CHAPTER ONE

The Cultural Functions of Computation

This book is not about computers. It is instead about a set of widespread contemporary beliefs about computers—beliefs that can be hard to see as such because of their ubiquity and because of the power of computers themselves. More specifically, it is about the methods computers use to operate, methods referred to generally as *computation*. Computation—as metaphor, method, and organizing frame—occupies a privileged and under-analyzed role in our culture. Influential new concepts often emerge alongside technological shifts—they emerged alongside the shifts to steam power, electricity, and television, for example (see, e.g., Marvin 1988). Like enthusiasts during these other shifts, computer enthusiasts suggest that their bedrock principle is *the* one people need to use to resolve our most pressing social problems. To a greater degree than do some of those earlier concepts, computing overlaps with one of the most influential lines in the history of modern thought, namely the rationalist theory of mind. This may account in part for the strength of computing's influence in contemporary culture. I argue that the current vogue for computation takes this old belief system—that something like *rational calculation* might account for every part of the material world, and especially the social and mental worlds—and repurposes it in such a way so as to give every appearance of its being something very new.

This book foregrounds the roles played by the rhetoric of computation in our culture. I mean thereby to question not the development of computers

themselves but the emphasis on computers and computation that is widespread throughout almost every part of the social fabric. In this way, despite its critical orientation, I do not suggest that computers are useless, that we should discard them altogether, or (in the spirit of some recent popular commentators) that computers are destroying the fabric of expert reason and judgment on which our society supposedly rests. To the contrary: my concern is that belief in the power of computation—a set of beliefs I call here *computationalism*—underwrites and reinforces a surprisingly traditionalist conception of human being, society, and politics. In other registers, we might imagine these views to have long been abandoned, in large part because their faults as part of a total account of human being have been long ago demonstrated conclusively.

Like all the other things human beings build and discover, computers can only be understood productively when they are seen as part of the cultural and historical contexts out of which they emerge—when, to put it in a colloquial and potentially misleading manner, they are read like texts. The primary goal of such an investigation is not to understand computers, though it may have the effect of providing new analyses of them in context. The primary goal is to understand our own culture, in which computers play a significant but not decisive role. As such, the guiding argument of this book is not and cannot be that our society and human beings are in the process of being *fundamentally* transformed by computers, if by fundamentally we mean that we are becoming something categorically unlike ourselves as-we-are and as-we-have-ever-been—in Katherine Hayles's (1999) term, "posthuman." Of course, our society and human beings are changing, but they are also always changing. Change that is so fundamental as to redefine altogether what it is to be human and what it is to participate in a society therefore must be either that same kind of change to which we are always subject, or a kind of transcendence of the human lifeworld that arguably we cannot comprehend, because it is by definition beyond our human understanding.

Too often the rhetoric of computation, especially that associated with so-called new media, suggests that we are in the process of experiencing a radical historical break of just this millennial sort.[1] My bedrock conviction in this study is that whatever the range of historical and cultural difference may mean, it does not entitle us to posit such radical breaks lightly. Until and unless evidence to the contrary presents itself, and with reference to other significant and in their way world-changing technologies, we must assume that technological shifts are best seen as changes in degree and not in kind; that human beings remain what they are (however we decide to define such a vague concept), and that human societies, too, remain largely bound by much the same fundamental forces by which they have always been

characterized. In a time of the most extreme rhetoric of cultural change—which does not, at the same time, accompany a concomitant recognition of the possibilities for radical cultural difference—the need for resistance to the rhetoric of novelty seems especially pressing, not least when such claims are so often based on willful avoidance of the existence of analogous phenomena in the recent historical past. Networks, distributed communication, personal involvement in politics, and the geographically widespread sharing of information about the self and communities have been characteristic of human societies in every time and every place: a burden of this book is to resist the suggestion that they have emerged only with the rise of computers. In a familiar phrase whose import we sometimes seem on the verge of forgetting: the more things change, the more things stay the same.

The Circulation of Computational Discourse

This book focuses primarily on the ways in which the rhetoric of computation, and the belief-system associated with it, benefits and fits into established structures of institutional power. I investigate these benefits in two ways: first, by looking at those aspects of institutional power aided through belief in the superior utility of computerization as a form of social and political organization; second, by examining how the rhetoric of computerization circulates throughout our society, both inside of powerful institutions and outside of them, and then how that rhetoric entails beliefs about human subjectivity that endorse institutional power in a reciprocal manner. Because of its focus, this book is meant as a complement, rather than a direct contribution, to what is generally understood as the field of digital media studies. Computers and beliefs about them pervade our society through forms other than the ones usually designated by the term *media*; they are ubiquitous, playing vital roles in nearly every institution and nearly every product. "Digital media" names only a subset of the modes in which computers influence social formations; it must be the task of cultural criticism (as practiced by writers like Jameson 1981, 1991) to address all of these social forms and not confine itself to those that can legitimately be referred to as media.

I focus on the institutional effects of computing not merely to ensure that cultural criticism fully addresses our moment; rather, I am convinced both intellectually and experientially that computers have different effects and meanings when seen from the nodes of institutional power than from the ones they have when seen from other perspectives. If an unassailable slogan of the computing age is that "computers empower users," the question I want to raise is not what happens when individuals are empowered in this

fashion (a question that has been widely treated in literature of many different sorts), but instead what happens when powerful institutions—corporations, governments, schools—embrace computationalism as a working philosophy. I am convinced that from the perspective of the individual, and maybe even from the perspective of informal social groups, the empowering effects of computerization appear (and may even be) largely salutary. But from the perspective of institutions, computerization has effects that we as citizens and individuals may find far more troubling. Here, computationalism often serves the ends of entrenched power despite being framed in terms of distributed power and democratic participation.

Too often, computers aid institutions in centralizing, demarcating, and concentrating power. It is not that individuals lack power to affect aspects of the computer system, or that new media art, hackers, and open source software are wholly ineffective; much the contrary is true. But it is a mistake to see these often beneficial effects as ameliorating the institutional effects of computerization, and it is also a mistake to give too much credence to the ways that the structures of capital and authority retreat in the face of relatively more democratic, resistant, and responsive public/individual uses of computers. A part of my argument is that this public existed well before the Internet did, and seeing public resistance too much in the context of computerization aligns too closely with the technological progressivism that conditions so much computational discourse.

