Introduction: Sex, Death, and Machinery, or How I Fell in Love with My Prosthesis

It started this afternoon when I looked down at my boots. I was emerging from a stall in the women's room in my department. The university was closed for the holidays. The room was quite silent except for the distant rush of the air conditioning, imparting to the cramped institutional space the mechanical qualities of a submarine. I was idly adjusting my clothing, thinking of nothing in particular, when I happened to look down, and there they were: My boots. Two completely unremarkable boots. They were right where they belonged, on the ends of my legs. Presumably my feet were inside.

I felt a sudden thrill of terror.

Maybe, I suppose, the boots could have reminded me of some long-buried trauma, of the sort that Freudians believe leads to shoe fetishism. But my sudden fear was caused by something quite different. What was driving me was not the extraordinariness of the sight of my own boots, but the ordinariness of them. They were common as grass. In fact, I realized that I hadn't even thought about putting them on. They were *just there.* If you wanted to "get real ugly about it"—as they say in Austin—you might call it a moment of radical existential *Dasein,* in the same way you might say déjà vu again. I had become transparent to myself. Or rather, the *I* that I customarily express and that reflexively defines me through my chosen personal style had become part of the wallpaper.

This is hardly a serious problem for some. But I tend to see myself as an entity that has chosen to make its life career out of playing with

identity. It sometimes seems as though everything in my past has been a kind of extended excuse for experiments with subject position and interaction. After all, what material is better to experiment with than one's self? Academically speaking, it's not exactly breaking new ground to say that any subject position is a mask. That's well and good, but still most people take some primary subject position for granted. When pressed, they may give lip service to the idea that perhaps even their current "root" persona is also a mask, but nobody really believes it. For all intents and purposes, your "root" persona is *you*. Take that one away, and there's nobody home.

Perhaps someone with training in drama already perceives this, but it was a revelation to me. In the social sciences, symbolic interactionists believe that the root persona is always a momentary expression of ongoing negotiations among a horde of subidentities, but this process is invisible both to the onlooker and to the persona within whom the negotiations are taking place. For me this has never been particularly true. My current *I* has been as palpably a mask to me as any of my other *I's* have been. Perceiving that which is generally invisible as really a kind of capital has been more than a passing asset (as it were); it has been a continual education, a source of endless challenge, not to mention fear, and certainly not least, an ongoing celebration of the sacred nature of the universe of passing forms. It was for these reasons, then, that I found looking down rather complacently at my boots and not really seeing them to be so terrifying. Like an athlete who has begun to flub a long-polished series of moves, I began to wonder if I was losing my edge.

Going through life with this outlook has been a terrific asset in my chosen work, and the current rise in the number of people who engage in social interactions without ever meeting in the customary sense of the term—that is, engaging in social intercourse by means of communication technologies—has given me increasing opportunities to watch others try on their own alternative personae. And although most still see those personae as just that—alternatives to a customary "root" identity—there are some out at the margins who

have always lived comfortably with the idea of floating identities, and inward from the margins there are a few who are beginning, just a bit, to question. What it is they are questioning is a good part of what this essay is about.

A bit of background may be appropriate here.

I have bad history: I am a person who fell in love with her own prostheses. Not once, but twice. Then I fell in love with somebody *else's* prosthesis.

The first time love struck was in 1950. I was hunkered down in the dark late at night, on my bed with the big iron bedstead on the second floor, listening absently to the crickets singing and helping a friend scratch around on the surface of a galena crystal that was part of a primitive radio. We were looking for one of the hot spots, places where the crystal had active sites that worked like diodes and could detect radio waves. There was nothing but silence for a long, long time, and then suddenly the earphones burst into life, and a whole new universe was raging in our heads—the ranting voice of Jean Shepherd, boiling into the atmosphere from the massive transmitter of WOR-AM, 50 kilowatts strong and only a few miles away. At that distance we could have heard the signal in our tooth fillings if we'd had any, but the transmitter might as well have been in Rangoon, for all the fragrant breath of exotic worlds it suggested. I was hooked. Hooked on technology. I could take a couple of coils of wire and a hunk of galena and send a whole part of myself out into the ether. An extension of my will, of my instrumentality . . . that's a prosthesis, all right.

