

## 48. [Introduction]

# You Say You Want a Revolution?

## Hypertext and the Laws of Media

The revolution hasn't been adequately televised—or Webcast, for that matter. There are disturbing visions put forth in new media's revolutionary banter: Ted Nelson's dream of a McDonald's-inspired world hypertext chain, Clifford Stoll's acceptance of government information surveillance as if it were silicon snake oil for the soul—and these are just some of the ideas coming from guys who are on our side. If there's any hope we can hold out for what will eventually become reality—or tomorrow's particular level of mediated hyperreality—it can only be seen, in Stuart Moulthrop's view, by subjecting the essential qualities of a particular new medium to scrutiny.

Applying McLuhan's plan for a four-part media interrogation, Moulthrop noted several qualities of one particular new media format, hypertext, which indeed were borne out over the following decade. (McLuhan's four questions, of course, can similarly be applied to other specific digital media.) By placing the new medium against others, and considering how it might function in the extreme, certain assumptions previously taken for granted were upset. Moulthrop pointed out, for instance, that hypertext does not replace the book—it's more likely a replacement for TV. Putting the book on the card against hypertext is still a popular amusement, though. Yet while our appliances await “convergence,” middle school and high school students often spend hours a day occupied in reading and writing online, using time that two decades earlier would likely have been offered up to the living room idol. Such an outcome was suggested by Moulthrop in the following pages, back before the graphical Web browser had even been deployed, when the very few users of the text-only Web were all people who could solve second-order differential equations.

Not every aspect of today's prevailing hypertext system has been as rosy. As predicted, Sony has indeed purchased Xanadu Operating Company, at least in a manner of speaking. Although individuals are free to scribble in publicly-posted Web diaries and the like, the populace (elite or not) accesses the Web and reads information almost entirely via large, corporate Web sites such as Yahoo!, CNN.com, and MSNBC. Like the Parisian student revolutionaries of 1968 that Jean Baudrillard mentions (◊19), we have taken over the station only to resume normal methods of broadcasting. Is it too late to make a real revolutionary effort, or do we simply listen to a word from our sponsor and accept this return to our usual programming?

The open and dynamic docuverse that hypertext was supposed to bring can't be sensed in the pullulation of possibilities today, even on a Linux computer that is forking like mad. Instead of hypertext on Ted Nelson's model (◊11, ◊21, ◊30), or any other hypertext model current at the time of this essay's writing, we now have a simple hypertext system, the Web, borne upon the Internet. When Moulthrop asked the last of McLuhan's four questions—“What does it produce or become when taken to its limit?”—of hypertext, he noted that a medium taken to its limit is said to reverse; with a participatory medium, for example, becoming homogenous and hegemonic. The next question, if we follow the link, involves asking what the Web, today's specific hypertext system, becomes when taken to the limit. Part of the answer might be seen in un-hypertext-like services such as instant messaging, MP3 swapping, *Quake* tournaments, and massively multiplayer roleplaying games—all of which share the Internet with the Web but take the idea of textual exchange to its data- or action-packed limit.

—NM & NWF

Moulthrop is also the author of well-known hypertext fictions (e.g., *Victory Garden*, *Reagan Library*) and of a widely-discussed, unpublished experiment in extending Jorge Luis Borges's “Garden of Forking Paths” (◊01) into hypertext ☹.

◊01  
29◊11  
133◊19  
277◊21  
301◊30  
441

On the subject of Sony's purchase of XOC, or AOL's of Time Warner, see the essay by Ben Bagdikian (◊32).

◊32  
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## Further Reading

McLuhan, Marshall, and Eric McLuhan. *Laws of Media: The New Science*, University of Toronto Press, 1988.

Moulthrop, Stuart. *Reagan Library*. Self-published on Web, January 1999. Republished on CD-ROM as part of *Gravitational Intrigue*, *The Little Magazine's* electronic anthology. <<http://iat.ubalt.edu/moulthrop/hypertexts/rl/>>

Moulthrop, Stuart and Nancy Kaplan. "Where No Mind Has Gone Before: Ontological Design for Virtual Spaces." *Proceedings of the ACM Hypertext Conference*. Edinburgh: Association for Computing Machinery, 1994, 212–223.

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# You Say You Want a Revolution?

## Hypertext and the Laws of Media

### Stuart Moulthrop

When this essay first appeared, all of two years ago, very few people outside the information sciences had heard of hypertext, a technology for creating electronic documents in which the user's access to information is not constrained, as in books, by linear or hierarchical arrangements of discourse. This obscurity had always seemed strange, since hypertext has been around for a long time. Its underlying concept—creating and enacting linkages between stored bits of information—originated in 1945 with Vannevar Bush, science advisor to President Roosevelt, who wanted to build a machine called Memex to help researchers organize disparate sources of knowledge (see Bush; Landow, 14–15). Bush's design, based on microfilm, rotating spools, and photoelectric cells, proved impractical for the mechanical technologies of the late 1940s. But when electronic computers arrived on the academic scene a few years later, Bush's projections were quickly realized. In a sense, all distributed computing systems are hypertextual, since they deliver information dynamically in response to users' demands (Bolter, 9–10). Indeed, artificial intelligence researchers created the first hypertextual narrative, the computer game called *Adventure*, in order to experiment

with interactive computing in the early 1960s (Levy, 140–41).

It was about this time that Theodor Holm Nelson, a sometime academic and a dedicated promoter of technology, coined the term "hypertext." Nelson offered plans for a worldwide network of information, centrally coordinated through a linking and retrieval system he called Xanadu. In a trio of self-published manifestoes (*Computer Lib*, *Dream Machines*, *Literary Machines*), Nelson outlined the structure and function of Xanadu, right down to the franchise arrangements for "Silverstands," the informational equivalent of fast-food outlets where users would go to access the system. (This was long before anyone dreamed of personal computers.) Nelson's ideas got serious consideration from computer scientists, notably Douglas Engelbart, one of the pioneers of user interface design. Engelbart and Nelson collaborated at Brown University in the early 1970s on a hypertext system called FRESS, and a number of academic and industrial experiments followed (see Conklin). To a large extent, however, the idea of hypertext—which both Bush and Nelson had envisioned as a dynamic, read/write system in which users could both manipulate and alter the textual corpus—was neglected in favor of more rigidly organized models like distributed databases and electronic libraries, systems that operate mainly in a read-only retrieval mode. To Nelson, hypertext and other forms of interactive computing represented a powerful force for social change. "Tomorrow's hypertext systems have immense political ramifications," he wrote in *Literary Machines* (3/19). Yet no one seemed particularly interested in exploring those ramifications, at least not until the mid-1980s, when the personal computer business went ballistic.

1987: the *annus mirabilis* of hypertext. Many strange and wonderful things happened in and around that year. Nelson's underground classics, *Computer Lib* and *Dream Machines*, were published by Microsoft Press; Nelson himself joined Autodesk, an industry leader in software development, which announced plans to support Xanadu as a commercial

enterprise; the Association for Computing Machinery sponsored the first of its international conferences on hypertext; and most important, Apple Computer began giving away HyperCard, an object-oriented hypertext system, to anyone who owned a Macintosh personal computer. HyperCard is the Model T of hypertext: relatively cheap (originally free), simple to operate (being largely an extension of the Macintosh's graphical user interface), quite crude compared to more state-of-the-art products, but still enormously powerful. In the late 1980s it seemed plausible that HyperCard and other personal computer applications would usher in a new paradigm for textual communication, the logical step beyond desktop publishing to all-electronic documents containing multiple pathways of expression.

