# The Electronic Word: Literary Study and the Digital Revolution

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PERHAPS THE REAL QUESTION for literary study now is not whether our students will be reading Great Traditional Books or Relevant Modern ones in the future, but whether they will be reading books at all. Our first round of technological perturbation, which pitted the codex book and Culture As We Know It against commercial television, didn't turn out so badly as we feared. The print media continued to thrive during TV's great expansion period.[1] And literature continued to be taught in American schools and colleges much as before; students read books and wrote papers and exams about them, which the professor then read, marked up (time and zeal permitting), and returned to the student. Compared to other areas of textual informing in the society around us, literary study has felt almost no pressure from changing technology. This grace period has now been ended by the personal computer and its electronic display of what, until a new word is invented, we must call "text."

The literary world, having gingerly learned to manipulate pixeled print ("pixels" are "picture elements," the dots which electronically paint the letters onto the computer screen) through word processing, has found personal computers handy engines to produce printed texts about printed texts. But our thinking has not gone much further than that. Meanwhile, the electronic word has been producing profound changes in the outside world. Some of the billions of dollars American business and government spend to train their employees are being spent in redefining the "textbook"—and, almost in passing, the codex book itself—into an interactive multimedia delivery system.[2] Sooner or later, such electronic "texts" will redefine the writing, reading, and professing of literature as well.

This changed status of the word affects the whole range of arts and letters. Digitized communication is forcing a radical realignment of the alphabetic and graphic components of ordinary textual communication. In music, not only notation but creation and performance have been transformed. Digitization is desubstantiating the whole world of the visual arts. This common digital denominator of the arts

and letters forces upon us a rhetoric of the arts like none seen before. And the free marketplace in which the arts and letters live and breathe is being transformed as well, for perhaps the most immediate, certainly the most immediately felt, effect of the electronic word has come in the area of intellectual property. Copyright law emerged to establish a market for printed text. In a world of electronic word and image, literally every fundamental principle of that law, and hence of that marketplace, must be renegotiated.[3] But the most fundamental questions posed for literary study by the electronic word emerge where we would last think to seek them, in our fundamental poetics—and we might begin our survey there.

The late Eric Havelock, in his pioneering work on the Greek alphabet,[4] stressed that an alphabet which could support a high literate culture had to be simple enough to be learned easily in childhood. Thoroughly internalized at that time, it would become a transparent window into conceptual thought. The shape of the letters, the whole written surface, was not to be read aesthetically; that would only interfere with purely literate transparency. "Reading" would not, except in its learning stages, be a self-conscious, rule-governed, recreative act but an intuitive skill exercised on the way to thought. It took a long while for this ideal to be realized in a page of modern print, a page which should, in the famous words of one book designer, stand to its thought as a fine crystal goblet stands to the wine it contains.[5] The physical effort required to write on and read from wax or parchment had first to be attenuated. The scribe's perennial temptation to elaborate the letters, to convert boredom into beauty, had to be overcome. Spaces had to be left between words (a convention invented, according to one authority, as a remedial technique to teach Latin to slow-witted seventh-century Celtic monks).[6] And, after Gutenberg, "transparent" print faces had to be modeled. But once all this was done, unintermediated thought, or at least what seemed like unintermediated thought, was both possible and democratizable. And this unselfconscious transparency has become a stylistic, one might almost say a cultural, ideal for Western civilization. The best style is the style not noticed; the best manners, the most unobtrusive; convincing behavior spontaneous and unselfconscious.

Pixeled print calls this basic stylistic decorum, and the social ideal built upon it, into question. Electronic typography is both creator-controlled and reader-controlled. The screen upon which these words appear as I write has five sizes of a dozen Roman type styles and two Greek styles at its immediate command and literally hundreds more in second-level storage. I can enlarge the print if my eyes get tired, reduce it to check format and page layout, flow it around illustrations

if I want. I can redesign the very shapes of the letters, zoom in on them until their transparency becomes an abstract pattern of separate pixels. I can alter the whole alphabetic/graphic ratio of conventional literacy in dozens of ways. I can reverse the basic black/white, figure/ground relationship. I can create and maintain a purely transparent verbal surface, **but I need not**. And as literary scholars above all should know, where the verbal creative spirit has room to play, play it will. When inspiration lags, **I'll be tempted to see what a new type style might do for me.** I can reformat a text to make it easier to read, or, using a dozen transformations, make it harder, or just different, to read. I can literally color my colors of rhetoric. I can heal the long hiatus of silent reading and make the text read itself aloud. At present this reading sounds a little funky, but it will become an expressive parameter as agile and wide as the others. I can embolden my own special key words and places. I can reformat prose into poetry. I can illuminate my manuscript in ways that would make a medieval scribe weep with envy. And when I have finished, I can print it out on a Linotronic-300 electronic typesetter by pushing a keystroke or two. And so can you, as an electronic reader, do all these things, whatever I have chosen to do.

Desktop publishing, as this kind of razzle-dazzle is called, has turned a lot of commercial practices and relationships upside down along with our traditional notions of literary and cultural decorum. The textual surface is now a malleable and self-conscious one. All kinds of production decisions have now become authorial ones. The textual surface has become permanently bistable. We are always looking first AT it and then THROUGH it, and this oscillation creates a different implied ideal of decorum, both stylistic and behavioral. Look THROUGH a text and you are in the familiar world of the Newtonian Interlude, where facts were facts, the world just "out there," folks sincere central selves, and the best writing style dropped from the writer as "simply and directly as a stone falls to the ground," just as Thoreau counseled. Look AT a text, however, and we have deconstructed the Newtonian world into Pirandello's and yearn to "act naturally." We have always had ways of triggering this oscillation, but the old ways—printing prose consecutively and verse not, layering figures of sound and arrangement on the stylistic surface until it squeaked—were clumsy, slow, unchangeable, and above all author-controlled. And we used them sparingly because the final aim was stable transparency. Make these changes electronically and the oscillations alter radically in frequency and wavelength. The chain reaction goes critical. The difference is profound. You change Edens.[7] And your new Eden becomes, not choosing one or the other attitu-

dinal world, as the current deconstructionist streetfight trivializes it, but determining what kind of oscillation between them you want to create and what stylistic patterns will create it. You return, by electronic ambages, to that Renaissance *sprezzatura* of rehearsed spontaneity which Newtonian science so unceremoniously set aside.

The interactive reader of the electronic word incarnates the responsive reader of whom we make so much. Electronic readers can do all the things that are claimed for them—or choose not to do them. They can genuflect before the text or spit on its altar, add to a text or subtract from it, rearrange it, revise it, suffuse it with commentary. The boundary between creator and critic, another current vexation, simply vanishes here. As does the analogous boundary between prose and verse. And, as Richard Ziegfeld points out so perceptively in another essay in this collection, literary works are being created to exploit this radical interactivity. In interactive fiction, the reader determines the story's outcome by controlling its branching of event. Such decisions amount to literary criticism of a sort, in the same way that deploring Nahum Tate's ending of *King Lear* is an act of critical judgment. Suitably embedded in the fiction, a reader's comments about the plot's decision points become part of the fiction itself. The whole work thus snowballs into electronic orality, changes and grows as it moves from one screen and keyboard to another.

