Comments and Communications

The Natural Sciences Applied to Social Theory

A small conference was held in Princeton last October and attended by scientists and scholars expert in a wide variety of fields, including mathematics, astronomy, physics, physiology, sociology, marketing, economics, philology, and history. The conference was supported by The Rockefeller Foundation and its purpose was to explore the possibility of broadening research in the natural sciences by applying results to the improvement of thought in the social sciences, particularly through increased emphasis on ideas and methods of a mathematical sort. General agreement was reached among the group that this can and should be done and that the division between the natural and social sciences is becoming much less severe.

The following statement was issued.

Critical importance is attached to improved descriptions of social processes. No substantial body of social scientists are opposed to the collection of data which can be described in mathematical terms. No advocates among us were found for the idea that the study of human nature cannot be advanced by the same methods which have succeeded with physical nature. Mathematical reasoning about well-established social concepts supplements verbal reasoning and may even supplant it in some instances.

Modern mathematics is not limited to numerical equations, as is witnessed by such subjects as topology and theory of groups. Many students of the social sciences should be encouraged to familiarize themselves with the methods and some of the phenomena and principles of the mathematical sciences. The relationship is bilateral, in that wholly new phases of mathematics such as the theory of games will be developed in order to deal more adequately with some types of social phenomena.

Standards of making and presenting social observations need to be raised in many cases. Difficulties of defining what is to be measured are even more evident than in the physical sciences, although the same difficulties are met in physics when high precision is demanded. There must always be a blur around the edges of a category when it is applied to phenomena. Wherever feasible some indication of uncertainties should be published with the observations; they are larger than most users of social statistics realize.

Some too-impatient applications of mathematical reasoning in the social field have tended to make unmathematical scholars accept its results with reservation. Perhaps, as one example, the idea of applying exact time cycles has been overworked. Valid empirical regularities occasionally have been pressed too far and employed as though they were complete theoretical explanations usable under conditions widely different from those where they had been proved to agree with observation.

The origination of social theories by the carryover of analogues from the natural sciences requires special attention. An analogy, even when detailed, is not a proof but always must be tested against observed social data. The analogy must be more than verbal; it must express a function or abstract relationship common to the two fields. A question of terminology arises when such a transfer is made, but we are agreed that questions of mere names can be deferred.

The distinction between pure science and engineering exists also in the social field. There most workers have been interested in reaching decisions and making utilitarian application, as engineers, to a greater degree than in stopping, as scientists, with description and prediction.

Our discussions discovered and mapped an interesting rift between investigators trained in natural science and those trained in social science. There is a marked difference of opinion with respect to the usefulness of empirical regularity as a middle stage in progressing from observation to hypothesis or theory. While sociologists have given some attention to purely empirical studies, it is theory which has been the glamorous element. And social theory usually is elaborated deductively from considerations that have a priori appeal rather than from the much more laborious and detailed process of searching first for significant regularities among masses of observations—the search for regularity without regard to so-called meaning. One idea advanced in our discussions was that the conceptual level of the original observations must in some sense already be at the stage of final theory, and that in consequence the question always is, What observations to make? Which regularities will be significant?

We suggest that any natural scientist who may be ambitious to make a contribution to or criticism of social science should heed the red flags which came out in our discussions. Contrasts we touched upon, such as statistics versus history, communication versus uniqueness, denotation versus connotation, description versus decision, are not to be slurred over lightly.

We all feel that these results of only six hours of joint discussion among people who represent a wide scientific baseline is an encouraging preliminary test of the mixed-team method. Here is a new academic research tool. It was first proposed long ago and, under the name operations analysis, has met with successes when directed toward engineering objectives.

Signers of this declaration of interdependence in research include:

Read Bain
Miami University
P. W. Bridgman
Harvard University
Reavis Cox
University of Pennsylvania
William J. Crozier
Harvard University
Stuart C. Dodd
University of Washington
George A. Lundberg
University of Washington
Oskar Morgenstern
Princeton University
Marston Morse
The Institute for Advanced Study
John Q. Stewart
Princeton University
Joseph R. Strayer
Princeton University
Joseph L. Walsh
Harvard University
Edwin B. Wilson
Harvard University (emeritus)
Max A. Woodbury
The Institute for Advanced Study
George K. Zipf
Harvard University

It is a source of deep regret as well as pride to us that this was the last scientific meeting which Alfred J. Lotka attended. His death came before he, a pioneer in the mathematical study of society, could comment on the results.

JOHN Q. STEWART

Princeton, New Jersey