Chapter Two

# VIRTUAL BODIES AND FLICKERING SIGNIFIERS

*We might regard patterning or predictability as the very essence and* raison d'être *of communication . . . communication* is *the creation of redundancy or patterning.*

Gregory Bateson, *Steps to an Ecology of Mind*

The development of information theory in the wake of World War II left as its legacy a conundrum: even though information provides the basis for much of contemporary U.S. society, it has been constructed never to be present in itself. In information theoretic terms, as we saw in chapter 1, information is conceptually distinct from the markers that embody it, for example newsprint or electromagnetic waves. It is a pattern rather than a presence, defined by the probability distribution of the coding elements composing the message. If information is pattern, then noninformation should be the absence of pattern, that is, randomness. This commonsense expectation ran into unexpected complications when certain developments within information theory implied that information could be equated with randomness as well as with pattern.[1] Identifying information with *both* pattern and randomness proved to be a powerful paradox, leading to the realization that in some instances, an infusion of noise into a system can cause it to reorganize at a higher level of complexity.[2] Within such a system, pattern and randomness are bound together in a complex dialectic that makes them not so much opposites as complements or supplements to one another. Each helps to define the other; each contributes to the flow of information through the system.

Were this dialectical relation only an aspect of the formal theory, its impact might well be limited to the problems of maximizing channel utility and minimizing noise that concern electrical engineers. Through the development of information technologies, however, the interplay between pattern and randomness became a feature of everyday life. As Friedrich Kittler has demonstrated in *Discourse Networks 1800/1900,* media come into existence when technologies of inscription intervene between the hand gripping the pen or the mouth framing the sounds and the production

of the texts. In a literal sense, technologies of inscription are media when they are perceived as mediating, inserting themselves into the chain of textual production. Kittler identifies the innovative characteristics of the typewriter, originally designed for the blind, not with speed but rather with "spatially designated and discrete signs," along with a corresponding shift from the word as flowing *image* to the word "as a geometrical figure created by the spatial arrangements of the letter keys" (here Kittler quotes Richard Herbertz).[3] The emphasis on spatially fixed and geometrically arranged letters is significant, for it points to the physicality of the processes involved. Typewriter keys are directly proportionate to the script they produce. One keystroke yields one letter, and striking the key harder produces a darker letter. The system lends itself to a signification model that links signifier to signified in direct correspondence, for there is a one-to-one relation between the key and the letter it produces. Moreover, the signifier itself is spatially discrete, durably inscribed, and flat.

How does this experience change with electronic media? The relation between striking a key and producing text with a computer is very different from the relation achieved with a typewriter. Display brightness is unrelated to keystroke pressure, and striking a single key can effect massive changes in the entire text. The computer restores and heightens the sense of word as image—an image drawn in a medium as fluid and changeable as water.[4] Interacting with electronic images rather than with a materially resistant text, I absorb through my fingers as well as my mind a model of signification in which no simple one-to-one correspondence exists between signifier and signified. I know kinesthetically as well as conceptually that the text can be manipulated in ways that would be impossible if it existed as a material object rather than a visual display. As I work with the text-as-flickering-image, I instantiate within my body the habitual patterns of movement that make pattern and randomness more real, more relevant, and more powerful than presence and absence.

The technologies of virtual reality, with their potential for full-body mediation, further illustrate the kind of phenomena that foreground pattern and randomness and make presence and absence seem irrelevant. Already an industry worth hundreds of millions of dollars, virtual reality puts the user's sensory system into a direct feedback loop with a computer.[5] In one version, the user wears a stereovision helmet and a body glove with sensors at joint positions. The user's movements are reproduced by a simulacrum, called an avatar, on the computer screen. When the user turns his or her head, the computer display changes in a corresponding fashion. At the same time, audiophones create a three-dimensional sound field. Kines-

thetic sensations, such as G-loads for flight simulators, can be supplied through more extensive and elaborate body coverings. The result is a multisensory interaction that creates the illusion that the user is *inside* the computer. From my experience with the virtual reality simulations at the Human Interface Technology Laboratory and elsewhere, I can attest to the disorienting, exhilarating effect of the feeling that subjectivity is dispersed throughout the cybernetic circuit. In these systems, the user learns, kinesthetically and proprioceptively, that the relevant boundaries for interaction are defined less by the skin than by the feedback loops connecting body and simulation in a technobio-integrated circuit.

Questions about presence and absence do not yield much leverage in this situation, for the avatar both is and is not present, just as the user both is and is not inside the screen. Instead, the focus shifts to questions about pattern and randomness. What transformations govern the connections between user and avatar? What parameters control the construction of the screen world? What patterns can the user discover through interaction with the system? Where do these patterns fade into randomness? What stimuli cannot be encoded within the system and therefore exist only as extraneous noise? When and how does this noise coalesce into pattern? Working from a different theoretical framework, Allucquère Roseanne Stone has proposed that one need not enter virtual reality to encounter these questions, although VR brings them vividly into the foreground. Merely communicating by email or participating in a text-based MUD (multi-user dungeon) already problematizes thinking of the body as a self-evident physicality.[6] In the face of such technologies, Stone proposes that we think of subjectivity as a multiple warranted by the body rather than contained within it. Sherry Turkle, in her fascinating work on people who spend serious time in MUDs, convincingly shows that virtual technologies, in a riptide of reverse influence, affect how real life is seen. "Reality is not my best window," one of her respondents remarks.[7]

In societies enmeshed within information networks, as the U.S. and other first world societies are, these examples can be multiplied a thousandfold. Money is increasingly experienced as informational patterns stored in computer banks rather than as the presence of cash; surrogacy and in vitro fertilization court cases offer examples of informational genetic patterns competing with physical presence for the right to determine the "legitimate" parent; automated factories are controlled by programs that constitute the physical realities of work assignments and production schedules as flows of information through the system;[8] criminals are tied to crime scenes through DNA patterns rather than through eyewitness accounts

verifying their presence; access to computer networks rather than physical possession of data determines nine-tenths of computer law;[9] sexual relationships are pursued through the virtual spaces of computer networks rather than through meetings at which the participants are physically present.[10] The effect of these transformations is to create a highly heterogeneous and fissured space in which discursive formations based on pattern and randomness jostle and compete with formations based on presence and absence. Given the long tradition of dominance that presence and absence have enjoyed in the Western tradition, the surprise is not that formations based on them continue to exist but that these formations are being displaced so rapidly across a wide range of cultural sites.

