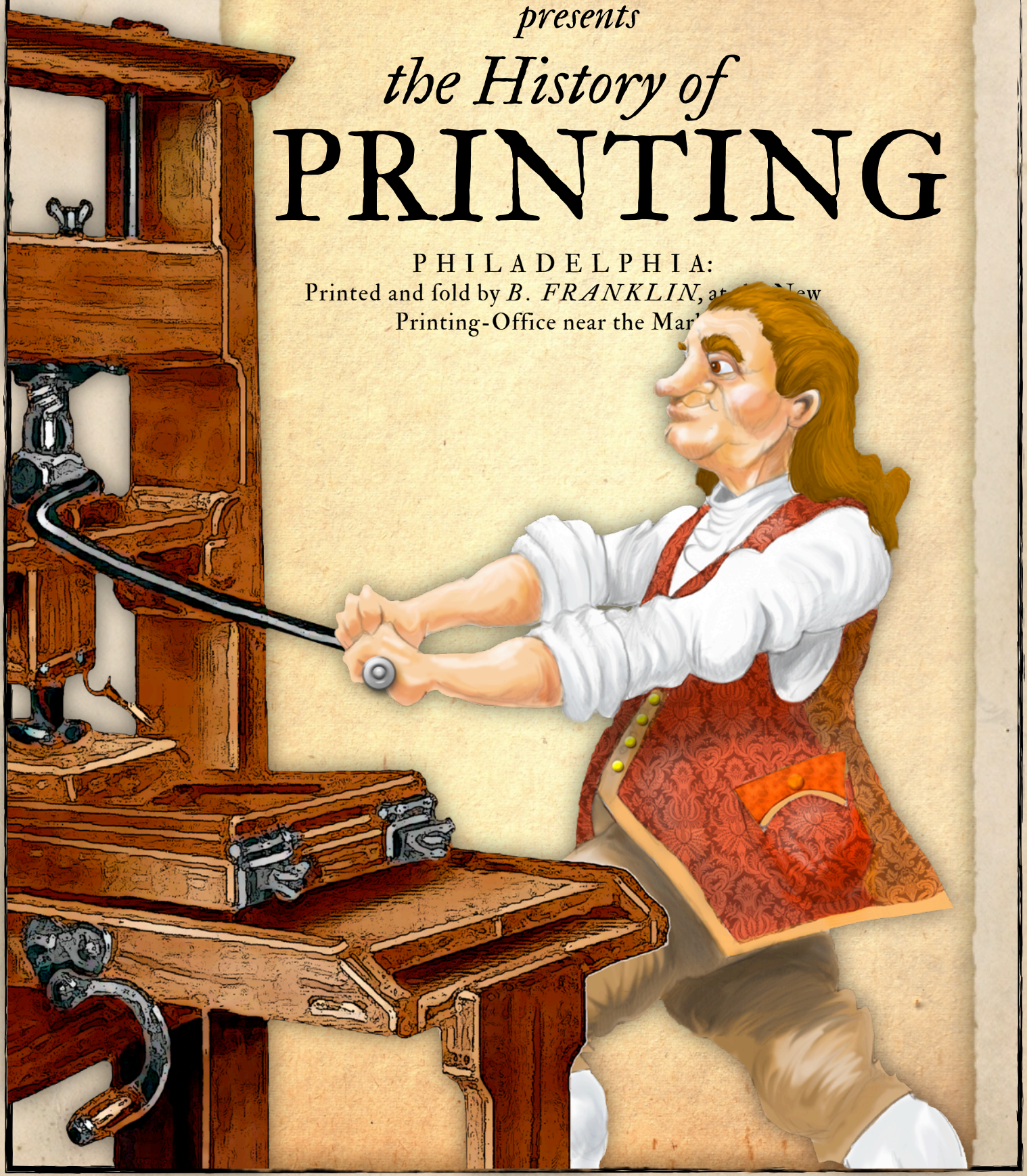
Poor Richard, an Almanack

presents

the History of PRINTING



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Printing: History

Overview

Johannes Gutenberg's invention of the printing press is widely thought of as the origin of mass communication-- it marked Western culture's first viable method of disseminating ideas and information from a single source to a large and far-ranging audience. A closer look at the history of print, however, shows that the invention of the printing press depended on a confluence of both cultural and technological forces that had been unfolding for several centuries. Print culture and technology also needed to go through centuries of change after Gutenberg's time before the "massification" of audiences could fully crystallize.

