they can exist in one dimension, one value, or in many different dimensions. Constant concepts are unidimensional; the mental image evoked by a term implies one and only one form of an object or phenomenon. Assume that in the

* Evidence of the fact that social classes do not exist are the variable analyses by sociologists as to how many social classes exist in the United States, estimates ranging from two to nine with many analyses falling between these extremes. If social classes existed in fact, there would not be such variance in the analysis of social class at one time and place. Social class is a mental construct in the mind of the sociologist.

remote reaches of a distant desert, nomads see a car for the first time in their lives. It happens to be a jeep driven by some anthropologists, who explain that they are riding in a car. After the anthropologists leave, these nomads will have a constant concept of a car. The mental image which the word "car" evokes will bring to mind a singular kind of object, the one jeep they saw.

Most concepts used in sociology have several dimensions of values. We call the different qualities or dimensions of a variable concept "variables." Sex is a variable concept inasmuch as people can be male or female. Male and female are variables of the concept sex. Religion is a variable concept inasmuch as people can be Catholic, Methodist, Episcopalian, Jewish, Buddhist, etc. These denominations are variables of the concept religion. The fact that a concept may manifest itself in a variety of ways makes the term "variable" appropriate for signifying the multitude of dimensions or values of the concept. For the average American, car is not a constant concept but is a variable concept. We can distinguish cars of different manufacturers, two-door from four-door cars, hard-tops from convertibles, and so forth. While car is a concept, the variable forms which cars take—Ford, Chevrolet, Cadillac, Volkswagen—are variables of that concept.

In our everyday world, we categorize objects in terms of their color. The word "color" can include a variety of different dimensions such as the colors blue, red, yellow, orange, green, white, black, and so forth, which makes color a variable concept. The different categories of colors—red, blue, green, yellow—are variables.

It should be pointed out that not all cultures recognize the same dimensions of color. The Navaho Indians, for instance, are reputed to have no separate dimension we label as "orange". They perceive orange as a shade of yellow.

Another concept of everyday life is snow. The number of dimensions used to categorize snow often varies from individual to individual, depending upon how important snow is in a person's life. People living in areas of California or Florida, where snow is seldom seen, may be unable to categorize different types of snow. For them, snow would be a constant concept. An avid skier may depict snow as being "powder", "hard-pack" or "corn". For the skier snow is a variable concept. Like the skier, the Eskimo recognizes more dimensions of snow than does the average Californian or Floridian because snow plays a more important function in his life, and it is thus useful for him to make precise distinctions between kinds of snow.

Most Americans would have difficulty categorizing types of camels. In popular phraseology, "if you've seen one camel you've seen them all." Most Americans perceive camels to be basically alike. If nothing else, differences between camels are for all practical purposes irrelevant to us. We tend to use "camel" as if it were a constant variable. To Arab nomads, on the other hand, camels are very important, and they are reputed to have thousands of words in their vocabularies to designate different kinds of camels. These would enable the Arab to distinguish one-humped from two-humped camels, male from female camels, long-haired from short-haired camels, pregnant from non-pregnant camels, and so forth. The categories Arabs use to label camels are numerous. Unlike most Americans, Arabs treat the concept "camel" as a variable concept.

DEFINITIONS. The definition of a term is an articulation of how that term is conceptualized. It specifies the mental abstraction the researcher conjures up when he uses a term. It spells out exactly what the researcher means when he uses a term. Because concepts are man-made rather than inherent in reality, it is important that terms be explicitly defined. Different sociologists hold different conceptualizations of a common term, and thus we find that terms such as "social role", "social class", and "family" have a variety of different conceptual definitions within sociology. This may come as a surprise to beginning sociology students who are traditionally exposed to singular definitions of terms. But all terms in sociology have several conceptual definitions. By defining a term, we communicate to others the concept we have in our mind, we articulate what that term means to us.

There are two kinds of definitions which are used in sociology: nominal definitions and operational definitions. *Nominal definitions* consist of an articulation of the theoretical meaning of a term, that is, the sociologist states what his conceptualization of a term is. *Operational definitions* consist of a measurement-oriented interpretation of the nominal definition. Within most operational definitions is a description of how the term is to be measured. There must be consistency between the nominal and operational definitions of terms. If there is no such consistency, the definition of the term is said to lack *internal validity*.*

* Whereas internal validity usually refers to the consistency between the way terms are nominally and operationally defined, external validity refers to whether or not theoretical propositions are empirically validated when they are tested. If a proposition is validated, this reinforces our confidence in the external validity of that proposition. External validity refers to whether or not a theoretical proposition accurately describes or predicts human behavior.

