Projects

1. Talking about ethics, even in relation to cases others have faced, is not the same as taking ethical action. But being prepared and able to take effective ethical action requires that we take time to examine it from a distance, so to speak. One way to examine ethical action is to talk about it in abstraction and as it relates to other instances. We can also learn a great deal about ethics and ethical action, without actually being faced with the concrete realities, by assuming the roles of others who are taking such action. This project asks you to take that intermediary step, to put yourself in the place of other writers faced with negotiating appropriate ethical action.

   Assume the role of Just, the memo writer in Katz's opening example, as well as one other writer from any of the cases discussed in the articles from this chapter. Also, assume that you have adopted and are putting into practice Porter's ethical principles for professional writers. Speaking in the first person narrative, describe how you put Porter's ethical practice into action in both cases. In each narrative, examine what you have to do, the constraints and limitations you face, and the emotional responses (e.g., fear, worry, or pride) you have toward the actions you are taking. Thus, you are writing a story of your ethical/rhetorical action. Then, write a separate commentary that analyzes how your revised professional writing practice is similar to and different from the original case.

2. If we take it seriously that professional writing is ethical action, we should pay as much attention to developing phronesis and praxis as we do to developing technē and poiesis. All writing requires both, but too often we direct our attentions toward technē/poiesis and let unreflective habits drive phronesis/praxis. The following client project requires you to shift your attention toward phronesis/praxis.

   In groups of three or four, locate a client on your campus or in your local community who has a writing project you could work on for them. If you can, locate projects that are well within your reach in terms of genre knowledge, rhetorical strategies needed, technical skills required for document production, and overall time needed to complete the project. Do, however, look for projects that require you to interact with several parties. For instance, constructing a whole Web site for a campus organization would probably not be a good choice. Depending on your experience with Web page design and construction, though, creating a splash page only for the same campus organization may be a good choice.

   - At the outset of the project, discuss and develop an ethical action plan delineating the principles you agree will guide your interactions with the client and involved parties, as well as among yourselves as a co-authoring group (these will probably be two related but different plans).
   - As you work through the project, each group member should keep a journal in which you discuss judgments you have made, actions you have taken, and the reasoning behind them. (Do not look for and focus on things that you see as "ethical dilemmas," only; consider actions such as discussing design options with an audience representative as an important action which you have judged to be good, based on a certain line of reasoning.)
   - At the end of the project, write a co-authored report that summarizes and reflects on your group's ethical actions, judgments, and reasoning throughout the project. In addition to turning in your report, the final client project, and your journals to your instructor, be prepared to summarize and discuss your report with the class.

CHAPTER 5

Professional Writing as Technologically Situated Action

INTRODUCTION

The readings in Chapter 5 highlight some of the issues related to the technological contexts in which professional writing practice takes place. When writing is understood as only a way of producing something, technologies are understood as mere "tools" to help us get things done (or tools that get in the way of getting things done). Approaching writing from this direction, technological issues focus on how to use X tool, what Y tool is good for, and when a writer might want to use Z tool.

When writing is understood, also, as a social practice, technologies become more than mere tools; they become part of the context in which writing takes place. Approaching writing from this second direction, technological issues broaden. Tool-focused issues are still important. For instance, one still must address how to use HTML, what HTML is good for, and when a writer might want to use HTML. But other issues also arise, like how does writing in HTML change the writing process, the writer's relationship with a reader, and what we mean by "written texts." From this broader perspective, professional writing does not merely involve using technological tools; professional writing becomes a social practice that is situated within technological contexts. In order to increase your awareness of and sensitivity to the impact of technological contexts, keep the following questions in mind as your read the selections in Chapter 5:

- What is the relationship between technological context and writing processes?
- What is the relationship between technological context and writer-reader interactions?
- In what ways do technological contexts affect what we understand as "written texts"?
- How do technological contexts affect our definitions of what writers do and what writers must know?

One of the best ways to increase awareness of the impact technological context has on professional writing is to defamiliarize the technological contexts that have become "natural" to us. James Kalmbach's "Publishing Before Computers" helps to defamiliarize our current contexts by describing a familiar process—writing and publishing—in unfamiliar contexts. Reading about how writing and publishing were practiced in technological contexts that pre-date desktop computers clarifies how our current technological contexts affect things like writing process and writer-reader relationships.

In addition to looking back at how technological contexts affect the work of professional writers, we can and should look forward to explore how future technological contexts may influence who writers are and what writers do. Instead of putting all of the bulleted questions above in the present tense, consider them in the future tense (e.g., what will be the relationship between tomorrow's possible technological contexts and the writing process?). Professional writers need to look ahead in this way, not only so they are prepared for what is to come, but also because by looking ahead and understanding the impact technological contexts have on writing, professional writers can be active in shaping the technologies that will later shape them and their work. Stephen Bernhardt models this looking-ahead in "The Shape of Texts to Come: The Texture of Print on Screens," even though what he wrote about circa 1992 seems quite natural to us today.