We might note here that interactive fictionalized modeling is already used in the everyday working world on a massive scale. All kinds of situations are being modeled—a literary critic might say *dramatized*—interactively. The great battles of the world, both past and future, are being fought electronically, both at home in Uncle Toby's garden and in the Pentagon. Buildings are being designed, constructed, and inserted into a specific townscape through which the prospective client is then walked. Political campaigns are rehearsed, peace treaties negotiated, interests balanced by gaming theory of all sorts. Into all these interactive environments the literary imagination, the fictional impulse, enters vitally. The personal computer has thus proved already to be a device of intrinsic dramaticality. This dramaticality will now inform a reader's re-creation of electronic literary text.

In the face of such volatility, it is reassuring to recall all the real literature that got written and fixed forever before pixels dissolved the literary monasteries.[8] After all, establishing the fixed text has been *the* humanistic *raison d'être* since the Renaissance. To nail it down forever and then finally explain it, has been what literary scholars do. All our tunes of glory vary this central theme, even our current endeavors to show once and for all why nobody can once and for all explain anything. The pixeled word, in fact, seems to sharpen both

horns of our current Con- and Decon-structive dilemma. An ever-varying chameleon text forever eludes definitive explanation, as the Decons would have it, but it also invites rearrangements that would allow the Cons to have their way with it. Like a Cretan bull leaper, the electronic reader must grab the dilemma firmly in both hands and flip.

Are even the classic printed texts safe from such gymnastics? Imagine growing up as an electronic reader, used to the broad interactive enfranchisements just sketched. How would you feel about *Paradise Lost* when presented to you in a codex book? Probably you'd prefer to access it from the CD-ROM disk which, in a few years, will contain all the texts you were asked to read—or ever could read—in your undergraduate career. Wouldn't you begin to play games with it? A weapon in your hands after 2500 years of pompous pedantry about the Great Books, and you not to use it? Hey man, how about some music with this stuff? Let's *voice* this rascal and see what happens. Add some graphics and graffiti! Print it out in San Francisco (the kooky face I used above) for Lucifer, and Gothic for God. Electronic media will change not only future literary texts but past ones as well. The electronic word, for both literature and literary history, works both ways.

We will wince at this playfully blasphemous rearrangement even more when it becomes commonplace in popular entertainment. Rock musicians are beginning to design pieces with alternative endings or performative sequences, much as "serious" experimental musicians have done for a long time in "aleatory" compositions. Films, too, can be viewer-arrangeable using present digital techniques. As Stewart Brand remarked at a recent Directors' Guild seminar on changing technology, in digital media there is no "final cut." Digitized films can now be released with alternative outtakes, or alternative endings, from which each viewer will assemble a private ideal version at home. No "final cut" means, finally, no conventional endings, or beginnings or middles either. Interactive literary texts will share this fundamental irresolution. Obviously our poetics will require some basic non-Aristotelian adjustments.

And "books," the delivery system for texts, are changing as much as the texts themselves. Here, too, technology is forcing vital theoretical issues. As long as the codex book stands at the center of the humanities curriculum, we can with tranquil mind fuss about what we are *really* doing, what the core curriculum *really* should be, and so on, because we all really *know* what we really do. We read books and write about them and teach students about them. Yes, Homer may oxymoronically be "oral literature," and Chaucer may have recited his poems

and Shakespeare written *plays,* but we deal with the book forms. It is the codex book which carries that vital symbolic charge, symbolizes our escape into our "real" world, constitutes our badge of office, furnishes our genuine home. What is valuable about what we do is what happens when we *read books.* But if you are not going to read books any more, or are going to read them in different ways, you must finally decide what it is that happens when you do read them. You must know this if you are to recreate that ineffable something in another medium. You must decide what business you are really in. You can conclude, of course, that that ineffable something cannot be transplanted, that the business you are really in is Reading Books.

Many areas of endeavor in America pressured by technological change have already had to decide what business they were really in, and those making the narrow choice have not usually fared well. The railroads had to decide whether they were in the transportation business or the railroad business and chose the latter and gradual extinction. Newspapers had to decide whether they were in the information business or only the newspaper business; most who chose the newspaper business are no longer in it. A fascinating instance of this choice is now taking place in the piano industry. Steinway used to own the market, and it has decided to stay in the piano business. Yamaha decided it was in the keyboard business—acoustic and electronic—and has, with Roland, Korg, and other manufacturers, redefined the instrument. Time has yet to tell who will win, financially or musically. For all its fastidious self-distancing from the world of affairs, literary study faces the same kind of decision. If we are not in the codex book business, what business are we really in?

Even if we decide that books will be our only business, our assumption that the book is the natural and only vehicle for a written text has been irreparably shaken. We have been made to see the assumptions that come with a book more clearly: it is authoritative and unchangeable, transparent and unselfconscious, read in silence and, if possible, in private. And we see the particular kind of literary and cultural decorum, and hence self and society, it implies much more clearly too. This self-consciousness about the codex book will prompt basic rearrangements in literary history, and these rearrangements may not be restricted to the age of print. We have for a long time misread and mistranslated the Greek and Latin classics according to the coordinates of philosophical print rather than their native rhetorical orality. The electronic word is hastening this long-overdue revaluation. Literary history, that is, like literature and literary criticism, is being changed both forward and backward.

We have become, we might parenthetically remark, more self-

conscious about prose itself. So used are we to thinking black-and-white, continuous printed prose the norm of conceptual utterance, that it has taken a series of theoretical attacks and technological metamorphoses to make us see it for what it is: an act of extraordinary stylization, of remarkable, expressive self-denial. The lesson has been taught by theorists, from Marinetti to Burke and Derrida, and by personal computers which restore to the reader whole ranges of expressivity—graphics, fonts, typography, layout, color—which the prose stylist has abjured. Obviously these pressures will not *destroy* prose, but they may change its underlying decorum. And perhaps engender, at long last, a theory of prose style as radical artifice rather than native transparency.

