Authors' imagination

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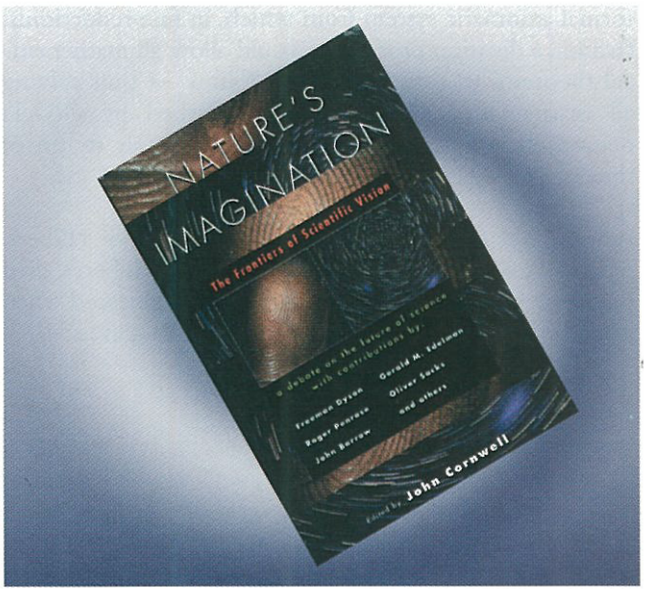
Nature's Imagination: The Frontiers of Scientific Vision edited by John Cornwell. Oxford University Press, 1995, 212 pages. $23.00 hardcover (ISBN 0-1985-1775-0).



David Hilbert, whose reductionist efforts in mathematics prefigure the work of Gödel and Turing, is featured in several contributions to the edited book *Nature's Imagination: The Frontiers of Scientific Vision*. His presence recalls the following story. The Hilberts hosted a dinner party, and as the guests began to arrive Mrs. Hilbert asked her husband to change his shirt. Twenty minutes passed, and David Hilbert had not returned. Forty minutes passed. Mrs. Hilbert ascended the stairs in search of her spouse. She found him — pajama-clad and asleep in bed. His explanation: "It's simple. First I took off my jacket; then my tie; my shirt, my pants... It was the usual sequence of events."

Similarly, although the subtitle of this book is 'a debate on the future of science', in fact the contributors — including Roger Penrose, Gerald Edelman, Oliver Sacks, Freeman Dyson, and ten others — principally hold forth each on their characteristic themes, in their accustomed manner: first they uttered one statement, then the next; it was the usual sequence of events.

This is the strength and weakness of the book. On the one hand, *Nature's Imagination* serves a noble function, affording a précis of the styles and substance of its distinguished authors. As a consequence, much of the exposition is lucid, and some of the ideas felicitous. On the other hand, the book fails to rise to its cover-billing as a debate on the future of science. But as the editor, John Cornwell, notes in the preface, the authors were in fact brought together to discuss the primacy of reductionism — "a perspective in which all biological and mental events are reducible to physical events and all physical events are reducible to matter–energy" — in the future of science; and many authors indeed proffer perspectives on reductionism, woven into their signature subject matter. In any case, the authors are doubtless better equipped to reprise their customary material, with or without *en passant* comments about reductionism, than to prophesy the future of science.

What, then, is this customary material? Many contributors speculate about cognitive function (Penrose, Patricia and Paul Churchland, Edelman and Tononi, Sacks, Margaret Boden, Hao Wang and W.F. Clocksin), a sport which is always in season and accepts any credentials. Chapters also touch on the relation of reductionism to such sundries as quantum computers and quantum entanglement (Penrose); experimental arithmetic (Gregory Chaitin); symmetry breaking and Theories of Everything (John Barrow); artificial life (Boden); 'computabilism' (Wang); and assorted subsets of Gödel, Turing and Hilbert (Dyson, Chaitin, Penrose and Wang).

Most contributions offer savory tidbits. But for those who seek sound logic and penetrating insight, *Nature's Imagination* will disappoint. For example, Dyson's introduction asserts that science is an alliance of free spirits in rebellion against the locally prevailing culture; a noble ideal, but one which ignores the reality that each scientific discipline forges its own locally prevailing culture, which — buttressed by the custom of peer review — imposes its own orthodoxy and tyranny. Dyson insists that scientists should be "artists and rebels". Yet he notes that great advances in science usually result from new tools, rather than new doctrines, which would seem to make the necessity of rebellion rather less compelling.

Penrose, meanwhile, expounds prettily on the hypothetical connection between quantum mechanics and neurobiology. His logic appears to distill to this: both are interesting, and difficult to fathom, so they must be related.

Edelman attacks one flimsy metaphor for the brain (brain as computer) to replace it with a flimsier one (brain as Darwinian evolution). Edelman has a penchant for muddying the waters to make them look deep; a co-author and good editing only marginally temper his enthusiasm for obfuscation.

Despite such reproofs, *Nature's Imagination* may make worthwhile reading for those who seek a foretaste of the

writings of these fourteen popularizers of science, or those interested in a largely well written if idiosyncratic introduction to past and present thinking on reductionism. In the latter vein, Barrow reminds us that processes in nature can be simple but the outcomes of those processes can evade prediction. And Chaitin recounts how our friend David Hilbert sought to establish a formal axiomatic system from which, in fine reductionist fashion, a decision procedure would allow all mathematical theorems to once and for all follow — thus solving all mathematics. (This hope was dashed by Gödel's demonstration that no system rich enough to be of interest could be both complete and consistent.)

Indeed we close, as we open, with David Hilbert. Tragically, a promising young student of Hilbert's died prematurely, and Hilbert (the story goes) acquiesced when asked by the family to deliver a eulogy at the graveside. "This is a terrible loss to us all. He was a gifted mathematician," Hilbert began movingly. "Indeed, at the time of his death he was working on the following problem. Let Omega be a function of three complex variables; ..."

Hilbert did not deliver what was billed. But what should one expect from a man known not for his obsequies but his mathematics? In the present instance, too, one should expect — and is arguably best off hearing — from each contributor not what was billed — a debate on the future of science — but that which he or she is best equipped to deliver. And that is what one gets.

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