

# 3 Hypotheses

After operationalising the variables, the researcher wants a clear framework and guide for collecting and interpreting the data. His interest is to determine relationships between variables. Hypotheses provide such guidance. While in qualitative research, hypotheses emerge out of the research, in quantitative research, hypotheses act as a step towards research.

## WHAT IS A HYPOTHESIS?

A hypothesis is an assumption about relations between variables. It is a tentative explanation of the research problem or a guess about the research outcome. Before starting the research, the researcher has a rather general, diffused, even confused notion of the problem. It may take long time for the researcher to say what questions he had been seeking answers to. Hence, an adequate statement about the research problem is very important. What is a good problem statement? It is an interrogative statement that asks: what relationship exists between two or more variables? It then further asks questions like: Is A related to B or not? How are A and B related to C? Is A related to B under conditions X and Y? Proposing a statement pertaining to relationship between A and B is called a hypothesis.

According to Theodorson and Theodorson (1969:191), "a hypothesis is a tentative statement asserting a relationship between certain facts. Kerlinger (1973:8) describes it as "a conjectural statement of the relationship between two or more variables". Black and Champion (1976:126) have described it as "a tentative statement about something, the validity of which is usually unknown". This statement is intended to be tested empirically and is either verified or rejected. If the statement is not sufficiently established, it is not considered a scientific law.

Webster (1968) has defined hypothesis as "a tentative assumption

made in order to draw out and test its logical or empirical consequences". 'Test' here means "either to prove it wrong or to confirm it". Since statements in hypothesis have to be put to empirical investigation, the definition of hypothesis excludes all statements which are merely opinions (e.g., aging increases ailments), value judgements (e.g., contemporary politicians are corrupt and have a vested interest to serve), or normative (e.g., all people should go for a morning walk). Normative statement is a statement of what ought to be, not a factual statement that can be shown through investigation to be right or wrong.

In other words, a hypothesis carries clear implications for testing the stated relationship, i.e., it contains variables that are measurable and specifying how they are related. A statement that lacks variables or that does not explain how the variables are related to each other is no hypothesis in scientific sense.

Following are a few examples of hypotheses:

- Group study increases higher division achievement.
- Hostlers use more alcohol than non-hostlers.
- Young girls (between 15-30 years) are more victims of crimes against women than middle-aged women (between 30-40 years).
- Lower-class men commit more crimes than middle-class men.
- High-status high-ability students participate much less in students' agitations than low-status low-ability students.
- Suicide rates vary inversely with social integration.
- Young people are more satisfied with efforts for social development by democratic leadership than by autocratic leadership.
- Educated women have more adjustment problems after marriage than illiterate women.
- Economic instability hampers development of an establishment.
- Job satisfaction decreases as working hours increase.
- Aggression is caused due to frustration.
- Children from broken homes tend to become delinquents.
- Unemployment decreases juvenile delinquency.
- Upper-class people have fewer children than lower-class people.

### CRITERIA FOR HYPOTHESES CONSTRUCTION

Hypothesis is never formulated in the form of a question. Bailey (1982), Becker (1989), Selltiz et al (1976), and Sarantakos (1998:134)

have pointed out a number of standards to be met in formulating a hypothesis:

1. It should be empirically testable, whether it is right or wrong.
2. It should be specific and precise.
3. The statements in the hypothesis should not be contradictory.
4. It should specify variables between which the relationship is to be established.
5. It should describe one issue only.

A hypothesis can be formed either in descriptive or relational form. In the former, it describes events, whereas in the latter it establishes relations between variables. A hypothesis can also be formed in the directional, non-directional or null form.

### NATURE OF HYPOTHESES

A scientific justified hypothesis must meet the following criteria:

- It must accurately reflect the relevant sociological fact.
- It must not be in contradiction with approved relevant statements of other scientific disciplines.
- It must consider the experience of other researchers.