Validity involves an assessment of whether a researcher is, in fact, measuring what he thinks he is measuring. If nominal and operational definitions are not consistent, then most likely the measurement instrument, derived from the operational definition, is not measuring what the researcher intends to have measured, as articulated by his nominal definition.

One of the most fruitful ways to criticize most sociological studies is to look for consistency in the nominal and operational definitions of terms. It is here that many sociologists falter. At times, there are inconsistencies in these definitions. More frequently, however, authors fail to define terms either nominally or operationally. If terms are not defined, there is no way of determining the internal validity of a measurement.

Definitions serve several functions. Definitions aid in theory development. One purpose of theory is to systematically interrelate theoretical propositions to convey some general pattern or process. If theoretical propositions are to be combined, they must contain logically related and internally consistent conceptual definitions.

Assume a sociologist, studying marital instability in American families, posits the theoretical proposition that "marital instability is inversely related to social class." This means that the higher the social class, the less marital instability will exist; the lower the social class, the more marital instability will exist.

Another sociologist, doing a completely different study of American family life observes that "freedom of mate choice is inversely related to social class." By this he means that people in higher social classes tend to have less freedom in selecting a mate of their choice; people in lower social classes tend to have more freedom in selecting mates of their choice.

A theorist may want to take these two propositions and combine them in a theory. In order to combine these propositions, each proposition must share logically related and internally consistent conceptual definitions. The terms which each proposition have in common must have consistent definitions. The terms which are unique to one proposition must have a logical relationship to terms in the other proposition. Thus, if these propositions were combined, social class would have the same meaning in the two propositions and marital stability and freedom of mate choice would be logically related. This interrelation would constitute yet another theoretical proposition, such as, "freedom of mate

choice is positively related to instability in marriage." Two of our theoretical propositions were grounded in an empirical reality. The third proposition was derived from combining or interrelating these two. Propositions which come from logically relating two or more nominal propositions we will call derived propositions. Thus we have the beginnings of a theory of marital instability.

Nominal propositions:

- 1) Marital instability is inversely related to social class.
- 2) Freedom of mate choice is inversely related to social class.

Derived proposition:

- 1) Marital instability is positively related to freedom of mate choice.

It should be mentioned that when the original two studies were conducted, the nominal and operational definitions of social class may have been different in each study. To combine the two propositions, one or both of the original definitions of social class may have required change to achieve internal consistency of the definitions. The fact that definitions of concepts can be changed, enables the sociologist to build theory. It is only with this freedom that propositions specific to one time and place can be expanded upon to elaborate more general social processes.

Changing the original definition of social class would in no way affect the validity of either proposition inasmuch as each proposition in the theory has no external validity until it is empirically tested. The study which creates a theoretical proposition does not also prove the external validity of that proposition. The propositions must be continually tested and retested in a variety of times and places to gain empirical validity.

Because conceptual definitions are changeable, it is crucial that all terms be explicitly defined. Theories are composed not only of interrelated propositions but of interrelated conceptual definitions as well. Definitions are an indispensable part of all theoretical propositions, for without the conceptual definitions, we would not know what the propositions really mean.

Definitions aim and guide social research. One task of social research is to empirically test theoretical propositions. When propositions are tested, the definitions of the terms in the proposition guide the researcher in making decisions on what to measure and how to measure it. When

we say that definitions aim and guide social research, we mean that every conceptual definition carries certain measurement biases within it. Every definition specifies certain aspects of a phenomenon that are relevant and important and other aspects that are presumed irrelevant or unimportant. Assume that the sociologist who observed that marital instability was inversely related to social class, defined marital instability as "the attainment of a legal divorce." This definition of marital instability articulates what measurement must be taken to test the external validity of this proposition. We must measure the concept "marital instability" by determining whether or not persons have been legally divorced. According to this definition, measurements of separation among respondents or how often respondents fight with their spouse, or whether respondents are happily married to their spouses, are irrelevant.

