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Authors and Readers in an Age of Electronic Texts

ABSTRACT

Electronic hypertext is the latest in a series of technologies of writing; it is a technological innovation that is both revolutionary and evolutionary. Hypertext challenges our sense that any book is a complete, separate, and unique expression of its author. In addition to hypertextual writing, the computer also supports new forms of graphic representation and communication. As all forms of electronic communication become increasingly important in our society, we must learn how to combine these two orthogonal information spaces: the visual space of computer graphics with the semantic space of hypertext.

INTRODUCTION

These proceedings address a range of issues under the rubric of electronic literacy. Some of the authors consider the problems of transferring texts recorded in earlier technologies of writing to the new electronic medium. Others consider how to use these texts once they have been transferred. Some address the challenges that electronic technology poses for publishers as the traditional providers of texts, others the challenges faced by libraries as the traditional centers for collecting and organizing texts. These issues in turn entail larger questions: How does the computer change the nature of symbolic representation and communication, the nature of writing itself? What does it mean to be an author in an electronic environment? What does

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it mean to be an electronic reader? At the outset, it may be useful to reflect briefly on these larger questions.

HYPERTEXT AND THE HISTORY OF WRITING

What makes electronic writing interesting and novel are the qualities of fluidity, multiplicity, and dispersed control—in other words, its hypertextual qualities. Hypertext systems are by no means as widely used as word-processing programs. However, the word processor is only a transitional tool, because the results of word processing are still meant to be read in the conventional way, as ink on paper. In a fully electronic or hypertextual document, the writing and the reading occur in the computer medium. When the writer writes and the reader reads on the computer screen, then the computer can display the qualities that distinguish it from the older technology of print. Unlike print, the computer allows the writer to define units of text of any size and to present those units in a variety of orders, depending upon the needs and wishes of the reader. This capacity for fluid presentation is what characterizes hypertext.

Electronic writing is the latest in a series of technologies of writing; regarding electronic writing as part of a technological tradition helps us to see that the technological innovations in writing are always revolutionary and evolutionary at the same time. It is common to compare electronic media to the printed book, but the comparison is usually limited to the printing and publishing industry as it exists today. Our historical field of view needs to be wider. The state of print technology today is the latest phase of what we might call the "industrial period of print," which began in the early nineteenth century with the development of the steam-driven press and continued with such innovations as paper from wood pulp, mechanized typesetting, and effective photo-offset lithography. It is equally important to consider printing in the "Gutenberg period," from the fifteenth to the eighteenth centuries. This craft period in the history of printing had rather different qualities from the industrial era that followed. Indeed, in order fully to appreciate the nature of electronic writing, we should look at the long period before Gutenberg. When we do, we can identify a number of ways in which electronic writing resonates with early technologies and with the earlier genres and practices that grew up around these technologies.

Since the invention of the Greek alphabet, there have been three principal writing media in ancient and Western societies—the papyrus roll, the handwritten codex, and the printed book—and each has fostered certain attitudes toward the act of writing and the nature of written

text. The electronic medium is likely to do the same. As Elizabeth Eisenstein (1979) explains in *The Printing Press as an Agent of Change,* the introduction of printing was a technical change that also changed the way science was practiced and the attitude of humanists toward the ancient and modern texts that they studied. The printing press affected styles of writing and genres of literature. In fact, each technology of writing has had this effect. In describing the changes brought about by printing, Eisenstein stresses the ability of the press to preserve and stabilize both words and images with a greater degree of accuracy than handwriting could provide. It was the fixity of the printed text that encouraged exacting textual criticism in humanistic scholarship and the drive for greater mathematical precision and descriptive accuracy in the sciences. Now, however, the computer is calling the idea of fixity into question: in place of the stable printed text, the computer offers us a fluid and interactive one. The computer promises, therefore, to reverse at least some of the qualities that Eisenstein identified in the printing revolution (see Bolter 1991, 1-43).