The second time happened in 1955, while I was peering over the edge of a 24 24 recording console. As I stood on tiptoe, my nose just clearing the top of the console, from my age and vantage point the massive thing looked as wide as a football field. Knobs and switches from hell, all the way to the horizon . . . there was something about that vast forest of controls that suggested the same breath of exotic worlds that the simple coil of wire and the rickety crystal did.

I was hooked again. Hooked on even bigger technology, on another extension of my instrumentality. I could create whole oceans of sound, universes of sound, could at last begin on my life's path of learning how to make people laugh, cry, and throw up in dark rooms. And I hadn't even heard it turned *on.*[1]

But the third time . . .

The third time was when Hawking came to town.

Stephen Hawking, the world-famous physicist, was giving a lecture at UC Santa Cruz. The auditorium was jammed, and the overflow crowd was being accommodated outside on the lawn. The lawn looked like a medieval fair, with people sitting on blankets and towels, others standing or milling around, all ears cocked toward the loudspeakers that were broadcasting Hawking's address across the landscape.

If you haven't seen Stephen Hawking give a talk, let me give you a quick background. Hawking has amyotrophic lateral sclerosis, which makes it virtually impossible for him to move anything more than his fingers or to speak. A friendly computer engineer put together a nice little system for him, a program that displays a menu of words, a storage buffer, and a Votrax allophone generator—that is, an artificial speech device. He selects words and phrases, the word processor stores them until he forms a paragraph, and the Votrax says it. Or he calls up a prepared file, and the Votrax says that.

So I and a zillion other people are on the lawn, listening to Hawking's speech, when I get the idea that I don't want to be outside with the PA system—what I really want to do is sneak into the auditorium, so I can actually hear Hawking give the talk.

In practice this maneuver proves not too hard. The lecture is under way, security is light—after all, it's a *physicist,* dammit, not the UC Board of Regents, for which they would have had armed guards with two-way radios—so it doesn't take long for me to worm my way into the first row.

And there is Hawking. Sitting, as he always does, in his wheelchair, utterly motionless, except for his fingers on the joystick of the laptop; and on the floor to one side of him is the PA system microphone, nuzzling into the Votrax's tiny loudspeaker.

And a thing happens in my head. Exactly where, I say to myself, *is* Hawking? Am I any closer to him now than I was outside? Who is it doing the talking up there on stage? In an important sense, Hawking doesn't stop being Hawking at the edge of his visible body. There is the obvious physical Hawking, vividly outlined by the way our social conditioning teaches us to see a person as a person. But a serious part of Hawking extends into the box in his lap. In mirror image, a serious part of that silicon and plastic assemblage in his lap extends into him as well . . . not to mention the invisible ways, displaced in time and space, in which discourses of medical technology and their physical accretions already permeate him and us. No box, no discourse; in the absence of the prosthetic, Hawking's intellect becomes a tree falling in the forest with nobody around to hear it. On the other hand, with the box his voice is auditory and simultaneously electric, in a radically different way from that of a person *speaking* into a microphone. Where *does* he stop? Where are his edges? The issues his person and his communication prostheses raise are boundary debates, borderland/*frontera* questions. Here at the close of the mechanical age, they are the things that occupy a lot of my attention.[2]

Flashback: I Was Idly Looking

I was idly looking out my window, taking a break from some nasty piece of academic writing, when up the dusty, rutted hill that constitutes my driveway and bastion against the world there abruptly rode, on a nasty little Suzuki Virago, a brusque, sharp-tongued person of questionable sexuality. Doffing her helmet, she revealed herself, both verbally and physically, as Valkyrie, a postoperative m/f transgender with dark hair and piercing black eyes who evinced a pronounced affinity for black leather. She announced that there were things we had to do and places we had to go, and before I could mutter "science fiction" we were off on her bike.[3]

Valkyrie proceeded to introduce me to a small community of women in the San Francisco Bay area. Women's collectives were not new to me; I had recently studied a group of women who ran a business, housed themselves under one roof, and lived their lives according to the principles of a canonically undefined but quite powerful idea known as lesbian separatism.[4] But the group to which my new friend now introduced me did not at all fit the model I had painstakingly learned to recognize. This collective ran a business, and the business was hetero phone sex . . . not something of which my other research community, immured in radical lesbian orthodoxy, would have approved.

