
There are two deep affinities between this book and Charles Darwin’s Origin of Species (1859). Darwin, we know, did not invent the notion of evolution but rather transformed, through his mechanism of natural selection, a general idea that the natural world evolves by slow incremental changes into a far-reaching scientific theory. Similarly, John Ziman and his collaborators have the ambition of transforming a general notion that the technological or human-made world evolves by slow incremental changes into a wide-ranging cultural theory. To ground his theory of evolution, Darwin engaged a wide body of knowledge ranging from coral-reef formation through pigeon-breeding to his own fieldwork on the Galapagos Islands. Likewise, in the interdisciplinary Epistemology Group that he convened in 1994, Ziman has brought together economists, anthropologists, historians, educators, and social theorists to propose, discuss, and refine possible theories of technological evolution. But while Darwin crafted “one long argument” that allows us to comprehend and explain unexpected yet meaningful connections between, say, clover and cats as well as among a dozen scientific disciplines, this present volume reveals the sharp limits of viewing evolution in technology (in Ziman’s words) as a “well-formed model.” (p. 5)

One solid achievement of this volume is to move discussions of evolution in technology beyond the orthodox Darwinian paradigm of “blind variation and selective retention.” As several contributors point out, it does not seem helpful to speak of purposeful, institutionalized technological development as random or “blind” (even if modern corporations and governments experience unanticipated outcomes). Several contributors flirt with the notion of Lamarckian evolution, since it seems to capture the phenomena of willful (not blind) variation and the “inheritance of acquired characteristics” in technology, while others take up current evolutionary ideas including epigenetic or embryological-developmental inheritance. Yet most authors attempting a serious theoretical reconnaissance re-frame the entire concept. They propose a
general selectionist paradigm that positions technological evolution as an instance of the wider phenomena of cultural evolution, often drawing on Donald Campbell’s evolutionary epistemology. This thread provides something of a backbone for the volume, linking up Ziman’s chapter on theoretical-biological evolution, Richard Nelson’s on evolutionary economics and cultural evolution, Geoffrey Miller’s on genetic algorithms, and Edward Constant’s on “recursive practice” in engineering knowledge.

Focusing on technology as knowledge has obvious attractions, not least in providing a coherent answer to the question: what is “evolving”? Rival answers to the question range from entire nation-states, down through industries, companies, systems, artifacts, components, or even primordial gene-like units termed “techno-memes.” Such uncertainty about the domain of any theory is remarkable. By contrast, Darwin focused on explaining changes in biological populations through his mechanism of natural selection acting on individual organisms. In doing so, he provided a compelling answer to a problem (the origin of species) that had baffled two generations of his predecessors and that engaged public debate in philosophy and theology.

Since technology today raises Darwinian-scale questions about ethics, epistemology, mortality, and global sustainability, it seems more urgent than ever to have greater conceptual insight into its evolution and interactions with society and culture. Further attempts at a Darwin-like synthesis of these problems will need to grapple, I believe, not only with technological knowledge as it floats about human actors (a problematic stance taken by some of the authors) but also with technological practices that constrain and enable social and cultural formations. Equally important will be conceptual insight into failed technologies and technology-spawned societal problems. In several ways, Constant’s (second) chapter on war and technology helps redress the volume’s focus on “successful” technologies, creative inventors, and not-so-subtle presumption of “progress.” (One recalls Darwin’s insistence that evolution yields not “progress” but only a better fit between an evolving organism and its dynamically changing environment.)

In its widely varying essays and approaches, this volume will help make clear the strengths and limitations of specific evolutionary conceptions of technology.

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