One additional article, by Tharon Howard, examines one way technology complicates authorship. Copyright is often misunderstood as a way to protect authors' individual ideas, and often seen as a principle uncomplicated by context. Howard first corrects our historical understanding of copyright and then examines how electronic media complicate who is the "author" of electronic texts.

FOCUSING ON KEY TERMS AND CONCEPTS

Focus on the following terms and concepts while you read through this selection. Understanding these will not only increase your understanding of the selection that follows, but you will find that, because most of these terms or concepts are commonly used in professional writing and rhetoric, understanding them helps you get a better sense of the field itself.

1. **publishing as action**
2. **letterpress**
3. **typography**
4. **lithography**
5. **xerography**
6. **desktop publishing**
7. **economies of scale**

PUBLISHING BEFORE COMPUTERS

JAMES R. KALMBACH

Writing and writing systems are forms of technology (Ong, 1982). They are technologies in terms of how written symbols represent the sound system of a language, and they are technologies in terms of how those symbols are formed, preserved, and transmitted.[1] Publishing as action is, in its essence, an interplay between social forces and technological resources. The nature of publishing at any point in history is shaped by the actions people wish to take and the technological resources available to express those actions in writing. Over the years, publishing and the technologies for publishing have evolved from a limited, conserving activity to a pervasive form of social transaction. This evolution has always been in the direction of increasing expressiveness of written text, increasing availability of technology, and increasing interactivity.

This chapter traces the evolution of publishing technology from the invention of the alphabet in ancient Greece through to Xerox's introduction of the plain paper copier in 1960. It compresses several thousand years of innovation into a few brief pages. The goal of the argument is not to explicate these technologies in detail, but to show that even though the technologies change the ways in which these technologies are used, the social forces they respond to have remained fairly constant.

THE INVENTION OF THE ALPHABET

The alphabetic writing system, first developed in Greece around the 9th century (Gelb, 1963), is the original technology of publishing. Prior to the alphabet, writing systems were limited in the range of meanings they could communicate. Havelock (1974) suggests that the prealphabetic syllabic writing systems, which attempted to represent in print the actual, physically heard syllables of a language, could only communicate a limited range of texts. The inherent ambiguity of these writing systems made it difficult for readers to decode unique ideas.[2] Instead, topics were limited to those that were familiar and predictable to the reader:

> The record of a culture which is composed under these restrictions is likely to center upon religion and myth, for these tend to codify and standardize the variety of human experience so that the reader of such scripts is more likely to recognize what the writer is talking about (p. 35)

Source: *The Computer and the Page: Publishing, Technology, and the Classroom,* James R. Kalmbach, "Publishing Before Computers," 1997, pp. 55–69. Copyright 1997 by Ablex, a division of Greenwood Publishing Group. Reproduced with permission of Greenwood Publishing Group, Inc., Westport, CT.

[1] "The term 'writing' describes a series of technological devices which . . . assist the user in an act of recognition" (Havelock, 1974, p. 16).

[2] "One sign [in syllabic writing systems] has to represent several sounds and the open choices left to the reader . . . become extensive" (Havelock, 1974, p. 31).

In cultures dominated by these prealphabetic scripts, reading was restricted to specialists:

> Expected and recognizable discourse [in syllabic writing systems] becomes highly traditional both in form and content. Such traditionalism is characteristic of a craft, the secrets of which are carefully nurtured by its practitioners. The scribes who used these syllabaries were practitioners of this sort. The so-called literacy that they represent was craft literacy. (p. 37)

Rather than a means of achieving social action, the limited access to literacy in prealphabetic writing systems and the difficulty of interpreting unique texts meant that literacy was primarily a means of acquiring and preserving power.

The Grecian writing system's central technological innovation was to abstract away from the real sounds that syllabic writing systems attempted to represent and instead use written symbols to represent an abstract unit of phonological structure: the phoneme.[3] It was a remarkable conceptual leap. Phonemes such as *b*, *p*, *d*, *t*, *g*, and *k* only exist in the abstract. They cannot be pronounced without an accompanying vowel.[4] Separating vowels from consonants enabled the Greeks to limit the number of unique symbols in their writing system to under 30, while at the same time decrease the ambiguity of the original texts. With a writing system that represented abstract phonological structure rather than real speech, it was possible to write down (and to read) original texts. Writing systems were no longer solely a means of preserving traditional texts. They could be used to create new ideas and to communicate those ideas to others. New technologies enabled the Greeks to use written language in new ways. The result, Havelock (1974) argues, was literacy and the literate basis of modern thought.

As Lanham (1993), Ong (1982), and others have argued, alphabetic writing also introduced a fundamental dichotomy into Western civilization. On the one hand, alphabetic texts were an even better substitute for memory (Ong, 1982) than were earlier forms of writing. As a result, longer more diverse texts could be recorded and preserved. On the other hand, the fact that alphabetic writing and reading were relatively easy to learn and could be used to record and communicate original thoughts made alphabetic writing a means of resisting this conserving tendency. We have struggled ever since with this tension between the conserving and creative functions of writing (Perkinson, 1995).

