

CHAPTER 18

**COMPUTERS AND
CULTURAL STUDIES**

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CULTURAL STUDIES AND COMPUTERS

Arguably the most widespread and productive set of critical approaches to media in contemporary theory, cultural studies has so far been applied only partially to the world of computers. One role for cultural studies has been to look for the places in media and technology where it is possible to locate forms of social resistance and personal empowerment. Indeed, this mode is often especially important for understanding marginalized and minority cultures and cultural productions when they interact with majority and majoritarian forms. In every existing medium, we see productive examples of such analyses, and Raymond Williams insisted upon them when he showed how a technological medium like television could be constructed in socially complex ways.¹ When cultural studies looks to computers for something called *new media*, it appears to be looking for and championing just these sorts of resistant practices and forms.²

Yet this literature addresses only part of what is usually understood as “culture” in cultural studies. Foundational theorists such as Williams and Stuart Hall, along with Fredric Jameson, John Fiske, John Frow, and the authors in the Grossberg, Nelson, and Treichler *Cultural Studies* anthology, share a profound concern with the politics of our contemporary world, and understand cultural

production, including not just media but also technical production, as part of this culture, part of us. In this mode of inquiry, cultural studies often explores the ways in which *existing* forms of power and *existing* institutions are strengthened, reinforced, deployed, and distributed throughout society. This is not simply to accuse each medium of being “complicit”; it is to say that every human product turns out, on close analysis, to reflect all the apparently political tensions of our culture.

Part of what is so unconvincing about the new media literature is that it fails so often to address real examples of digital media, and that it so often gestures—and this is particularly true of Manovich—at media that have not yet come into being, or that occupy no more than a small segment of contemporary digital practice.³ This state of affairs exists despite the fact that Hollywood entertainment has been completely transformed by computationalist practices, from the raw calculative processes of accounting and project management to the remarkable computational transformation of special effects and no less of movie production and screenwriting. The widespread presence of the view that we are awaiting a much more significant media/technological transformation in the main run of scholarship labeled “cultural studies,” while refusing in many cases to examine this real-world digital transformation, seems quite odd. A glance at cultural studies of other media would show that every new medium has come along with a rush of specifically capitalist advertisements that radically oversell the capabilities of the medium.⁴ Of particular note are sales pitches that vaguely offer radical, nonspecific, transformative political change. Such claims are omnipresent in the literature on electricity, the telegraph, the telephone, television, and so on—and these technologies certainly did transform society, although rarely in a clearly democratic or especially benign fashion. There is every reason to suspect that recent hyperbolic claims about computers will turn out to be as misleading as they were about every other medium.⁵

Were we to put aside such claims, we would be forced to look at computers more carefully as they are—as they exist in front of us, and in the world around us. From this perspective, exploring the ways in which individuals might be empowered via computational power seems analytically secondary to questions the literature does not seem to want to ask: How do computers aid the powerful? What does already-existing power in our world gain from massive computerization? What are the observable effects on existing human cultures of computerization? That such questions have been downplayed in a literature labeled “cultural studies” is, at least, cause for reflection. More important, we need to develop an understanding of what cultural studies might say, and has said even if in its margins, about these questions.⁶

THE BIAS OF COMPUTATION

Questions about power relations are, in fact, typical if not characteristic of cultural studies with regard to any medium or technology: How does it enable power? What does it do for the functions of power in our society? To ask these questions requires that we look away from potential formations and toward existing ones. What is especially disturbing about the general failure to ask questions like this in the critical literature is that what is unprecedented about computers, what is characteristic of them, is the degree to which they serve the interests of power. In a critical way, computers act the role of a perfected slave in a Hegelian Master-Slave dialectic (and therefore imply a kind of perfected mastery). While this may or may not be connected with the especially American drive to computerize everything, it is nevertheless characteristic of our computers that they are strongly implicated in our contemporary experience of power and mastery. At every level, from the most miniature to the global, computers and the networks they instance appear to offer a kind of equal, distributed access to power, that on closer examination also provides unprecedented power and control to centralized and bureaucratic authorities. At a personal level, computers are very much used so as to convey to the user a sense of mastery, and users who can attain this state of mastery find themselves quickly assimilated onto paths of power and capital. These “success” stories, which arguably constitute a major part of the story of computing in our time, seem invisible when we discuss how new educational tools and online communities may empower some groups.