Hypotheses cannot be described as true or false. They can only be relevant or irrelevant to the research topic. For instance, the causes of poverty in a village can be explored in terms of:

- (i) Low development of agriculture (caused by lack of irrigation, sandy soil, erratic rainfall and use of traditional agricultural implements) causes poverty.
- (ii) Lack of infrastructure (electricity, roads, markets) causes poverty.
- (iii) Barriers in rural development are resource barriers (water, soil, minerals), support barriers (rainfall, irrigation, livestock) and social system barriers (credit, infrastructure, extravagant expenditure and market barriers).

The important hypotheses could be:

1. Rural poverty is positively co-related with availability of and accessibility to credit.
2. Rural poverty is the result of lack of infrastructural facilities.
3. Poverty is associated with extravagant social expenditure.
4. Rural poverty is adversely related to resource barriers (water, soil, minerals).

Sarantakos (1998:135) has presented a few hypotheses pertaining to the effects of education on religiosity: (i) high education is associated with low religiosity, (ii) education is adversely related to religiosity, (iii) education is positively correlated with religiosity, and (iv) there is no relationship between education and religiosity.

## DIFFERENCE BETWEEN A PROPOSITION, A HYPOTHESIS AND A THEORY

### A proposition

A proposition is "a statement about relationships among concepts or variables" (Zikmund, 1981:22). Bailey (1978:40) says that it is a generalised statement of a relationship among facts or about one or more facts or phenomena. Consider the following proposition in business administration: If reinforcements follow each other at evenly distributed intervals and everything else is held constant, the resulting habit will increase in strength as a positive growth function of the number of trials (Zikmund, op.cit:22). This proposition identifies relationship between the concepts 'reinforcements' and 'habit'. It identifies the direction and magnitude of this relationship.

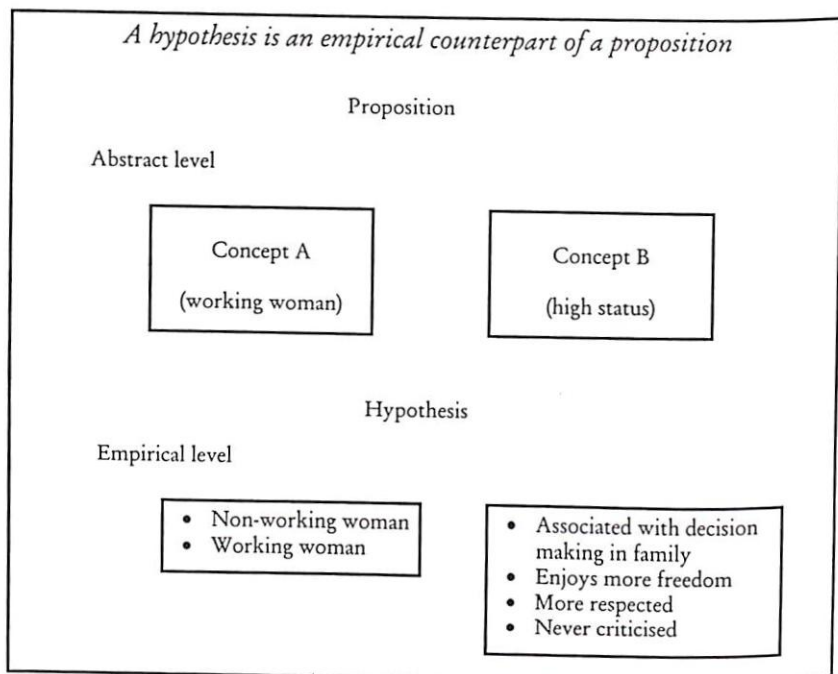
A proposition that discusses a single variable is called *univariate* proposition (e.g., hostler boys are more smokers). A *bivariate* proposition is one that relates two variables (e.g., illiterate and poor women are more exploited by in-laws than educated and rich women). A proposition relating more than two variables is called *multivariable* (e.g., the higher the illiteracy among females, the poorer their self-image and the higher their exploitation by males).

Multivariate propositions are generally written as two or more bivariate propositions. For instance, in the above example, the two bivariate propositions will be: (1) the higher the illiteracy among women, poorer will be their self-image; and (2) the lower the self-image, the higher will be women's exploitation. Of these two propositions, either both can be rejected or accepted or one can be accepted and other rejected. In social research, most propositions are bivariate.

