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Organon 7, 97-115

1970

Artykuł umieszczony jest w kolekcji cyfrowej Bazhum, gromadzącej zawartość polskich czasopism humanistycznych i społecznych tworzonej przez Muzeum Historii Polski w ramach prac podejmowanych na rzecz zapewnienia otwartego, powszechnego i trwałego dostępu do polskiego dorobku naukowego i kulturalnego.

Artykuł został zdigitalizowany i opracowany do udostępnienia w internecie ze środków specjalnych MNiSW dzięki Wydziałowi Historycznemu Uniwersytetu Warszawskiego.

Tekst jest udostępniony do wykorzystania w ramach dozwolonego użytku.



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PROBLEM OF VALUE IN SCIENCE AND THE SIGNIFICANCE
OF HISTORY AND PHILOSOPHY OF SCIENCE

INTRODUCTION

The problem of value in science is the question of deciding the place of values in scientific activities. The basic question is, what place, if any, do or should values have in the selection of a problem, analysis of data, interpretation of findings, and the use of findings in science?

Historically, this problem is a modern one. In essence, medieval science was an evaluation of nature's behaviour. Under the influence of religion, medieval science treated natural events as part of a divine plan and tried to explain natural events and changes as the best thing which could occur. The remarkable success of modern science is mainly due to the distinction it drew between "facts" and "values" and to its insistence on exclusive reliance on "facts".¹ Values were regarded as something alien to science. While the insistence of modern science on the exclusive reliance on facts, as opposed to values, helped the modern science to move away from the armchair speculation, it also created what is known as the problem of value in science.

The air-tight separation of "facts" and "values", as if they have nothing to do with each other, is too artificial to be meaningful.² One can not go very far without the other. There is no such thing as value totally unrelated to some factual (actual or assumed) basis. For example, the ethical commandment to love others implies some good effects for loving; or the commandment to help others implies the knowledge of what

¹ Everett W. Hall, *Modern Science and Human Values: A Study in the History of Ideas*, Van Nostrand, New York, 1956, p. 4.

² Karl W. Deutsch, *Scientific and Humanistic Knowledge in the Growth of Civilization*, in: Leonard M. Marsak (ed.), *The Rise of Science in Relation to Society*, Collier-MacMillan, New York 1964, pp. 146-150.

is helpful, as opposed to harmful, to others. There is no such thing as knowledge or fact apart from an evaluation or means of evaluation. Man's search for knowledge is based on his assumption that knowledge is worth having, though there is a great deal of disagreement regarding the nature of the goodness of knowledge.

It is important to note here that while the modern science has deemphasized values, it has done so only with a certain type of values and, at the same time, has overemphasized certain other values. As a product of Enlightenment, while it deemphasized the old religious and mystical values of the Middle Ages, it overemphasized the liberal values of Enlightenment.³ Modern science, being born in a liberal environment, reflected the liberalism. The controversy raised was between the liberal-secular and the religious-mystical values. However, the problem of value was not an acute one then, since the new-born science was predominantly an "academic" affair in the sense that most of the problems it dealt with were academic problems with very little practical implications and applications.

With the phenomenal growth of national commerce during the 16th and 17th centuries, science lost its academic isolation. It became intimately associated with national commerce as an ally. Increasingly, the problems the scientists studied were practical technological problems faced by the commerce of those days. The so-called "commercialization" of science was nevertheless responsible for the unprecedented rise in the standard of living of the people of the West since the 17th century. Only after tasting the practical fruits from the tree of knowledge, did science gain social support from the grass-root level. Science had been predominantly nationalistic during those days, in its orientation, an orientation which science could afford then, but can no longer do so.

The history of science is full of controversy regarding the place of value in science. Consequently, there has been a great deal of confusion regarding this problem.⁴ The author seeks to clarify some of the issues involved and to point out the significance of the history and philosophy of science for the problem of value. The problem of value is treated under four areas: evaluations in the selection of contents and problems for scientific analysis, evaluations (value-orientations) in the professionalization of scientists, social responsibility of the scientists to the society, and the values involved in the conduct of inquiry.

³ Moody E. Prior, *Bacon's Man of Science*, in: *ibid.*, pp. 41-54.

⁴ For the controversy and confusion see the following sources—for example: Maurice Stein and Arthur Vidich (eds.), *Sociology On Trial*, Prentice-Hall, Englewood Cliffs, 1963; John G. Burke, (ed.), *The New Technology and Human Values*, Wadsworth, Belmont, 1966; Boyd R. Kennan, *Science and the University*, Columbia University Press, New York, 1966; Robert Gilpin, and Christopher Wright (eds.), *Scientists and National Policy-Making*, Columbia University Press, New York, 1964; Stefan F. Dupre and Stanford A. Lakoff, *Science and the Nation: Policy and Politics*, Prentice-Hall, Englewood Cliffs, 1962.