It has now been six years since that great unveiling of hypertext, and no such "digital revolution" has arrived. At one point, sources in the personal computer industry foresaw a burgeoning market for "stackware" and other hypertextually organized products; nothing of the kind has materialized. Instead, the most commercially ambitious application of HyperCard in electronic publishing has been the Voyager Company's line of "Expanded Books," based exclusively on print titles and carefully designed to duplicate the look and function of traditional books (Stansberry, 54). True, the hypertext concept has finally received some attention from humanist academics. Jay David Bolter's *Writing Space* (1991) outlines a historical view of hypertext as the successor to print technology—and with Nelson's *Literary Machines* is one of the first studies of hypertext to be presented in hypertextual form. George Landow's *Hypertext* (1992) places developments in electronic writing within the context of poststructuralist criticism and postmodern culture (and is also due to appear shortly as a hypertext). The spectre of hypertextual fiction has even been raised by the novelist Robert Coover in the *New York Times Book Review* (see "The End of Books"). But paradoxically (or as fate would have it), this recognition comes when hypertext is no longer what one of my colleagues calls a "bleeding edge" technology. Indeed, much of the caché seems to have bled out of hypertext, which has been bumped from the limelight by hazier and more glamorous obsessions: cyberspace, virtual reality, and the Information Highway.

Such changes of fashion seem a regular hazard of the postmodern territory—taking *post modo* at its most literal, to mean "after the now" or *the next thing*. Staring down at our

desktop, laptop, or palmtop machines—which we know will be obsolete long before we have paid for them—those of us within what Fred Pfeil calls the "baby-boom professional-managerial class" will always desire *the next thing*. (*Another Tale*, 98). Not for nothing have we updated *Star Trek*, our true space Odyssey, into a "Next Generation." We are the generation (and generators) of nextness. Or so Steve Jobs once assumed, somewhat to his present chagrin. Possibly hypertext, like Jobs's sophisticated NeXT computer, represents an idea that hasn't quite come to the mainstream of postmodern culture, a precocious curio destined to be dug up years from now and called "strangely ahead of its time." Unfortunately, as Ted Nelson can testify, hypertext has been through this process once before. A certain circularity seems to be in play.

Perhaps the problem lies not in our technologies or the things we want to do with them, but in our misunderstanding of technological history. Some of us keep saying, as I note in this essay, that we need a revolution, a paradigm shift, a total uprooting of the old information order: an apocalyptic rupture or "blesséd break," as Robert Lowell once put it. And yet that is not what we have received, at least so far. Maybe we suffer this disappointment because we do not understand what we are asking for. What could "revolution" mean in a postmodern context? We might look for answers in Baudrillard, Lyotard, Donna Haraway, or Hakim Bey; but Hollywood, as usual, has the best line. J.F. Lawton's screenplay for *Under Siege*, last summer's Steven Seagall vehicle, includes an enlightening exchange between a CIA spymaster (played by Nick Mancuso) and a rebellious terrorist formerly in his employ (Tommie Lee Jones). The spook chides the terrorist, reminding him that the sixties are over, "the Movement is dead." Jones's character replies: "Yes! Of course! Hence the name: 'Movement.' It moves a certain distance, then it stops. Revolution gets its name by always coming back around—in *your face*."

Perhaps hypertext is just another movement. On one level, it is hard to discriminate among hypertext, virtual reality, and next year's interactive cable systems. All three seem to move in the same general direction, attempting to increase and enrich our consumption of information. But as Andrew Ross has noted, undertakings of this type may have large consequences (*Strange Weather* 88). Potentially at least, they threaten to upset the stability of language-as-property—a possibility with great political ramifications indeed. It might

therefore be dangerous to dismiss hypertext as merely a local movement, an initiative as dead as the social agendas of the sixties from which it partly sprang. Considering the vicissitudes of hypertext's history, we might indeed call it a "revolution"—if revolution is something that comes full circle, escaping repression to smack us smartly in the face. Such being the case, however, is this revolution something our culture genuinely wants? When it comes to information technologies, what *do* we want? Why are we moving in circles? What is this figure we are weaving, twice or thrice, and what enchanter or enchantment do we wish to contain?

....

The original Xanadu (Samuel Taylor Coleridge's) came billed as "A Vision in a Dream," designated doubly unreal and thus easily aligned with our era of "operational simulation" where, strawberry fields, nothing is "real" in the first place, since no place is really "first" (Baudrillard *Simulations*, 10). But all great dreams invite revisions, and these days we find ourselves perpetually on the re-make. So here is a new Xanadu™, the universal hypertext system proposed by Theodor Holm Nelson—a vision which, unlike its legendary precursor, cannot be integrated into the dream park of the hyperreal. Hyperreality, we are told, is a site of collapse or implosion where referential or "grounded" utterance becomes indistinguishable from the self-referential and the imaginary. We construct our representational systems not in serial relation to indisputably "real" phenomena, but rather in recursive and multiple parallel, "mapping on to different coordinate systems" (Pynchon, 159). Maps derive not from territories but from previous map-making enterprises: all the world's a simulation.

This reality implosion brings serious ideological consequences, for some would say it invalidates the informing "master narratives" of modernity, leaving us with a proliferation of incompatible discourses and methods (Lyotard, 26). Such unchecked variation, it has been objected, deprives social critique of a clear agenda (Eagleton, 63). Hyperreality privileges no discourse as absolute or definitive; critique becomes just another form of paralogy, a countermove in the language game that is techno-social construction of reality. The game is all-encompassing, and therein lies a problem. As Linda Hutcheon observes, "the ideology of postmodernism is paradoxical, for it depends upon and draws its power from that which it contests. It is not truly radical; nor is it truly oppositional" (120).

This problem of complicity grows especially acute where media and technologies are concerned. Hyperreality is as much a matter of writing practice as it is of textual theory: as Michael Heim points out, "[i]n magnetic code there are no originals" (162). Electronic information may be rapidly duplicated, transmitted, and assembled into new knowledge structures. From word processing to interactive multimedia, postmodern communication systems accentuate what Ihab Hassan calls "immanence" or "the intertextuality of all life. A patina of thought, of signifiers, of 'connections,' now lies on everything the mind touches in its gnostic (noō)sphere..." (172). Faced with this infinitely convoluted system of discourse, we risk falling into technological abjection, a sense of being hopelessly abandoned to simulation, lost in "the technico-luminous cinematic space of total spatio-dynamic theatre" (Baudrillard *Simulations*, 139). If all the world's a simulation, then we are but simulacral subjects cycling through our various iterations, incapable of any "radical" or "oppositional" action that would transform the techno-social matrix. Even supposedly resistant attitudes like "cyberpunk," as Andrew Ross has observed, tend to tail off into cynical interludes where the rules of the game go unquestioned (Ross, 160).