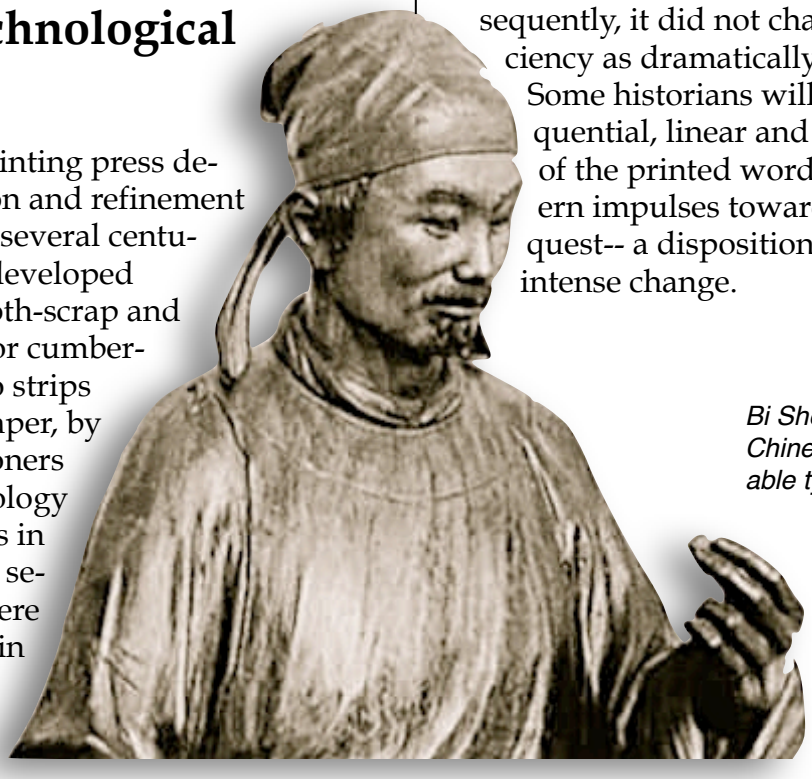
The story of print is a long and complex one. It may be too much to claim that print was the single cause of the massive social, political and psychological changes it is associated with. However, print did wield enormous influence on every aspect of European culture. Some historians suggest that print was instrumental in bringing about all the major shifts in science, religion, politics and the modes of thought that are commonly associated with modern Western culture.

China: The Technological Roots

The invention of the printing press depended on the invention and refinement of paper in China over several centuries. The Chinese had developed "rag" paper, a cheap cloth-scrap and plant-fiber substitute for cumbersome bark and bamboo strips and for precious silk paper, by A.D. 105. Chinese prisoners passed a mature technology on to their Arab captors in the eighth century. The secrets of the craft that were revealed to Europeans in the twelfth and thirteenth centuries were substantially the same techniques the Chinese had passed to the Arabs several centuries earlier.

Moveable type cut from wood. Later type was molded in clay. Thousands of characters were required for complex printing.

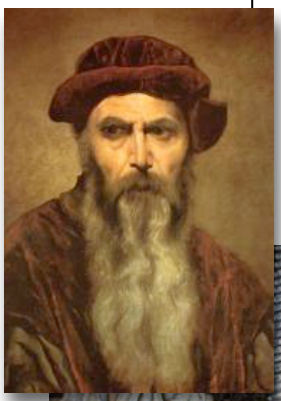
Long before the Gutenberg press, Chinese innovations in ink, block printing and movable clay type all fed the technological push toward expanding the written word's range of influence. Althought the European innovations came much later, European culture certainly felt the impact of print more dramatically than the Chinese did. Because their alphabet employs thousands of visually specific ideograms, the use of movable type was much more labor-intensive for the Chinese. Consequently, it did not change production efficiency as dramatically as it did for Europeans. Some historians will also assert that the sequential, linear and standardized character of the printed word especially suited Western impulses toward progress and conquest-- a disposition that favors quick and intense change.