Electronic text reveals, too, that books as specific educational tools—textbooks—do have their limitations. People who study and create literature in universities seldom read the elementary and secondary textbooks their students have used to prepare for university study, but they would be horrified if they did. These volumes—physically ugly, worn out if distributed in the public schools, bound in vile peanut-butter-sandwich-proof pyroxeline covers, unmarked since unowned, written in a prose style intentionally dumbed down by readability formulae which filter out all the pleasures of prose, written of course to offend no one—these volumes do a terrific job of teaching students to hate reading. The El-Hi market, as this area of publishing is called, assiduously shuts out anything fresh or new. If electronic technology simply blew it to smithereens, none of us would have undue cause to repine. Or consider our old college friend the big Freshman Comp handbook. How many classes actually use more than a small part of it? It probably contributes more to physical fitness, as a mandatory dumbbell, than it does to the study of prose style. Enormous amounts of money, in these instances and in dozens of others, are spent on monstrously wasteful delivery systems. And even library books, if you think about it, have their limitations. What a blessing if each student had a private copy of the assigned text and could *mark it up,* individualize it just as scholars do with their own books.

No one knows exactly what electronic "textbooks" will look like; we can hope that great inventions yet impend. Certainly the current textbook publishers, firmly in the Book, not the information, business are guilty of no fresh thinking. The current state of the art is being created in the gigantic world of business and government training programs. There interactive video-and-text programs, based on laser-optical techniques, are proliferating, and radically renegotiating the customary alphabetic/iconic ratio. The single book sold in a single sale is being replaced by a delivery system that remains in place and is

continually updated. The explosive growth in database storage capacity made possible by laser-optical techniques hasn't begun to be used. An interactive compact laser disk can hold one thousand video stills, two thousand diagrams, six hours of high-quality sound, ten thousand pages of text, and have enough space left over to make it all work together.[9] Such a disk stands to a fixed text as interactive fiction stands to a paperback novel. It promises not the spindled mutilation which the sixties feared but an incredible personalization of learning, a radical democratization of "textbooks" which allows every student to walk an individual pace. Stylistic levels can be reader-selectable rather than permanently dumbed down. All kinds of reading assistance—spoken accompaniments, language glossing embedded hypertextually, dynamically interactive bilingual texts—can enfranchise non-native-speaking minorities within the world of letters. Electronic "textbooks" are democratizing education in all the arts in the same way that the invention of printing reinforced the spread of Protestantism.

One possible pattern for textbooks is suggested by Lexis and Westlaw, the two electronic information networks which serve the legal profession. These continually updated on-line databases provide a legal library to anyone with a computer terminal, anywhere in the country. Imagine a major "textbook," continuing over a generation, continually in touch with all the teachers who use it, continually updated and rewritten by them as well as by the "authors," with the twenty-four-hour electronic bulletin boards and the other one-to-one devices of communication such a network inevitably stimulates. Imagine a department faculty collaborating to produce a full on-line system of primary and secondary texts, with supporting pedagogical apparatus, to be collectively updated and enhanced; it might encourage a real, and nowadays rare, collegiality. Lexis and Westlaw are expensive, but so are those never-read Freshman Comp texts.

We need not prophesy: the electronic revolution of the textbook is taking place right now. The whole of Greek literature is now on disk. Latin is following suit. Surely the modern languages must do so soon. What use will we make of this gold mine? Students nowadays seem to read only textbooks and only the chapters assigned. Often, required texts are so expensive they leave no money for any other kind. None of that need be true any longer. We will have to think about canonical expansion from a technological as well as a theoretical perspective. If nowadays students read only what they are assigned, soon they can be assigned almost anything they should read—and will have their own copy of it. In university literature courses, we will soon have to teach students who have been brought up on interactive electronic "texts,"

and we will have to prepare them for a world of work which relies on the electronic word. I don't think we can sit out this technological revolution; why not use it?

Nowhere does technological pressure fall more intensely than on the relation between the arts. Digitization gives them a new common ground, a quasi-mathematical equivalency that recalls the great Platonic dream for the unity of all knowledge. Digitization both desubstantiates a work of art and subjects it to perpetual immanent metamorphosis from one sense-dimension to another. I keep returning to "Ovidian" as the adjective to describe its force. Perhaps the most striking instance of desubstantiation is real-light holography, where an insubstantial but totally "real" and persuasive sculptural image can be displayed. Such techniques will be first employed in cost-intensive industrial and military applications, but it is only a matter of time before sculpture gardens will be constructed in the same way. Such desubstantiation volatilizes our whole sense of artistic quiddity, of the existence of art objects. They live finally in the digital code, the sensuous manifestation only a temporary "printout." This changed essential location pushes images some distance toward the ontological status of words. (It also introduces the issues of possession and pricing, of art as investment-grade specie against which the minimalists, conceptualists, earth artists, and others have waged so notably unsuccessful a war in the last decades.) Digital equivalency means that we can no longer pursue literary study by itself; the other arts will form part of literary study in an essential way. Let me sketch how this is happening.

Ovidian digitization in the arts has gone furthest, perhaps, in the composition, notation, and performance of music. All three dimensions have been radically altered. Programs available widely and cheaply for use on computers just like the one these words are being written on (through? by? with? or from?) allow novices to compose pleasant-sounding music by enlisting the computer as co-composer. Far from regretting the role of chance in such a composition, or thinking that the computer diminishes human originality and skill, the authors of such programs often regard the physical skills needed for performance, and the theoretical knowledge needed for notation, as elitist prejudices. As one of them, Laurie Spiegel (author of "Music Mouse"),[10] has said, "sheer physical coordination has nothing to do with musicality. . . . The ability to deal with and manipulate symbolic notation is irrelevant to musical ability. . . . All in all, we filter out 90 percent of the musicians and we're left with virtuosos who play piano like it's a sport—without soul."[11]

We ought not underestimate the metamorphic power of this tech-

nology just because such computer programs are inexpensive, widely available, and have cute names like "Music Mouse." The entire structure of Wagnerian sublimity which, at least until Cage, we all ascribed to music stands at risk in this new orchestration. Our sense of "musicality" as artistic rarity, as that combination of divine talent and endless effort which shows the real way to Carnegie Hall, has been called into question. What "musical talent" is thought to be may itself change. New combinations of physical and neurochemical activity may become valorized as "musical genes" under such a new system. In Laurie Spiegel's "Music Mouse," you move the Macintosh Mouse around on its pad and the geometrical motions are translated by the computer into musical sounds. Time and space, drawing and music, are made one by digitization. And if the music sounds good, as often it does, what does "good" mean here? "Who" has created the goodness? Such creation takes us deep into the "aleatory" world of chance so densely explored by experimental music since Cage. To yoke expressivity through one sense to expressivity through another by coaxed chance is Ovidian metamorphosis come true.

Using FM-synthesizers and digital sampling techniques to convert sound into sight for purposes of musical notation and editing is now commonplace. Sounds are converted into a whole range of visual equivalents and then manipulated through a variety of transforms before being reconverted into sounds. The "art" of music is thus visualized. There seems no reason why the direction of this translation could not be reversed—although it has not, to my knowledge, been done—and programs be made available to "play" already existing visual patterns musically. One could choose the instrument or instruments on which the visual designs would be "played," the style and tempo of play, and one of a dozen or so choices of intonation system, from "well-tempered" to the "just" intonations of Harry Partch. And all these permutations are available to performers without formal musical training. (The computer training required is something else.) We can thus, in something like a strict analogy, speak of "music processing" just as we speak of "word processing." And the music thus processed can be arranged into orchestral patterns and performed, a one-person electronic orchestra, by the computer and its programmer. Creator, notator, editor/critic, and performer all fuse into the same creative source.

