# MACHINE DREAMS:
# THE CULTURE OF TECHNOLOGY

*By Herbert Sussman*

THE VICTORIANS LOVED MACHINERY. One example, to serve for many, is Mayhew's description of reduced admission days at the Great Exhibition:

> But if the other parts of the Great Exhibition are curious and instructive, the machinery, which has been from the first the grand focus of attraction, is, on the "shilling days," the most peculiar sight of the whole. . . . The people press, two or three deep, with their heads stretched out, watching intently the operations of the moving mechanism. You see the farmers, their dusty hats telling of the distance they have come, with their mouths wide agape, leaning over the bars to see the self-acting mills at work, and smiling as they behold the frame spontaneously draw itself out, and then spontaneously run back again. . . .
>
>  Round the electro-plating and the model diving-bell are crowds jostling one another for a foremost place. Youths are watching the model carriages moving along the new pneumatic railway. . . . Indeed, whether it be the noisy flax-crushing machine, or the splashing centrifugal pump, or the clatter of the Jacquard lace machine, or the bewildering whirling of the cylindrical steampress, — round each and all these are anxious, intelligent, and simple-minded artisans, and farmers, and servants, and youths, and children clustered, endeavouring to solve the mystery of its complex operations. (Qtd. in Jennings 258–59)

As techno-tourists, Victorians gazed at iron bridges, factories, shipyards, or studied illustrations of Stephenson's Locomotive Manufactory and the steel pen-nib factory at Birmingham in *The Illustrated London News* (Chew 14, 15). Pride, admiration, awe, even a strong sense of beauty in the locomotive, the automatic spinning machine, the steam-hammer, informed the Victorian imagination.

But one would have little sense of Victorian machine dreams and the Victorian pleasures in machinery from the writings of contemporary Victorianists. In the journals and in the classroom, industrialization is engaged by reading anti-industrial writing — the Luddite views of Ruskin, industrial novels by visitors from London or from the clerical world. Here, factories appear as mysterious sites whose function is discharging both smoke and weary workers. And my own students, who are training for careers in the computer age, remain politely resistant to this technophobic pedagogy.

How can we account for the reluctance to engage the Victorian mechanists and examine their world; for our own dismissal of the positive feeling of the age toward its new

technologies; for our excising the dominant energy of the nineteenth century from nineteenth-century studies; for our own erasure of the technological imagination, the Victorian sense of machine beauty.

One reason lies in the generally Marxist or economic tradition of Victorian studies which, quite rightly, sees the industrial revolution as a history of class struggle. This narrative has reappeared, albeit without situating power in a particular class, in the new narrative of power that has come to dominate Victorian studies — the Foucauldian model of "biopolitics," which focuses on control of the body in the factory, the army barracks, the schoolroom, and in the policing of the self by the self. It might be noted, as I have argued elsewhere, that this anti-technological story has been adopted from the narrative "developed by the Victorians themselves, specifically in the formation of 'culture' as a realm of individual freedom defined as the opposite of the industrial, so that Foucauldian histories reproduce the ideology of the period they seem to demystify" (Sussman 6).

And yet, as Francis Spufford acutely remarks in praising Gibson and Sterling's *The Difference Engine,* Victorianists function within "the fluctuating process by which at different times different parts of history seem to come to prominence as we recognize unfinished business there" (268). Indeed, our sense of the present reshapes our view of the past. And just such a shift is beginning with our own "unfinished business" regarding Victorian technological change. We have seen in our own society the transformation from an economy of iron and steel, continuous with the Victorian factory and the Manchester of Engels, to a "post-industrial" age; from the machine as snorting locomotive or smoking blast-furnace to the machine as sleek, intelligent rival of the human, from production in fluff-filled mills and superheated foundries to immaculate, if still toxic, microchip plants.

With this material change has emerged an equally radical shift in feeling toward what has come to be called technoculture. With the growing symbiosis in our society of the organic and the mechanical has come a sense not only of the domination or panoptical potential, but also of the liberatory possibilities of the intelligent machine, whose perhaps most celebrated expression is Donna Haraway's: "I would rather be a cyborg than a goddess" (181). Indeed, Haraway's "A Cyborg Manifesto" provides the ground for a fresh examination of technology, and of Victorian technology in particular: "Taking responsibility for the social relations of science and technology means refusing an anti-science metaphysics, a demonology of technology. . . . Science and technology are possible means of great human satisfaction, as well as a matrix of complex dominations" (181).

With this new sense of technoculture, there are the stirrings of a new project in Victorian studies, recovering what Spufford gracefully terms the "elusive strains of genuine nineteenth-century technological feeling" (288). Engaging the technological, what we may call machine beauty or machine dreams, would productively modify the thesis of Raymond Williams that has shaped Victorian accounts of industrialism — the idea that the domain of culture, in the sense of high culture or art, was necessarily generated as a response to the narrow and impoverished nature of the industrial realm.