Of course, this pessimistic or defeatist outlook is hardly universal. We are far more likely to hear technology described as an instrumentality of change or a tool for liberation. Bolter (1991), Drexler (1987), McCorduck (1985), and Zuboff (1988) all contend that postmodern modes of communication (electronic writing, computer networks, text-linking systems) can destabilize social hierarchies and promote broader definitions of authority in the informational workplace. Heim points out that under the influence of these technologies "psychic life will be redefined" (164). But if Hutcheon is correct in her observation that postmodernism is non-oppositional, then how will such a reconstruction of order and authority take place? How and by whom is psychic life—and more important, political life—going to be redefined?

These questions must ultimately be addressed not in theory but in practice; which is where the significance of Nelson's new Xanadu lies. With Xanadu, Nelson invalidates technological abjection, advancing an unabashedly millenarian vision of technological renaissance in which the system shall set us free. In its extensive ambitions, Xanadu transcends the hyperreal. It is not an opium vision but something stranger still, a business plan for the development

of what Barthes called “the *social* space of writing” (81), a practical attempt to reconfigure literate culture. Xanadu is the most ambitious project ever proposed for hypertext or “non-sequential writing” (*Dream Machines* 29; *Literary Machines* 5/2). Hypertext systems exploit the interactive potential of computers to reconstruct text not as a fixed series of symbols, but as a variable-access database in which any discursive unit may possess multiple vectors of association (see Joyce; Landow; Slatin). A hypertext is a complex network of textual elements. It consists of units or “lexias,” which may be analogous to pages, paragraphs, sections, or volumes. Lexias are connected by “links,” which act like dynamic footnotes that automatically retrieve the material to which they refer. Because it is no longer book-bounded, hypertextual discourse may be modified at will as reader/writers forge new links within and among documents. Potentially this collectivity of linked text, which Nelson calls the “docuverse,” can expand without limit.

As Nelson foresees it, Xanadu would embody this textual universe. The system would provide a central repository and distribution network for all writing: it would be the publishing house, communications medium, and great hypertextual Library of Babel. Yet for all its radical ambitions, Nelson’s design preserves familiar proprieties. Local Xanadu outlets would be Silverstands™, retail access and consulting centers modeled after fast-food franchises and thus integrated with the present economy of information exchange. Xanadu would protect intellectual property through copyright. Users would pay per byte accessed and would receive royalties when others obtained proprietary material they had published in the system. The problems and complexities of this scheme are vast, and at the moment, the fulfilled Xanadu remains a “2020 Vision,” a probe into the relatively near future. But it is a future with compelling and important implications for the postmodern present.

The future, as Disney and Spielberg have taught us, is a place we must come “back” to. The American tomorrow will be a heyday of nostalgia, an intensive pursuit of “lost” or “forgotten” values. Xanadu is no exception: Ted Nelson sees the history of writing in the 21st century as an epic of recovery. His “grand hope” lies in “a return to literacy, a cure for television stupor, a new Renaissance of ideas and generalist understanding, a grand posterity that does not lose the details which are the final substance of everything”

(“How Hypertext (Un)does the Canon” 4). To a skeptical observer, this vision of Xanadu might suggest another domain of the postmodern theme park. Gentle readers, welcome to Literacyland!

But on the other hand, this vision might add up to more than just a sideshow attraction. Nelson foresees a renovation of culture, a unification of discourse, a reader-and-writer’s paradise where all writing opens itself to/in the commerce of ideas. This is the world in which all “work” becomes “text,” not substance but reference, not containment but connection (see Barthes; Landow; Zuboff). The magnitude of the change implied here is enormous. But what about the politics of that change? What community of interpretation—and beyond that, what social order—does this intertextual world presume? With the conviction of a true Enlightenment man, Nelson envisions “a new populism that can make the deeper understandings of the few at last available to the many” (“How Hypertext (Un)does the Canon” 6).

What is *populism*?—another of Nelson’s infamous neologisms (e.g., “hypermedia,” “cybercrud,” “teledildonics”), in this case a portmanteau combining “populism” with “elite.” The word suggests the society-of-text envisioned by theorists like Shoshana Zuboff and Jay David Bolter, a writing space in which traces of authority persist only as local and contingent effects, the social equivalent of the deconstructed author-function. A “populite” culture might mark the first step toward realization of Jean-François Lyotard’s “game of perfect information” where all have equal access to the world of data, and where “[g]iven equal competence (no longer in the acquisition of knowledge, but in its production), what extra performativity depends on in the final analysis is ‘imagination,’ which allows one either to make a new move or change the rules of the game” (52). This is the utopia of information-in-process, the ultimate wetware dream of the derisive: discourse converted with 100 percent efficiency into capital, the mechanism of that magical process being nomology or rule-making—admittedly a rather specialized form of “imagination.”

At least two troubles lurk in this paradise. First, the prospect that social/textual order will devolve not unto the many but only to a very few; and more important, that those few will fail to recognize the terms of their splendid isolation. Consider the case of the reluctant computer dick Clifford Stoll, whose memoir, *The Cuckoo’s Egg*, nicely illustrates these problems. Stoll excoriates “cyberpunks,” electronic vandals

who abuse the openness of scientific computing environments. Their unsportsmanlike conduct spoils the information game, necessitating cumbersome restrictions on the free flow of data. But Stoll's definition of informational "freedom" appears murky at best. He repeatedly refers to the mainframe whose system he monitors as "his" computer, likening cybernetic intrusions to burglaries. Digital information, as Stoll sees it, stands in strict analogy to material and private property.

Private in what sense? Stoll professes to believe that scientists must have easy access to research results, but only within their own communities. He is quick to condemn incursions by "unauthorized" outsiders. There is some sense in this argument: Stoll repeatedly points out that the intruder in the Stanford mainframe might have interfered with a lifesaving medical imaging system. But along with this concern comes an ideological danger. Who decides what information "belongs" to whom? Stoll's "popular elite" is restricted to academic scientists, a version of "the people" as *nomenklatura*, those whose need to know is defined by their professional affiliation. More disturbingly, Stoll seems unaware of the way this brotherhood is situated within larger political hierarchies. Describing a meeting with Pentagon brass, he reflects: "How far I'd come. A year ago, I would have viewed these officers as war-mongering puppets of the Wall Street capitalists. This, after all, was what I'd learned in college. Now things didn't seem so black and white. They seemed like smart people handling a serious problem" (278).

Here is elite populism at its scariest. Though he protests (too much) his political correctness, Stoll's sense of specialist community shifts to accommodate the demands of the moment. He observes repeatedly over the course of the memoir that he is finally "coming of age" as a working scientist. When in Fort Meade, Stoll does as the natives do, recognizing agents of Air Force Intelligence, the National Security Agency, even the CIA and FBI as brothers-in-craft. After all, they are "smart" (technologically adept) and "serious" (professional). Their immediate goal seems legitimate and laudable. They are just "handling" a problem, tracking down the intruder who has violated the electronic privacy of Stoll's community (and, not coincidentally, their own). They are the good policemen, the ones Who Are Your Friends, not really "Them" after all but just a quaint, braid-shouldered version of "Us."

Stoll is not troubled that these boon companions live at the heart of the military-industrial complex. He disregards the fact that they seem aware of domestic communications intercepts—in phone conversations, Stoll's CIA contact refers to the FBI as "the F entity," evidently to thwart a monitoring program (144). Stoll does task his agency buddies for sowing disinformation and managing dirty wars, but this critique never gets much past the stage of rhetorical questions. In fact Stoll seems increasingly comfortable in the intelligence community. If the data spooks turn out to be less interested in freedom of scientific speech than in quashing a security leak, Stoll has no real objection. His own ideals and interests are conveniently served in the process.

