

Reviews

Andrew Russell, Editor

Joseph November, *Biomedical Computing: Digitizing Life in the United States*, Johns Hopkins University Press, 2012, 360 pages.

Joseph November's *Biomedical Computing: Digitizing Life in the United States* is concerned with the intellectual, institutional, and social forces that supported efforts to enable biology and medicine's objects of study to be transformed "from exemplars of systems that computers could not describe into exemplars of systems that computers could indeed describe" (p. 7). He argues that the origins of digital computing, more broadly, has its roots in biomedicine and the opportunities and constraints provided by the US National Institutes of Health (NIH).

As November notes in a concise bibliographic essay, historians of computing have had little to say about biology and even less about medicine. This is remarkable considering the ubiquity of computers in the lab as well as the clinic. In his lucid telling, the history of computing and the history of biomedical science are inextricably linked.

This reworking of the history of computing begins in the 1940s to show how operations research (OR) provided a mathematized channel for the importation of computers into biology and medicine. Robert S. Ledley, a dentist-turned OR computer specialist, and Lee B. Lusted, a radiologist with a background in radar engineering, set out to optimize the clinical encounter by trying and not quite succeeding to digitize patient screening across the country.

November then looks at debates at the NIH in the 1950s and 1960s over how to promote computer use among biomedical researchers. Members of the newly created Advisory Committee on Computers and Research (ACCR) at the NIH were dismayed to realize that many biologists were relatively uninterested. Ledley sought to change this, arguing that it would be crucial to reform the life sciences such that they could be made amenable to computers. This would mean mathematizing data processing as well as discouraging the individualistic, small-scale approach that characterized biological research.

In the following chapter, "The Forgotten Biomedical Origins of Personal Computing," November revisits the history of LINC, now recognized as the first personal computer. Wesley Clark, LINC's steward, took a different tack than Ledley and Lusted. Rather than changing biologists to meet the needs of computers, he sought to transform computers to meet the need of biologists. Clark felt they needed a computer that they could use without the help of intermediaries. The real-time computing capacities of LINC, as well its visual interface

and small scale, would prove critical. NIH agreed to support a training camp where biologists could learn how to use LINC, which gradually gave them the confidence to take the machine back to their labs.

The next chapter looks at what happened when they did so, focusing on the use and development of NIH-sponsored computers, especially LINC, in laboratories and hospitals. It is here the reader gets a view of the opinions and experiences of biologists and clinicians themselves, and it becomes clear that biology and medicine were each very differently oriented toward computers. In the realm of biology, for instance, demand for computers was stoked by outside actors: first the NIH and then computer manufacturers. November demonstrates the missionary zeal with which the latter group descended upon biologists, including an amusing discussion of a role-playing exercise between "John Q. Scientist" and a Digital Equipment salesman peddling LINC-style computers.

The situation was different in the clinic, where there was a need to handle much greater amounts of data and to do so more reliably. In one of the most telling chapters—which could well be expanded into a book of its own—November sketches the roadblocks that computing faced in the realm of clinical care. We learn about NIH's support of an elaborate but impersonal patient screening system developed for Kaiser Permanente. We also learn about Massachusetts General Hospital's attempts to integrate biomedical research and clinical care through the digitization of patient records. November concludes that the same NIH policies intended to encourage hospitals to adopt computers ended up hindering their uptake, largely because they failed to provide means for hospitals to use computers to enhance patient care.

The final chapter is a case study of Stanford during the Sterling-Terman era, which situates computing as central to the remaking of the university into a powerhouse for biomedical research. Anyone who has wondered why our nation's elite hospitals are led by professors focused on research rather than patient care will learn a great deal. The successful recruitment of George Forsythe (the "Martin Luther of the Computer Reformation") and Joshua Lederberg (a Nobel-prize winning geneticist who participated in Wesley Clark's LINC training camp) was central to putting computing at the core of that effort. Their leadership of the Advanced Computer for Medical Research (ACME) also resulted in breakthroughs in artificial intelligence.

This book will be essential reading for historians of both biomedicine and computing. November has

done these fields a great service by mapping a complex but fundamental set of technical and institutional relations that have given momentum to our contemporary digitized lives.

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John Harwood, *The Interface: IBM and the Transformation of Corporate Design*, University of Minnesota Press, 2011, 336 pages.

That form follows function is one of the most regularly repeated and critiqued adages in both the histories of design and of technology. *The Interface: IBM and the Transformation of Corporate Design* by John Harwood rethinks this paradigm for the computer age. The book is an excellent survey of a history of IBM's design programs, with a focus on the immediate post-World War II period into the 1970s. At stake in this text is inverting the famous argument about form and function to demonstrate how aesthetic practices and design interventions are coproduced with corporate systems and technology. If in an earlier age we theorized that how things look and how they act was a linear process of function creating form, now we are invited to consider the feedback loops between spectacle and system. How we imagine, design, and figure our machines, Harwood argues, is not merely a superficial activity shadowed by engineering. Rather, it is one that shapes our organizations and technology—in this case of computing.

