SOURCES OF DERIVING HYPOTHESES

Following sources have been identified for deriving hypotheses:

Cultural values of society

American culture, for example, emphasises individualism, mobility, competition and equality, while Indian culture emphasises tradition, collectivism, *karma* and unattachment. Therefore, Indian cultural values enable us to develop and test the following hypotheses:

(i) Residential jointness in Indian family has decreased but functional jointness continues to exist.
(ii) Divorce is used as a last resort by a woman to break her marriage.
(iii) Caste is related to voting behaviour among Indians.
(iv) Indian family comprises of not only primary and secondary kin but most often of tertiary and distant kin too.

Past research

Hypotheses are often inspired by past research. For example, a researcher studying the problem of student unrest may use the finding of another study that "students having spent two or three years in the college/university take more interest in students' problems in the campus than freshers; or that "students with high ability and high social status participate less in students' agitations than those who have low ability and low social status". Such hypotheses could be used either to replicate past studies or revise the hypotheses that the alleged correlation does not exist.

Folk wisdom

Sometimes researchers get the idea of a hypothesis from commonly held lay beliefs, e.g., caste affects individual's behaviour, or that geniuses lead unhappy married life, or married women without children are less happy, or that young illiterate married girls are more exploited in joint families, or that being an only child creates barriers in child's development of some personality characteristics, and so on. Although social scientists are often accused of stating the obvious, social researchers who test a hypothesis based on "what everybody knows is true" often find that it is not true after all.

Discussions and conversations

Random observations during discussions and conversations and reflections on life as a person throw light on events and issues.

Personal experiences

Very often researchers see evidence of some behaviour pattern in their daily lives.

Intuition

Sometimes the investigators get a feeling from inside that certain phenomena are correlated. The suspected correlation leads the investigator to hypothesise a relationship and conduct a study to see if his/her suspicions are confirmed. For example, living in a hostel for a few years gives an idea to the hostler that "lack of control leads to deviant behaviour". He/she therefore decides to study hostel sub-culture.

Hypothesis can be deducted from theory itself, i.e., theory points out the direction of research. For example, a hypothesis may be deduced from Frustration-Aggression Theory that "preventing children from reaching desired goals (frustrations) will result in (their) aggressive behaviour".

FUNCTIONS OR IMPORTANCE OF HYPOTHESES

Sarantakos (1998:137) has pointed out following three functions of hypotheses:

1. to guide social research by offering directions to the structure and operation;
2. to offer a temporary answer to the research question; and
3. to facilitate statistical analysis of variables in the context of hypothesis testing.

The importance of hypotheses can also be pointed out in following terms:

1. Hypotheses are important as tools of scientific inquiry/research because they are derived from theory or lead to theory. The relationship expressed in the hypothesis tells the researcher how to conduct inquiry, what types of data need to be collected and how are the data to be analysed. Suppose we take three hypotheses: H_1,

H_2 and H_3. We say, if H_1 is true, H_2 will also be true but H_3 will not be true. Then, we test H_2 and H_3. If H_2 is found true and H_3 not true, H_1 will be confirmed.

2. The facts (in hypotheses) get a chance to establish the probable truth or falsify it. A problem really cannot be scientifically solved if it is not reduced to hypothesis form because a problem is a question of a broad nature and in itself, not directly testable. One does not test the question but one tests relationship between two variables.
3. Hypotheses are tools for the advancement of knowledge as they stand apart from man's values and opinions.
4. Hypotheses help the social scientists to suggest a theory that may explain and predict events. Though more often research proceeds from theories to hypotheses, occasionally the reverse is true.
5. Hypotheses perform a descriptive function. The tested hypothesis tells us something about the phenomenon it is associated with. The accumulation of information as a result of hypothesis testing reduces the amount of ignorance we may have about why a social event occurs a given way.

In a nutshell, the main functions of hypotheses are: (i) to test theories, (ii) to suggest theories, and (iii) to describe social phenomena. The secondary functions are: (a) to help in formulating social policy, say, for rural communities, penal institutions, slums in urban communities, educational institutions, solutions to various kinds of social problems; (b) to assist in refuting certain 'common sense' notions (e.g., men are more intelligent than women); and (c) to indicate need for change in systems and structures by providing new knowledge.

