Information in Society*

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1 Introduction

“To know how to write well is to know how
to think well.” —Blaise Pascal

Dear Blaise... welcome to the verge of the twenty-first century. You are reading text that is composed within and output from and electronic device. A device which could not have been invented before society learned how to write, and until writing changed the ways we think. (After all... what use would a Cro-Magnon have for dreaming up a Macintosh computer with a big hard drive?). What has led us from the spoken word to the word processor? This is a question I will address as I describe three related forms of communication: writing, printing, and electronic communication.

The root of these three technologies is writing. In an effort to widely and quickly disseminate written work, printing and electronic communication have evolved. With respect to Naisbitt’s quote in Megatrends, writing is the new technology, and in following the path of least resistance, it has been enhanced by printing, which in turn helps lead to another technological innovation: electronic communication.

2 Writing

As Mesopotamian society increased in complexity around the 3rd millennium BC, “Reliable records of accounts could not be kept orally. Writing was born of practical necessity.” Early written languages were pictogram–based, and served to bridge a communication gap between societies with different spoken languages.

Gradually the pictographs led to ideographic representations, which employed written characters to represent abstract ideas. Ideographic writing evolved into analytic writing, which consisted of transitional scripts with symbols added to represent certain sounds. Phonetic writing, (what you are reading right now) originated on the Sinai Peninsula around 1500 BC. This form of writing is the graphical counterpart of speech, and uses an alphabet of characters to represent the phonic elements of language: consonants, syllables, vowels, etc.

Most cultures resisted the idea of literacy—Plato said (I’m assuming he wasn’t the one who actually wrote it down) that writing destroys memory and that texts are ‘inherently contumacious.’ Yet the only reason we know Plato existed in the first place is because someone cared to write about him. Early societies with access to writing were proto–literate. In such a culture, people are aware that a system for writing exists, but it is not a common system. Before the advent of printing (explained in the next section of this exam), most literate cultures reached a level of restricted literacy. In this society, only an elite group, such as scribes or monks, know how to write. The system of writing in the restricted literacy society is often used for communication in a foreign language—not the common spoken language.

The invention of writing satisfied the growing need for a technology that could permanently record information, and communicate across time and language barriers. This invention ultimately created more needs—the need for people who were literate, the need for efficient writing tools, the need for a way to share the same written words among many, and among the few who were literate... they needed something to read!

Reading materials evolved from the clay tablet

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through the papyrus scroll to the codex, which allowed the reader random, rather than sequential access to the information contained within. One of the first social institutions to empower itself with literacy was the church. Monks are responsible for constructing and illustrating many beautiful illuminated manuscripts, such as The Book of Kells during the medieval period. The ability to read the written word of God, and to respond in the same written language must have been quite a privilege at the time. Among those elite who could read and write in cultures of restricted literacy, writing "...changed the basic form of human memory."

3 Printing

Goldsmith Johann Gutenberg is credited with combining existing technologies to mechanize the printing of text in 1454. He combined his idea for movable metal type with the screw press and attempted to reproduce in every detail the manuscript. Printing was plagued with technical problems and met with resistance from the public, who considered the new printed books to be inferior to the manuscript. Early printed books were supplemented by hand drawn illustrations to help them pass for manuscripts. "The slow and laborious process was greatly speeded up by the introduction of paper." Still, certain individuals continued to turn their noses up at this new form of communication. For example, Federigo da Montefeltro, the Duke of Urbino, would accept no printed books in his library.

Aside from the Duke, the rest of the world was enjoying the Renaissance and Enlightenment. The Protestant Church usurped some of the power of the Catholic Church by using printing as a means to distribute its common-language bibles in a rapid way. Where it once took six months to produce a single bible by hand, the printing press could now crank out one complete bible every day. The eventual success of the printing press allowed formal scholarly communication to develop through the journal. The first such journal was the Journal Des Scavans, a publication of France’s Royal Academy of Science.

With the introduction of daily newspapers in the 19th century, the final phase of literate society, mass literacy, was enabled. It is now possible for the entire population to become literate, and for society to depend upon this mass literacy. With the power to reach hundreds of people at once, printing threatened the reign of governments and of the Roman Catholic Church. With the widespread public acceptance of the printed page came its censorship and control by the powers that be. The church published its Index Expurgatorius of banned reading material, while Germany, Britain, and other nations reacted to the ‘menace’ of printing by imposing other controls and limits upon it.

Considering Naisbitt’s quote in Megatrends, we can see that writing is an original technology that is amplified through printing. Printing allows more people to share in common a body of knowledge. According to Naisbitt, this technology will follow the path of least resistance and a new technology will evolve from the printed word.

4 Electronic Media

Electronic media exists today in many forms: radio, television, videotape, audiotape, telephone, telegraph, computer file, etc. In our exploration of the technologies that have led us from the spoken word to the word processor (we’re almost there), I will discuss the forms of electronic media most relevant to the dissemination of writing. The seminal form of electronic communication was the telegraph, developed by Samuel Morse in 1834. It was so important that most electronic media today can be traced back to the telegraph. Communication by telegram afforded businesses a competitive edge- they could talk to other branches of their company almost instantly. The industrialization of the U.S.A. was dependent upon use of the telegraph.

In attempting to refine telegraph technology, Alexander Graham Bell discovered that he could broadcast his voice across a telegraph wire in 1876. Following Naisbitt’s ‘path of least resistance’... Bell’s telegraph research became what we now know as the telephone. This innovation was followed by other advances in electronic communication media: radio was introduced in 1895, television in 1927, early computers in 1942, the photocopy machine in 1946, the transistor in 1947, and ultimately the minicomputer of the 1960’s, which exploited a technology called ‘integrated circuits’ to downsize enormous computing machines to fit onto a desktop.