These examples, taken from studies of information technologies, illustrate concerns that are also appropriate for literary texts. If the effects that the shift toward pattern/randomness has on literature are not widely recognized, perhaps it is because they are at once pervasive and elusive. A book produced by typesetting may look very similar to one generated by a computerized program, but the technological processes involved in this transformation are not neutral. Different technologies of text production suggest different models of signification; changes in signification are linked with shifts in consumption; shifting patterns of consumption initiate new experiences of embodiment; and embodied experience interacts with codes of representation to generate new kinds of textual worlds.[11] In fact, each category—production, signification, consumption, bodily experience, and representation—is in constant feedback and feedforward loops with the others.

As the emphasis shifts to pattern and randomness, characteristics of print texts that used to be transparent (because they were so pervasive) are becoming visible again through their differences from digital textuality. We lose the opportunity to understand the implications of these shifts if we mistake the dominance of pattern/randomness for the disappearance of the material world. In fact, it is precisely because material interfaces have changed that pattern and randomness can be perceived as dominant over presence and absence. The pattern/randomness dialectic does not erase the material world; information in fact derives its efficacy from the material infrastructures it appears to obscure. This illusion of erasure should be the *subject* of inquiry, not a presupposition that inquiry takes for granted.

To explore the importance of the medium's materiality, let us consider the book. Like the human body, the book is a form of information transmission and storage, and like the human body, the book incorporates its encodings in a durable material substrate. Once encoding in the material base

has taken place, it cannot easily be changed. Print and proteins in this sense have more in common with each other than with magnetic encodings, which can be erased and rewritten simply by changing the polarities. (In chapter 8 we shall have an opportunity to see how a book's self-representations change when the book is linked with magnetic encodings.) The printing metaphors pervasive in the discourse of genetics are constituted through and by this similarity of corporeal encoding in books and bodies.

The entanglement of signal and materiality in bodies and books confers on them a parallel doubleness. As we have seen, the human body is understood in molecular biology simultaneously as an expression of genetic information and as a physical structure. Similarly, the literary corpus is at once a physical object and a space of representation, a body and a message. Because they have bodies, books and humans have something to lose if they are regarded solely as informational patterns, namely the resistant materiality that has traditionally marked the durable inscription of books no less than it has marked our experiences of living as embodied creatures. From this affinity emerge complex feedback loops between contemporary literature, the technologies that produce it, and the embodied readers who produce and are produced by books and technologies. Changes in bodies as they are represented within literary texts have deep connections with changes in textual bodies as they are encoded within information media, and both types of changes stand in complex relation to changes in the construction of human bodies as they interface with information technologies. The term I use to designate this network of relations is *informatics.* Following Donna Haraway, I take *informatics* to mean the technologies of information as well as the biological, social, linguistic, and cultural changes that initiate, accompany, and complicate their development.[12]

I am now in a position to state the thesis of this chapter explicitly. The contemporary pressure toward dematerialization, understood as an epistemic shift toward pattern/randomness and away from presence/absence, affects human and textual bodies on two levels at once, as a change in the body (the material substrate) and as a change in the message (the codes of representation). The connectivity between these changes is, as they say in the computer industry, massively parallel and highly interdigitated. My narrative will therefore weave back and forth between the represented worlds of contemporary fictions, models of signification implicit in word processing, embodied experience as it is constructed by interactions with information technologies, and the technologies themselves.

The compounding of signal with materiality suggests that new technologies will instantiate new models of signification. Information technologies

do more than change modes of text production, storage, and dissemination. They fundamentally alter the relation of signified to signifier. Carrying the instabilities implicit in Lacanian floating signifiers one step further, information technologies create what I will call *flickering signifiers,* characterized by their tendency toward unexpected metamorphoses, attenuations, and dispersions. Flickering signifiers signal an important shift in the plate tectonics of language. Much of contemporary fiction is directly influenced by information technologies; cyberpunk, for example, takes informatics as its central theme. Even narratives without this focus can hardly avoid the rippling effects of informatics, however, for the changing modes of signification affect the *codes* as well as the subjects of representation.

## Signifying the Processes of Production

"Language is not a code," Lacan asserted, because he wanted to deny one-to-one correspondence between the signifier and the signified.[13] In word processing, however, language *is* a code. The relation between machine and compiler languages is specified by a coding arrangement, as is the relation of the compiler language to the programming commands that the user manipulates. Through these multiple transformations, some quantity is conserved, but it is not the mechanical energy implicit in a system of levers or the molecular energy of a thermodynamical system. Rather it is the informational structure that emerges from the interplay between pattern and randomness. When a text presents itself as a constantly refreshed image rather than as a durable inscription, transformations can occur that would be unthinkable if matter or energy, rather than informational patterns, formed the primary basis for the systemic exchanges. This textual fluidity, which users learn in their bodies as they interact with the system, implies that signifiers flicker rather than float.

To explain what I mean by flickering signifiers, I will briefly review Lacan's notion of floating signifiers. Lacan, operating within a view of language that was primarily print-based rather than electronically mediated, not surprisingly focused on presence and absence as the dialectic of interest.[14] When he formulated the concept of floating signifiers, he drew on Saussure's idea that signifiers are defined by networks of relational differences between themselves rather than by their relation to signifieds. He complicated this picture by maintaining that signifieds do not exist in themselves, except insofar as they are produced by signifiers. He imagined them as an ungraspable flow floating beneath a network of signifiers, a network that itself is constituted through continual slippages and displacements.

Thus, for him, a doubly reinforced absence is at the core of signification—the absence of signifieds as things-in-themselves as well as the absence of stable correspondences between signifiers. The catastrophe in psycholinguistic development corresponding to this absence in signification is castration, the moment when the (male) subject symbolically confronts the realization that subjectivity, like language, is founded on absence.