I was instantly entranced, and also oddly repelled. After all, I had broken bread with one of the most episcopal of women's collectives for five years, and any deviation from group norms would have been punishable in fairly horrid ways. To imagine that hetero sex could be enjoyable, not to mention profitable, was playing into the hands of the gentiles, and even to spend time with a group that supported itself in such a manner (and even joked about it) could have had mortal consequences.

For reasons best described as kismet, the phone sex workers and I became good friends. We found each other endlessly fascinating. They were intrigued by my odd history and by what I'd managed to make out of it. In turn, I was intrigued by the way they negotiated the mine fields of ethics and personal integrity while maintaining a lifestyle that my other research community considered unthinkable.

After a while, we sorted out two main threads of our mutual attraction. From my point of view, the more I observed phone sex the more I realized I was observing very practical applications of data compression. Usually sex involves as many of the senses as possible. Taste, touch, smell, sight, hearing—and, for all I know, short-range psychic interactions—all work together to heighten the erotic sense. Consciously or unconsciously phone sex workers translate all the modalities of experience into audible form. In doing so they have reinvented the art of radio drama, complete down to its sound effects,

including the fact that some sounds were best represented by *other* improbable sounds that they resembled only in certain iconic ways. On the radio, for example, the soundmen (they were always literally men) represented fire by crumpling cellophane, because to the audience it sounded *more like* fire than holding a microphone to a real fire did.

The sex workers did similar stuff. I made a little mental model out of this: The sex workers took an extremely complex, highly detailed set of behaviors, translated them into a single sense modality, then further boiled them down to a series of highly compressed tokens. They then squirted those tokens down a voice-grade phone line. At the other end of the line the recipient of all this effort added boiling water, so to speak, and reconstituted the tokens into a fully detailed set of images and interactions in multiple sensory modes.

Further, what was being sent back and forth over the wires wasn't just information, it was *bodies*. The majority of people assume that erotics implies bodies; a body is part of the idea of erotic interaction and its concomitants, and the erotic sensibilities are mobilized and organized around the idea of a physical body which is the seat of the whole thing. The sex workers' descriptions were invariably and quite directly about physical bodies and what they were doing or what was being done to them.

Later I came to be troubled by this focus on bodies because of its relation to a remark of Elaine Scarry's. In a discussion of human experience in her book *The Body in Pain*, she says,

> Pain and imagining are the "framing events" within whose boundaries all other perceptual, somatic, and emotional events occur; thus, between the two extremes can be mapped the whole terrain of the human psyche (165).

By that time I had stopped thinking of the collective as a group of sex workers and had begun to think of them in rather traditional anthropological terms as *my* sex workers. I had also moved on to a more complex mode of fieldwork known as participant observation,

and I was getting an education I hadn't expected. Their experience of the world, their ethical sense, the ways they interpreted concepts like work and play were becoming part of my own experience. I began to think about how I could describe them in ways that would make sense to a casual reader. As I did so, Scarry's remark returned to intrigue me because of its peculiar relationship to the social groups I was studying. It seemed to me that the sex workers' experiential world was organized in a way that was almost at right angles to Scarry's description of the continuum of pain and imagining. The world of the sex workers and their clients, I observed, was not organized along a continuum of pain and imagination but rather within an experiential field in which *pleasure* and imagination were the important attractors.

Patently it is not difficult in these times to show how phone sex interactions take place within a field of power by means of which desire comes to have a particular shape and character. In the early days of phone sex that view would have been irrefutable, but things are changing rather fast in the phone sex business; more traditional hetero and hetero-modeled interactions may still get their kick from very old patterns of asymmetrical power, but there seems little doubt that the newer forums for phone sex (as well as other forms of technologically mediated human interaction) have made asymmetrical power relationships part of a much larger and more diverse erotic and experiential tool kit.

This diversity has obvious and interesting implications for critical studies, but it does not in any way imply that a hypothetical "new erotics," if that's what I'm describing, has escaped from the bottomless gravity well of the same power structures within which we find ourselves fixed in position, regardless of what our favorite position is. It does seem to mean, though, that a good many of the people I observe are aware of the effects of those structures, even though as of this writing I see little effort to alter or transcend them. There does appear to be a central and critical reason for this lack of effort, particularly in regard to erotics, and that is that none of the people

I observe who *do* erotics—even those who play with different structures of power—have yet begun to speculate on how erotics really works.

