LETTERS

Will Gutenberg Survive?

In partial response to Garrett Hardin's editorial "Will Xerox kill Gutenberg?" (2 Dec. 1977, p. 883), allow me to quote an old document that I have just discovered in the belongings of my great-great grandfather. I translated the document from the original Armenian, and it reads as follows:

> Father Kevork came to bless our house today. After the traditional rituals we sat down to chat. Father Kevork was greatly disturbed and incensed [no pun intended]. For some years now, it seems, the price of parchment has been hitting the ceiling. At the same time, taxes levied by Shah-Abbas (may God's curse be on him) have reached intolerable levels. To complicate matters further, the transportation routes between Pergamum and Etchmiadzin are not safe at all. Also, our beloved lazulite is becoming scarce, and no other blue could replace it in our illuminations. And the final blow has been dealt by some barbarian from Germania who prints so-called books, and these books are much cheaper than manuscripts.

Seriously, the point I am trying to make is that we are probably witnessing the beginning of book obsolescence. Xeroxing, computer-linked reproduction systems, microfilms, computer-based information retrieval systems, and so forth have begun to replace books. And in about a century or so, we will not miss books any more than we miss incunabula today. In short, in dealing with the "book crisis," we need, among other things, some historical perspective and a progressive kind of common sense.

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Xerox won't kill Gutenberg, as Hardin predicts, but computer memory systems may. The Library of Congress is planning to close its card catalog by 1980, relying on a computer cataloging system instead. Can other "hard copy" be long in following?

The economics of book publishing are unarguable, but if we reverse our perspective on Hardin's figures and look only at the author and publisher royalties, the cost per page of scientific books is reduced to 1.4 cents. If the user were to pay for printing (presumably from a local terminal with access to the computer of the publisher or of a library), it would be cheaper to buy a book than to make a copy. The practice of charging more to libraries for journals could be extended to books as well. Individuals might buy computer access to books and be

charged through their telephone company, as they are now charged for telegrams.

Such a system would provide wider and more rapid access to scholarly work; we may hope that data printers capable of fine typography will be available to those of us who like a well-designed book.

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The threat of impending bibliocide described by Hardin clearly is another example of the "tragedy of the commons" (*1*), although it is not identified as such. Here, the commons is knowledge, and a balance between the need for access to knowledge and the need for incentives to discover and to publish new knowledge is critical. According to Hardin (*1*), the remedy for misuse of a commons consists of "mutual coercion mutually agreed upon" which results in denying access to the resource or in regulating its use, such as a societal decision that the resource shall not be a commons. Denial of access might be achieved by requiring that all copyrighted materials be printed on paper impregnated with a fluorescent additive that interferes with xerographic copying; such a technique is used by our intelligence agencies. Regulation of use might involve the issuing of duplication licenses that would be revocable in cases of misuse, just as liquor licenses are. But, should these measures prove successful, they would deprive us of much of the convenience and currency afforded by xerography and thereby impede the dissemination of knowledge. The desired balance might be effected by instituting a tax on xerographic copying, with the revenue distributed to publishers. Concurrently, a tax would increase the total cost of such copying, thus restoring books to the competitive market while preserving the advantages of xerography.

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References

1. G. Hardin, *Science* **162**, 1243 (1968).

The editorial "Will Xerox kill Gutenberg?" calls attention to the increasing disparity between the economics of the printing press and xerographic copying for small runs.

The National Technical Information Service (NTIS), which announces annually about twice as many new titles as the entire U.S. book industry, sells only a few copies of many of these titles. In spite of the low volume, the development of automated xerographic equipment and order processing procedures for the NTIS service makes it possible to sell a single copy, printed on demand, for about $8 (average).

Such pioneering has made it possible, for the first time, to have easy access at low costs to limited interest publications. Visitors to NTIS concerned with the difficulties of publishing scholarly monographs have, in fact, judged its system to be a solution to this increasingly important problem.

NTIS will announce shortly its Journal Article Copy Service, which includes royalty payments to the creators of the original printed copy. In this case, the coupling of telecommunications, computers, and xerography makes it possible to add, at low cost, to the flexibility and service rendered by the existing publishers.

I suggest that the institutional adaptations to prevent bibliocide have already begun, and the prognosis is very favorable.

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A simple solution exists to Hardin's dilemma concerning the illegal copying of books: printing houses could begin to use blue and green inks that are not reproduced well by current copying machines. (Of course, new machines may be developed that *will* copy these colors inexpensively.)