What leads to such regrettable blindness, and how might it have been prevented? These may be especially pertinent questions as we consider entrusting our literate culture to an automated information system. The spooks are not so easily conjured away. It is no longer sufficient to object that scientists and humanists form distinct communities, and that Stoll's seduction could not happen in our own elect company. The old "Two Cultures" paradigm has shifted out from under us, largely through catholic adoption of technologies like data networks and hypertext. Networks are networks, and we can assume that most if not all of them will eventually engender closed elites. Fascism, as Deleuze and Guattari instruct, is a matter of all-too-human desire (26). What can shield humanist networks, or even the "generalist" networks Nelson foresees, from the strategy of divide and co-opt? What might insulate Xanadu from those ancestral voices prophesying war?

The answer, as forecasters like Pamela McCorduck, K. Eric Drexler, and Andrew Ross point out, may lie in the hypertext concept itself—the operating principle of an open and dynamic medium, a consensual canon with a minimum of hierarchical impedances and a fundamental instability in those hierarchies it maintains. Visionary and problematic as it may seem, Nelson's idea of "populism" has much to recommend it—not the least of which is its invitation to consider more carefully the likely social impact of advanced communication systems. In fact hypertext may well portend social change, a fundamental reshaping of text production and reception. The telos of the electronic society-of-text is anarchy in its true sense: local autonomy based on consensus, limited by a relentless disintegration of global authority. Since information is now virtually an equivalent of capital,

and since textuality is our most powerful way of shaping information, it follows that Xanadu might indeed change the world. But to repeat the crucial question, how will this change come about? What actual social processes can translate the pragmatics of Nelson's business plan into the radicalism of a hypertext manifesto?

The complete answers lie with future history. In one respect, Ted Nelson's insistence that Xanadu become an economically viable enterprise is exemplary. We will discover the full implications of this technology only as we build, manage, and work in hypertextual communities, starting within the existing constraints of information capitalism. But while we wait on history, we can try a little augury. In trying to theorize a nascent medium, one is reduced to *playing* medium, eking out predictions with the odd message from the Other Side. Which brings us to the last work of Marshall McLuhan, a particularly important ancestral voice from whom to hear. At his death, McLuhan left behind notes for an enigmatic final project: the fourfold "Laws of Media" which form the framework for a semiotics of technology. The Laws proceed from four basic questions that can be asked about any invention:

- What does it enhance or intensify?
- What does it render obsolete or displace?
- What does it retrieve that was previously obsolete?
- What does it produce or become when taken to its limit?

As McLuhan demonstrates, these questions are particularly instructive when applied to pivotal or transforming technologies like printing or broadcasting. They are intended to discover the ways in which information systems affect the social text, rearranging sense ratios and rewriting theories of cultural value. They reveal the nature of the basic statement, the "uttering or 'outring'" that underlies mechanical extensions of human faculties. If we put Xanadu and hypertext to this series of questions, we may discover more about both the potential and the limits of hypertext as an agency of change.

### 1 What Does Hypertext Enhance or Intensify?

According to McLuhan's standard analysis, communications media adjust the balance or "ratio" of the senses by privileging one channel of perception over others. Print

promotes sight over hearing, giving us an objectified, perspectival, symbolized world: "an eye for an ear" (*Understanding Media* 81). But this approach needs modification for our purposes. Hypertext differs from earlier media in that it is not a new thing at all but a return or *recursion* (of which more later) to an earlier form of symbolic discourse, namely print. The effect of hypertext thus falls not simply upon the sense channels but farther along the cognitive chain. As Vannevar Bush pointed out in the very first speculation on informational linking technologies, these mechanisms enhance the fundamental capacity of *pattern recognition* ("As We May Think," qtd. in *Literary Machines* 1/50).

Hypertext is all about connection, linkage, and affiliation. Formally speaking, its universe is the one Thomas Pynchon had in mind when he defined "paranoia" as "the realization that *everything is connected, everything in the Creation*—not yet blindingly one, but at least connected. . . ." (820). In hypertext systems, this ethos of connection is realized in technics: users do not passively rehearse or receive discourse, they explore and construct links (Joyce, 12). At the kernel of the hypertext concept lie ideas of affiliation, correspondence, and resonance. In this, as Nelson has argued from the start, hypertext is nothing more than an extension of what literature has always been (at least since "Tradition and the Individual Talent")—a temporally extended network of relations which successive generations of readers and writers perpetually make and unmake.

This redefinition of textuality gives rise to a number of questions. What does it mean to enhance our sensitivity to patterns in this shifting matrix, to become sensitized to what Pynchon calls "other orders behind the visible?" Does this mean that hypertext will turn us into "paranoids," anxious interpreters convinced that all structures are mysteriously organized against us? What does interpretive "resistance" mean in a hypertextual context? Can such a reading strategy be possible after poststructuralism, with the author-function reduced (like Pynchon himself) to quasi-anonymous disappearance, a voiceless occasion for deconstructive "writing" (McHoul and Wills, 9)?

Perverse though it may seem, hypertext does increase the agonistic element in reading. Early experience with hypertext narrative suggests that its readers may actually be more concerned with prior authority and design than are readers of conventional writing. The apparent "quickliming of the

author” does not dispel the aura of intention in hypertext (Douglas, 100). The constantly repeated ritual of interaction, with its reminder of discursive alternatives, reveals the text as a made thing, not monologic perhaps but hardly indeterminate. The text gestures toward openness—*what options can you imagine?*—but then swiftly forecloses: some options are available but not others, and someone clearly did the defining long before you began interacting. The author persists, undead presence in the literary machine, the inevitable Hand that turns the time. Hypertextual writing—at least when considered as read-only or “exploratory” text (see Joyce)—may thus emphasize antithetical modes of reading, leading us to regard the deconstructed system-maker much in the way that Leo Bersani describes the author of *Gravity’s Rainbow*: as “the enemy text” (108).

So perhaps we need a Psychiatrist General’s Warning: Interacting With This Hypertext Can Make You Paranoid—indeed it must, since the root sense of paranoia, a parallel or parallax gnosis, happens to be a handy way to conceive of the meta-sense of pattern recognition that hypertext serves to enhance. But would such a distortion of our cognitive ratios necessarily constitute pathology? In dealing with vast and nebulous information networks—to say nothing of those corporate-sponsored “virtual realities” that may lie in our future—a certain “creative paranoia” may be a definite asset. In fact the paragnosticism implicit in hypertext may be the best way to keep the information game clean. Surrounded by filaments and tendrils of a network, the sojourner in Xanadu or other hypertext systems will always be reminded of her situation in a fabric of power arrangements. Her ability to build and pursue links should encourage her to subject those arrangements to inquiry. Which brings us to the second of McLuhan’s key questions:

## 2 What Does Hypertext Displace or Render Obsolete?

Though it may be tempting to respond, *the book, stupid*, that answer is ineligible. The book is already “dead” (or superseded) if by “alive” you mean that the institution in question is essential to our continued commerce in ideas. True, the cultural indications are ambiguous. Irving Louis Horowitz argues that reports of the book’s demise are exaggerated; even in an age of television and computers, we produce more books each year than ever before (20). Indeed, our information ecology seems likely to retain a mix of print

and electronic media for at least the next century. Yet as Alvin Kernan recently pointed out, the outlook for books in the long run is anything but happy (135–43). As the economic and ecological implications of dwindling forests come home, the cost of paper will rise precipitously. At the same time, acidic decay of existing books will enormously increase maintenance costs to libraries. Given these factors, some shift to electronic storage seems inevitable (though Kernan, an analogue man to the last, argues for microfilm).

