

culture complex, culture base, culture accumulation, mass culture, implicit and explicit culture, adaptive culture, culture survival, idealistic culture, ideational culture, sensate culture, culture lag, and so on.

Sanders and Pinhey (1974:57) hold that concepts are the basis of building a theory. The logical linking together of concepts makes theory.

THE CONSTRUCT

A 'construct' is a concept devised to aid in scientific analysis and generalisation. A construct is generally inferred from an observable phenomenon. It is an abstraction from reality, selecting and focusing on certain aspects of reality and ignoring others. Thus, a 'construct' is also a concept with the added meaning of having been deliberately and consciously invented or adopted for a special scientific purpose (Kerlinger, 1964:32). For example, 'intelligence' is a concept and 'intelligence quotient' (IQ) is a scientific construct which enables a behavioural scientist to measure the intelligence of a person.

$$IQ = \frac{\text{mental age}}{\text{chronological age}} \times 100$$

A person with an IQ of less than 75 is considered 'feeble-minded' while a person with an IQ of more than 130 is regarded as 'genius'. As a scientific construct, the concept enters into theoretical schemes and is related in various ways to other constructs. In sociology, a few examples of constructs are anomie, status, role, ideal type, modernisation, socialisation, system, structure, etc.

Some examples of the operational definitions of constructs may be given as under:

Social class, if defined in terms of social status (SES or socio-economic status), is defined by using indices like occupation, income and education or by combination of all three. This is 'measured' variable.

Untouchability is defined in terms of not being served by Brahmins as *purohiths*, not permitted to enter temples, not allowed to use public conveniences, touch or proximity polluting high castes, being engaged in despised occupations, and so on.

Popularity is defined operationally by number of sociometric choices an individual receives from other individuals (in neighbourhood, friends' group, college, club, office, and so on) by asking questions like: with whom would you like to work, play, live and so

on and tickmarking individuals chosen.

Concepts may have three definitions: real, nominal and operational. The *real* definition attempts to capture the essential nature of the phenomenon in question. For example, the mathematical definition of a triangle is that it is a three-sided figure. It is a real definition. But real definition of a concept is not easy to achieve in social sciences. Take for example the concept of 'development'. It is defined as: "advancement to a higher state", or "a process of planned institutional change to bring about better adjustment between human needs and aspirations on the one hand and social policies and programmes on the other". But these definitions tell very little as to what is 'higher state' or what is 'better adjustment'. Its other definition is: "positive progress in a society's condition by preventing decline or stagnation". The first two definitions may be referred to as real definitions and third one as nominal one. Development varies from society to society. The goals of socialist societies are not the same as those of capitalist ones. The former stresses on egalitarianism and latter on individualism in and personal freedom. But there are some aspects of development on which in practice there is near-universal agreement. These aspects are mainly technological, economic and educational. Therefore, *operational* definition of development would be: "a state (of a society) characterised by following indicators like: (i) improvement in technology, (ii) increase in health, (iii) change in skills of people, (iv) elimination of poverty, (v) change in levels of living, (vi) increase in availability of employment opportunities, (vii) expansion in literary level and in educational achievements, (viii) social justice, i.e., equal distribution of opportunities, (ix) uplift of weaker groups, (x) improvement in social welfare amenities, (xi) providing security against various exigencies of life, (xii) protection of health, (xiii) protection from pollution, (xiv) democratic political regime, and (xv) popular participation in expansion programmes.

As social researchers, we would not only like to develop a nominal definition of a concept but would also like to operationalise it for measurement, i.e., have an operational definition for studying it. Let us take the concept of 'authoritarianism'. It is a phenomenon supporting or requiring obedience to authority (nominal definition). But to measure it, it may be taken as characterised by (operational definition): (i) extreme conformity to conventions, (ii) tendency to condemn, reject and punish people who violate conventional values,

(iii) rigidity, (iv) belief in dominance-submission, strong-weak, (v) generalised hostility, and (vi) arrogance towards those considered inferior.

Having identified the characteristics and dimensions of the concept, the researchers have to develop ways of measuring them. A series of statements may be prepared expressing the attitudes in each dimension so that respondents could be asked to express their level of agreement or disagreement. For instance, take the following statements: (i) the power-holder does not tolerate opposition, (ii) gives little importance to others' viewpoints, (iii) gives little freedom of expression, (iv) curbs rebellious ideas of people, and so on. The respondents level of agreement or disagreement with each statement can be measured on a 3-point or 5-point scale (strongly agree: + 3, agree: + 2, undecided + 1, disagree, - 1, strongly disagree: - 2). The total score based on averaging the score for all the statements then becomes the measure of the respondents' degree of authoritarianism.