Inside our existing institutions of power, computerization tends to be aligned with relatively authority-seeking, hierarchical, and often politically conservative forces—the forces that justify existing forms of power. This is true in academic disciplines (where it is especially visible in analytic philosophy, the subject of Chapter 3, and in linguistics, the subject of Chapter 4); it is true in corporations and the corporate monitoring and control of everyday life, including the worldwide spread of capital and accompanying surveillance known as globalization (Chapter 6); and it is true even in politics, despite the obvious utility of computers for communicating and political organizing (Chapters 8 and 9). It is those in power, and those who align themselves with existing structures of power, who are most often (but not exclusively) served by the advancement of computerization, and who make the fullest use of computers; it is they who endorse most fully the computational rhetoric and the computational beliefs that have become so widespread in our society. Following a line of criticism that extends at least as far back as Kant (at least on one interpretation of Kant's views), and that has recent avatars in figures as diverse as established scholars like Lewis Mumford (1934, 1964), Harold Innis (1950, 1951), Jacques Ellul (1964, 1980, 1990), Joseph Weizenbaum, Martin Heidegger, Norbert Wiener (1954,

1964), Terry Winograd, and Theodore Roszak (1986), and more recent writers like Langdon Winner (1977, 1988), Mark Poster (1990, 2000, 2006), Michael Adas, Philip Agre (1997), Christopher May (2002), Kevin Robins and Frank Webster (1999), Alison Adam, McKenzie Wark, Scott Lash (2002), Vincent Mosco, Dan Schiller, Lisa Nakamura, and others discussed below, I argue that computationalism meshes all too easily with the project of instrumental reason. Because of this commitment and its strength in our society, it seems problematic to put too much emphasis on computers in projects of social resistance, especially that kind of resistance that tries to raise questions about the nature of neoliberalism and what is (too often, disingenuously) referred to as free-market capitalism.

This book examines the ties between institutional power and the rhetoric of computationalism, in the hopes of helping to develop an even stronger political resistance to the power-effects of institutional computerization. In addition, therefore, to championing practices such as hacking (Wark 2004), network "exploits" (Galloway and Thacker 2007), transgressive computer art (Galloway 2004), resistance to overarching schemes of copyright (Benkler 2006; Lessig 2002, 2005; Litman 2001; Vaidhyanathan 2003), open source and free software (Stallman 2002), etc., I argue that we must also keep in mind the possibility of de-emphasizing computerization, resisting the intrusion of computational paradigms into every part of the social structure, and resisting too strong a focus on computationalism as the solution to our social problems. This study is written in the belief that computationalism aids some of the pernicious effects of institutional power; and that the best solutions to our pressing social problems lie in the social fabric itself and in social action, and less than we may imagine via computational transformation.

At the same time, I distance myself from certain lines of popular criticism of computers themselves, most especially that line of criticism that suggests that computers produce unsupervised interference with expert discourses and/or a crisis of legitimate authority with regard to the presentation of factual information. To begin with, I am less than persuaded that the democratizing effects of computers outweigh their tendency to centralize and concentrate power, as I discuss throughout this book; at another level, I endorse the demotion of expert opinion via tools like Wikipedia whose proliferation worries critics like Keen (2007). To a large degree, my concern is much the opposite: that the recent left-liberal adoption of computational evangelism (historically best documented and analyzed in Turner 2006) fails to offset the profoundly authoritarian bent of computationalism, so that radical democratization only appears likely if one avoids looking at the computational boon to centralized power. Thus both Keen and the wave of upbeat "democratization of information" writers (e.g., Shirky

2008; Surowiecki 2005; and Weinberger 2003, 2007) seem to look almost exclusively at what one might think of as the "good side" of the web, and in so doing nearly ignore the countervailing tendencies that undermine the movements they champion. These writers also endorse a radical populism that around the world only sometimes aligns itself with democratic social justice.

A second form of popular critique, this one having more exponents in academic circles, meshes more closely with my argument. This critique is often dismissed due to its first and best-known presentation in Birkerts (1994), where computerization is associated with a tendency to privilege the visual (a real worry, on my account), a decline in the ability to read (a real but more complex worry), and a decline in cultural standards that resembles the Keen (2007) attack on "amateurization" and lack of "expert oversight" of cultural production—phenomena that I would in fact find salutary if they were as widespread or as powerful as their advocates and their critics claim. Put simply, such critiques are elitist. But Birkerts also points to a line of critique that must be taken more seriously, which goes something like this: how do we guarantee that computers and other cultural products are not so pleasurable that they discourage us from engaging in absolutely necessary forms of social interaction? I see the current emphasis on the "social web" as not so much an account of a real phenomenon as it is a reaction to what we all know inside—that computers are pulling us away from face-to-face social interactions and in so doing removing something critical from our lived experience. While I am more skeptical about the implicit value of reading *per se* than Birkerts, the question of what that activity is being replaced with, raised more pointedly in Bauerlein (2008), must give anyone pause. In the Epilogue below I also discuss in some detail the pointed version of an allied critique offered by developmental psychologists, who examine the impact on personality formation of decreasing direct social interaction and unstructured play, as articulated by Adele Diamond (2006) and others (see Spiegel 2008a, 2008b).

This book is philosophical in form, but interpretive in method. Its form proceeds from one familiar throughout a number of philosophical traditions, in that it builds from discussions of the way people are constructed—via discussions of mind and then language—outward toward discussions of the consequences these particular notions have for culture and politics. Unlike some works in these traditions, my goal is not to articulate a philosophical system. Rather, and perhaps more in line with some recent works of this form, such those by Rorty (1979) and Putnam (1981a, 1992), it emerges from the conviction that there is no strong way to separate these kinds of issues, even if specialization might suggest otherwise. We are always talking about cultural politics, even when we appear not to be doing

so. More overtly than those works, however, I adopt Louis Althusser's post-structuralist conception of the project of philosophy: not a "demonstrative discourse" or "discourse of legitimation," but a "position on the philosophical battlefield: for or against such-and-such an existing position" (Althusser 2006, 256–7). My goal is not to articulate an alternative to computationalist presumptions about language, mind, and culture. It is to show the functions of that discourse in our society, to think about how and why it is able to rule out viable alternative views, and to argue that it is legitimate and even necessary to operate as if it is possible that computationalism will eventually fail to bear the philosophical-conceptual burden that we today put on it.

Computationalism

Computationalism is a word that has emerged only recently in the literature of analytic philosophy (see, e.g., Copeland 1996, 2002; Davenport 2000; Hardcastle 1995; Scheutz 2002; Wilson 1994, 1995). In that discipline, computationalism is used as a successor term to *functionalism,* notably deployed after the heyday of the doctrine, as discussed in detail in Chapter 3 below. Today, philosophers write about computationalism not as a view to be embraced directly, for the most part, but instead as a problematic doctrine which raises as many questions about philosophical practice as it does about its own putative subject matter. In its received (sometimes called its "classical") form, computationalism is the view that not just human minds are computers but that *mind itself* must be a computer—that our notion of intellect is, at bottom, identical with abstract computation, and that in discovering the principles of algorithmic computation via the Turing Machine human beings have, in fact, discovered the essence not just of human thought in practice but all thought in principle (see especially Kurzweil 1990, 1999, 2006).

