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On Science and Social Science

ROBERT KATZ

THERE are many definitions of science, and these are commonly based on literary and social usage rather than on the technical problem of distinguishing different areas of scholarship. To evolve an adequate definition we shall attempt to extract common elements from physics, biology, chemistry, geology, and astronomy, from those fields which are commonly called sciences. Any acceptable definition of science must be equally applicable to all of these, to all the natural sciences. To speak in the usual metaphor, we shall attempt a "scientific" definition of science.

All the natural sciences are organized and systematic. Is system the characteristic of science? The words "science" and "scientific" are often used as though they were synonymous with "system" and "systematic." Thus classification and organization have been thought to generate "Library Science." Yet there are vast differences in the extent to which our prototype sciences have been systematized, as related to their complexities, and I think there will be no disagreement with the statement that system is not a fundamental aspect of science and that system alone cannot serve as a basis for definition. Organized knowledge is not of itself scientific knowledge.

The natural sciences are empirical; their instrumentation requires ingenuity, inventiveness, and craft, and this has fathered another popular usage of "science." Boxing has given way to boxing science; barbering to barber science; the type shop has been transformed in at least one college to the typography laboratory. No, artistry, in-

ventiveness, and originality all describe a broader arena than that of the natural sciences, and not even *systematic* craft is science.

Is there a method which characterizes the sciences? The so-called "scientific method" is generally thought to include steps such as observation, induction, and prediction. Yet the literature abounds with definitions of *the* scientific method, and their very multiplicity discloses that there is no unique method by which the data and theories of science are obtained, and the scientific method may be more accurately described as the mold into which scientists cast their published papers than as the recipe for achieving knowledge. As Holton¹ has said, ". . . in formalizing an individual contribution for publication, it is part of the game . . . to make the results in retrospect appear neatly derived from *clear fundamentals*. . . . Months of tortuous, wasteful effort may be hidden behind a few elegant paragraphs, with the sequence of presented development running directly opposite to the actual chronology, to the confusion of students and historians alike." That there is no method common to the sciences becomes acutely evident when we observe that the geologist would be forced to predict future geologic structures in spite of the disparity between geologic and human time scales, that simple morphology, which simply describes organisms but does not attempt to generate new laws or predict new facts, would be an unscientific activity for the biologist, if we forced these studies to conform to the "scientific method" in

1. Gerald Holton, *American Scientist*, 41 (1953), 89.

order to qualify for their claim to scientific status. We must reject the use of a common method as the basis for the definition of science, for it is now a truism that there is no method common to the natural sciences. Systematized observation, induction, and prediction do not characterize the sciences uniquely.

What then are the fundamental characteristics which are at the basis of the activities of all the natural sciences and without which they could not exist? The most pertinent of these is the *public* character of scientific data. All "standard observers" properly situated must be capable of identifying the "same" event and of reporting it in the same way. As William Earle² has said, the ". . . standard observer is 'anyone,' anyone, that is, whose senses are sound and whose mind is not hallucinated." The empirical data of science must be accessible to all. Since it is these data that all inductions must follow, and to which all theories must ultimately return, it is upon the public character of the nature of its data that any definition of science must rest. At its empirical foundation science need not be logical, it need not be mathematical, but as an irreducible minimum, science must be public. This stipulation is certainly not inclusive; all public events are not necessarily science. Rather, the requirement that the data be public is meant to be exclusive. No private datum or collection of such data can be said to constitute a science.

The data of the psychotherapist are wholly private. There is only one observer, the patient himself. The inner structure of the mind is wholly private and is not and can never be equally visible to all "standard observers." At best, it is the role of the therapist to help the observer make and interpret his own observations. What there is to see can be seen only by the patient. A science of psychotherapy is a logical impossibility. A similar problem is faced by the sociologist whose basic datum is testimony. While testimony can

be counted, no observer can say whether the testimony is true, for the correlation between an individual's testimony and his belief can be known only to the testator. In so highly charged an area as sexual behavior, the assertion that even freely given testimony is truly representative of past experiences has been vigorously debated. While it is generally recognized that the collection of testimony is subject to such criticism, there seems to be an underlying and untestable belief in the social sciences that the disparity between testimony and truth is as often positive as negative, and that on the average truth is attained. As difficult as is the problem of relating testimony to truth for the living, the same problem for the dead is truly insurmountable. Chronicle is undeniably public and is available to all historians, but interpretative history in which untestified motives are attributed to individuals, to groups, and to entire nations certainly must lie outside the pale of anything even metaphorically called "historical science." Similar objections pertain to claims of a "science of esthetic criticism," a "scientific psychology of art or music." Some psychological research attempts to relate private experiences like loudness or brightness to public stimuli called sound intensity or light intensity, and is subject to the same challenge, that its data are not public and cannot be made public through testimony.