Where terms within theoretical propositions are clearly defined, the procedure for empirically validating that proposition is clear. Definitions convey what variables should be considered and frequently convey the kinds of measurements which should be made in validating the proposition.

EMPIRICAL INDICATORS. Empirical indicators function to link concepts to the real world. They are instruments for measuring concepts. It is through empirical indicators that concepts are operationalized. Empirical indicators can consist of one question or a series of questions within a questionnaire, interview schedule, or other research instrument. They are designed to measure a concept. The empirical indicator is derived from both the nominal and operational definitions of a term.

We have already asserted that social class is a term signifying many different concepts. When we ask how we can measure a respondent's social class or what questions we can ask people to ascertain their social class, we are looking for empirical indicators of this concept.

If social class is to be a useful concept, it must have within it some criterion for distinguishing members of one social class from members of other social classes. It assumes that a social class exists within a system of social classes. As such, a social class must be seen in terms of a larger system of which it is a part.

If we define a social class system as a hierarchy of statuses with respect to the economic processes within a society, we can use the two indices or variables most frequently used by sociologists to measure social class:

level of education and level of occupation. When these measures are used, the assessment of levels of education and occupation is usually made by some objective analyst. Information about a respondent's education or occupation comes from the respondent, but the determination of how that data are organized, and the determination of how many social classes are to be attributed to a community, is the decision of the analyst. This is called the objective approach to the study of social stratification.

If we define a social class system as a "hierarchy of statuses which is perceived to exist among selected informants in a community," we would have to go to a number of community members and ask them for their appraisals of the status hierarchy in their community. If appropriate, we might ask where specific community members were placed in their perceived hierarchy. Observation by an outside objective analyst would be inappropriate for a definition of social class, which is based on the appraisals of community members. Asking community members to assess the community's stratification system is called the reputational approach to measuring social stratification.

We could also define a social class system as "a hierarchy of statuses abstracted from appraisals of how respondents regard their own social position relative to others living in their community." Here we would ask people what social class they perceived themselves to be within. According to this definition of social class, it would be inappropriate to use either detached, objective assessors of social class or other members of the community to measure any respondent's class standing. The respondent would have to assess his own class standing. This is called the subjective approach to measuring social stratification. Note how the definition of social class will determine the type of empirical indicator to be used in measuring this term.

A very crude but valuable way of measuring social class by the objective approach is to dichotomize the empirical indicators, education and occupation, so that any individual can be classified as either high or low in level of occupation. Any person who scores high on both indicators would be classified as having high socio-economic status. Any person scoring high in one index and low on another, in any combination, can be classified as having middle socio-economic status. Any person scoring low on both indices would be classified as having low socio-economic status. This can be schematized as follows:

How does one determine whether a person is high or low in level of education or level of occupation? If we ask a respondent for the last

Level of Occupation

	High	Low
Level of Education	High SES	Low SES
	Middle SES	Middle SES
		Lower SES

Level of Socio-Economic Status (SES) by Level of Occupation and Level of Education

grade he was in when he last attended school, we might expect responses ranging from "I had no formal education; I never went to school" to "I completed my PhD," "I finished medical school," or "I obtained an LL.D." We construct a continuum of possible educational levels and devise a cut-off point which dichotomizes the continuum into high and low educational levels. Assume we make this cut-off between high school graduation and some college. The continuum of education, when dichotomized into levels might then be:

Low level of education	No formal education 1-8 years of education Some high school High school graduate
High level of education	Some college A.A. degree (junior college graduate) some upper division college work College graduate Some graduate work MS or MA degree Beyond Ms or MA degree Ph.D., M.D., LL.D.

The person who was a high school graduate and without any college education would be scored low on level of education. The high school graduate with some college education, even though he did not have any college or junior college degree, would be scored high on level of education.

Level of occupation is harder to measure because several empirical indicators must be combined when occupations are compared. At least three factors are usually taken into account when level of occupation is measured. *Income* is one factor considered. However, income is not the only factor which sets some jobs above others. Another form of compensation for work is *prestige*. Prestige is not necessarily positively related to income. College professors, for instance, earn little income relative to the prestige of their occupation. Garbage collectors have high income relative to the prestige of their job. Jobs also differ in the amount of *power* which they afford. Power is the ability of one person to exercise his will over others. The amount of power one has in his job is often considered in assessing one's level of occupation.