Today, few philosophers can accept any of the straightforward versions of computationalism (although there are certainly exceptions to this rule), generally because, as Scheutz writes, "computation, assumed to be defined in abstract syntactic terms, necessarily neglects the real-time, embodied, real-world constraints with which cognitive systems intrinsically cope" (Scheutz 2002, ix). For Scheutz's cognitive systems we must read instead "human cognitive systems," since part of the failure of computationalism has been to show that we really cannot come to general conclusions about cognition per se—we are not even sure we know what that is. Defined this way, however, the recent reevaluations of computationalism pose a question that this volume seeks to answer: not merely why was computationalism so

attractive to philosophers—and why does it remain so attractive to many of them—but also what is at stake in the deep cultural commitment to this view, both inside and outside of philosophy?

In this sense, despite the widespread availability, indeed ubiquity, of computational systems throughout world culture today, I suggest that we must all the more urgently step back and ask questions that are not, in their essence, technological at all. In the terms used by Scheutz and other recent writers, it is clear that computationalism is not so much a commitment to the idea that our brains are fundamentally the same thing as personal computers (what would it mean, in this sense, for our brains to be "running programs" the way that computers run Microsoft Word or a web browser?) as it is a commitment to a set of views that are not at all new to Western or other imperial cultures in our history: views according to which cognition is a process of abstracting away from the embeddedness of material culture, and human beings can not merely be separated hierarchically from animals but also amongst themselves in terms of their cultural deployment of abstract rationality, of so-called "reason." This is a view of human being that is familiar as what Deleuze and Guattari (1983, 1987) call "State philosophy" from as far back in history as we care to trace, although it reaches a certain apotheosis in at least one brand of European Enlightenment, especially the high rationalism associated with Leibniz—who has become, not coincidentally, a kind of patron saint for computationalism (Saul [1992] is a particularly trenchant historical analysis of rationalism in the sense I am using it here).

While philosophers use the term *computationalism* to refer to others of their kind who believe that the human mind is ultimately characterizable as a kind of computer, here I deploy the term more expansively as a commitment to the view that a great deal, perhaps all, of human and social experience can be explained via computational processes. While a great deal hangs precisely on the idea that cognition in particular is computational, in the world at large the belief that computers and human minds are converging entails a set of wider beliefs, namely that any number of real-world phenomena may not simply benefit from computerization but are ultimately "becoming" computerized (precisely due to a passive agency that is here a significant object of critique). In its benign forms, this kind of computationalism manifests in the belief not just that media like recorded music, books, television, and movies are being changed by and replicated on computers, but that they are at bottom fundamentally computational processes that will be transformed quite utterly, in a long term to which we seem to lack good access today, by accelerating computerization (for a skeptical counterpoint to such views, see in particular the writings of Paul Virilio, especially

Virilio 1983, 1989, 1997, and 2000). In more malevolent guises, computationalism manifests in messianic claims about sudden, radical, and almost always salutary changes in the fundamental fabric of politics, economics, and social formations: in claims that the world simply "is" becoming "flat" (to quote one particularly popular version of the view in circulation today; see Friedman 2005); in the belief that computers inherently create distributed democratic forms; and more abstractly, in claims that we can ignore any number of pressing social problems by dint of some kind of unnamable change, a change I see as being precisely messianic, one which computers are in the process of bringing into being. In this sense, by computationalism I mean something close—but not identical—to what Hayles (2005) rightly calls the "regime of computation"; I believe it is accurate to say that the regime of computation targets the combined effects of computational rhetoric and mass computerization; here, at least in great part, my effort is to separate these two phenomena, even if we often want to examine how they work in tandem.

In the most explicit accounts of Western intellectual history, mechanist views cluster on the side of political history to which we typically think of as the right, or conservatism, or Tory politics, or in our day, and perhaps more specifically relevant to this inquiry, neoliberalism. In some 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. It is figures like Leibniz who champion such views in European history, and skeptical figures like Voltaire and Swift who call them into question. 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 often been invoked by conservative and neoliberal leaders when they want to consolidate power. This contrasts with ascendant liberal power and its philosophies, whose conceptual and political tendencies follow different lines altogether: Hume, Kant, Nietzsche, Heidegger, Dewey, James, etc. 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 arises. Resistance to the view that the mind is computational is often found in philosophers we associate with liberal or radical (usually, but not always, left) views, despite a significant amount of variety in their views—for example, Locke, Hume, Nietzsche, Marx. These thinkers put both persons and social groups in the place of mechanical reason 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 particular understanding of the

nature of human being is something we discuss much less often today than we 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 in some important ways meshes well with associated beliefs of both dogmas.[2] It conflicts with the traditional views of the left, but it is intriguing enough and its contradictions are far enough *sub rosa* that many there take it up as a matter of course, where computationalism has today gained a surprisingly strong foothold.

Just in order to take advantage of what Deleuze and Guattari (1982, 1987) call 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."[3] 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 *rationalism,* because we are not accustomed to understanding rationality as a mechanical function, though that is exactly what its definition suggests. 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 understanding of psychology, through Hobbes in particular we associate the modern State's conception of the "free" rational individual with absolute sovereignty and natural right. Because each citizen has the power to reason (to *calculate ratios,* or in our terms to *compute*) for himself, each citizen has access to the know-how (Foucault's *savoir*) of State sovereignty.[4] Each citizen can work out for himself 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."[5]

To submit a phenomenon to computation is to striate otherwise-smooth details, analog details, to push them upwards 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 (Delevze 1992). In this sense, 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. Computation 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 state that the "digital age" is distinguished by "four very powerful qualities that will result in its ultimate triumph: decentralizing, globalizing, harmonizing, and empowering."[6] Without any consideration of arguments to the contrary, Negroponte asserts 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

> The 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.[7]

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."[8] It is also no surprise that Negroponte now spearheads a worldwide effort to distribute computers to children (the One Laptop Per Child program, or OLPC) that can also be seen as realizing a desire to propagate computationalism, and in this mode emerges not from a prior base of interest in the social and economic problems of the world's most marginalized people, but instead from the intuitions of computer users and developers about what it is like to engage deeply with the machine.[9]

The closing words of Negroponte's best-selling book completely lack exemplary support, and with good reason. Their staging of an artificial, precomputerization past where things like collaboration as opposed to

competition existed seems purely ideological, and the observation that computers alone teach a kind of perspectivalism instanced in the ability to read code as poetry is nothing short of bizarre. "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.

