Their contrasting selves on opposite sides

John von Neumann and Norbert Wiener: From Mathematics to the Technologies of Life and Death

S. J. Heims
547 pp. MIT P., Cambridge, Mass, 1980. $19.95

by Robert Andersen

Norbert Wiener was, for many years, the genius in residence at MIT, while John von Neumann enjoyed hypercerebral status at Los Alamos, Washington, and the Institute for Advanced Studies. Wiener was the genuine article, a genius cut from homespun cloth, a sometimes hapless, often wily, occasionally formidable eccentric whose heart proved as expansive as his mind. Von Neumann on the other hand was an accomplished social adept and status seeker whose proclivity for service to the wealthy and powerful nicely reflected the successful banker's image he cultivated. Wiener invited stories about his homorous quirks and clownish lapses, but von Neumann elicited awe, for his unnerving mental prowess.

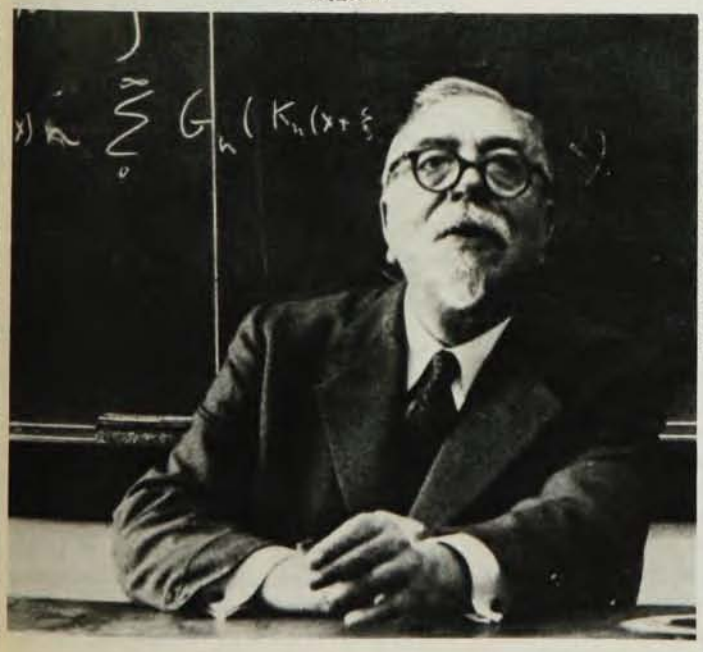
Once they ventured out of pure mathematics, these *wunderkinder*-grown-colossi aligned their contrasting selves on opposite sides of the nuclear weapons onslaught: Wiener's humanist critique and individualist refusal against von Neumann's cavalier incitement (as principal Air Force advisor and influential AEC commissioner). As competitors and collaborators, they put their brilliant theory of automata—cybernetics and computation—on the technical agenda. More crucially, as exemplars and exponents of rival schools of social practice they demarcated the boundaries of the nascent "transvaluation of scientific activity." They were seminal figures in the upheaval that turned science into a feverish enterprise of State and Industry.

Steve Heims, himself a reconstructed physicist, has sought to explore these contradictions by means of a perilous genre, the double biography. The result—several layers of insight superior to the look-alike *Lawrence and Oppenheimer*—is an often fascinating critical study. Contrasting his protagonists' qualities of upbringing, mathematical inclination, and moral imagination that led to antipodal positions on the political consequences of technical work, Heims has gone far toward fulfilling the subtitle's promise. Here are the essential Wiener and von Neumann, regarded without the biases of scientific reverence and political disdain.

The contrasts between them are emblematic of the doubts that assail scientists today about the legitimacy of their work. Heims suggests, for instance, that von Neumann's chosen role as a technological conquistador, his affinity for bureaucratic power and ideological rigidity, are of a piece with his mathematical drive for axiomatic certitude; that life-long effort to deny legitimacy to contingency and change—the stuff of politics and ethics—lies, close to the foundation of his contribution to technological mayhem.

Heims brings many penetrating observations to his book. Unfortunately, he also brings some weaknesses, most notably a pedestrian pen and a cloying raised-consciousness. Too often the obvious is underscored, and the analytic task of providing a reciprocal illumination of these two lives is neglected. Von Newmann and Wiener don't divide the scientific mind between them; in fact, in many ways, they are similar. The effect is to render what should have been a brilliant study into an inert, albeit important, one. Still, Heims has grappled admirably with the challenge of representing the transformation/deformation of science, and if this effort is incomplete, it is also overdue. Here is

WIENER



MIT MUSEUM AND HISTORICAL COLLECTIONS

VON NEUMANN

PHOTO BY ALAN W. RICHARDS, AIP NIELS BOHR LIBRARY

the point of departure for any serious effort to appraise the meaning of genius in the era of apocalyptic science. Highly recommended.

* * *

A former editor at the Hastings Center (Institute for Society, Ethics, and the Life Sciences), Robert Andersen is currently at work on a book on the atomic scientists.