How does this scenario change when floating signifiers give way to flickering signifiers? Foregrounding pattern and randomness, information technologies operate within a realm in which the signifier is opened to a rich internal play of difference. In informatics, the signifier can no longer be understood as a single marker, for example an ink mark on a page. Rather it exists as a flexible chain of markers bound together by the arbitrary relations specified by the relevant codes. As I write these words on my computer, I see the lights on the video screen, but for the computer, the relevant signifiers are electronic polarities on disks. Intervening between what I see and what the computer reads are the machine code that correlates alphanumeric symbols with binary digits, the compiler language that correlates these symbols with higher-level instructions determining how the symbols are to be manipulated, the processing program that mediates between these instructions and the commands I give the computer, and so forth. A signifier on one level becomes a signified on the next-higher level. Precisely because the relation between signifier and signified at each of these levels is arbitrary, it can be changed with a single global command. If I am producing ink marks by manipulating movable type, changing the font requires changing each line of type. By contrast, if I am producing flickering signifiers on a video screen, changing the font is as easy as giving the system a single command. The longer the chain of codes, the more radical the transformations that can be effected. Acting as linguistic transducers, the coding chains impart astonishing power to even very small changes. Such amplification is possible because the constant reproduced through multiple coding layers is a pattern rather than a presence.

Where does randomness enter this picture? Within information theory, information is identified with choices that reduce uncertainty, for example when I choose which book, out of eight on a reading list, my seminar will read for the first week of class. To get this information to the students, I need some way to transmit it. Information theory treats the communication situation as a system in which a sender encodes a message and sends it as a signal through a channel. At the other end is a receiver, who decodes the signal and reconstitutes the message. Suppose I write my students an email. The computer encodes the message in binary digits and sends a sig-

nal corresponding to these digits to the server, which then reconstitutes the message in a form the students can read. At many points along this route, noise can intervene. The message may be garbled by the computer system, so that it arrives looking like "*#e%^&s**." Or I may have gotten distracted thinking about DeLillo halfway through the message, so that although I meant to assign Calvino for the first week, the message comes out, "If on a winter's night a white noise." These examples indicate that for real-life communication situations, pattern exists in dynamic tension with the random intrusions of noise.

Uncertainty enters in another sense as well. Although information is often defined as *reducing* uncertainty, it also *depends* on uncertainty. Suppose, for example, *Gravity's Rainbow* is the only text on the reading list. The probability that I would choose it is 1. If I send an email telling my students that the text for this week is *Gravity's Rainbow,* they will learn nothing they did not already know, and no information is communicated. The most surprising information I could send them would be a string of random letters. (Remember that information in the technical sense has nothing to do with meaning; the fact that such a message would be meaningless is thus paradoxically irrelevant to calculating the amount of information it contains.) These intuitions are confirmed by the mathematical theory of information.[15] For an individual message, the information increases as the probability that the event will occur diminishes; the more unlikely the event, the more information it conveys. Appropriately, this quantity is usually called the "surprisal." Let's say that nine of my reading assignments were on *Gravity's Rainbow,* and one was on *Vineland.* The students would gain more information from a message telling them that the assignment was *Vineland* than from a message stating that the assignment was *Gravity's Rainbow*—the more probable event and hence the more expected. Most of the time, however, electrical engineers are not interested in individual messages but in all the messages that can be produced from a given source. Thus they do not so much want to know the surprisal as the *average* amount of information coming from a source. This average reaches a maximum when it is equally likely that any symbol can appear in any position—which is to say, when there is no pattern or when the message is at the extreme of randomness. Thus Warren Weaver, in his interpretation of Shannon's theory of information, suggested that information should be understood as depending on both predictability and unpredictability, pattern and randomness.[16]

What happens in the case of mutation? Consider the example of the genetic code. Mutation normally occurs when some random event (for example, a burst of radiation or a coding error) disrupts an existing pattern and

something else is put in its place instead. Although mutation disrupts pattern, it also presupposes a morphological standard against which it can be measured and understood as a mutation. If there were only randomness, as with the random movements of gas molecules, it would make no sense to speak of mutation. We have seen that in electronic textuality, the possibilities for mutation within the text are enhanced and heightened by long coding chains. We can now understand mutation in more fundamental terms. Mutation is crucial because it names the bifurcation point at which the interplay between pattern and randomness causes the system to evolve in a new direction. It reveals the productive potential of randomness that is also recognized within information theory when uncertainty is seen as both antagonistic and intrinsic to information.

We are now in a position to understand mutation as a decisive event in the psycholinguistics of information. Mutation is the catastrophe in the pattern/randomness dialectic analogous to castration in the presence/absence dialectic. It marks a rupture of pattern so extreme that the expectation of continuous replication can no longer be sustained. But as with castration, this only appears to be a disruption located at a specific moment. The randomness to which mutation testifies is implicit in the very idea of pattern, for only against the background of nonpattern can pattern emerge. Randomness is the contrasting term that allows pattern to be understood as such. The crisis named by mutation is as wide-ranging and pervasive in its import within the pattern/randomness dialectic as castration is within the tradition of presence/absence, for it is the visible mark that testifies to the continuing interplay of the dialectic between pattern and randomness, replication and variation, expectation and surprise.

Shifting the emphasis from presence/absence to pattern/randomness suggests different choices for tutor texts. Rather than studying Freud's discussion of "fort/da" (a short passage whose replication in hundreds of commentaries would no doubt astonish its creator), theorists interested in pattern and randomness might point to David Cronenberg's film *The Fly*. At a certain point, the protagonist's penis does fall off (quaintly, he puts it in his medicine chest as a memento of times past), but the loss scarcely registers in the larger mutation he is undergoing. The operative transition is not from male to female-as-castrated-male but from human to something radically other than human. Flickering signification brings together language with a psychodynamics based on the symbolic moment when the human confronts the posthuman.

As I indicated in chapter 1, I understand human and posthuman to be historically specific constructions that emerge from different configurations of embodiment, technology, and culture. My reference point for the

human is the tradition of liberal humanism; the posthuman appears when computation rather than possessive individualism is taken as the ground of being, a move that allows the posthuman to be seamlessly articulated with intelligent machines. To see how technology interacts with these constructions, consider the picture that nineteenth-century U.S. and British anthropologists have drawn of "man" as a tool-user.[17] Using tools may shape the body (some anthropologists made this argument), but the tool nevertheless is envisioned as an object that is apart from the body, an object that can be picked up and put down at will. When the claim that man's unique nature was defined by tool use could not be sustained (because other animals were shown also to use tools), the focus shifted during the early twentieth century to man the tool-maker. Typical is Kenneth P. Oakley's 1949 *Man the Tool-Maker,* a magisterial work with the authority of the British Museum behind it. Oakley, in charge of the Anthropological Section of the museum's Natural History Division, wrote in his introduction, "Employment of tools appears to be [man's] chief biological characteristic, for considered functionally they are detachable extensions of the forelimb."[18] The kind of tool he envisioned was mechanical rather than informational; it goes *with* the hand, not *on* the head. Significantly, he imagined the tool to be at once "detachable" and an "extension," separate from yet partaking of the hand. If the placement and the kind of tool mark Oakley's affinity with the epoch of the human, the construction of the tool as a prosthesis points forward to the posthuman.