Just as importantly, 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.[10] Calculation 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.[11] As David Alan Grier has recently shown, along lines that have become accepted throughout the small field of computer history, since at least the late-19th century many sorts of institutions routinely employed rooms of human calculators, often women, and precisely enabling the exercise of administrative power to which the workers lacked access.[12]

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 Adas, Crosby, Headrick, and Mattelart and no less poststructuralist thinkers like Deleuze and Guattari, Virilio, and Derrida, we can 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 20th 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 politics. For a materialist study of computing to follow its predecessors, 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 all the world's cultures for profit.

Computers come with powerful belief systems that serve to obscure their real functions, even when we say we are acutely aware of the consequences of our technologies. The thought surrounding issues like global climate change and genetics (and, in an earlier time, research into atomic physics) suggests that technologies have strong inherent destructive potentials, even when we don't see them. The fact that computers empower users is not in doubt; what is in question is what power it gives which users, how, and why. In a world where corporations already inhabit an ideal personhood (exported uniquely from an Anglo-American model) that obscures what we understand as human being (not least because the humans who inhabit them are rarely held accountable for a corporation's actions), and as with commercials for detrimental technologies like always-on wireless connectivity, it is all the more necessary to articulate the ideological operations of the computational tropes as they come into being, rather than afterwards. We need to find a way to generate critical praxis even of what appears as an inarguable good. What historicist and poststructuralist writers like Foucault and technological skeptics like Ellul and Innis share is the view that social transformations emerge anywhere other than political movements, even when their overriding trope is technological. The lesson from that work that this book deploys is that we have to learn how to critique even that which helps us (much as computers help us to write books like this one, among many other things). It would be better not to have computers, in that sense, than to live in a world where many more people come to believe that computers by themselves can "save us," can "solve our problems."

For at least one hundred years and probably much longer, modern societies have been built on the assumption that more rationality and more *technē* (and more capital) are precisely the solutions to the extremely serious problems that beset our world and our human societies. Yet the evidence that this is not the right solution can be found everywhere. This is not to suggest that rationality is wrong or misguided or that we should eradicate it (arguably figures like Derrida and Foucault follow the counter-Enlightenment tradition of Voltaire and Swift, none of whom altogether dismiss the value of rationality); it is to suggest that our societies function best when they are balanced between what we will call here rationalism and whatever lies outside of it. To some extent this is a perpetual tension in all societies, not just in ours or in so-called modern ones; what is distinctive about our society, historically, is its emphasis on rationalism and its terrific adeptness at ruling out any discourse that stands against rationalism. In

other societies and places just the opposite might be true, in a way that our own rationalist moment makes difficult to see. There is no doubt that societies have existed and do exist where there is so much emphasis on power without the appearance of rational rule that rationalism is precisely what they need to undo long histories of despotism.

Here I argue that the opposite has become the case for us. The computer, despite its claims to fluidity, is largely a proxy for an idealized form of rationalism. This book shows how the rationalist vision could be mutated into something like a full articulation of human society, despite the obvious, repeated, *a priori* and *a posteriori* reasons that this could never and will never be the case. On this view, the main reason figures like Kant, Hegel, Plato, Hume, the late Wittgenstein, and even Derrida and Spivak look odd at all to us is precisely because of the sheer power held by the rationalist vision over so much of society. It seems conceivable that someday they will be seen (again) as offering what is at least a plausible articulation of human social formation. At that point, this moment will look to be one in which we were possessed by a kind of extreme rationalist vision that carries with it at least two repressed historical formations: the absolutist leader whose will in fact transcends all rational calculation, and disdain for the "illogical" historical and social fabric of the human world.

The Deconstruction of Computation

Despite its rigid formal characteristics, in part because of them, then, computationalism is in every sense what Foucault calls a discourse, one that we are actively creating and enabling, and among whose fundamental principles is the elaboration of centralized power. Its deployment is in no way new in our world; as even computing's advocates insist, at least since Leibniz, it has been well understood that a form of mathematical calculation could be made to represent propositions that are not themselves mathematical. There is little more to understanding computation than comprehending this simple principle: mathematical calculation can be made to stand for propositions that are themselves not mathematical, but must still conform to mathematical rules.

Yet the nature of Leibniz's personal commitment to computation as a cognitive principle only demonstrates the degree to which it is culturally situated. Even orthodox computer histories have trouble making Leibniz sound like anything other than a product of the Western intellectual history of which he is a part, possessed by a belief system to which he subscribes for reasons we would today see as political at least as much as they are properly

scientific. The computer historian and logician Martin Davis calls the computer "Leibniz's Dream," and leaves us in no doubt that the dream is no simple anticipation of the machines we see today: it is a full-blown wish for the elimination of everything that is imprecise or ambiguous in human social practice. Thus in one of his fullest statements about the potential of computation, Leibniz writes to his friend Jean Galloys that he is

> convinced more and more of the utility and reality of this general science [i.e., computation], and I see that few people have understood its extent. . . . This characteristic consists of a certain script or language . . . that perfectly represents the relationships between our thoughts

The pursuit of this "perfect relationship between our thoughts," while not exclusive to computationalists or rationalists, nevertheless has persistently informed a central strand of Western thought about language and subjectivity. It emerges from a terrible anxiety about exactly the ambiguity that characterizes human experience; and it points toward a seemingly perfect world in which "it will be impossible to write . . . chimerical notions such as suggest themselves to us. An ignoramus will not be able to use it, or in striving to do so, he himself will become erudite."[13]

For hundreds of years, sentiments such as this one were considered a kind of pipe-dream, the sort of stuff of which acerbic and highly rational anti-rationalists like Jonathan Swift could make merciless fun, with some confidence that the dreams would never be realized, on grounds that are philosophical, discursive, and empirical. Yet more recently, despite the strong philosophical and conceptual tradition that raises questions not about the reality of computation as a powerful praxis—its raw power should be of no question to anyone, especially today—but precisely about the conceptual underpinnings on which rest views about the general utility of computation as a form of something close to what we can call, as shorthand, "human thinking."

Few writers have doubted the importance of rational calculation in the operation of human thinking. What is in question is the degree to which that sort of calculation explains all the facts of cognition, all the effects of culture, and all that is possible in the realm of culture and cognition. Thinkers who try to construct a rationalist line extending from Leibniz through Descartes to Boole and Frege (the 19th-century logicians most relevant to computing) must conveniently put aside the most famous dissenters from the view that computation is everything, which includes figures of note such as Hume, Hegel, and Kant; and no less the 20th-century thinkers, themselves quite close culturally and personally to the birth of modern computers, like Russell and Wittgenstein, all of whom raised the most profound

conceptual questions about the extent to which logical calculation could, in fact, represent all or even much of human cognitive practice.