Several different scales of occupational stratification have been devised by combining all three variables. One such scale, developed by the National Opinion Research Center, quantitatively ranks different occupations. Numerical scores represent the result of quantifying and weighting income, power, and prestige and combining these indices into a summary score. Their scale is reproduced in Figure 1.1.

This scale is normally not dichotomized into high and low levels of occupation. It was done here because we needed dichotomous occupational categories to match our dichotomous educational categories, so that we could combine both to create an index of social class. The dichotomy for occupations was drawn at the average score for all occupations listed in the scale.

Using these indices of education and occupation, we can designate any respondent who scores high on both education and occupation as being upper socio-economic status, someone who scores high on one index and low on the other can be considered as having middle socio-economic status, and someone scoring low on both indices would be considered to have low socio-economic status.

Not all empirical indicators are as complicated as the one that was just cited. Often an empirical indicator can be simply one question. If we want to assess the age of a respondent we can ask, "How old are you?" This question is the empirical indicator of the concept "age." If we want to assess a respondent's sex, we can ask "What is your sex?" as an empirical indicator of the concept sex. Single, simple questions are not to be underrated however. They are not immune to the issue of validity. Ideally, before any empirical indicator is used, it should be compared to a plethora of alternative indices.

Figure 1.1 The Ratings of Occupations

OCCUPATION	SCORE	OCCUPATION	SCORE
U.S. Supreme Court Justice	94	Newspaper columnist	73
Physician	93	Policeman	72
Nuclear physicist	92	AVERAGE	71
Scientist	92	Reporter on a daily newspaper	71
Government scientist	91	Bookkeeper	70
State governor	91	Radio announcer	70
Cabinet member in the federal government	90	Insurance agent	69
College professor	90	Tenant farmer—one who owns livestock and machinery and manages the farm	69
U.S. Representative in Congress	90	Local official of a labor union	67
Chemist	89	Manager of a small store in a city	67
Diplomat in the U.S. Foreign Service	89	Mail carrier	66
Lawyer	89	Railroad conductor	66
Architect	88	Traveling salesman for a wholesale concern	66
County judge	88	Plumber	65
Dentist	88	Barber	63
Mayor of a large city	87	Machine operator in a factory	63
Member of the board of directors of a large corporation	87	Owner-operator of a lunch stand	63
Minister	87	Playground director	63
Psychologist	87	Corporal in the regular army	62
Airline pilot	86	Garage mechanic	62
Civil engineer	86	Truck driver	59
Head of a department in a state government	86	Fisherman who owns his own boat	58
Priest	86		

Banker	85	Clerk in a store	56
Biologist	85	Milk route man	56
Sociologist	83	Streetcar motorman	56
Captain in the regular army	82	Lumberjack	55
Accountant for a large business	81	Restaurant cook	55
Public schoolteacher	81	Singer in a nightclub	54
Building contractor	80	Filling station attendant	51
Owner of a factory that employs about 100 people	80	Coal miner	50
Artist who paints pictures that are exhibited in galleries	80	Dock worker	50
Author of novels	78	Night watchman	50
Economist	78	Railroad section hand	50
Musician in a symphony orchestra	78	Restaurant waiter	49
Official of an international labor union	78	Taxi driver	49
County agricultural agent	77	Bartender	48
Electrician	76	Farmhand	48
Railroad engineer	76	Janitor	48
Owner-operator of a printing shop	75	Clothes presser in a laundry	45
Trained machinist	75	Soda fountain clerk	44
Farm owner and operator	74	sharecropper—one who owns no livestock or equipment and does not manage farm	42
Undertaker	74	Garbage collector	39
Welfare worker for a city government	74	Street sweeper	36
		Shoe shiner	34

Robert W. Hodge, Paul M. Seigel, and Peter H. Rossi, "Occupational Prestige in the United States, 1925-1963," *American Journal of Sociology*, 70 (November, 1964), 286-302. Used by permission of Professor Hodge and The University of Chicago Press.

A question should be reworded in many different ways with the advantages and disadvantages of each alternative being weighed. This is one way of improving the validity of questions; it is one way of checking to see that a question is measuring exactly what we want it to measure.