In recuperating the technological imagination, the "technological feeling" of the age, one of the most productive moves has been to apply to the mechanists the methods of cultural studies recently applied to theologians, painters, and politicians. The first tentative efforts to do so — to examine the work of Charles Babbage and Andrew Ure, James Nasmyth and Samuel Smiles — reveal more than simple technological determinism, mere puttering with the external condensers for the steam engine or adding new rollers to the

jenny, but rather a complex cultural context for invention. The early Victorian technological culture emerges as rich and complex, informed by the unresolved contradictions and problematics so dear to Victorianists in other areas: panoptical surveillance; issues of gender in the masculine ideal of self-control and the attractions of the robotic female; machinery as spectacle; a positive sense of machinery informed by a consistent and complex aesthetics or technological imagination; deep interconnection with religious ideas, especially the monastic tradition of a celibate elite and the ideas of Natural Theology; a deconstructive sense of the machine figured in debates about prosthesis; and especially the challenge of the unprecedented "self-acting" or intelligent machine to the idea of the human.

The study of early Victorian technological culture turns to writers for whom we have no generic term, "outsiders" educated by apprenticeship to tool-makers rather than by literary studies at Oxbridge. To the Victorians they were "mechanists," "mechanicals"; to us proto-engineers, engineers, technologists. And what they have written are "non-literary" texts widely if not wildly popular in their time, addressed to the middle-class reader as high popularization in the form of techno-tourism, visits to the unknown country of the mechanists. One sign of the renewed interest in Victorian technology is that many such texts exist in modern reprints. A sample of major texts would include Andrew Ure, *The Philosophy of Manufactures* (1835); Peter Gaskell, *Artisans and Machinery: The Moral and Physical Condition of the Manufacturing Population Considered with Reference to Mechanical Substitutes for Human Labour* (1836); the autobiography of James Nasmyth, inventor of the steam-hammer, ghost-written by Samuel Smiles; Smiles's own *Self-Help* (1859); and the complete writings of Charles Babbage, the mechanist now most in vogue, including *The Economy of Machinery and Manufactures* (1832); his autobiography, *Passages from the Life of a Philosopher* (1838); and *The Ninth Bridgewater Treatise.*

Of course, to understand Victorian technological feeling, it is necessary to understand Victorian technology. Perhaps another obstacle to the study of mechanization, particularly for scholars in the humanities, has been the difficulty of understanding the water frame and the power loom, the revolutionary implications of Watt's external condenser and the way a cotton mill operated. For those like me who are machinery-challenged, I would recommend Donald Cardwell's *The Norton History of Technology* as a guide to steam engines, Jacquard looms, and blast furnaces. The clear prose and intelligible diagrams addressed to the nontechnical reader explain how the Watt engine and the Arkwright frame actually worked. The book also exemplifies the contemporary history of technology conceived not as a narrow specialty, but as the equal of other forms of history, interconnected with the history of science broadly conceived as well as the history of culture: "a history of technology that is related to the history of science and to the history of ideas generally. But, it must be emphasized, technology so regarded is not to be thought of as the dependent variable, drawing its ideas from and parasitic upon science; rather it is an equal partner" (6).

In the history of technology as in the history of culture, current preoccupations reconfigure the narrative of the past. The nineteenth century now appears not only as the birthplace of the industrial age of iron and coal, but, more importantly perhaps, of the information age, of our own wired times. Focus shifts to emergent technologies of intelligence, from Brunel to Babbage, from the blast furnace to the telegraph, from the railway to the railway telegraph; from the steamship to the undersea cable. Thus Tom Standage's

*The Victorian Internet: The Remarkable Story of the Telegraph and the Nineteenth Century's On-line Pioneers,* a work of high popularization light on citations and heavy on anecdote, productively if hyperbolically suggests that the dominant communication technologies of our time were set in place during the Victorian period, in the telegraph and submarine cable: "There was . . . an Internet. . . . During Queen Victoria's reign, a new communications technology was developed that allowed people to communicate almost instantly across great distances. . . . A worldwide communications network whose cables spanned continents and oceans" (vii).

Indeed, even *Wired,* the hip magazine of today, has good things to say about the Victorians, praising these purportedly stodgy folk for being really "wired." In the compelling essay "Mother Earth, Motherboard," Neal Stephenson describes the unheralded later nineteenth-century feat of constructing the undersea cable system to wire together the Empire. Indeed, the e-mail of Victorianists now speeds through the material base of undersea phone wires laid down by the Victorians themselves: "The world has actually been wired together by digital communications systems for a century and a half. Nothing that has happened during that time compares in its impact to the first exchange of messages between Queen Victoria and President Buchanan in 1858" (160).