The slogans that are accepted today as dogma by many computing advocates—most notably, that computing and the Internet somehow lead directly to democracy—have much in common with the slogans heard during prior significant technological and media shifts. Perhaps the strong and near-uniform belief that computerization is leading toward positive political change stands as a displacement for a harder truth, the repressed inverse of the computational dogma: namely, that computerization leads directly toward *more* centralized and administrative authority, toward stratification and hierarchical distribution of power, toward centralization of resources and assets, and toward a general kind of ordering of the world that Deleuze and Guattari call “striation.” Following the terminology of Harold Innis, we can think of this orientation of computation toward power and toward striation and order as a “bias,” a tendency, one that we may certainly at times resist with success.⁷ But in order to resist that bias we must see the existing phenomena as clearly as possible, and these include the significant (and today largely muted) absolutist heritage of computing itself.

Computational Politics

Computers provide an unprecedented level of specification and control over every aspect of human society (and the rest of our environment). Where possible, computers simulate processes from the business world, from institutional administration, and from the environment; depending on the domain, these simulations may be used either to guide human behavior or to fully govern it. In other domains, where physical manipulation is needed or where true formalization is not possible, computers control the machines and processes that produce or govern almost every aspect of society. Segmentation itself implies formalization; “perfect” processes from the computational standpoint are those which can be entirely operated through simulation and/or automation (for example, digital television recorders; CAD/CAM software and the physical models they produce; computer-generated imagery and full animation in films; nearly all accounting, investing, and banking processes). Perfectly segmented processes are found everywhere, perhaps even characteristic of what we today understand as modernity, business, government. The most successful managers and businesses today appear to be the ones who maximize efficiency by understanding how to focus on striated objects and processes and bypass smooth ones.

The most successful managers and business are also those who focus the most power in those who have the greatest interest in success itself: the very lack of rules and promotion of individualism appear to push our society to emphasize what C. Wright Mills identified as “power elites,” a tendency that seems to increase militarism, the role of imperial-style leadership (externally and internally, in government and in businesses), and indeed self-interested action on the part of the power elites.⁸ Specifically, Mills worried about the intrusion of military-industrial thinking into the education system, so that “the pursuit of knowledge has been linked with the training of men to enact special roles in all areas of modern society. The military, in addition to their own schools, have used and increasingly use the educational facilities of private and public educational institutions.”⁹ At the very heart of the “higher immorality” that is Mills’s central concern is the focused control of power by elites rather than its distribution across democratic masses.¹⁰ This requires looking in a top-down rather than a bottom-up direction: asking not just what do computers enable the masses to do, but what do computers enable the power elite to do?

We are used to speaking of a digital divide, but we conceive of it in brute economic terms—just the terms that serve the most elite interests. If only the poor and disadvantaged had computers, goes this view, they would be saved. No doubt, if they had computers, and the rest of the economic and social benefits that go along with not being poor and disadvantaged, then they would no longer be disadvantaged.¹¹ But computers alone seem no more than a small part of a much

larger puzzle, and an especially problematic one at that, especially if they distract our attention from much more urgent and direct problems. These include, first of all, problems of poverty, hunger, rule of force, nondemocratic states, and so forth—all of our most pressing social problems for which computers offer only the most indirect solutions. They also include the question of what computers are doing for the interests of the power elite.

It is on this score that computationalists seem less accountable. They are willing to admit to certain specific problems endemic in the computational environment—viruses, data theft, identity theft, financial theft (which occurs to a much larger extent than official statements would suggest)—but not at all willing to look at the more general outlines of computation and its usefulness to an oligarchical state. Yet the persistent deep themes of political concern in our time map uncomfortably onto the availability of computation: namely, concentration of power, unbalanced access to power and information, both in business and government, and a sense of absolute mastery and power verging on religious fervor. From this sovereign perspective, computing provides a “control-panel” view of society, an object-oriented simulation so powerful that it does not matter whether it maps precisely onto everyday material existence or not.¹² In the view from the top, the overhead view, the positionable camera angles available to simulation, (almost) all of social reality comes to appear striated, chesslike. Like every human ideology, and especially contemporary technology ones, this abstract machine is one we can become part of, or perhaps one that is already inside of us. Its power over us, its power in us, is in some sense proportional to the strength with which we believe in it.