By the 1960s, Marshall McLuhan was speculating about the transformation that media, understood as technological prostheses, were effecting on human beings.[19] He argued that humans react to stress in their environments by withdrawing the locus of selfhood inward, in a numbing withdrawal from the world he called (following Hans Selye and Adolphe Jonas) "autoamputation." This withdrawal in turn facilitates and requires compensating technological extensions that project the body-as-prosthesis back out into the world. Whereas Oakley remains grounded in the human and looks only distantly toward the posthuman, McLuhan clearly sees that electronic media are capable of bringing about a reconfiguration so extensive as to change the nature of "man."

As we saw in chapter 1, similar shifts in orientation informed the Macy Conference discussions taking place during the same period (1946–53). Participants wavered between a vision of man as a homeostatic self-regulating mechanism whose boundaries were clearly delineated from the environment[20] and a more threatening, reflexive vision of a man spliced into an informational circuit that could change him in unpredictable ways.

By the 1960s, the consensus within cybernetics had shifted dramatically toward reflexivity. By the 1980s, the inertial pull of homeostasis as a constitutive concept had largely given way to self-organization theories implying that radical changes were possible within certain kinds of complex systems.[21] In the contemporary period, the posthuman future of humanity is increasingly evoked, ranging from Hans Moravec's argument for a "postbiological" future in which intelligent machines become the dominant life form on the planet, to the more sedate and in part already realized prospect of a symbiotic union between human and intelligent machine, a union that Howard Rheingold calls "intelligence augmentation."[22] Although these visions differ in the degree and kind of interfaces they imagine, they concur that the posthuman implies not only a coupling with intelligent machines but a coupling so intense and multifaceted that it is no longer possible to distinguish meaningfully between the biological organism and the informational circuits in which the organism is enmeshed. Accompanying this change is a corresponding shift in how signification is understood and corporeally experienced. In contrast to Lacanian psycholinguistics, derived from the generative coupling of linguistics and sexuality, flickering signification is the progeny of the fascinating and troubling coupling of language and machine.

## Information Narratives and Bodies of Information

The shift from presence and absence to pattern and randomness is encoded into every aspect of contemporary literature, from the physical object that constitutes the text to such staples of literary interpretation as character, plot, author, and reader. The development is by no means even; some texts testify dramatically and explicitly to the shift, whereas others manifest this shift only indirectly. I will call those texts in which the displacement is most apparent *information narratives.* Information narratives show, in exaggerated form, changes that are more subtly present in other texts as well. Whether in information narratives or contemporary fiction generally, the dynamic of displacement is crucial. One could focus on pattern in any era, but the peculiarity of pattern in these texts is its interpenetration with randomness and its implicit challenge to physicality. *Pattern tends to overwhelm presence,* leading to a construction of immateriality that depends not on spirituality or even consciousness but only on information.

Consider William Gibson's *Neuromancer* (1984), the novel that—along with the companion volumes *Count Zero* (1986) and *Mona Lisa Overdrive*

(1988)—sparked the cyberpunk movement. The *Neuromancer* trilogy gave a local habitation and a name to the disparate spaces of computer simulations, networks, and hypertext windows that, before Gibson's intervention, had been discussed as separate phenomena. Gibson's novels acted like seed crystals thrown into a supersaturated solution; the time was ripe for the technology known as cyberspace to precipitate into public consciousness. In *Neuromancer* the narrator defines cyberspace as a "consensual illusion" accessed when a user "jacks into" a computer. Here the writer's imagination outstrips existing technologies, for Gibson imagines a direct neural link between the brain and the computer through electrodes. Another version of this link is a socket, implanted behind the ear, that accepts computer chips, allowing direct neural access to computer memory. Network users collaborate in creating the richly textured landscape of cyberspace, a "graphic representation of data abstracted from the banks of every computer in the human system. Unthinkable complexity. Lines of light ranged in the nonspace of the mind, clusters and constellations of data. Like city lights, receding."[23] Existing in the nonmaterial space of computer simulation, cyberspace defines a regime of representation within which pattern is the essential reality, presence an optical illusion.

Like the landscapes they negotiate, the subjectivities who operate within cyberspace also become patterns rather than physical entities. Case, the computer cowboy who is the protagonist of *Neuromancer,* still has a physical presence, although he regards his body as so much "meat" that exists primarily to sustain his consciousness until the next time he can enter cyberspace. Others have completed the transition that Case's values imply. Dixie Flatline, a cowboy who encountered something in cyberspace that flattened his EEG, ceased to exist as a physical body and lives now as a personality construct within the computer, defined by the magnetic patterns that store his identity.

The contrast between the body's limitations and cyberspace's power highlights the advantages of pattern over presence. As long as the pattern endures, one has attained a kind of immortality—an implication that Hans Moravec makes explicit in *Mind Children.* Such views are authorized by cultural conditions that make physicality seem a better state to be from than to inhabit. In a world despoiled by overdevelopment, overpopulation, and time-release environmental poisons, it is comforting to think that physical forms can recover their pristine purity by being reconstituted as informational patterns in a multidimensional computer space. A cyberspace body, like a cyberspace landscape, is immune to blight and corruption. It is no accident that the vaguely apocalyptic landscapes of films such as *Ter-*

*minator, Blade Runner,* and *Hardware* occur in narratives focusing on cybernetic life-forms. The sense that the world is rapidly becoming uninhabitable by human beings is part of the impetus for the displacement of presence by pattern.

These connections lie close to the surface in *Neuromancer.* "Get just wasted enough, find yourself in some desperate but strangely arbitrary kind of trouble, and it was possible to see Ninsei as a field of data, the way the matrix had once reminded him of proteins linking to distinguish cell specialities. Then you could throw yourself into a highspeed drift and skid, totally engaged but set apart from it all, and all around you the dance of biz, information interacting, data made flesh in the mazes of the black market."[24] The metaphoric slippages between urban sprawl, computer matrix, and biological protein culminate in the final elliptical phrase, "data made flesh." Information is the putative origin, physicality the derivative manifestation. Body parts sold in black-market clinics, body neurochemistry manipulated by synthetic drugs, body of the world overlaid by urban sprawl—all testify to the precariousness of physical existence. If flesh is data incarnate, why not go back to the source and leave the perils of physicality behind?