FROM ORAL TO SILENT READING

The scribes in the Middle Ages who inherited the Greek tradition of alphabetic writing were clearly in the conserving camp. They saw themselves not as creators or publishers of new texts, but as keepers of great texts from past eras; "One of the main functions of the monastic institutions of the Middle Ages was to preserve manuscripts and produce good copies, cleaned of the errors made by weary copyists of the past" (Smith, 1980, p. 5). Their task was to preserve, reproduce, and interpret these texts. Perhaps because of this role as guardians of great texts, scribal publishing also elevated the book-as-a-work-of-art to its highest level.[5]

This conserving role began to break down during the Middle Ages as the act of reading gradually transformed from an oral, communal act into a silent, individual process (Saenger, 1982). Reading for the Greeks and later the Romans meant reading out loud: a slave reading to a master or one person reading to a group. Oral reading was largely mandated by the technology of the writing system. Visible texts were rendered in all-capital letters with no spaces between words and no punctuation. Such texts, Saenger argues, were designed to be a transcription of spoken language that was best read orally:

> The Roman reader, reading aloud to others or softly to himself, approached the text syllable by syllable in order to recover the words and sentences conveying the meaning of the text. . . . A written text was essentially a transcription which, like modern musical notation, became an intelligible message only when it was performed orally to others or to oneself. (p. 371)

Oral reading of such texts must have been physically exhausting and reading for meaning a constant challenge. Even with contemporary typefaces, one can get a sense of the challenge they faced when lower case letters, word spaces, and punctuation are stripped away from a text. The following passage is the opening of Jay Bolter's *Writing Spaces*, set in a Roman style:

> INVICTORHUGOSNOVELNOTREDAMEDEPARIS1482THEPRIESTREMARKEDCECITUERACELATHISBOOKWILLDESTROYTHATBUILDINGHEMEANTNOTONLYTHATPRINTINGANDLITERACYWOULDUNDERMINETHEAUTHROITYOFTHECHURCHBUTALSOTHATHUMANTHOUGHTWOULDCHANGEITSMODEOFEXPRESSIONTHATTHEPRINCIPALIDEAOFEACHGENERATIONWOULDNOLONGERWRITEITSELFWITHTHESAMEMATERIALANDINTHESAMEWAYTHATTHEBOOKOFSTONESOSOLIDANDDURABLEWOULDGIVEPLACETOTHEBOOKMADEOFPAPERYETMORESOLIDANDDURABLE

Could you read the passage silently, or did you read it quietly to yourself, pronouncing the text syllable by syllable, sacrificing meaning to make sound–letter correlations? Do you remember any of what you read, or does your head ache and your eyes hurt? Such text clearly privileges oral, linear reading.

The principle innovation that made silent reading possible in the Middle Ages was the insertion of spaces between words (Saenger, 1982). Notice how much easier the Bolter passage is to read with these spaces:

> IN VICTOR HUGOS NOVEL NOTRE DAME DE PARIS 1482 THE PRIEST REMARKED CECI TUERA CELA THIS BOOK WILL DESTROY THAT BUILDING HE MEANT NOT ONLY THAT PRINTING AND LITERACY WOULD UNDERMINE THE AUTHROITY OF THE CHURCH BUT ALSO THAT HUMAN THOUGHT WOULD CHANGE ITS MODE OF EXPRESSION THAT THE PRINCIPAL IDEA OF EACH GENERATION WOULD NO LONGER WRITE ITSELF WITH

[3] A *phoneme* is the minimal unit of sound that changes the meaning of a word. Phonemes differ from language to language. *Spit* and *pit* are the same *p* phoneme in English even though one *p* is pronounced with a puff of air and the other is not. In Arabic languages, these two *p* sounds are separate phonemes.

[4] These sounds are called stops because they "stop" the vibrating column of air created by a vowel or semivowel. Stop consonants cannot be pronounced except in combination with other sounds because without the vibrating air there is nothing to stop.

[5] *The Book of Kells*, a gorgeously illustrated biblical codex completed around 800, is a national treasure for the Irish (Olmert, 1992, p. 92).

THE SAME MATERIAL AND IN THE SAME WAY THAT THE BOOK OF STONE SO SOLID AND DURABLE WOULD GIVE PLACE TO THE BOOK MADE OF PAPER YET MORE SOLID AND DURABLE

The addition of word spacing enabled readers to group words into meaningful units, to skim texts to locate specific passages of interest, and to predict what would come next. The use of upper and lower case letters and punctuation as clues to grammatical and semantic relationships, which made it easier for readers to infer syntactic and discourse-level structures, further encouraged the move toward silent, nonlinear reading (Levenston, 1992).[6]

LETTERPRESS PRINTING

One consequence of silent reading was a dramatic increase in the amount of text that a reader could process. Saenger (1982) reports that in the 12th-century cloister libraries, books were lent out at Easter for a period of one year; "The lengthy loan period had reflected the slow pace of reading orally either to oneself or to others in small groups" (p. 396). As silent reading became more widespread, libraries had to increase their holdings to meet the demand for more texts: "In 1450, a university population which was approximately forty per cent smaller than it had been in 1300 was reading a much larger corpus of scholastic writing than had existed one hundred fifty years before" (p. 398). The traditional means of producing books by hand could not meet this demand.