TESTING HYPOTHESES

For testing a hypothesis, we have to define the concepts (used in the hypothesis) in a measurable way. For example, "genius often lead unhappy married life" is not a testable hypothesis unless it is defined on an empirical level, i.e., in terms of intelligence quotient (IQ) and characteristics/indicators of happy/unhappy married life. If we say "higher the IQ of a person, more the marital conflicts in his family", by measuring the IQ and the conflicts, we can test the hypothesis. No wonder, scholars talk in favour of quantitative measurement of variables in a hypothesis as quantification eliminates vagueness.

When concepts in the hypothesis are abstract and it is difficult to

measure them, how can one be sure that one's measure of the concept is error-free?

Classical approach

Bailey (1982:53) has suggested the classical approach to hypothesis construction and testing. This approach consists of three stages: the first is the conceptual stage, the second is the empirical stage, and the third is gathering data and analysing it. In other words, the first stage is of defining the concepts/variables and writing a proposition stating a relationship between them. The second stage includes writing a testable hypothesis that links the empirical measures of the two concepts. The third stage is of verifying the hypothesis on the basis of collected data and analysing it. Thus, the hypothesis "geniuses often lead unhappy married life" is the first stage of conceptual level. In the second stage it is expressed in terms of empirical measures, i.e., "higher the IQ of a person, higher the marital conflicts in his family". In the third stage, by measuring the IQ and assigning scores to different IQ levels (say, less than 80, 81-90, 91-100, 101-110, 111-120, 121-130 and more than 130) and measuring the number of conflicts in a year (say, less than 4 conflicts, 4-6 conflicts, 7-9 conflicts, 10-12 conflicts, and more than 12 conflicts) and assigning scores to conflicts, the hypothesis can be verified. Here, happiness is measured only in terms of one variable, viz., marital conflicts. But one can take many variables and assign scores to each one of them. For example, number of conflicts, enacted role being in conformity to expected role, finding time to spend with partner, taking interest in friendship associations company and the educational career of children, occasionally visiting friends and relatives with spouse, and so forth. Giving two scores to each indicator of marital happiness, we can calculate the total scores secured by the respondent and measure his level of marital happiness. By relating the scores secured in IQ test, we can determine whether the hypothesised relationship (higher the IQ, lesser the happiness) exists or not. We may not find any relationship between the two or if the relationship is positive, it could be strong or weak. Here the researcher has also to show that it is not the high IQ in itself which leads to marital conflicts but the high IQ makes the person to remain more committed to work roles because of which he neglects the roles in his home, affecting relations with wife and children and creating marital conflicts too.

The reasons for failure of hypothesis could be many: (1) the stated

hypothesis may be simply incorrect; (2) proposition in the first stage may be correct but in the second stage may be incorrect; (3) there may be measurement error; (4) the sample on which the hypothesis was tested may be inadequate; and (5) the respondents selected may be wrong people. A hypothesis that is designed to be revised, if necessary, on the basis of findings is called a working hypothesis.

Hypothetico-deductive method

Singleton and Straits (1999:53-58) have referred to the hypothetico-deductive method in testing hypothesis. This method involves three steps: the first is forming a hypothesis, the second is deducing consequences from the hypothesis and the third is making inferences about the hypothesis on the basis of one's observations. We can take the example of Durkhiem's work on suicide where he says: "higher the social solidarity, lower the suicide rate". He has analysed social solidarity among married persons and divorced/widowed persons, childless persons and persons with children, city dwellers and rural people, and so on. This is how Durkheim tests his hypothesis through hypothetico-deductive method.

I step (proposing hypothesis)

If the social solidarity in one group is higher than in another, then its suicide rate will be lower (*hypothesis*).

2nd step (deducing consequences from the hypothesis)

Social solidarity is higher among married people than among widowed or divorced persons.

3rd step (making inference on the basis of observations)

The suicide rate is lower among married people than among widowed or divorced persons (*observed fact*).

