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The Places of Books in the Age of Electronic Reproduction

The Future of Books

ACCORDING TO PATRICE HIGONNET, an outspoken critic of the new Bibliothèque de France project, its controversial architectural scheme may answer to a secret belief that the building will not have to serve for very long as a library:

The architects and managers of this devastating project simply think that books are on their way out. They may well believe that what would once have been in print will soon be electronified, microfilmed, and microfiched. In this view there will never be many books in the towers, and if there are and they do decompose, it won't matter because all those pages will soon be on CD-ROMs, on-line periodicals, and computer screens. Such suspicions are given support by some of the early plans for the library, which call for a heavy emphasis on converting books into a data base.¹

And Higonnet goes on to speculate that the project is designed to "permit cheap conversion of the towers to office space, when books have disappeared into dust."

Now whatever reservations one might have about the program of the library, it is hard to find anything in it that would justify conclusions like these. If the French government were really convinced that books were on their way out, it would make little sense to spend seven billion francs on a new building to house them. But as the saying goes, even paranoids have enemies: Higonnet would not have had to look hard to find enthusiasts of information technologies who do in fact take it for granted that both the book and the physical library are on their last legs. In a recent article in the *Library Journal* called "The End of Books," for example, the artificial intelligence entrepreneur Raymond Kurzweil predicts that the paper book will be obsolescent by the early twenty-first century, "although because of its long history and enormous installed base, it will linger for a couple of decades before reaching antiquity." With the passage of books, he suggests, new uses will have to be found for library buildings (though probably not as offices, which Kurzweil predicts will themselves be made obsolete by high-definition holographic video conferencing).

"The end of books"—the phrase must be irresistible to any writer who wants

to make his name as a visionary. No prediction could be more evocative of the changes that technology will work on culture, or better calculated to contrast the New Man's easy confidence in the face of the future with the timorous anxiety of the old-style humanist, whose vision of the bookless utopia of *Star Trek* is clouded by the specters of the bookless dystopias of 1984 or H.G. Wells's *The Time Machine*.² And bibliophiles like Higonnet inevitably rise to the bait, because their fetishism makes them susceptible to the same technological Darwinism the visionaries trade in: once the new artifacts are given a foothold they will move with remorseless logic to displace the old. You think of the passage in *The Hunchback of Notre Dame* where a scholar holds up an early printed book as he looks at the cathedral and says: "Ceci tuera cela." Except that now he's holding an Apple Powerbook, and the building in the background is the Bibliothèque nationale.

There's a temptation to respond to this with a reassuring ecumenism: "Not to worry; in the future we'll have books *and* electronic texts, the old alongside the new," and so on. This isn't wrong, but the propitiatory tone is misleading; it implies that you can introduce new communication technologies without transforming existing cultural forms. Clearly new technologies will have an effect on the book and the institutions that surround it. The trick is to try to consider these changes without slipping into a totalizing determinism, and above all without assuming that what is at stake is just a matter of artifacts. Quantitatively, the enthusiasts are unquestionably right: most books are likely to be replaced by electronic representations in the near future. But books as such—that is, bound and printed documents—are not an interesting category. In modern industrial societies, the vast majority of books bear no cultural burden at all: they are parts catalogs, census reports, Department of Agriculture pamphlets, tide tables, tax codes, repair manuals, telephone directories, airline schedules—documents whose appearance as books rather than in some other form has mostly to do with the practical requirements of display and diffusion and the limits of available technologies. The Travelers Insurance Company produces printed output at a rate of roughly a billion impressions a month, enough to fill all the shelves of the new Bibliothèque de France every six months or so. The printed documentation that accompanies the delivery of a single Boeing 747 weighs about 350 tons, only slightly less than the airplane itself. Who would have any reservations about putting texts like these into electronic form, if it will make the world a roomier and greener place?

But of course when people talk about the future of the book they have something else in mind: works of literature, belles lettres, scholarship, and criticism, as well as the sorts of journalism, reportage, and general informative writing that the Germans call *Sachprosa*. These are the works that constitute the "patrimony" that an institution like the Bibliothèque de France is charged with conserving, the works that carry on a line of public discourse. Understood in this way, concerns about the future of the book are something more than reflexes of the nostalgia

we feel for threatened artifacts like the steam locomotive or the pinball machine. “The book” here stands in a metonymy for all of the material circumstances of print culture—not just the artifacts it is inscribed in, but the forms and institutions that have shaped its use. In this broader sense, the question becomes, Can there be print culture after print?

The visionaries’ answer is generally No, and a good thing, too. The coming replacement of the book by the computer will lead to an efflorescence of new discursive genres that are more versatile, more expressive, and more democratic than traditional print forms. For example, here is the classicist Jay David Bolter, an articulate enthusiast of the new technology:

The printed book . . . seems destined to move to the margin of our literate culture. The issue is not whether print technology will completely disappear; books may long continue to be printed for certain kinds of texts and for luxury consumption. But the idea and the ideal of the book will change: print will no longer define the organization and presentation of knowledge, as it has for the past five centuries. The shift from print to the computer does not mean the end of literacy. What will be lost is not literacy itself, but the literacy of print, for electronic technology offers us a new kind of book and new ways to write and read. . . . The computer is restructuring our current economy of writing. It is changing the cultural status of writing as well as the method of producing books. It is changing the relationship of the author to the text and of both author and text to the reader.³

I expect that most people who have worked with information technologies will share this enthusiasm about the new forms of expression and new channels of communication that they make possible. But at the same time, these technologies have certain features that force us to temper any millenarian expectations that they will wholly replace the book as vehicles for the conduct of public discourse. I am thinking here not so much of technical limitations that are likely to be overcome in time, but of features inherent in the very properties that make these media seem so superior to print—their ability to store, manipulate, and transmit huge amounts of information at a very low cost; the immateriality of the representations they traffic in; their versatility as tools for the production, diffusion, and reception of texts. What I want to argue here is that it is precisely because these technologies transcend the material limitations of the book that they will have trouble assuming its role. “The book” will change, of course, and the character of public discourse along with it, both in ways that it would be idle to try to predict in any detail. But two things are clear. First, the future of both will be shaped, not just by the available technologies, but by our ingenuity in deploying them. As Raymond Williams wrote thirty years ago about a very different set of technologies, “the crisis in communications has been caused by the speed of invention and by the difficulty of finding the right institutions in which these technical means are to be used.”⁴ And second, if history is any guide, the future will be populated with a more varied and complicated collection of forms and institutions than the present is, and we are likely to find it no less uncanny

for what it preserves than for what it alters. (What made Wells a true visionary was not his ability to predict so many of the technological marvels of the late twentieth century, but his prescience in setting them in a world where men were still wearing neckties.)