These parchment books were large and difficult to use. They were rare and closely guarded, often stored in enormous metal boxes (to keep the parchment pages flat) and chained to library shelves.

Moreover, creating books by hand was slow and labor intensive. Manuscript books were hard to find and harder still to purchase. Commercial trade in books was rare. Instead, the way to acquire books was to hire copyists to create them from scratch.[7]

The invention of letterpress printing by Johann Gutenberg in the mid-15th century came at a time when manuscript books were at their artistic height. When Gutenberg produced his 42-line Bible in 1455, he took fine hand-drawn letterforms as his models because he was competing with copyists, and quality letterforms were what would appeal to patrons.[8] However, at the same time, he was developing a technology that could meet the growing demand for printed materials.

Although the scribes no doubt complained bitterly that these newfangled "printed" books were degrading the visual and tactile quality of handwritten books, they could not compete with the speed, precision, and economy of the letterpress. In the first 50 years after the invention of movable type, more books were printed (approximately 10 to 20 million) than had ever been produced before Gutenberg (Craig & Banton, 1987). Because of movable type, books became a commodity, an object of commerce, increasing the availability of printed documents for everyday users.

Letterpress printing may have established bookmaking as a commercial rather than an artistic or conserving activity, but printing was still a slow, labor-intensive process. Letterforms had to be cut in steel, matrices built, and then typecast from molten lead. Signatures had to be hand-composed, the press made ready, and paper hand-fed into and then pulled off the press. As a consequence, only the most significant manuscripts found their way into print—religious or political documents that printers thought would sell or that a patron was willing to commission.

Before the invention of movable type, all documents were created by hand; after the invention of printing, most documents were still produced by hand.[9] Letterpress printing was a technology best used to create many copies of a few documents rather than a few copies of many documents. Letterpress printing helped establish publishing as a commercial activity and made mass literacy possible by producing the books, newspapers, and pamphlets that gave people something to read, but it continued to limit access to the tools of publishing.

Letterpress printing also reinforced the dichotomy between "the book" as something to be bought, sold, and valued and the "everyday document" as something ephemeral and handwritten, to be used and discarded. Between the typeset, printed book and the everyday handwritten document lay an enormous station of opportunity.[10] Not surprisingly, inventors tried to fill that gap with machines that would be fast and simple enough to set type by hand. The first of those machines was the typewriter.

THE TYPEWRITER[11]

From its beginning, the typewriter had been conceived as a publishing device, an alternative to handwriting for everyday publishers. This intent is clear from the first patent application in 1714 by Henry Mill in England: "An artificial machine or

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[6] The consequences of this shift from oral to silent reading can still be seen today. There are more than 1,800 words in English that are pronounced the same but spelled differently (*there*, *they're*, *their*, etc.), but only about a half dozen words are spelled the same but pronounced differently (*read* and *read*). Homophones complicate sound–letter correspondences, but they make the process of identifying words in silent reading easier by signaling differences in meaning through differences in visual shape. Similarly, spelling patterns often preserve meaning at the expense of phonemic accuracy. The second *o* in photograph or photography represents two different phonemes (*/o/* and */ae/*), but keeping the spelling the same preserves the common meaning of the root word, which is an advantage in silent reading. Indeed typography and typographic variation also support silent reading. Whether a document is set in Times Roman or Helvetica has little effect on our ability to read that document out loud.

[7] Consider this description of how a 14th-century library was created: "When Cosimo de'Medici was in a hurry to form a library . . . he sent for Vespasiano, and received from him the advice to give up all thoughts of purchasing books, since those that were worth getting could not be had easily, but rather to make use of the copyists; whereupon Cosimo bargained to pay him so much a day and Vespasiano, with fifty-five writers under him, delivered 200 volumes in twenty-two months" (quoted in Chappell, 1970/1980, pp. 36–37).

[8] As a result the quality of that first Bible was remarkably high. Chappell (1970/1980) has argued that "it is possible to put the best piece of contemporary printing beside the Gutenberg Bible, and to compare the two without any concession being asked for the latter because it was produced more than five hundred years ago" (p. 19).

[9] Olmert (1992) devotes a whole chapter, "Debits and Credits: The Keeping of Accounts," to the topic of medieval everyday handwritten documents, including ledgers, court records, parish registers, wills, and insurance inventories.

[10] This dichotomy continues in contemporary discussions of electronic publishing that single out the book (rather than the newspaper or the magazine) as the primary artifact of print culture (see Bolter, 1991; Landow, 1992).

[11] The material in the next two sections is adapted from Kalmbach (1988a).

method for the impressing or transcribing of letters . . . whereby all writings whatsoever may be engrossed in paper or parchment so neat and exact as not to be distinguished from print" (quoted in Blanchard, 1981, p. E-2).