EVALUATIONS IN THE SELECTION OF CONTENTS AND PROBLEMS
FOR SCIENTIFIC ANALYSIS

The intellectual or the socio-emotional status of a problem is important in the development of scientific knowledge about it. The knowledge about the physical world had to be regarded as worth having before modern science could really be born.⁵ Each historical epoch has had its key problems related to the underlying socio-historical values or philosophies of the time.⁶

With the rising prestige of science, there has been a tendency from within to disassociate itself from religion, history, and philosophy. That which was regarded as "scientific" became something of high status and desirable, and that which "religious" or "philosophical" something of low status and somewhat undesirable. It was due to this negative evaluation towards philosophy that social science did not tackle some common problems of man as basic human problems, and towards religion that it did not tackle problems which touched on the meaning of life. Our negative attitude toward religion and philosophy is reflected in our selection of concepts. For example, we use the phrase, "the community of scientists" rather than the "fellowship" or "brotherhood" of the scientists, and the concepts such as "drive", "instinct", and "need", instead of "basic nature of man". The negative attitude toward history is equally well-known.⁷

Only a discipline which has a historical framework is in a position to bring the underlying relationship between the socio-historical situations and science to our attention. Modern science with its emphasis on empiricism, experimentalism, productivity, originality, and individualism is predominantly ahistorical in its time-perspective. For example, in sociology, most of the theories ("reference group theory", "role theory", "balance theory", to mention a few), are ahistorical in their time-perspective. Sorokin was, to a great extent, a lonely voice crying for a historical perspective in analyzing society. A historical perspective is regarded as "speculative" and "metaphysical", a negative evaluation derived from the above-mentioned positive evaluations about science. In other words, it is a product of values such as experimentalism, empiricism, productivity, originality, and individualism that we failed to see the relationship between scientific activities and the socio-historical factors (including socio-historical values). If science is to tackle large problems

⁵ For further elaboration of this point, see P. M. George, "Some Master Models within the Historical Perspectives", *Organon*, 5 (1968), pp. 73-83.

⁶ For details see Phillipp G. Frank (ed.), *The Validation of Scientific Theories*, Collier Books, New York, Chapter I.

⁷ Karl R. Popper, *The Poverty of Historicism*, Routledge and Kegan Paul, London, 1957.

it must learn to use historical perspectives rather than the ones it is now using; and if we are to say anything meaningful, we must have better methodological tools than the ones our "historicists" are using.

If we can make one prediction from the history of science, it is the prediction that the future scientists under different socio-historical conditions are bound not only to tackle different problems, but also to tackle them quite differently. To look at science from an ahistorical point of view reflects arrogance and failure to learn lessons from history. The realization that science itself is part of the socio-historical forces of a time is what brings us close to one of the basic components of the spirit of science—the spirit of humility. It is no accident that most of the scientific utopians had been ahistorical in their conception of science. Man's ability to learn new lessons is directly related to his ability and willingness to learn from history. It is important to keep in mind the historical nature of social science data. Today's "ideals" can become tomorrow's "typicals", just as today's "latent" functions can become tomorrow's "manifest" functions or today's "liberalism" tomorrow's "conservatism". Such changes are related to man's sense of values and history.

It is true that we are influenced by our values (both social and personal) in the selection of a problem. If we are not influenced by the socio-historical values of our time, we would not be part of our time. It was the idealization of physics as the model of science which led many social scientists to exclude contents and problems which did not easily fit within the physical science model. The effect of idealization of nuclear family by the American culture led social science in general to neglect the study of extended family in the United States of America.⁸

Although the selection of problems in science is related both to the values of the society and of the scientists, it does not tell the whole story. Man as a creative animal lives in two worlds, the natural and the artificial. He does not have to be a plastic in the mould of history. He can create his own environment, the one he prefers, to be influenced by it, though his ability to do so is limited and it varies from condition to condition. To the extent he shapes his environment artificially he is freed from the natural environment.⁹ It makes a difference whether he chooses to be influenced by the artificial one or not, and which artificial one he chooses to be influenced by.

⁸ Ethel Shanas and Gordon F. Streib, *Social Structure and the Family: Generational Relations*, Prentice-Hall, Englewood Cliffs, 1965, p. 3.

⁹ Maurice Mandelbaum, *The Problem of Historical Knowledge: An Answer to Relativism*, Harper and Row, New York, 1967.

If man cannot do anything about the effects of historical values (forces) there is no point in having a philosophy to guide him. This is the significance of "philosophy" for man. The significance of philosophy for man is rooted in his ability to see behind and beyond the immediate and the present. Human history can be conceived as the continual struggle to free man from his environment by creating new ones. The problems raised by the sociology of knowledge are not so serious as we might be tempted to believe; on the contrary, they can guide us to new areas for knowledge. The realization of obstacles to achieving objectivity is the beginning of objectivity in scientific analysis. Obstacles against as well as encouragements for the achievement of objectivity are historical in nature, since there are no metaphysical sets of them. However, from the analysis of the historical situations, we can develop a tentative set of them to guide us.