The Future of Reading

The argument that the computer will replace the printed book is simple enough. Everyone seems to be agreed that within a short time, electronic displays will be the equal of printed text—as light and as portable as books, with screen resolution and contrast roughly comparable to that of the printed page.⁵ At that point, the argument goes, the versatility of the computer will give it a decisive edge over the book as a reading medium. As Kurzweil puts it: “The personal computer of the early 2000s will . . . have enormous advantages, with pictures that can move and interact with the user, increasingly intelligent search paradigms, simulated environments that the user can enter and explore, and vast quantities of accessible material. Yet vital to its ability to truly make the paper book obsolete is that the essential qualities of paper and ink will have been fully matched.”⁶

There is no question that over the coming decades electronic displays will come to be an increasingly important medium for reading and manipulating texts of all kinds, including the kinds of books associated with literary culture. There are a lot of reasons why you might want to have Proust online, after all. You can search the text for words and phrases, you can copy passages into other documents, you can annotate the text extensively (electronic representation makes it possible to prepare critical editions of a thoroughness and complexity that are unattainable in print).⁷ And what is most important, you can carry it around in a very small space or access it from anywhere with a very small device. In the end, the choice will come down to putting into your briefcase a two-pound copy of *Swann's Way* or a two-pound computer that contains the whole *Remembrance of Things Past*, not to mention all of the *Nouvelle Revue Française* and the *Grand Larousse*.

Still, most people are usually content to carry around one book of Proust at a time, and their interest in manipulating the text stops at being able to sit somewhere and turn its pages. And for these purposes, I think it is very unlikely that the computer will replace the book as a reading tool in the way that it has replaced the typewriter as a writing tool. The argument that Kurzweil gives presupposes a greatly oversimplified picture of what happens when we read. On this account, the chief function of a medium of presentation is to deliver a text directly to consciousness in a transparent way, so as to establish an unmediated psychological relation between the author and the reader. This is a common understanding of

the process of reading; Georges Poulet spoke about it in terms of the phenomenal disappearance of the book at the moment we engage the text: “Such is the initial phenomenon produced whenever I take up a book, and begin to read it. . . . Where is the book that I held in my hands? It is still there, and at the same time it is there no longer, it is nowhere. That object wholly object, that thing made of paper, as there are things made of metal or porcelain, that object is no more, or at least it is as if it no longer existed, as long as I read the book. For the book is no longer a material reality. It has become a series of words, of images, of ideas which in their turn begin to exist.”⁸

If one accepts that the physical volume plays no part in interpretation once the text is delivered to the eye, then it seems to make sense to frame the contrast between the book and the computer in terms of an opposition between the purely perceptual properties of the page and the screen. But there is more to reading than this. As Roger Chartier puts it, “Reading is not just an abstract operation of intellection: it is an engagement of the body, an inscription in space, a relation to oneself and others.”⁹ And even when the electronic display has achieved perceptual parity with the printed page, it will not be equivalent to the book with regard to these other aspects of reading—corporeal, spatial, and social.

Let us begin with the body. Defenders of the book often stress the “pleasure of handling books” as a reason for their continued use. Of course this argument sometimes amounts to little more than an appeal to the bibliophile’s pleasure in handling his possessions. And while we are all susceptible to this sensation, it has little to do with reading as such, and it is unlikely to play much of a role in the future of books. In purely economic terms, the interests of bibliophiles will support only a limited production of gift books, luxury editions, and the like, and in fact collectors should secretly welcome the general disappearance of the book, which would invest their possessions with added rarity and their preoccupations with the distinction of conspicuous impracticality. Then too, a portable computer is itself an eminently fetishizable commodity—not exactly the same as a book, perhaps, but both objects keep one’s hands agreeably busy in one’s lap.¹⁰

But there is another way in which books engage us physically, not as commodities, but as embodiments of particular texts; and this affects even books that are implausible objects of desire, like textbooks or paperback mysteries. The connection between the text and the volume has its origin in the ontogeny of reading. Before children learn to decipher books—quite probably, in order to learn to decipher them—they assign them magical power according to physical particularities that somehow enable each of them to evoke its own unique story. And these are properties that an electronic representation, being immaterial, cannot have. (It is unlikely that virtual reality will soon be developed to the point of being able to render *Pat the Bunny* in all its sensory complexity.)

It’s true that the book is demystified when we learn to decode the written language—must be demystified, so that we can take up the mystery of the story

in earnest. But the book remains crucially an “inscription in space,” whose physical presence is a constant element in the process of interpretation. For in fact the disappearance of the book that Poulet describes is illusory. However engaged we may feel by the text, the volume never is completely absent from perception. That is why we can often close our eyes and recover the image of a passage we have read according to what part of the page it appears on, and why our custom of saying that we have read something *in* a book is more than mere idiom. What makes possible the impression that Poulet reports is the way the book is absorbed (or “compiled”) in the act of reading. But that is possible only because of the particular correspondence the volume bears to the text. A book doesn’t simply contain the inscription of a text, it *is* the inscription. It is as fat as the text is long, it opens at the beginning of the text, and if we break off our reading, we are left literally *in media res*. This property is crucial to the way we read any book whose content is essentially linear or narrative, as we subconsciously register the external boundaries of the volume in terms of the space between our thumb and forefinger, and reckon our place in the text accordingly. As Jane Austen wrote in the final chapter of *Northanger Abbey*, “My readers . . . will see in the tell-tale compression of the pages before them, that we are all hastening together to perfect felicity.”

A computer doesn’t have to store texts in a form that corresponds to the space they occupy when they are displayed; that is the source of all its informational capacity. But for just this reason, there is no perceptible correlation between the boundaries of the texts we read on a computer and the physical properties of the artifact or the display itself. So there is inevitably a sense of disconnection between the text that is immediately present to the senses and the text that stretches out indefinitely and invisibly on either side of it—reading Proust in a window is like viewing Normandy through a bombsight. Of course windows with scroll bars don’t exhaust the devices for representing the reader’s place in an electronic text, and other visual metaphors may be more intuitive and less intrusive. But however ingenious these interfaces are, they remain representations, at a physical remove from the boundaries of the text itself. You literally cannot grasp an electronic text in its entirety.¹¹

Perhaps someday the book and the electronic display will converge in an electronic display so thin and flexible that it is all but indiscernible from a printed page. At that point we might speak of a genuine electronic book—something that has most of the useful physical properties of a traditional book, but which can also be erased, updated, annotated, searched, and so forth. But if such a convergence does take place, it will be because the technology has become for all purposes invisible. Phenomenally, the electronic book will have to handle like a book, just as the electronic piano has to handle like a piano. And in the meantime it’s likely that the printed book will remain the preferred medium for sustained, serious reading of the kinds of texts associated with literary culture, with elec-

tronic versions of these texts becoming available for other purposes. This by no means precludes an increasing role for documents involving multimedia, interactivity, hypertext, and other features that can only be engaged in electronic form. Up to now most of the work on these media has concentrated on resource documents like encyclopedias, image catalogues, critical editions, and textbooks, partly because their print equivalents already have relatively nonlinear structures, and partly because there is a more mature market for documents like these among institutions like schools and libraries, who are in a position to acquire the equipment and software required to read them. As the technology becomes more widely available and standardized, however, we can expect to see much more of the new forms that people have been experimenting with: hypertext fictions, multimedia travel books, and the rest.¹² But there is no reason to suppose that these genres will replace traditional textual forms. The mere fact that a modality is available doesn't mean that authors or readers will find it generally convenient or necessary. Novelists may chafe under the tyranny of linearity, for example, and long for forms that make the spatialization of narrative something more than a metaphor, but when it comes to the crunch, it's a safe bet that most of them will be unwilling to throw linearity over the side. In short, the bookless library is a very unlikely prospect, just like the paperless office that a number of people were enthusiastically predicting around fifteen years ago.