Just as concepts are the building blocks of propositions, propositions are the building blocks of theories. Sub-types of propositions include hypotheses, empirical generalisations, postulates and theorems.

## A hypothesis

A hypothesis is a proposition that is empirically testable. For example, the proposition "non-working women enjoy lower social status than working women" can be empirically verified. Here, the variables are woman's work and social status which can be measured.



Bailey (1982:41) has also said: "Hypothesis is a proposition stated in a testable form which predicts a particular relationship between two or more variables." It is also described as "a tentative statement asserting a relationship between certain facts".

For example, in Sutherland's "Theory of Differential Associations" pertaining to the causes of crime, the important proposition given is that "crime is a behaviour learned in a process of communication with persons in primary groups who define the legal rules unfavourably". The questions we can ask here are: Is crime learnt through interaction? Is interaction with criminals more important in learning crime? How and why is interaction in primary groups different from the one in other (or secondary) groups? On the basis of these

arguments, Sutherland's proposition (about crime causation) has not been accepted.

According to Blalock, the task of science is not to prove but to disprove and reject the hypothesis. For example, take the following hypothesis: "Probability that the sale of commodity is dependent on multiple causes is greater than the probability that it is caused by one single factor." *This has to be disproved and rejected.*

### A theory

According to Theodorson and Theodorson (1969:436), a theory is a set of assumptions. The body of the theory is composed of logically interrelated and empirically verifiable propositions. The propositions of a theory are constantly subject to further empirical testing and revision. Zikmund (1988:20) has described theory as "a coherent set of internal propositions explaining apparent relationships of certain observed phenomena".

The two purposes of theory are understanding and prediction. In most situations, prediction and understanding go hand in hand. To predict phenomena, we must have an explanation of why variables behave as they do. Theories provide these explanations. For example, the Aggression-Frustration Theory is that aggression is a response to frustration. The explanation is that aggression is a learned social behaviour and that it is provoked when the individual feels frustrated (not deprived). He learns that *aggression often pays*. This learning is not only by one's own experiencing but also by observing others. But merely to say that aggressive responses are learned does not help us predict when such responses will actually occur. Aggressive acts are motivated by a variety of aversive experiences like frustration, pain, insults. Such experiences arouse individuals emotionally. But whether they will act aggressively or not will depend upon what consequences they anticipate. Individuals act aggressively when they feel they will be rewarded.

The propositions that comprise a theory are regarded as scientific laws if they have been sufficiently verified to be widely accepted. Through the process of *deduction*, a theory provides specific hypotheses for research, and through *induction*, research data provide generalisations to be incorporated into and modify a theory. The essence of theory is that it attempts to explain a wide variety of empirical phenomena.

According to Black and Champion (1976:56), a theory is “a set of systematically related propositions specifying causal relationships among variables. The ideas in a theory must conform to the following criteria (Ibid:57):

1. They must be logically consistent, i.e., there should be no internal contradictions.
2. They must be interrelated.
3. The propositions should be mutually exclusive.
4. They must be capable of being subjected to empirical scrutiny.

### TYPES OF HYPOTHESES

Hypotheses are classified as working hypotheses, research hypotheses, null hypotheses, statistical hypotheses, alternative hypotheses and scientific hypotheses.

*Working hypothesis* is a preliminary assumption of the researcher about the research topic, particularly when sufficient information is not available to establish a hypothesis, and as a step towards formulating the final research hypothesis. Working hypotheses are used to design the final research plan, to place the research problem in its right context and to reduce the research topic to an acceptable size. For example, in the field of business administration, a researcher can formulate a *working hypothesis* that “assuring bonus increases the sale of a commodity”. Later on, by collecting some preliminary data, he modifies this hypothesis and takes a *research hypothesis* that “assuring *lucrative* bonus increases the sale of a commodity”.

*Scientific hypothesis* contains statement based on or derived from sufficient theoretical and empirical data.