Jonathan Turner (1978:4) has referred to two types of concepts: *abstract* and *concrete*. The former refer to very general properties of phenomenon. They do not refer to a particular place, time or event. The latter refer to particular individuals and interactions. For example, people had seen apples falling from trees for centuries but did not understand why; it was so until the concept of 'gravity' was introduced. This was an abstract concept which explained all heavy things (men, stones, iron rods, etc.) falling on ground due to gravity. The abstract concepts are thus not restricted to only one situation or event but are applicable to a much wider range of occurrences. Concrete concepts, on the other hand, being 'fixed' by their reference to particular phenomenon, are not as theoretically useful as the abstract ones.

We can take the example of a rack (for holding books, utensils, clothes, food articles, files, etc.). A rack can be a wooden rack, steel rack, aluminium rack, iron rack, and so on. It can be a small rack to be used in kitchen or a medium-sized rack to be used in a shop or a very big rack to be used in a college library. The concept 'rack' points only to general properties or attributes or characteristics that all racks have in common. But, by referring to small, medium-sized or big racks for kitchen, libraries, etc., it is made less abstract and more concrete as it refers to a particular category.

We can also take a sociological example of the concept of 'social integration' (individual's acceptance by other members of the group)

which Durkheim used for explaining the rate of suicide and proposing an inverse relationship between suicide rate and level of social integration. He also pointed out a relationship between a person's propensity for suicide and his/her social surroundings (soldiers more prone to suicide than civilians, unmarried persons more prone to suicide than married, males committing more suicides than females, Protestants more likely to commit suicides than Catholics, and so on). Thus, 'social integration' refers to a person's involvement with a social group or how tightly he is bound into groups. Here 'social integration' is not tied to any one specific group, time or place. It is thus an 'abstract' concept which is applicable not only to suicide but to a much wider range of occurrences.

THE VARIABLE

For moving from abstract concepts to the practice of social research, we have to explore some additional terms. One such term is 'variable': A variable is a characteristic that takes on two or more values. It is something that varies. It is a characteristic that is common to a number of individuals, groups, events, objects, etc. The individual cases differ in the extent to which they possess the characteristic. Thus, age (young, middle-aged, old) income class (lower, middle, upper), caste (low, intermediate, high), education (illiterate, less educated, highly educated), occupation (low status, high status), etc., are all variables.

It is not unusual to see some confusion between variables and the attributes or categories of which they consist. 'Gender' is a variable consisting of two categories of male and female. 'Income' is a variable consisting of different categories of destitutes, poor, middle class and rich persons. The researcher has to be clear of this distinction between variable and category.

The variables selected for analysis are called *explanatory* variables and all other variables are *extraneous*. Extraneous variables which are not part of the explanatory set are categorised as controlled or uncontrolled variables. Controlled variables, commonly called *control* variables, are held constant or prevented from varying during the course of study. This is to limit the focus of the research. For example, in age, all males and females under 18 years of age may be excluded from study. This would mean that the hypothesis is not concerned with specific sub-groups.

Thus, variables may have different degrees of magnitude or differ-

ent categories (e.g., positive or negative) so that the category of characteristic, in which the case falls, differentiates it from others.

Types of variables

Variables are classified in various groups as under: (i) dependent and independent, (ii) experimental and measured, (iii) discrete and continuous, (iv) qualitative and quantitative, and (v) categorical and numerical.

Dependent and independent variables

An *independent* variable is the presumed *cause* of the dependent variable—the presumed *effect*. When we say, A causes B, it means A is independent variable and B is dependent variable. The independent variable thus is one which explains or accounts for variations in the dependent variable. A *dependent* variable (also called Y variable in statistics) is one which changes in relationship to changes in another variable(s). An independent variable (also called X variable in statistics) is one whose change results in the change in another variable. In a controlled experiment, the independent variable is the experimental variable, i.e., one which is withheld from the control group.

In experiments, the independent variable is the variable manipulated by the experimenter. For example, a teacher wants to know which method of teaching is more effective in the students' understanding: lecture method, question-answer method, visual method or combination of two or more of these methods. Here, teaching method is independent variable which is manipulated by the teacher. The "effect on students' understanding" is the dependent variable. The dependent variable is the condition we are trying to explain. In this experiment, besides the methods of teaching, other independent variables could be personality types (of students), social class (of students), types of motivation (reward and punishment), class atmosphere, attitude towards teacher, and so on. Similarly, in studying juvenile delinquency (dependent variable), the independent variables (i.e., causes) could be poverty, type of associations, nature of family control, and so on.