The Future of Publishing

But as I said earlier, it is not books as such we are interested in, but the forms and institutions that surround their use. And here technology promises to have more significant effects, even on traditional "print-and-distribute" publishers. Some of the most significant changes will come from the introduction of high-resolution digital printers, for example, that permit demand printing of copies from electronically stored files—a boon to university presses, reprint houses, and scientific publishers, who have relatively small press runs and who now have to maintain costly inventories over a long backlist life. (The Harvard Business School has already adopted this method for publishing its case studies, for example.)¹³ But certainly the most far-reaching changes in publishing will come when these technologies are combined with the technologies of electronic diffusion, so that texts can be delivered over an electronic net to users who can either view them on screen or send them to a local printer to make high-quality bound paper copies. At this point publishing seems no longer to be subject to many of the laws that govern the production and distribution of physical commodities.

Speaking very roughly, the electronic corpus consists of two types of texts. First, there are the secondary or derivative representations of traditionally pub-

lished books, or of texts intended primarily for print publication, some of them available as images and some as structured texts.¹⁴ These include texts drawn from composers' tapes, newspaper and magazine stories prepared for news wire distribution, and library holdings that have been scanned for purposes of conservation or for electronic use and dissemination, for example the 200,000 volumes to be scanned by the Bibliothèque de France. The electronic versions of texts like these circulate in what is basically a secondary market, not necessarily in terms of their economic importance, but in terms of the way we interpret them. Whatever the form in which we actually encounter *Moby-Dick*, we read it as a traditionally published book.

But electronic distribution is increasingly becoming a primary means for publishing new materials. Established scientific and scholarly publishers have already begun to experiment with this form of distribution, largely for economic reasons.¹⁵ The economics of electronic publishing also makes it easier for individuals and organizations to take control of the publication process and cut traditional publishers out of the loop, so that jobs of editor and publisher coalesce. Institutions like libraries or research projects now can assume the publisher's role. The multinational Human Genome Project has established an extensive internal system for publication and information management, with an internal refereeing process, nomenclature committees, and so forth. And a task force of the American Physical Society has proposed establishing a worldwide physics information system that would include all of the formal literature in the field as well as a variety of databases and informal communication. At the other end of the scale, there's the electronic samizdat of Internet and the other net services, which offer a welter of discussion groups, bulletin boards, information services, databases, and electronic magazines and journals, together with individual publications that range from software to cookbooks.

Over the short run, to be sure, these forms of publication are subject to a number of technical and economic constraints. For one thing, electronic distribution is only possible within communities that have general access to the relevant hardware and to network facilities. And even within such communities, most users don't have the capacity to handle large files or complex documents (for example, documents with elaborate formatting, or which contain graphics or color), partly because of limits of hardware and partly because of a number of difficulties in standardizing document interchange. Then too, electronic publishing raises vexed economic and legal questions. For example, how should the publishers of an electronic journal charge for the use of their product? Should subscribers pay for a site license that allows them unlimited access to the files, for the time they spend logged in to the journal's server, for every shipment of a file to a printer or local station, or for every search they make in the journal's files? How does the publisher control unauthorized access or reproduction? What rights do authors and publishers have over the use and reuse of electronic doc-

uments? Who will pay for building and maintaining the extensive infrastructure that makes electronic diffusion possible?¹⁶

These problems suggest the need for wide changes in the economic and legal structures of publishing. And to the extent that one believes that it is these institutions that determine discursive roles like the “author,” the cultural implications could be considerable. My own sense is that while the technologies will require extensive revisions in conceptions of intellectual property and the like, they are unlikely to require thorough transformation, precisely because forms of public discourse will remain heterogeneous and variegated, with print continuing to play a central role. But these are more complicated issues than I can go into here. For the present I am simply going to assume that the problems will solve themselves over the course of time—that most people will have access to computers, high-speed networks, and high-resolution printers, either at home, in libraries, or at work; and that publishers and users will be able to work out economic and legal arrangements that make this sort of distribution a practicable alternative to the traditional print-and-distribute model. Ultimately, the role that electronic reproduction will play as a vehicle for public discourse will be determined by the inherent properties of the medium and by the institutions that grow up around its use. It is to these that I now turn.

Electronic Reproduction

Two features, more than anything else, set electronic technologies apart from the technologies of mechanical reproduction that have shaped the cultural role of the book. The first is the versatility of the technology: unlike mechanical antecedents like the printing press, the typewriter, or the telegraph, the computer isn’t restricted to a single role in production or diffusion. In fact, the technology tends to erase distinctions between the separate processes of creation, reproduction, and distribution that characterize the classic industrial model of print commodities, not just because the electronic technology employed is the same at each stage, but because control over the processes can be exercised at any point. There’s a nice indication of this in the way the names of modes of distribution undergo a semantic shift when they are applied to electronic domains. The difference between “posting” and “sending” an electronic memo has mostly to do with what commands a user has to enter to see the document; it is nothing like the difference between tacking a paper memo to an office bulletin board and putting copies of it in everyone’s mailbox.

The second important difference between the two technologies follows from the immateriality of electronic representations and the resulting reductions in the cost of reproduction. It remains to be seen whether information technology will substantially lower the initial costs of producing electronic documents—there

is not a lot of large-scale experience to go by here, and the sobering lesson of the past ten years is that savings and productivity gains expected from the introduction of office automation have generally proven to be elusive. One thing is certain: electronic technology reduces the incremental costs of reproduction by eliminating the economies of scale associated with the mass production of books. So the unit cost of making a copy or printout of an electronic file doesn't decrease with the number of copies made.

One important consequence of these differences is that with electronic reproduction, the user has a much greater role in the process of reproduction. In this sense electronic reproduction has more in common with the fourteenth-century scriptorium than with the print capitalism that replaced it. In the electronic world, as in the scriptorium, texts are "copied" (that is, transferred, downloaded, displayed, or printed) by individual users when and where they are needed. For this reason it makes no sense to talk about the "printings" or "editions" of an electronic document, all the more so because the master or source file of a text can be changed at any time. And as in the scriptorium, the physical properties of the document can vary from one copy to the next. It can be left to the user or the local environment to determine the binding, paper stock, size, and even fonts of the printed volume, or the layout and appearance of a screen representation. Finally, it is the individual user who determines the modularity of the document, that is, the particular chunk of text that it contains.

All of this affects the way documents are used and reproduced. Let me begin with modularities. A mass-produced book is both bound and bounded in a way that's replicated for all its instances: each copy contains the same text in the same order. But the computational representations of texts can be divided and reassembled in an indefinitely large number of documents, with the final form left to the decision of the individual user. To say that the reader "writes" an electronic text is not simply a conceit of reception theory. This feature of the technology has figured prominently in the speculations of visionaries, who foresee a day when categories like "literature" and "knowledge" are freed from the trammels of narrativity and decomposed into a set of propositional atoms that readers can reassemble *ad libitum*. Reading what people have had to say about the future of knowledge in an electronic world, you sometimes have the picture of somebody holding all the books in the library by their spines and shaking them until the sentences fall out loose in space: "Transclusion is a way to include, to quote, parts of a document without losing its current (or any subsequent) contexts, and without it becoming a physical part of the new text (which could be a movie, hyperfiction document, you name it). In this fashion one might see all newly formulated or recorded texts, data, sounds, pictures as future 'boilerplate paragraphs' or fragments, available for viewing, digesting, and transclusion in new works."¹⁷ This makes for an appealing tableau: technology administering the death blow to the *grand récit* and ushering in the golden age of appropriation. As

a purely practical matter, though, decomposition has its limits. In most forms of discourse there is a basic integrity to a certain unit of content—the article, the short story, the book section, the encyclopedia entry—that will continue to be the natural module of distribution. But modularities above that level are strictly optional and *ad hoc*. And this has important consequences for many of the traditional publishing genres where the modularity of the volume doesn't coincide with the atomic modularities of the texts they contain: serials, newspapers, anthologies, and so on.

