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1. Hypothesis

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1.1 Introduction:

"……hypotheses are powerful tools for the advancement of knowledge…… This is too important that we ensure to say that there could be no science in any complete sense without hypothesis." – **Kerlinger.**

Any Scientific investigation starts with the statements of the solvable problem. When the problem has been started, a tentative solution in the form of a testable proposition is offered by the investigation. This testable proposition is called a Hypothesis. Hypothesis (i.e. hypo + thesis) means a rational viewpoints i.e., a theory which is still to be reasoned and tested.

Thus a theory which if formulated for the study of the facts and to examine the validity of the theory. Therefore, a hypothesis is nothing but a suggested testable answer to a problem.

In other words, we may say that – "A hypothesis is a testable relationship between two or more that two variables.

1.1.1 Definitions:

A hypothesis involves observation, reflextion, deduction and verifications. It has been defined as any supposition which we make (either without actual evidence or an evidence a roundly insufficient) in order to endeavor to deduce conclusion in accordance with facts which are known to be real, under the idea that if the conclusions to which hypothesis leaps are known truths, the hypothesis itself either must be or at least likely to be, true".

According to Lundberg – "A hypothesis is a tentative generalization the validity of which remains to be tested."

Me Guigan (1990) has defined hypothesis as, "a testable statement of a potential relationship between two or more variables."

Kelinger (1973) has defined as, "a conjectural statement of the relation between two or more variables William H. George has defined that – "The hypothesis actually emerge from the theory.

It is a generalization drawn from the theory itself and when it has been tested and found correct it becomes a part of the theory itself. Thus theory itself in its early form is only a hypothesis and the two are interdependent upon each other."

On the basis of these definitions two points are clear:

- Hypothesis is a testable statement, which means that it displays the relationship between those variables which are measurable or potentially measurable.
- A hypothesis exhibits either a general or specific relationship between variables.

1.2 Sources of Hypothesis:

According to Goode and Hatt following are the sources of a hypothesis:

a. General Culture: The general pattern of culture facilitates in formulating a hypothesis, and also to guide its trend. Culture having immense influence upon the thinking process of people a hypothesis may be evolved to test one or more of these ideas. The metaphysical basis in Indian culture and these metaphysical ideas may form a suitable basis of hypothesis of a social research.

b. Scientific Theory: A theory provides the basis of what has been discovered to be correct. The knowledge of theory enables one to form further generalizations and such corollaries or generalization form the part of hypothesis.

c. Analogies: There are situations when a hypothesis is formed from the analogy. The step taken is find out a similarity between two phenomena. The next step is to form a hypothesis to test whether the two phenomena or similar in any other respect. According to

Prof. Julian Huxley,, the casual observation in nature or frame work of another sciences may be a fertile source of hypothesis.

d. Personal Experience of the Researcher: Goode and Hatt feel that not only do culture, science and analogy effect the formation of hypothesis the way in which an individual reacts to each of these is also a factor in the statement of hypothesis. Sometimes the facts are there, but a right individual assess it in right perspective and formulates a hypothesis.

Importance of Hypothesis in Scientific Research: The importance of hypothesis lies in its indispensability for any research. Hypothesis, forms the basis of the scientific research. In the absence of a clear, simple and scientific hypothesis it would defeat the very purpose of research as in such a situation a lot of time and labour is wanted in fruitless research. The advantages of hypothesis in any scientific enquiry are briefly mentioned below:

a. It gives point to enquiry. Hypothesis makes the research more specific and to the point and lead towards the destination. It is opined that „in the absence of hypothesis the researcher is like a sailor on the vast unchartered sea without compass or rudder. Hypothesis provides direction to research.

b. It helps deciding the direction of research. Since research aims at discovery of new facts, it must be proceeded in a right direction to achieve the goal. Hypothesis provides that direction and thus a scientist with proper hypothesis can arrive at right conclusion in the long run.

c. It helps in selecting required facts. A researcher comes across a number of factors while studying and he must confine himself to the study only those factors that are relevant to our study. This necessitates the process of delimiting and sigling out pertinent facts and hypothesis is essential for the purpose. **P. V. Young** has rightly remarked – "The use of hypothesis prevents a blind search and indiscriminate gathering of masses of data which may later prove irrelevant to the problem under study."

d. It enable the researchers to draw specific conclusions. Hypothesis helps in coming to particular and well defined conclusions. In the opinion of Goode and Hatt: "Without hypothesis the research is unfocussed, a ramdom empirical wandering. The results cannot be stated as facts with clear meaning. Hypothesis is necessary link between theory and investigations, which lead to discovery of addition to knowledge."

1.3 Formulation of Hypothesis:

It is difficult to tell precisely how a scientist formulates a hypothesis because. The process of formulation itself it vague and idiosyncratic. Goode & Hatt (1952) have pointed out three major possible difficulties in formulation of a good research hypothesis.

- The Absence of knowledge of a theoretical framework is a major difficulty in formulating a good research hypothesis. If detailed theoretical evidences are not available or if the investigator is not aware of the availability of those theoretical evidences, a research hypothesis cannot be formulated.
- When the investigator lacks the ability to utilize the knowledge of the theoretical framework, a hypothesis cannot be formulated.
- When the investigator is not aware of the important scientific research techniques, he will not be able to frame a good research hypothesis.