Yet this change in the medium of print does not worry cultural conservatives like Kernan, Neil Postman, or E.D. Hirsch nearly so much as the prospect that the decline of the book may terminate the cultural dominance of print. The chief technological culprit in Kernan’s “death of literature” is not the smart machine but the idiot box. “Such common culture as we still have,” Kernan laments, “comes largely from television” (147). But the idiot box—or to be precise, the boxed idiot—is precisely the intellectual problem that hypertext seems excellently suited to address. In answer to McLuhan’s second question—what does hypertext render obsolete?—the best answer is not *literacy* but rather *post-literacy*. As Nelson foresees, the development of hypertext systems implies a revival of typographic culture (albeit it in a dynamic, truly paperless environment). That forecast may seem recklessly naive or emptily prophetic, but it is quite likely valid. Hypertext means the end of the death of literature.

Here the voice of the skeptic must be heard: *a revival of literacy?*—*read my lips: not in a million years*. Even the most devoted champion of print is likely to resist the notion of a Gutenberg renaissance. In the West, genuine literacy—cultural, multicultural, or simply functional—can be found only among a well-defined managerial and professional class. At present that class is fairly large, but in the U.S. and U.K., world leaders in laissez-faire education, it is contracting noticeably. So it must seem foolish to imagine, as Ted Nelson does, a mass consumer market for typographic information, a growth industry based on the electronic equivalent of the local library.

Indeed, should Xanadu become a text-only system (which is not intended), its prospects would be poor in the long run. There are however other horizons for interactive textuality—not just hypertext but another Nelsonian coinage, “hypermedia.” Print is not the only means of communication deliverable in a polysequential format

articulated by software links. In trying to imagine the future of hypertext culture, we must also consider interactive multimedia “texts” that incorporate voice, music, animated graphics, and video along with alphabetic script (Lanham, 287). Hypertext is about connection—promiscuous, pervasive, and polymorphously perverse connection. It is a writing practice ideally suited to the irregular, the transgressive, and the carnivalesque (see Harpold). Culturally speaking, the *promiscuity* of hypertext (in the root sense of “a tendency to seek relations”) knows no bounds of form, format, or cultural level. There is no reason to assume that hypertext or hypermedia should not support popular as well as elite culture, or indeed that it might not promote a “populite” miscegenation of discourses.

But what can this mean—talking books in homeboy jive? Street rap mixed over Eliotic scholia? Nintendo with delusions of cinema? Or worse, could we be thinking of yet more industrial light and magic, the disneyverse of eyephones and datagloves where YOU (insert userName) are IN THE FANTASY? Perhaps, as one critic of the computer industry recently put it, interactive multimedia must inevitably decay to its lowest common denominator, “hyper-MTV” (Levy “Multimedia,” 52). According to this analysis, the linear and objectifying tendencies of any print content in a multimedial text would be overwhelmed by the subjective, irrational, and emotive influence of audio/video. This being the case, hypertext could hardly claim to represent “a cure for television stupor.”

But Nelson’s aspiration should not be so easily set aside as merely a vision in a dream. Hypertext does indeed have the power to recover print literacy—though not in quite the way that Nelson supposes; which brings us to the third of McLuhan’s queries:

### 3 What Does Hypertext Retrieve That Was Previously Obsolete?

Xanadu and similar projects could invite large numbers of people to become reacquainted with the cultural power of typographic literacy. To assert this, of course, is to break with McLuhan’s understanding of media history. It is hard to dispute the argument of *Understanding Media* and *The Gutenberg Galaxy* that the culture of the printing press has entered into dialectic contention with a different ethos based on the “cool” immediacy of broadcasting. But though that diagnosis remains tremendously important, McLuhan’s

cultural prognosis for the West holds less value. McLuhan saw clearly the transforming impact of “electric” technologies, but perhaps because he did not live much beyond the onset of the personal computer boom, he failed to recognize the next step—the *recursion* to a new stage of typographic literacy through the syncretic medium of hypertext.

It is crucial to distinguish recursion from return or simple repetition, because this difference answers the objection that print literacy will be lost or suppressed in multimedia texts. Recursion is self-reference with the possibility of progressive self-modification (Hofstadter, 127). Considered for its recursive possibilities, “writing” means something radically different in linked interactive compositions than it does in a codex book or even a conventional electronic document. Literacy in hypertext encompasses two domains: the ordinary grammatical, rhetorical, and tropological space that we now know as “literature,” and also a second province, stricter in its formalisms but much greater in its power to shape interactive discourse. This second domain has been called “writing space” (Bolter, 4); a case might be made (with apologies to those who insist that virtual reality is strictly a non-print phenomenon) that it also represents the true meaning of *cyberspace*.

Walter Benjamin observed with some regret that by the 1930’s, any literate European could become an author, at least to the extent of publishing a letter or article in the newspapers (232). With no regrets at all, Ted Nelson envisions a similar extension of amateur literary production in Xanadu, where all readers of the system can potentially become writers, or at least editors and commentators. The First Amendment guarantee of free speech, Nelson points out, is a *personal* liberty: anyone may publish, and in Xanadu everyone can. Nelson bases his prediction of revived literacy on the promise of a broadly popular publishing franchise.

This vision is limited in one crucial regard. Nelson treats print essentially as the *content* of his system, which is taking a rather narrow view. In describing Xanadu as a more or less transparent medium for the transmission of text, Nelson overlooks the fact that alphabetic or alphanumeric representation also defines the *form* of Xanadu, and indeed of any hypertext system. This neglect is consistent with the generally broad focus of Nelson’s vision, which has led him to dismiss details of user-interface design as “front-end functions” to be worked out by the user.

Design details, whether anterior or posterior to the system, cannot be passed over so easily. In fact the structure and specifications of the hypertext environment are themselves parts of the docuverse, arguably the most important parts. Beneath any hypertext document or system there exists a lower layer that we might call the *hypotext*. On this level, in the working implementations of its “protocols,” Xanadu is a creature of print. The command structures that govern linkage, display, editing, accounting, and all the other functions of the system exist as digital impulses that may be translated into typographic text. They were written out, first in pseudo-English strings, then in a high-level programming language, finally as binary code. Therefore Xanadu at its most intimate level is governed by all those features of the typographic medium so familiar from McLuhan’s analysis: singular sequentiality, objectivity, instrumentality, “left-brained” visual bias, and so on. The wonder of hypertext and hypermedia lies in their capacity to escape these limitations by using the microprocessor to turn linear, monologic typography recursively back upon itself—to create linear control structures that militate against absolute linear control.

