Science, Technology, & Progress: Lessons from the History of the Typewriter

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C'est en retraçant l'histoire de la machine à écrire que l'auteure nous fait réfléchir sur l'impact des changements technologiques sur les employées de bureau. Aujourd'hui, le bureau électronique se répand partout: les employées de bureau actuellement peuvent tirer des leçons importantes de l'histoire de la première révolution technologique au bureau que fut l'introduction de la machine à écrire.

Today, workers are facing massive technological revolution, and in the front line of these changes are women white-collar workers. Barely a week goes by when there is not a new announcement, book, or major article on the "new electronic office," " automated office," "office of the future," or the "integrated office," the wonders of science and technology at last placed at the office-workers' fingertips. Proponents of this new technology have both a soft and hard-sell approach to its promotion.

The soft sell is to tell us that this new technology is labour saving. It will mean improved working conditions, the elimination of tiring and repetitious work and drudgery, the creation of new, more interesting jobs, and limitless access to information. In short, they assert that we are on the road to a wonderful, new, liberating society.

With the hard sell we are told that office-automation technology represents the "new reality." It is inevitable, it represents progress, and we cannot stop it. Proponents of the hard sell insist that we must not simply accept the new technology but must embrace it, or all will be lost.

In the face of this onslaught, we could almost forget that the quickly disappearing Office of Today was somebody's dream office of the future a hundred years ago. The first technological revolution in the office, which took place over a forty-year period from 1880 to 1920, saw the development and consolidation of the mechanical office, the entry of large numbers of women into the paid-labour force, and significant overall growth in the clerical workforce. It might be valuable to look at this first technological revolution in the office in light of the promises made and subsequent history. There are some valuable lessons for office workers today from this first technological revolution.

The quintessential tool which came to symbolize both the new mechanical office and women's entry into it was the typewriter. The typewriter, much like the new office technology today, was not the invention of a single individual. While Christopher Latham Sholes is credited with the title "father of the typewriter," Carlos Glidden and Samual W. Soule worked closely with Sholes in establishing a series of designs and patents for writing machines. In the years 1867 to 1873 the three worked closely with a machine shop in Milwaukee to design a workable, reliable, mass-producible typing machine. The technology involved in the typewriter was not trivial. In the era of cast iron, a writing machine was a hi-tech item. It needed to be built strong enough to endure daily, constant use and yet have its entire operation driven by the light touch of a finger.

The fine machining required for the typewriter was one of the most frustrating production aspects of the machine's development. In 1872 Sholes established a collaboration with one of his earliest promoters, James Densmore, who negotiated a contract with the E. Remington and Sons rifle factory. The Remington company was suffering a slump after the massive growth in production experienced a decade before, during the U.S. Civil War. While some of the slack was taken up by manufacturing farm machinery and the sewing machine, sales and production were a far cry from wartime levels. Remington was anxious to manufacture and market a writing machine with potentially limitless sales. Like many of today's electronic wonders, the typewriter was produced on production lines first developed to meet the needs of the military.

Physically the first typewriters bore a remarkable resemblance to the sewing machine. Advertisers presented it to the public as an elegant machine which looked like a sewing machine but was to be played like a piano. Typewriters featured fancy scrolling and painted flowers on their outer casing. But most of the early designs were awkward and cumbersome to use. On many models the carriage return and line spacing were accomplished by pressing a foot treadle at the base of the stand on which the typewriter stood. They printed only in capitals and on the underside of the platen instead of the front. Thus the typist was obliged to