That reversal comes from the hypertextual character of the electronic writing. Hypertext is the essence of electronic writing. The definition of hypertext should not be limited to systems with explicit links and paths for navigation, although there are now many such applications in use—everything from George Landow's (1991) pedagogical hypertext on Charles Dickens to Michael Joyce's (1989) fiction *afternoon.* The hypertextual qualities of fluidity and dispersed control are also present in a variety of computer applications, including electronic mail, textual databases, electronic encyclopedias and handbooks, presentation programs, and computer-assisted instruction. My definition of hypertext extends to all those applications that promote the topical division and interrelation of texts as well as dispersed access and control. This defi-nition includes most of the initiatives described at this conference. Textual databases—such as those of the Center for Electronic Texts in the Humanities under the direction of Susan Hockey and Project Gutenberg headed by Michael Hart—provide the foundation for hypertextual division, commentary, and dispersal. The Text Encoding Initiative, whose editor is C. M. Sperberg-McQueen, will allow further segmen-tation and hypertextual treatment of text.

Perhaps the best example of hypertext by another name is the Internet itself. The Internet is a physical embodiment of hypertext, with computers serving as nodes and cables or satellite connections as links. These physical connections become the surface upon which hypertexts are written and read; these hypertexts may take the form of listservs and newsgroups. Each newsgroup on the USENET is a disorganized, collaborative hypertext. The whole Internet consisting of hundreds of newsgroups and probably millions of messages is a text that spreads

its reticulations over the United States and around the world. It is a hypertext that changes minute by minute, as users add messages and as moderators and systems delete them. No one writer contributes more than a tiny fraction of the messages, and no one reader can read more than a fraction. Of course, the World Wide Web and Mosaic do constitute an explicit hypertext system. With its blocks of text and graphics and its point-and-click interaction, Mosaic functions as a simple unified interface for the hypertextualization of all the various resources of the Internet.

ELECTRONIC WRITING AND CRITICAL THEORY

A hypertext is different in important ways from a printed book. Hypertext challenges the traditional notion of the book as a writing that is complete in itself and is the unique expression of an author. Hypertext encourages us to remember that all texts are connected. Once we begin to understand writing as connecting, we have less sympathy for traditional distinctions between the individual book, the encyclopedia, and the library as a great collective book. Hypertext suggests new kinds of collective works and libraries as well as new individual works, and in suggesting new kinds of text, hypertext compels us to reconsider the relationship among the text, the author, and the reader. The computer as hypertext raises fundamental questions of literary theory because it undermines both the fixity of the text and the authority of the author.

There is now a body of scholarship on hypertext fashioned by Stuart Moulthrop (1989), Michael Joyce (1988), George Landow (1992), Landow and Delany 1991), Richard Lanham (1989), Jane Douglas (1991), and many others. A broad area of agreement has emerged that hypertext seems in a curious way to embody poststructural literary theory. Hypertext is the operational realization of major theoretical work of the past two decades. Theorists from the reader-response critics to the deconstructionists have been talking about text in terms that are strikingly appropriate to hypertext in the computer (Bolter 1991, 147-68). When the deconstructionists emphasize that a text is unlimited, that it expands to include its own interpretations, they are describing a hypertext, which grows with the addition of new links and elements. When Roland Barthes draws his famous distinction between the work and the text, he is giving a characterization of the difference between writing in a printed book and writing by computer (Bolter 1991, 161).

Barthes's and Foucault's critique of traditional notions of authorship is borne out by the practice of hypertext (see Landow 1992). In hypertext, the reader assumes something of the role of a traditional author; that

is, the reader constitutes the text in the act of reading. In a hypertext of any significant size, each reading and therefore each text is unique. By participating in the creation of the textual structure, the reader becomes both author and audience at the same time. And if we arrange the writing space so that the reader's choices can be saved, then the reader may give the newly constituted text to others to read. The first reader becomes an author for a second reader, and the chain of authors and readers may then continue indefinitely. The author too has a new relation to the text, since he or she is creating not one text but a whole family. The author sets up the outlines and defines the limits of possible thought and action in the text, but the author leaves to the reader the responsibility of exploring the space within those limits.