When a journal is electronically distributed, for example, there is no point to issuing individual numbers of the publication—that is, collections of articles bound and distributed together. Articles can still be released in bunches, but the contiguity of articles is no longer an important feature of their representation. So electronic journals will be published simply as periodically updated lists of titles and abstracts. Taken together with the reductions in production and distribution costs that accompany electronic reproduction, this change in the form of publication is likely to result in a diminution of the editorial role of the publisher of the electronic journal. Of course there are still crucial filtering functions that someone has to fill. In scientific and scholarly publishing, peer review is presumed in the collective conception of knowledge, not to mention the system of material rewards. But there is no particular reason why journal publishers should be required as middlemen in the process, particularly when the field itself has a set of institutions that can fill this role. And for the rest, electronic publication presents few disincentives to publishing large amounts of material. An electronic literary journal has no reason to decline to run a competent 10,000-word article about an obscure author simply because it is of interest only to a few subspecialists, because no one else is likely to call it up anyway. An electronic newsmagazine article on the civil war in Somalia can include forty columns of background material as a kind of sidebar interested readers can open by clicking an icon. Readers will need tools to comb through all this material, of course, but here they will be helped by a variety of new interfaces and search techniques; individual user profiles set to flag articles on certain topics and ignore others; automatic summarizers; full-text retrieval systems that pair an article with others in a database appearing to have the same content; “knowbots” they can send out to comb through a database for information on the Icelandic noun or the declining use of musk in the late eighteenth century.¹⁸ In the course of things, then, electronic journals and newspapers will become more inclusive, on the reasonable assumption that readers can ignore irrelevant information much more easily in electronic formats than if it were included in a 400-page volume stuffed in their mailbox every month.

Among other things, this entails that few readers will ever see most of the articles in an electronic journal, much less read them. So it will be hard for electronic journals to preserve the immanent intertextuality a print journal achieves

by binding articles physically together, where a reader can get to one only by traversing another. This effect is compounded by other features of electronic publication that blur the distinctions between one periodical or journal and another. Electronic search mechanisms enable readers to look for material in a number of sources with a single query or operation, so that “the literature” comes to seem a vast undifferentiated database, rather than a collection of diverse editorial streams. At the same time, texts from a single journal are less likely to have a distinctive appearance, partly because the appearance of documents will be determined by the user’s preferences and local computing and printing environments, and partly because the requirements of electronic publishing encourage the standardization of features like typography and paper size.

All of these considerations conspire to muffle the corporate voice of electronic serials, and to make it unlikely that they can come to fill the role of the traditional periodical in the sense the term has had since the eighteenth century—that is, an ongoing publication imposing a certain interpretation on texts in virtue of their physical and temporal contiguity. Nor, for the same reason, are there likely to be exact electronic equivalents of print anthologies or readers. Of course, electronic reproduction makes possible other genres of publication that print does not easily support. The most notable success to date is the kind of informal public exchange that we find in electronic bulletin boards, discussion groups, and the like. And these in turn make possible a variety of forms of self-publishing. If you’ve written an article about the Gulf War or about object-oriented programming that you want to make available to a large readership, you can simply post it where other people can get access to it and send the equivalent of a publication notice to all the relevant distribution lists and bulletin boards. In a sense, this signals the reappearance of the pamphlet, a publication genre that hasn’t played an important part in English-language public discourse since the time of Shelley—though the effectiveness of this kind of publication is limited to certain kinds of discourse, as we will see in a moment.

For many communities and discourses, the advantages of electronic publishing will make the transition worthwhile. It is not surprising that scientific and scholarly communities have taken the lead here. They have a number of economic and practical motivations for replacing print publication: the spiraling costs of journals, the inefficiency of long publication delays in fields where research progresses rapidly, the need for more effective search procedures to keep track of research.¹⁹ But the shift to electronic publication wouldn’t be possible in the absence of a social organization that enables scientific communities to compensate for features of print discourse that are lost in the transition. For example, electronic publication by itself can’t canonize an article in the way that publication in a prestigious print journal or review can, partly because of the reduction of editorial authority, and partly because the form of publication provides no guarantee that other members of the community will have seen the

article. In scientific communities, however, formal publication isn't the only or even the most important way of bringing research to the attention of the relevant audience. A large part of scientific discourse is transacted through seminars, conference papers, exchanges of photocopies, and most important, in informal discussions among practitioners (a type of discourse that electronic communication extends and enhances in very useful ways). So by the time an important paper appears in press, it's usually old news to most of the people who matter—the final publication of a result or theory confirms its status as a public fact rather than creating it.

Yet even in the scientific community the complete disappearance of the bound journal number would have some unhappy consequences. Scientific journals make use of the modularity of the number when they publish special numbers, for example. And it's striking that the most prestigious places for scientific publication are general journals that run articles on a range of topics transcending even the broadest delineation of scientific fields. A microbiologist who publishes an article in *Science* or *Nature* knows that at least 90 percent of the readership will not be in a position to read it critically. But she will also have the satisfaction of appearing on the dais alongside luminaries from other fields, in plain view of university colleagues from remote departments who will be suitably impressed by her association with *their* big names—a reciprocal exchange of reputation that allows scientists to taste the pleasures of purely literary fame. Then too, journals like *Science* provide readers with an opportunity for making serendipitous discoveries about topics whose relevance to their own work they may not have suspected, a kind of reading that tends to be discouraged by electronic journals, where search procedures generally presume that readers know in advance what they are interested in. So it is unlikely that science will wholly abandon traditional print-and-distribute publication, though versions of these journals will be available in secondary electronic representations as well.

Other Discourses, Other Publics

The features of print that make it a superior medium for journals like *Science* become still more conspicuous when we move to other kinds of discourse where the modularity of the number does more important work, and where there is no obvious social mechanism to compensate for its loss. It is hard to imagine journals like *Representations* or *Les Annales* moving to online publication, for example, at the cost of the immanent intertextuality that physical binding imposes. In fact, electronic publication will have problems adapting to any discourse in which the reader's interests are shaped less by explicit topicality than by tone or point of view. The type is epitomized by the *Atlantic Monthly* or the *New Yorker*, say, whose chief purpose is to bring us articles we had no idea we wanted

to read, about subjects we would never search out or set our reader profiles to flag for us—and more to the point, to bring no advertisements for commodities we had no idea we wanted to buy. In this regard, general-circulation magazines are much like the nineteenth-century newspaper, about which Richard Terdiman has observed that both their form and format are determined by the physical contiguities of “editorial” and “commercial” content.²⁰ The transformation of such genres to electronic distribution is not just a question of finding other ways to present advertising or new economic models for publication. When the physical contiguities of texts are altered or removed, the discursive forms themselves may become pointless or uninterpretable.