In recognizing the recursive trick behind hypertextual writing, we come to a broader understanding of electronic literacy. Literacy under hypertext must extend not only to the “content” of a composition but to its hypotextual “form” as well—e.g., the way nodes are divided to accommodate data structures and display strategies, or the types of linkage available and the ways they are apparent to the reader. Practically speaking, this means that users of a hypertext system can be expected to understand print not only as the medium of traditional literary discourse, but also as a meta-tool, the key to power at the level of the system itself.

Ong and McLuhan have argued that television and radio introduce “secondary orality,” a recursion to non-print forms of language and an “audile space” of cognition (*Orality and Literacy*, 135; *Laws of Media*, 57). By analogy, hypertext and hypermedia seem likely to instigate a *secondary literacy*—“secondary” in that this approach to reading and writing includes a self-consciousness about the technological mediation of those acts, a sensitivity to the way texts-below-the-text constitute another order behind the visible. This secondary literacy involves both rhetoric and technics: to read at the hypotextual level is to confront (paragnostically) the design of the system; to write at this level is to

reprogram, revising the work of the first maker. Thus this secondary literacy opens for its readers a *cyberspace* in the truest sense of the word, meaning a place of command and control where the written word has the power to remake appearances. This space has always been accessible to the programming elite, to system operators like Clifford Stoll and shady operators like his hacker adversary. But Nelson’s 2020 Vision puts a Silverstand in every commercial strip right next to McDonald’s and Videoland. Vice President Gore’s information “Superhighway” would bring cyberspace even closer. If Xanadu succeeds in re-awakening primary literacy as a mass phenomenon, there is reason to believe that it will inculcate secondary literacy as well.

But like any grand hope, this technopiate dream of a new literacy ultimately has to confront its man from Porlock. Secondary literacy might well prove culturally disastrous. The idea of a general cyberspace franchise, in which all control structures are truly contingent and “consensual,” does summon up visions of informatic chaos. “Chaos,” however, is a concept we have recently begun to understand as something other than simply an absence of “order”: it is instead a condition of possibility in which new arrangements spontaneously assemble themselves (Prigogine and Stengers, 14).

Taking this neo-chaotic view, we might inquire into the positive effects of secondary literacy in a postmodern political context. In outlining a first move beyond our recent “depthless,” ahistorical quiescence, Frederic Jameson calls for an “aesthetic of cognitive mapping,” a “pedagogical political culture” in which we would begin to teach ourselves where we stand in the networks of transnational power (92). At this moment, as the West reconsiders its New World Order in the aftermath of a war for oil reserves, we seem in especially urgent need of such education. But a cultural pedagogy clearly needs something more than the evening war news, especially when reporters are confined to informational wading pools. We require not only a sensitivity to the complex textuality of power but an ability to intercept and manipulate that text—an advanced creative paranoia. This must ultimately be a human skill, independent of technological “utterance;” but the secondary literacy fostered by hypertext could help us at least to begin the enormous task of drawing our own cognitive maps. Here, however, we verge on the main question of hypertextual politics, which brings up the last question in the Toronto catechism:

#### 4 What Does Hypertext Become When Taken to Its Limit?

Orthodox McLuhanite doctrine holds that “every form, pushed to the limit of its potential, reverses its characteristics” (*Laws of Media*, viii). Media evolution, in McLuhan’s view, proceeds through sharply punctuated equilibriums. “Hot” media like print tend to increase their routinization and determinism until they reach a limit (say, the prose of the late 19th century). Beyond that point, the overheated medium turns paradoxical, passing almost instantly from hot to supercool, bombarding readers with such a plethora of codings that conventional interpretation collapses. Structure and hierarchy, the distinguishing features of a hot medium, reduce to indeterminacy. The plurality of codes overwhelms hermeneutic certainty, the “figure” of a univocal text reverses into polysemous “ground,” and we reach the ultima thule of Gutenberg culture, *Finnegans Wake*.

But though McLuhan had much to say about the reversal of overheated media, he left the complementary possibility unexplored. What happens to already cool or participatory media when they reach their limits? True to the fourth law, their characteristics reverse, but here the effect is reactionary, not radical. Radio, for instance, begins in interactive orality (two-way transceiving) but decays into the hegemony of commercial broadcasting, where “talk radio” lingers as a reminder of how open the airwaves are not. Television too starts by shattering the rigid hierarchies of the Gutenberg nation-state, promising to bring anyplace into our living rooms; but its version of Global Village turns out to be homogenous and hegemonic, a planetary empire of signs (as we say in Atlanta, “Always Coca-Cola”).

Hypertext and hypermedia are also interactively cool, so following this analysis we might conclude that they will undergo a similar implosion, becoming every bit as institutionalized and conservative as broadcast networks. Indeed, it doesn’t take McLuhanite media theory to arrive at that forecast. According to the economic logic of late capitalism, wouldn’t the Xanadu Operating Company ultimately sell out to Sony, Matsushita, Phillips, or some other wielder of multinational leverage?

Such a self-negating “reversal” may not be the only possible outcome, however. What if the corporate shogunate decide not to venture their capital? What if business leaders realize that truly interactive information networks do not make wise investments? This conclusion might be supported by

memory of the nastiness Sears and IBM stirred up when they tried to curtail user autonomy on their Prodigy videotex system (see Levy, “In the Realm of the Censor”). This scenario of corporate rejection is not just speculative fabulation, but the basis for a proposed modification to McLuhan’s fourth law. Media taken to their limits tend to reverse, but not all media reverse in the same way. The case of a complex, syncretic, and fundamentally interactive medium like hypertext may involve a “reversal” that does not bring us back to the same-as-it-ever-was—not a reversal in fact but a recursion (*déjà vu*) to a new cultural space.

We have entered into a period of change in reading and writing that Richard Lanham calls a “digital revolution” (268). As this revolution proceeds (if it is allowed to do so), its consequences will be enormous. The idea of hypertext as a figment of the capitalist imagination, an information franchise in both Nelson’s and Lyotard’s senses, could well break down. Though Xanadu may in fact open its Silverstands some day, hypertext might not long remain a commercial proposition. The type of literacy and the kind of social structure this medium supports stand fundamentally against absolute property and hierarchy. As we have hinted, hypertext and hypermedia peel back to reveal not just an aesthetics of cognitive mapping but nothing less than the simulacral map-as-territory itself: the real beginnings of cyberspace in the sense of a *domain of control*.

“Cyberspace. A consensual hallucination experienced daily by billions of legitimate operators, in every nation. . . . A graphic representation of data abstracted from the banks of every computer in the human system” (Gibson, 51). William Gibson’s concept of a cybernetic workspace, laid out in his dystopian novel *Neuromancer*, represents the ultimate shared vision in the global dream of information commerce. For all its advancement beyond the age of nation-state capitalism, Gibson’s world remains intensely competitive and hierarchical (for nation-state substitute the revived *zaibatsu*). *Neuromancer* is *Nineteen Eighty-Four* updated for 1984, the future somewhat gloomily surveyed from Reagan’s America.

There is accordingly no trace of social “consensus” in Gibson’s “consensual” infosphere. In his version of cyberspace, the shape of vision is imposed from without. “They” control the horizontal, “They” control the vertical. Of course there must be some elements of chaos, else Gibson would be out of business as a paperback writer; so he invents the “cyberspace cowboy,” a hacker hero who plays the information game by

what he likes to call his own rules. But though cowboys may attempt to unsettle the system, their incursions amount at best to harassment and privateering. These forms of enterprise are deemed “illegal,” though they are really just business by another name (“biz,” in Gibson’s parlance), inventiveness and competitive advantage being the only effective principles of operation.

