al source book available on the archeology of the Florida Indians. It is a little too technical for most lay readers, perhaps, and is not always detailed enough for the serious student, but it is a cogent and valuable introduction to the subject. Most important (and gratifying) of all, the book clearly demonstrates how much has been learned since the last major attempts to synthesize Florida archeology just 30 years ago. The authors do an admirable job in bringing us up to date.

JEFFREY P. BRAIN
Peabody Museum,
Harvard University,
Cambridge, Massachusetts 02138

Two Mathematicians

John von Neumann and Norbert Wiener. From Mathematics to the Technologies of Life and Death. STEVE J. HEIMS. MIT Press, Cambridge, Mass., 1980. xx, 548 pp. $19.95.

Steve Heims has undertaken an ambitious task in writing this book. In Wiener and von Neumann he has chosen subjects of prodigious intellect and versatility, well suited for dual biography because their activities and research brought them into frequent contact, while their attitudes toward politics and technology diverged.

Wiener is best known as the "exprodigy" (the title of the first volume of his autobiography), who capitalized on an intense and demanding early education in his later accomplishments. These included a mathematical treatment of Brownian motion, advances in probability theory, and the development of cybernetics, with its applications in the social and life sciences as well as in engineering. After education in Hungary and Germany, von Neumann applied his precise and rapid powers of reasoning to axiomatic quantum mechanics, game theory, electronic computing, and weapons technology. In their years at MIT and Princeton, respectively, the two men often had occasion to meet. They shared many interests, but pursued them in characteristically different ways.

In his impressionistic portraits of the two Heims weaves a variety of sources together, including correspondence, interviews (both his own and those conducted by others), reminiscences of colleagues, and his subjects' publications. But the ideal situation of equivalent sources for the two subjects does not obtain, since there is no von Neumann counterpart to Wiener's intimate self-portraits. This fact, combined with von Neumann's notably smooth adaptation to his social environment, may account in part for Heims's difficulty in grasping the human character of von Neumann. Wiener, with his penchant for self-analysis and eccentric behavior, presents no such difficulty.

Heims's ultimate intention, however, is less to examine Wiener and von Neumann as individuals than to appraise scientific activity itself. In this context, von Neumann stands as symbol and archetype, "a scientific man within all the major connotations of today" (p. 360). As a "paragon of science," von Neumann espoused "value neutrality" and faith in scientific and technological progress (*ibid.*). Much of this dual biographical essay is devoted to a critique of the scientific ethos, which Heims sees in fundamental "conflict with a wider, more comprehensive humanness" (p. 363). Particularly damnable is von Neumann's enthusiastic and lucid commitment to technological horrors. Heims provides a lengthy account of the politics and administration of superarmament. The reader might wish to learn more about von Neumann's participation in the decision-making process, but the necessary governmental documentation was evidently not open to Heims. For his purposes, however, it is enough to know that von Neumann participated, and did so willingly.

By contrast, Wiener, whose relations with society were often rocky, held implicitly "organismic" values infused with the concept of process, an outlook Heims characterizes as fundamentally ecological. Wiener's mode of cybernetic analysis "is particularly suited to exposing the inhuman use of human beings" (p. 303), and, unlike von Neumann's game-theoretical approach, helps the social steersman keep off a suicidal course. Wiener sought to construct a practical and painfully modern philosophy of technology. Its personal expression would be a refusal to put technological knowledge and tools in irresponsible hands and the erection of yet another barrier between Wiener and the amoral majority of the scientific and technical community. All this Heims finds laudable and, more to the point, congenial to his own point of view.

The genre of dual biography puts special demands on an author, and Heims occasionally succumbs to the natural temptation to force a contrast or parallel. The insistence on von Neumann as an "outsider," for example, seems forced or irrelevant at times. The author also passes up some promising opportunities for detailed comparison—for example, Wiener's and von Neumann's different approaches to long-range weather prediction. Heims does describe with care and finesse Wiener's concern with stochastic processes and von Neumann's formal, axiomatic method. If some topics—the early history of quantum mechanics, or prewar Hungarian society and politics—are better explained elsewhere, Heims's accomplishment in providing access to measure theory and game theory is still substantial. The appetite is whetted for intellectual biographies of both Wiener and von Neumann.

Heims entertains no such intent in this work. Instead, he uses Wiener and von Neumann to illustrate his contention that "the traditional ethos of the scientific community, dictated by the god of scientific and technological progress, needs modification so as to allow for the reemergence of suppressed human and cultural needs" (p. 159). It is debatable whether these two mathematicians are representative of the options facing the scientific community. For Heims, however, this question, and the tasks of the biographer, are made subordinate to a vehement conviction of the moral poverty of modern science.

ROBIN E. RIDER
History of Science and Technology Program, University of California, Berkeley 94720

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