No drawing or models exist of Mill's machine. It would be another 150 years before typewriters were commercially feasible. The first American patent for a typewriter was issued in 1829 to William Austin Burt. He called his machine "Burt's Family Letter Press." The first commercial typewriter was marketed in 1852 by John Jones. His advertising copy suggests that he was going squarely after what we today would call the desktop publishing market:

> It may be advantageously used in localities remote from Printing Offices, for printing advertisements, handbills, circulars, cards, etc, . . . It is easily managed, and any child that can read will, with a few hours practice, print accurately. (quoted in Blanchard, 1981, p. E-9)

Although these 19th-century entrepreneurs hoped to bring the power of typography and letterpress printing to everyday users, they could not deliver a machine that matched their vision. Christopher Latham Scholes developed the first commercially successful typewriter in the 1870s by placing individual letters on separate bars. Each bar was activated by its own key—a move that improved speed but severely limited the quality and variety of letterforms.

Scholes's machine could use only one typeface, and that first model offered only all-capital letters. (The shift key, which made possible the inclusion of upper and lower case letterforms on a single typebar, did not appear for another two years.) For the typebars to function without jamming, each character had to be allotted an equal amount of space, and the characters had to be made visually simple so that they would reproduce accurately. Even so, image quality was uneven and spacing erratic. Those early typists could not even see what they were typing. The typebars were arranged in a circle beneath the platen, and text did not emerge until six lines after it was typed. Although the early typewriter entrepreneurs may well have dreamed of a desktop publishing market, it was Scholes's ability to deliver inexpensive, consistent speed rather than visual quality that made the typewriter a success (see Walker, 1984).

Like today's proponents of computers, desktop publishing, and hypertext, proponents of the typewriter were quick to get carried away in promoting this new technology. As early as 1872, Ely Beach announced the following in the pages of *Scientific American:*

> [The Scholes typewriter] requires no especial skill in its manipulation. A child knowing its letters may use it after an hour's instruction, and indeed any one, after short practice, can easily become able to write from 60 to 80 words per minute. (quotes in Blanchard, 1981, p. E-26)

Along the same vein, in 1922, James Collins speculated about the typewriter's likely effect on printers:

> The first inventors thought the typewriter would take the place of a pen—write letters and copy documents faster. But people quickly saw that, by using carbon paper, they could write several copies of a letter or document. That proved to be a fine thing. Thinner paper gave more copies, but not as many as its users wanted. Then Edison invented the mimeograph, by which the typewriter could write a stencil on waxed paper, and from that, thousands of copies were made. The printers were frightened! If a girl with a typewriter could make thousands of circulars, who would want printed circulars? (p. 493)

Unfortunately, no matter how much inventors and futurists promoted the typewriter, it could still only produce one page at a time. Typewriters were limited publishing devices. They offered an alternative to handwriting only when one copy was needed (or, with carbon paper, a few copies), but typewriters were not an alternative when multiple copies were needed. The gap between the high-end publishing on a letterpress and the low end publishing of a typewriter-driven office continued to be large and largely empty. Not until after World War II did the technologies of offset printing—photo-offset lithography and its electrostatic cousin xerography—fill that gap by moving reproduction from a mechanical to a chemical and eventually an electrostatic basis.

LITHOGRAPHY

Lithography was invented in 1796 by Aloys Senefelder, a struggling Bavarian playwright and musician. No one would publish his stuff so he decided to print it himself. Letterpress printing was beyond his means, so he began to experiment with alternative printing methods. According to the no doubt apocryphal story, Senefelder had just prepared a piece of limestone for etching when his mother asked him to write a laundry list for her. The laundress was waiting and there was no paper or writing ink nearby, so he wrote the list with lampblack on the clean stone. Later, he discovered, largely by chance, that the waxy lampblack could be transferred directly from the stone to paper. Senefelder had discovered an alternative to letterpress printing. Instead of creating images mechanically by pressing paper against type, he could transfer an image chemically (Lawson, 1963).

Senefelder named his new process *lithography* from the Greek for "stone writing" and abandoned the arts to develop and promote his invention. During the 19th century, lithographic stones were used to produce color prints and other illustrations. Mechanized lithographic presses were introduced in the 1840s. Photography was first used to transfer images to stone in 1857, and the offset principle of first transferring an image to a rubber blanket and then from the blanket to paper was introduced in 1875. These different innovations were first combined in 1905 with the rotary offset press (Lawson, 1963).