This takes me to the most basic question about electronic publication: Under what circumstances can it replace print as an instrument of publicity, in the older sense of the term; that is, as a means of making texts public objects? In its broadest form, the problem affects not just journals and periodicals but other kinds of books as well. The crucial distinction here is between two realizations of the public. The first is the intimate public whose members are connected by a welter of personal and institutional ties, where written discourse floats over a sea of conversation that adjudicates literary reputation. The scientific community is one example of this type, but so too was the classical public sphere that emerged at the beginning of the eighteenth century in the “Town” of coffeehouses, clubs, and salons, whose oral discourse was amplified and broadcast by new forms like the newspaper and the periodical. Addison estimated that every copy of *The Spectator* reached twenty readers in the coffeehouses—probably an exaggeration, but still an indication of the degree to which print discourse was regarded as an adjunct and accompaniment to oral discussion. (In the same way, when a well-established scientist sends photocopies or electronic versions of a new paper to colleagues at other labs, he can expect to precipitate flurries of reproduction at the other end.) In this context, works could become public without having been formally published—and nothing would be published, in any event, before it was submitted to the critical discussion of a coffeehouse, club, or salon, the equivalents of the modern scientific conference and system of peer review.²¹

In such communities—that is, communities constituted independently of their participation in a published discourse—electronic reproduction can accomplish most of the important work of publicity by making texts widely available to an audience that already knows how to receive them. A number of other things being equal, I see no reason why *The Spectator* and *The Tatler* could not have been distributed electronically. But it is harder to imagine electronic equivalents for the new periodicals that began to appear in the mid eighteenth century, like *The Gentleman's Magazine* or Johnson's *Rambler*, when the booksellers became the mediators of a public discourse that had been transformed into an exchange between a putatively anonymous author and the “reading public,” a community defined primarily by its participation in the print discourse itself.²² This is what

Johnson was getting at when he said that Britain had become “a nation of readers,” with the implication that books and periodicals had become the primary agents in creating the common sense of community that was constitutive of the national identity.

Benedict Anderson has given account of the formation of “imagined communities” like the nation, and of the role the book plays in their formation. Take the newspaper, which as Anderson observes is merely “an extreme form of the book,” a “one-day bestseller . . . of ephemeral popularity.” He describes the reading of the morning newspaper as a paradoxical mass ceremony:

It is performed in silent privacy, in the lair of the skull. Yet each communicant is well aware that the ceremony he performs is being replicated simultaneously by thousands (or millions) of others of whose existence he is confident, yet of whose identity he has not the slightest notion. Furthermore, this ceremony is incessantly repeated at daily or half-daily intervals throughout the calendar. What more vivid figure for the secular, historically-clocked, imagined community can be envisioned? At the same time, the newspaper reader, observing exact replicas of his own paper being consumed by his subway, barbershop, or residential neighbors, is continually reassured that the imagined world is visibly rooted in everyday life . . . creating that remarkable confidence of community in anonymity which is the hallmark of modern nations.²³

The book has several properties that make it a locus around which the nation of readers can discover and declare itself. First, it is widely distributed in identical copies over a large geographical or social territory, which ensures the replication of experience. Second, and no less important, its extension is a matter of common knowledge, in a technical sense of the term: readers in London know the paper is being read by people in Leeds, and know the people in Leeds know the paper is being read in London, and so on. Finally, readers can reach this conclusion without any direct knowledge of one another’s circumstances. This is what distinguishes the imagined community of the nation from the early eighteenth-century town. Here, the extension of the community of readers is implicit in the books themselves, or in what is said about them in other books about whose diffusion readers can have a similar confidence. (You might learn that a book was a best-seller in a private conversation with a publisher, but this information wouldn’t permit you to presuppose familiarity with it in talking to other people, the way you could if the title had appeared on a newspaper bestseller list.)

The Places of Books

Historically, these properties of the book have been intimately connected to its mode of existence. A traditional mass-produced book is two kinds of object, whose relation is determined by the uniformity of the print edition. One is the set of copies or instances that readers actually engage, objects that belong

to private life, even if they happen to be shelved in public places. The other is the work or type, a scattered object that inherits a spatial location from the locations of its copies and a temporal location from the date of their production. This is the object that can come to have a public life, as when we talk about the book as a “locus” for a certain idea; that is, a linguistic fixed point that we can use to calibrate our subsequent discourse. But our access to these public places is always mediated through copies; as the eighteenth-century philosopher George Campbell characterized it, a public locus is a “certain, steady, and well-known standard . . . which every one hath access to canvass and examine.” In ordinary speech, in fact, we often seem to refer to both kinds of objects at the same time. When we say that *L'Education sentimentale* is in the Bibliothèque nationale, for example, we imply that the work itself acquires a certain property (of distinction, accessibility, or whatever) from the location of one of its copies, a property that doesn't apply, say, to the *User's Guide to Microsoft Flight Simulator*.

But electronic documents involve a very different sort of ontology. Here, too, documents are realized by two kinds of objects, but these do not correspond to the instances or the types of a print work. First, there are the screen displays or printouts that individual users produce, the private objects in which readers physically encounter a work. But unlike copies of print works, these are generally too labile, too evanescent, and too partial to stand as surrogates for the type—an electronic work, we feel, is something more than an abstraction over the content of all the windows it is displayed in, and would exist even if no one happened ever to have called it up. Second, there are the source files in which texts are stored. These have physical locations, of course; they sit somewhere on a disk, for example. But these locations are in principle independent of the locations of displays or printouts where people encounter the text, and setting aside some practical considerations, it is of no consequence to a user to know where the source file is, or how many other versions of it exist.²⁴ What is important here is not the relation of inclusion but the relation of access: we no longer ask whether a text is “in” the Bibliothèque nationale, but whether and how easily we can get to it from there.

These properties of electronic documents raise several problems for establishing them as public loci. As we've already seen, the source files of electronic documents don't impose the same kind of uniformity on particular instances that print editions do. One telling example of this is the “individualized electronic newspaper” which has been popularized by people at the MIT Media Lab, and of which one prototype version has been developed at the IPSI Institute in Darmstadt (fig. 1).²⁵ The system enables readers to look at news stories that fit their pre-set interest profiles, or to display other stories listed in directories. It has an impressive range of functionalities: the screen can be customized according to the user's preferences, users can call up additional information or earlier stories about a topic they are interested in, and there is provision for including audio



FIGURE 1. Interface for an “individualized” electronic newspaper designed by the IPSI Institute, Darmstadt. Clicking the buttons on the right brings up screen displays of different sections of the paper, or services like dictionaries and the user’s private archive. Clicking buttons marked “background,” “interview,” and so on brings up new windows containing related stories or information. The picture is actually a single frame of a video. The newspaper is available in several display formats.