Computational Sovereignty

Conceptually there is a powerful tie between the theory and implementation of modern political authority and the figure of computation. In the single text that might be said to most clearly define the very notion of political sovereignty in the West, *Leviathan* by Thomas Hobbes, computation figures in two precise and related ways. Both are quite well-known in their own way, but they are generally not related as tropes in Hobbes’s especially tropic writing. The first occurs very famously on the very first page of the introduction to the volume:

NATURE (the Art whereby God hath made and governes the World) is by the *Art* of man, as in many other things, so in this also imitated, that is can make an Artificial Animal. For seeing life is but a motion of Limbs, the beginning whereof is in some principall part within; why may we not say, that all *Automata* (Engines that move themselves by springs and wheeles as doth a watch) have an artificial life? For what is the *Heart*, but a *Spring*; and the *Nerves*, but so many *Strings*;

and the *Joynts*, but so many *Wheeles*, giving motion to the whole Body, such as was intended by the Artificer? *Art* goes yet further, imitation that Rational and most excellent worke of Nature, *Man*. For by Art is created that great LEVIATHAN called a COMMON-WEALTH, OR STATE, (in latine CIVITAS) which is but an Artificiall Man; though of greater stature and strength than the Naturall, for whose protection and defence it was intended; and in which, the *Soveraignty* is an Artificiall *Soul*, as giving life and motion to the whole body.¹³

We dismiss this today largely as metaphor, wondering even what sort of automata Hobbes can have had in mind, since he is saying by his own example that watches are alive. From the citizen's perspective, the view seems metaphorical to the point of absurdity; but from the sovereign perspective it seems quite rational—indeed, it seems to justify a line of antidemocratic action on the part of the sovereign individual. The sovereign is already inhabiting the artificial soul of the people in his own being; the transubstantiation informing this exchange is fully licensed by God; the actions of the king are inherently in the interests of the parts of his body.

The parts of the body politic—in other words, individuals—the body that before was a “body without organs,” and that is now an artificial animal, to be made up in the new automaton called the state, cannot themselves escape computational state administration. Very much like pieces on a chessboard, the activities of citizens are administered computationally, their own human powers essentially irrelevant to the operation of the giant machine that is equivalent, in a transubstantiative act, to the body and will of the king. But citizens cannot simply be ordered to submit, in the sense that this would deny the most fundamental principle of “natural right” that Hobbes recognized but whose satisfaction the sovereign alone can realize. They must feel it is in not just their interest but their nature to submit to the sovereign; they must have within them a simulacrum of the very mechanism that constitutes the Leviathan itself. Thus, in *Leviathan*, Chapter 5, Hobbes wrote:

When a man *Reasoneth*, hee does nothing else but conceive a summe totall, from *Addition* of parcels; or conceive a Remainder, from *Substraction* of one summer from another: which (if it be done by Words,) is conceiving of the consequence of the names of all the parts, to the name of the whole; or from the names of the whole and one part, to the name of the other part. And though in some things, (as in numbers,) besides Adding and Subtracting, men name other operations, as Multiplying and Dividing; yet they are the same; for Multiplication, is but Adding together of things equall; and Division, but Subtracting of one thing, as often as we can. . . . REASON, in this sense, is nothing but *Reckoning* (Adding and Subtracting) of the Consequences of generall names agreed upon, for the *marking* and *signifying* of our thoughts.¹⁴

While by no means its origin, this passage serves as an appropriate proxy for the association in the West of the view that the mind just *is* a computer with the pursuit of political absolutism. One name we give to this view, somewhat contrary

to its content but in accordance with its political lineage, is “Cartesian rationalism,” including its strong association with what Macpherson has rightly called “possessive individualism.”¹⁵ A more descriptive name for the view would be “Hobbesian mechanism.” Indeed, these thinkers were lumped together at the time under the term “mechanists,” as opposed to “vitalists” (who thought living matter was different in kind from mechanisms like watches), and it is the mechanists we associate especially with the rest of possessive-individualist doctrine. A more contemporary name would be “computationalism.”

