Social Interests and Statistical Theory

Statistics in Britain, 1865–1930. The Social Construction of Scientific Knowledge. DONALD A. MACKENZIE. Edinburgh University Press, Edinburgh, 1981 (U.S. distributor, Columbia University Press, New York). viii, 306 pp. $25.

Although scientific organization has long fallen within the purview of sociological analysis, it has traditionally been assumed that the antecedents of theory in natural science are exclusively philosophical and empirical. Donald MacKenzie is one of a new generation of sociologically oriented historians of science who are calling this old premise into question. The social interpretation of scientific knowledge has been systematically expounded in numerous recent works, not least conspicuously or successfully by MacKenzie's colleagues in the Science Studies Unit at Edinburgh, Barry Barnes, David Bloor, David Edge, and Stephen Shapin. MacKenzie's object in the present work is to enrich the generalities in which the sociology of scientific knowledge is often couched with some compelling examples from a case study. The episode he narrates is one in which ideological considerations were integral to the transformation of scientific ideas. Their effect was not to corrupt science but to fertilize it.

The subject of this case study is British mathematical statistics from 1865 to 1930, the period during which it assumed its recognizable modern form. Few areas of mathematics or natural science could be more promising as locations in which to seek out interactions between scientific doctrine and social dogma, for statistics has been closely bound to the social sciences and even to political movements for at least two centuries. Indeed, the very title statistics was almost synonymous with social science—the science of the "statist"—during the early 19th century, and it has more recently been celebrated as a vehicle for the quantification of sociology. MacKenzie has seized upon a particularly conspicuous social link, that between statistics and eugenics. Francis Galton, Karl Pearson, and R. A. Fisher, the three greatest statisticians of this period, were also among the most influential and dedicated advocates of racial improvement through selective human breeding. To a large extent, their interest in statistics was subsidiary to this social purpose.

Among the strongest features of MacKenzie's book is the success with which he ties together a wealth of disparate subjects. He explains the attractiveness of eugenics to the professional middle-class people who endorsed it in terms of the positions it promised to furnish for men with advanced scientific training, and also its implicit celebration of their expertise as evidence of biological superiority. His work makes clear the importance of this eugenic creed, and the social context that motivated it, for the technical history of statistics. MacKenzie also discusses at some length the organization of statistics during the first decades of the 20th century, and even surveys the various figures who contributed significantly to statistics during this period. To some extent, however, MacKenzie sacrifices the explicit subject of his book, British statistics during the late 19th and early 20th centuries, to its thematic subtitle, the "social construction of scientific knowledge." Innovations in the theory of statistics are treated only insofar as they illustrate the theme of social influence. This gives the work a certain episodic character and obliges the reader to supply the mathematical context. In no case does the importance of a particular technical development for the general history of statistics receive explicit attention.

MacKenzie focuses his attention on three examples of theories or procedures for which he is able to say: "we have here an instance of the effect of social interests on the conceptual development of statistical theory" (p. 72). The first of these is Galton's idea of correlation, which emerged from his eugenic studies of the transmission of variation between generations. The second instance is the debate between biometricians such as Karl Pearson and Mendelians such as William Bateson. Finally, MacKenzie argues that Pearson's proposed measure of correlation for noncontinuous variables manifested the intrusion of eugenic concerns into scientific matters.

MacKenzie's illustrations are reasonably persuasive, but perhaps less impressive than other familiar instances from other sciences. Whereas the Weimar physicists portrayed by Paul Forman incorporated indeterminism into the quantum theory as a direct reflection of their ideology, Francis Galton's correlation was simply the solution to a problem that was ultimately motivated by eugenic concerns. More generally, MacKenzie's labored distinction between social circumstances that inspire interest in a subject and those that affect its content has limited usefulness for a methodological discipline like statistics, whose object is not to represent nature but to provide effective techniques for analyzing data.

Thus MacKenzie might have done better to focus less sharply on these three specific episodes. A more comprehensive history of British statistics from Galton to Fisher, informed by MacKenzie's exceptional understanding of the influence of eugenics, not only would be welcomed by historians of science with a more technical bent but might also provide a more potent illustration of social construction than do these particular instances. MacKenzie can hardly be faulted, though, for failing to produce so large and complex a book as would be entailed in fulfilling this desideratum. We can be grateful to him for the book he has written, for the moderation and insight he brings to this important set of issues regarding the relation of science to ideology. MacKenzie succeeds in establishing the importance of eugenics for the development of statistics, and his book, though making no pretense of completeness, is the best work we have on the creation of statistics as a branch of modern mathematics.

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History of the Calculus

The Origins of Cauchy's Rigorous Calculus. JUDITH V. GRABINER. MIT Press, Cambridge, Mass., 1981. xii, 252 pp. $25.

In *The Origins of Cauchy's Rigorous Calculus* Judith V. Grabiner explores the "commonplace among mathematicians" that Cauchy provided the "first essentially rigorous treatment of the calculus." Cauchy deserves historical attention for his participation in the establishment of rigorous analysis and for his influence on other mathematicians. But in Grabiner's view Cauchy's work is equally important for his creative transformation of 18th-century attitudes and techniques. "Mathematics may often grow smoothly by the addition of meth-