Hypertext, then, permits levels of authorship—without suggesting that one level is more important or worthy than others. There is the author of the program or system that constitutes the writing environment. There is the author who creates the structure of text and links. There is the reader as author who follows the links to call forth the text. As I have just mentioned, this reader as author may also have the ability to alter the text itself or make new links. Furthermore, any of these authors may work in collaboration rather than alone. In itself, this multiplicity of authorial roles is nothing new. Writing in the age of print has been characterized by multiple roles: authors, publishers, editors, proofreaders, typesetters, binders, and so on. But print technology is also characterized by a fairly rigid hierarchy, with authors and publishers at the top, and by a radical separation of authors from their readers. The hierarchy was perhaps not so rigid prior to the invention of the printing press, when publication was not an event. Publication simply meant making a copy of one's work by hand and sending it to a colleague.

In this sense at least, the electronic writing space more closely resembles the space of the manuscript than that of the printed page. In this new space, too, it is easy to pass from reader to author. It is easy in a technological sense; it merely involves entering a few commands at the keyboard. It is also easy in a cultural sense, for there is (as yet) no great divide between electronic authors and their readers. Again, electronic mail and newsgroups on the Internet are good examples here. One can move easily from reading a newsgroup article to writing and posting one's own article; anyone with full Internet access can be a contributor as well as a reader.

With hypertext, writing is connecting. The idea that writing should be a kind of creation *ex nihilo* seems to belong to or at least to be fostered by the technology of print. The legal notion of copyright, which grew up in the age of print, assumes that each writer will create something new and unique, without more than a limited debt to other

writers. Other constructions of the idea of writing are certainly possible. One thinks, for example, of the Platonic dialogue in which the text is a product of collaboration. The philosophical value of the text depends upon the agreement and contributions of two interlocutors. For Plato, the sophist, who creates his text by himself and delivers it in a continuous speech, cannot attain true wisdom. Another construction of writing is provided by medieval writers such as Bonaventura, cited by Elizabeth Eisenstein (1979) in *The Printing Press as an Agent of Change* (pp. 121-22). For him, compilers and commentators are writers too. What compilers and commentators do is to link together textual units, so that their writing practices have always been hypertextual. Electronic technology encourages us to return to that kind of writing, indeed to see writing in a radical sense as connecting—connecting verbal ideas, connecting one text to others in a tradition, connecting texts together to form a new composite. And once we begin to understand writing as connecting, we are carried easily from the individual texts to collective texts, from the individual book to the encyclopedia and library as a collection of texts. Hypertext suggests new kinds of collective works and libraries as well as new individual works.

Once again, a historical perspective seems important to me. Libraries are very old—depending upon our definition, we can date them back to ancient Alexandria in the third century B.C. or to ancient Nineveh centuries earlier. Libraries are great books: organized collections of text whose principles of organization depend both upon the structure of knowledge in their contemporary society and upon the contemporary technology of writing. For our society and with electronic technology, a hypertextual library would be a great book that dissolves and recon-stitutes itself to meet the needs of each user.

AUTHORSHIP, COPYRIGHT, AND HYPERTEXT

Just as electronic technology seems likely to change the institution of the library, there are other institutions and institutional practices in our society that are also threatened. Let us return to the question of authorship. In her article, "The Genius and the Copyright," and in subsequent work, Martha Woodmansee (1984, 1992) has shown how the notion of author evolved in the eighteenth and nineteenth century and how this affected the budding theory of copyright. Peter Jaszi (1992) has carried that analysis on into the legal language and decisions of the twentieth century. Both have reached the conclusion that there is a discord between current legal theory and current literary theory. Legal theory in the United States and Europe still seems wedded to the nineteenth-century notion that an author is a solitary, independent,

creative agent; that creativity is practically synonymous with originality; and that the value of a text is measured by its originality.