There are other areas of inquiry which are organized around what might be called an epistemological Calvinism. A recent but fairly broad area of inquiry in the social sciences into the nature and character of human-computer interaction is known as the study of computer-supported cooperative work (CSCW). Part of the informing philosophy of this discipline is the idea that all human activity can be usefully interpreted as a kind of work, and that work is the quintessential defining human capacity. This, too, I think, misses some of the most important qualities of human-computer interaction just as it does when applied to broader elements of human experience. By this I mean that a significant part of the time that humans spend in developing interactional skills is devoted not to work but to what by common understanding would be called play. Definitions of what counts as play are many and varied, generally revolving around the idea of purposive activities that do not appear to be directly goal oriented. "Goal orientation" is, of course, a problematic phrase. There is a fine body of research addressed to the topic of play versus work activities, but it doesn't appear to have had a deep effect on CSCW and its allied disciplines. From the standpoint of cultural criticism, the issue is not one of definitions of work or play, but of how the meanings of those terms are produced and maintained. Both work and play have culture-specific meanings and purposes, and I am conducting a quite culture-specific discussion when I talk about the primacy of play in human-computer interaction (HCI, or for our purposes just "interaction") as I do here.[5]

In order to clarify this point, let me mention that there are many definitions of interaction and many opinions about what interaction is for. As I write, large industry consortiums are finalizing their standards for what they call interactive multimedia platforms. These devices usually consist of a computer, color monitor, mouse, CD-ROM drive, sound card, and pair of speakers. This electronic instantiation

of a particular definition freezes the conceptual framework of interaction in a form most suitable for commercial development—the user moves the cursor to the appropriate place and clicks the mouse, which causes something to happen—or what the interactivist Michael Naimark would call, more pejoratively, poke-and-see technology. This definition of interaction has been in the wind for so long now that few researchers say much about it. It is possible to play within the constraints of such a system, but the potential for *interaction* is limited, because the machine can only respond to an on-off situation: that is, to the click of the mouse. Computer games offer a few more input modes, usually in the form of a joystick, which has two or three degrees of freedom. However, from the standpoint of kind and gentle instruction, what the game companies do with this greater potential is not very inspiring. Technologically speaking, Sega's *Sewer Shark* (1993), for example, was an amazing exercise in game design for its time, but it reinforced the feeling that interaction in a commercial frame is still a medium like television, in which the most advanced product of the technological genius of an entire species conveys Geraldo Rivera to millions of homes in breathtaking color.

I don't want to make this a paradise-lost story, but the truth is that the definitions of interactivity used by the early researchers at MIT possessed a certain poignancy that seems to have become lost in the commercial translation. One of the best definitions was set forth by Andy Lippman, who described interaction as mutual and simultaneous activity on the part of both participants, usually working toward some goal—but, he added, not necessarily. Note that from the beginning of interaction research the idea of a common goal was already in question, and in that fact inheres interaction's vast ludic dimension.[6]

There are five corollaries to Lippman's definition. One is *mutual interruptibility,* which means that each participant must be able to interrupt the other, mutually and simultaneously. Interaction, therefore, implies conversation, a complex back-and-forth exchange, the goal of which may change as the conversation unfolds.

The second is *graceful degradation,* which means that unanswerable questions must be handled in a way that doesn't halt the conversation: "I'll come back to that in a minute," for example.

The third is *limited look-ahead,* which means that because both parties can be interrupted there is a limit to how much of the shape of the conversation can be anticipated by either party.

The fourth is *no-default,* which means that the conversation must not have a preplanned path; it must develop fully in the interaction.

The fifth, which applies more directly to immersive environments (in which the human participant is surrounded by the simulation of a world), is that the participants should have *the impression of an infinite database.* This principle means that an immersive interactional world should give the illusion of not being much more limiting in the choices it offers than an actual world would be. In a nonimmersive context, the machine should give the impression of having about as much knowledge of the world as you do, but not necessarily more. This limitation is intended to deal with the Spock phenomenon, in which more information is sometimes offered than is conversationally appropriate.

Thus interactivity implies two conscious agencies in conversation, playfully and spontaneously developing a mutual discourse, taking cues and suggestions from each other as they proceed.