Fatalism has no place in science. Not only do we have the power, to a great extent, to choose the kind of values we want to be influenced by in our scientific work, but we are encouraged to exercise it. We can decide what problems are more valuable for development of knowledge apart from its applicability and social demand. With a guideline, we can remind ourselves of the professionally neglected areas of our study, a task which can not be accomplished without the help of history of science.

This is part of task of the philosophy of science. This is supposedly the area which our "theoreticians" study. It is true that in the history of science we find evidence to indicate the relationship between socio-historical values and the selection of problems for the scientific analysis. But it is also true that the history of science has a long tradition of scientists with relatively high theoretical motivation, who encouraged their fellow scientists to enter into new areas for scientific analysis in spite of the society's discouragements and prohibitions regarding such actions. These creative dialogues between the society and the scientific community and between the theoretically oriented scientists and practically oriented scientists have contributed to the historical development of science and society. The guiding spirit of man in history has been the refusal to give in to fatalism. Nevertheless, we cannot develop a genuine dialogue with a group of people without certain guidelines (philosophy of science), however tentative they might be, and without an understanding regarding the common socio-historical situation in which we find ourselves (history of science). Moreover, we need a creative understanding of the other group if we are to expect a creative dialogue with them. This point is discussed in detail in another part of this paper.

EVALUATIONS (VALUE-ORIENTATIONS) IN THE PROFESSIONALIZATION OF THE SCIENTISTS

Without evaluations there can be no motivation. Just as choice presupposes evaluation, so does motivation. No community in the entire history of mankind has been so concerned about values as the scientific community has been in the case of collection and analysis of data. Absolute honesty is an absolute must. There is no place for "sinners" when it comes to honesty in dealing with data. The scientific community provides neither priest nor confession booth for the "sinners". Muller points out that the scientific community has been the most impressive example in history of international, supra-personal, supra-partisan, supra-racial standards and values.¹⁰ In this author's opinion, the universalistic and humanistic outlook of the scientific community has been a major source of motivation for the young minds which wanted to break the enclaves of parochialism. We value open-mindedness, freedom of thought, etc. These values are not only desirable from an ethical point of view, but also essential for motivating top minds to join the scientific community around the world.

To the extent that our potential candidates have trust and respect in the scientific community, will they be motivated to join this community. The young people join the scientific community not because we do not have any values, but because we do value honesty, open-mindedness, dedication, trust, and professionalism. It is important to note here that the science of the ancient worlds failed to attract the top minds of those times in any significant numbers because it did not have sufficient idealism to challenge the young minds. The scientists of those times were "technocrats" of the rulers. The former group did not have a philosophy of science as such. It is a peculiarity of modern science that it has a model for the scientists as such. Historically, the Baconian model of a scientist as the finest product of Enlightenment has replaced the previous models (ideals) of man such as the "saint", the "warrior", the "patriot", the "philosopher", the "gentleman", etc.¹¹ Without idealism, there can not be any life-time commitment and without realism, commitment can not be meaningful. The philosophy of science contributes to the former and the history of science to the latter.

Historically, the scientific community is doing what the religious communities have done in the past by developing a life-time commitment from the individuals. This is the meaning of professionalism for our time. Professionalism not only involves a life-time commitment to the chosen field of interest, but also an ethical obligation to the society.

¹⁰ Hert J. Muller, "The Use and Abuse of Science" in: Burke, *op. cit.*, pp. 44-49.

¹¹ Prior, *op. cit.*, pp. 44-49.

A scientist's work is increasingly regarded as a "vocation", a conceptualization which is closely related to the old religious notion of a "call". One's commitment to his work is directly related to his satisfaction from it, a finding which has tremendous socio-moral implications.

SOCIAL RESPONSIBILITY OF SCIENTISTS TO THE SOCIETY

Science has grown so much that it has reached every fibre of the Western world. The phenomenal growth of science in the 20th century is related to the social demand for knowledge. This world-wide social demand for knowledge is far more evident in the Western world. Science has become part of the social values of the Western World and social science is no exception. The prestige of science is so great that it created new problems. Now the racists and antiracists, democrats and authoritarians alike seek the sanction of science for their convictions. With the rising prestige of science, there has been a corresponding rise in the tendency from without for individuals and ideals to be identified with science. Science is increasingly faced with the task of separating itself from pseudo-science, a task which is an extremely difficult one for the philosophy of science. As science becomes more complex, abstract, and touches on the life and death aspects of man, and comes in contact with pseudo-science, the need for science-interpretors is an acute one.

Without the supporting social values, science, like any other institution, can not grow much. The ancient science not only failed to attract the top minds in any significant measure, but also failed to gain genuine support from the masses. In the author's opinion, it was due to the failure of the ancient science to produce the fruits of knowledge for mass consumption that it failed to gain social support. The ancient science was mainly used for the personal glory of the rulers. Here again it is a distinct mark of modern science that its fruits are more widely diffused in society. We can not expect continued social support from science unless we produce some edible fruits of the tree of knowledge for mass consumption. In other words, it is through our applied scientists that we gain social support for science. On the other hand, it is also through them that we get social opposition against science. It is important to keep in mind the nature of social hunger for the fruits of knowledge while we work at the fruits. The social support or revolt we get from the society is likely to be directed at science in general.