Gibson’s dark dream is one thing—in effect it is a realization of McLuhan’s prophecy of reversal, an empowering technology turned into a mechanism of co-optation and enslavement. But perhaps Ted Nelson’s 2020 Vision of hypertextual literacy is something else. If not a utopian alternative, Nelson’s project may at least provide a heterotopia, an otherplace not zoned in the usual ways for property and performativity. Cyberspace as Gibson and others define it is a Cartesian territory where scientists of control define boundaries and power lines. The Xanadu model lets us conceive instead a decentered space of literacy and empowerment where each subject acts as *kubernetes* or as Timothy Leary says, “reality pilot,” steering her way across the intertextual sea (“Reality Pilot” 247).

Nelson’s visions of the future differ crucially from Gibson’s. In Xanadu we find not consensual illusion but genuine, negotiated consensus. The pathways and connections among texts would be created on demand. According to Nelson’s plans to date, only the most fundamental “back end” conventions would be strictly determined: users would be free to customize “front end” systems to access information more or less as they like. Xanadu thus possesses virtually no “canons” in the sense of a shelf of classics or a book of laws; the canons of Xanadu might come closer to the musical meaning of the word—congeries of connections and relationships that are recognizably orderly yet inexhaustibly various. The shifting networks of consensus and textual demand (or desire) in Xanadu would be constructed by users and for users. Their very multiplicity and promiscuity, one might argue, would militate powerfully against any slide from populism back toward hierarchy.

Nelson’s visionary optimism seems vindicated, then. Xanadu as currently conceived—even in its status as Nelson’s scheme to get rich very slowly—opens the door to a true social revolution with implications beyond the world of literature or mass entertainment. Xanadu would remove economic and social gatekeeping functions from the current owners of the means of text production (editors, publishers,

managers of conglomerates). It would transfer control of cultural work to a broadly conceived population of culture workers: writers, artists, critics, “independent scholars,” autodidacts, “generalists,” fans, punks, cranks, hacks, hackers, and other non- or quasi-professionals. “Tomorrow’s hypertext systems have immense political ramifications, and there are many struggles to come,” Nelson warns (*Literary Machines* 3/19). This is an understatement of cosmic proportions.

But it would be a mistake to celebrate cybernetic May Day without performing a few reality checks. Along with all those visionary forecasts of “post-hierarchical” information exchange (Zuboff, 399), some hard facts need to be acknowledged. The era of the garage-born computer messiah has passed. Directly or indirectly, most development of hardware and software depends on heavily capitalized multinational companies that do a thriving business with the defense establishment. This affiliation clearly influences the development of new media—consider an influential paper on “The Rhetoric of Hypertext” which uses the requirements of a military training system to propose general standards of coherence and instrumental effectiveness for this medium (Carlson, 1990). Technological development does not happen in cyberspace, but in the more familiar universe of postindustrial capital. Thus to the clearheaded, any suggestion that computer technology might be anything but an instrument of this system must seem quixotic—or just plain stupid.

Before stepping off into cyberspace, we do well to peel off the futurist headgear and listen to some voices in the street. No one wants to read anymore: “books suck, Nintendo rules.” Computers are either imperial business machines or head toys for yuppies. Anyone still interested in “mass” culture needs to check out the yawning gap between the rich and the debtayers, not to mention the incipient splintering of Euro-America into warring ethnicities and “multicultural” tribes. And while we’re at it, we might also do some thinking about our most recent global conflict, wargame-as-video-game with realistic third-world blood, a campaign in defense of economic imbalance and the West’s right to determine political order in the Middle East. Perhaps we are using the word “revolution” far too loosely. Given the present state of political and cultural affairs, any vision of a “populite” future, or as John Perry Barlow has it, an “electronic frontier” (see Sterling), needs hard scrutiny. Revolution, as Tommie Lee Jones reminds us, is what you find *in your face*.

Do we really want a revolution? Are academic and corporate intellectuals truly prepared to dispense with the current means of text production and the advantages they afford in the present information economy? More to the point, *are we capable* of overturning these institutions, assuming we have the will to do so? Looking back from the seventies, Jean Baudrillard criticized the students of Paris '68 for assuming control of the national broadcast center only to reinstate one-to-many programming and the obscurantist focus of the "media event." The pre-revolutionary identity of television swiftly reasserted itself in the midst of radical action. The seizure was a sham, Baudrillard concludes: "Only total revolution, theoretical and practical, can restore the symbolic in the demise of the sign and of value. Even signs must burn" (*Political Economy of the Sign*, 163). Xanadu as Nelson imagines it does promise to immolate certain cultural icons: the entrepreneurial publishing house, the codex book, the idea of text as unified, self-contained utterance. Taken to its limits, hypertext could reverse/recourse into a general medium of control, a means of ensuring popular franchise in the new order of virtual space. Public-access Xanadu might be the last hope for consensual democracy in an age of global simulation.

Or it might not: we do well to remember that Ted Nelson's vision comes cleverly packaged with assurances that copyright and intellectual property shall not perish from the earth. Some signs would seem to be flame-resistant. The vision of Xanadu as cyberspatial New Jerusalem is conceivable and perhaps eligible, but by no stretch of the imagination is it inevitable. To live in the postmodern condition is to get along without the consolation of providential fictions or theories of historical necessity. This renunciation includes the "Laws of Media," whose force in the final analysis is theoretical and heuristic, not normative. As Linda Hutcheon observes, postmodernism undermines any attempt at binary distinction. To invoke the possibility of a "post-hierarchical" information order, one must assert the fact that all orders are contingent, the product of discursive formations and social contracts. But this postulate generates a fatally recursive paradox: if all order is consensual, then the social consensus may well express itself against revolution and in support of the old order. The term "post-hierarchical" may some day turn out to carry the same nasty irony as the words "postmodern" or "postwar" in the aftermath of Desert Storm: welcome back to the future, same as it ever was.

In the end it is impossible to dismiss Nelson's prophecies of cultural renovation in Xanadu; but it is equally hard to predict their easy fulfillment. Xanadu and the hypertext concept in general challenge humanists and information scientists to reconsider fundamental assumptions about the social space of writing. They may in fact open the way to a new textual order and a new politics of knowledge and expression. However, changes of this magnitude cannot come without major upheavals. Responsibility for the evolution of hypertext systems as genuine alternatives to the present information economy rests as much with software developers, social scientists, and literary theorists as it does with legislators and capitalists. If anything unites these diverse elites, it might be their allegiance to existing institutions of intellectual authority—the printed word, the book, the library, the university, the publishing house.

