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RELATING SCIENCES: AN INTRODUCTION

THE discipline which attempts systematically to relate sciences to each other is almost a dead discipline. Its last great field day was the 18th century; almost its last practitioners were August Comte and K. Pearson. I shall, therefore, describe it briefly before practicing it.

There are three methods which may be used for relating the sciences: the dogmatic, the empirical, and the analytic.

THE DOGMATIC METHOD

By means of the dogmatic method, the natural and social sciences take fixed positions based on a single philosophic doctrine which defines their respective ends, methods, and mate-

rials. For example: According to the classical Aristotelian view, the social sciences would be distinct in subject matter and method from the natural sciences on the one hand, and from the "practical" sciences of conducting one's life or the life of the state, on the other. In this scheme the outstanding characteristic of the social sciences (which survives as part of a modern point of view) is the tentativeness of its method and conclusions and the relativistic nature of its conclusions when and if they are taken as applicable to practical affairs.

The social sciences take this position in the Aristotelian scheme because their subject matter, society as such, does not constitute a species in the Aristotelian sense of the word, and is therefore, not amenable to genuine scientific induction. Instead, it must be treated by a semi-scientific method which employs opinion rather than fact and therefore concludes tentatively rather than certainly.

J. S. Mill's view of the method and subject matter of the social sciences reflects important aspects of this Aristotelian position. In Mill, these aspects arise because Mill recognizes the complex character of causation in social phenomena and therefore asserted both the impossibility of an experimental method and the impossibility of certainty by any means. Also like Aristotle, Mill proposes a social science which depends upon psychology for its principles and upon history for its data.

How the dogmatic method generates strife by its use of possibly correct but never complete sets of assumptions can be seen by contrasting the view of A. Comte on the social sciences with that of Aristotle and Mill. Aristotle begins by positing what can be known inductively and with certainty. Mill begins by positing what can be verified by patterns of experiment designed around the notion of causation. As a consequence of these quite defensible starting points, each of these men separates social science from natural science in respect of method and degree of certainty. Comte. on the other hand begins by restricting the object of all disciplines to a grasp of the parts or elements of which its subject-matter is composed, and to a

grasp of the particular organization of these elements which characterize the subject-matter in question. Thus, physiology asks only what chemical compounds and chemical and physical transformations characterize the living organism and what part the products of one chemical or physical combination or decomposition play in other chemical processes. Similarly, "social physics" asks only what aspects of the living organism are involved in human social organization and how they are materially related. In "social physics" then, as in biology, physics and chemistry, the problems are the same and the methods of solving them are also the same. No science differs from another except in the level of organization of its chosen subject-matter and this difference in level of organization requires no corresponding shift in mode of problem formulation nor of method of solution.

The conclusion of their "positive" approach of the question of the relation of natural and social sciences is obviously in head-on opposition to the Aristotelian view, and at least tangentially different from Mill's position. Without consideration of their starting points, these doctrines can do no more than compete by force of one kind or another. Even to include the starting-points in discussion can, by a dogmatic method alone, do no more than provide a firmer base for a choice of doctrine by taste and preference.

Yet there is a genuine heuristic advantage to the dogmatic method if there is only one dogmatist functioning successfully in a given institution or science, it supplies a clear line for the researcher or the curriculum maker to follow: problems are prescribed, methods defined, and subject-matter sharply indicated.

Its major disadvantage lies in its necessary restriction of the problems and the methods employed in the science if one dogma or doctrine wins in the methodological strife which dogmatism engenders. On the other hand, if the methodological strife reaches no clear resolution, the result is the draining of interest of time, and energy into discussion of method. How-

ever, where a practically appropiate balance between orthodoxy and conflict obtains, the dogmatic method may be of unqualified advantage since a measure of orthodoxy yields consistent direction on the one hand, and the conflict ensures against complacent maintenance of the status quo for too long a time.

The Empirical Method

The empirical method assumes a kind of naturalness or rightness to inhere in the state of the science at any given time. It proceeds therefore by determining the methods, materials and kinds of problems employed in the majority of published documents in the field at a given time. It then notes the similarities and differences of these, relative to similar materials in the natural sciences. This, though apparently a "scientific" method, is in fact an extreme form of the dogmatic method but minus that method's consciousness of its own assumptions, since the "rightness" and "naturalness" of the status quo is taken as a principle and therefore admits of no argument.

The major advantage of the empirical method, if it is an advantage, is that it minimizes methodological warfare by establishing an unarguable orthodoxy, and thus tends to ensure and enlarge the status quo of the science. This is exemplified by the band-wagon effects which have characterized the social science in recent times: the recurrent rashes of psycho-analytic studies; the re-emergence of typological studies since Sheldon's work; the frequency of pseudo-controlled studies of the effects on attitudes of this or that in the 1920's. These examples represent largely unintentional employment of the existing status of a science as the ground for a fiat concerning future research, but such unintentional activities differ in effect from intentional ones largely in degree only.

The Analytical Method

The analytic method employs as principles neither the assumption of one particular philosophic doctrine, nor the em-

pirical, determined, conditions which define the status quo of a science. Indeed it employs no substantive principle at all unless it be the notion that a given body of crudely objective "things" (e. g. societies, living organisms, physical bodies) can be seen from many points of view, and in, or out of context with many other groups of things. As a consequence, even if a given science be restricted to study of a given group of "things" (e. g. "societies"), phenomenologically "real" subject-matter of that science is potentially manifold and may be very different to different workers at the same time or at different times. The same kind of thing can be said for method in a science. Even if restricted to "scientific method" there are so many differing models of scientific study that the term is extremely ambiguous, and permits within very broad limits highly varied attacks upon problems.