The most thorough and most critical of these perspectives, and the one least addressed by contemporary computationalists, is the one offered by Immanuel Kant. Kant fully understood the power of logic and calculation, but he was famously not persuaded by the work of rationalists before him that this was the correct model for what humans do with their brains. Even this argument, clear enough in the main run of Kant's arguments, has started to become lost on us; today Kant looks in departments of Anglo-American analytic philosophy as if he is at least fairly close to a full-blown rationalist on the Leibniz model. Yet as one of Kant's most careful contemporary readers, Gayatri Spivak, has shown repeatedly, Kant argued that "mere (rather than pure) reason is a programmed structure, with in-built possibilities of misfiring, and nothing but calculation as a way of setting right" (Spivak 2005, 93). "Mere" reason, for Kant, is not like the two major categories of cognition, "pure" and "practical" reason, specifically because in its quest for exactness it actually eliminates the possibility of human agency in cognitive practice. Like mathematical equations, formulae that are "merely" reasonable admit of unique, univocal solutions. No thought is necessary to compute that 2 plus 2 equals 4; one can of course come to this conclusion through general thought, or through memorization, or exemplar, or through sheer calculation. But as is characteristic of such computational facts, no human being or human thought is actually necessary to determine that 4 is the unique solution to the question "what is the sum of 2 plus 2?"

It is no accident that Spivak uses the term *programmed* to describe the kind of thought that Kant did not think encompasses all of human reason, precisely the kind of cognitive practice that would eliminate the ambiguity that so troubled Leibniz and others. Jacques Derrida, who himself suggested some of the views of Kant on which Spivak elaborates, is often thought of as a thinker who teaches us to reject handed-down distinctions, showing why and how, for example, much thinking in the Western tradition has relied on an implicit and at times explicit distinction between writing and speech that is philosophically much less tenable than it may appear on the surface. At the same time, in a way that has not been so well understood by his readers, Derrida does not want to deny, exactly, that some societies, especially modern cosmopolitan and imperial societies, are everywhere characterized by writing and printing, while other societies, including the Nambikwara discussed by Claude Lévi-Strauss in the *Tristes Tropiques* and elsewhere, have historically had less formal systems of writing and have relied less on fully articulated systems of writing and printing.

Despite the efforts of pro-computer writers like George Landow to make hypertext sound like the realization of Derridean dreams of a language without binding or hierarchical structures (Landow 1992), in fact from his earliest writing Derrida has been concerned precisely with the difference between human language and something like computer code. *Of Grammatology* (1976) announces this concern in the deliberate use of the morpheme *gram* in its title, and Derrida cannily indicates that this term, associated for his purposes primarily with a history of writing proposed by the Egyptologist I. J. Gelb in his *Study of Writing* (1952), points at a more general and contemporary problematic that has been insufficiently thematized, even as he calls into question the distinction between so-called writing and other forms of inscription:

> we say "writing" for all that gives rise to an inscription in general, whether it is literal or not and even if what it distributes in space is alien to the order of the voice: cinematography, choreography, of course, but also pictorial, musical, sculptural "writing." One might also speak of athletic writing, and with even greater certainty of military or political writing in view of the techniques that govern these domains today. All this to describe not only the system of notation secondarily connected with these activities but the essence and content of these activities themselves. It is also in this sense that the contemporary biologist speaks of writing and *pro-gram* in relation to the most elementary processes of information within the living cell. And, finally, whether it has essential limits or not, the entire field covered by the cybernetic *program* will be the field of writing. If the theory of cybernetics is by itself to oust all metaphysical concepts—including the concepts of soul, of life, of value, of choice, of memory—which until recently served to separate the machine from man, it must conserve the notion of writing, trace, *grammè,* or grapheme, until its own historico-metaphysical character is also exposed. (Derrida 1976, 9)

This is not the work of someone who wants to dispose of the distinction between computer program and language. One detects, despite Derrida's suspicion of all true messianism and distinctions that are too neat, a certain wariness that "the concepts of soul, of life, of value, of choice, of memory" may be overwhelmed by a mechanistic view of language (Harris 1987) and cognition that, heedless of Kant, substitutes "mere" reason for all the complex of human reasoning that philosopher knew must characterize our experience and most especially our moral and political actions and choices.

Derrida is no Luddite, and no one would be more suspicious than he of the view that one technology or another was leading us down a royal road to monstrous disaster—far from it. But the computer in particular is a technology that caused him great concern, for precisely the reason that it offers to substitute for the flux of experience an appearance of certainty that

cannot, in fact, adequately represent our experience. Marian Hobson, a critic who knew Derrida quite well personally, writes:

> The information embodied in the digital series cannot be summarized to any useful extent. A summary which can be raised to the level of theme, of next-level program, is simply not possible. Such types of binary series suggest that the much more variegated strings of signifiers in natural language may likewise not be summarized without loss, by imposition of law-like program or summary equation one to another of different scales of detail and signification—what can be generally called "thematization." The elements in the series can only be taken at the level of singulars.
>
> For Derrida, a philosophic or fictional text is neither a code which is interpreted, nor a program which is "run." (This stance takes the form of occasionally explicit resistance to a commentator in *Jacques Derrida* [Bennington and Derrida 1993] and is one of the sources of humor there.) (Hobson 1998, 194)

Hobson is right to point us to codes and programs as precisely the things which texts are not, despite Derrida's putative disregard for analytic distinctions, and it is no surprise to hear Hobson report that the notion of a "deconstruction computer program" struck Derrida as profoundly troubling, nor to read in the introduction to Bennington's "Derridabase":[14]

> The guiding idea of the exposition comes from computers: G. B. would have liked to systematize J. D.'s thought to the point of turning it into an interactive program which, in spite of its difficulty, would in principle be accessible to any user. As what is at stake in J. D.'s work is to show how any such system remains essentially open, this undertaking was doomed to failure from the start. . . . In order to demonstrate the ineluctable necessity of that failure, our contract stipulated that J. D., having read G. B's text, would write something escaping the proposed systemization. (Bennington and Derrida 1993, 1)

Perhaps just as striking is the fact that Bennington does not even propose the creation of an actual computer program, and does not make it clear how the written text that follows—merely an ordered list of terms and concepts important in Derrida's writing—might be made into something like a program. It seems to me that this hesitation on Derrida's part show just how well he understood computer programs and how they differ from written texts.