The role of a scientist has a new historical meaning which it never had before. Scientists like other professionals are increasingly called upon to play larger roles in politics. No great nation can afford to ignore its scientists. The cost, complexity, and destructiveness of modern weapons and the speed with which they become obsolete make it extremely dif-

difficult for any modern nation to ignore scientists.¹² Scientists not only occupy the top positions in modern society, but also decide who will occupy these positions in the future. Only in the modern industrialized society do we find a well-delineated position for a large number of scientists in its social structure, a provision which motivates large numbers of people to become scientists.

The 20th century social problems could be viewed as the problem of dehumanization of man. Both science and industry have contributed heavily towards the dehumanization of modern man. Modern occupations in industry are created or removed mostly on the basis of economic consideration. Practically little attempt, if any, is made to make modern jobs more challenging for the individuals. Where industry has applied improvements in the working conditions, here too, they were introduced to increase economic gain for the industry, and not for the well-being of the workers. Science, with its behavioristic conception of man, failed to see man as creative animal. It is responsible for the conviction on the part of many modern dictators that human beings can be manipulated and moulded. The modern revolts and revolutions cannot be explained from the point of view of environmentalism. The modern man is revolting even more violently against the methods that men of power are using to soothe him. Yet, these modern problems for the evolution of which science has contributed, can not be solved without the intelligent application of science either.

The problem of value faced by science during the 20th century is further complicated by the unprecedented growth of what is known as "military science". The so-called militarization of science has already violated some of the basic principles of science such as the principle of open fellowship among the scientists.¹³

In the author's opinion, it is time for us to reflect on science itself. Social science, which has historically taken up the task of empirical analysis of society, has been quick to critically analyze other phenomena such as religion, primitive society, etc.; but it has not shown comparable interest in examining science itself. Science could not examine itself seriously because it lacked a historical framework and also a philosophical perspective to take the implications of historical analysis seriously. We know a great deal about the immediate effects of the usage of birth-control pills and insecticides, but very little about their long-term impact on human life. We are somewhat vaguely aware of the impact of technology on man, but we tend to consider the industrialists and others responsible for the ill-effects of the application of technology.

¹² Dupre and Lakoff, *op. cit.*, pp. 179-180.

¹³ Robert Bruce Lindsay, *The Role of Science in Civilization*, Harper and Row, New York, 1963, p. 252. Gerard Piel, *Science in the Cause of Man*, Knopf, New York, 1962, Ch. I: "Science and Secrecy". pp. 3-20.

When it comes to the impact of scientific thinking on man, we are still in the dark and cannot put the blame on others so easily. The predominant model of man in science has been the conception of man as a product of his environment, as noted earlier. Have we not been, though unintentionally, striking, at the very root of man's basic sense of responsibility? We are in serious trouble if man takes our conception of him seriously! We can argue that our model of man is only a conceptual tool; but it would not make any difference in its social impact. The perception of man as a creature of his environment must be balanced by the perception of man as a creator of his environment. It is this balanced perspective of man which gets lost when we find ourselves too busy with the immediate problems of science. Without a historical and philosophical framework, we cannot tackle that problem.

Intellectuals' products do not exist in a social vacuum any more than their efforts do. Our findings have bearing not only on philosophy and religion, but also on immediate social interaction. This is particularly true in the case of social science. When we pronounce that two races are potentially equal in intelligence or that premarital intercourse has no bearing on marital happiness, our pronouncements have tremendous socio-ethical meaning and connotation, which is not the case when similar pronouncements are made regarding animal world. It is our responsibility to clear the air so that society would not misunderstand or misinterpret our findings.

In the author's opinion, history has resolved a conflict for us. It is no longer a meaningful question to ask whether the scientists should or should not participate in socio-political matters, just as it is no longer meaningful to ask whether or not a science of social life is possible. The question is only how and to what extent. The interest of society in science is so great that whether or not to apply our findings is no longer a meaningful question. The society is bound to apply them. If we fail to indicate the proper use of our findings, society is bound to misinterpret them. The need for science-interpreters is well recognized in the scientific community, but only from the point of view of what is good for science and not from the point of view of what is good for society or for both.¹⁴ This self-centred orientation on the part of scientists as a collectivity has reached an unhealthy level recently. The practice of science is becoming more and more for the advancement of individual scientists than for the advancement of science. There is a growing preoc-

¹⁴ The emphasis in the sociology of science has been almost exclusively on what is good for science, and not what is good for science and society. Norman Kaplan (ed.), *Science and Society*, Rand McNally, Chicago, 1965; Bernard Barber and Walter Hirsch (eds.), *The Sociology of Science*, The Free Press, Glencoe, 1963. Moreover, the American scientific associations have come out in the past to defend (protect) its members against the harassment by the American government; but it has not extended its concern for the common man. Piel, *op. cit.* (Ch. III).

cupation with publicity and prestige among the modern scientists.¹⁵ The classical pure scientists were pure in the sense that they were least concerned about their own prestige and most concerned about the development of science—the heart of which was a moral sentiment.