But in looking to the sources of contemporary information technology in the nineteenth century, caution is necessary. Direct descent is often problematic. Doron Swade, who led the London Museum of Science in reconstructing a Babbage Difference Engine using only techniques and materials available in the nineteenth century, warns that the Babbage Engine was more of an anticipation than a direct ancestor in the historical line leading to the modern computer; Babbage "is repeatedly referred to as the father, grandfather, forefather, great ancestor of the modern computer. The language of fatherhood serves to reinforce the notion of an unbroken line of descent. But the lineage of the modern computer is not as clear-cut as these genealogical tributes [to Babbage] imply" (37). As Swade notes, "Our fascination with his [Babbage's] failures may have a cultural dimension. The combination of eccentricity, genius and failure perhaps touches something deep in English culture" (37).

Exemplifying the move from the material history of the machine to the study of the machine's interactions with things "deep in English culture" are the exciting cultural studies of technology collected in Spufford and Uglow's *Cultural Babbage: Technology, Time and Invention.* In her introduction Jenny Uglow sets out the program, calling for "a powerful merging of ideas, a transgressing of borders between engineering and imagination, number, gender, nature and art" (1). Moving from the eighteenth century to the present, the essays breach what Neil Belton, in "Candied Porkers: British Scorn of the Scientific," aptly describes as the "antiquated barricades [of English culture], tollgates at crossing points between forms of imagination that should be free and open. One of the strangest is the neo-Gothic door that controls access from science to other kinds of making and thinking" (240).

Several essays are of particular interest to Victorianists. In "The Difference Engine and *The Difference Engine,*" Spufford, quite rightly in my own view, argues for Gibson and Sterling's science fiction novel *The Difference Engine* as a work that "refreshes the nineteenth century" (289), as the most compelling re-presentation of the nineteenth century as an age of information technology. A rare work at the juncture of the technological imagination and the literary imagination, *The Difference Engine* as alternative

history rewrites Disraeli's *Sybil,* hypothesizing that the unbuilt Babbage Engine had been built and a Victorian society had emerged based on this proto-computer. The Victorian age becomes the analogue of our own time, as a moment of choice between a panoptical disciplinary use of the intelligent machine and the enhancement of intelligence and creativity through the fusion of the machine and the human. This tour de force offers a lively thought experiment, allowing us to think our way out of the Ruskinian narrative grounded in the human/machine binary, out of "the vestigial dualisms of literary humanism passed down from the Victorians, dualisms that find powerful contemporary reinforcement in our pastoral recreations of the Victorian age" (Sussman 20–21).

From the perspective of our own technoculture, Babbage has become admired as the presumed father of the computer. Simon Schaffer's "Babbage's Dancer and the Impresarios of Mechanism" turns upon Babbage the cultural-studies interest in sexuality and spectacle to show a more complex, certainly a more quirky figure involved in the spectacular situation of early nineteenth-century automata and the erotics of clockwork female figures. Working with Babbage's autobiography, Schaffer traces Babbage's obsession with a clockwork "silver figure" that he saw as a young man at the Mechanical Museum of John Merlin in London, "an admirable *danseuse*" who "attitudinized in a most fascinating manner" and whose "eyes were full of imagination, and irresistible" (Babbage, *Passages* 12). Later in life, Babbage discovered and bought this clockwork silver dancer and set it (her?) on view at home next to the unfinished portion of his Difference Engine. Such attention to "obscure objects of desire embodied in the automata" (Schaffer 59), to the erotic motivations of masculine technological innovation suggests further consideration of the erotic valence of the automaton in Victorian literature and of the continued sexual attraction of the female robotic, as in *Metropolis* and *Blade Runner.*

Even though the Babbage Engines were never completed, machine intelligence as incarnated in what the Victorians called the "self-acting" and we term the automatic machine was a powerful force in Victorian discourse. In his "Babbage's Intelligence: Calculating Engines and the Factory System," Schaffer places the development of a discourse of the intelligent machine within the struggles for social and economic power in the early industrial age. He provides a Foucauldian observation that "intelligence" carries the double meaning of both "the growing system of social surveillance and the emerging mechanisation of natural philosophies of mind" (204). In more traditional Marxist fashion, the essay demonstrates that the effort to represent intelligence as situated in the machine rather than in the workers who expertly fabricate the machine functions to deskill craft persons, thus transferring control to the managerial class, shifting power and ownership of the intelligent machine to its ostensible creators, notably Babbage himself. Thus, the fetishization of machines in the culture of technology, like the fetishization of the commodity, camouflages the necessary activity of skilled workers.