In order to better draw this out let me briefly review the origins and uses of computers. Afterward I will return to the subject of play from a slightly different perspective.

The first devices that are usually called computers were built as part of a series of projects mandated by the military during World War II. For many years, computers were large and extremely costly. They were also cranky and prone to continual breakdown, which had to do with the primitive nature of their components. They required continual maintenance by highly skilled technicians. The factors of cost, unreliability, and the need for skilled and continual attention, not to mention the undeniable aura of power that surrounded the new machines like some heady smell, combined to keep computers

available only to large corporations and government organizations. These entities came already equipped with their own ideas of efficiency, with the concepts of time and motion study then in vogue in industry (of which my colleagues have written at length), and of course with the cultural abstraction known as the work ethic perpetually running in the background. Even within the organizations themselves, access to the new machines was restricted to a technological elite which, though by no means monolithic in its view of technological achievement, had not had enough time to develop much of a sense, not to mention a sensibility, of the scope and potential of the new devices.

These factors combined to keep attention focused on the uses of computers as rather gross instrumentalities of human will—that is, as number crunchers and databases. Computers could extend human abilities, physically and conceptually. That is, computers were tools, like crowbars and screwdrivers, except that they primarily extended the mind rather than the muscles. Even Vannevar Bush's astonishingly prophetic "As We May Think" (1949) treated computers as a kind of superswitch. In this frame of understanding, computers were prosthetic in the specific sense of the Greek term *prosthenos*—extension. Computers assisted or augmented human intelligence and capabilities in much the same way that a machine or even another human being would; that is, as separate, discrete agencies or tools that occupied physical or conceptual spaces separate from those of the human.

It seems significant that the epistemic evolution that appeared to be gradually but inexorably making its way across Western cultures also manifested itself in a number of unexpected and quite unpredictable ways in cultural milieus far removed from the context of the Enlightenment and after. A pertinent though perhaps startling (and perhaps offensive) example is the aesthetics and philosophy of bullfighting. Prior to the schismatic work of the torero Juan Belmonte in the 1940s and '50s, the physical area in which bullfighting took place was divided into spaces of signification called "territories of the bull" and "territories of the torero." When designing his choreography for

the bullring, Belmonte raised the heretical argument that since the human possessed the only agency in the arena, territory of the bull was a polite but fictional concept; all territories were territories of the torero. The choreographic movements Belmonte developed as a result of this argument transformed the character of bullfighting. The abstraction I call attention to here is the breakdown of boundaries between two systems of agency and how that transformation affects the play of power within a field of social action. In dance, Martha Graham articulated a similar revision of shared spaces of action, but somewhat closer to the center of what might be called traditional Western culture. Graham's relocating the center of agency to a hypothesized center of the body redefined the quality of contact that was possible between two agents. Susan Foster's theoretical and practical work on dance discusses these points in considerable detail.

All this changed in the 1960s, but the change was largely invisible both physically and conceptually. Deleuze and Guattari and Manuel De Landa and the eerie concept of the machinic phylum would not arrive on the scene for some 30 years. In 1962, the young hackers at Project MAC, deep in the bowels of MIT, made hardly a ripple in corporate arenas with their invention of a peculiarly engrossing computational diversion that they called *SpaceWar*.[7] This first computer game was still firmly identified with the military, even down to its name and playing style, but in that moment something quite new and (dare I say it) completely different had happened to the idea of computation. Still, it would not be until the 1970s that two kids in a garage in Mountain View, California, rather than a corporate giant like Sperry Rand or IBM or a government entity like the Bureau of Vital Statistics, would knock the props out from under the idea of computation-as-tool for all time.

Let me return to the discussion of work versus play once again, from the standpoint of computation and instrumentality. Viewing computers as calculatory devices that assist or mediate human work seems to be part of a Kuhnian paradigm that consists of two main elements. The first is a primary *human work ethic;* the second is a

particularized view of *computers as tools*. The emergence of the work ethic has been the subject of innumerable essays, but the view of computers as tools has been so totally pervasive among those with the power to determine meaning in such forums as school policy and corporate ethics that only recently has the idea begun to be seriously challenged. The paradigm of computers as tools burst into existence, more or less, out of the allied victory in World War II (although the Nazis were working on their own computers). A paradigm of computers as something other than number crunchers does not have a similar launching platform, but the signs of such an imminent upheaval are perspicuous. Let me provide an example.