Pocket Pal (1984), the classic reference guide for the print industry, describes the modern process of offset lithography as follows:

> Lithography uses the *planographic* method. . . . Printing is from a *plane* or flat surface, and there are two basic differences between offset lithography and other processes: (1) it is based on the principle that grease and water do not mix, and (2) ink is *offset* first from the plate to a rubber blanket, and then from the blanket to the paper.
>
> When the printing plate is made, the printing image is rendered grease receptive and water repellant, while the non-printing areas are rendered water receptive and ink repellant. On the press, the plate is mounted on the plat cylinder which, as it rotates, comes into contact successively with rollers wet by water or dampening solution, and rollers wet by ink. The dampening solution west the non-printing areas of the plate and prevents the

ink from wetting these areas. The ink wets the image areas which are transferred to the intermediate blanket cylinder. The paper picks up the image as it passes between the blanket cylinder and the impression cylinder. (p. 28)

This offset process involves three essential steps:

1. A plate containing the image to be produced is treated in some manner so that ink is attracted by the image area and repelled by the nonimage area.
2. The image is offset from the plate to a secondary medium such as blanket.
3. The image is transferred from the blanket to paper.

Because an image is transferred from plate to blanket to paper, the plates used for offset lithographic printing can be made from materials that could not otherwise withstand the stress of imaging directly onto paper. In particular, paper plates for offset lithography were developed that could be imaged by hand or with typewriters. More popular and more effective, however, were metal or bi-metal aluminum plates that were imaged by various photographic processes.

Creating plates by photographic reproduction (rather than by hand or with a typewriter) had a number of advantages. When a plate wore out, an exact duplicate could be created photographically. Errors could be corrected on the original copy rather than on the plate or on the press. Perhaps, more significant, photographic reproduction freed graphic designers from the need to square lead type and slugs into a letterpress form. Anything that could be put on a piece of paper could be photographed and then printed.

Despite these advantages, lithographic presses were not widely used until after World War II. During the early 20th century, offset printers had to use a linotype machine to set type, pull a proof of that type off a proofing press, and then use that type to create a page (Kleper, 1976).

One alternative to hot lead were typewriter-like systems, often referred to as "cold type." These systems were based on a technology of interchangeable type elements that had originally been introduced in the 1870s to compete with Schole's typebar machine.[12] The cold-type typewriters that inherited this technology offered excellent typographic controls and a reasonable selection of typeface, although with limited type sizes.

Of these cold-type typewriters, one of the best was the IBM Composer. Introduced in 1966, the Composer offered excellent intraletter and interlinear controls with 11 true typefaces ranging from 6 to 12 points and an image quality that was outstanding: dense, black, consistent type that was easily comparable to or better than an all-text page from a laser printer.[13]

Regardless of this quality, cold-type typewriters were limited typesetting devices, and the potential of offset printing remained largely untapped until inventors figured out how to image letterforms directly onto photographic paper, a process called *phototypesetting*. The first phototypesetters were introduced in the late 1940s. They were slow, mechanical devices that operated much like their hot lead parents. The second generation of machines began appearing in the mid-1950s with the Photon 200. The third generation, using cathode tube technology, began appearing 10 years later.

The marriage of photographically produced type with photographically imaged printing plates has made offset lithography a dominate commercial printing technology. Letterpress, gravure, and other forms of printing continue largely as niche technologies. Photo-offset lithography, in the form of small table-top duplicators, also found its way into commercial and nonprofit organizations for in-house print shops. Today, however, such in-house printing has been all but replaced by a different form of offset: electrostatic printing.

XEROGRAPHY

Electrostatic printing (more commonly known as *xeroxing*) is the process used in most photocopy machines and laser printers. The Xerox machine's story is a classic tale of American business. An inventor working in his kitchen, a small company persevering in the face of skepticism and outright disbelief, and a product—the Xerox 914—combined to change the way we do work.

The process of electrostatic printing was invented by Chester Carlson in 1938.[14] Carlson had graduated from Cal Tech with a degree in Physics in 1930 just as the depression was beginning. He could not find employment as a physicist so he moved to New York, where he worked as a clerk in the patent department of a law firm. His primary tasks involved recopying manuscripts and preparing photostats of drawings for patent applications. Convinced that there had to be a better way, he converted his kitchen to a laboratory and set out to find a way to use photo conductivity to reproduce an image. The process Carlson discovered was complicated and tedious:

> The Carlson process essentially broke down into five steps. First, a special photo conductive surface was given an electrostatic charge [in early demonstrations Carlson rubbed the material with a piece of fur] which it could hold only in the dark. Once exposed to light, the charge would disappear. Next a printed page was placed in close proximity to this surface and light was shone on it so that an image of the printing was projected onto the surface. (Because of the light, the surface kept its charge only in those places occupied by the dark ink.) The third step was to dust the surface with powdered ink, which stuck to the charged portions, creating a mirror image of the printed page. This image was then transferred to a blank sheet of paper. Finally, to make it permanent, heat was applied which melted the ink and fused it to the page. (Kearns & Nadler, 1992, p. 18)

Carlson worked for years refining and promoting his invention. He convinced the Battelle Memorial Institute to invest in the process, and they in turn interested Haloid, a small photo paper company from Rochester, NY to invest.

In 1948, Haloid produced its first product based on Carlson's process: a large flatbed copier. The machine, however, was difficult to operate. A skilled operator had to go through over a dozen separate steps to complete a single copy. Haloid sent evaluation versions of the copier out to large companies. The machines all came back

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[12] Typewheel typewriters generally offered better image quality than typebar typewriters, but until IBM perfected their Selectric electric typewriter, type wheels could not compete with typebars on speed.