HYPOTHESES: A hypothesis is a theoretical proposition which indicates a relationship of at least two variables. The relationship between variables can be descriptive or causal. Descriptive relationships between variables exist in many forms. Two variables may co-vary. Two variables are said to co-vary in a positive relationship if, when variable X occurs, variable Y occurs also or when variable X does not occur, variable Y does not occur either. A positive relationship between variables indicates that two variables either exist or do not exist together.

Variables may co-vary in an inverse relationship. Two variables are said to be inversely related if, when variable X occurs variable Y does not occur or when variable X does not occur, variable Y does.

Variables may also be said to be positively or inversely related when the values of a variable increase or decrease relative to the values of another variable. If people, as they get older, also get more politically conservative, then age and political conservatism are positively related. As one variable increases so does the other. If people, as they get older, see a fewer number of movies each year, then age and movie viewing are inversely related. As age increases, movie going decreases. All of these examples illustrate a descriptive relation between variables in that one variable does not cause another variable to exist or not exist. Rather, one describes the quality of a relationship between variables.

A causal relation between variables exists when one variable is the cause of another. Causality is not empirically proven in sociology, but is inferred when the following conditions exist: (1) when the causal variable precedes in time the occurrence of the affected variable, (2) when the causal variable is logically related to the variable it affects, (3) when the causal variable is empirically related to the variable it is said to affect, and (4) when the causal variable, more than any other variable one tests, causes the existence of the affected variable. Causal relations will be discussed more fully in Chapter III.

All hypotheses have an implicit structure: "if . . . then . . .". If hypotheses are not explicitly structured in this way, they can at least be translated into an "if . . . then . . ." proposition. Factors included in the "if" part of a hypothesis specify the conditions which must exist if the

hypothesis is to be applicable. These are called independent variables. They are factors from which a prediction is being based. The "then" part predicts what will happen when these conditions exist. Factors which are cited in the "then" part are called dependent variables. They are the factors which are being predicted.

At times, the independent variable does not affect the dependent variable directly. Sometimes the existence of other factors alters or affects a relationship between the independent and dependent variables. Such factors are called intervening variables. They are called intervening variables because they occur while the independent variable is affecting the dependent variable, and they influence the nature of the relationship between these two variables. An intervening variable is a kind of independent variable, which intervenes in time between the occurrence of an independent and dependent variable.

Whether in fact a variable is independent, intervening, or dependent, is a matter for empirical validation. Hypotheses are written as if one factor is an independent variable and another factor is a dependent variable, but the nature of the relationship between them must be empirically tested. Frequently empirical evidence reveals that what was thought to be an independent variable is in fact an intervening variable, which is not the ultimate cause of the dependent variable at all.

When a hypothesis does not predict accurately, we must discover why; we must probe for what went wrong. Hypotheses are frequently inaccurate because they are incomplete. Thus, rather than being discarded as wrong, hypotheses are often refined. This refinement frequently involves adding additional independent or intervening variables to the hypothesis. If a hypothesis has no empirical validity, the sociologist must alter it to make it reflect the empirical world. An example of how this is done is in order.

During the depression several studies were done which focused on the effects of unemployment on family life. These studies indicated that "if a man becomes unemployed, then he will lose considerable authority in his home." Among the reasons given for this hypothesis was that the base of the man's authority was his ability to provide for the physical needs of his family. Being economically dependent upon the husband, the other family members acquiesced to the traditional patriarchal pattern of authority. With unemployment, the base of the husband's authority crumbled. He was no longer able to supply the family with the necessities of life. His own self-respect and the respect of other family

Indicates strong possibility

members for him was undermined, and the husband experienced a decline in the willingness of the family to accept his control.

Though this formulation seems reasonable and logically sound, it is nevertheless incomplete. The hypothesis was refined by Mirra Komarovsky, who found that it was not accurate for some of the families she observed during the depression.³

She found that unemployment did not destroy the husband's authority in some families. She asked what the difference was between the families for which the hypothesis did and did not hold true.

She found the significant difference to be the nature of the foundation on which the marriage was based. Some marriages operated around social roles which family members performed. Members were evaluated on the basis of what they did, on the basis of what functions they served for the family. People were loved because they were good providers, good football players, impressive scholars, or successful socialites. They were loved because of things they did, not because of who they were. Marriages which are based on functional contingencies are said to be based on *instrumental* considerations. In these marriages, unemployment seriously affected a husband's authority.