The reasoning presupposes that subjectivity and computer programs have a common arena in which to interact. Historically, that arena was first defined in cybernetics by the creation of a conceptual framework that constituted humans, animals, and machines as information-processing devices receiving and transmitting signals to effect goal-directed behavior.[25] Gibson matches this technical achievement with two literary innovations that allow subjectivity, with its connotations of consciousness and self-awareness, to be articulated together with abstract data. The first is a subtle modification in point of view, abbreviated in the text as "pov." More than an acronym, pov is a substantive noun that constitutes the character's subjectivity by serving as a positional marker substituting for his absent body.

In its usual Jamesian sense, point of view presumes the fiction of a person who observes the action from a particular angle and tells what he sees. In the preface to *The Portrait of a Lady,* James imagines a "house of fiction" with a "million windows" formed by "the need of the individual vision and by the pressure of the individual will." At each window "stands a figure with a pair of eyes, or at least with a field glass, which forms, again and again, for observation, a unique instrument, insuring to the person making use of it an impression distinct from every other."[26] For James, the observer is an embodied creature, and the specificity of his or her location determines what the observer can see when looking out on a scene that itself is physically

specific. When an omniscient viewpoint is used, the limitations of the narrator's corporeality begin to fall away, but the suggestion of embodiment lingers in the idea of focus, the "scene" created by the eye's movement.

Even for James, vision is not unmediated technologically. Significantly, he hovers between eye and field glass as the receptor constituting vision. Cyberspace represents a quantum leap forward into the technological construction of vision. Instead of an embodied consciousness looking through the window at a scene, consciousness moves *through* the screen to become the pov, leaving behind the body as an unoccupied shell. In cyberspace, point of view does not emanate from the character; rather, the pov literally *is* the character. If a pov is annihilated, the character disappears with it, ceasing to exist as a consciousness in and out of cyberspace. The realistic fiction of a narrator who observes but does not create is thus unmasked in cyberspace. The effect is not primarily metafictional, however, but is in a literal sense metaphysical, above and beyond physicality. The crucial difference between the Jamesian point of view and the cyberspace pov is that the former implies physical presence, whereas the latter does not.

Gibson's technique recalls Alain Robbe-Grillet's novels, which were among the first information narratives to exploit the formal consequences of combining subjectivity with data. In Robbe-Grillet's work, however, the effect of interfacing narrative voice with objective description was paradoxically to heighten the narrator's subjectivity, for certain objects, like the jalousied windows or the centipede in *Jealousy,* are inventoried with obsessive interest, indicating a mindset that is anything but objective. In Gibson, the space in which subjectivity moves lacks this personalized stamp. Cyberspace is the domain of virtual collectivity, constituted as the resultant of millions of vectors representing the diverse and often conflicting interests of human and artificial intelligences linked together through computer networks.[27]

To make this space work as a level playing field on which humans and computers can meet on equal terms, Gibson introduces his second innovation. Cyberspace is created by transforming a data matrix into a landscape in which narratives can happen. In mathematics, "matrix" is a technical term denoting data that have been arranged into an n-dimensional array. Expressed in this form, data seem as far removed from the fascinations of story as random-number tables are from the *National Inquirer.* Because the array is already conceptualized in spatial terms, however, it is a small step to imagining the matrix as a three-dimensional landscape. Narrative becomes possible when this spatiality is given a temporal dimension by the pov's movement through it. The pov is *located* in space, but it *exists* in time.

Through the track it weaves, the desires, repressions, and obsessions of subjectivity can be expressed. The genius of *Neuromancer* lies in its explicit recognition that the categories Kant considered fundamental to human experience—space and time—can be used as a conjunction to join awareness with data. Reduced to a point, the pov is abstracted into a purely temporal entity with no spatial extension; metaphorized into an interactive space, the datascape is narrativized by the pov's movement through it. Data are thus humanized, and subjectivity is computerized, allowing them to join in a symbiotic union whose result is narrative.

Such innovations carry the implications of informatics beyond the textual surface into the signifying processes that constitute theme and character. I suspect that Gibson's novels have been so influential not only because they present a vision of the posthuman future that is already upon us—in this they are no more prescient than many other science fiction novels—but also because they embody within their techniques the assumptions expressed explicitly in the themes of the novels. This kind of move is possible when the cultural conditions authorizing the assumptions are pervasive enough that the posthuman is experienced as an everyday, lived reality as well as an intellectual proposition.

The shift of emphasis from ownership to access is another manifestation of the underlying transition from presence/absence to pattern/randomness. In *The Condition of Postmodernity,* David Harvey characterizes the economic aspects of the shift to an informatted society as a transition from a Fordist regime to a regime of flexible accumulation.[28] As Harvey and many others have pointed out, in late capitalism, durable goods yield pride of place to information.[29] A significant difference between information and durable goods is replicability. Information is not a conserved quantity. If I give you information, you have it and I do too. With information, the constraining factor separating the haves from the have-nots is not so much possession as access. Presence precedes and makes possible the idea of possession, for one can possess something only if it already exists. By contrast, access implies pattern recognition, whether the access is to a piece of land (recognized as such through the boundary pattern defining that land as different from adjoining parcels), confidential information (constituted as confidential through the comparison of its informational patterns with less-secure documents), or a bank vault (associated with knowing the correct pattern of tumbler combinations). In general, access differs from possession because the former tracks patterns rather than presences. When someone breaks into a computer system, it is not a physical presence that is detected but the informational traces that the entry has created.[30]

When the emphasis falls on access rather than ownership, the private/public distinction that was so important in the formation of the novel is radically reconfigured. Whereas possession implies the existence of private life based on physical exclusion or inclusion, access implies the existence of credentialing practices that use patterns rather than presences to distinguish between those who do and those who do not have the right to enter. Moreover, entering is itself constituted as access to data rather than as a change in physical location. In Don DeLillo's *White Noise* (1985), for example, the Gladneys' home, traditionally the private space of family life, is penetrated by noise and radiation of all wavelengths—microwave, radio, television.[31] The penetration signals that private spaces, and the private thoughts they engender and figure, are less a concern than the interplay between codes and the articulation of individual subjectivity with data. Jack Gladney's death is prefigured for him as a pattern of pulsing stars around a computerized data display, a striking image of how his corporeality has been penetrated by informational patterns that construct as well as predict his mortality.