RATIONALISM, COMPUTATIONALISM, AND THE STATE

In Western intellectual history at its most overt, mechanist views cluster on the side of political history to which we have usually attached the term “conservative.” In many historical epochs it is clear who tends to endorse such views and who tends to emphasize other aspects of human existence in whatever the theoretical realm. There are strong intellectual and social associations between Hobbes’s theories and those of Machiavelli and Descartes, especially when seen from the state perspective. These philosophers and their views have very often been invoked by conservative leaders at times of consolidation of power in iconic or imperial leaders, who will use such doctrines overtly as a policy base. This contrasts with ascendant liberal power and its philosophy, whose conceptual and political tendencies follow different lines altogether: Hume, Kant, Nietzsche, Heidegger, Dewey, James, and so on. These are two profoundly different views of what the state itself means, what the citizen’s engagement with the state is, and where state power itself arises. Resistance to the view that the mind is mechanical is often found in philosophers we associate with liberal or radical views—Locke, Hume, Nietzsche, Marx. These thinkers put both persons and social groups in the place of mechanical reason, and as we all admit, tend to emphasize social and relational duties rather than “natural right.”

The general tendencies of these two intellectual and political bodies are well-known, but their connection with a particular understanding of the nature of human being is something we discuss much less often today than they did in the 1650s. The immense proliferation of scientific specialties leaves most people arguably without even a frame from which to conceptualize a view of human nature sensitive to the vast literature on cognition. More precisely, each side of the debate continues with its tacit understanding of what is vital to human being, while

technological changes subtly influence the social field out of which broad political opinion is formed. The idea that the person is somehow in essence a digital thing, especially via the sense that the mind is a computer—with no more detail than that metaphorical equation—appears to be “loose” in contemporary culture. This idea fits well with capitalist rationalism and literalist evangelical Christianity, and it in some important ways meshes well with associated beliefs of both dogmas.¹⁶ It conflicts with the traditional views of the Left, but it is intriguing enough and its contradictions are so sub rosa that many there take it up as a matter of course, where computationalism has today gained a surprisingly strong foothold.

From the historical perspective, at least, computationalism reads very much as state philosophy. It is in the nature of any philosophy that neither its progenitors nor its consequences can be said to entirely characterize its “essence”; it is contradictory on at least some readings to speak of a philosophy having an essence. But it is critical not to overlook the powerful associations of mechanism and state absolutism that appear again and again, especially in Western history.¹⁷ “When the State creates armies,” wrote Deleuze and Guattari, “it always applies this principle of numerical organization: but all it does is adopt the principle, at the same time as it appropriates the war machine”;¹⁸ “it is in State armies that the problem of treatment of large quantities arises, in relation to other matters.”¹⁹

Just in order to take advantage of the war machine, and then subsequently as a method of social organization in general, the state uses computation and promotes computationalism. This is precisely because “the modern State defines itself in principle as ‘the rational and reasonable organization of a community.’ . . . The State gives thought a form of interiority, and thought gives that interiority a form of universality.”²⁰ Interiority qua universal subjectivity emerges from numerical rationality applied as an understanding of human subjectivity, and not vice versa. This is not to reject the idea of subjectivity outside of rationalist modernity: it is rather to suggest that the particular and elaborated form of interiority we associate with present-day modernity underwrites an unexpected and radical mechanism. This mechanism does not seem radical if we associate it with a word like “rationality,” because we are not accustomed to understanding rationality as a mechanical function, though that is exactly what it must be. Indeed, it is rationalists themselves who take the term most literally, seeing in the creating of ratios—of weightings, largely of the more and less powerful force—the characteristic computation of modernity. While Descartes himself did not subscribe to this particular understanding of psychology, through Hobbes in particular we associate the modern state’s conception of the free individual with absolute sovereignty and natural right. Because each citizen has the power to reason (make ratios, or, in our terms, compute) for him- or herself, each citizen has access to the know-how (Foucault’s *savoir*) provided by mechanical reason.²¹ Each citizen can work out for him- or herself the state philosophy: “Always obey. The more you obey, the more you will be master, for you will only be obeying pure reason. In other words

yourself . . . Ever since philosophy assigned itself the role of ground it has been giving the established powers its blessing, and tracing its doctrine of faculties onto the organs of State power."²²

EMPIRES OF COMPUTATION

Computers fit into the modern story of progress, and they fit even more closely into the story of modern empire. Computers have been with us since the very idea of the state existed, as has computation. The realization of the computer in digital form propels automation in many fields where its advent had previously been unthinkable. But one fundamental law of networks is that information made available to the user may ultimately be made available for central administration. In many ways these products and projects do serve the people who use them, but they are created primarily for the use of administrators whose purpose is to govern, usually on economic terms, transactions and relations that had so far eluded human control. In economic domains such as Amazon.com, in fact, such programmatic means are often confined to economic goals, but in other parts of social experience computation can be expanded to govern much more than raw currency.