Of course, "Derridabase" is well ordered, and for this reason it could easily be made part of a functioning computer application. But its concept of system is rudimentary. It is less elaborate than the kind of logical structure computer scientists call an *algorithm,* or at any rate forms one of the most basic types of algorithm, an ordered list (and it is not entirely wrong to think that an algorithm is the same thing as a very small computer program, and so as computation itself, the principle of letting mathematical formulae corre-

spond to logical ones; see Berlinski 2000). This helps to show the ways in which we have identified computers with every sort of logical system. This is because a computer can simulate or represent any logical system that can be precisely defined. In fact this is the definition of computation. (The thing we refer to as a computer today is a particular kind of algorithm, commonly referred to as a Turing machine.) The power and universal applicability of computation has made it look to us as if, quite literally, *everything* might be made out of computation (von Baeyer 2005; Wolfram 1994, 2002). This is meant literally: researchers have proposed, in the course of what must in part be nothing but normal scientific practice, that everything from DNA, to the interactions between subatomic particles, to the shape of space-time, might be constructed from the algorithmic passing of information in some abstract sense.

No doubt, at least some of these scientific theories will turn out to have a grain of truth to them, and no doubt others of them will fail. But what have proven to be of especially limited consequence, as this book shows, are theories that try to apply the universal representational capability of computation to the human world. The place where this is most visible is language, exactly because computers must partake of something like human language (called by computer scientists "natural language") in order to be used by human beings at all. Programming languages, as Derrida knew, are codes: they have one and only one correct interpretation (or, at the absolute limit, a determinate number of discrete interpretations). Human language practice almost never has a single correct interpretation. Languages are not codes; programming "languages" like Basic and FORTRAN and scripting "languages" like HTML and JavaScript do not serve the functions that human languages do. The use of the term *language* to describe them is a deliberate metaphor, one that is meant to help us interact with machines, but we must not let ourselves lose sight of its metaphorical status, and yet this forgetting has been at stake from the first application of the name (see Chapters 2 and 4).

Of course, from the beginning of computation as a practice and in fact as part of it, writers have proposed that language itself might be subsumed by formal systems, eradicating the ambiguity that so troubles human society. As physical computers themselves came into being, scarcely a year has gone by when several corporate or governmental entities have failed to generate multiple press stories about computers that are about to speak—and only recently, in no small part because of the heated attention they receive, have we seen fewer claims that computers are about to start thinking. But it is a core commitment of this book that neither of these events is about to happen, soon if ever. The reason is not because we and our thought and language are

magical entities, beyond the science of computers; it is instead because we are material beings embedded in the physical and historical contexts of our experience, and it turns out that what we refer to as "thought" and "language" and "self" emerge from those physical materialities. Yes, we can easily build codes that are independent of our bodies; but we don't even know how to conceive of what we call speaking and what we call thinking as independent of our bodies and selves. We can't conceive that the destruction of identity that accompanies the "uploading self" fantasies of so much computer fiction has already and can always happen, because there is no self there to realize it or to feel it. Our selves can only stay where they are, in a singularity that has already happened—and is no nearer than it has ever been.

Discussions of the digital world and technology in general often are forced to hinge on conceptions of the human, and it would be easy enough to suppose that a poststructuralist perspective would have to rule out access to the concept of the human altogether. Nevertheless, like all writing including poststructuralism, cultural criticism of all sorts must inherently be concerned with something we can perhaps only vaguely call "the human world." Arguably, we would not even know what our objects of study were without recourse to such a concept. We need, then, to distinguish between the concept *human* prior to poststructuralism and after it—to keep in mind the object of criticism Derrida and Foucault meant to target, while not jettisoning a robust enough conception of human life to sustain political and cultural reflection. The most narrow, and not entirely accurate, heuristic for making this distinction is to think about the term *human nature:* do we imagine that there are many substantive features of human nature, so that much of what it is to be human is invariant over time; or do we imagine that much of human nature is flexible and open to definition, so that what it means to be human can change depending on context? The former, substantive concept of human nature can be understood as that which the poststructuralists had most in mind, while the latter, flexible conception is the one with which poststructuralism is far more comfortable.

It would be inaccurate to say that we have passed beyond the notion of a substantive human nature in our own society; such a concept functions powerfully in popular discourse around gender, race, and sexuality, among other places. Contemporary geneticists and biologists, despite the power of DNA-based analysis, recognize that human beings are far more characterized by variability than they are by substantive qualities. Persons bearing XX chromosomes and typically classified "female" usually have less upper-body strength than does a typical male of similar height, weight, and age; but this statistical observation provides almost no information for predicting whether any specific human being will be more or less strong than an-

other. We have learned not to define women as "the weaker sex," and not to disparage women with significant upper-body strength as failing to meet the substantive definition of their kind, just as many of us have learned to assign few characteristics to any individual based on his or her membership in any given group. In this sense contemporary views of human nature dovetail with poststructuralist views in rejecting the idea that "the human" is defined by the capability for rationality, or "man" is defined by bravery, sexual prowess, sportsmanship, and so on. Whatever our particular characteristics, we are all human, and we accept the fact that this term has little substantive content. As the philosopher of biology David Hull has put it, writing against the more substantive view of human nature adopted by sociobiologists, "if by 'human nature' all one means is a trait which happens to be prevalent and important for the moment, then surely human nature exists. Each species exhibits adaptations, and these adaptations are important for its continued existence. . . . But this adaptation may not have characterized us throughout our existence and may not continue to characterize us in the future" (Hull 1986, 9).

There is no essence to human nature, no particular set of traits or forms of life that make us human or make us inhuman. Human nature is highly malleable; the ability to affect what humans are and how they interact with their environment is one of my main concerns here, specifically along the lines that computerization of the world encourages computerization of human beings. There are nevertheless a set of capacities and concerns that characterize what we mean by human being: human beings typically have the capacity to think; they have the capacity to use one or more (human) languages; they define themselves in social relationship to each other; and they engage in political behavior.[15] These concerns correspond roughly to the chapters that follow. In each case, a rough approximation of my thesis might be that most of the phenomena in each sphere, even if in part characterizable in computational terms, are nevertheless *analog* in nature. They are gradable and fuzzy; they are rarely if ever exact, even if they can achieve exactness. The brain is analog; languages are analog; society and politics are analog. Such reasoning applies not merely to what we call the "human species" but to much of what we take to be life itself, and it is notable that many animals (and even some plants) evidence behavior that falls under one or more of these headings. It is not even clear what the boundaries of "the human" might be in these regards; it is not at all intuitively clear what characteristics aliens would have to display for us to consider them roughly the same as humans, or even to be human. Presumably, the capacities to engage in thinking, language, social relations, and politics would go a long way in helping us draw this conclusion, but the problem is thornier than

some would like to admit; recent suggestions that animals might deserve something like "human rights" only goes to show the dense problematic sedimented into the term.