Bi Sheng, the legendary Chinese inventor of moveable type.

Gutenberg and the Historical Moment in Western Europe

In the early 1450's rapid cultural change in Europe fueled a growing need for the rapid and cheap production of written documents. Johannes Gutenberg, a goldsmith and businessman from the mining town of Mainz in southern Germany, borrowed money to develop a technology that could address this serious economic bottleneck. From its European debut in the 12th century, paper gradually proved to be a viable alternative to the animal-skin vellum and parchment that had been the standard means of carrying written communication. Rag paper became increasingly cheap and plentiful while literacy expanded; the two processes accelerated, in part, by stimulating each other.



The need for documentation continued to increase with expansions in trade and in governmental scope and complexity. Scribal monks sanctioned by the Church had overseen the maintenance and hand-copying of sacred texts for centuries, but the secular world began to foster its own version of the scribal copyist profession. The many new *scriptoria*, or writing shops, that sprang up employed virtually every literate cleric who wanted work.

Gutenberg foresaw enormous profit-making potential for a printing press that used movable metal type. Despite their rapid growth in numbers, secular scribes simply could not keep up with the commercial demand for books. Gutenberg also saw strong market potential in selling indulgences, the slips of paper offering written dispensation from sin that the Church sold to fund crusades, new buildings and other projects devoted to expanding its dominance. In fact, press runs of 200,000 indulgences at a time were common soon after the handwritten versions became obsolete.

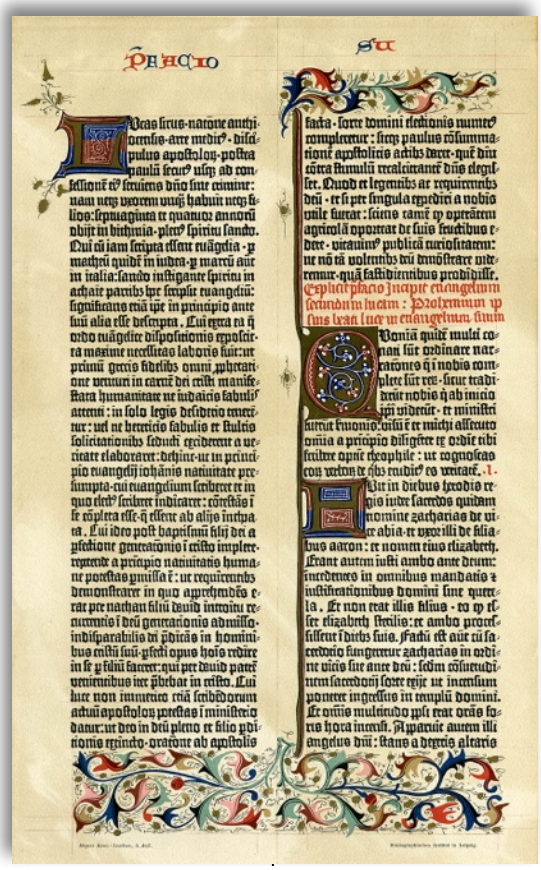
Gutenberg developed his press by combining features of existing technologies: textile, papermaking and wine presses. Perhaps his most significant innovation, however, was the efficient molding and casting of movable metal type. Each letter was carved into the end of a steel punch which was then hammered into a copper blank. The copper impression was inserted into a mold and a molten alloy made of lead, antimony and bismuth was poured in. The alloy cooled quickly and the resulting reverse image of the letter attached to a lead base could be handled in minutes.

Johannes Gutenberg (inset) and in his print shop proofing copy.

The width of the lead base varied according to the letter's size (for example, the base of an "i" would not be nearly as wide as the base of a "w"). This emphasized the visual impact of words and clusters of words rather than evenly spaced letters. This principle lent an aesthetic elegance and sophistication to what seemed to many to be the magically perfect regularity of a printed page.