Computational Utopianism

When we talk about computers, we do well to remember the multiplicity of referents with which the term has been associated over a hundred or so years, rather than the contemporary exclusive usage. Indeed, that usage, which points most especially at personal computers and what used to be thought of as mainframe computers, ignores too much of even the digital world to be truly useful to critical thought. To this obvious designation we must add all the social systems that include physical methods of computation and calculation as well as human beings, since these together form working computational systems and not merely PCs sitting on desks. Perhaps just as intriguingly, a great proportion of the true computers used today are not captured by the PC model: these are the so-called embedded computers, essentially complete, ROM (read-only memory)-based integrated circuit computers that govern almost all contemporary electronic devices. These functions too are extremely characteristic of computer operations as a

whole. Embedded computers typically striate a field that might previously have been unanalyzed or analog, identifying internal (often “soft”) hierarchies that can be processed algorithmically. This information is fed back to control nodes, either preprogrammed performance measurements or human controllers who have responsibility for the object in question.

To accept the accelerating computerization of everything in society is to accept that exactly this logic benefits society. Note that in the case of the automobile, a prime but also typical example of embedded computing, despite the theoretical sense in which many different aspects of automotive performance and construction are now understood at much more detailed levels than in the past, virtually none of this knowledge is available to the user. For example, the fuel-air combustion mixture used to be managed electrochemically via spark plugs and carburetion; today, the much more efficient process of fuel injection is entirely computer controlled, and sealed in a “black box” that is inaccessible to individuals. The extremely user-friendly and convenient geographical positioning systems (GPS) included with many cars help drivers in many ways—but also locate the automobile as an object on any number of twenty-four-hour electronic surveillance networks, precisely striating what had been (relatively) invisible to these systems. This information is both specific and local (the details of the movement of the automobile) but also massively concentrated and striating, in that the master systems’ GPS systems (in the “home offices,” the National Security Administration, and so on) have knowledge of all the vehicles in the system, and many other objects as well. Information about and access to such mechanisms is released only very sparingly in the face of market pressures—much the opposite of what computer evangelists would suggest.²³ The consumer has not been given more democratic access to automobile technology, even if it is arguable that the automobile industry as a whole uses computerization to meet consumer needs across a broad spectrum.

To compute is to striate otherwise-smooth details, to push them upward toward the sovereign, to make only high-level control available to the user, and then only those aspects of control that are deemed appropriate by the sovereign. Computers wrap the “legacy data” of the social world in formal markup, whose purpose is to provide the sovereign with access for post hoc analysis, and secondarily to provide filter-style control. Computers can then be used, at sovereign discretion, as part of instruction, as a way of conditioning subjects to respond well to the computational model. From this perspective, it is surprising to hear prominent academics like Nicholas Negroponte suggest that the “digital age” is distinguished by “four very powerful qualities that will result in its ultimate triumph: decentralizing, globalizing, harmonizing, and empowering.”²⁴ Without argument, Negroponte asserted that “the traditional centralist view of life will become a thing of the past,” that “in the digital world, previously impossible solutions become viable,” that

[t]he harmonizing effect of being digital is already apparent as previously partitioned disciplines and enterprises find themselves collaborating, not competing. A previously missing common language emerges, allowing people to understand across boundaries. Kids at school today experience the opportunity to look at the same thing from many perspectives. A computer program, for example, can be seen simultaneously as a set of computer instructions or as concrete poetry.²⁵

It is no surprise that Negroponte's "optimism comes from the empowering nature of being digital. . . . As children appropriate a global information resource, and as they discover that only adults need learner's permits, we are bound to find new hope and dignity in places where very little existed before."²⁶

These closing words of Negroponte's best-selling book completely lack exemplary support, and with good reason. Their staging of an artificial, precomputer past where things like collaboration as opposed to competition existed seems purely ideological, and the observation that computers alone teach a kind of perspectivalism instantiated in the ability to read code as poetry is nothing short of bizarre. Indeed, "lessons" about perspective might be thought one of the main goals of any sort of humanities education, and easily obtainable from the whole world of cultural objects—a world which, in many worlds of education, exactly requires no particular "missing common language," especially not the monolingual majority languages of computing.

