

USE OF INDUCTION AND DEDUCTION IN RESEARCH IN SOCIAL SCIENCES : AN ILLUSTRATION*

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THE END of the 17th century and the beginning of the 18th witnessed what may be termed the scientific revolution. Until then the growth of scientific knowledge was slow and halting but since then it has been rapid and phenomenal. This unprecedented growth of scientific knowledge is actually due to a transformation of the scientific method into what it is today, which took place in the 17th century as exemplified in the studies of Galileo and Newton. The transformation of the scientific method consisted in a combination of the methods of reasoning and observation or in the combination of the methods of inductive and deductive logic.

The earlier scientific studies followed mainly the method of deduction, which is a method of arriving at conclusions from premises. In deduction it is immaterial whether the premises are true or false so long as the conclusions follow logically from the assumptions. All that is needed is to select propositions in such a way that the analysis of their meanings leads to other propositions. Take for instances the following two propositions:

1. It is in the nature of weaker persons to become subordinate to stronger ones.

2. Women are weaker than men.

It is possible to deduce a third proposition from these two propositions namely, (3) women are subordinate to men. The truth or validity of the third statement, would depend upon the truth of the first two statements which are the premises. But the method of deduction is indifferent as to the validity of the premises. Therefore one cannot be sure about the truth of the third statement.

There are two main reasons why no serious attempts were made in the past to test the validity of the premises or axioms employed in one's study. One is a different kind of world view of the people of the period, which assumed that the changes in the phenomena were caused by certain qualities of the phenomena themselves which were divinely ordained. Such a world view was well exemplified in the traditional explanation about the *Varna* system in India. The four *Varnas* were supposed to have been created by God from his own body—the Brahmins from His mouth, the Kshatriyas from His arms, the Vaishyas from His trunk and the Shudras from His feet. The qualities of the different *Varnas* were thought to have been

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derived from the different parts of the body from which they originated and therefore they were fit to perform the different kinds of tasks assigned to them by the society. With such an understanding which was backed up by divine sanctions, there was no question of validating the premises.

A second reason for not validating the premises in the past was the fact that knowledge was rarely put to use for the solution of problems of life. The learned persons considered it below their dignity to associate themselves in any kind of productive work which was the lot of the menial persons who belonged to altogether a different class. So long as knowledge was not needed for use, it was immaterial whether it was true or false.

The tremendous growth in our productive capacity goes back to the industrial revolution whose foundation lies in the application of true knowledge for the solution of problems. But the acquisition of true knowledge is preceded by a change in our world view. As against the theological and metaphysical world views of the past, the modern scientific world view assumes that the objects and events in the universe are interrelated and as such the changes in a given set of phenomena are caused by changes in the related phenomena. Such a world view implies the possibility of observing and verifying the causes of phenomena. It also suggests that the desired kind of changes can be brought about by manipulating the appropriate phenomena.

True knowledge is the knowledge which corresponds with the reality. Unfortunately all that we perceive is not necessarily true. Therefore, a distinction has to be made between the reality that we experience or the *empirical reality* and the reality which is out there or the *true reality*. Our perceptions are subjective, conditioned as they are by our past experiences, values and world view. However, through intersubjective communication we can render our subjective experiences objective so that a large number of people may perceive the same phenomenon in the same way. But even an objective view of a phenomenon may not necessarily correspond with the true reality; it is still an empirical reality. Yet the scientist can observe only the empirical reality. Therefore, the problem faced by a scientist is how to understand the nature of the true reality through an investigation of the empirical reality. In this task mere reasoning alone or observation alone is not sufficient but both the methods have to be combined.

Reasoning is also involved in observation. But when we refer to reasoning as a method of scientific study then what is implied by this term is mainly deductive reasoning. On the other hand, inferences from observation are made through inductive reasoning which has its own rules of logic as distinguished from those of deduction. Now the combination of induction and deduction is necessary for obtaining true knowledge because the testing of the truth or validity of a set of propositions depends upon demonstrating that the consequences deduced from those propositions are observable. It is the testing of hypothesis which is the linchpin of scientific investigation.

Through observation and inductive reasoning we accumulate knowledge consisting of facts, concepts and empirical generalizations. This is not necessarily true knowledge. The next step makes use of deductive reasoning. In this step a theoretical model is constructed from known generalizations and other assumptions, and hypotheses are deduced from this model. Hypotheses are propositions which are deduced from theoretical models and whose truth has to be tested through observation. The process of constructing the theoretical model and deducing hypotheses from it is entirely based on reasoning. To complete the study, however, hypotheses have now to be tested through observation. If the hypotheses are validated then it is to be accepted that the theoretical model from which the hypotheses have been deduced is also true. It then becomes part of the theoretical knowledge or true knowledge. Thus we succeed in acquiring knowledge about the true reality through an investigation of the empirical reality.