Gutenberg designed a Latin print Bible which became his signature work. He launched a run of some 300 two-volume Gutenberg Bibles which sold for 30 florins each, or about three years of a clerk's wage. Despite the dramatic success of his invention, Gutenberg managed to default on a loan and lost his whole printing establishment.

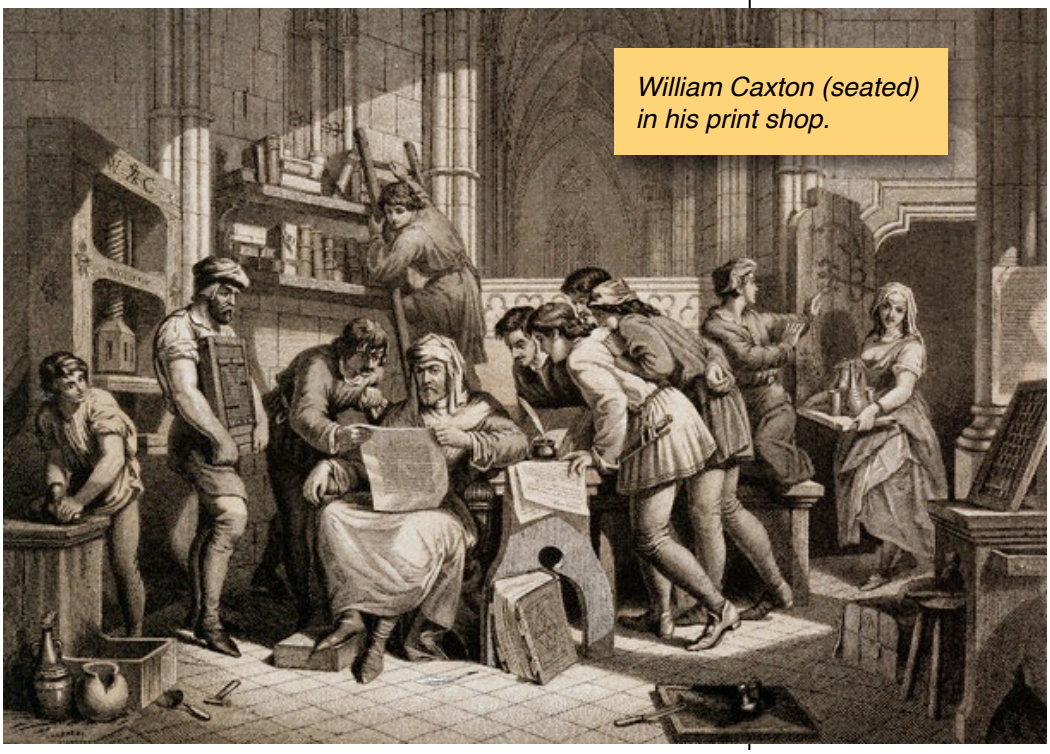
His techniques were made public and his creditor won the rights to the proceeds from the Gutenberg Bibles.
The clergy were eager to take advantage of the power of print. Printed indulgences, theological texts, even how-to manuals for conducting inquisitions became common tools for the spread of the Church's influence. But the Church had even more difficulty controlling the activities of printers than they had with the secular scribes. The production and distribution of an expanding variety of texts quickly became too widespread to contain. Printed copies of Martin Luther's theses, for example, were widely and rapidly disseminated. They prompted far-reaching discussions that became the foundation for mounting opposition to the Church's role as the sole custodian of spiritual truth. Bibles printed in vernacular languages rather than Latin fueled the Protestant Reformation based on the assertion that there was no need for the Church to interpret scripture--an individual's relationship with God could be, at least in theory, direct and personal.



A page from Gutenberg's Bible.

In 1476, William Caxton set up England's first printing press. Caxton had been a prolific translator and found the printing press to be a marvelous way to amplify his mission of promoting popular literature. Caxton printed and distributed a variety of widely appealing narrative titles including the first popular edition of Chaucer's The Canterbury Tales. Caxton was an enthusiastic editor and he determined the diction, spelling and usage for all the books he printed. He realized that English suffered from so much regional variation that many people couldn't communicate with others from their own country. Caxton's contributions as an editor and printer won him a good portion of the credit for standardizing the English language.