One of the most perceptive scholars currently studying the emergent computer societies is the anthropologist Barbara Joans. She describes the community of cyberspace workers as composed of two groups that she calls Creative Outlaw Visionaries and Law and Order Practitioners. One group has the visions; the other group knows how to build stuff and get it sold. One group fools around with technology and designs fantastic stuff; the other group gets things done and keeps the wheels turning. They talk to each other, if they talk to each other, across a vast conceptual gulf. These groups are invisible to each other, I think, because one is operating out of the older paradigm of computers as tools and the other out of the newer paradigm of computers as something else. Instead of carrying on an established work ethic, the beliefs and practices of the cultures I observe incorporate a *play* ethic—not to displace the corporate agendas that produce their paychecks, but to complexify them. This play ethic is manifest in many of the communities and situations I study. It is visible in the northern California Forth community, a group of radical programmers who have adopted for their own an unusual and controversial programming language; in the CommuniTree community, an early text-based virtual discussion group that adopted such mottos as "If you meet the electronic avatar on the road, laserblast Hir"; and in the Atari Research Lab, where a group of hackers created an artificial person who became real enough to become pro tem lab director. The

people who play at these technosocial games do not do so out of any specific transformative agenda, but they have seized upon advantages afforded by differences of skill, education, and income to make space for play in the very belly of the monster that is the communication industry.

This production and insertion of a play ethic like a mutation into the corporate genome is a specifically situated activity, one that is only possible for workers of a certain type and at a certain job level. In specific, it is only possible to the communities who are perhaps best described as hackers—mostly young (although the demographic changes as the first- and second-generation hackers age), mostly educated (although the field is rife with exceptions, perhaps indicating the incapability of U.S. public schools to deal with talented individuals), mostly white (and exceptions are quite rare in the United States), and mostly male (although a truly egregious exception is part of this study). They create and use a broad variety of technological prosthetics to manifest a different view of the purpose of communication technology, and their continual and casual association with the cutting edge of that technology has molded them and their machines—separately and jointly—in novel and promising ways. In particular, because they are thoroughly accustomed to engaging in nontrivial social interactions through the use of their computers—social interactions in which they change and are changed, in which commitments are made, kept, and broken, in which they may engage in intellectual discussions, arguments, and even sex—they view computers not only as tools but also as *arenas for social experience*.

The result is a multiple view of the state of the art in communication technology. When addressing the question of what's new about networking, it's possible to give at least two answers. Let's stick with two for now.

Answer 1: Nothing The tools of networking are essentially the same as they have been since the telephone, which was the first electronic network prosthesis. Computers are engines of calculation, and their

output is used for quantitative analysis. Inside the little box is information. I recently had a discussion with a colleague in which he maintained that there was nothing new about virtual reality. "When you sit and read a book," he said, "you create characters and action in your head. That's the same thing as VR, without all the electronics." Missing the point, of course, but understandably.

Answer 2: Everything Computers are arenas for social experience and dramatic interaction, a type of media more like public theater, and their output is used for qualitative interaction, dialogue, and conversation. Inside the little box are *other people.*

In order for this second answer to be true, we have to rethink some assumptions about presence. Presence is currently a word that means many different things to many different people. One meaning is the sense that we are direct witnesses to something or that we ourselves are being directly apprehended. This is what we might call the straightforward meaning, the one used by many sober virtual reality researchers. Another meaning is related to agency, to the proximity of intentionality. The changes that the concept of presence is currently undergoing are embedded in much larger shifts in cultural beliefs and practices. These include repeated transgressions of the traditional concept of the body's physical envelope and of the locus of human agency. This phenomenon shows itself in such variegated forms as the appearance and growth of the modern primitive movement, and the astonishing fascination of a portion of the population with prosthetic implants. Simultaneously new companies spring up to develop and manufacture wearable and eventually implantable computers. The film *Tetsuo, the Ironman* appears, with its disturbingly florid intermingling of biology and technology. William Gibson's cyberspace and Neal Stephenson's Metaverse are both science fiction inflections of inhabitable virtual worlds. A slow process of belief and acceptance, perhaps most clearly instantiated in the process of cultural acclimatization to the telephone, accompanied by the issues of

warranting and authentication raised by the interjection into human social life of a technological object that acts as a channel or representative for absent human agencies.