Hypertext calls all these propositions into question. Literary theory had already been questioning these propositions for the past quarter of a century. The character of the author, the nature of originality, the independence of one text from other texts—all these are familiar targets of poststructuralist literary theory. My point is simply this. If hypertext (and therefore the computer as a writing technology) embodies or realizes poststructural theory, then it too must come into conflict with current legal theory. And if, as Woodmansee and Jaszi both argue, legal theory is having difficulty dealing fairly with the current practices of writers in print, it will have infinitely greater difficulty dealing with hypertextual writing. The ironies abound when we try to measure hypertext by the legal terms that have been defined for printed text. Copyright law recognizes fixed verbal expressions. Yet hypertext is not a single fixed text; nor is a hypertext fully characterized by the words it contains. In a hypertext, linking is writing. What legal status does a link have? What happens if a subsequent reader changes the structure of a hypertext by adding new links? No verbal text has been changed, but the hypertext is different, because new possible readings have been created. To whom do these readings belong?

Let me offer the following, somewhat subversive thoughts on hypertext and the notions of copyright and intellectual property. First, I would like to make a distinction—one that may at first seem frivolous but in fact seems to me useful in discussing the ambiguities and ambivalences that now surround copyright. It is a distinction between the legal speed limit and what I might call "the cultural speed limit." The legal speed limit is of course whatever the white rectangular road sign indicates—say, 55 miles per hour for urban expressways. But in most American highways, the cultural speed limit is not 55 but rather somewhere between 65 and 70. That is, most drivers do not think they are traveling too fast until they are going perhaps 10 to 15 miles per hour over the legal limit. Perhaps there are many such gaps between the legal and cultural definitions of what is right or appropriate. Certainly, such a gap already exists with regard to copyright for printed materials and now especially for computer materials. The photocopier, the tape recorder, and the computer disk drive have made it easy to make copies, and our cultural assumption seems to be that we should be able to make copies in limited quantities for most any use. I think the very ease of making copies has raised the cultural speed limit here.

In the coming decades, fully electronic writing promises to have a much greater effect on our cultural notion of protected expression. As we come to use the computer for more and more of our reading and writing, as we come to regard hypertext as the "natural" way to

write, we will necessarily be more and more estranged from traditional theories of copyright. The gap between the cultural and the legal speed limits here will widen, and I suppose that such a gap can only grow so wide before one has to change the legal limit. If people continue to ignore certain aspects of the laws of copyright, then eventually the courts may have to recognize what they do as fair use. I admit that for the present that does not seem to be happening. Instead, corporations and individuals seem to be in a frenzy to claim everything as intellectual property—to copyright, patent, and trademark the world. This frenzy itself may point to a cultural concept that is approaching crisis.

If our culture were to be consistent as it moves towards a period in which electronic text becomes ubiquitous, then it would just throw the notion of copyright out. Copyright is incompatible with hypertext or with electronic writing in general. We would retain the notion for printed products but not for computer-mediated writing. There would be no such thing as copyright: people would be free to copy, link, alter, and appropriate texts as they saw fit. Society would have to evolve other means of encouraging and remunerating various kinds of writing, as indeed was the case before the institution of copyright. Clearly, this is not what will happen in the short run, yet in the long run, the gap between the cultural and legal speed limits may well become intolerable.

SYMBOLIC COMMUNICATION AND PERCEPTUAL MANIPULATION

I have now touched on various aspects of hypertextual reading and writing and offered an optimistic assessment of what the future holds— optimistic for those at this conference who are committed to exploring and elaborating the possibilities of electronic writing. There is a caution that needs to be expressed: the computer and electronic media can also be used in ways that do not foster literacy in any form, electronic or traditional.

We have been considering the computer as a means of symbolic representation and communication. This is the principal role that the computer has played in the almost fifty years since its invention. The original inventors and users of computers were scientists and engineers who needed a powerful calculator for numerical analysis. But it was soon realized that numerical analysis was only part of the larger sphere of symbolic manipulation: that the computer could manipulate letters of the alphabet or arbitrary systems as well as numbers. Since that

realization, there has been a development from databases for business purposes to word processors and outline processors to textual databases to hypertext.