Print and Modern Thought



William Caxton (seated) in his print shop.

The scientific revolution that would later challenge the entrenched "truths" espoused by the Church was also largely a consequence of print technology. The scientific principle of repeatability--the impartial verification of experimental results-- grew out of the rapid and broad dissemination of scientific insights and discoveries that print allowed. The production of scientific knowledge accelerated markedly. The easy exchange of ideas gave rise to a scientific community that functioned without geographical constraints. This made it possible to systema-

tize methodologies and to add sophistication to the development of rational thought. As readily available books helped expand the collective body of knowledge, indexes and cross-referencing emerged as ways of managing volumes of information and of making creative associations between seemingly unrelated ideas.

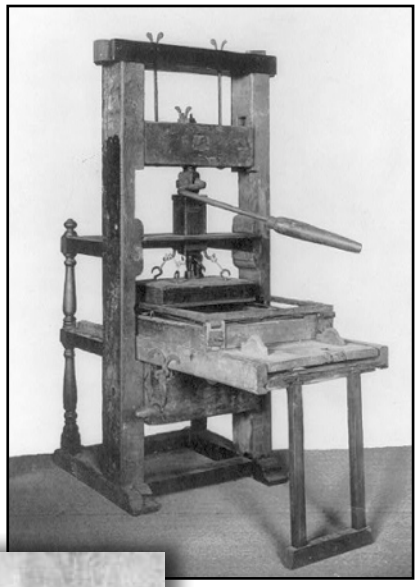
Innovations in the accessibility of knowledge and the structure of human thought that attended the rise of print in Europe also influenced art, literature, philosophy and politics. The explosive innovation that characterized the Renaissance was amplified, if not in part generated by, the printing press. The rigidly fixed class structure which determined one's status from birth based on family property ownership began to yield to the rise of an intellectual middle class. The possibility of changing one's status infused the less priveleged with ambition and a hunger for education.

Print technology facilitated a communications revolution that reached deep into human modes of thought and social interaction. Print, along with spoken language, writing and electronic media, is thought of as one of the markers of key historical shifts in communication that have attended social and intellectual transformation. Oral culture is passed from one generation to the next through the full sensory and emotional atmosphere of interpersonal interaction. Writing facilitates interpretation and reflection since memorization is no longer required for the communication and processing of ideas. Recorded history could persist and be added to through the centuries. Written manuscripts sparked a variation on the oral tradition of communal story-telling--it became common for one person to read out loud to the group.

Print, on the other hand, encouraged the pursuit of personal privacy. Less expensive and more portable books lent themselves to solitary and silent reading. This orientation to privacy was part of an emphasis on individual rights and freedoms that print helped to develop. Print injected Western culture with the principles of standardization, verifiability and communication that comes from one source and is disseminated to many geographically dispersed receivers. As illustrated by dramatic reform in religious thought and scientific inquiry, print innovations helped bring about sharp challenges to institutional control. Print facilitated a focus on fixed, verifiable truth, and on the human ability and right to choose one's own intellectual and religious path.

Print in the U.S.

Religious, intellectual and political freedom served as rallying cries for the Europeans who were drawn to the American colonies. Stephen Daye, a locksmith whose son Matthew was a printer's apprentice, brought the continent's first press to Cambridge, Massachusetts in 1638. The Dayes printed a broadside and an almanac in their first year. In 1640 they produced 1700 copies of the first book printed in the colonies, the *Bay Psalm Book*. The printing press quickly became central to political and religious expression in the New World. Writers and printers like Benjamin Franklin were heroes of the time. Print was at the heart of the dissemination and defense of visionary ideas that shaped the American Revolution.