Explaining facts in this fashion indicates that we have a legitimate hypothesis, which does not necessarily mean that it is true.

Let us take one more illustration on hypothesis testing in a research on widows. Suppose a woman becomes a widow at a very young age (say, within a year or so after marriage at the age of 22-23 years). She faces two problems: one of bereavement and other of ex-

ploitation by in-laws. How does she adjust herself in the new situation? Her adjustment will depend on: (1) the functioning of social structures in which she lives and works, i.e., help and barriers she faces in renewing, redeeming, restoring, reviving and revitalizing her life; (2) her social background (age, education, value orientation, job, etc.); (3) dependence on traditional support networks (i.e., in-laws, parents, office colleagues, neighbours, kin, peers, etc.); (4) gender-specific support system, i.e., help she gets from brother-in-law, father-in-law, brother, father, male kin, etc., in 'service supports', say, help in shopping, transportation, sick-care, house-repairs, legal aid, etc.; (5) her own self-image and self-esteem (timid, docile, courageous, bold, extrovert, etc.); and (6) her substitute attachments, i.e., whether she diverts her attention to job, social work, music, art, religious work, and so on.

On this basis, the four factors which impede a widow's adjustment are: (1) low self-esteem, i.e., feeling of helplessness, timidness, inferiority complex; (2) absence of new attachment; (3) economic dependence; and (4) lack of emotional support.

We can now propound a hypothesis on widows' adjustment process: "higher the psycho-socio-economic impediments, lower the adjustment of widows." Another hypothesis could be: "impact of women's bereavement grief and protection from exploitation are directly related to forming substitute attachments", i.e. "higher the substitute attachments, lower the exploitation and bereavement grief." These hypotheses may be taken in the form of inductive conclusions in a spirit of tentativeness. By deducing consequences from the hypotheses, their validity can be checked. This will be hypothetico-deductive method. The logic of confirming hypothesis through hypothetico-deductive method is that: (a) if the hypothesis is true, then the predicted fact is true; and (b) since the predicted fact is true, therefore the hypothesis is true.

In the above example, the *hypothesis* is: "higher the substitute attachments, lower the exploitation and bereavement grief or higher the adjustment of a widow." The *consequence* is: "adjustment is higher among those widows who have resources of education, support (economic, emotional and social), attachments, and modern values." The *observed fact* will be: adjustment would be higher among widows who have 'resources' than among widows who lack resources.

Other views on testing

According to Black and Champion (1976:141), "testing hypothesis is subjecting it to some sort of *empirical scrutiny* to determine if it is supported or refuted by what the researcher observes". They hold that what is needed for testing are: (i) real situation that will suffice as a reasonable testing ground for the hypothesis, e.g., managerial behaviour (good organisation), getting access to data, and (ii) researcher should make sure that his hypothesis is testable.

According to Goode and Hatt (1952:74), hypothesis has to be empirically demonstrated. It requires a logical proof. Basic designs for logical proof were formulated by John Stuart Mill and these still remain the foundation of experimental procedures (though some refinements have been made). His analysis provides two methods: (1) method of agreement which includes (a) method of logic, and (b) classical method; and (2) method of difference. According to method of *logic*, when two or more cases of a given phenomenon (say A and B factories) have only one condition (say, absenteeism of temporary staff) in common, then what condition is to be regarded as the cause of the phenomenon? This is explained diagrammatically below:

Logic Method in Testing Hypothesis

- Phenomenon: Loss in production
- Cases (two or more): A and B factories
- Common condition in two situations: Absenteeism of temporary workers
- Two situations:

Situation 'X' | A | B | C | : produce 'Z'

Situation 'Y' | C | D | E | : produce 'Z'

Therefore, 'C' produces 'Z'
or 'C' and 'Z' are causally related

(causes absenteeism) (affects loss)

The above method is based on logic than on accuracy. Though this method is weak, yet it is useful because: (i) it rules out role of various factors (i.e., irrelevant factors) in phenomenon, (ii) it points out

common factor, and (iii) it allows us to point out that a certain specific factor always occurs in certain specific phenomena. The weaknesses in this method are: (i) it is common sense reasoning; (ii) some factors may not even be considered even though they may be of importance (as cause); (iii) it is possible that the pointed out specific factor may operate only when other factors are present; and (iv) phenomenon may be the result of one factor in one case and other factor in other case.