*Alternative hypothesis* is a set of two hypotheses (research and null) which states the opposite of the null hypothesis. In statistical tests of null hypotheses, acceptance of  $H_0$  (null hypothesis) means rejection of the alternative hypothesis; and rejection of  $H_0$  means similarly acceptance of the alternative hypothesis.

*Research hypothesis* is a researcher's proposition about some social fact without reference to its particular attributes. Researcher believes that it is *true* and wants that it should be *disproved*, e.g., Muslims have more children than Hindus, or drug abuse is found more among upper-class students living in hostels or rented rooms. Re-

search hypothesis may be derived from theories or may result in developing of theories.

*Null hypothesis* is reverse of research hypothesis. It is a hypothesis of no relationship. Null hypotheses do not exist in reality but are used to test research hypotheses (ibid.:128-129).

Why is research hypothesis changed in null hypothesis for verification? The main reasons according to Black and Champion are: (1) It is easier to prove something *false* than to prove it *true*. (2) When one tries to prove something, it indicates his firm belief and commitment to the idea but when he wants to disprove it, it indicates his objectivity. (3) It is based on *probability* theory, i.e., it can either be *true* or *false*. It cannot be *both*. (4) It is a convention in social research to use null hypotheses.

*Statistical hypothesis*, according to Winter (1962), is a statement/observation about statistical populations that one seeks to support or refute. The things are reduced to *numerical quantities* and decisions are made about these quantities, e.g., income difference between two groups: group A is richer than group B. Null hypothesis will be: group A is not richer than group B. Here, variables are reduced to measurable quantities.

<i>Research Hypothesis</i>	<i>Null Hypothesis</i>	<i>Statistical Hypothesis</i>
$H_1$	$H_0$	$H_1$ and $H_0$
Two industrial establishments differ in mean profits	Two industrial establishments do not differ but are the same in mean profits	$H_0 : \bar{X}_1 = \bar{X}_2$ $H_1 : \bar{X}_1 \neq \bar{X}_2$ $H_0$ is rejected
$H_1 : \bar{X}_1 \neq \bar{X}_2$	$H_0 : \bar{X}_1 = \bar{X}_2$	$H_1$ is proved Null hypothesis is not true Research hypothesis is supported
$H_0$ is derived from $H_1$		
$H_1$ is researcher's proposition		$H_0$ is not true $H_1$ is supported

Symbolically, the hypothesis may be shown as below:



		(mean age)		(same)	( $\bar{X}$ bar sub one)
Null	$H_0$	:	$\bar{X}_1$	=	$\bar{X}_2$
	$H_1$	:	$\bar{X}_1$	#	$\bar{X}_2$
Working/research					
	$H_2$	:	$\bar{X}_1$	>	$\bar{X}_2$ (greater than)
	$H_3$	:	$\bar{X}_1$	<	$\bar{X}_2$ (less than)

In the above example, in *null hypothesis*, mean age for the first group (A) is the same one as mean age for the second group (B), i.e., *two groups do not differ in average age*. In *research hypothesis*, group A is older than group B.

$$H_0 : \bar{x}_1 < \bar{x}_2 \text{ less than}$$

$$= \text{equal to}$$

$$H_1 : \bar{x}_1 > \bar{x}_2 \text{ greater than}$$

It could be said that:

- Research hypothesis is a derived hypothesis.
- Null hypothesis is research hypothesis to be tested.
- Statistical hypothesis is numerical expression of null hypothesis.

The process of formulating hypotheses may start with developing working hypotheses, which are then gradually upgraded to research hypotheses and finally translated into statistical hypotheses (null hypotheses and alternative hypotheses). The collected data will then allow statistical testing and show whether the research hypothesis is accepted or rejected.

Goode and Hatt (1952:59-62) have given the following three types of hypotheses on the basis of level of abstractness:

1. which presents proposition in common sense terms or, about which some common sense observations already exist or, which seeks to test common sense statements.

For example:

bad parents produce bad children, or  
committed managers always give profits, or  
rich students drink more alcohol.