Despite these difficulties, the investigator attempts in his research to formulate a hypothesis. Usually the hypothesis is derived from the problem statement. The hypothesis should be formulated in a positive and substantive form before date is collected. In some cases additional hypotheses may be formulated after data has been collected, but they should be tested on a new set of data and not on the old set which has suggested it. The formulation of a hypothesis is a creative task and involves a lot of thinking, imagination and the like. Reichenbach (1938) has made a distinction between the two process found commonly in any hypothesis-formulation task. One is the *context of discovery* and another is the *context of justification.* The manner or the process through which a scientist arrives at a hypothesis illustrates the context of discovery, and the presentation of evidence or proof in support of the truth of the hypothesis illustrates the context of justification. A scientist is concerned more with the context of justification in the development of a hypothesis. He never puts his ideas or thoughts as they nakedly occur in the formulation of a hypothesis. Rather, he logically reconstructs his ideas and thoughts and draws some justifiable inferences from those ideas and thoughts. He never cares to relate how he actually arrived at a hypothesis. He does not say, for example, that while he was shaving, this particular hypothesis occurred to him. He, usually arrives at a hypothesis by the rational reconstruction of thoughts. When a scientist reconstructs his thoughts and communicates them in the form of a hypothesis to others, he uses the context of justification.

When he arrives at a hypothesis, he extensively as well as intensively surveys a mass of data, abstracts them, tries to find out similarities among the abstracted data and finally makes a generalization or deduces a proposition in the form of a hypothesis.

For example, consider the following situation in Pavlovian conditioning. A bell is sound and immediately after that meant powder is presented to a dog. The dog starts salivating. After a number of presentations of the bell and food, the dog salivates at the mere presentation of the sound of the bell. In such a situation the experimenter observes that all the instances of salivation made in each trial are similar to each other and hence, they are abstracted by him as belonging to one general class of the salivation response. Likewise, the sound of the bell presented in each trial is seen by him as forming one general class because all the sounds of the bell are similar enough to form a class. Thus the scientist uses classification for distributing a mass of data into a smaller number of categories so that they can be effectively handled. Next, he tries to find out the relationship between the classified data so that a hypothesis can be formulated. For example, the experimenter may now formulate the hypothesis: After so many repetitions of the bell and food, the dog will eventually respond to the mere sound of the bell.

The above example, illustrates the typical process through which a scientist, at least a behavioral scientist, proceeds before arriving at a hypothesis. However, there is no dearth of scientists who proceed in a haphazard way in formulating a hypothesis.

1.4 Functions of Hypothesis:

A hypothesis does the following major functions:

A. Hypothesis test the various theories: In behavioural research the researcher develops a theory to account for some phenomenon and then, he devises a means whereby they theory can be tested. He seldom tests the theory directly. Most of the time he conducts tests of hypotheses that have been generated and derived from that theory. If the hypothesis test out as specified by the researcher, it is said that his theory is supported in part. Thus one of the major functions of hypothesis is to make possible to test theories. Thus in this light an alternative definition of a hypothesis can be the statement of theory in a testable form. All statements of theory in testable form can be called hypothesis.

B. Hypotheses suggest the various theories: In behavioural research it is often found that some hypothesis are not associated with any particular theory. It is just possible that as a result of some hypothesis, a theory may eventually be constructed. Therefore, another function of hypothesis is to suggest theories that may account for some event.

Although it is a common practice that the researcher proceeds from theory to hypothesis, occasionally the reverse is true. The researcher may have some idea about why a given phenomenon occurs and he may hypothesize a number of things that relate to it. He may find that some hypotheses have greater potential than others for explaining the event or particular behavior, and a result, he may construct a logical system of propositions, assumption and definitions linking his explanation to the event. In other words, it can be said that he have devised a theory.

C. Hypotheses ten to describe social phenomena: A hypothesis also does a descriptive function. When a researcher tests a hypothesis empirically, it tells him something about the phenomenon it's associated with. If the hypothesis is supported then his information about the phenomenon increases. When the hypotheses are refuted, the test tells us something about the phenomenon the researcher did not now before. The accumulation of information as a result of the hypothesis testing that way reduces the amount of ignorance of the researchers.

Apart from these primary functions, hypotheses also have some important secondary functions. In fact, testing hypotheses tend to refute some „common sense" notion about the behavior of the organism, raise questions about the explanations we presently use to account for things and also tend to alter our orientation towards the environment to one degree or another. Besides these, as a result of testing certain hypotheses, social policy may be formulated in communities, delinquents and offenders may be treated differently, teaching methods may be modified and improved, solutions to various kinds of problems may be suggested and penal institutions may be redesigned and revamped.

1.5 Types of Hypothesis:

On the basis of degree of generality, research can be divided into two types:

- Universal hypothesis
- Existential hypothesis

A universal hypothesis is one in which the stated relationship holds good for all the levels or values of variables which are specified for all time at all places. "Adequate level of light increases reading efficiency" is an example of universal hypothesis.