Between 1960 and 1980, computer based information systems evolved into practical resources for everyday use. Computer technology is advancing in every
walk of life to the point which “change is occurring so rapidly that there is no time to react.” The desire to share information between computers has inspired both local and wide area networks. One such network is the Internet, a network of computer networks which connects the academic community through a common communications protocol. The Internet allows people to share files, text articles, and electronic mail, with two large improvements over print-based communication: 1. Dissemination of information is instantaneous—you can send a letter to seven different people in seven different countries, and the message will reach them (their computer account, at least) within minutes. 2. Paper is not used.

This potential for electronic distribution of text has prompted several writers, such as Lancaster and Naisbitt to propose that we are approaching a paperless society, where it is faster and less expensive to communicate through electronic channels: “It is becoming cheaper to handle words electronically than to handle them physically, to the point where the physical mode is becoming too expensive for ordinary use.” It is easy to fit electronic publication into Naisbitt’s progression—writing is improved by printing, and now it is both easier and faster to adopt an electronic media for the dissemination of writing. It is now possible for, say, a student to type a paper on a word processor and upload it directly to a computer network, where thousands of people are free to read it as though it were a printed work.

As a new technology, all forms of electronic communication are causing a shift in the interpretation of copyright law on an international level. The idea of an intellectual work and moral rights of an author must now be considered. Government regulation of communication and potential conflicts with the first amendment are another consideration. These problems are not unlike the resistance offered to writing and to printing when they were in their infancy. It will be interesting to see, given today’s rapid pace of technological change, how we communicate in the twenty first century.

All of the major means of communication that have ever been embraced by Society remain with us to this day. Speech has successfully adapted and coexisted with many subsequent communication techniques. Certain printed publications will undoubtedly be replaced by electronic alternatives. This is especially true in fields where the rapid dissemination of information is important, as it is among scholars. When an electronic system is established for the purposes of scholarly communication, it will force publishers of journals and books to adapt their emphasis, but it will not force them out of print.

Before the scientific journal, “…the only way new scientific ideas could be made public was through specially printed and published books.” The book was soon replaced by the journal, because it afforded members of the scientific community a faster way to: establish priority claim, participate in critical debate, and gain access to needed information. Swiftness in providing scientists with these three objectives was the primary reason for choosing the journal over the book.

To assure the quality of journal content, a complex system of peer--refereeing evolved. In the model of this system by Ziman, an ‘invisible college’ of referees and editors determine which articles to publish, decline, or return for revision. This system may have been born with the introduction of the printed journal, but my own experience on the Internet convinces me that such peer review is growing into an integral part of the online or electronic journal also.

Specialization or ‘twigging’ among scholarly fields has led to an exponential growth of the number of academic journals published- there are more journals in print today than any one person can ever read. How does the resourceful researcher track down relevant and well written articles? They consult a ‘Journal of Journals’ such as an index to journals, review of journals, or abstracts of journals. Accessibility to scientific journals is declining- due to astronomical increases in price. Some journals are priced beyond the budget of university libraries. There is also a substantial time lag between the submission of articles and their actual publication. It is for these reasons, F.W. Lancaster notes, that scholars are turning to faster, informal alternatives to meet their information needs.

I believe that the scientific and academic communities are already accepting the electronic journal as the logical successor to the printed journal. There is some skepticism about it, just as people were once wary of the validity of the written word as compared against their tried and true spoken language. In the context of formal scholarly communication, a “paperless society” is indeed on the historical horizon. If the primary criteria for judging effective scholarly communication is swiftness, then an electronic equivalent will soon replace the printed journal. Only when physically neces-
sary will a work be output to paper. The resulting society may not ever become paperless, but will certainly succeed in using less paper.

As a result of electronic media technology, the role played by the book will be re-written for the 21st century. According to Daniel Bell, the book is already obsolete as a means of information storage and retrieval. I think that Business will be the first (and possibly the only) field to completely abandon the ink and paper publication. The speed afforded by electronic media and the power of the computer to manipulate information make it hard for a competitive business not to adopt the latest communication technologies. Aside from the fact that they have been passed by in the race to provide immediate dissemination of information, both the book and the printed journal will continue to enjoy their place in society as sources of learning, pleasure, and as aesthetic, collectible objects. In the practice of electronic publishing, we have not lost the book—we have merely gained an alternative means to distribute intellectual work.

Implementing a computer-based system to facilitate scholarly communication has its own set of concerns and issues. The Internet is an existing attempt at such a system. It offers users the benefits of access, file transfer, and electronic mail (which includes electronic journals) with remote systems around the world. Internet member organizations are still straightening out their kinks, which include hopelessly ‘local’ user interfaces which might instruct a remote user to ‘press the red button to log-in,’ and resolving whether to charge local users directly for access to the network.

In his proposal for an ideal National Research and Education Network, Dr. E. Brownrigg suggests ten principles be adopted for such a scholarly system. These principles provide for protection of each user’s first amendment rights, the freedom of all users to publish onto the network, a free market status for the network administration, remote access, privacy from government eavesdropping, and recognition of intellectual property which includes copyright enforcement and royalty distribution. The existing Internet has a long way to go before it achieves these goals.

Perhaps by the end of this academic year, students will be encouraged to submit their research papers and take-home exams electronically. Imagine yourself trying to evaluate this exact same intellectual work as it beams out at you from your computer monitor. It is bound to happen someday.