While human beings can surely engage in activities that resemble or are even equivalent to digital ones, it is their capacity to engage in analog activities—their propensity so far in history to engage most of the time in such activities—that are of signal concern in this study. Famously, Deleuze and Guattari write at length in the two volumes of *Capitalism and Schizophrenia* (1983, 1987) that much of human life and human society can be characterized in terms of machines; they go so far as to include much of everything we recognize as part of a "machinic phylum." There is much to recommend this view, and it is not my purpose to put it under scrutiny here. But what is notable for our purposes is that these machines are generally analog: like most of our world, they are machines built for one or more specific functions, sometimes able to be repurposed for other uses, inexact, rough, fuzzy. They don't choose between 1 and 0 to build up symbolic operations; rather, the machine of the animal elbow moves at any number of stretchable angles, which no part of the body needs to decompose into numeric approximations. While enough frames-per-second can make digital animations appear as smooth as analog ones, there is still a translation occurring inside the computer that the animal body does not need to make. There is no mystery here; analog machines are at least as old as digital ones and pose no conceptual obstacles (that they might is arguably a symptom of exactly the computational mania with which this book is concerned). Lawn mowers, toasters, drills, typewriters, elbow joints, pianos, and jaws may be mechanical, but there is no reason to suspect them of being digital (Derrida [1993] offers an excellent account of the machinic qualities of the organic world that nevertheless remain different from digital representation). That digital media can approximate their function should raise this suspicion no more than the existence of baseball or golf simulations makes us suspect that these games are digital.

Few theorists addressed the interconnection of politics, culture, and technology more closely than Deleuze and Guattari. In *A Thousand Plateaus,* Deleuze and Guattari develop a concept, *striation,* that arguably emerges in part from the growing emphasis on computerization that was evident even in the 1970s, but that has sometimes been overlooked by media theorists in favor of what is clearly a misreading of Deleuze and Guattari's discussion of *virtuality* (see especially Lévy 2001). The term *virtual reality* emerged in wide use (popularized in particular by the computer evangelist Jaron Lanier) after Deleuze and Guattari's pathbreaking work, and it is clear that Deleuze and Guattari intended the virtual to refer to a generic use

of the term rather than to a computer-based phenomena (see De Landa 2002; Massumi 2002; Shields 2003; and Wark 2004 for more accurate discussions of what Deleuze and Guattari mean by the virtual and how it relates to the computer). The idea that computers represent a better instantiation of "virtuality" than do the human brain or human society is a curious and curiously computer-centric notion, one that bespeaks the tremendous cultural power of computation itself.

Nevertheless, the emphasis on the virtual as Deleuze and Guattari's chief contribution to the cultural study of computers has helped to obscure their much more sustained and meaningful ideas that center on the term *striation,* and that clearly have computation as an historical abstraction, and not just material computers, as their object of analysis. Striation is discussed throughout *Capitalism and Schizophrenia* (1983, 1987), principally in its second book, *A Thousand Plateaus,* but it receives thorough treatment in Chapter 14, "1440: The Smooth and the Striated." It is important to remember that this is essentially the final substantive chapter of *Capitalism and Schizophrenia* and that the distinction implemented here builds on others Deleuze and Guattari work out throughout the two volumes. "Smooth space and striated space—nomad space and sedentary space—the space in which the war machine develops and the space instituted by the State apparatus—are not of the same nature" (474), Deleuze and Guattari write, despite the fact that in reality "the two spaces only exist in mixture." Still, we can find examples that help us to distinguish the two principles. Smooth space, where "points are subordinated to the trajectory" (478), may be represented by the lifestyles of nomads, hunter-gatherers, navigation by "bearings" rather than maps, intuition, what Deleuze and Guattari call deterritorialization, rhizomatic organization, relatively anarchic and local forms government, and relatively mobile forms of life. Striated space, where "lines or trajectories tend to be subordinated to points" (478), is the space of the State, of firm bureaucratic and governmental orders, of the grid, of maps, coordinate orientations, of territorialization, tree-like (hierarchical) organization, settlement and agriculture (see Lunenfeld 2000, xvi-xviii, for a more laudatory but, for its closeness to contemporary computing practice, all-the-more telling account of the importance of grids; Crosby 1997, Scott 1999, and Wright 2005 touch on the importance of certain views of quantification to the State-based conception of progress that are closely tied to striation).

Schematized in this way, it is clear that most of the thought and practice surrounding computers promotes striated over smooth space. It is remarkable, then, how much of the cultural-political discussion of computers uses the rhetoric of smooth space while simply not addressing issues of

striation—of territorialization rather than deterritorialization. As in the case of language, computers are found on the side of culture in which people move to metropoles and then stay in them, commit to hierarchical organization, grow increasingly reliant on technologies and politics of organization and settlement, and see the world as an already-comprehended object that is available for exploitation; at the same time what is left behind is a space of relative smoothness and (although it may be heavily constrained by the pressures of global capital) mobility. While the rhetoric of computation looks for those places in which the network allows for smooth practices, arguably this is not because the computational infrastructure is itself hospitable to such practices. Rather, it is because we simply do not want to admit how overwhelming are the forces of striation within computers and computation, and we grasp at precisely those thin (but of course real) marks of smoothness that remain as computers grow ever more global in power. Of course computers contribute in some ways to what is arguably a vitally necessary resistance to global striation; but if our goal is truly to participate in such resistance, we need to see with clear eyes just how deeply computers are implicated in striation to begin with. Given the pervasive insistence of computers on State power and striation, there is perhaps no more relevant technology of which one can say, with Audre Lorde, that "the master's tools will never dismantle the master's house" (1984, 110).

Politically, the goal of this study is to expand on a cultural opening that generally has been discounted in public discourse. In today's left, political analysis of computation largely focuses on one of two political possibilities. The first, expressed in liberal writings like those of Joseph Trippi and Markos Moulitsas, comes close to a kind of technological determinism: it suggests that the Internet is inherently democratizing, and we simply need to have faith that global computerization will produce democracy as a necessary side-effect. Trusting that the computer makes our political efforts qualitatively different from earlier ones, advocates of this position suggest that computer-based tools for fundraising, organizing, and citizen journalism will have a transformative effect on the public sphere: because the old media conglomerates will inevitably dissolve in the face of ubiquitous Internet access, we need do little more than use the computational tools engineers provide for us—as well as, no doubt, creating a few of our own—to effect significant, anti-authoritarian political change. In its best form—McChesney (2007), for example—this position embodies an admirable vision of citizen participation in the creation of the polis, something like a genuine liberal position. In its worst form—say, Friedman

(2005)—a similar position can degenerate into something very close to techno-progressivist neoliberalism, in which the computer is inherently effecting such massive social changes that we are virtually powerless over them, and at the same time need not worry about them, since they are almost inevitably going to make society more egalitarian, more resistant to authoritarian control and centralization.