At the center of this book is the argument that studying design strategies offers us insights into reconsidering what corporations are and into rethinking what media might be. "At IBM," Harwood states, "the design program was to serve a control function; in harmony with the demand of the computer that all its data be processed in mathematical terms, the design program would seek to establish a material regime by, for, and of the logic of organization" (p. 4). For Harwood, design offers the symbolic and material structure that made the seeming abstractions of computation acceptable and desired by the public. Moreover, the book argues that design was not an activity secondary to IBM's engineering and administration, but rather an integral part, coproduced with a transforming organization. As IBM

developed more flexible, decentralized administration and was forced to transform its engineering and scientific laboratories to adjust to communication theories, the designs of its machines, labs, headquarters, marketing and educational programs, and logos all aided and abetted this structural transformation in knowledge and economy. The book traces the IBM design program through four nodes—its introduction and development immediately after the war, the participation of designers in IBM's computer production, the architecture of IBM's many global office parks as the corporation expanded after the 1950s, and finally, IBM's efforts at public engagement and science education.

Surveying the work of prominent mid-century designers such as Eliot Noyes, Paul Rand, Eero Saarinen, and Charles Eames, Harwood traverses a territory that on the surface appears familiar to design and art historians. This appearance is deceptive. Harwood's innovation is to use the familiar to defamiliarize our present and accepted understandings of corporations and computers. He insightfully extracts the specific logics that convinced the public and engineers of the type of machines they needed to build. Central to this narrative is an underdeveloped but useful term, "the interface," which Harwood defines as the location where human and machine interactions are organized. This is not necessarily a screen, he implies (but insufficiently elaborates upon), but rather a field where bodies and technologies are spatially arranged in new relations for production (p. 9).

For example, from the beginning of IBM's turn to computing, designers had debated the appearance of the computer (pp. 80–82). Such seemingly inconsequential decisions, Harwood argues persuasively, produced concepts of what it means to engage with a machine and how human operators should be trained and incorporated into the human-machine system. Decisions about how much the customer or user might see of the inside of the computer, what parts are transparent and opaque, and how the machine would be color coded were closely linked to rethinking computers not as mammoth architectures and isolated objects, but rather as "furniture"—modular, scalable, and parts of a system rather than discrete objects. In machines such as IBM's System/360, the careful design of attention and distraction—from the structure of operating systems to the skin of the

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machine and the white rooms within which they were placed—all were strategies that helped clients to grasp the object while simultaneously being prepared to subscribe to a system, and perhaps network, invisible to the human eye and incomprehensible to the human mind (pp. 87–99). The aesthetics of the machine were thus integral to assisting IBM in rethinking the computer industry as a whole—away from providing discrete machines and toward providing business solutions and systems.

Harwood's analysis is particularly excellent for illuminating the seeming idiosyncrasies and hypocrisies of contemporary computer culture. In each of the chapters he expands on themes of transparency and opacity, organicism and mechanism, systems and parts, and process and object to explore how design for a computer company utilized the tensions that fuel information economies to create new systems. For Harwood, design was about recruiting and educating human beings to reorient themselves to machines and to make the connection that "human endeavor = rational planning," where both sides of the equation also equaled computing. This task, he argues, "involved a design logic of displacement and enclosure" (p. 195)—the displacement of concerns about the computer's novelty, through the production of aesthetically coherent environments that substantiated the everydayness, and normality, of information as part of life. Design made it possible to close oneself ergonomically into the space of the machine and simultaneously to open oneself into a networked information system. This "displacement," Harwood argues, is not necessarily negative; it can also produce new forms of organization and economy—a point he

makes by showing design influence on work, education, and territory. Harwood thus dispels any simplistic concepts of control, "closed worlds," or surveillance that so dominate the studies of cybernetics, computing, and design.

Possible shortcomings of this text are its lack of connection to a broader political economy as well as Harwood's reliance on architectural concepts of organicism, modernism, and materiality to substantiate his arguments. Readers fluent in contemporary media theory may find some of his suggestions excellent but may be frustrated that they are never followed through. Ultimately, Harwood veers away from making any grand assessments or conclusions about a historical transformation in the nature of organization and never fully elaborates on the potential political and economic repercussions of the strategies he studies. The book's suggestive title, *The Interface*, is somewhat misleading and always underdefined historically and conceptually. The book is an excellent history of design in a corporate setting, but it does not fully develop a history or a theory of our contemporary forms of attention, interactivity, or interfaces.

This shortcoming, however, is also an opportunity. No book can accomplish everything, and Harwood opens his readers—including historians of computing and observers of IBM—to a new set of questions. If function and form are trapped in feedback loops, then this book is an invitation to begin inquiring more broadly on the place of aesthetic practices in information economies. The implication that design is central to the organization and action of computer corporations also then implies that our contemporary information economy is an attentive and affective economy—an economy that demands the modulation of our attention and perception in particular ways in order to work. Although Harwood does not thoroughly investigate this possibility, he offers some possible places to begin, and he invites us to do so. *The Interface* is an excellent provocation to further research and thinking; it opens up a new interface to the study of computing, aesthetics, and technology as related to society.

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