In all these applications, the computer is a tool for symbolic writing. In the past couple of decades, however, the computer has been serving as a tool for a different kind of representation: graphic representation. The great success of computer-generated graphics and computer-controlled multimedia has exposed a new mass audience to electronic technology. Viewing computer graphics is also a quite different experience from reading text in a word processor. The viewer is not interacting with a symbolic structure; he or she is instead enjoying a perceptual experience provided by the machine. In graphics applications (and often in multimedia as well), the computer is functioning as a perceptual manipulator, creating or re-creating for us a world of sight and sound. When the computer is used to control recorded video clips, it is presenting segments of a televised world, and television is a medium that advertises itself as a re-creation of perceived reality. Computer graphics and animation are also attempts to create a perceptual world. Sometimes, this world resembles the real one; sometimes, it is intentionally distorted—for example, in cartoon animation. The appeal is to visual and aural perceptions: what communication goes on is through perception rather than through mathematical or alphabetic symbols. In these applications, the computer is much closer in spirit to television than to its traditional uses as a writing technology—for broadcast television too is a perceptual medium.

Perhaps the most compelling demonstrations of computer-mediated perception come from three-dimensional graphics and virtual reality. Three-dimensional environments and virtual reality present the user with a visual world that is wholly created and controlled by the machine: the user is immersed in a synthetic perceptual world. The virtual room or landscape is drawn in perspective, and when the user changes his or her view by a movement of the head, the perspective is redrawn to match. The computer has replaced our familiar perceptual world with another that has its own convincing visual logic. Virtual reality is at the moment the highest of high tech, but the goal of re-creating the perceptual world is centuries old. Its origins can be traced back at least to the development of linear perspective and realism in Renaissance painting—techniques meant to convince the viewer that the painting was a view into a real, or at least possible, world. Realism in some form dominated Western painting until the development of photography in the nineteenth century. Photography then led to animated photography, that is, film. Film was more lifelike in the sense that the image now moved. Then came electronic photography or television, which was not

more precise than film but again more lifelike in the sense that it could be immediate. Film is always recorded, but television can be "live." With virtual reality, the view is "live" in a different sense: the virtual world responds to the viewer's movements.

Virtual reality allows the viewer to step into the picture and move around in it. In realistic painting and in photography, what you get is only a framed view, a view that looks onto another world. There is a sense of depth, but there is only one perspective, the one originally defined by the artist or by the lens of the camera. And the viewer remains separated from the view. Film puts the framed world in motion, but the world is still separated from you. The same is true of television. Because television cannot be more visually precise than film, it tries another avenue. Broadcast television claims to be your window on the world, bringing you news and events as they happen: a summit meeting, the Olympics, a failed coup in Russia. The Persian Gulf War was an extraordinary example of television's attempt to put you there: live coverage was coming at times from both sides of the battle. But even with live television, what the viewer sees is a flat, framed image.

In order to put the viewer in the scene, one has to define a common space for the viewer and the image. Virtual reality takes the radical approach of surrounding the viewer with the image. It permits the viewer to pass through the frame into the depicted world. The goal of virtual reality is to replace the world as we know it through our senses with another world. This is the whole point of virtual reality for telepresence (operating a robotic device at a safe distance), for simulation (such as flight simulation), and for entertainment uses. What virtual reality attempts to eliminate is any sense of difference or separation between the viewer and the view. And computer-controlled multimedia is often conceived in the same spirit as virtual reality. Multimedia on a computer screen or separate monitor does not surround the viewer, but it is responsive to the viewer's actions. The viewer can press a button or type a command and get a new view. Multimedia puts the viewer operationally at the center of a changing world, whereas virtual reality puts the viewer visually at the center. In either case, the emphasis is on creating a world that the user can both visit and (to some extent) control.

Multimedia, virtual reality, interactive, and even conventional linear television are all examples of electronically mediated perception. There is nothing inherently wrong with this technology. What concerns me is first that users may tend to misconstrue the experience that the technology offers. It remains a mediated experience. Yet there is a strong tendency to forget the mediating character of the technology, to imagine that what the screen shows is reality. This complaint has of course