The above approach of study starts with induction, is followed with deduction and then ends up, again with induction. Studies need not always begin with observation. If there are already a sufficient number of tested propositions, one can straightaway formulate a theoretical model and deduce hypotheses and then test the hypotheses with observation. This approach of study starts with reasoning (deduction) and ends up with observation (induction). However, in either of these approaches both induction and deduction are involved.

The scientific study of any subject matter depends upon the possibility that the subject matter can be empirically observed and measured. Calling attention to the special nature of the subject matter of social sciences, particularly its symbolical and teleological aspects, there are some persons who doubt that social behaviour could at all be studied scientifically. Such persons, however, do not doubt that social behaviour can be observed, but point out that its special meaning as understood by the actor cannot be directly observed. But we have seen that in any case the knowledge obtained from a direct observation of the reality need not necessarily be true knowledge and that the modern scientific method based on a combination of induction and deduction enables us to correct the biases in our observation. Therefore, social behaviour is no exception to the subject matters which are amenable to scientific investigation.

Let me now illustrate the two different approaches in scientific investigation in research in social science with reference to the problem of *women's participation in the labour force*, which I have already discussed in detail elsewhere.¹ One of the problematic aspects of women's participation in the labour force stems from the fact that whereas it is common for

1. Victor S. D'Souza, "Family Status and Female Work Participation", in Alfred de Souza (ed.): *Women in Contemporary India and South Asia*, Manohar, New Delhi, 1980.

all men to participate in the labour force, only a few women do so. Therefore, why do some women enter the labour force whereas the others do not, becomes an interesting question.

In trying to understand this problem, first let me take up the approach which involves induction, deduction and induction, in that order. I adopted this approach in my own investigation of the problem. In the course of the observation about the participation of women in the labour force certain empirical generalizations came to light : (a) If we classify the working-age women according to their educational background it is found that up to a point, say just below matriculation, with the increasing level of education the proportion of women workers in an educational category diminishes; but beyond that point with the increasing level of education, the corresponding proportion increases in an educational category. Thus in terms of the educational variable, the participation of women in the labour force forms a curvilinear trend. (b) A similar trend is also observed when the degree of women's participation in the labour force is related to the occupational prestige of their husbands. When the husbands of women are classified according to the degree of their occupational prestige, up to a certain point in the degree of occupational prestige, the degree of labour force participation of wives diminishes with the increasing degree of husbands' occupational prestige; whereas beyond that point it increases with the increase in the husband's occupational prestige. These curvilinear trends invalidate the commonly held notion that the husband's relatively low income is the main cause of the wife's participation in the labour force. (c) A third major empirical generalization is that when the women workers as well as their husbands are classified according to their occupational prestige, there is a relationship between the occupational prestige of the husband and of the wife; however, on the whole, the wife's occupational prestige is slightly lower than that of her husband's. In this case, interestingly, the relationship is a linear one as distinguished from the trends in the empirical generalizations (a) and (b), which are curvilinear.

The study so far has been observational-inductive. The next phase of the study was aimed at providing a logical explanation of these empirical generalizations and in the process, at finding an answer to the question why some women work while the others do not. This had to be done by formulating a theoretical model, which is a deductive exercise. In doing so I argued as follows :

1. Since women are the subordinate members in the Indian family system their behaviour as regards participation in the labour force can be better understood if viewed from the family unit.
2. The members of a family share their status in common within the larger stratification system.
3. The status of the family is, by and large, derived from the occupational prestige of its members.

4. If there is only one earning member in a family the other members share the status derived from his or her occupational prestige.

5. If there are more than one member following occupations in a family then for the family to maintain its character as a status unit the occupational prestige of different members should be similar.

6. The husband and the wife are intimate members of the family in which the latter is regarded as dependent upon the former.

7. As the superior partner, it is the primary responsibility of the husband to earn a livelihood and the wife shares the status derived from his occupational prestige.

8. If the wife should also work she must find an occupation which is consistent with the occupational prestige of her husband.

9. As a subordinate partner it is ideal if the wife secures an occupation whose prestige is slightly lower than that of her husband's occupation.

From all the above propositions which form a theoretical model it can be deduced that (10) women would participate in the labour force if they could secure occupations which are consistent with their family status; their occupational prestige should be either the same or slightly lower than the prestige of their husband's occupation.

The hypothesis derived from the theoretical model, namely proposition No. 10 is directly in agreement with empirical generalization (c) pointed out above, namely that there is a relationship between the occupational prestige of the husband and of the wife. The same hypothesis can also be shown to be in agreement with the empirical generalizations (a) and (b) by making use of some additional propositions.