Although the Gladney family still operates as a social unit (albeit with the geographical dispersion endemic to postmodern life), their conversations are punctuated by random bits of information emanating from the radio and TV. The punctuation points toward a mutation in subjectivity that comes from joining the focused attention of traditional novelistic consciousness with the digitized randomness of miscellaneous bits. The mutation reaches incarnation in Willie Mink, whose brain has become so addled by a designer drug that his consciousness is finally indistinguishable from the white noise that surrounds him. Through a route different from that used by Gibson, DeLillo arrives at a similar destination: a vision of subjectivity constituted through the interplay of pattern and randomness rather than presence and absence.

The bodies of texts are also implicated in these changes. The displacement of presence by pattern thins the tissue of textuality, making it a semipermeable membrane that allows awareness of the text as an informational pattern to infuse into the space of representation. When the fiction of presence gives way to the recognition of pattern, passages are opened between the text-as-object and those representations within the text that are characteristic of the condition of virtuality. Consider the play between text as physical object and as information flow in Italo Calvino's *If on a winter's night a traveler* (1979). The text's awareness of its own physicality is painfully apparent in the anxiety it manifests toward keeping the literary corpus intact. Within the space of representation, texts are subjected to

birth defects, maimed and torn apart, lost and stolen. The text operates as if it knows it has a physical body and fears that its body is in jeopardy from a host of threats, from defective printing technologies and editors experiencing middle-age brain fade to nefarious political plots. Most of all, perhaps, the text fears losing its body to information.

When "you," the reader, are foiled in your pursuit of its story by the frailty of the text's physical corpus, the narrator imagines you hurling the book through a closed window, reducing the text's body to "photons, undulatory vibrations, polarized spectra." Not content with this pulverization, you throw it through the wall so that the text breaks up into "electrons, neutrons, neutrinos, elementary particles more and more minute." Still disgusted, in an act of ultimate dispersion, you send it through a computer line, causing the textual body to be "reduced to electronic impulses, into the flow of information." With the text "shaken by redundancies and noises," you "let it be degraded into a swirling entropy." Yet the very story you seek can be envisioned as a pattern, for that night you sleep and "fight with dreams as with formless and meaningless life, seeking a pattern, a route that must surely be there, as when you begin to read a book and you don't yet know in which direction it will carry you."[32]

Once the text's physical body is interfaced with information technologies, however, the pattern that is story stands in jeopardy of being disrupted by the randomness implicit in information. The disruptive power of randomness becomes manifest when you find yourself entangled with Lotaria, a reader who believes books are best read by scanning them into computers and letting the machine analyze word-frequency patterns. Seduced by Lotaria against your better judgment, you get tangled up with her and with rolls of printout covering the floor. The printouts contain part of the story that you desperately want to finish, which Lotaria has entered into the computer. Distracted by her multiple entanglements, Lotaria presses the wrong key, and the rest of the story is "erased in an instant demagnetization of the circuits. The multicolored wires now grind out the dust of dissolved words: the the, of of of of, from from from from, that that that that, in columns according to their respective frequency. The book has been crumbled, dissolved, can no longer be recomposed, like a sand dune blown away by the wind."[33] Now you can never achieve satiation, never reach the point of satisfied completion that comes with finishing a book. Your anxiety about *reading interruptus* is intensified by what might be called *print interruptus*, a print book's fear that once it has been digitized, the computer will garble its body, breaking it apart and reassembling it into the nonstory of a data matrix rather than an entangled and entangling narrative.

This anxiety is transmitted to readers within the text, who keep pursuing parts of textual bodies only to lose them, as well as to readers outside the text, who must try to make sense of the radically discontinuous narrative. Only when the chapter titles are perceived to form a sentence is the literary corpus reconstituted as a unity. Significantly, the recuperation is syntactical rather than physical. It does not arise from or imply an intact physical body. Rather, it emerges from the patterns—metaphorical, grammatical, narrative, thematic, and textual—that the parts together make. As the climactic scene in the library suggests, the reconstituted corpus is a body of information, emerging from the discourse community among whom information circulates. The textual body may be dismembered or ground into digital word dust, the narrative implies, but as long as there are readers who care passionately about stories and want to pursue them, narrative itself can be recuperated. Through such textual strategies, *If on a winter's night* testifies vividly to the impact of information technologies on bodies of books.

Human bodies are similarly affected. The correspondence between human and textual bodies can be seen as early as William Burroughs's *Naked Lunch,* written in 1959, in the decade that saw the institutionalization of cybernetics and the construction of the first large-scale electronic digital computer.[34] The narrative metamorphizes nearly as often as bodies within it, suggesting by its cut-up method a textual corpus that is as artificial, heterogeneous, and cybernetic as they are.[35] Since the fissures that mark the text always fall *within* the units that compose the textual body—within chapters, paragraphs, sentences, and even words—it becomes increasingly clear that they do not function to delineate the textual corpus. Rather, the body of the text is produced precisely by these fissures, which are not so much ruptures as productive dialectics that bring the narrative as a syntactic and chronological sequence into being.

Bodies within the text follow the same logic. Under the pressure of sex and addiction, bodies explode or mutate, protoplasm is sucked out of cocks or nostrils, plots are hatched to take over the planet or nearest life-form. Burroughs anticipates Fredric Jameson's claim that an information society is the purest form of capitalism. When bodies are constituted as information, they can be not only sold but fundamentally reconstituted in response to market pressures. Junk instantiates the dynamics of informatics and makes clear the relation of junk-as-information to late capitalism. Junk is the "ideal product" because the "junk merchant does not sell his product to the consumer, he sells the consumer to his product. He does not improve and simplify his merchandise. He degrades and simplifies the client."[36] The junkie's body is a harbinger of the postmodern mutant, for it demon-

strates how presence yields to assembly and disassembly patterns created by the flow of junk-as-information through points of amplification and resistance.

The characteristics of information narratives include, then, an emphasis on mutation and transformation as a central thematic for bodies within the text as well as for the bodies of texts. Subjectivity, already joined with information technologies through cybernetic circuits, is further integrated into the circuit by novelistic techniques that combine it with data. Access vies with possession as a structuring element, and data are narrativized to accommodate their integration with subjectivity. In general, materiality and immateriality are joined in a complex tension that is a source of exultation and strong anxiety.