In studying issues of presence, warranting, and agency, the work of theorists of dramatic interaction vis-à-vis computation, of which Brenda Laurel is an outstanding example, is invaluable. Many of the interesting debates involved in my research would not have been possible without the arguments Laurel presents in *Computers as Theatre* and elsewhere.

My first organized piece of research in the field of virtual systems involved studying a group of phone sex workers in the early 1980s. In this study I was doing two things. On one hand, I was beginning to develop some of the ideas I set forth here and, on the other, also discovering in microcosm the fascinating interplays between communication technology, the human body, and the uses of pleasure. If I were to frame some of the questions that occurred to me during that time, they might be these: How are bodies represented through technology? How is desire constructed through representation? What is the relationship of the body to self-awareness? What is the role of play in an emergent paradigm of human-computer interaction? And overall: What is happening to sociality and desire at the close of the mechanical age?

If I'm going to give in to the temptation to periodize—which I do again and again, though frequently with tongue in cheek—then I might as well take the period that follows the mechanical age and call it the virtual age. By the virtual age I don't mean the hype of virtual reality technology, which is certainly interesting enough in its own ways. Rather, I refer to the gradual change that has come over the relationship between sense of self and the body, and the relationship between individual and group, during a particular span of time. I characterize this relationship as virtual because the accustomed grounding of social interaction in the physical facticity of human bodies is changing. Partly this change seems good, and partly it seems bad. There are palpable advantages to the virtual mode in relation

to the ways that the structure of cities and expectations of travel have changed with the advent of the telephone, the rise of large corporations, the invention and marketing of inexpensive tract housing, the development of the shopping mall, the commercial development and exploitation of electronic mass media, the development of the personal computer, the greening of large-scale information networks (which can be coopted for social interaction), and the increasing miniaturization of electronic components (eventually perhaps to be extended to mechanical devices, that is, Drexler and others). There are equally palpable disadvantages to each of these deep changes in our lives. I don't want this perhaps too-familiar list to be read as either extolling or condemnation. They are the manifestations, as well as causative agents, of the social changes, ruptures, and reorganizations that they accompany. In the course of this essay I sometimes organize the manifestation of these developments as a progressus, an ensemble of events that had a beginning and that leads in a particular direction. In doing so, I nod in the direction of Deleuze and Guattari, Paul Virilio, and Manuel De Landa.[8] But I am large; I contain multitudes. At other times the story is not at all meant to be teleological, because I don't foresee the telos toward which it tends. I may make some suggestions in that regard, but they are suggestions only and do not arise from any prophetic vision. I try to leave the prophetic side of things to my academic betters in the same line of work.

In the process of articulating the gradual unfolding of the cultural and technological foundations for virtual systems, I call on the work of scholars in a number of disciplines. One factor that bears importantly on the emergence of virtual systems is a change in the character of public space and the development and articulation of particular kinds of private space. I discuss this change in the context of portions of the social world of Elizabethan England with the help of the useful and important work of Francis Barker. In her study *The Tremulous Private Body*, Barker discusses from the point of view of textuality the creation of new social spaces; of particular relevance to our concerns here is a new and progressively ramified division of social space

from a predominantly public space to a congeries of spaces increasingly privatized.[9] Barker uses the physicality of this new privatized space as a link to the metaphoricality of a symbolic and psychological private space that is both elicited by and is mutually supportive of its physical concomitant. In this regard the development of separate interior spaces within small dwellings—changes in philosophies of architecture and in methods of carpentry—is crucial.

The relationship of these changes to the changing concepts of interior and exterior space that enable and support the character of virtual systems is complex. In regard to the emergence of the concept of the interiorized cultural and epistemic individual, which we are by now used to calling the sovereign subject and to seeing as perhaps the most egregious product of the Enlightenment, this too bears a complex relationship to the changes in social and architectural space within which it is embedded. In his study *Segmented Worlds and Self*, Yi-Fu Tuan calls attention to these changes in the context of studies of architecture and subjectivity. Over time, Tuan shows, we can trace the emergence of an increasing social and epistemic privatization that leads to the idea of the individual, for better or worse, as we understand it today. The development of a palpable awareness of self can be followed through the changes by means of which it is produced, beginning in the Middle Ages when information first begins to accumulate—the increasing number of family and self-portraits; the increasing popularity of mirrors; the development of autobiographical elements in literature; the evolution of seating from benches to chairs; the concept of the child as a stage in development; the ramification of multiple rooms in small dwellings; the elaboration of a theater of interiority in drama and the arts; and most recently, psychoanalysis.