and video materials. But precisely because of its power and versatility, this form of publication will have difficulty in filling the role of the traditional newspaper as a guarantor of uniform experience. A reader has no way of knowing whether other people are reading the same stories that he is, or whether they are being given the same evaluation of the relative importance of news as conveyed by the page layout of the conventional newspaper. By the same token, the electronic newspaper will not be a “daily newspaper,” with all that that entails for the construction of the modern notion of “daily life.”²⁶ On the one hand, stories can be filed or updated as needed; on the other, relevant stories can be kept online and available until the reader decides to get to them. After all, breaking news is only a small part of the content of a modern newspaper, particularly in America; as I heard an Englishman say when a newsdealer handed him a copy of the *Sunday New York Times*, “Dear me, what can have happened since yesterday?” So the electronic newspaper will be a document that changes by gradual substitution and accretion of its parts, which readers can consult at any time of the day or week. (This has other formal consequences: as writers begin to prepare their stories

directly for electronic delivery, for example, deictic expressions like “today” and “next week” must be replaced by descriptions that presuppose no common time of utterance.) To be sure, none of this is strictly necessary. The electronic newspaper could be arbitrarily constrained to reproduce all the limitations of the daily newspaper. But it isn’t clear why readers would want this. Why should I have to wait until tomorrow morning to find out whether the Giants won this afternoon, or have to rifle through screenfuls of sports or shipping news that doesn’t interest me, or be prevented from postponing reading of the science section until I have some free time? Left to their own devices, readers will always choose personal convenience over the abstract benefits of collective uniformity.

However and whenever readers encounter the online newspaper, it will probably still count as “the” newspaper, a common point of reference for the community, if only because these services will be underwritten or by existing news-gathering organizations. In general, though, the properties of electronic documents may make it more difficult for them to achieve this kind of public status. The problem here is a kind of paradox of accessibility. The great virtue of these technologies is that they allow us to make a document “accessible” without having physically to reproduce or distribute it—it is enough to post it on a server where users can get to it. (That is, the technologies break the historical connection between reproduction and publicity implicit in the etymology of the word *publish*.) This is what makes possible the conception of “libraries without walls,” which in turn has led librarians to take up in earnest the development of standardized union catalogues.²⁷ Over the long run, though, and looking at the full range of electronic publications, the number of collections and catalogs is sure to multiply. Electronic libraries, after all, can dispense not just with walls but with all physicality; anyone can assemble a new “collection” by publishing a bibliography annotated with pointers to the electronic locations of the source files. The physicists will have their library, the Dickensians theirs, and the Freudians theirs, each group organizing the relevant literature according to its immediate interests.²⁸ In the course of things, the “electronic library” will be realized as an aggregation of catalogs, lists, and indexes of documents of every imaginable type, organized according to myriad schemes of classification, and linked and cross-indexed for search, so that they come to behave as a single database in which the lines between individual collections and catalogs are blurred. (It is an inevitable feature of the library without walls that the porosity goes both ways.)

Like Pascal’s infinite sphere, the space inhabited by electronic documents can be either exhilarating or unsettling to contemplate. On the one hand, it offers universal access to information, freedom from all constraints of space and time, even a kind of purification from the taint of embodiment:

Cyberspace: A world in which the global traffic of knowledge, secrets, measurements, indicators, entertainments, and alter-human agency takes on form. . . . A place, one place, limitless; entered equally from a basement in Vancouver, a boat in Port-au-Prince, a cab in

New York. . . . From vast databases that constitute the culture's deposited wealth, every document is available, every recording is playable, and every picture is viewable. . . . The realm of pure information, filling like a lake, siphoning the jangle of messages transfiguring the physical world, decontaminating the natural and urban landscapes, redeeming them . . . from all the inefficiencies, pollutions (chemical and informational), and corruptions attendant to the process of moving information attached to *things*.²⁹

But "cyberspace" can also evoke a tohu-bohu of databases, catalogs, newsgroups, and net services extending indefinitely in all directions, a fortuitous concourse of the scholarly and the popular, the public and the private, the perduring and the ephemeral, which presents a different aspect to every observer. And in such a world, the very fact that every text is accessible makes it difficult to privilege any of them as public objects.³⁰

To a certain extent, it is true, this chaotic impression is exaggerated by current technical limitations. When documents are all represented simply as strings of text characters with minimal formatting, collections become very difficult to browse: wandering around in a variegated document database like Dialog can feel a bit like browsing in a bookstore in which all the volumes have been stripped of their covers and reproduced with identical typographies on paper stock of the same size and quality, to the point where you cannot tell the difference between *The Great Tradition* and *The Great Train Robbery*.³¹ Doubtless this effect will be ameliorated as communications bandwidths grow and document interchange systems become more robust. Browsing a document database will never be quite as informative as browsing a bookstore or library stacks, since electronic documents don't bear physical traces of their provenance the way print books do—the price we pay for delivering them of their bodies. But it may not be much different from browsing around in a video rental outlet.

In the end, though, it will be not technology but discursive institutions that impose a discernible public order on the electronic literature, just as they do in the world of print. In the intimate publics of scientific and scholarly communities, as we've seen, professional organizations can play this role: one assumes that the electronic library of the physicists will be managed by librarians working under the aegis of institutions like the American Physics Society, who will be in a position to circumscribe and standardize the collection. For more general discourse, though, the question here is whether the electronic medium can support communities of reception that can mediate public literary reputation.

This is of course a great hope of enthusiasts, who point to electronic discussion groups and bulletin boards where "virtual communities" can take shape around a general critical discussion. The phenomenon is undeniable, but it is not clear whether these communities can be assembled at the scale of the modern reading public—the assumption that is implicit, say, in the claim that the "electronic town hall" will become the functional equivalent of the discursive institutions of the nineteenth-century American small town, but conducted over a

continent. The difficulties here are analogous to the problems we have seen with other electronic forms. For one thing, the absence of material constraints on participation tends to make these discussion groups unmanageably prolix when they get over a certain size. You can see the effect even in the discussion groups of small professional communities. From the linguists' list, for example, I receive the equivalent of ten to twenty four-page newsletters every week—and this is a moderated discussion, all of whose participants could probably be assembled in a single hotel ballroom. In larger groups unmediated discourse gets very quickly out of hand, and invariably breaks up into a number of separate conversations. The largest American commercial network service, Prodigy, has 1.5 million users. Its "arts club" contains 420 bulletin boards, which collectively receive around 22,000 messages a day; its "music club" receives another 9,000.³² It is hard to see how any critical consensus or sense of general community could emerge from such a colloquy.

The second difficulty follows from the indifference of electronic publication to constraints of time and space. It can be difficult to project the "virtual communities" of the net into actual communities that are "rooted in everyday life," to use Anderson's term—another difference between the electronic newspaper and its print equivalent, which circulates in an actual public space. The participants in electronic discussions can be anywhere, and the ease with which messages can be duplicated, forwarded, and reposted makes it very difficult to estimate the size or location of their audience. (Many users of electronic discussion groups and bulletin boards are familiar with the experience of posting a message to what they assumed was a local group only to receive a response a few days later from somebody in Prague or Sydney.) Once again, this problem is tractable for small groups: one famous case is the San Francisco area net group called *The Well*, whose members get to know each other face-to-face at regular parties. But larger electronic communities may be condemned to perpetual virtuality; once in cyberspace, it may be hard to find the road back to the world of effective action.