A second characteristic common to the sciences is their subject matter. Their common subject is *nature*, a subject matter quite public and accessible to the standard observer. Nature may be disturbed or altered by the act of observation, but never by the fact that man is the observer. The organization of the sciences is in part due to the genius of the scientist, but in larger measure to the organization of nature itself. From the point of view of the scientist the systematic, logical, mathematical, predictable character of his subject is the sheerest accident. If nature were fanciful the scientist would study its fancy. But nature is not capricious and

2. William Earle, *Ethics*, 63 (1953), 293.

there is ample evidence presently available that the consistency of nature is expressible in "natural law," that the description of the world is cumulative and continually grows more accurate, for it is a relatively stable nature that is studied by successive observers. The phases of Venus discovered by Galileo some three hundred years ago are even better known today; the electron's charge measured by Millikan some fifty years ago is considerably more accurately known today.

While the non-public datum of the social studies is clearly excluded from the category of science, there remains a vast body of material in which the data are public. The student of economics deals with carloadings, market receipts, bank deposits, and so on. Such studies are founded on the proposition that lawful behavior is characteristic of man and his institutions, and that only the youth of his enterprise is responsible for the inability of the scholar to display the analogues of Newton's laws of motion. Yet it is an empty argument that man has studied man for a shorter time than he has studied nature. The scholar looks back upon a history of his subject from which no significant natural law has emerged and extrapolates to a future in which the laws of human behavior are propounded in every textbook. There is an interesting and subtle conflict between the faith of the social scientist in an inflexibly lawful behavior (which remains only to be discovered), and the nature of the social structure which he studies. Certainly there could be no society if human behavior were completely indeterminate, yet human behavior as well determined as the trajectory of a rifle bullet makes a farce of such vital social institutions as the judiciary. Carried to its relentless conclusions the concept of "scientifically" lawful human behavior assumes a predestined future in which there can be neither reward nor punishment and in which the concept of personal responsibility is a mockery.

What can be wrong with the use of the

word "science" in the context of the social studies? According to Richfield,³ the question of the scientific status of psychoanalysis is important because of the eulogistic function or emotive significance of the term "science." "It seems to be assumed that to question the scientific status of an activity is equivalent to asking whether that activity is desirable, reliable or valid." For the purposes of the present discussion the question of value is to be divorced from the question of the scientific character of the social studies. There can be no doubt that the study of man is worthy and desirable. Nor is the present discussion to be interpreted as an assertion that the social studies cannot be objective. All subjects may be treated objectively, the social studies, esthetics, and religion not excepted. In science the interpretation of data, the formulation of concepts, the vehemence with which an argument is propounded are certainly tainted with personal bias. Yet the question of subjectivity does not arise in the sciences, for all data must ultimately reside in nature, not in man. In fact, if the question of subjectivity or objectivity is a meaningful one in a particular context, then that context cannot appropriately be called science.

No, the objection to the application of the word "science" to the social studies lies in the fact that in patterning themselves after the sciences the social studies have tended to reject insights which cannot be expressed quantitatively and statistically. In some areas it seems to be considered unprofessional to study man in ways which are not likely to yield tabular data and graphs. Primary decisions as to what research can be undertaken and secondary decisions as to experimental design are distorted by a straitjacket of form built from the specifications of an alien scholarship. Within all of the social studies there are conflicts between the "more scientific" and the "less scientific" schools, and the worst epithet which can be applied to another's work appears to be "unscien-

3. J. Richfield, *Scientific Monthly*, 29 (1954), 306.

THE KANSAS MAGAZINE

tific." In the light of the present discussion such debates are particularly fruitless. Perhaps a new symbol is needed, generated from the content of the social studies, uniting rather than dividing the studies of man, and avoiding the self-imposed blinders which must be donned by the social student turned social scientist.