Other marriages were based on *expressive* considerations. People were loved because of who they were, not because of things they did or did not do. Unemployment had little or no effect in undermining the husband's authority in these families. The husband was basically the same man whether he was working or not and he was loved and respected regardless of his employment status.

This is an overly simplified account of Komarovsky's findings. Other variables such as the kind of authority patterns that existed prior to the unemployment and the way the unemployment was rationalized (whether it was the husband's or the system's fault) also affected change in authority patterns.

What is important is that a hypothesis existed which did not fit an empirical reality. The hypothesis "if a man becomes unemployed then he will lose considerable authority in his home" was true only some of the time. It was refined to fit the empirical world. The revised hypothesis read, "if a man becomes unemployed and his marriage is based on instrumental considerations, then he will lose considerable authority in his home." An addition was made to the "if" part of the hypothesis.

³ Mirra Komarovsky, *The Unemployed Man and His Family* (New York: Dryden Press, 1940).

As independent and intervening variables are added to a hypothesis to refine it, the range of applicability for that hypothesis is reduced. Hypotheses exist at many different ranges of applicability. The higher the range of a hypothesis, the more people, situations, times, and places are incorporated within that hypothesis. The more people, situations, times and places that are incorporated within any theoretical proposition, including a hypothesis, the higher is that proposition's *level of abstraction*.

We can illustrate how single hypotheses can exist at many different levels of abstraction by means of an outline model.

- I. Minority groups will have less power than majority groups in a society.
 - A. Racial minority groups will have less power than racial majority groups in a society.
 1. Black people living within the United States, will have less power than Caucasians living within the United States.
 2. Orientals living within the United States will have less power than Caucasians living within the United States.
 - a. Chinese people living within the United States will have less power than Caucasians living within the United States.
 - b. Japanese people living within the United States will have less power than Caucasians living within the United States.
 - B. Religious minority groups will have less power than religious majority groups in a society.
 1. Catholics living within the United States will have less power than Protestants living within the United States.
 2. Jews living within the United States will have less power than Protestants living within the United States.

There are four levels of abstraction reflected in the above set of hypotheses. The hypothesis labeled I is the highest level of abstraction in this sequence and incorporates within it all the other hypotheses. It includes all minority groups, whether they be racial, ethnic, or social minority groups. Statement A is included within statement I because it includes a special category of minority groups, racial minorities. Statements 1 and 2 are of a lower order than is statement A because they include special sub-categories of proposition A, namely, two types of racial minorities. Statements a and b are subsumed under statement 2 because they constitute two different oriental cultures which exist within American society.

Statement B is of the same level of abstraction as statement A. Both statements are predicting about categories of minority group, racial and religious minorities. Statement B-1 is of the same level of abstraction as statement A-1 in that it has the same logical position in the structure as does statement A-1. Actually, from a somewhat different perspective, if there are more Catholics than Blacks in the United States, then statement B-1 has a slightly greater range inasmuch as it is predicting for a greater number of people. Statement B-2 is of the same level of abstraction in this scheme as statements A-1, A-2, or B-2.

Once all concepts are defined, empirical indicators can be devised for measuring the concepts, and the hypotheses can be tested. It is probably easier and less costly to test the lowest level hypotheses because the population to be studied is smaller, more homogeneous and more clearly delimited. Note that in the structure we have outlined, the failure to validate a low level hypothesis seriously affects all higher level hypotheses. If it is not true that "Japanese living in the United States will have less power than Caucasians living in the United States," we would seriously question whether it is true that "Orientals living in the United States will have less power than Caucasians living in the United States," and that "racial minority groups will have less power than racial majority groups in a society," and that "minority groups will have less power than majority groups in a society." The testing of a low level hypothesis reflects on the validity of all higher level hypotheses which are logically related to the tested hypotheses.

If a power level statement is false the higher level statement is not automatically also false. Though Japanese in the United States may be found empirically to have more power than Caucasians, it may still be true that Orientals living in the United States have less power than Caucasians, if the Japanese constitute a small enough sub-system of Orientals. A hypothesis need not be 100% correct to be empirically validated. Researchers select the criterion by which a hypothesis is accepted as valid or not, and this criterion may be that the hypothesis is correct 100%, 90%, 80% or 51% of the time. For this reason it is possible for statement I-A-2-b to be empirically false and for statement I-A-2 to be empirically validated.