A second view, more prominent within academic and creative thought about computing, suggests that there actually are problems inside of the contemporary computing infrastructure, but that it is "*through* protocol that one must guide one's efforts, not against it" (Galloway 2004, 17). Adumbrating this position, Galloway and Wark, especially, describe the actions of hackers, artists, creative writers, and programmers who work diligently to exploit gaps in the system and to re-use the system, especially the computational system, for anti-authoritarian ends. Wark's "hacker class" is wider than just those (e.g., Kevin Mitnick) understood to be hackers in the most literal sense; nevertheless, Wark writes that "*A Hacker Manifesto* is among other things an attempt to abstract from the practices and concepts" of "groups, networks, and collaborations such as Adilkno, Ctheory, EDT, Institute for Applied Autonomy, I/O/D, Luther Blisset Project, Mongrel, Nettime . . ." (Wark 2004, n.31). These artists and creative programmers (and mailing lists and critical communities) are extremely diverse entities, but it is fair to say that they generally adhere to Galloway's dictum: "through protocol, not against it."

This, too, is a laudatory goal, perhaps even more so than the first form of resistance articulated above; but I wonder what authorizes Galloway's prohibition: "*not* against" protocol. I am all for resistance through protocol; what I want to articulate is the case precisely for resistance *against* what Galloway calls protocol, and what is more generally thought of as computerization. My point is not to simply raise a kind of Luddite anti-technologism according to which we should simply dispose of all computers; my point is to raise the question whether the shape, function, and ubiquity of the computing network is something that should be brought under democratic control in a way that it is not today. I do not think computing is an industry like any other, or even a communications medium like any other; rather, it is a name for the administrative control and concentration powers of our society—in a sense, precisely what Foucault would call our governmentality. It seems more than reasonable to insist that such governmental powers must remain in the hands of a widespread citizenry, one that encompasses both majorities and minorities, communities and individuals. It is not exactly the "concentration of media ownership," but the concentration of computing

power within institutions, to which I am encouraging resistance. Thus to Galloway's dictum I offer this simple emendation: resistance "through protocol, *and* against it."

In this way the goal of this study is to point out how pervasive the discourse of computationalism has become throughout our powerful institutions, especially where these touch on the third rails of true political authority. Trying to broaden the space from which informed leftist thought can insist that the question of how much computer technology is used, and how and where it is used, raises questions that must be open to the polis and not simply decided by technocrats. To a degree, this position has started to be articulated with regard to legal notions of intellectual property and even, perhaps to a lesser extent, to the kinds of knowledge generated within medical fields and biological research (where the question of who owns and who has access to genetic information is becoming more and more heated).

I don't think we can know at this historical juncture which of these modes of resistance might or might not be successful; nor do I see any reason to suppose they are anything but complementary, even if there is no doubt that differences will exist among them. But I will confess to being concerned about just where (because he does not say) a writer like Galloway derives the imperative in his statement that we *must not* resist against what he calls protocol. Again, resisting through protocol is a laudable goal; actually working to democratize media and information technology is a laudable goal (as for example in democratized projects like Wikipedia, and open source and free software, etc.); but it seems to me we can leave it to technocrats and capitalists to insist that we as the citizenry have no right or power to determine how technologies change, adapt, and function in society. No doubt there are a whole range of technical questions that can be left to specialists. The ubiquity of computer technology is not one of them.

It can be no coincidence that the computer emerges at just a moment when the public ideology of human enslavement has been changed by intense social effort. We address computers as our slaves, and never think of the power and satisfaction we feel precisely in knowing how perfectly the machine bends to our will. We exercise and intensify mastery over the machine at the individual and the social levels; we experience frustration when the real world fails to live up to the striated and rigid computational model. Yet we continue to look to the computer for solutions to this problem, itself largely created and intensified by the computer. We don't see people who use computers extensively (modern Americans and others around the world) breaking out everywhere in new forms of democratic action that disrupt ef-

fectively the institutional power of capital (see Dahlberg and Siapera 2007, Jenkins and Thorburn 2003, and Simon, Corrales, and Wolfensberger 2002 for close analysis of some of the more radical claims about democritization), yet our discourse says this is what computers bring. Our own society has displayed strong tendencies toward authoritarianism and perhaps even corporate fascism, two ideologies strongly associated with rationalism, and yet we continue to endorse even further tilts in the rationalist direction. This book is written in the hope that this historical imbalance between rationalism and "anti-rationalism" has gone about as far as it can go it the rationalist direction. Perhaps, despite appearances, there is a possible future in which computers are more powerful, more widespread, cheaper, and easier to use—and at the same time have much less influence over our lives and our thoughts.

Notes

Chapter 1 The Cultural Functions of Computation

1. For the most overt rhetorical presumptions of the newness of new media, see Hansen (2004), Manovich (2001), and the editor's comentaries in Wardrip-Fruin and Montfort (2003). Gitelman (2006) and some of the essays and commentary in Chun and Keenan (2003) and Gitelman and Pingree (2004) raise critical questions about the utility (though not as often the purpose) of this rhetoric.
2. See, e.g., Mosco (2005).
3. Deleuze and Guattari (1987), 375.
4. For the *savoir/connaissance* distinction, see Foucault (2000), especially "Truth and Juridical Forms."
5. Deleuze and Guattari (1987), 376.
6. Negroponte (1995), 229.
7. Ibid., 230.
8. Ibid., 231.
9. See OLPC (2009).
10. Agre (2002) and Sloman (2002) provide convincing typologies of current computational practice that highlight the importance of "traditional" (if massive) computation and the relative and surprising unimportance of Turing machine-style algorithmic processing to contemporary computational practice.
11. See, e.g., Campbell-Kelly and Aspray (2004); Hayles (1999).
12. Grier (2005). See also, e.g., Campbell-Kelly and Aspray (2004).
13. Gottfried Wilhelm Leibniz, letter of December 1678 to Jean Galloys. Quoted in and translated by Davis (2000), 16.
14. Marian Hobson, p.c.

15. In this sense the position I describe here is meant to be completely consistent with what is usually, but perhaps misleadingly, called antihumanism in post-structuralist theory; see, in addition to the Derrida and Foucault material cited elsewhere in this chapter, Althusser (2003, 221–305), and Badiou (2001, 4–17).