The Uneven Development of Calculation

Just as important, it is critical not to accept a priori the idea that "computation" as such refers only to the operations of the particular physical objects we understand as computers. Arguably, the major function that computers perform routinely in our society is calculation. Calculation as such has a long history in civilization, especially in centralized, bureaucratic administrations, and in empires. Calculation is especially important for warfare, where it is deployed in a manner that must be understood as simulation, even if the simulation is represented entirely via mathematics. Turing, von Neumann, and other early developers of physical computers relied just as much on what were then named computers as they did on the machines for which we now use that name, and warfare was their main purpose.²⁷ As David Alan Grier has recently shown, along lines that have become accepted throughout the small field of computer history, since at least since the late nineteenth century many sorts of institutions routinely employed rooms of human calculators, very often women, and precisely enabling the exercise of administrative power to which they lacked access.²⁸

These human computers were in fact the first operators of electronic and mechanical computers, regardless of whether they were built for analog or digital

functions. In the administrative scheme, computing acts as a slave to the powerful human master, and it is always the task of imperial administration to amplify computational power. Following historians like Crosby, and no less poststructuralist thinkers like Deleuze and Guattari, Virilio, and Derrida, we can easily see how uneven are the benefits of computational power in more aspects of their distribution than might be ordinarily supposed. This is no mere fantasy; on even cursory examination, one can easily see how many of the twentieth century's most famous and infamous institutions depended heavily on computational practices. These are the accomplishments of computing, the ones its internal advocates trumpet, today more loudly than ever, as if they were devoid of ideology. For a materialist study of computing to follow its predecessor studies, it must look not (or not only) to what computers may someday present to us, whether in the form of a genuinely "new" medium or not; it must look to what computers are doing in our world, from the implementation of widely distributed identification and surveillance to the reduction of the world's whole culture for profit.

INSTITUTING COMPUTERS

Computers present themselves as a major part of a wholesale lifestyle choice for many professionals in our world. Within large universities, both the computer science and electrical engineering departments are typically enormous, producing hundreds of graduates each year, many of whom are hoping for immediate employment after graduation, either directly within computing or in one of the many associated fields. Management practice today relies heavily on computer modeling of business systems; indeed, much of the software sold by major manufacturers such as Siebel, Computer Associates, Oracle, and other major computer companies is devoted to business process modeling (BPM), in which a variety of practices are reconfigured so as to be transportable across computing platforms or, more profitably, from the analog world to the digital world. Even more strong, and less apparent on the surface, is the pervasive use of computer models in the sciences (for example, in modeling the molecules used in drug design) and in business itself, so that many top business school graduates move to so-called consulting firms. These firms often maintain large staffs of software designers in-house, or work closely with software or hardware companies (indeed, software companies such as IBM, Oracle, and Siebel are themselves largely comprised of consultants, making both types of organization surprisingly similar).

The job of these firms is to "reengineer" corporate practices either from the analog world or from one digital platform to another. Each transaction that can be

sold results in a profit for the consultant, which is the main goal of that party; each transaction is typically sold to the buyer as potentially profit generating, usually through “efficiency.” Sometimes this efficiency is easy to see and specify, sometimes it is openly speculative, and sometimes it is not clear at all. Regardless, the basic operation of much business in the world today, especially the business associated with the keyword “globalization,” is conducted in the name of BPM and other solutions that are focused around providing management with *simulative control of business practice*. The general thrust of this work is to reduce social process to form, ideally to the CEO’s preferred computational form, which in many cases continues to be the spreadsheet.

In this sense, computational practice reflects social imbalance: we might say it is “classed.” Despite the strong sense of “being cool,” of being “the people who ‘get it,’” and so forth, the educated elite who operate computers—whether they are programmers or accountants, administrators or assistants—are too close to the actual machine to get more than a glimpse of the abstract machine that the corporation (along with its computers) embodies.²⁹ But the corporation is much like Hobbes’s Leviathan: it is an automaton with many parts, most of which are small and interchangeable, but like a person it has something like a “brain,” and that brain controls it and seeks, as Hobbes and capitalists alike would see it, only its own self-interest. What computer workers easily miss is that their role is not the same as those of the parts of the “brain,” unless the corporation is explicitly structured in that manner. The true power relation to the computer involves the raw distillation of information to a point, the ability to get a bird’s-eye view (or a God’s-eye view), especially if one is in the bird’s seat. The spreadsheet, with its emphasis on the pure reduction of social information via computational means into numeric data, especially percentage data—ratios, that is to say, the very hallmark of rationality—provides the most direct view of “the facts of the matter” about a corporate entity.