High level hypotheses are generally considered to have higher level explanatory power than lower level hypotheses. They are thought to have higher explanatory power because the range of phenomena they take into account is much greater than that of lower level hypotheses.

Though the empirical validation of high level hypotheses would give a social scientist a great deal of explanatory and predictive power, the fact remains that the higher the level of a hypothesis, the more difficult it becomes to empirically validate it. The higher the level of the hypothesis, the more hypotheses there are subsumed under it, which, when tested, could invalidate or force an alteration of the higher level hypothesis.

There is such diversity in the kinds of groups and the kinds of social settings in a society that high level hypotheses usually fail to be validated because they are too simple, too incomplete. They fail to be validated because they fail to take into account the complex diversity of human group life. Once this diversity is taken into account in a hypothesis, there are so many variables included in a hypothesis that it is no longer a high level hypothesis.

A dilemma is thus presented to the social scientist. He would like to create and validate high level hypotheses because they have such high explanatory power, yet the empirical world is too diverse and high level hypotheses do not fit this complex world. Low level hypotheses take into account diversity and complexity and predict behavior accurately but for only a small number of persons in a very limited number of social settings. The social scientist thus has a choice of continuing to create and trying to validate high level hypotheses, the vast majority of which will not be validated, or to work within the limited though surer bounds of low level hypotheses. This dilemma is a central issue of contemporary sociology.

THEORIES: A theory is a system of logically related, logically complete, internally consistent definitions and hypotheses. Each hypothesis that is part of a theory must ideally meet the following conditions:

- 1) Each hypothesis must be empirically verifiable. Each hypothesis must be capable of being tested. Theories are not tested directly. Rather each hypothesis within a theory is tested. If all hypotheses are empirically validated, one gains considerable confidence in the validity of the overall theory. Theories that contain hypotheses which are repeatedly validated when empirically tested become laws. Laws, then, are theories which contain repeatedly tested and validated hypotheses. A theory does not become a law until one is confident of the theory's empirical external validity.

2) *Each hypothesis must be couched in exactly defined terms.* In order to be verifiable, hypotheses must contain terms which are explicitly defined. Only then can appropriate operational definitions of concepts be devised and the hypothesis be validly tested.

3. *All hypotheses must be consistent with one another.* Hypotheses must be logically consistent. There must be no two hypotheses which imply contradictory things. Two contradictory statements cannot both work to support a higher level generalization.

4. *Hypotheses which constitute a theory must be logically complete.* There must be no steps left out which would prevent one from moving from a hypothesis at one level of abstraction to a hypothesis at another level, whether this be a higher or lower level. The hypotheses must be logically related to one another.

To illustrate a theory, we borrow the basic thesis of Emile Durkheim's classic study of *Suicide*:⁴

Our theory consists of three basic hypotheses:

1. Catholics exhibit lower suicide rates than do Protestants.
2. Catholics are more highly integrated into the social structure than are Protestants.
3. The more groups are integrated into the social structure, the lower will be their rates of suicide.

For these hypotheses to be tested, all concepts must be nominally and operationally defined. Nominal and operational definitions necessary to test these hypotheses are offered below. The nominal definition of each concept is given first, followed by an operational definition of that concept.

Catholic - A follower of the Catholic Church. A person who states that his religion is Catholic.

Protestant - A follower of some Protestant Church. A person who states that his religion is some Protestant denomination.

⁴ Emile Durkheim, *Suicide. A Study in Sociology*. Translated by John A. Spaulding and George Simpson (New York: Free Press of Glencoe, 1951).

Integrated - Involvement in collective activity. Number of hours per day spent in social interaction with other adults.

Social Structure - The parts of a social system. The network of social institutions in a society.

Suicide Rate - A measure of suicide frequency. The number of suicides divided by the total population sharing some characteristic, this quotient to be multiplied by 1000.

Group - A social aggregate of persons. Persons having a designated characteristic in common.