11. Since the husband is regarded as the superior partner in marriage he has to marry a wife whose educational qualifications should not be higher than his own, although they may be lower.

12. The women as a whole are less educated than men.

It follows from propositions 11 and 12 that at the one extreme all illiterate men have to marry illiterate women and at the other, all highly educated women have to marry highly educated men. In the middle of the range, however, there would be many instances where there would be a wide disparity in the educational background of husband and wife, the former being the better educated partner. Therefore, at the two extremities of the educational levels of women there is likely to be a parity in the educational backgrounds of husbands and wives in most cases and hence most wives would be in a position to secure occupations which are consistent with the occupational prestige of their husbands. Hence the empirical generalization (a) which shows a curvilinear trend between the degree of educational levels of women and the degree of their participation in the labour force. Insofar as occupational prestige is related to the educational levels, the same explanation, *mutatis mutandis*, also holds good in the case of empirical generalization (b).

The formulation of the theoretical model to explain the empirical

generalizations, completes the second phase of our study which is based on deduction. But there is no guarantee that our theoretical model which supplies the explanation of the problem is true. A false model can also explain satisfactorily the empirical findings. Therefore, our study is still not complete until we have tested the theoretical model which has to be done through further observation and induction.

A theoretical model is validated by testing hypotheses derived from it. The major hypothesis in this case is the proposition No. 10 which states that women would participate in the labour force if they can secure occupations whose prestige is either the same or slightly lower than that of their husbands' occupations. This hypothesis can be operationalized into two parts. Since occupational prestige and educational level are interrelated, it would mean that (10 A) in the case of working wives their education is almost equal to that of their husbands, as a consequence of which they have succeeded in securing occupations at consistent levels; (10 B) on the other hand, in the case of nonworking wives there is a wider disparity between their education and that of their husbands because of which they are unable to secure occupations at consistent levels. These operational hypotheses were actually tested empirically and were found true. It is this validation which gives us the confidence that the theoretical model which was formulated to explain "why do some women work whereas the others do not", corresponds with the true reality.

The other approach of scientific study in which we start with deduction and end up with induction may also lead us to a similar understanding about the participation of women in the labour force. I am here referring to a couple of studies by American authors about the labour-force participation by the American women.² The authors of these studies have tried to test some of the hypotheses about women's economic role, which can be deduced from the theory about the American nuclear family put forward by Talcott Parsons. The relevant theoretical formulations with which they have started their studies are :

1. The American nuclear family is a unit of diffuse solidarity and as a result the members of a given family must share a common status in the overall system of stratification.
2. The primary determinant of the family's status is the occupational position of the husband.
3. Because of the possibility of disruptive status competition between husband and wife, the society and the members of the family ignore the occupational status of the wife (if she is employed) and perceive only the husband's occupational prestige as giving status to the family.

2. Ritter, Kathleen V. and Lowell L. Hargens : "Occupational Positions and Class Identifications of Married Working Women—A Test of the Asymmetry Hypothesis", *American Journal of Sociology*, Vol. 80, No. 4, 1975, Pp. 934-948; and Valerie K. Oppenheimer : "The Sociology of Women's Economic Role in the Family", *American Sociological Review*, Vol. 42, No. 3, 1977, Pp. 387-406.

The above formulations give rise to the following hypotheses :

4. Even when the wife is working her status will be derived entirely from the occupational status of her husband and not from that of her own occupation, and

5. For the reason of avoiding status competition with her husband, the wife, if employed, will play only a marginal economic role by following an occupation of a much lower status in comparison with her husband.

The above hypotheses (proposition No. 4 and 5) were tested and were found untrue. The authors have come to the conclusion that the status of a working woman is as much influenced by her own occupational status as by that of her husband. So also, rather than a wife's taking up an occupation, much lower in status than that of her husband's occupation, the tendency is for the wife to equalize her occupational status with that of her husband. Talcott Parsons' assumption that family as a whole constitutes a single unit of status is sustained, but his other assumption that the status of this unit is solely determined by the occupational status of the husband, turns out to be untrue. The occupational status of the wife also is aimed at maximizing the status of the family and in doing so an effort is made at achieving consistency or compatibility between the roles of husband and wife and not avoiding competition.

Thus the final results of this study agree with the conclusions from my own study although the approaches were different. But both the types of studies had one thing in common and that is the combination of induction and deduction. Such a method provides a self-corrective in the accumulation of knowledge of the true reality. It is for this reason that Karl Pearson has maintained that "there is no way to gain a knowledge of the universe except through the gateway of scientific method".