We can also speak of "image processing."[12] The technology for this is now familiar to us from the space probes and their presentation of digitally processed images on commercial television. Once an image has been digitized, it can be metamorphosed endlessly. Brightness and contrast can be reset. Gray levels can be plotted on a histogram

and then manipulated. Pseudocolor can be used to bring patterns into the visual spectra which the human eye can see. Three-dimensional models can be synthesized through volumetric reconstruction. Filtering can elicit patterns the eye cannot normally see. The possibility of such metamorphoses renders the visual image as intrinsically volatile, as desubstantiated, as the musical one. And convertible into it. And these transforming techniques, as with literature, can transform the "fixed" canon of past art as well as setting the future in permanent motion. The Ovidian metamorphosis looks backward as well as forward.

In the digital light of these technologies, the disciplinary boundaries that currently govern academic study of the arts dissolve before our eyes, as do the administrative structures which enshrine them. It is not only the distinction between the creator and the critic which dissolves, but the walls between painting and music and sculpture and architecture and literature. Might not they all, like a Wagnerian *gesamtkunstwerk,* finally find a common literary reality as drama, just as Cage so long ago predicted? The very volatility of it all, the relentless *dramaticality* of such continual modeling, might bring it about.

The other arts, that is, face the same metaphysical adjustments which literature faces. If sculpture is not chiseling and casting, just what is it? If painting is not painting on canvas and selling it to buy more paint to put on more canvas, what is it? And because all the arts face the same technological pressures, they are going to find, create, new relationships through that technology, through their new digital equivalences. Such equivalences pose the most fundamental, and most obvious, challenges to the structure and purpose of the university arts curriculum, and to the place of literary study in it. The shocked responses to chance techniques of creation in experimental music[13] will no doubt be duplicated in responses to programs which create aleatory poetry. But the shock created by aleatory techniques marks only the beginning of the change in attitudes required by the digital metamorphosis of the arts and letters. For the same technological pressures on how past literature will be "read" and metamorphosed in the reading will bear upon the art and music of the past. What is a mustache on the Mona Lisa, compared to a Fourier transform practiced upon it? What does colorizing *Casablanca* amount to, compared to pseudocolor techniques applied to Titian? What will the first digital sketches of the Beethoven G-Major Concerto look like? Or one of the Opus 17 Haydn String Quartets? How would they sound in Partch's "just intonation"? Such questions, if not precisely literary questions, will have literary analogues equally disconcerting.

The university world has for half a century been desperately seek-

ing a "core curriculum" for the arts and letters. And we have, more recently, yearned with equal hunger to expand the canon, to breathe air not yet passed through the Arnoldian purifier. The digitization of the arts answers both desperations. What will emerge finally, I think, is a new rhetoric of the arts, an unblushing and unfiltered attempt to plot all the ranges of formal expressivity now possible, however realized and created by whom- (or what-) ever. This rhetoric will make no invidious distinctions between high and low culture, commercial and pure usage, talented or chance creation, visual or auditory stimulus, iconic or alphabetic information. And rather than outlaw self-consciousness, it will plot the degree of it in an artistic occasion. As a start, we might think of a new locational matrix for the arts, one based on the bistable decorum I have been discussing rather than on a stable, unselfconscious transparency. It might look like this:

| | Unselfconscious | Self-conscious |
|---|---|---|
| Object | Transparent | Opaque |
| Viewer | Through | At |
| Reality | Biogrammar | Drama |
| Motive | Hierarchy | Play |

The classical notion of decorum, like modern equivalents—"clarity," "authenticity," and so on—measures an effect on the beholder. If a style works, if it creates the transparent illusion, it is decorous. Decorum is such a poor descriptive term precisely because it describes so many different kinds of verbal patterns yet allows only one virtue, unselfconscious transparency. We know that all literature, that all the arts are infinitely more various. A matrix like this one allows us to plot them on a common ground. We can define an artistic occasion in terms of object, perceiver, reality perceived, or animating motive. A text or painting can present itself as "realistic," a transparent window to a preexisting world beyond, and thus fall at the left end of the "Object" spectrum; or it can present itself frankly as an invention, as pure fantasy, and thus choose the right extreme. We can choose to read or view in the same way: either we assume that the object is "real" and stand to the left, or that it is "art" and stand to the right. The object will invite a certain placement but we can decline the

invitation, "read" a fantasy as if it were a realistic description of a world as yet unknown, if we like. The social reality presented by the object can be pure human biogrammar, an act as natural and unthinking as a mother's love for her child, or as self-conscious as an actress playing the same scene, or it can be some kind of "ordinary reality" halfway between. We can plot the motival structure which animates the object we see, or our viewing of it, or the creation of the object, on a spectrum which runs from the most intense competition for hierarchical ranking to the most spontaneous, gratuitous behavior which we perform just for the hell of it, because the performative muscles want to fire; careerism at the left, saintly simplicity at the right. Ordinary life, or perhaps I should say "Ordinary Life," mostly falls in the middle of these spectra. *Homo sapiens* is one kind of species—practical and sensible—if, as we usually do, we think the center the norm and the two extremes extreme. We are a quite different animal—obsessed by competitive games on the one hand and unmotivated play on the other—if the two "extremes" are really our basic norms, the two buttons that make us dance. The Greek philosophers championed the first view, the Sophists the second, and we have been debating the issue ever since. A matrix like this allows us to mix these two views as richly as does life itself. We can plot the range and, with a dynamic electronic version of the matrix, the frequency of the oscillation as well. We can, that is, do what experimental humanism has spent much of the twentieth century striving to do—substitute experiment and observation for authoritative critical guesswork.

The history of criticism in arts and letters has been largely a history of arbitrary and invidious discriminations, single fixations across these spectra of expressivity which then seek to prohibit all other such fixations. Art is an eternal object which exists beyond any beholder. Or it is a kind of perception which can be applied to anything from the Mona Lisa to Duchamp's famous urinal. Great Art is individual expression, or that of a sublime collective unconscious such as created the medieval cathedrals. It stems from the play impulse. Or from ludic contention. It is good only when you don't notice it or, in Wildean inversion, only when you do. It is "real" only when it refers to the world of myth, or to self-conscious social drama, or to the mixed reality of "ordinary life" in between. Meaning is always in the reader, always in the text, or always in between. Such exclusive fixes across the matrix have always been hopelessly inadequate to the full range of artistic expression, but the digitization of the arts shows us how silly they really are. Even the simplest work of art describes a complex wave-form across the matrix, a wave-form which varies as we read.