The End of the Book

The fragmentation of discourse, the blurring of traditional discursive roles—we have heard all this before. "The public" has always appeared an unstable aggregation. Walter Benjamin seemed to welcome the centrifugal effect of new discursive forms in "The Work of Art in the Age of Mechanical Reproduction:"

With the increasing extension of the press, which kept placing new political, religious, scientific, professional, and local organs before the readers, an increasing number of readers became writers. . . . Today there is hardly a gainfully employed European who could not, in principle, find an opportunity to publish somewhere or other comments on

his work, grievances, documentary reports, or that sort of thing. Thus the distinction between author and public is about to lose its basic character. The difference becomes merely functional.³³

and Thomas Carlyle remarked on the same phenomenon a hundred years earlier in “Signs of the Times”:

Mark, too, how every machine must have its moving power, in some of the great currents of society; every little sect among us, Unitarians, Utilitarians, Anabaptists, Phrenologists, must have its Periodical, its monthly or quarterly magazine;—hanging out, like its wind-mill, into the *popularis aura*, to grind meal for the society.³⁴

Eighteenth-century authors made the point even more vociferously, for example, in Johnson’s famous remark in *The Adventurer* that “there was never a time when men of all degrees of ability, of every kind of education, of every profession and employment were posting with ardour so general to the press.”³⁵ In retrospect, of course, these comments reveal more about the changing composition and widening of the reading public than about its imminent disintegration, which is as much a misperception as its retrospective unity.³⁶ And here, too, I suspect that the impression of disorder is likely to recede, not just because of the emergence of new institutions of reception, but because of a growing understanding that the electronic domain is not an autonomous discursive sphere, but one of a number of channels that collectively mediate public discourse.

For the foreseeable future, it is safe to assume that public texts will require as their primary avatars the kinds of print-and-distribute books that can serve as loci for all the practices associated with publicity and anti-publicity—objects that can be reviewed in other print organs, browsed in bookstores in the congenial company of like-minded clerks and shoppers, given as gifts, or publicly burned.³⁷ But as I have been at pains to point out here, none of this precludes an important role for electronic media. Conventional print-and-distribute publication may be required to establish the public presence of a text, but it isn’t necessary to sustain it. Texts will have primary, secondary, and tertiary lives, moving back and forth over scanners and printers, and each version will take on a part of the communicative work that was associated with the traditional published book. In some cases, print publication may become largely ceremonial, analogous to the common American practice of first releasing a book in hardcover to establish its claim to serious critical attention, then publishing it several months later in paperback, where it enjoys its widest circulation after its locus has been fixed. Or it may be that university presses and scholarly publishers will find it expedient to print a small initial press run using digital printers for distribution to reviewers and display at conventions, while simultaneously shipping an electronic version to university bookstores and libraries for local demand printing. In the same way, the apparatus of reception will be increasingly distributed over both media. Already the professional lists on Internet run book announcements and reviews,

and there are print publications devoted to finding one's way around the net. At some point we may in fact be justified in talking about the end of the book—not in an apocalyptic sense, but simply because the connections between cultural forms and technologies will have become so contingent and ramified that “the book” is no longer an especially interesting category.

Notes

1. Patrice Higonnet, “Scandal on the Seine,” *New York Review of Books*, 15 August 1991, 32–33.
2. In the original *Star Trek* television series, book-reading was associated with antiquarian eccentricity. The subsequent series *Star Trek: The Next Generation*, set a hundred years further in the future, has an ironic strain that was largely absent in the original: the captain is sometimes shown reading a book, and the ship has acquired a staff psychologist.
3. Jay David Bolter, *Writing Spaces: The Computer, Hypertext, and the History of Writing* (Hillsdale, N.J., 1991), 2–3. Bolter is one of a number of humanists who have seen the future in the works. Richard Lanham writes that “Electronic information . . . changes the central humanistic artifacts (the CPU, we might call it) from printed book to digital display. . . . It metamorphizes the *marketplace* of humanistic inquiry in ways so radical we can scarcely yet find our way”; “The Implications of Electronic Information for the Sociology of Knowledge,” Paper presented at conference on Technology, Scholarship, and the Humanities, National Academies of Science and Engineering, 30 September–2 October, 1992.
4. Raymond Williams, *Communications* (London, 1962), 20.
5. The screen resolution of a typical laptop computer is 72 dots per inch (dpi). Displays are already commercially available with resolutions of 300 dpi, the same as most laser printers, and screen resolutions several times better than that are possible using technology that is either already available or likely to be available soon. At 600 dpi, the resolution of current digital printers, most readers are hard put to distinguish digital and offset representations of black-and-white text, though there is still a small but perceptible difference in the display quality of halftones or color images.
6. Raymond Kurzweil, “The Future of Libraries, Part 2: The End of Books,” *Library Journal*, 15 February 1992, 140–41.
7. For a discussion of the role of computers in the preparation of critical editions, see Wilhelm Ott, “Software Requirements for Computer-Aided Critical Editing,” in Sharon Butler and William P. Stoneman, eds., *Editing, Publishing, and Computer Technology* (New York, 1988).
8. Georges Poulet, “Criticism and the Experience of Interiority,” in Jane P. Tompkins, ed., *Reader-Response Criticism* (Baltimore, 1980).
9. Roger Chartier, *L'Ordre de livres* (Aix-en-Provence, 1992), 20.
10. The argument against electronic representations is often put: “You can’t take a computer to bed with you.” Bolter has a stern answer to this objection: “The great advantage of the first printed books was that you could *not* read them in bed. Gutenberg might well have been appalled at the thought of someone taking his beautiful folio-

sized Bible to bed. For generations, most important printed books remained imposing volumes that had to be read on bookstands, so that people often read (and wrote) standing up. . . . The book in whatever form is an intellectual tool rather than a means of relaxation. If the tool is powerful, writers will put up with inconveniences to use it"; *Writing Spaces*, 4. But not all of us can measure up to so austere a standard, and in any case the response is wrong. Writing in bed on a laptop is quite as comfortable as writing on a pad. The only problem is that the computer folds horizontally, rather than vertically, so that the device sits on one's lap, rather than in it.

11. Even experienced programmers usually prefer to print out a long prose text in order to read it, far more often than they will print out a program to debug it. The difference is that a program doesn't have the kind of linear structure that a narrative does: the interpretation of a line of code doesn't depend crucially on how far it is from the beginning of the program.
12. For a stimulating survey of some of these possibilities, see George P. Landow, *Hypertext: The Convergence of Contemporary Critical Theory and Technology* (Baltimore, 1992).
13. Demand printing also makes possible the emergence as publishers of institutions like libraries, which have *only* backlists, so to speak. In the current state of the art, it costs around fifty dollars to hand-scan a 300-page book, say for purposes of electronic access or conservation (the scanning process is difficult to automate without risk to delicate originals, and advances in the mechanical technology of paper handling are likely to be slow and incremental in the immediate future). But additional bound copies can be produced for less than ten dollars, so it will be relatively cheap and easy to make copies of rare books available to other collections or to individual scholars, even assuming that these are to be distributed by conventional nonelectronic means.
14. It is likely to be a while before optical character recognition software reaches the point of being able to render imaged pages as text in a reliably automatic way, particularly with older books that have been printed with uneven lines and nonstandard fonts.
15. It has been observed that journal publishers have traditionally existed in a perfect colonial relationship to universities: academics produce the raw material and do the local administration, and the publishers refine the product and resell at a high markup to universities, who before now have not been in a position to avail themselves of the ordinary economic response of import substitution.
16. For detailed discussions of some of these questions, see the papers collected in Czeslaw Jan Grycz, ed., *Economic Models for Networked Information*, special number of *Serials Review* 18, no. 2 (1992).
17. Ian Feldman, "First Xanadu stand opens Jan. 1993, El Camino Rd, Palo Alto CA. Be there," in *TidBITS* 30/Xanadu.etx (undated net publication; c.1990, <ace@tidbits.uucp—CIS:72511,306—AOL:Adam Engst>).
18. The first three of these are already operational in experimental versions that work more or less well. The fourth is still something of an artificial intelligence pipe dream, though there are other search-and-retrieval techniques that can approximate this kind of functionality with the active collaboration of a human user.
19. Then too, scientific authors don't expect to be paid royalties for their work, and access to publications is usually mediated by libraries and other institutions, which makes it simpler to monitor use and collect fees for it. And finally, scientists have a particular interest in some of the forms of representation that are only possible with electronic publications—images of time-dependent data, dynamic equations that allow readers to assign arbitrary values to parameters, and "floated" diagrams that can be consulted whenever they are referred to in the accompanying text.