Computers and Instrumentation: A Practical Handbook of Measurement, Interfacing and Control Circuits

A. Carrick
256 pp. Heyden, Philadelphia, 1979. $19.50

Minicomputers with performance rivaling that of batch-mode "mainframe" computers of a decade ago can be had for thirty thousand dollars; a modest microcomputer, complete with plenty of memory, floppy disks, graphic printer, terminal, and analog/digital interfaces costs one fifth as much. The ready availability of computational power in the laboratory is merely convenient; connecting a computer "online" to an experiment is revolutionary, seen from the framework of scientific experimentation of merely two decades ago.

This ability to gather data from an experiment while controlling the various parameters (perhaps in response to the data just gathered) can now be considered a pleasant fact of scientific life. The essential skills—assembling the computing system, interfacing to the experimental apparatus, writing and debugging the software—are, unfortunately, far harder to come by than that elegant hardware harvest from Silicon Valley.

In this volume, subtitled *A Practical Handbook of Measurement, Interfacing and Control Circuits*, Alan Carrick, an experienced British industrial designer of electronic instrumentation, has attempted to set down "a basis for questioning about computers in scientific surroundings." In fact, he grapples with the specifics of computer architecture, analog and digital hardware fundamentals and, of most importance, the interfacing of small computers to laboratory instrumentation.

Computing hardware, the most rapidly changing area of electronics, is therefore the most difficult to write about and get into print without it appearing hopelessly dated by the time the ink has dried. Carrick's solution is to take a historical and generic approach, avoiding the specifics that would make the book a true "practical handbook." In my opinion, the volume is greatly weakened by the intentional omission of the specifications and names of parts. We are shown an example of microprocessor architecture, but *which* microprocessor? The feeling of loss is most poignant in the otherwise admirable collection of analog and digital instrumentation examples: schematic diagrams with unnamed and unknowable resistors, capacitors, amplifiers. Carrick avoids the specifics in software as in hardware: Barely a dozen lines of programming accompany as many interface examples.

By contrast, the most successful and enjoyable sections are those in which the author allows himself the luxury of naming names: the fine summary of the standardized interfaces (RS232C, IEEE488, CAMAC and the British BS4421). Carrick is in fine form, too, when general advice is what is needed: what to look for when choosing a computer; software languages, standards, benchmarks; good advice on the use (*non*use!) of monostables; the hardware/software choice in design; when to avoid computers.

While this volume makes interesting reading, particularly for those already acquainted with small computers, it does not succeed as a handbook. Those looking for detailed help should consider J. W. Cooper's *The Minicomputer in the Laboratory* (Wiley, 1977) and M. Sargent and R. Shoemaker's *Interfacing Microcomputers to the Real World* (Addison-Wesley, 1981). The former is a fine introduction to assembly-language programming (PDP-11) with laboratory applications; the latter covers all aspects of microcomputer hardware and software, including interfacing, control and signal processing, based around the specific example of the Z80. Both feature very detailed and complete examples.

PAUL HOROWITZ
Harvard University

Nuclear Nightmares: An Investigation into Possible Wars

N. Calder
175 pp. Viking, New York, 1979. $10.95

I can think of few, if any, books of recent years that I would recommend as strongly—but with as little pleasure—as Nigel Calder's *Nuclear Nightmares*. Out of his sense of responsibility as a journalist he has taken on the most worrisome and intractable problem of our times, the threat of nuclear war, and found the situation worse than he had expected: not just risky but insane, a peril from which there is little hope of escape.

My strong recommendation for this disquieting book has its basis in the belief that whatever small hope there is might be increased if enough people, particularly those professionals concerned with nuclear arms and policy, read it.

The subject divides naturally into four components: technology; the consequences of the use of nuclear arms; the ways in which nuclear war might begin and develop, including all the esoteric doctrinal questions; and what, if anything, might be done to make nuclear war less likely or to mitigate its consequences.

It is difficult for someone like myself, who has lived with these matters for decades, to judge whether Calder has treated them at a level that is meaningful and understandable to the intelligent nonexpert, but I believe he has. I feel more comfortable in giving him accolades for accuracy—I don't recall any technical errors—and for giving balanced and reasonable judgments on matters of some dispute, such as how "conventional" war is changing as a result of the introduction of precision-guided munitions and what are the likely near-term prospects (very poor) for charged-particle-beam weapons.

He is at his best in dealing with doctrine and concepts for use of nuclear weapons, including differences between the East and the West, and in highlighting the uncertainties that must attach to their use. Although advocates of "flexible response," "extended deterrence" and "limited nuclear war" will resist his arguments, I find them persuasive in demonstrating that nuclear weapons cannot be used for these purposes without risks that are unreasonable.

Nearly all of this material is woven into the four central chapters, each of which deals with a type of possible origin of nuclear war: the East-West conflict in Europe; the spread of nuclear weapons to additional countries; failures of command and control; and disarming attacks by one of the superpowers against the nuclear forces of the other. I find the first of these chapters flawed in that Calder has accepted too much of the conventional wisdom about the superiority of the Warsaw Pact forces relative to NATO's. After all, the personnel balance in the European theater is about even; by any reasonable measure, NATO has been spending more each year on its military establishment than the Pact; and the Soviets have a Chinese problem for which some allowance ought to be made. I am also troubled about his giving the first and fourth scenarios as much weight as he does. Perhaps he is right, as a reporter, in doing so. They have certainly been the scenarios stressed in the development of policy and the rationalization of weapons-acquisition decisions. However, overemphasis on them underlies, in my