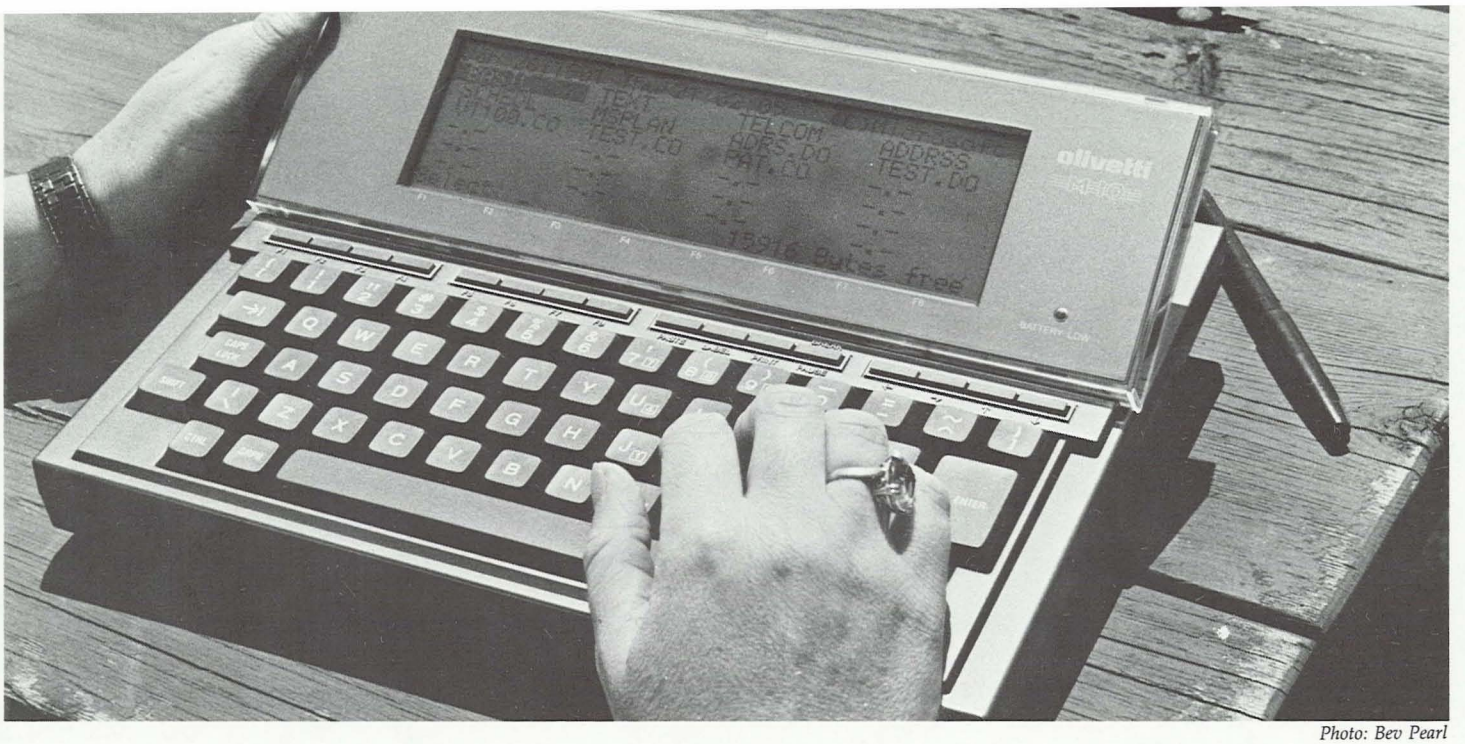

Photo: Bev Pearl

raise the carriage on its hinges to see the print.

Not all design innovations were readily accepted. When a competitor of Remington developed a typewriter which allowed the typist to see the print without lifting the platen – essentially the standard front print seen on typewriters today – Remington attempted to block this improvement by countering that good typists did not need to see what they were typing. But once the new design proved popular, Remington switched its own model to a front print.

In developing the typewriter, Sholes patented the QWERTY configuration of the typewriter keyboard. This patent constitutes the oldest major design component on modern computers. QWERTY refers to the order of the first six letters on the third row of standard keyboards. Sholes first experimented with an alphabetical configuration (elements of which can still be seen with GHJKL all in a row), but he found that with this configuration the type bars jammed easily. He then commissioned a study to determine frequency of letter combinations in the English language and redesigned the typebasket to assure maximum separation of frequent combinations.

Today, typing students who complain about the awkward layout of keyboards are most often told that the board was scientifically designed to optimize the typist's speed, when in fact it was designed to do the opposite. In the 1930s a scientific board, Dvorak, was developed with a key configuration designed to maximize typing speed. But with millions of typists trained on QWERTY, the new board never caught on, in spite of the fact that it improves typing speed from 5 to 25 per cent with approximately half the errors. Clearly it is easier to change things when machines are first being designed rather than after they have been accepted by millions of people.

Once the design problems had been conquered, marketing the new writing machine was a major challenge. Fortunately for the typewriter, its introduction corresponded with major changes beginning to take place in the office. The office before the U.S. Civil War had been small, exclusively male, and the administrative centre for an enterprise which serviced primarily a local market. Rare indeed was a business which employed more than 100 people. Clerks were administrative assistants to the owner, almost apprentice bosses. They were required to be familiar with a wide group of skills, including bookkeeping, letter drafting, correspondence, billing, and filing information. With the exception of "copy clerks," who copied correspondence by hand, there was not a highly developed division of labour in the office.