Given this view of the defensibility of many different definitions of matter and method, as a principle, an *analytic* attack on the relations between the social and natural sciences undertakes to assert, not what ought to be (as in the dogmatic method) or what is (as in the empirical method) but what *may* be, both presently and in the future. Thus, it incorporates the conclusion of many dogmas, but takes them as conceivable or defensible alternatives rather than take one of them as imperative. Similarly the actual status quo in the science is seen and understood as one, or, often, as a compendium of several definitions of the science among a great many other useful, possible ones.

Herein lies both the great advantage and disadvantage of analytic method. On the one hand, since it holds up *many* possible definitions of the subject-matter, method, and principles, of a science, it tends to ensure that a given mode of formulating and solving problems in that science will be seen only as one incomplete way of viewing the multivalent subject-matter of that science, not as the complete truth concerning it. The sense of incompleteness which I intend here has nothing to do with incomplete, or tentative *solutions* to problems. It is to say,

instead, that even if a theoretical ideal is achieved in the sense that complete and indubitable answers to a set of formulated questions are established, this constitutes knowledge of a subject-matter only in a partial, specially colored, and restricted sense. For example, it is possible to think about and search for knowledge of society solely in economic terms. It was once fashionable to do so. It was also once fashionable to formulate all social problems in terms of the relation of the individual and the state to each other. Since these approaches to the study of society are no longer fashionable, they are visible and therefore serve, I hope, to communicate the notion of the incompleteness of *any* body of knowledge. when it is formulated within the frame work of a single set of terms. I am not sure that currently fashionable ways of viewing society as an object of knowledge are similarly perceived as proper but incomplete ways of examining their common subject, at least by the exponents of these views. Currently, for example, the effort to understand society by applying to it, literarily or analogically, the terms of psycho-analysis is pursued and defended with enormous enthusiasm by many social scientists. The enthusiasm suggests that at least some exponents of this approach deem it to be, not a complement to ethics, politics, economics and cultural anthropology, but as a replacement for, or correct definition of these sciences. They conceive of wars as the expression of some collective aggressive need, guilt, or anxiety, and therefore reduce social research to an attempt to discover the particular aggressions, guilts, or anxieties functioning in particular situations, and to the effort to predict the social consequences of such psycho-dynamics. This is so different in kind from the 19th. century economic and political abstractions of the problem of war. The economic abstraction saw war as the product of the conflict between nations growing from unacceptable ratios of material needs to the means of their satisfaction. The earlier political abstraction examined wars as primarily or entirely struggles for the possession of power. If these abstractions are vicious and if they are the same in kind as the abstraction of psycho-analysis the latter is vicious too.

In fact, of course, each of these abstractions is vicious only if taken to the exclusion of the others. That war has an economic component, a political component and a psychological component cannot be denied in view of the facts and ideas disclosed by the disciplines of economics, politics, and psychology. Therefore the viciousness lies, not in the abstractions themselves but in mistaking the abstraction for the thing, the part of the whole.

It would be pleasant indeed if any and every abstraction could be discarded in favor of the thing, the whole, itself. Unfortunately, man has failed in this endeavor in the social sciences. It is not yet possible to discard the separate disciplines of ethics, economics, politics, sociology, and so on, in favor of the one unified social science which studies society, as it may really be in all its complex unity. Instead, we must fall back on images of this reality, the several abstractions which man's ingenuity has invented, and approximate the complex reality by discovering *and admitting* the complemental relations which these abstractions bear to each other. In this respect, it should be added, the social sciences are no different (except, perhaps in minor degree) from the natural sciences.

Physiology, biochemistry, biophysics, and psychology are all studies of abstracted aspects of the whole living organism. As a whole, no biological science is prepared to study it. Similarly, even the physical body to which the equations of mechanics and dynamics refer is an abstraction from the real bodies which exist in nature. Newton's laws of motion, for example, refer to the motion of a body farther from a second or third body than is any body in the physical universe.

In brief then, the analytic method takes as its principle the incompleteness and imperfection of any one method of formulating and solving problems, that is, it recognizes the "abstractive" nature of the object of each such method, and therefore relates one science to another, by trying to understand the relations of the abstracted object of each (with its appropriate method) to the other. It is admitted by a merely critical or jarkal science. It creates nothing itself, but only

examines and relates the creations of other disciplines, yet it serves two functions.

At the level of research it serves to remind each enthusiastic school that its own object, however worthy of pursuit is only one of many. It thereby encourages that synthesis of conclusions by which the fictions of science are made to approach closer and closer to reality.

At the level of curriculum and instruction it helps the teacher and planner guard on the one hand against the one-sided doctrinaire teaching which comes from over-sensitivity to the shifting winds of popular academic novelties. Without the measuring rod of such an analytic and critical discipline, the teacher and planner is allergic to every enthusiastic pleader who would assimilate all other sciences to his favorite of the moment, whether it be semantics, mass communication, propaganda analysis, or psycho-analysis. On the other hand, it helps the planner guard himself against unhospitality to new approaches in his science by reminding him of the uncompleteness of his discipline.