The method of *difference* may be explained through the following illustration:

'Difference' Method in Testing Hypothesis

- Two situations

Situation 'X' | A | B | C | (produce 'Z')

Situation 'Y' | A | B | Non C | (produce 'Z')

(i.e., not loss in production in above example but bad quality of production)

∴ C produces Z

- Two cases

In one case observation 'Z' is made
In other case, observation 'Z' cannot be made
i.e. 'C' occurs in 'Z'but 'C' does not occur
when observation 'Z' is not made
This shows that 'C' and 'Z' are related

- Two observations
- first observation indicates that 'C' could cause 'Z'
- second observation indicates that other factors could not cause 'Z'

Errors in testing hypotheses

Many a time it so happens that the hypothesis (research or null) is true but we reject it, or the hypothesis is not proved but we accept it. In both cases, we have committed an error. Rejecting a true hypothesis is referred to as type I error and failing to reject a false hypothesis is called type II error. The first is designated as alpha error and the second as beta error (Black and Champion, 1976:145-146). Eliminating

both errors is not possible but minimising both errors is possible. The alpha error lies under the direct control of the researcher and it can be minimised by changing the significance level (say, from .01 to 0.5 or to 1.0). The beta error is indirectly controlled by the researcher and it can be reduced by controlling the sample.

Changing one type of error will always cause a change in the other type. If one is minimised, the other is increased, or if one is increased, the other will be decreased. We can give an illustration to explain this. Suppose our null hypothesis is that the mean income of a group of persons is Rs. 1,000 per month (H_0: $\bar{x} = 1000$), whereas the alternative hypothesis is that the mean income is not Rs. 1,000 per month (H_1: $\bar{x} \neq 1000$). We are making the hypothesis test at the 0.05 level of significance (i.e., there is a 5% chance that our hypothesis will be wrong). The decision is to reject H_0 in support of H_1, according to our data. We conclude that $\bar{x} \neq 1000$. According to probability, five times in 100 we could be wrong in rejecting H_0, possibly a true hypothesis. Levels of significance, thus, assist us to be more objective about our observations and the interpretation.

The sampling is another important decision that preceeds tests of hypotheses. Suppose our sample is 10 students from a total population of 100 students and, we compute mean marks secured by this sample. Let us then replace this sample in its original population and draw another 10 students from the universe. We can compute the mean marks of the new sample. If we continue this until we have obtained all possible different samples that could be drawn theoretically, the new mean would differ from the previously computed sample. Each mean figure would be closer to or away from the true mean than the others. Because we have no way of determining the true figure of mean marks without getting marks of all the 100 students, each sample estimate is as good as another. If we arrange these means from smallest to largest, we could then calculate the average of these means which will be a true mean. All this points out that when statistical hypotheses are tested, the used sampling distributions will enable us to make probability statements about the accuracy with which sample statistics reflect population values of which they are estimates. The researcher is in a position to know from a probability standpoint, how much error is involved in any decision to reject or not to reject some hypothesis.

CRITICISM OF HYPOTHESES

Some scholars have argued that each study needs a hypothesis. Not only exploratory and explanatory researches but even the descriptive studies can benefit from the formulation of a hypothesis. But some other scholars have criticised this position. They argue that hypotheses make no positive contribution to the research process. On the contrary, they may bias the researchers in their data collection and data analysis. They may restrict their scope and limit their approach. They may even predetermine the outcome of the research study.

Qualitative researchers argue that although hypotheses are important tools of social research, they must not precede the research but rather result from an investigation.

Despite these two contradictory arguments, many investigators use hypotheses in their research implicitly or explicitly. The greatest advantage is that they not only guide in goals of research but help in concentrating on the important aspects of the research topic by avoiding less significant issues.

Further Readings

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