The problem of town-gown relationship is not a simple one. Several hundred years ago, if a scientific community became dissatisfied with the society (town), it could move out of the town (society); or, if a society refused to pay the bills for the scientific work, the scientists could manage to take care of them with relative ease because of the small costs involved. This is no longer the case. We live or die together. We have no choice but to work out a philosophy to regulate our relationship. However, it can be worked out on the basis of a realization of mutual dependence, or on the basis of mutual respect and concern. The author hypothesizes that the latter course is much healthier for all concerned.

By resolving one conflict, history has raised others. Now not only is there a general social demand for social knowledge, but different segments of a society, not to mention different societies, demand our cooperation for conflicting purposes. Some demand our help for peace while others for war. The problem is so acute that we can no longer ignore it. There is no way out without developing a philosophy of science to guide us. The modern situation demands a new approach to the problems we face. The old piecemeal approach is no longer adequate if we are to solve the role-conflict felt by the modern scientists. Here again one can develop a philosophy of science on the basis of political opportunism and partisanship or on a principle which transcends them. The author hypothesizes that the latter path is much healthier in the long run.

Science is particularly ready now, in the author's opinion, for the development of a realistic philosophy of science. The impact of science on man is no longer a hypothetical question. The history of science has a rich and long tradition of experiences of all kinds to reflect on and develop guidelines for the future. What we need is not an absolute philosophy of science, which is inconsistent with the basic spirit of science (open-mindedness), and divorced from reality (history), but a creative dialogue with the society so that each problem is tackled in its own right. The principle of equality or of free enterprise does not mean much to a segment of a population which has been under handicaps for so long, for example; the significance of a principle is not in itself, but is related to the socio-historical conditions of its applicability. This is a basic significance of the history of science. Only a historical framework can save us from the deadening weight of an absolutistic philosophy and only a philosophy of science can save us from the meaningless of absolute relativity.

¹⁵ Walter Hirsch, *Scientists in American Society*, Random House, New York, 1968, p. 124.

Ethical neutrality on our part is not the answer, though it may sound like the easiest way out from this dilemma. What we need is political nonpartisanship, as scientists, and not ethical neutrality. In my opinion, the reason for the failure of the so-called "scientific management movement" in the U.S.A. was its political partisanship. It was more "managerial" in its orientation than "scientific", at least according to the labour unions. We need to be constantly reminded that our basic commitment is to the profession and not to a client, unlike in the case of a lawyer, particularly at a time when we are increasingly called upon to play greater socio-political roles. However, this does not mean that we have no commitment other than the one to the profession. The commitment to the profession is meaningless unless it is balanced with another one to humanity in general. This was what the German scientists recognized during the Nazi regime and a good many scientists are beginning to recognize in the U.S.A. and other places.

It is the concern for others which helps us from becoming selfish and the concern for all mankind from becoming partisan in our thinking. Historically, if the scientific community is to become partisan or self-centred, it will have much more devastating effects on the society compared to the effects of any other segment of society becoming so.

It is the intensity of the present historical situation which makes us feel the need for a concern for all mankind. History has never given us a better time than the present, (a point the author shall elaborate on later), for the reflection on all mankind, since at no other time in history we faced the possibility of total annihilation of mankind. It is the first time in history that man may enter into war without hoping to win.

There is a double irony in our relationship with society. We know that we need the co-operation from the society and the individual subjects. As we grow bigger and bigger in our enterprise, we are becoming increasingly aware of our dependence on the society. We can no longer finance our research projects which run into the millions. We know that our knowledge would make a difference in the course of history of individuals and societies. Yet we are reluctant to draw the implications of the mammoth power we possess as a community to influence the course of history of mankind, even at a time when the mere survival of mankind is threatened. Isn't it strange that we are eager to get co-operation of the society in providing money and other resources for our research, but reluctant to co-operate with the society in solving its problems? Isn't it strange that after collecting immense amount of data on alcoholism, drug-addiction, suicide and mental illness, we have not been willing to say something about the proper use of liquor, creative use of leisure, and misuse of resources? In the name of ethical neutrality of science, we have embraced "cultural relativity" as the only guideline against ethno-centrism.

Cultural relativity is not the answer for the problem of ethno-centrism. Following the lead given by Freud, the neo-Feudians challenged the extreme notion of cultural relativism. They carried the implication of a biological model of man to its logical end. They pointed out that the conceptualization of life is inseparable from the conceptualization of health and survival. An individual, for example, needs a basic sense of security and dignity rooted in reality for the healthy evolution of his personality. If man as a biological animal has certain fundamental needs, then science is in a position to evaluate various cultures in terms of their ability to cope with the fundamental needs of man, regardless of how differently various cultures express these needs or their fulfillment. This is true in the case of man as a social and creative animal too.