We pass in and out of self-consciousness, take our stand first "Out There" and then "In Here," look and hear first "At" and then "Through."

Electronic media make us aware of just how complex a measurement of bistable decorum can be. Indeed, always has been. But the parameters of this matrix are now *user-definable*. We will be able not only to see them more clearly than heretofore but to manipulate them. By such manipulations and scaling changes, we will be able to glimpse patterns of order in a reality which seemed chaotic and upon which, consequently, we felt obliged to impose an arbitrary order, an individual "theory" of literature. The norms of electronic art will be so volatile that the volatility of a nonexclusive matrix will be the only norm; it will prove a great exposer of pontificating ukase.

Electronic media are essentially dynamic rather than static. This will mean not only a new future for criticism, one where experimental measurement will figure as largely as critical fiat, but a new history of it as well. For bistable decorum is not only the premise of electronic text, it has been the fundamental premise of rhetorical education from the Greeks onward. We can thus use this electronic decorum to rewrite the history and criticism of Western literature wherever it has been influenced by rhetoric—and that is practically everywhere. Rhetoric becomes, through the digital equivalences such a matrix can plot, a general theory for all the arts. And thus the central structure for a central curriculum in the arts and letters.

Parallel Ovidian revolutions in the other arts change the status of the word by implication. This status is now being changed explicitly as well. Students of literature rarely interest themselves in business communication, but digital techniques have been metamorphic there too. Visual modeling is now employed for all kinds of communication which formerly took place in words, through written prose and discursive conversation. It is being used increasingly, for example, to supplement courtroom argument, especially before a jury considering complex abstract or historical relationships in civil cases. All kinds of conceptual relationships can now be electronically modeled in dynamic and compelling ways. I have no wish to mix in the current debate about lateral hemisphericality in the brain, or the oral/literate debates which depend therefrom, but perhaps I can say under metaphorical license that the left-handed and right-brained are finally inheriting their ancestral lands. If we remember how much our education system depends on grades—"grades" both as merit badges and as age and ability groups—and how much grades depend on verbal testing and verbal cleverness (as vocal but not always verbal minorities remind us), we can glimpse the attitudinal and administra-

tive readjustments which will be required. If a "musical" child can be musical without the long and expensive muscular training required, who knows what "verbal" talents may emerge, or what verbal training may be required, when words and images and sounds, when pixeled print and digital voice, mix in such profoundly metamorphic new ways. Perhaps we will learn the lesson Ovid's metamorphoses sought to teach, see how the literary imagination really works. One thing is certain: the Arts and Letters will be one activity as never before.

Technological change, then, is forcing disciplined literary study to look outward to the changing literacy in the world around us. If the codex book is being revolutionized, surely we must ponder this process. We cannot preserve Western culture in pickle. It must be recreated in the technologies of the present, especially if these technologies prove more condign to that preprint part of it which is oral and rhetorical. And surely we are impelled to this outward view by even the most fashionable and inward of our current activities, literary theory in all its manifestations. Theory is really rhetorical practice, as we are becoming increasingly aware, part of a returning rhetorical paideia which began with the didacticism of Futurism and Dada and has been colonizing the humanities and social sciences ever since. Our agonizing "deconstructive" readjustments have come from the figure/ground alternation of our two great tectonic plates, Rhetoric and Poetic. The movement from inward to outward gaze, from purity to application, comes from our most inward thoughts as well as outward technological pressures.

The great *explanandum* of changing technologies in the arts and letters rests right here, in fact, in the extraordinary convergence between technological and theoretical pressures. I have argued elsewhere that the personal computer itself constitutes the ultimate postmodern work of art.[14] It introduces and focuses all the rhetorical themes advanced by the arts from Futurism onward. Digital desubstantiation poses in the most acute way the issue of quiddity, of instrumental substance, to which Cage alluded when he closed the keyboard cover of a piano and rapped on it with his knuckles, and which Nam June Paik dramatized more vividly by taking an ax to the whole instrument. The interactive audience which outrageous Futurist evenings forced upon Victorian conventions of passive silence finds its perfect fulfillment in the personal computer's radical enfranchisement of the perceiver. Cage's games of chance and Oldenburg's experiments in visual scaling become everyday routines in home computer graphics. Preoccupation with game and play, which figures so strongly in experimental humanism from Futurism to the present day, has surrounded the computer from the beginning. Pioneer

"hacking" was born in the play spirit and that spirit still animates the computer world—especially the personal computer world.[15] Above all, digital technology poses, as we have seen, the abiding problem of postmodern musings, the status and purpose of art. Here, by fundamentally altering its radix of presentation and reception, technology forces us to rethink fundamental questions we have preferred to answer with windy, self-serving spiritual protestations.

The invention of printing brought a struggle between freedom to publish and profit therefrom and state efforts to control publication. From this struggle emerged the concept of copyright, the protection of a writing as the author's intellectual property.[16] Western literature for the last two centuries has been created in a marketplace stabilized by copyright laws. And it has, in America, in Constitutional times been rigorously protected by the First Amendment's guarantee of free speech. In the American literary world, if we have not taken this orderly marketplace and its First Amendment freedoms for granted, we have certainly grown to expect them. But this marketplace and its rules are based on print. Copyright law is a creation of print. And, as Ithiel de Sola Pool has argued in *Technologies of Freedom,* the strong bulwark of the First Amendment has been applied mostly to print as well. The electronic word does not fit into the existing copyright marketplace, nor can we be sure, as Pool makes clear, that the First Amendment will protect it as well as it has protected print. And the electronic image stands similarly imperiled.

These marketplace changes affect literary studies in various ways. Let's start with the least exalted: our profits on textbooks, editions of literary texts, and literary texts themselves. At the center of the electronic word stands a denial of nature; *copia* can be kept and yet given away. Making a digital copy for you does not impoverish me; the only substantial exchange of such a desubstantiated "property" is the physical disk which contains the data, and to send the text over a modem from your hard disk to mine involves no expenditure of substance at all. As software "publishers" have found out, the resulting duplication can bankrupt the producer and beggar the author. The policing required to prevent illicit duplication offends open society and, a fortiori, that of scholarly interchange. Yet as our texts are all digitized the literary community will face the same problems. If "textbooks" are distributed via local area networks, telephone lines, or more capacious broadband conduits of some sort, how will we protect the intellectual property of those who have created these works? And if the works are excerpted and revised continually by those using them, as we know

they will be, who then will "own" the revised "property" then redistributed for yet further revision? Who will "own" an interactive novel after it has been repeatedly interacted with? The blurring of the creator/critic distinction here finds a direct legal and financial manifestation. Our whole ethics of quotation, and the stylistic formulae that embody it, is called into question by electronic media. The electronic word is, obviously, much easier to quote because it is much easier to duplicate and move around. We can imbed much larger quotations in our text through hypertextual techniques (indicating by the shape of the cursor, for example, that a further text of a certain sort is embedded behind the surface text) than we could when they would grossly distort our own prose surface. Will these larger quotations exceed what is now reckoned as "fair use" under existing copyright laws?