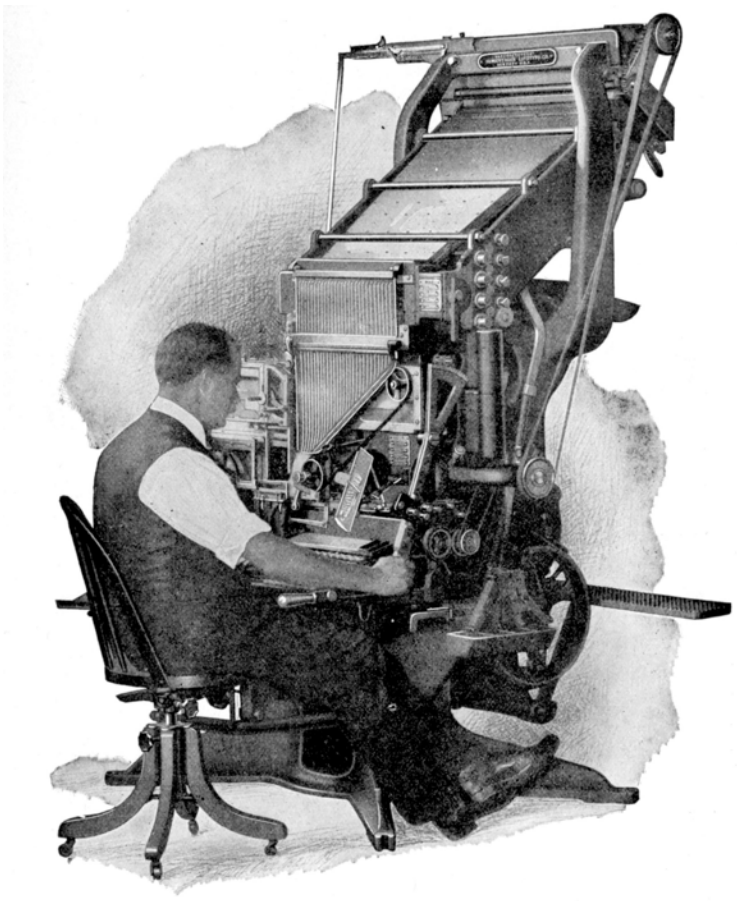
Until the 19th century Gutenberg's print technology

Daye's press (above), the first in the colonies. Ben Franklin (left) proofing a newspaper page.

had not changed dramatically. In the early 1800's the development of continuous rolls of paper, a steam-powered press and a way to use iron instead of wood for building presses all added to the efficiency of printing. These technological advances made it possible for newspaperman Benjamin Day to drop the price of his New York Sun to a penny a copy in 1833. Some historians point to this "penny press" as the first true mass medium--in Day's words, his paper was designed to "lay before the public, at a price well within the means of everyone, all the news of the day."

Advances in Print Technology

A number of dramatic technological innovations have since added a great deal of character and dimension to the place of print in culture. Linotype, a method of creating movable type by machine instead of by hand, was introduced in 1884 and marked a significant leap in production speed. The typewriter made the production and "look" of standardized print much more widely accessible. The process of setting type continued to go through radical transformations with the development of photo-mechanical composition, cathode ray tubes and laser technologies. The Xerox machine made a means of disseminating print documents available to everyone. Word processing transformed editing and contributed dramatic new flexibility to the writing process. Computer printing has already moved through several stages of innovation, from the first daisy-wheel and dot matrix "impact" printers to common use of the non-impact printers: ink-jet, laser and thermal-transfer.



An illustration of a typesetter using a Linotype "hot-press" metal cast printer

Both the Internet and interactive multimedia are providing ways of employing the printed word that add new possibilities to print's role in culture. The printed word is now used for real-time social interaction and for individualized navigation through interactive documents. It is difficult to gauge the social and cultural impact of new media without historical distance, but these innovations will most likely prove to signal another major transformation in the use, influence and character of human communication.

Related Resources

- American Museum of Papermaking
- Oral and Scribal Culture History
- History of Media
- Oxford Early Books Project
- Society For The History of Authorship, Reading & Publishing

Sources

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- Eisenstein, Elizabeth, The Printing Revolution in Early Modern Europe (Cambridge University Press, 1983).
- Olmert, Michael, The Smithsonian Book of Books (New York:Wing Books, 1992).
- The Graphion's Online Type Museum
- "Printers" in the Jones MultiMedia Encylopedia CD-ROM

Credits

--contributed by Geoffrey Rubinstein