It may be, as Linda Hutcheon asserts, that though we are incapable of direct opposition to our native conditions, we can still criticize and undermine them through such postmodern strategies as deconstruction, parody, and pastiche (120–21). Secondary literacy might indeed find expression in a perverse turn about or within the primary body of literate culture. But it seems equally possible that our engagement with interactive media will follow the path of reaction, not revolution. The cultural mood at century's end seems anything but radical. Witness President Bush's attacks on cultural diversity (or as he saw it, "political correctness") in higher education. Or consider Camille Paglia's memorable "defense" of polyvalent, post-print ways of knowing, capped off by a bizarre reversal in which she decrees that children of the Tube must be force-fed "the logocentric and Apollonian side of our culture" (Postman and Paglia, 55). Given these signs and symptoms, the prospects for populite renaissance do not seem especially rosy. "It is time for the enlightened repression of the children," Paglia declares. Yet in the face of all this we can still find visionary souls who say they want a textual, social, cultural, intellectual revolution. In the words of Lennon:

*Well, you know . . .*

*We all want to change your head.*

The question remains: which heads do the changing, and which get the change?

## Works Cited

- Barthes, Roland. "From Work to Text." *Textual Strategies: Readings in Poststructuralist Criticism*. Ed. Josué Harari. Ithaca, NY: Cornell UP, 1979. 73–81.
- Baudrillard, Jean. *For a Critique of the Political Economy of the Sign*. Trans. Charles Levin. St. Louis: Telos, 1981.
- . *Simulations*. Trans. Paul Foss, Paul Patton, and Philip Beitchman. New York: Semiotext(e), 1983.
- Benjamin, Walter. "The Work of Art in the Age of Mechanical Reproduction." *Illuminations*. Ed. Hannah Arendt. New York: Schocken, 1969. 217–52.
- Bersani, Leo. "Pynchon, Paranoia, and Literature." *Representations* 25 (1989): 99–118.
- Bolter, Jay. *Writing Space: The Computer, Hypertext, and the History of Writing*. Fairlawn, N.J.: Lawrence Erlbaum Associates, 1990.
- Bush, Vannevar. "As We May Think." *Atlantic Monthly* (July, 1945): 101–08.
- Carlson, Patricia. "The Rhetoric of Hypertext." *Hypermedia* 2(1990): 109–31.
- Conklin, Jeffrey. "Hypertext: An Introduction and Survey." *Computer* 20(1987): 17–41.
- Coover, Robert. "The End of Books." *New York Times Book Review*, June 21, 1992. 1 ff.
- Deleuze, Gilles and Félix Guattari. *Anti-Oedipus: Capitalism and Schizophrenia*. Trans. Robert Hurley, Mark Seem, Helen R. Lane. Minneapolis: University of Minnesota, 1977.
- Dorfman, Ariel. *The Empire's Old Clothes*. New York: Pantheon, 1983.
- Douglas, Jane Yellowlees. "Wandering through the Labyrinth: Encountering Interactive Fiction." *Computers and Composition* 6(1989): 93–103.
- Drexler, K. Eric. *Engines of Creation: The Coming Era of Nanotechnology*. New York: Doubleday, 1987.
- Eagleton, Terry. "Capitalism, Modernism and Postmodernism." *New Left Review* 152 (1985): 60–73.
- Gibson, William. *Neuromancer*. New York: Ace, 1984.
- Harpold, Terence. "The Grotesque Corpus: Hypertext as Carnival." *What's a Critic to Do?* Ed. G.P. Landow. Baltimore: Johns Hopkins UP [forthcoming].
- Hassan, Ihab. *The Postmodern Turn: Essays in Postmodern Theory and Culture*. Columbus: Ohio State, 1987.
- Heim, Michael. *Electric Language: a Philosophical Study of Word Processing*. New Haven: Yale UP, 1987.
- Hofstadter, Douglas. *Gödel, Escher, Bach: An Eternal Golden Braid*. New York: Basic, 1979.
- Horowitz, Irving Louis. "Postmodernism, or the Cultural Logic of Late Capitalism." *New Left Review* 146(1984): 53–92.
- Joyce, Michael. "Siren Shapes: Exploratory and Constructive Hypertexts." *Academic Computing* (November, 1988): 11 ff.
- Kernan, Alvin. *The Death of Literature*. New Haven: Yale UP, 1990.
- Landow, George. *Hypertext: The Convergence of Contemporary Critical Theory and Technology*. Baltimore: Johns Hopkins UP, 1992.
- Lanham, Richard. "The Electronic Word: Literary Study and the Digital Revolution." *New Literary History* 20(1989): 268–89.
- Leary, Timothy. "The Cyberpunk: The Individual as Reality Pilot." *Storming the Reality Studio: A Casebook of Cyberpunk and Postmodern Fiction*. Ed. Larry McCaffery. Durham: Duke UP, 1992. 245–58.
- Levy, Steven. *Hackers: Heroes of the Computer Revolution*. New York: Dell, 1984.
- . "The End of Literature: Multimedia is Television's Insidious Offspring." *Macworld* (June, 1990): 51+.
- . "In the Realm of the Censor: The Online Service Prodigy Tells its Users to Shut Up and Shop." *Macworld* (January, 1991): 69+.
- Lyotard, Jean François. *The Postmodern Condition: A Report on Knowledge*. Trans. Geoff Bennington and Brian Massumi. Minneapolis: University of Minnesota, 1984.
- McCorduck, Pamela. *The Universal Machine: Confessions of a Technological Optimist*. New York: McGraw-Hill, 1985.
- McHoul, Alec and David Willis. *Writing Pynchon: Strategies in Fictional Analysis*. Urbana: University of Illinois, 1990.
- McLuhan, H. Marshall. *Understanding Media: The Extensions of Man*. New York: McGraw-Hill, 1964.
- McLuhan, H. Marshall and Eric McLuhan. *Laws of Media: The New Science*. Toronto: University of Toronto, 1988.
- Nelson, Theodor Holm. *Computer Lib/Dream Machines*. Redmond, WA: Tempus Books, 1987.
- . *Literary Machines*. Sausalito, CA: Mindful, 1990.
- . "How Hypertext (Un)does the Canon." Paper delivered at the Modern Language Association Convention, Chicago, December 28, 1990.
- Ong, Walter. *Orality and Literacy: The Technologizing of the Word*. New York: Methuen, 1982.
- Pfeil, Fred. *Another Tale to Tell: Politics and Narrative in Postmodern Culture*. New York: Verso, 1990.
- Postman, Neil and Camille Paglia. "She Wants Her TV! He Wants His Book!" *Harper's* 282(March, 1991): 44 ff.
- Prigogine, Ilya and Isabelle Stengers. *Order out of Chaos: Man's New Dialogue with Nature*. New York: Bantam, 1984.
- Pynchon, Thomas. *Gravity's Rainbow*. New York: Viking, 1973.
- Ross, Andrew. *Strange Weather: Culture, Science, and Technology in the Age of Limits*. New York: Verso, 1991.
- Slatin, John. "Reading Hypertext: Order and Coherence in a New Medium." *College English* 52(1990): 870–83.
- Stansberry, Dominic. "Hyperfiction: Beyond the Garden of the Forking Paths." *New Media*. May, 1993. 52–55.
- Sterling, Bruce. *The Hacker Crackdown: Law and Disorder on the Electronic Frontier*. New York: Bantam, 1992.
- Stoll, Clifford. *The Cuckoo's Egg: Tracking a Spy Through the Maze of Computer Espionage*. New York: Doubleday, 1989.
- Zuboff, Shoshana. *In the Age of the Smart Machine: The Future of Work and Power*. New York: Basic, 1988.