To litigate a copyright case you must have a "final cut," a fixed version, upon which to base your arguments. What if there isn't any? The dilemma goes to a yet deeper distinction. Intellectual property in words may never have been rooted in a substance, an essence, but we could fool ourselves most of the time that it was. Words there on the page. Look at them. Compare them. That book there with the splendid red binding, that's mine. I wrote it. The Great American Novel. The definitive edition of The Great American Novel. The greatest critical discussion of The Great American Novel. The electronic word has no essence, no quiddity, no substance of this sort. It exists *in potentu,* as what it can become, in the genetic structures it can build. It is volatile not only in how it is projected onto an electronic screen but in how it works in the world. In both places, its essence is dynamic rather than static. How do we invest an intellectual property in an intellectual *potentiality*? Not in what something is but what something may become, the uses to which it *may* be put? The great catchphrase in copyright law (the lawyers call it a principle) is "substantial similarity." As a legal principle, the phrase has always had its problems,[17] but what if the property litigated has been desubstantiated? Who owns a piece of music which has been created by tracing a drawing on a digitizer pad? Or the music created by a program responding to mouse and keyboard manipulations? Do I own the musical rights to my drawings?[18] The graphics rights to my music? And what if some lunatic literary scholar succeeds in his efforts to do dynamic three-dimensional models for basic rhetorical figures? When he uses them in the hypertext version of his *Handlist of Rhetorical Terms,* can he then protect them as original expressions? Suppose I decide to make an interactive version of a conventional novel? Or illustrate it in an in-

teractive way through hypertext? Do I need the author's permission or is this "fair use"? Suppose I use digital conversion to add voice and music to a fiction according to some fixed parameters?

Electronic information, as Stewart Brand has said in *The Media Lab,* wants to be free.[19] To make sure that it does flow freely in the world of literary study, we will have to create a new marketplace based on a new conception of intellectual property and copyright protection, and make sure that the Constitutional guarantees of free speech made good in the print world prevail here too. Such a readjustment will not come easily. And if we modulate from the cash marketplace to the academic marketplace, surely the electronic word will pose puzzles there too. Academic life's real currency, the intellectual currency which determines the dollar amounts, is publication. How will the electronic word affect the elaborate system of merit badges which, during the last hundred years, we have worked out on the basis of print? It is only when we compare print to its pixeled analogue that we realize how talismanic the physical book and journal have become. Will we feel as good about a text that exists only in electronic form, or as cheap printouts? Will an "offprint" communicated through electronic mail carry the same grooming charge to one's scholarly acquaintance, stroke their *amour-propre* as satisfactorily as a real offprint with a real cover? In those departments where a "textbook" carries merit-badge status, will an electronic delivery system, with its inevitable several co-"authors" and subsequent re-creation by others, count as much as a real, coated-stock-heavy book? And what of the new forms of critical commentary which may emerge? Let's assume that an enterprising young scholar undertakes to construct a hypertext edition of a famous novel with a vexed textual history. It will include all textual possibilities plus suggestions as to their relationships. And these will be presented in certain carefully determined related ways; the reader can dial up, as it were, different coherent combinations of alternate readings. And with them all the available, or at least all the good, commentary on the text, embedded behind a set of "buttons" which are reader-selectable. This commentary will be indexed to individual passages in the text and cross-indexed by a user-selectable group of categories. Various recorded readings will be available, too, as well as animated three-dimensional diagrams illustrating basic stylistic patterns. Surrounding the whole will be a pedagogical framework with user-selectable levels. If you want guidance on how this text-delivery system might be used in secondary schools, you make the appropriate selections and a suggested pedagogy is offered. For various university applications, specific guidance is likewise offered. And

the whole is conceived on an open structure: each user can make comments and these will become part of the system.

Who "wrote" such a "text"? Who gets the royalties? Clearly it is *original* in its conception and realization. Is it then a copyrightable "expression," to use the law's terminology, or only an unprotectable "idea"? Are all its textual uses "fair"? If it is a "textbook," in my department at least it cannot be awarded a merit badge, but isn't it "criticism" as well? And "literary history"? Therefore badge-worthy? And aren't some major theoretical issues raised by such a "text"? Hypertexts are, in more than a manner of speaking, three-dimensional. Fuguelike, they can carry on an argument at several levels simultaneously. And if we cannot read them exactly simultaneously, we can switch back and forth with great rapidity. We talk a lot about "subtexts" and such, but what if several are actually there in residence? Here again, electronic text literalizes a theoretical conundrum. Doesn't this further disempower, unpack, the force of linear printed prose, following the argument developed above? And if the embedded texts consist of our own commentary on the text, our own or others', or somebody else's, or long quotations from the authorities whom we are presently treating, mustn't we avail ourselves of the nomenclature of musical arrangement to find terms adequate to this fugal, but at the same time totally literary, occasion?

Property issues of a nonlegal but very real professional sort will supervene when, as seems likely, we come to do our scholarly disputation electronically. Scholarly journal publication, for example, would make much more sense done electronically. The audiences are usually specialized and small, library budgets for journals perennially tight, and storage a gigantic problem; publication schedules involve both long delays and lots of hurry-up mailing at proof stages; students often want to use journals but all the same journals at the same time, which makes them unavailable to most. Even the physical labor of reading old volumes—lugging them from the library, propping them open on your desk with both hands while the acidified paper crumbles to the touch—gets in the way.

All this fuss could be avoided if scholarly journals were "published" as on-line data banks upon which individual scholars could draw at will. The extraordinary delays in humanistic publishing could be avoided. The costs of such publication, if we consider the whole scholarly apparatus from producer to library storage and distribution, could be markedly reduced. And new informational opportunities would arise. We could update our own articles as we wanted to, and those revisions would be immediately available to the scholarly com-

munity. We could choose to include, as part of our work, subsequent comments upon it—either champagne or, for stout hearts, hemlock, or both.[20] Most of us now keyboard our writing electronically to begin with. After it goes through various permutations and re-keyboardings, we read it in print and then take notes on it—by electronic keyboarding. Keeping the process electronic from beginning to end would save much time and effort. And it would make the whole apparatus of "published" scholarship available to anyone anywhere in the world who had a computer terminal. Our whole sense of scholarly "location" would change. Academic urbanity would no longer be an affair of big research campuses. Such a system would be an extraordinarily democratizing one.