When so-called computer geeks rise to corporate ascendancy, it is usually not through direct expertise in computer engineering. This is true throughout the computer industry, but one of the most instructive stories is also one of the most central, because it is sometimes told exactly the other way. The modern corporation resembles nothing so much as the principality we think of as characteristic of premodern states. In this sense modern government, too, shows allegiance to the apparent state only insofar as it serves the interests of the most concentrated power. Within most corporations, power is absolute, and computation is the characteristic medium for surveilling every aspect of the behavior and work of every individual contributing to the apparently corporate good. The corporate good no longer equals the good of all its members, unless such a policy is willed by the managers—thus, as in the Middle Ages, it is quite possible to have a beneficent prince who shares resources and hardships somewhat equally, but this cannot change the structural fact of the nature of political relations. They are absolute. One either is the prince or one is not; yes or no—one or zero. At least, that is the way computationalist politics, and often computers themselves, would have it.

It is tempting, and in some ways very accurate, to see the practices of companies like Apple, Google, and Yahoo! as exemplary of the computer's impact on business. Arguably, though, there have always been businesses that profit by nurturing employee creativity and distributing management power. Much writing on new media reads like it sees only the Googles, and not the way that even companies that operate like Google (such as many of the small Web companies prior to the 2001 dot-com crash) can be swallowed by more profit-driven interests. Business practices like these are the exception, and the computer plays a fundamental role in the much more normative version of contemporary business practice, such as investment banks, insurance companies, and major product companies. In each of these environments, the computer serves to focus, concentrate, and centralize power, often serving as a linchpin in profitably outsourcing corporate resources at the expense of long-term employment. For example, the computer and automation in general have played a signal role in the destruction of the U.S. auto industry, so that the highly efficient foreign manufacturing plants are in many ways entirely automated, and can use only the cheapest and often least educated laborers where human work is required.

Microsoft, IBM, Wal-Mart, Home Depot, AT&T, Cisco, Intel, Merrill Lynch, Citigroup, Nomura, Honda, Toyota: these kinds of companies, and no less the contemporary governments within which they operate, must be seen as the real exemplars of the computer revolution. WorldCom, Enron, Sprint, Merrill Lynch, Citigroup, Qwest: many of the companies accused of the most significant wrongdoing in the wake of the dot-com crash were especially devoted to selling computerization (to say nothing of the Internet companies themselves). In many cases, they are bloated, internally clashing, nonproductive bureaucracies of enormous size; some were originally much smaller and used creative strategies to displace or join their rivals (thus, today, Microsoft comes more and more to resemble the IBM it once thought to creatively destroy). Every scrap of information in these companies is computerized—every moment of the lives of many employees are available to the corporate mind. Each of the companies today makes its major profit through what can only be called striation—the capitalization of raw material, often informatic, for sale to the highest bidder who can realize more profit from informatic capitalization itself. Often the process is so literal, and so explicitly tied to the colonial project that we tell ourselves has long ended, as to be scarcely credible. But from the “suburbanization” of small-family agricultural land in the semiurban United States, to the “consumerization” of China, to “drug discovery” in indigenous South American and subcontinental Asian territories, to the “outsourcing” of electrical engineering and consumer support to metropolitan India, the computer is the central Western tool in taking for its own profit resources that often play crucial roles in existing social networks.

It is all well and good to show how computers can be used to create rhizomic connectivity and distributed decision making. At the same time, this is true of virtually every other interactive communications medium. (Many of the world's

people who do not have computers do have telephones, helping to create a rhizomic, distributed network of enormous power.) Furthermore, looking for some kind of inevitable transition to something new, something coming from computers, also serves to downplay the role of human agency in all cultural and technological production. We could have a much stronger sense of human social control over computation, as we do over many other human and informational resources; we could have a much stronger sense of the human politics that informs computation as a field just as it does every other human field. To do so would not mean that we stop looking at the ways computers help us, but that we recognize that it may be just as important to focus on the ways that computers serve powerful interests.