20. "Its form *denies form*, overturns the consecrated canons of text structure and coherence which had operated in the period preceding its inception. . . . The newspaper is built by addition of discrete, theoretically disconnected elements which juxtapose themselves only in response to the abstract requirements of 'layout'—thus of a disposition of space whose logic, ultimately, is commercial"; Richard Terdiman, *Discourse/Counter-Discourse* (Ithaca, N.Y., 1985), 122.
21. Even then, writers often refused to allow their names to be attached to the published version; Gray not only insisted that his "Elegy" be published anonymously, but asked the printer to add a note "to say that the work had come into his hands by accident." For an excellent discussion of the ways in which print discourse was dependent on and largely subordinate to the oral substrate before Johnson's time, see Alvin Kernan's *Printing Technology, Letters, and Samuel Johnson* (Princeton, N.J., 1987).
22. In this new public discourse, it was not necessary to maintain even a fiction of personal communication. Johnson acknowledged the new relationship in the *Rambler*, no. 23, remonstrating with readers who "were angry that the Rambler did not, like the Spectator, introduce himself to the acquaintance of the publick, by an account of his own birth and studies, an enumeration of his adventures, and a description of his physiognomy," as well as with those who "had admonished [the Rambler] to have a special eye upon the clubs of this great city, and informed him that much of the Spectator's vivacity was laid out upon such assemblies." In W.J. Bate and Albrecht B. Strauss, eds., *The Yale Edition of the Works of Samuel Johnson*, vol. 3, *The Rambler* (New Haven, 1969), 128–29. The shift has a mirror image in the development of electronic net discussions, where participants tend to take a highly personal and informal tone even when the forum has a large audience whose members are personally unknown to one another. Convention dictates, moreover, that interlocutors shall address their remarks to each other directly, rather than referring to other participants in the third person, as one would do in writing a letter to the editor of a periodical; in this way the audience is treated as an eavesdropper to a private conversation. For a discussion of some of the properties of electronic discourse, see Lee Sproull and Sara Kiesler, *Connections* (Cambridge, Mass., 1991).
23. Benedict Anderson, *Imagined Communities* (London, 1983), 39–40.
24. From the standpoint of the user, there are some reasons for wanting to know where a text is, at least to the degree that the systems we use to manipulate and access texts are likely to behave—or more to the point, to misbehave—in different ways according to whether the text is mounted on the user's own hard disk, on a machine somewhere else in the building, or on a distant file server. But for all its diagnostic interest, this information is irrelevant to the metaphysical status of the text.
25. A description of this system can be found in Christoph Hüser and Anja Weber, "The Individualized Electronic Newspaper: An Application Challenging Hypertext Technology," in R. Cordes and N. Streitz, eds., *Hypertext und Hypermedia 1992: Konzepte und Anwendungen auf dem Weg in die Praxis* (Munich, 1992), 62–74.
26. In addition to these remarks by Anderson, see Terdiman, *Discourse/Counter-Discourse*, for a discussion of the part that the daily newspaper played in shaping the conception of daily life.
27. This activity has been given first priority in the Libraries Program of the Commission of the European Community. See Gitte Larson, "The CEC Libraries Program," *Bulletin of the American Society for Information Science* (June–July 1991): 25–26.
28. Inasmuch as the elements of the collection have no inherent physical location, or at least none that matters to users, collections can be organized in an unlimited number

of ways: the contiguities among titles are entirely the creations of the cataloguer. A text that appears in the Dickens catalog under the heading "*Bleak House*, criticism of" can appear in the Freud catalog under "*Das Unheimlich*, literary examples of."

29. Michael Benedikt, "Introduction," in Benedikt, ed., *Cyberspace: First Steps* (Cambridge, Mass., 1991).
30. One can get a sense of the intricacies of the problem from the occasional eruptions of net discussions over how to cite electronic documents, given basic uncertainties about how they should be classified and which versions or source files should be taken as authoritative. See, for example, John.M.Lawler (<John.M.Lawler@um.cc.umich.edu>), "Citing LINGUIST," in *Linguist List* 3 (July 1992):575 (<linguist@tamvm1.tamu.edu>); archive ftp (ascii) anonymous@linguistics.archive.umich.edu: linguistics/linguist.list/volume.3/no.551-600; and for further comments, contributions to *Linguist List* (July 1992): 593.
31. One ancillary effect of this homogenization of the appearance of electronic documents is to blur the sense of provenance that we ordinarily register subconsciously when we are reading. As a colleague said to me not long ago, "Where did I see something about that the other day? I have a clear mental picture of a UNIX window."
32. These figures are drawn from William Grimes, "Computer Networks Foster Cultural Chatting for Modern Times," *New York Times*, 1 December 1992, B1.
33. Walter Benjamin, "The Work of Art in the Age of Mechanical Reproduction," *Illuminations*, ed. Hannah Arendt (New York, 1969), 232.
34. Thomas Carlyle, "Signs of the Times," *Critical and Miscellaneous Essays: Collected and Republished*, vol. 2, (Boston, 1860), 140.
35. Cf. also Pope's remarks in the *Dunciad* (I, 37-44):

Hence Bards, like Proteus long in vain ty'd down,
Escape in Monsters, and amaze the town.
Hence Miscellanies spring, the weekly boast
Of Curl's chaste press, and Lintot's rubric post:
Hence hymning Tyburns elegiac lines,
Hence Journals, Medleys, Merc'ries, Magazines,
Sepulchral Lyes, our holy walls to grace,
And New-year Odes, and all the Grub-street race.
36. To be sure, contemporary electronic discourse isn't quite so clearly in the line of Long Revolution as the nineteenth-century popular press, say, particularly in America, where its use has been largely restricted to a highly educated, technically sophisticated elite. But this may change if access to the technology can be made more democratic, as in the French Minitel experiment.
37. Of course someone might want to censor an electronic text, or even to eradicate all of its representations, say by means of a selective virus. But in that case each instance would die a private death. There would be occasion for public ceremonies of confiscation and destruction, and no point to them either. The purpose of such ceremonies, after all, is not to eliminate all the private copies of a book—burning is a singularly inefficient way of accomplishing that—but to symbolically purge its public presence, like pulling down a statue. And at this time, electronic books don't have this kind of presence to begin with.