Information technologies leave their mark on books in the realization that sooner or later, the body of print will be interfaced with other media. All but a handful of books printed in the United States and Europe in 1998 will be digitized during some phase of their existence. Print texts such as *If on a winter's night a traveler* bear the imprint of this digitalization in their narratives, as if the text remembers the moment when it was nothing but electronic polarities on a disk. At moments of crisis, the repressed memory erupts onto the textual surface in the form of an acute fear that randomness will so interpenetrate its patterns that story will be lost and the textual corpus will be reduced to a body of meaningless data. These eruptions are vivid testimony that even print texts cannot escape being affected by information technologies.

To understand more about the effects of informatics on contemporary fictions, let us turn now to consider the relation between text and subjectivity, specifically how information narratives constitute both the voice speaking the narrative and the reader.

## Functionalities of Narrative

The very word *narrator* implies a voice speaking, and a speaking voice implies a sense of presence. Jacques Derrida, announcing the advent of grammatology, focused on the gap that separates speaking from writing. Such a change transforms the narrator from speaker to scribe or, more precisely, someone who is absent from the scene but toward whom the inscriptions point.[37] Informatics pushes this transformation further. As writing yields to flickering signifiers underwritten by binary digits, the narrator becomes not so such a scribe as a cyborg authorized to access the relevant codes. The progression suggests that the dialectic between absence and presence

came clearly into focus with the advent of deconstruction because it was already being displaced as a cultural presupposition by randomness and pattern. Presence and absence were forced into visibility, so to speak, because they were already losing their constitutive power to form the ground for discourse, becoming instead the subject of discourse. In this sense, deconstruction is the child of an information age, formulating its theories from strata pushed upward by the emerging substrata beneath.

To see how the function of the narrator changes as we progress deeper into virtuality, consider the seduction scene from "I Was an Infinitely Hot and Dense White Dot," one of the stories in Mark Leyner's *My Cousin, My Gastroenterologist.* The narrator, "high on Sinutab" and driving "isotropically," so that any destination is equally probable, finds himself at a "squalid little dive."

> I don't know . . . but there she is. I can't tell if she's a human or a fifth-generation gynemorphic android and I don't care. I crack open an ampoule of mating pheromone and let it waft across the bar, as I sip my drink, a methyl isocyanate on the rocks—methyl isocyanate is the substance which killed more than 2,000 people when it leaked in Bhopal, India, but thanks to my weight training, aerobic workouts, and a low-fat fiber-rich diet, the stuff has no effect on me. Sure enough she strolls over and occupies the stool next to mine. . . . My lips are now one angstrom unit from her lips . . . I begin to kiss her but she turns her head away. . . . I can't kiss you, we're monozygotic replicants—we share 100% of our genetic material. My head spins. You are the beautiful day, I exclaim, your breath is a zephyr of eucalyptus that does a pas de bourre across the Sea of Galilee. Thanks, she says, but we can't go back to my house and make love because monozygotic incest is forbidden by the elders. What if I said I could change all that. . . . What if I said that I had a miniature shotgun that blasts gene fragments into the cells of living organisms, altering their genetic matrices so that a monozygotic replicant would no longer be a monozygotic replicant and she could then make love to a muscleman without transgressing the incest taboo, I say, opening my shirt and exposing the device which I had stuck in the waistband of my black jeans. How'd you get that thing? she gasps, ogling its thick fiber-reinforced plastic barrel and the Uzi-Biotech logo embossed on the magazine which held two cartridges of gelated recombinant DNA. I got it for Christmas. . . . Do you have any last words before I scramble your chromosomes, I say, taking aim. Yes, she says, you first.[38]

Much of the wit in this passage comes from the juxtaposition of folk wisdom and seduction clichés with high-tech language and ideas. The narrator sips a chemical that killed thousands when it leaked into the environment, but

he is immune to damage because he eats a low-fat diet. The narrator leans close to the woman-android to kiss her, but he has not yet made contact when he is an angstrom away, considerably less than the diameter of a hydrogen atom. The characters cannot make love because they are barred by incest taboos, being replicants from the same monozygote, which would make them identical twins, but this does not seem to prevent them from being opposite sexes. They are governed by kinship rules enforced by tribal elders, but they have access to genetic technologies that intervene in and disrupt evolutionary modes of descent. They think their problem can be solved by an Uzi-Biotech weapon that will scramble their chromosomes, but the narrator, at least, seems to expect their identities to survive intact.

Even within the confines of a short story no more than five pages long, this encounter is not preceded or followed by events that relate directly to it. Rather, the narrative leaps from scene to scene, all of them linked by only the most tenuous and arbitrary threads. The incongruities make the narrative a kind of textual android created through patterns of assembly and disassembly. There is no natural body to this text, any more than there are natural bodies within the text. As the title intimates, identity merges with typography ("I was a . . . dot") and is further conflated with such high-tech reconstructions as computer simulations of gravitational collapse ("I was an infinitely hot and dense white dot"). Signifiers collapse like stellar bodies into an explosive materiality that approaches the critical point of nova, ready to blast outward into dissipating waves of flickering signification.

The explosive tensions between cultural codes that familiarize the action and neologistic splices that dislocate traditional expectations do more than structure the narrative. They also constitute the narrator, who exists less as a speaking voice endowed with a plausible psychology than as a series of fissures and dislocations that push toward a new kind of subjectivity. To understand the nature of this subjectivity, let us imagine a trajectory that arcs from storyteller to professional to some destination beyond. Walter Benjamin's shared community of values and presence—the community that he had in mind when he evoked the traditional storyteller whose words are woven into the rhythms of work—echoes faintly in allusions to the Song of Songs and tribal elders.[39] Overlaid on this is the professionalization that Jean-François Lyotard wrote about in *The Postmodern Condition*, in which the authority to tell the story is constituted by possessing the appropriate credentials that qualify one as a member of a physically dispersed, electronically bound professional community.[40] This phase of the trajectory is signified in a number of ways. The narrator is driving "isotropically," indicating that physical location is no longer necessary or relevant to the

production of the story. His authority derives not from his physical participation in a community but from his possession of a high-tech language that includes pheromones, methyl isocyanate, and gelated recombinant DNA, not to mention the Uzi-Biotech phallus. This authority too is displaced even as it is created, for the incongruities reveal that the narrative and therefore the narrator are radically unstable, about to mutate into a scarcely conceivable form, signified in the story by the high-tech, identity-transforming orgasmic blast that never quite comes.