It may be noted that a variable which is dependent in one study can be independent in another. Take the case of relation between farmer's income and availability of water. If we take income as de-

pendent variable and water availability (for irrigation) as independent variable, the relationship between the two variables may be shown as higher the availability of water, higher would be income and vice versa. But, if we want to show relationship between income (independent variable) and quality of life (dependent variable), we may say: higher the income, higher the quality of life (or living standard). In the first study, income is the result and in the second, study it is the cause.

Intervening variable is one that comes between the independent and the dependent variables. Suppose we hypothesise the relationship between cultivators' poverty and size of landholding. We say, lower the size of landholding, higher the cultivator's poverty and vice versa. But it is possible that even when a person owns large landholding, he may not use good seed, good fertiliser, and tractor, etc. These will reduce income and increase poverty, i.e., they would change our stated relationship. In other words, technology, seeds, manure might intervene between a cultivator's agricultural production and his income, i.e., poverty. All these variables (technology, seed, manure) will be intervening variables.

Experimental and measured variables

The experimental variables spell out the details of the investigator's manipulations while the measured variables refer to measurement. For instance, rural development (measured variable) may be assessed in terms of increase in income, literacy level, infrastructure, availability of medical facilities, availability of social security, and so forth. In another study on factors affecting student's achievement (high or low marks), we may examine the absence/availability of books, libraries, good teachers, use of visuals and so on. All these will be experimental variables or experimental manipulations for the researcher. It is important when planning and executing research to distinguish between these two types of variables.

Measurement of variables

Measurement of variables can be performed at four levels: nominal, ordinal, interval and ratio.

Nominal level is the simplest type of measurement. It involves classification of events into categories that must be distinct, unidimensional and mutually exclusive. For example, classifying the

respondents in categories such as male-female, married-unmarried, young-old, Hindu-Muslim, rural-urban, illiterate-educated is based on nominal measurement. Nominal measurement has following characteristics: (i) it is essentially qualitative, (ii) it cannot be arranged in a continuum of low-high, and (iii) it is based on the principle of equivalence.

Ordinal level involves not only categorisation but also ranking of variables in a continuum of low-high, e.g., first, second and third divisioner students; lower, middle and upper classes; low, intermediate and high castes, etc. Other examples (besides income, class, caste) of forms of continuum in ordinal measurement are: status (low, middle, high), size (small, medium, big), quality (poor, good, excellent), occupation (high and low status occupation).

Interval level provides information about the distance between the values and contains equal intervals, e.g., every 5th, 10th, 15th student... This is essentially a quantitative measurement. The other example is, say, of IQ of three students being 100, 110 and 125 respectively. In nominal terms, this means that students have different IQ; in ordinal terms, the first student has lower IQ, the second high, and the third higher IQ; in interval terms, this means that the IQ of second student is 10 points higher than that of the first student and of third student is 15 points higher than that of the second student.

Ratio level measures proportions and ratios, i.e., relates one value to another. For example, one person's weight is 30 kilos and other's is 60 kilos. This means that the second is twice as heavy as the first.

Variables are not measured at one specific level only. It will depend on the type of indicators used during measurement. For instance, age can be measured nominally (young, middle-aged, old), ordinally (youngest, oldest person), at interval level (students with a difference of 5 years), and at ratio level (40 year person is twice as old as 20 year person).

Active and assigned variables

Manipulated or experimental variables will be called *active* variables, while measured variables will be called *assigned* variables. In other words, any variable that is manipulated is an active variable and variable that cannot be manipulated is an assigned variable.

Qualitative and quantitative variables

The quantitative variable is one whose values or categories consist of numbers and if differences between its categories can be expressed numerically. Thus, age, income, size are quantitative variables. The *qualitative* variable is one which consists of discreet categories rather than numerical units. This variable has two or more categories that are distinguished from each other. Class (lower, middle, upper), caste (low, intermediate, high) sex, (male, female), religion (Hindu, non-Hindu) are all qualitative variables.

Relationships among *quantitative* variables may be either positive or negative (Singleton and Straits, 1999 :76). A *positive* relationship exists if an increase in the value of one variable is accompanied by an increase in the value of the other, or if decrease in one is accompanied by decrease in the other. In other words, the two variables constantly change in the same direction, e.g., the taller a father, the taller will be his son. The *negative* relationship between variables exists if the decrease in the value of one variable is accompanied by an increase in the value of the other, e.g., as age increases, the life expectancy decreases.

Therese Baker (*Doing Social Research*, 1988:125-126) has used the terms categorical and numerical variables for qualitative and quantitative variables respectively. The former (e.g., occupation, religion, caste, gender, education, income) are made up of sets of categories (or attributes) which must follow two rules: one, the categories must be *distinct* from one another, i.e., they must be mutually exclusive; two, the categories must be *exhaustive*, i.e., they should cover all the potential range of variation in a variable. After putting himself in the categories of educated (other being illiterate) in the field of education, one can put himself in the subcategory of undergraduate, graduate, postgraduate, etc.