been made about broadcast television for decades—that users tend to assume that what they see is unmediated perceptual reality. The same problem exists with the new computer-controlled manifestations, particularly virtual reality. So we get the strange notion that virtual reality can put the user into immediate experiential contact with a world of his or her choosing. One enthusiast for virtual reality, Jaron Lanier, has suggested that "in virtual reality you can visit the world of the dinosaur, then become a Tyrannosaurus. Not only can you see DNA, you can experience what it's like to be a molecule" (Ditlea 1989, 97). Lanier speaks as if there were such an experience—as if you as a human subject could enter into an immediate intuitive relationship with the creatures of the Jurassic Period or with inanimate molecules. It is odd enough to ask what it would be like to be a Tyrannosaurus, but it is utterly incoherent to ask what it is like to be a molecule. A molecule is a mathematical and scientific construct. In other words, it belongs far more obviously to the world of symbolic representation than to the world of perception. The danger is that electronic media of perception will encourage some to think that they can replace symbolic representation with pure perception. If that danger seems remote, consider the fact the Lanier has already made precisely that claim: that virtual reality will usher in an era of what he calls "post-symbolic communication" (see Bolter 1991, 229-31). This is really a new version of the myth of presence—that one can forget the mediating technology and place oneself in direct contact with an objective reality. With the myth of presence and the reliance on media of perception, the whole notion of reading and writing is challenged—and not as hypertext challenges the traditional definition by providing new opportunities for symbolic interaction. The myth of presence suggests that we can do without reading and writing altogether. It suggests that symbolic structures of our culture (electronic texts as well as conventional printed books) can be replaced with electronic imagery.

Here is an important dichotomy. The computer as hypertext belongs to the tradition of the printed book or earlier forms of writing technology. The computer as graphics engine belongs to the tradition of television, radio, photography, and even realistic painting. These different traditions correspond to different forms of communication and ultimately to different kinds of knowledge: abstract or symbolic knowledge on the one hand and perceptual or procedural knowledge on the other. There is the familiar adage that a picture is worth a thousand words. In fact, no amount of verbal description can contain or constrain a picture, for a picture is simply a different form of communication. Yet the same is true in reverse. A paragraph of prose cannot be translated into a picture. Even descriptive prose is a form of symbolic communication in language that has no visual equivalent, although it may have visual analogues.

In the computer, too, text and graphics are complementary forms of communication. The question is how can we combine these two orthogonal information spaces: the visual space of graphics with the semantic space of text. In the business world, we are witnessing a number of attempted mergers: attempts to bring together the computer, the television, and the telephone into attractive packages for office or home use. Hardware and software manufacturers, entertainment companies, and telecommunications companies are busily forming alliances. All are eager to market products like the Personal Digital Assistants, combinations of faxes, telephones, databases, and notepads; two-way television for the home; video-telephones; and so on.

Many of these proposals emphasize graphics and video at the expense of textual and symbolic communication. The real challenge, I would suggest, is to insist on the importance of symbolic representation and communication in the coming development of electronic applications. In this way, we can achieve new forms of communication that combine graphics with the symbolically dense character of computerized text. The desktop metaphor of today's personal computers already points the way to such a combination: graphic elements or icons are used in conjunction with conventional alphabetic text. Hypermedia applications also show how text, graphics, animation, and video can coexist in the space of the computer. But here I would distinguish, as some others do, between multimedia and hypermedia. In hypermedia, the point is not merely to present sounds and images but to establish and present sounds and images as part of a hypertextual web. Multimedia images are related to one another and also often to elements of ASCII text. In other words, the multimedia elements are themselves textualized: they no longer pretend to be simple recorded perceptions and become instead part of a larger symbolic structure.

AN ECLECTIC FUTURE

The future of electronic communication promises to be even more eclectic than the present situation. Two- and three-dimensional graphics and animation may soon become as common in the electronic writing space as the textual databases and hypertextual documents with which we are now familiar. There will likely be two-way video and interactive television. There will likely be virtual reality games that offer the viewer the experience of being a dinosaur. There should also be applications that integrate computer graphics into symbolic structures. These applications can define a new typography, a new kind of book that can flourish only in electronic writing space. The work of the researchers here at this conference will help to insure that this new writing space

remains rich in symbolic content. If we can retain and enhance the symbolic richness of this space, then the essence of reading and writing will be preserved, and readers and writers in the electronic age will remain in touch with the five-thousand-year-long tradition of symbolic communication.

ACKNOWLEDGMENTS

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