[13] Carte (1974), for example, advocated using an IBM Selectric Composer for "final repro typing" of technical manuals to provide readers with much more professional looking documents.

[14] The first words ever photocopied were the date and place of the event, "10–22–38 Astoria." This landmark copy is reproduced by Kearns and Nadler (1992).

with notes of apology to the effect that the process was just too difficult and messy for office use. Things looked bleak until someone from Battelle suggested that the machine might be used to image paper plates for offset lithography as press operators were used to running complicated, messy machinery. Haloid sent more prototypes out, this time to press rooms. Soon a major automobile manufacturer reported that whereas it cost them $3.12 to produce an offset page using a zinc plate, that page could be printed for 37¢ using a paper plate created with a Xerox plate maker, and that plate could image up to 20,000 copies.[15]

Haloid began marketing the Xerox paper plate maker, and throughout the 1950s, profits from the plate maker financed their efforts to bring out a plain paper office copier. That machine, the Xerox 914, was introduced in March 1960, 22 years after Carlson had invented the xeroxgraphic process. Haloid had learned from their difficulties with flatbed copiers. To use the 914, a user had only to put a sheet of paper face down on the glass, twist a dial for the number of copies (up to 15), and then press a button. Fifteen seconds later a copy emerged.[16]

In addition to making their copier easy to use, Haloid's most important innovation was to lease rather than to sell the 914 and to charge a per-page cost for copies. The machines were extremely expensive to make and would have been difficult to sell but for the fact that for only $100 per month anyone could lease one and make 2,000 free copies. After that, copies cost 4 cents. The plan was truly elegant; both large and small businesses could afford the same machine and pay according to their usage. Even better, the need to make copies seemed to feed itself. Unlimited copies of documents was one of those things people did not know they needed until they had a copier in their office. Haloid originally projected that each 914 copier would generate 10,000 copies a month. The actual number proved to be closer to 40,000. A cash cow was born. Largely on the back of a single product, Haloid was transformed from a small Rochester photographic paper maker into a major international technology company. From 1959 to 1968, Xerox (they changed the name in recognition of the success of the product) went from annual sales of $32 million to $1.25 billion.

The critical innovation in xerography was eliminating the plate (and, of course, plate preparation) from the reproduction process. With a Xerox machine, the original paper document also served as the plate. The operator simply puts the original on the glass and presses a button. The image on the paper is then optically translated into a negative electrostatic charge on a drum. This drum rotates through a bath of positively charged toner. The toner is attracted to the negatively charged areas of a drum. The drum then transfers this toner to a piece of paper, and the toner and paper are heat-sealed together.

Plate preparation is a tedious and expensive component of traditional offset printing. The original document has to be photographed to create a line negative (in which any black areas of the original page are clear and any white areas are black). Flaws in the line negative are opaqued. The negative is then "stripped" or taped onto a sheet of golden rod paper (from which rectangular boxes have been cut for each type block). The stripped negative is then attached to a photosensitive plate, and the two are exposed to an intense light. The image that the light has etched onto the plate is developed with chemicals, and the plate is coated with lacquer. All these steps have to be done for each plate before that plate can be mounted on a press and adjusted for printing.

The advantage of a plate, however, is that it can produce thousands to hundred of thousands of copies. Consequently, the cost of preparing that plate can be prorated across the number of copies needed. As the number goes up, the plate's cost per copy goes down. Because a photocopy machine does not use a plate, the cost to create a copy never changes. If the effective cost of creating one copy is 5¢, then the effective cost of creating 100 copies is $5 and the effective cost of creating 1,000 copies is $50. The cost of creating a few documents is quite reasonable, but at some point it becomes cheaper to print documents by offset lithography than it does to use a photocopy machine. Because of these differing economies of scale, chemical-based offset printing and electrostatically based photocopy machines are complimentary rather than competing technologies. Electrostatic printing can produce small numbers of copies inexpensively, but costs mount as copies increase. Offset lithographic printing can produce large numbers of copies inexpensively, but its cost per page to create small numbers is high.

The economic balance point between offset and xerographic printing has, however, been shifting. When I was in college, in the early 1970s, the quality of photocopy machines could not compare with offset printing. We could justify the cost of offset printing if we needed 100 or more high-quality copies. Today, unless special paper, halftones, or color are needed, the decision point is closer to 10,000 copies. Current machines produce not only black, text-only pages of quality comparable to offset printing, but they can print on both sides of the page and collate and bind multipage documents. A set of master pages is put in one end and a bound booklet emerges from the other.

Together the technologies of photo-offset lithography and electrostatic photocopying have helped to shape the information age we now live in. Before, if someone wanted copies of a document, he or she could copy or retype the document by hand, go to a printer and have the work reset and then printed. There was little choice in between. Today anything can be inexpensively printed, and virtually anyone who can put words or images on paper can get those words or images reproduced at a library, grocery store, or laundromat.