Numerical variables are broken down into units in which the numbers used carry mathematical meaning. The numbers may be either *discrete* (1, 2, 3, etc.) which cannot be broken down into smaller fractional quantities (e.g., number of children) or *continuous*.

What is the relationship between a qualitative and a quantitative variable? What happens when both qualitative and quantitative variables are involved. In such cases, most often, the independent variable is qualitative (say, income) and the dependent variable is quantitative (say, crime). A relationship is said to exist if the different categories of the independent variable (say, low, middle and upper income groups)

predict different values for the dependent variable (say, crime). Thus, if each category of the independent variable is treated as a distinct group, then a relationship can be described in terms of the differences among groups on the dependent variable (say, people in lower income groups commit more crimes than in middle and upper income groups). Here, crime rate is a quantitative variable. Average crimes in a year could be computed for each of the three income groups. This may indicate a relationship between crime and income.

The variables can also be dichotomous or continuous. While sex is dichotomous variable, intelligence is continuous variable. Ordinarily, only a few variables are true dichotomies. Most variables are capable of taking on continuous values. Nevertheless, it is useful to remember that it is often convenient or necessary to convert continuous variables to dichotomous or trichotomous variables.

THE MODERATOR VARIABLE

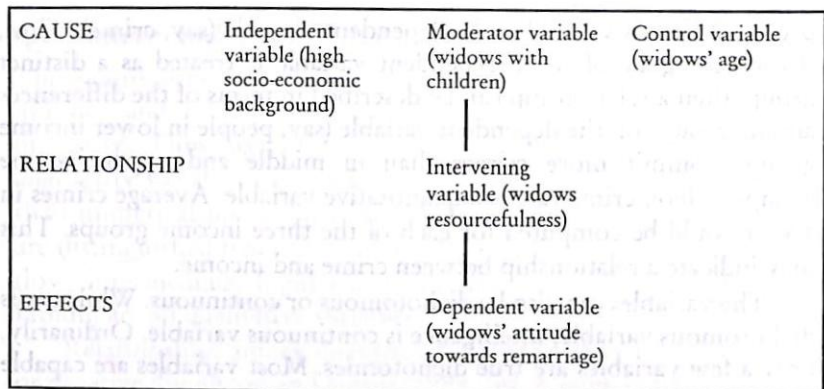
This is a *secondary independent* variable which is selected for study to determine if it affects the relationship between the primary independent variable and the dependent variable. In the relationship between X (independent variable) and Y (dependent variable), if Y is altered by the third factor Z, then Z will be a *moderator* variable. Suppose we take a hypothesis: "Widows' attitudes to remarriage are related to their socio-economic background." Here widows' attitudes are dependent variable and their socio-economic background is independent (primary) variable. It is possible that widows having children or no children may also affect their attitudes towards remarriage. Thus, the third factor 'widows with children' (secondary independent variable) can also affect their attitudes.

The combined variables

The relationship between five types of variables can be illustrated with the help of the diagram (given on the next page), by taking the above example of widows' attitudes towards remarriage.

Difference between 'constructs' and 'variables'

The main difference is that the former are non-observables and the latter are observables. Tolman (*Behaviour and Psychological Man*, 1958:



115-129) has called constructs as 'intervening variables'. These terms account for directly unobservable processes that in turn account for behaviour. An intervening variable cannot be seen, heard or felt. It is inferred from behaviour, e.g., 'hostility' is inferred from aggressive acts; 'learning' is inferred from achieving high marks in exams; 'anxiety' is inferred from the restlessness of a person.

How are the *appropriate* variables located for a study? These depend upon the problem selected, one's own ideas and perceptions about the problem, and the available literature related to the problem. Suppose we want to study factors that affected voting behaviour in September 1999 parliamentary elections in India. The important factors usually stated to affect the voting behaviour are voter's socio-economic status (SES), his political ideology, the crucial issues before the country and the programmes and policies of the political parties contesting elections. Now, SES in India includes not only *education*, *occupation* and *income* (indicating that education increases maturity, class background points out the economic interests of a person (i.e., whether he is attracted more to party's policy of liberalism or party's programme of reducing taxes and so on) and occupation (say, agriculture or service or business or profession) affecting individual's attraction towards party's proclaimed manifesto for giving concessions) but also *religion* (Muslims criticising the Hindu-oriented policies of a particular party), *caste* (castes demanding to be declared as OBC and party proclaiming to support this demand after coming in power), *tribe* (some tribes demanding a separate state) and *residence* (*rural people* being more conservative having low political awareness, etc.). The crucial issues may be whether a foreigner should become the