Existential hypothesis is one which states that the relationship stated holds good for at least one particular case. For example, "there is at least one schizophrenic who does not have either delusion or hallucination" is an example of existential hypothesis. Of those two types of hypotheses, the universal hypothesis is preferred because such a hypothesis has a greater predicative power that the existential hypothesis. As we know hypothesis is a formally stated expectation about a behavior that defines the purpose and goals of the study being conducted. Based upon the goals of explaining and controlling the causes of behavior, there are two types of hypothesis:

- Causal hypothesis
- Descriptive hypothesis

A causal hypothesis postulates a particular causal influence or behavior. In other words, it tentatively explains a particular influence on. Or a cause for, a particular behavior. For example, if the researcher hypothesizes that boring contents of commercial advertisements is the cause of channel changing by TV viewers it becomes the example of causal hypothesis. Although it is a fact that boring contents may not be the only causal influence of the channel-changing behavior, it is the probable cause we are investigating at the moment.

Descriptive hypothesis is one that postulates particular characteristic of a behavior or provides some specific goal for the observation. In fact, such hypothesis tentatively describes a behavior in terms of the characteristic or the situation in which it occurs. Such hypothesis identifies the various characteristics or attributes of behavior and allows us to predict when it occurs. For example, it the researcher hypothesizes that channel changing during TV viewing occurs more frequently when the person is alone than when he is watching with other. The reality may be that even the number of people present might partially cause channel changing, and the researcher has not stated that. In this way, it can be said that a descriptive hypothesis simply describes the behavior in terms of the various characteristics of the situation and it does not attempt to identify the causes of a behaviour.

Apart from these, the other type of hypothesis that we commonly use in behavioral researches are simple hypothesis, complex hypothesis, research hypothesis, null hypothesis and statistical hypothesis. These may be described as under:

C. Simple hypothesis: Simple hypothesis contains only one or two variables. For example, hypotheses like children from broken homes tend to become delinquent, reward improves learning, aggression is associated with frustration are all examples of simple hypothesis. In all these hypotheses the relationship between only two variables have been postulated. Hence, they are example of simple hypotheses.

D. Complex hypothesis: Complex hypotheses are hypotheses which contain more than two variables and therefore, require complex statistical calculation too. Such hypotheses are called complex because the interrelatedness of more than two variables acting simultaneously is more difficult to assess quantitatively and theoretically.

A hypothesis like children from upper and lower socioeconomic status have larger adult adjustment problems than children from middle socio-economic status is an example of a relatively complex hypotheses.

E. Research hypothesis: A hypothesis derived from the researcher's theory about some aspects of behavior is called research hypothesis or is also known as working as a working hypothesis. The researcher believes that his research hypotheses are true or that they are accurate statements about the conditions of things he is investigating. He also believes that these hypotheses are true to the extent that the theory from which they were derived is adequate. In this perspective, Siegel and Castell (1998) have defined research hypothesis as, "the prediction derived from the theory under test."

F. Null hypothesis: A null hypothesis (H_o) is, in a sense, the reverse of a research hypothesis. It is, in fact, a no-effect or difference hypothesis or negation hypothesis that lends to refuse or deny what is explicitly indicated in a given research hypothesis. Generally, the experimenter or researcher's aim is to refuse this hypothesis on the basis of the obtained results so that its reverse, that is, the research hypothesis can be supported or confirmed.

G. Statistical hypothesis: A statistical hypothesis, also known as alternative hypothesis (H_1), is one that makes numerical expressions of null hypothesis and of research hypotheses. In other words, it is operational statement of the investigator's research hypothesis.

The interrelatedness of research hypothesis, null hypothesis and alternative, or statistical, hypothesis can be explained through an example: Suppose a certain social-psychological theory would lead us to predict that two specified groups of people would differ on the measure of intelligence. This prediction would be our research hypothesis which would state that the two groups differ. Confirmation of this hypothesis would lend support to the theory from which it was derived. To test this research hypothesis, we state it in an operational form as the alternative hypothesis, that is, H_1. One operational way to state this alternative hypothesis would be that mean intelligence scores of these two groups differ or are unequal. The null hypothesis (H_0) would be that the mean intelligence score of the two groups is the same. If the data permits us to reject H_0 then H_1 would be accepted because the data support the research hypothesis and its underlying theory.

In fact the nature of the research hypothesis determines how the alternative hypothesis (H_1) should be stated. If the research hypothesis simply states that two groups will differ with respect to mean then the alternative hypothesis would be simple that mean of the two groups are not equal. But if the research hypothesis predicts *difference with direction*, that is, one specified group will have a larger than the other then the alternative hypothesis may be that the mean of group 1 is greater or less than the mean for group 2.

Thus, we can say that hypothesis is important not just in Social Research but also in every other disciplines. It is often used to limit the scope of research undertaking. A well-chosen hypothesis will increase the chance of success. It is a needed information for the correct application of results found in a research. We can conclude in the word of Kerliner – "There is little doubt that hypothesis are important and indispensable tools of scientific research.

1.6 References:

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