A number of information processing occupations (such as technical writing, proposal writing, public relations, etc.) owe their existence in large part to the offset revolution. The major genres of documents that today drive desktop publishing—newsletters, brochures, fliers, booklets, and so on—all became popular because of offset's flexibility. How many brochures would be received in the mail if each was set in hot lead type? How many manuals would be produced, and how useful would they be? Just as letterpress printing democratized literacy by making written texts available to a larger number of people, offset printing—in the form of small duplicators, photocopy machines, and laser printers—has made publishing as social action available to virtually anyone.

New purposes for published have come to supplement older ones as the technologies for creating and distributing copies have changed. Publishing evolved from a

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[15] It was perhaps the first report of using desktop publishing technology to save money by sacrificing quality.

[16] To prove the machine was easy to use, Xerox produced a television commercial in which a businessman asks his 6-year-old daughter to make a copy for him. She happily skips off. When she comes back, he asks her which is the original and which the copy, she scratches her head and says, "I forget."

preserving activity to a commercial activity as literacy levels increased and access to printed texts became widespread. Offset technologies such as lithography and xerography made the tools for creating copies even more widely available, but it would take an additional technology—the computer—to make publishing part of society's everyday transactions through writing. . . .

DEVELOPING YOUR UNDERSTANDING

1. Analyze how technology affects who reads, what gets written, and why texts are written. Use three technologies, including the Web, as examples.
2. Kalmbach, in this article, does not pay particular attention to the ways technologies affect the writer's work (e.g., where the writer works, the writer's function/role, who the writer writes to/for, who employs the writer, the prestige of the writer, and the writer's routine tasks). Briefly trace, through the technological history represented by Kalmbach, the ways technologies have affected the professional writer's work, and predict some of the ways near-future technologies might affect your work as a professional writer.
3. Describe the ways economic issues like cost, supply, demand, and economies of scale have driven the development and use of writing technologies, as well as the decay and elimination of others. Explain how these economic variables and the availability of such automated features as brochure design templates, grammar check, and fit-to-page commands can both enhance and threaten the professional writer's work.

FOCUSING ON KEY TERMS AND CONCEPTS

Focus on the following terms and concepts while you read through this selection. Understanding these will not only increase your understanding of the selection that follows, but you will find that, because most of these terms or concepts are commonly used in professional writing and rhetoric, understanding them helps you get a better sense of the field itself.

1. task-oriented reading
2. interactivity
3. functional mapping
4. modularity
5. navigational strategies

The Shape of Text to Come: The Texture of Print on Screens

STEPHEN A. BERNHARDT

Changes in the technology of text invariably trigger changes in the shape of text. Texts are undergoing monumental transformation as the medium of presentation shifts from paper to screen. We need to constantly appraise the broad drifts in the shape of text—to anticipate what now constitutes and what will soon constitute a well-formed text. We need to think about how readers interact with text—what they do with it and how. We need to anticipate where text is going: the shape of text to come.

This paper suggests some of the dimensions of change in how text is structured on the page and on the screen. It is necessarily speculative, since the topic is just beginning to receive systematic attention (Bolter; Brockmann; Horton; Kostelnick; Merrill; Rubens, "A Reader's View" and "Online Information"; Rubens and Krull; Special Issue of *Visible Language* 1984).

We have a good theoretical understanding and a highly developed practical art of the rhetoric and text structure of paper documents, and this praxis exerts a strong shaping influence over texts produced via electronic media. We are in a state of rapid evolution, with heavy borrowing on the history of text on paper, applied sometimes appropriately and sometimes inappropriately to the new medium. Because electronic text does not create a totally new rhetoric but depends for its design on the strategies of paper texts, the starting point in this analysis is not "How do screen-based texts differ categorically or essentially from their paper-based counterparts?" but "What is a framework for understanding dimensions of variation in texts across the two media?"

This paper uses a text analytical approach to identify nine dimensions of variation that help map the differences between paper and on-screen text. Screen-based text tends to exploit these dimensions to a greater degree than does paper text.

To a relatively greater extent, then, on-screen text tends to be:

Situationally Embedded: The text doesn't stand alone but is bound up within the context of situation—the ongoing activities and events that make the text part of the action.

Interactive: The text invites readers to actively engage with it—both mentally and physically—rather than passively absorb information.

Functionally Mapped: The text displays itself in ways that cue readers as to what can be done with it.

Modular: The text is composed and presented in self-contained chunks, fragments, blocks.

Navigable: The text supports reader movement across large pools of information in different directions for different readers and purposes.

Hierarchically Embedded: The text has different levels or layers of embedding; text contains other texts.

Spacious: The text is open, unconstrained by physicality.

Graphically Rich: The text exploits and integrates graphic display to present information and facilitate interaction.

Customizable and Publishable: The text is fluid, changing, dynamic; the new tools of texts make every writer a publisher.

As academics with a commitment to certain kinds of discourse, we may not see as desirable all of these developments in the ways text is structured, but they appear to

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