However, it must be noted that moral sentiments are no substitute for scientific rigorousness, regardless of how noble they might be. Our so-called applied men have been more (or even merely) "applied" than "scientific", consequently with little to apply. They are often emotionally so wrapped up in the content of their special interest that they cannot see the implication of their work to others' work. They often live in a world of self-imposed isolation. They often lose their scientific spirit—the spirit of open-mindedness and become "ideologists". They produce more heat than light. Our social concern is not a substitute for methodological rigorousness, but is an additional reason for methodological rigorousness, because our mistake can be very costly in the socio-emotional sense. It is the author's belief that it is part of our responsibility as social scientists, unlike the laymen, to treat a problem scientifically (theoretically significant, and methodologically rigorous with implications made explicit for the public). We cannot waste society's money on research for every little problem by starting all over again from scratch. Our theoretical orientation would make a great deal of researches unnecessary.

We have no moral vacation from responsibility. Our two roles, one as a scientist and the other as a citizen, merge into one, to some extent, the role as a responsible human being who possesses valuable and pertinent knowledge. Our acquisition of new knowledge and tools, not to mention money and other things we acquire from the society in the name of research, only adds more responsibility to us. By no means do they take away responsibility from us. Our responsibility to the society is considerably more than the responsibility of a layman. The acceptance of prestige, money and other resources on our part implies a "social contract" with the society. To be ethically neutral is to violate this contract. The dialogue with the society must be developed with the full realization of this contract.

It is true that our main business as scientists, is the discovery of

truth. But there are many truths (areas and problems) to discover and many ways to discover them. And it makes a difference which one we choose. We cannot discover any truth any way we want to, any more than a police officer can establish law and order any way he likes to. It is here our ethical responsibility as scientists is most pertinent. No one else in the society is in a better position to deal with the ethical problems associated with the discovery of truth. We differ in our responsibility to the society with the moralists on three points. First of all, our responsibility to the society is a limited one and related to the problems in the conduct of inquiry. Secondly, our ethical concern is not limited to a client as such. Thirdly, the implications we draw must be as rigorous as scientific methodology would demand and tentative as the scientific spirit would demand.

• VALUES AND THE CONDUCT OF INQUIRY

In science we make not only the ontological assumption that reality exists, but also the axiological one that it is worth knowing. The pursuit of knowledge presupposes the value of knowledge.

In classical epistemology, values were treated as something which interfered negatively with the process of knowing. Bacon's "idols" are the classical examples of contamination of cognition by values. The problem of classical epistemology was to find out how to eradicate the negative influence of values. It had no conception of the positive effects of values on the process of knowing.¹⁶ In science, it is important to realize the positive influence of values. One can neither be dedicated to his work unless he believes in the values of what he is doing, nor can he enjoy doing something he considers as unimportant. This is even more so at a time when the training to be a scientist requires longer time and involves greater risks than ever before.

In social science the significance of value is even greater than it is in natural science. In science, data are not "given" but "taken". When it comes to taking data from people it is altogether a different matter. Only the subjects in social science (i.e. people) can withhold or distort the information we are trying to get. They actively participate for or against our purposes. The nature of their participation depends upon their values. We need to earn their trust and respect in us and in our methods before we can get the information we seek. It is here a more compassionate researcher gets the information that another researcher, otherwise more qualified, fails to get. This is part of the logic of the method called "participant observation".

¹⁶ Stanley Taylor, *Conceptions of Institutions and the Theory of Knowledge*, Bookman Associates, New York, 1956.

A basic respect and concern for people in general, and for the ones involved in particular, are a methodological necessity for collection of data in social science, since we are almost exclusively depending upon their co-operation, unlike the natural scientists. As Hill and Simpson have pointed out, for example, that progress in family research has had to wait, not only for the emancipation of the scientists from the moral impediments of the culture and for the development of adequate methods, but for the willingness of the families to be studied.¹⁷ Our clinical scientists are far more aware of the place of empathy and sympathy in the collection of pertinent data.¹⁸ Anthropologists are aware of the fact that "ethnocentrism" is the worst attitude for the collection of data from other cultures. It is in this vein of thought that social science is regarded as an "art". And once the data are taken, they do not speak for themselves. They are made to speak with the help of conceptual frameworks, a selection of which involves a great deal of arbitrariness on the part of the scientists.

Social and personal values raise a methodological problem. If there is a discrepancy between the "actual" and the "ideal" situations, then the actual behaviour tends to take a disguised form. For example, undemocratic actions in the U.S., where democracy is considered to be an ideal, tend to take pseudo-democratic forms. A casual observation is likely to report more democracy than there is in actuality. The necessity of depth technique in social science is related to the nature and types of values held by the observer and the observed in social science.

The classical conception of science equated the tasks of science with the discovery of something "objectively out there" wholly independent of the human observers. But when we look at scientific task as invention, subject to continual change in the light of new experience, our spirit is bound to be less dogmatic and we can understand why different theories are often offered for the explanation of the same phenomenon by different people. When it comes to the conduct of inquiry the scientists choose their concepts, models, and conceptual frameworks, just as an artist would choose a certain setting and colour combination for his works of art. Arbitrariness in theory construction reflects the freedom of the scientists to choose. The freedom of choice is always the freedom to prefer.¹⁹

In the case of social science, the above-mentioned arbitrariness cannot be treated lightly. During the very dialogue, the observed and the

¹⁷ R. Hill and R. L. Simpson, *Marriage and Family Sociology: 1945-55*, in: H. L. Zetterberg (ed.), *Sociology in the United States*, UNESCO, Paris, 1956, pp. 93-100.