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Why don't book publishers make xerographic copies of their books available, along with hardbound and paperback editions?

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The idea that xerography can displace conventional printing techniques because it is better or cheaper is completely wrong, given large enough quantities. The printed *World Almanac* costs, at retail, only one-third cent per page, and no xerographed copy is as easy to read. An energy analysis would, I think, show that xerography is intrinsically more expensive than conventional printing.

Distribution and the internalization of

costs are at the heart of the publication problem, which can be divided into seven elements: (i) generation of original material; (ii) motivation for (i); (iii) evaluation of written material; (iv) editing of written material; (v) motivation for (iii) and (iv); (vi) production of user's hard copy; and (vii) distribution.

The book system takes care of (ii) with royalties to the author, and of (v) with reimbursement and profits to the publisher. In xerography, (vi) and (vii) are partially interchanged in time, using a few publisher-distributed hard copies to generate many locally printed copies, evading the internalization of costs (ii) and (v).

Even without royalties, authors will generate new material: witness scientific papers. But publishers cannot publish at a loss forever. Xerography is a parasitic technology: it needs something to copy. If books disappear we will presumably be left with typewritten copy which can be fed into computer networks. If elements (iii) and (iv) are lacking we will surely be swamped with more trash.

If, on the contrary, the evaluation and editing now carried out by publishers are transferred to juries of peers, supported by the government, will the result be better or worse? Anyone who looks with equanimity to the imminent destruction of the host (conventional printing) by the parasite (xerography) should justify such meliorism.

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Oil Spills and Offshore Drilling

The article by William B. Travers and Percy C. Luney "Drilling, tankers, and oil spills on the Atlantic outer continental shelf" (19 Nov. 1976, p. 791) is directed at a timely problem, but the comparison it purports to make is flawed by an incomplete argument, factual errors, and a misuse of oil spill statistics taken from a report we coauthored (*1*).

We begin with the factual errors:

1) Travers and Luney state that "Since 1972 no major oil spills have occurred." Presumably the authors were unaware of the spills listed in a U.S. Geological Survey (USGS) annual report (*2*) (Table 1). There was also a large spill from the Cobia pipeline on 9 September 1974, but this incident only involved 2213 barrels, so it wouldn't fit into Travers and Luney's criterion for a "major spill" (more than 5000 barrels).

2) The authors say that before 1969 "more than 7000 wells were drilled . . . without a large oil spill occurring." Tables 1 and 5 in their article refer to four spills associated with drilling, production, and pipelines before 1969, three of which are more than 5000 barrels. St. Amant, an observer of the Gulf Coast outer continental shelf (OCS), thinks (*3*) that the worst of the Gulf spills occurred about 1961. The CATCO platform, 30 miles off Empire, Louisiana, caught fire. The fire was extinguished by dynamiting, and the well then ran crude oil for a week. A 50-square-mile slick came ashore and then blew out again, with apparently no permanent damage. Spills were not reported in those days, but this spill is well known to those who were active in offshore production at that time.

3) The authors also say that "No blowouts have occurred during drilling in the U.S. Gulf region in the past 5 years." The USGS (*2*, table A, pp. 7–11) lists 14 blowouts in the years from 1972 through 1976. One involved the complete loss of a rig. One involved heavy fire damage and three injuries. One burned for 2 days, spilling an unknown quantity of oil. Not all of these blowouts were associated with drilling (three were caused by hurricanes), but the comparison the authors purport to make between tanker imports and offshore production would appear to obviate such semantic distinctions.

In addition, there are a number of statements in the article that are logically incomplete, making review difficult. For example:

1) "Unreported spills have been significant because official offshore reports have not included tanker spills occurring in harbors or near terminals, and the Coast Guard's authority for reporting vessels extends only to the 3-mile territorial waters limit." The reference is to our report (*1*, p. 90), in which we simply said that tanker spillage was well reported in U.S. harbors and nearshore areas, but that the Coast Guard's authority for regulating oil spillage extended only to 3 miles (for foreign tankers), and so we were not sanguine regarding the completeness of the offshore ship spillage records.

2) "Offshore production and pipelines invariably introduce less crude oil and petroleum into the environment than do tankers and sources of automobile waste oil (Table 3)." A comparison like this raises the possibility of comparing every offshore activity with some "baseline" activity like sailing. Obviously we should like to know the payoff as well as the price, and so the figures of table 3 tell on-