2. which are somewhat complex, i.e., which give statement of a little complex relationship.

For example:

- (i) Communal riots are caused by religious polarisation (V.V.Singh).
  - (ii) Growth of cities is in concentric circles (Burgess).
  - (iii) Economic instability hampers development of an establishment.
  - (iv) Crime is caused by differential associations (Sutherland).
  - (v) Juvenile delinquency is related to residence in slums (Shaw).
  - (vi) Deviant behaviour is caused by mental disorders (Healy and Bronner).
3. which are very complex, i.e., which describe relationship between two variables in more complex terms, e.g., high fertility exists more in low income, conservatives, and rural people than in high income, modern, and urban people. Here dependent variable is 'fertility' while independent variables are income, values, education, and residence, etc. The other example is: Muslims have high fertility rate than Hindus. We have to keep number of variables constant to test this hypothesis. This is abstract way to handle the problem.

### DIFFICULTIES IN FORMULATING HYPOTHESES

According to Goode and Hatt (1952:57), three main difficulties in formulating hypotheses are:

1. Inability to phrase the hypothesis properly.
2. Absence of clear theoretical framework or knowledge of theoretical framework, e.g., awareness of rights among women depends upon personality, environment (education and family and aspirations).
3. Lack of ability to utilise the theoretical framework logically, e.g., workers' commitment and role skills and role learning.

Evaluating whether a hypothesis is good or bad depends upon the amount of information it provides about the phenomenon. For example, let us take the following hypothesis, given in three forms:

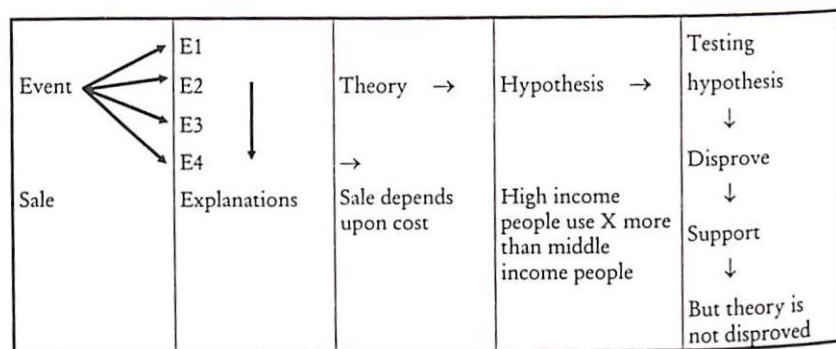
- (i) X is associated with Y.
- (ii) X is dependent on Y.
- (iii) As X increases Y decreases.

Of these three forms, third form explains the phenomenon better. We can take two more examples of good and bad hypotheses:

- (i) More the institutionalised controls, more the strains.

(ii) Rigid institutionalised control hampers goal-attainment.

The following illustration explains relation between theory, hypothesis and event:



### CHARACTERISTICS OF A USEFUL HYPOTHESIS

Goode and Hatt (1952:67) have described the following characteristics of a good hypothesis:

1. *It must be conceptually clear.* This means that (i) concepts should be defined lucidly, (ii) these should be operationalised, (iii) these should be commonly accepted, and (iv) these should be communicable. In the hypothesis, "as institutionalisation increases, production decreases", the concept is not easily communicable.
2. *It should have empirical referents.* This means that it should have variables which could be put to empirical test, i.e., they should not merely be moral judgements. For example, capitalists exploit workers, or officers exploit subordinates, or young people are more radical in ideas, or efficient management leads to harmonious relations in an establishment. These hypotheses cannot be considered useful hypotheses.
3. *It should be specific,* e.g., vertical mobility is decreasing in industries, or exploitation leads to agitation.
4. *It should be related to available techniques,* i.e., not only the researcher should be aware of the techniques but these should be actually available. Take the hypothesis: "change in infrastructure (means of production and relations of production) leads to change in social structure (family, religion, etc.)". Such hypothesis cannot be tested with available techniques.
5. It should be related to a body of theory.