The development of a sense of individuality seems to be accompanied by a corresponding withdrawal of portions of a person's attention and energy from the public arena and their nourishment and concentration within the new arena of social action called the self. In the discourses with which we are perhaps most familiar, the self appears to be a constant, unchanging, the stable product of a moment

in Western history. This seems a rather episcopal view of something that is not only better described as a process but that is also palpably in continual flux. Yet our institutions continue to be based on a fixed notion of what a self is—a local notion, a culturally delimited notion that inhabits the larger cultural infections of the mass media. It seems clear enough that the self continues to change, in fact has changed, beyond the snapshots we have of it that were taken within the last hundred years or so. The trends toward interiority and perhaps more importantly toward textuality that Barker reported still continue with increasing speed.

Further, they are abetted by concomitant developments in communication technology. Just as textual technologies—cheap paper, the typewriter, printing—accompanied new discourse networks and social formations, so electronic communication technologies—radio, television, computer networks—accompany the discourse networks and social formations now coming into being. These technologies, discourse networks, and social formations continue the trend toward increasing awareness of a sense of self; toward increasing physical isolation of individuals in Western and Western-influenced societies; and toward displacement of shared physical space, both public and private, by textuality and prosthetic communication—in brief, the constellation of events that define the close of the mechanical age and the unfolding or revealing of what, for lack of a better term, we might call the virtual age.

About Method

In regard to the term *virtual age,* I want it clear that when I talk about *ages, closes,* and *dawns,* it is not without being aware of what these words mean. I am grappling with the forms of historicization, and seeking—if frequently not finding—different ways to tell these stories. Pasted to one corner of my monitor screen I have a card that says,

NO CAUSES
NO EFFECTS
MUTUAL EMERGENCE

which is also an extreme position. Death and furniture, as Malcolm Ashmore said: If somebody whacks me in the head, I could rightly attribute my headache to their intervention. Larger phenomena are, of course, tricky. I don't think I can show with any assurance what "caused" the Atari Lab, but I can tell a few of the stories that surround its coming into being, each one of which is situated in a web of stories of its own. If I could walk the walk as well as talk the talk, there would be no "ages" or "dawns" in this essay, and eventually, given time, I hope to produce a different account in which the events I discuss here are more deeply situated in their context . . . and vice versa.

My chosen method of representation for this attempt—a kind of adventure narrative interspersed with forays into theory—developed out of earlier work in which I mentioned that my hypothesized ideal method would be a cross between Sharon Traweek's *Beamtimes and Lifetimes* and Leo Tolstoy's *War and Peace.*[10] This piece/*peace* is a sally in that direction. It is thoroughly experimental and subject to recall for factory modification at any time. I feel that it is only through the process of trying out various forms of representation, some experimental and some not, that I can properly grapple with the formidable challenge of finding viable pathways into academic discourse in the time of cultural studies. ("In the time of . . ." There, I've done it again.)

Rather than presenting a succession of chapters explicating a common theme, I have tried to organize the work as a set of provocations whose central ideas remain more or less unstated—hovering, as I would like to imagine them, in the background. In this effort, my idealized stance as a novelist is the motivating concept. That is my *preferred, ideal* method; however, in the interests of avoiding some possibly unfortunate debates I have cheated and provided a theoretical section as well, and more explanation than I would have liked. I

am still trying to move toward a methodology that Donna Haraway recently called cat's cradle. In other work I have mentioned that I prefer to thread these discourses and hold them in productive tension rather than allowing them to collapse into a univocal account, and cat's cradle describes this move perfectly. Haraway has added to my experimental statement the missing piece of community, of passing the accounts from hand to hand, perhaps turning them in different ways and threading them in new configurations, being ever mindful that we tell our stories within webs of power that distort them; and of course the important thing about a cat's cradle is that you can never let it collapse.