¹⁸ Robert L. Katz, *Empathy: Its Nature and Uses*, Free Press, Glencoe, 1963.

¹⁹ Lindsay, *op. cit.*, pp. 32-35.

observer influence each other considerably. We need to take the historical meaning and connotations of concepts and models into account since the choice is to influence the findings. The self-fulfillment of self-negation of prophecy (prediction) is possible only in the case of human beings. Those who report violence may instigate or repress violence by merely reporting it since some people might be motivated to get publicity for their violence while others are motivated to hide their violence. We influence the observations not only while observing, but also before and after the observations.

Often our definitions involve evaluations. Sociology of mental illness must have a concept of mental health; sociology of art must have a concept of art, a classification (definition) which involves an evaluation before observation which in turn affects the observation.

The phenomenologically oriented social scientists are correct, but not adequate, when they point out that the meaning of action is more important than the action itself in terms of understanding the action and reaction to it. However, they failed to point out that the social meaning of an action is rooted deep in history. A Muslim's or a Hindu's reaction towards each other's action is understandable only within a historical framework.

The author ventures to hypothesize the most heuristic conceptualization in social science is the most "universalistic" and the most "humanistic" conceptualization. To the extent we are "French" or "English" or "Indian" or "American", we cannot understand the opponents' problems. To an "English" Canadian, the "French" Canadians' problems do not make much sense. We ask serious questions regarding only the people whom we have taken seriously, and consider those problems which make sense. The others' behaviours are regarded as irrationality, stupidity, etc. The lack of understanding on the part of social scientists (i.e. bias) in dealing with lower class behaviour is rather well-known.²⁰ In other words, when the metaphysical notion of the logicity of things is extended to human beings, it has a socio-moral connotation. To regard one's behaviour as sensible is to regard him as a sensible person. This is the significance of the *verstehen* approach in social science. The assumption that the other person is no different from the observer and consequently is expected to act or react in ways similar to the observer's is the rationale for placing oneself in the subject's shoes for probable clues (not for final answers) in analyzing others' behaviour, according to the *verstehen* approach. The place of *verstehen* approach is in theory construction and not in theory verification. The "scientific

²⁰ Hyman Rodman, *Middle-Class Misconceptions About Lower-Class Families*, in: H. Rodman (ed.), *Marriage, Family and Society: A Reader*, Random House, New York, 1965, pp. 219-230.

equality of man" under similar conditions is the basis of modern liberalism.

The fundamental assumption in social science about man is that he is a social animal. This assumption is justifiable from various studies on isolation. In other words, as Cooley pointed out earlier, without society an individual is only an animal. Yet we fail to take the implications of this assumption seriously. To say that man is a social animal is to say that society (community) is important for an individual to become a human being. However, one cannot develop a basic sense of community without a basic sense of history. It is the memory of a pleasant past and the anticipation of a happy future which make us united here and now. In many modern rehabilitation projects, the bulldozers, in the name of modernization destroyed objects of historical significance and deprived the people of a fundamental basis of communal feeling. Though man is a social animal, his need for society varies according to the historical conditions in which he finds himself. We took the above-mentioned assumption to mean that man would adjust, or conform or submit to the social demands. This over-socialized view of man is an inadequate one to explain the revolutionary tempo of our time.

Only when man is treated as man are we in a position to know human problems as human problems. We need underlying conceptual framework within which men or societies under different conditions can be compared. Development of models of man which transcend particular times and places is part of the task of the philosophy of science. Yet, such conceptualization must be historical in nature. It is the historical man, not the metaphysical man, who has certain needs and values. An *apriori* set of basic human needs and values cannot help us very far in understanding man, since human needs and values change from time to time. Yet, they do not change to the extent that the formation of a tentative set of basic human needs and values is meaningless. Only with the convergence of both the historical and philosophical perspectives, can we expect to solve this dilemma of conceptualization.

We need more than mere conceptual tools to cope with the problems in the methodology of social science. We need to trust and respect them just as we need their trust and respect in us in the process of knowing about man and society. Environmentalism and behaviorism do not allow for human creativity, as they lack faith in the individuals. We see only what we look for, and we look for what we value and trust (expect) to find. Regarding many of our pressing problems we have very little knowledge to apply. But once we accept the value-relevant nature of social knowledge, then we will find more knowledge and places to apply it.