The term suicide would also have to be defined. Durkheim defined it as "all cases of death resulting directly or indirectly from a positive or negative act of the victim himself, which he knows will produce this result." In adding the last clause of his definition, Durkheim gives his definition a cognitive bias. The suicide victim must recognize, must realize that his action will result in his death. The person who dies from an overdose of drugs would not be considered a suicide victim if he did not anticipate that he might die when he took the drugs.

We have taken our nominal definition of integration directly from Durkheim. Durkheim was trying to demonstrate that differential suicide rates in different countries were not a function of weather or geography or psychological factors, but of empirically observable social factors. His exposition of just what "involvement in collective activity" means is left rather ambiguous, as he fails, for instance, to distinguish collective activity in business and in leisure. When Durkheim explains higher suicide rates during working hours than in the evening, he seems to imply that collective activity means business activity. But in his explanation of greater suicide rates during holidays, such as Christmas and Easter, collective activity seems to mean leisure activity. We imply in our definition that collective activity combines business and leisure activity, and we hope that this will not lead to ambiguities as it did for Durkheim.

The entire structure of interrelated definitions and hypotheses outlined above constitutes a sociological theory. One way of checking to see how many hypotheses are required for a theory is to construct a matrix of the concepts within the theory. Each concept must be linked to all the other concepts in a theory by a hypothesis. In the theory above, there are three concepts, religion, suicide rate and social integration. We construct a matrix of these concepts as follows:

	Religion	Suicide Rate	Social Integration
Religion			
Suicide Rate		1	
Social Integration			2

Concepts are arranged in the same order along both axes of the matrix. One does not interrelate a concept to itself, thus a line is drawn through the intersection of a concept with itself. This line will bisect the table. One goes across the matrix numbering each empty cell of the matrix *above* the line which bisects the table. Each cell indicates the need for a hypothesis to link the concepts which that cell intersects. The matrix for our theory shows a need for three propositions. Proposition 1 requires a linkage of religion and suicide rates. Proposition 2 requires a linkage of religion and social integration. Proposition 3 requires a linkage of suicide rates and social integration. As this matrix indicates, to be logically complete, every concept in a theory must be related to all other concepts in the theory through a separate proposition. To be logically consistent and complete, variables of each concept in each hypothesis must also be related to all other variables in the total theoretical structure.

If we were to empirically validate the hypothesis: Catholics exhibit lower suicide rates than do Protestants, we would have to measure the terms "Catholic" "suicide rate" and "Protestant". To measure these terms, we would have to construct empirical indicators for these terms, and to do this, we must look to their operational definitions. Looking at the operational definition of Catholic as given in the theory, we see that two empirical indicators are needed to measure this term: what do (did) you (he) consider to be your (his) religion? and Did you (he) attend a Catholic Church function at least twice in the past year? The words in parentheses would be asked about recent suicide victims. The testing of any hypothesis involves the measuring of terms within that hypothesis. Measuring terms involves constructing empirical indicators of the concepts those terms signify. These concepts are articulated in the definitions of those terms. Definitions guide us in operationalizing the terms in a hypothesis. Hypotheses and definitions are thus integral and necessary elements of all theories, for without them, the theories could never be evaluated through the testing of its hypotheses.

CHAPTER 2

MEASUREMENT AND THEORY CREATION

The main task of sociology is to construct accurate generalizations which describe and account for regularities of human group life. These generalizations are sociological theories.

The purpose of measurement in sociology is to create and test sociological theory. Creating theory and testing theory are two different but related enterprises. In this chapter we will examine how theories are created through measurement. In the next chapter we will examine how theories are evaluated through measurement.

There are four basic research designs in sociology: field work, survey research, laboratory experimentation, and document analysis.

Most hypotheses in sociology have come out of research which has had a field work or survey research design. In illustrating how hypotheses are created and combined to make theories, it is appropriate that we discuss these two designs and then illustrate how they can be used to create hypotheses and theories.

CREATING THEORY WITH FIELD WORK

Field work involves observing human group life in natural settings. This means that if a researcher wants to know what policemen do during a normal patrol, they will go with policemen and observe them as the police perform their normal duties. If a researcher wants to know what life is like for the black, urban, ghetto-dwelling male, he will live with them, go where they go, and observe them. If a researcher wants to know what life is like in a small midwestern town, or in a prison, or in a department of some organization, he will not just ask people working in these places what their life is like. He will go directly to these settings, experience this life himself, and in addition, will talk to people in these