This is not to argue that we should necessarily discard our computers, our iPods, and our cell phones. Instead, we must recognize the irreducibly human contribution to each part of the “computer revolution,” and do more to bring it under responsible social oversight. From this perspective, many of the current programs for Internet research seem too much to be *about* endorsing a rationalist view of the social fabric—programs like the Semantic Web, for example, along with other plans for changing the Web’s basic language from HTML to XML. These programs make it more difficult for novices to engage deeply with the Web, and help to make the contributions of novice users (for example, to projects like Facebook and MySpace) available for computation by sophisticated “power users.” From a different political perspective, it seems arguable that we should be doing everything we can to simplify, expose, and clarify the Web’s operations, and to make them available to anyone who wants them at the lowest economic, cultural, and linguistic cost. Such a program would make the Web “worldwide” in a sense that it just is not today, even in programs like Negroponte’s \$100-computers-for-everyone.³⁰ Giving the Web to everyone seems like a hard, fascinating, human, practical problem on which many of us could be working; what it would require is a change in exactly the cultural politics that many computer advocates overlook. Changing those cultural politics will mean thinking seriously about the unequal distribution of all the world’s resources, the human and the physical. However welcome such a transformation may be, there is every reason to believe that computers will be neither its cultural spur nor its technological engine.

NOTES

1. Williams (1974).
2. The new media literature includes, among many other works, books such as Aarseth (1997), Landow (1991, and clearly the first iteration of a view that has grown more complex), Manovich (2001), Hansen (2000, 2004), Ryan (2000), and some of the work in collections such as Wardrip-Fruin and Montfort (2003) and Harries (2002). Hayles (1999,

2005) and Liu (2004) come closest to a kind of neutral stance on the computer revolution, and examine satisfyingly wide samples of computational culture.

3. See Manovich (2001). When pressed for an example, Manovich (2002: 209) has offered Mike Figgis's 2000 film *Timecode* as "exemplifying the difficult search of digital cinema for its own unique aesthetics," and has suggested that *Timecode* might in fact be seen "a computer game that heavily relies on cinema"—all as a way of suggesting that some new art form that is radically different from existing ones is about to emerge.

4. See especially Marvin (1988).

5. And, indeed, as they have turned out within much of mainstream computer science and philosophy, especially with regard to projects instancing so-called Strong Artificial Intelligence; Dreyfus (1992) provides a good overview.

6. The exceptions to this generalization—heterodox works from across several disciplines—follow themes developed in the nascent literature of cultural studies of computing, including Adam (1998), Chun (2006), Edwards (1996), Galloway (2004), Mosco (2005), and Robins and Webster (1999), the authors in Chun and Keenan (2003), Kolko, Nakamura, and Rodman (2000), and Herman and Swiss (2000), and often detailed reflections by cultural theorists including Deleuze and Guattari (1987), Foucault (2000), Spivak (1999), Virilio (1983, 2000), and Žižek (1997); and critical computing theorists such as Agre (1997), Dreyfus (1992), and Winograd and Flores (1987).

7. See Innis (1950, 1951).

8. Mills (1956).

9. *Ibid.*, 218.

10. *Ibid.*, 343–61.

11. Warschauer (2003) provides an alternate and better account of the "digital divide," and begins to gesture at an alternate frame for understanding the phenomenon.

12. See Liu (2004), Mosco (1982).

13. Hobbes (1651), 81.

14. *Ibid.*, 110–11.

15. Macpherson (1962).

16. See, e.g., Mosco (2005).

17. See Anderson (1974), Mattelart (2000, 2003).

18. Deleuze and Guattari (1987), 387.

19. *Ibid.*, 389; also see Crosby (1997).

20. *Ibid.*, 375.

21. For the *savoir/connaissance* distinction, see Foucault (2000), especially "Truth and Juridical Forms."

22. Deleuze and Guattari (1987), 376.

23. Computers are notably hospitable to being used as "black boxes" and "closed systems," despite the focus in much contemporary writing on "open systems" (see Edwards [1996] on the heritage of closed systems throughout much of computing history).

24. Negroponte (1995), 229.

25. *Ibid.*, 230.

26. *Ibid.*, 231.

27. See, e.g., Campbell-Kelly and Aspray (2004), Hayles (1999).

28. Grier (2005). See also, e.g., Campbell-Kelly and Aspray (2004).

29. See Liu (2004) on "cool" in computer culture.

30. See Negroponte's <http://laptop.org/> Web site for the \$100 laptop project, one from which no less prominent a computer authority and philanthropist as Bill Gates has publicly demurred, later suggesting that the existing world cell phone infrastructure would be a more hospitable computing environment (reported in Markoff [2006]).

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