It would lead inevitably to real-time communication as well, an electronic bulletin board of sorts. What kind of merit badge, if any, could be awarded for participation in such a scholarly "conversation" is hard to say; we don't presently stigmatize similar conversations when they take place in conferences and in person, but we don't list them as publications either. The whole censorial process by which our efforts are judged "worthy of publication" might change as the meaning of "publication" changed. The present rejection rate of publications in the social sciences and humanities is 80–90 percent and in the sciences 25 percent. Certainly we are tougher and more discriminating than our lab-coated brethren, but perhaps not that much more so. Rowland Lorimer, in a recent article in *Scholarly Publishing,* suggested a "tiered-acceptance" system which would expand the acceptance rate.[21] Or perhaps the whole judgmental system could be made more interactive, as between referee and supplicant scholar. Maybe print publication is intrinsically a censorious technology and information would flow more efficiently in electronic form.

Whatever happens, our sense of what "publication" means is bound to change. We will be able to make our commentary part of the text, and weave an elaborate series of interlocked commentaries together. We will, that is, be moving from a series of orations to a continuing conversation and, as we have always known, these two rhetorics differ fundamentally. It seems reasonable to assume that as the definition and nature of "publication" changes, our system of academic rewards and punishments will change as well. If we keep an eye on these changes, they may change for the better. Above all, we may be able to introduce our students to the scholarly conversation sooner than we do now, and in more realistic and effective ways.

Issues of intellectual property, whether in the copyright marketplace or the (sometimes) less contentious marketplace of academic accomplishment and credentials, will then certainly arise as we move

in slow and staggered steps from the printed to the pixeled word. And solving them will not be made any easier by a fundamental theoretical issue underlying them, the concept of artistic rarity. The ease, speed, and magical metamorphosis of digitized arts and letters put the whole Rarity = Value equation at risk. This equation stands close to all our hearts, to our sense of self, status, and accomplishment. Yet electronic media do seem to imply that our individual voices will blend more quickly and thoroughly into the general conversation than heretofore. Not only our *amour-propre* will suffer but the whole Arnoldian aesthetic of the very best and most beautiful upon which we have built so much. The electronic word democratizes the world of arts and letters in far more ways than I can sketch here, but the political direction of the technological force is strong and unmistakable; value structures, markets ideological as well as financial and theoretical, will be reassessed.

Humanists are such natural Luddites and have become so used to regarding technology—and especially the computer—as The Enemy that it takes some temerity to call the personal computer A Possible Friend. Yet this remarkable convergence of social, technological, and theoretical pressures suggests that it may be. Literary study, as by now we all know, takes place very largely in a university environment, and that environment is far more open and democratic than it used to be, and draws upon a student body far more multilingual and multicultural than any of us contemplated even twenty years ago. This diverse student body often lacks the pattern of cultural practices and expectations upon which literary study has depended in the last hundred years, and so we are being asked to explain our customs and delights as never before. And since our activities, like those of higher education generally, are increasingly supported from public purses, we are being asked to document those unproven Arnoldian claims to cultural centrality and civic virtue by which we have set such traditional store.

The electronic word, as we have seen, asks this question—What business are we really in?—in equally forceful technological terms. It also suggests at least some tentative answers. If our business is general literacy, as some of us think, then electronic instructional systems offer the *only* hope for the radically leveraged mass instruction the problems of general literacy pose. If we are in any respect to pretend that "majoring in English," or any other literature, and all that it implies, teaches our students how to manipulate words in the world of work, then we must accommodate literary study to the electronic word in which that world will increasingly deal. Otherwise, we shall find ourselves, as engineering schools did half a dozen years ago, teaching manual mechanical drawing in a world of CADD (computer-

assisted design and drafting). Electronic technology is full of promising avenues for language instruction of all sorts; it will be lunacy if we do not construct a sophisticated comparative literature pedagogy upon it. The bankruptcy of our long-fragile ideas of a humanities curriculum has been exposed both by changing demography and changing technology. And again electronic technology, through its central agency of digital conversion, suggests how we might begin constructing precisely the rhetoric of the arts which we so need. The computer modeling which now stands central to social and scientific thinking of all sorts is a dramatic, that is to say a literary, technique through and through. Such techniques, used throughout the creative thought of a society, imply precisely the self-conscious dramatic conception of public reality which we now see advanced across the whole spectrum of the social and humane sciences.

The rhetorical paideia formed the basic pattern of Western education for most of our 2500 years. Electronic technology looks like forming a central part of our return to this basic pattern. The rehearsal reality which classical rhetoric created in the practice oration, we now model, in icon as well as word, on an electronic screen. Pixeled print *destabilizes* the arts and letters in an essentially rhetorical way, returns them to that characteristic oscillation between looking AT symbols and looking THROUGH them which the rhetorical paideia instilled as a native address to the world. Our present squabble in the public prints about teaching Western culture is usually animated on both sides by a radical misapprehension about what "Western Culture" has always been. We are asked to believe that it has been a print-stable collection of Great Ideas enshrined in Great Books, and we now quarrel about which books are, for our present needs, really Great. But Western education has in its essence been rhetorical, has been based, that is, not on a set of great ideas, but on a manner of apprehension; it has taught as central not knowledge but how knowledge is held. That characteristic grasp has been bistable, alternatively unselfconscious and purposive, and self-conscious and contemplative. It is this Thucydidean alternation of speech and narrative patterns and psychologies which has undergirded classical literature almost from its beginnings.[22]

We may view the whole strand of experimental humanism which started with Marinetti's Futurist Manifesto and the Dadaists, then returned as a specifically rhetorical argument with Kenneth Burke and Richard McKeon, exploded again in all the sixties Isms, and then returned again in the seventies as "literary theory," as finally a didactic movement, a long and variously animated argument about what

humanistic study should do and be. Experimental humanism aimed to convert the Arnoldian foregone conclusions into an open-ended experimentality; to galvanize the silent and impassive audience into interaction; to invoke the medium as self-conscious condition of the message; to expose scaling changes as movements to a different register of meaning; to precipitate game and play out of pompous purpose and plead directly to them; to readmit chance to the role it has always played in the human drama; to make war on taste in order to find out what kind of censor it really was; and through all these radically to democratize the arts. To return us, that is, from a closed poetic to an open rhetoric. The electronic word, as pixeled upon a personal computer screen, reinforces all these purposes, literalizes them in a truly *uncanny* way.

We may expect a deal of commentary greeting the electronic modification of print literacy as the death of the Western self.[23] Surely just the opposite is taking place. The characteristically unstable Western self, by turns central and social, sincere and hypocritical, philosophical and rhetorical, is just what electronic literacy has been busy revitalizing. Allowing the simplicities neither of Arnoldian Sincerity nor of Deconstructive Despair, it will force these extremes into that bistable oscillation which has created our richly felt Western life since Plato and Isocrates first started it rocking two and a half millennia ago.