What is this form? Its physical manifestations vary, but the ability to manipulate complex codes is a constant. The looming transformation, already enacted through the language of the passage, is into a subjectivity who derives his authority from possessing the correct codes. Popular literature and culture contain countless scenarios in which someone fools a computer into thinking that he or she is an "authorized" person because the person possesses or stumbles upon the codes that the computer recognizes as constituting authorization. Usually these scenarios imply that the person exists unchanged, taking on a spurious identity that allows him or her to move unrecognized within an informational system. There is, however, another way to read these narratives. Constituting identity through authorization codes, the person using the codes is changed into another kind of subjectivity, precisely one who exists and is recognized because of knowing the codes. The surface deception is underlaid by a deeper truth. We become the codes we punch. The narrator is not a storyteller and not a professional authority, although these functions linger in the narrative as anachronistic allusions and wrenched referentiality. Rather, the narrator is a keyboarder, a hacker, a manipulator of codes.[41] Assuming that the text was digitized at some phase in its existence, in a literal sense he (it?) *is* these codes.

The construction of the narrator as a manipulator of codes obviously has important implications for the construction of the reader. The reader is similarly constituted through a layered archaeology that moves from listener to reader to decoder. Drawing on a context that included information technologies, Roland Barthes in S/Z brilliantly demonstrated the possibility of reading a text as a production of diverse codes.[42] Information narratives make that possibility an inevitability, for they often cannot be understood, even on a literal level, without referring to codes and the informatics that produce and are produced by these codes. Flickering signification extends the productive force of codes beyond the text to include the signifying processes by which the technologies produce texts, as well as the interfaces that enmesh humans into integrated circuits. As the circuits connecting technology, text, and human expand and intensify, the point

where quantitative increments shade into qualitative transformation draws closer.

Because codes can be sent over fiber optics essentially instantaneously, there is no longer a shared, stable context that helps to anchor meaning and guide interpretation. Like reading, decoding takes place in a location arbitrarily far removed in space and time from the source text. In contrast to the fixity of print, decoding implies that there is no original text—no first editions, no fair copies, no holographic manuscripts. There are only the flickering signifiers, whose transient patterns evoke and embody what G. W. S. Trow has called the context of no context, the suspicion that all contexts, like all texts, are electronically mediated constructions.[43] What binds the decoder to the system is not the stability of being a member of an interpretive community or the intense pleasure of physically possessing the book, a pleasure that all bibliophiles know. Rather, it is the decoder's construction as a cyborg, the impression that his or her physicality is also data made flesh, another flickering signifier in a chain of signification that extends through many levels, from the DNA that in-formats the decoder's body to the binary code that is the computer's first language.

Against this dream or nightmare of the body as information, what alternatives exist? We can see beyond this dream, I have argued, by attending to the material interfaces and technologies that make disembodiment such a powerful illusion. By adopting a double vision that looks *simultaneously* at the power of simulation and at the materialities that produce it, we can better understand the implications of articulating posthuman constructions together with embodied actualities. One way to think about these materialities is through functionality. "Functionality" is a term used by virtual reality technologists to describe the communication modes that are active in a computer-human interface. If the user wears a data glove, for example, hand motions constitute one functionality. If the computer can respond to voice-activated commands, voice is another functionality. If the computer can sense body position, spatial location is yet another functionality. Functionalities work in both directions; that is, they describe the computer's capabilities and also indicate how the user's sensory-motor apparatus is being trained to accommodate the computer's responses. Working with a VR simulation, the user learns to move his or her hand in stylized gestures that the computer can accommodate. In the process, the neural configuration of the user's brain experiences changes, some of which can be long-lasting. The computer molds the human even as the human builds the computer.

When narrative functionalities change, a new kind of reader is produced by the text. The material effects of flickering signification ripple outward

because readers are trained to read through different functionalities, which can affect how they interpret any text, including texts written before computers were invented. The impatience that some readers now feel with print texts, for example, no doubt has a physiological as well as a psychological basis. They miss pushing the keys and seeing the cursor blinking at them. Conversely, other readers (or perhaps the same readers in different moods) go back to print with a renewed appreciation for its durability, its sturdiness, and its ease of use. I began to appreciate certain qualities of print only after I had experience with computers. When I open a book, it almost always works, and it can maintain backward compatibility for hundreds of years. I also appreciate that on some occasions—when I am revising a piece of writing, for example—there isn't a cursor blinking at me, as if demanding a response. With print I can take as long as I want, and the pages never disappear or shut themselves down. As these examples illustrate, changes in narrative functionalities are deeper than the structural or thematic characteristics of a specific genre, for they shift the embodied responses and expectations that different kinds of textualities evoke. Arguing from a different historical context, Friedrich Kittler made a similar point when he wrote about medial ecology.[44] When new media are introduced, the changes transform the environment as a whole. This transformation affects the niches that older media have carved for themselves, so they change also, even if they are not directly involved with the new media. Books will not remain unaffected by the emergence of new media.

If my assessment—that the emphasis on information technologies foregrounds pattern/randomness and pushes presence/absence into the background—is correct, the implications extend beyond narrative into many cultural arenas. As I indicated in chapter 1, one of the most serious of these implications is a *systematic devaluation of materiality and embodiment.* I find this trend ironic, for changes in material conditions and embodied experience are precisely what give the shift its deep roots in everyday experience. Implicit in nearly everything I have written here is the assumption that presence and pattern are opposites existing in antagonistic relation. The more emphasis that falls on one, the less the other is noticed and valued. Entirely different readings emerge when one entertains the possibility that pattern and presence are mutually enhancing and supportive. Paul Virilio has observed that one cannot ask whether information technologies should continue to be developed.[45] Given market forces already at work, it is virtually (if I may use the word) certain that we will increasingly live, work, and play in environments that construct us as embodied virtualities.[46] I believe that our best hope to intervene constructively in this de-

velopment is to put an interpretive spin on it—one that opens up the possibilities of seeing pattern and presence as complementary rather than antagonistic. Information, like humanity, cannot exist apart from the embodiment that brings it into being as a material entity in the world; and embodiment is always instantiated, local, and specific. Embodiment can be destroyed, but it cannot be replicated. Once the specific form constituting it is gone, no amount of massaging data will bring it back. This observation is as true of the planet as it is of an individual life-form. As we rush to explore the new vistas that cyberspace has made available for colonization, let us remember the fragility of a material world that cannot be replaced.