While labour shortages during the Civil War provided the impetus for women's entry into office work (primarily as copy clerks), the unprecedented growth and business consolidation in the decades following the war assured a continuing place for women. Through a series of vertical and horizontal mergers, industries integrated to form virtual monopolies in key sectors of the economy. The demanding tasks of administering firms with thousands of employees, plants, branches, and offices in many different locations, assuring supply of raw goods, transportation of finished products, sales, and overall co-ordination of the enterprise forced significant growth in office size. With significant growth in clerical staff, employers sought to rationalize the office with new work methods and procedures to keep down costs and to assure maximum control over the growing administrative workforce. This rationalization of the office consisted of three integrated parts: a major restructuring of the organization of work in the office, mechanization of office work, and the feminization of the clerical workforce.

In the restructuring, offices were broken down into separate departments. Clerks were assigned specific jobs within departments, generally leading to a deskilling of the workforce. Where once clerks were required to be familiar with all aspects of a company's books, now they were required to know only one aspect, such as billing or preparing accounts receivable.

Mechanization led to the development and integration of machines for the office. While some individual machines predated the mechanical office, their full power was not revealed, nor did they sell terribly well, until they were linked with the restruc-

Photo: Bev Pearl

turing of work and as part of a new office system of communications, calculations, and copying. Typewriters, telegraphs, telephones, teletype, tickertape, Edison dictating machine, adding machines, tabulators, and accumulators individually were curiosities, but in concert they heralded the mechanized office.

The final component of the office rationalization was the hiring of women. As long as the clerk's position was seen as an apprenticeship for becoming a businessman, owner, or boss, it was inconceivable that a woman could hold such a position. But in the newly organized offices, women could hold new, deskilled positions – as long as it was clear that they could not advance to managerial positions. Few male clerks could object to the mechanization of the lowest job in the office. Copying had been the first task in the office to be isolated and frozen as boring, repetitious work, with no advancement possibilities. Both the male clerk and the boss encouraged women to embrace the new machine, and the use of the typewriter accelerated women's overall entry into office work.

Sholes, "father of the typewriter," credited his invention with transforming the office and liberating woman. "I do feel that I have done something for the women who have always worked so hard," he stated. "This (typewriter) will enable them more easily to earn a living." "Whatever I may have felt in the early days of the value of the typewriter, it is obviously a blessing to mankind, and especially to womankind."

What are the lessons that we can learn about technology from the first technological revolution in the office?

1. Technology must be viewed as a system, including the organization of work in the workplace, not simply as individual machines in isolation. The typewriter was an important part of a new industrial office, which included mechanization of a wide variety of office functions and new methods of work.

2. Just because they don't seem to be able to do it right the first time does not mean that they won't eventually get it working. There was much in the early history of the typewriter to suggest that the machine might never work or that it was a passing novelty. Similarly today, workers facing massive technological change with the introduction of computer systems into their work area should not take much heart in the early failures of the systems. Electronic office technology is not the "hoola hoop" of the 1980s; it is an integral part of a massive reorganization of the office.

3. Radical changes in technology do not necessarily lead to radical changes in social relations. The feminization of office work did not substantially change women's position within society. There is no automatic liberating quality to new technology.

4. Beware of the myth of progress. Was the typewriter truly a "blessing to womankind"? There is a tendency in the history of technology to suggest that the way things have evolved is the only way they could have evolved – optimal, objective, and neutral. The QWERTY board is a good example of the myth of progress. While the system was clearly designed to slow the typist, the myth is that it was designed to maximize typing speed. Once the myth has taken hold it is difficult to change, even in face of evidence to the contrary, such as the Dvorak design.

5. The time to assert human needs in the use of technology is at the design stage. When a new technology is being introduced there is a period, before it has been consolidated, when things can be changed. But once it is fully adopted it is very difficult to change, and the myth of optimal design and progress seem to set in.

Further Reading:

Donald Sutherland. "The Office of Yesterday," *The Wharton Magazine*, Winter 1981-82, pp. 47-55.

Margery W. Davies. *Woman's Place is at the Typewriter*. Philadelphia: Temple University Press, 1982.

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