I hope I have been persuasive enough to coax you now into modeling literary study against a technological screen. So far as I can see it, our whole posture has been defensive, based on the book and the curricular and professional structures which issue from it. We conceive the humanities as a pickle factory preserving human "values" too tender and inert for the outside world. The world goes its way but supports us, museumlike, to show what, had it been composed of people like us, it might have become. This cozy conspiracy is sustained by both sides. The harsh world wants to imagine a finer world and we pretend to dwell in it. But our students and the society from which they come will not permit this illusion to continue unchanged; nor will a technology which has volatilized print; nor will our own thinking, our "theory," about what we are and do. All these are asking us to think *systemically* about literary study, to model it from kindergarten through graduate school. They are asking us to reconceive literary study, to think of it as permeating society in the way literary rhetoric has always done in the West, but with new technologies and through new administrative arrangements. We are being asked to explain just how the humanities humanize. Surely it is by teaching and studying,

and thus sustaining, that bistable oscillation which stands at the heart of the Western self. That is the business we are in, and it rests on the bedrock assumption of Western culture itself, the assumption that if we understand this dangerous and inventive heart of human life, we will cherish it and, so cherishing, will work to preserve it. The electronic word stands on our side in this endeavor and for that we should return thanks.

Apoplexy seems to come more naturally than apocalypse to literary scholars when we think about technology. Apoplectic rage and scorn has been the common response to commercial television; apocalyptic soaring on the wings of new technology has been altogether less common. I have tried, though, to guard against both in this essay. Electronic text is a different and not less important affair than commercial TV and the heated and defensive disputes it has inspired, and it needs the separate argument I have given it here. I have tried as well to avoid the windy prophetic suspirations which come so easily when pondering future technologies, by concentrating on the present, on technologies which are all commercially available right now at reasonable prices and which can be observed in action. And yet I am willing to be, if not apocalyptic, still optimistic and excited about literary study in an electronic age. We have scarcely begun to think constructively about the electronic word. Although it brings compulsions with it, I hope we will think of it less as a technological *vis a tergo* driving us where we don't want to go than as an opportunity to go where we have never been, and do things no one has done before. At the very least, we have been given an extraordinary opportunity to rethink literary study and its uses from the ground up. The basic implications of electronic technology may be inevitable but what we make of them certainly is not. We are free to think about, and plan for, literary creation and literary study in ways more agile, capacious, and hopeful than any generation has possessed since literature began to figure in human life. And we must do so, we must learn to think systemically. Technology is sending, finally, the same message being broadcast by society's demands upon us and by our own thinking: We must take into our disciplinary domain the world of general literacy upon which literature depends, a world whose existence up to now we have simply assumed. If the prejudices of print and craft-guild muff our play, we shall have only ourselves to blame. Literary scholars have traditionally resisted and resented technological change. If we decide once again to view technology with a hostile eye, this time we may find ourselves making the pianos while someone else makes the music. But if we put

aside our traditional resentments and fears, then we must decide just what our "music" is and how to make it in the new ways.

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## NOTES

1 See Ithiel de Sola Pool, *Technologies of Freedom* (Cambridge, Mass., 1983), p. 21: "From 1960 to 1977 the circulation of daily papers in the United States grew by 5 percent, the circulation of magazines by 25 percent, and the distribution of books annually by 75 percent."

2 See George Melloan, "Public Education's Failures Plague Employers," *The Wall Street Journal,* 21 June 1988, p. 39: "The American Society for Training and Development (ASTD) recently estimated a $210 billion total annual cost, not far below the $238 billion the U.S. spends on formal elementary, secondary and college education."

3 "And," as one copyright lawyer pondering a major media case told me, "since it took Congress sixteen years to revise the Copyright Act the last time, this may take a good while."

4 See esp. ch. 3–6 in Eric A. Havelock, *The Literate Revolution in Greece and its Cultural Consequences* (Princeton, 1982).

5 Beatrice Warde, *The Crystal Goblet: Sixteen Essays on Typography,* ed. Henry Jacob (London, 1955), pp. 11 ff.

6 Ivan Illich and Barry Sanders, *A B C: The Alphabetization of the Popular Mind* (San Francisco, 1988), p. 46.

7 I've spelled this contrast out in "The Choice of Utopias: More or Castiglione?" in my *Literacy and the Survival of Humanism* (New Haven, 1983).

8 George Steiner, in "The End of Bookishness?" *Times Literary Supplement,* July 8–14 1988, p. 754, has recently remarked on the historical connection between books and monasteries: "I would not be surprised if that which lies ahead for classical modes of reading resembles the monasticism from which those modes sprung. I sometimes dream of *houses of reading*—a Hebrew phrase—in which those passionate to learn how to read well would find the necessary guidance, silence, and complicity of disciplined companionship." We may expect a warm welcome for this monastic alternative to technological change.

9 Stewart Brand, *The Media Lab: Inventing the Future at MIT* (New York, 1987), p. 23.

10 Laurie Spiegel, "Music Mouse," OpCode Systems (Menlo Park, Calif.).

11 Steven Levy, "Whose Music Is It, Anyway?" *Macworld,* Aug. 1988, pp. 37 ff.

12 For a marvelous summary discussion, see Brita Meng, "Reality Transformed," *Macworld,* Aug. 1988, pp. 82 ff.

13 Michael Nyman coined the term in his pioneering *Experimental Music: Cage and Beyond* (New York, 1974).

14 Richard Lanham, "The Computer as Post-Modern Work of Art," in *Computers in the Literacy Age,* ed. Barton Thurber, forthcoming.

15 Steven Levy's *The Hackers: Heroes of the Computer Revolution* (New York, 1984) captures this play spirit perfectly.

16 In addition to Melville B. Nimmer's standard work, *Nimmer on Copyright,* 4 vols. (New York, 1988), see Lyman Ray Patterson, *Copyright in Historical Perspective* (Nashville, 1968); Alexander Lindey, *Plagiarism and Originality* (New York, 1952), ch. 6–8, pp.

62–104; and Benjamin Kaplan, *An Unhurried View of Copyright* (New York, 1966), ch. 1, pp. 1–37.

17 Amy Cohen makes this point in a brilliant recent essay, "Masking Copyright Decisionmaking: The Meaninglessness of Substantial Similarity," *The U.C. Davis Law Review,* 20 (1987), 719 ff.

18 Some of these issues have been opened by Patricia A. Krieg, "Copyright, Free Speech, and the Visual Arts," *The Yale Law Journal,* 93 (1984), 1565–85.

19 Brand, p. 211.

20 See K. Eric Drexler, "Publishing Hypertexts Isn't Hypertext Publishing," in *Hypertext '87: A Digest,* ed. Mark Bernstein (Eastgate Systems, Inc. disk; Cambridge, Mass., 1987).

21 Rowland Lorimer, "Implications of the new technologies of information," *Scholarly Publishing,* 16 (1985), 197–210.

22 I have developed this argument at length in *The Motives of Eloquence* (New Haven, 1976).

23 See, e.g., Illich and Sanders.