The question of establishing the truth validity is not simply a matter of discovery or verification. What we have is not evidence versus lack

of evidence, but degrees and types of evidence. Once the evidence is in, the question still hangs over us. "At what point can we make the judgment to accept or reject a hypothesis?" There is nothing in the evidence or logic which forces us to accept or reject a hypothesis when it comes to degrees and types of evidence. Our final evaluation is based on consensus. Truth by nature is as judgmental (evaluative) as it is logical or evidential. The evaluative nature of truth is reflected in the differential standards we apply in our methodology from time to time.²¹ It is important to keep in mind our ethical responsibility in accepting or rejecting a hypothesis. How sure we must be before we accept or reject a hypothesis depends upon how serious a mistake would be in the ethical sense.²² What we have is not just an intellectual responsibility, but a social responsibility to take the effects of our pronouncements into account, before we make them.

The problem of value is intimately related to the problem of objectivity as the sociologists of knowledge have pointed out. If values enter into the evaluations of our evidence, how can we arrive at objective truth? Scientific methodology presupposes not only a set of refined tools, but also a set of definitions commonly agreed upon among the scientists. Refined tools are meaningless, unless we have a common ground of agreement on the definitions of basic terms. The notion of scientific objectivity presupposes not only the common agreement on the definition of objectivity, but also on the tools and the rules of correspondence. Within this scientific framework, there is no objectivity of truth apart from a consensus on definitions of basic terms and on the basic rules of the game. There cannot be any consensus on definitions and rules of the game unless there is a basic unity of spirit, an acutely moral notion.

The conduct of inquiry now has a new dimension of history which adds to the meaning of fellowship. The problems we now deal in science involve not only more scientists working as a team, but also more time to the extent that they involve several generations of scientists. Often a scientist has to leave his work uncompleted in the hands of others to complete and enjoy the completion.

This cannot be accomplished without learning to be less self-centered. The meaning of the spirit of fellowship in science is abundantly clear now. It is with this historical dimension in mind that Bacon regarded

²¹ There is nothing sacred about the 0.05 level of significance in our statistical test of significance of a null-hypothesis, for example; it reflects our convention and not logic. Pitrim A. Sorokin has pointed out, more than anyone else in sociology, the changing nature of our criteria of truth from time to time and culture to culture.

²² Richard Rudner, *Value Judgments in the Acceptance of Theories*, in: Frank, *op. cit.*, pp. 31-35.

truth as the daughter of time.²³ The theories and laws in science reflect the historical accumulation of evidence as a result of struggle by several generations with the problems involved. It was in this sense that Newton following old comparison thought of himself as standing on the shoulders of giants.

SUMMARY AND CONCLUSIONS

The problem of value in science is the question of deciding the place of values in scientific activities. Historically, this problem is a modern one. If medieval science "humanized" the universe, modern science "dehumanized" even the humans.

In the author's opinion, there is no value-free science. In the selection of problems for scientific analysis, we are influenced by the underlying socio-historical values of the time, as sociologists of knowledge have made it clear. Values involved in the professionalization of scientists are well-known. In science, we assume that it is worthwhile to know. There cannot be a consensus on basic terms in science apart from a genuine sense of co-operation, any more than there can be a basic sense of experimentalism apart from a genuine spirit of tolerance among the scientists.

The problem of value has a special relevance to the philosophy of social science. Definitions in social science often involve value judgments. One cannot define mental illness apart from mental health. Social scientists influence their findings not only during their observation, but also before and after it. A social scientist's interest in studying a phenomenon, has its repercussions among the subjects involved. To declare two peoples as potentially unequal in intellectual ability, has a great deal of socio-emotional connotations, an implication which is not true in the case of similar pronouncements regarding two species of animals. The subjects in social science research distort or withhold the information we seek depending upon their values and perceptions. Social scientists need the co-operation of their subjects (human beings) to get the pertinent data from the latter. Mutual trust and respect between the observer and subjects are the cornerstones of the dialectics of social science methodology. How sure we must be before we accept or reject a hypothesis should depend upon the risks involved (in the socio-moral sense) in making a mistake. The added risks involved in working with human beings puts added responsibility in the hands of social scientists.

The problem of value in science is a problem of the history and philosophy of science. There is no problem of value in the abstract. The historical conditions decide the nature and magnitude of the problem.

²³ Prior, *op. cit.*, p. 45.

Yet from a long history of experiences in connection with this problem, we can develop tentative solutions (guidelines) which transcend particular times and their problems. At a time when the survival of mankind itself is depending on the wisdom of modern scientists, we can no longer depend upon the principle of the ethical neutrality of science to guide us. The philosophy of science must explicitly treat the problem of value as a legitimate area of scientific investigation. To recognize that scientific work is no different from other human activities when it comes to the influence of socio-historical values on it, is the basis of scientific humility and beginning of scientific objectivity. The realization that we do not have to be fatalistic about the influence of socio-historical values is the basis of scientific faith and beginning of philosophy of science. Only history of science can save us from the arrogance and pitfalls of absolutism, and only philosophy of science can save us from the despair and meaninglessness of relativism and fatalism. Only when history and philosophy of science go hand in hand, can we expect to be humble and not fatalistic at the same time and still find an adequate, if not permanent and perfect, solution to the problem of values we face in modern science.