And yet, Marx, even as rewritten through Foucault, cannot wholly recover the Victorian culture of technology. Observing the consciousness of mechanists through other lenses, especially through the religious sensibility of their time, does much to recuperate the complexity of technological feeling. Here, David F. Noble's important *The Religion of Technology: The Divinity of Man and the Spirit of Invention* shows a way to move beyond the artificial boundary between science and spirit, between technical innovation and spiritual practice. Noble brilliantly argues that, since the founding of monasticism, inventors have imagined themselves not as usurping the power of God as in the Promethean

myth embodied in *Frankenstein,* the great anti-technological fable of the nineteenth century, but rather as reverently imitating God, God the Designer. Although his argument works less well for the post-Darwinian age, Noble allows us to see the early Victorian mechanists, living within a yet unchallenged religion of Natural Theology, as feeling that in making the spinning machine or steam engine, Difference Engines or steam-hammers, they are manifesting the God-like within them, imitating the work of God the Designer Who built the great machine of the world. Thus the religious sensibility that grounds all early Victorian aesthetics appears as well in the work of Victorian technologists, dissolving the borderline between romantic ideas of creativity and technological design. As for Coleridge the poetic creative power replicates divine energy, so for the mechanists, within an analogous model of correspondences, the building of machinery manifests in human activity the divine power of rationality. Thus Babbage with his usual grandiosity wrote an unauthorized *Ninth Bridgewater Treatise* using his own Difference Engine as a microcosm to explain how miracles appear to violate the continuity of natural law, but have actually been programmed by God on His macrocosmic Engine.

The Victorians, then, were preoccupied with the mechanical/organic problematic raised by the unprecedented self-acting machines of the textile mills as well as the Babbage Engines, which transformed the meaning of "computer" from a human being who calculated to a machine that thinks. Exploring the machine/body problem links our own troubled feeling about whether we really would rather be cyborgs with the issues of Victorian technoculture. Scholars have already provided broad historical overviews of the machine/human question. Of these the most useful are David F. Channell's *The Vital Machine: A Study of Technology and Organic Life,* written from the perspective of a biologist, and Bruce Mazlish's *The Fourth Discontinuity: The Co-Evolution of Humans and Machines,* a more traditional history of ideas. What is needed is close and sustained attention to the specific form of the cultural discourse(s) of the body/machine problem within the nineteenth century.

For this project, the exemplary study is Anson Rabinbach's influential *The Human Motor: Energy, Fatigue, and the Origins of Modernity.* In the early industrial age, the body was conceived as machine within the model of clockwork automation. As Rabinbach demonstrates, the application of thermodynamics later in the century transformed the figuring of the body: "The working body was but an exemplar of that universal process by which energy was converted into mechanical work, a variant of the great engines and dynamos spawned by the industrial age. . . . For European physicists and physiologists, Descartes' distinction between the animal machine and the human being was no longer meaningful. . . . The automata no longer had to be denied a soul — all of nature exhibited the same protean qualities as the machine" (1–2). In his exemplary fusion of the history of science, technology, and culture, Rabinbach suggestively draws out the implications for social policy, "the new vision of social modernity" (1) generated by this paradigm shift that reimagines the body as engine. Given the energistic system, the central issue within the problem of industrial labor becomes adjusting the machine as engine to the human as engine so as to prevent depleting or exhausting the energy of the worker. In short, "fatigue" becomes the central term in the analysis of mechanized work. Certainly, the preoccupation with exhaustion, grounded in the idea of body as engine, is not limited to industrial policy, and might be productively explored in our reading of Victorian literary texts.

Contemporary theory can also illuminate nineteenth-century technoculture, as Tamara Ketabgian shows in "The Human Prosthesis: Workers and Machines in the Victorian Industrial Scene." Focusing on Marx, Samuel Butler, Babbage, and Harriet Martineau, Ketabgian persuasively argues that technological discourse then as now turns on the idea of prosthesis. Her highly theorized argument provides several useful insights — the Derridean notion that prosthesis implies both expanding human potential and filling a lack; that the Victorians already saw the body as "posthuman" (19), a hybrid of machine and organic that anticipates the post-modern sense of the body. Modifying the argument of Noble in *A World without Women*, which defines technological culture as a masculine enterprise originating in the celibate clerical culture of the monasteries, the essay shows Martineau's accounts of manufacturing as anticipating the feminist arguments of Haraway in praising the prosthetic enhancement of the female body won by fusion with machines.

Seeing Victorians in the first machine age, then, as grappling with this range of issues — the body as engine, the male and the female body as mechanical/organic hybrid, the challenge of machine intelligence — can not only recuperate the culture of technology, but also provide a fresh context for neglected writers such as Butler and Martineau, and canonical writers such as Charles Dickens.

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