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ANTENNA

Newsletter of the Mercurians, Society for the History of Technology

"19th-Century Small Presses" by Elizabeth Harris

&

"The QWERTY Solution" by Kay Youngflesh

Mercurial Matters

This has been a good year for SHOT special interest groups in general, and the Mercurians in particular. We were able to report in May that the Department of History at the **University of Colorado at Denver** had begun to assist us in publishing *Antenna*. Since then, Marvin D. Loflin, Dean of the College of Liberal Arts and Sciences, and Georgia Lesh-Laurie, Vice Chancellor for Academic Affairs, have each generously agreed to match the Department's contributions. As a result, we are able to publish this slightly expanded newsletter—instead of the slightly contracted edition otherwise planned, and we will be able to explore other options for the future. We are very grateful to UC/Denver.

The Mercurians' umbrella institution, **SHOT**, has just adopted a set of new policies that will greatly benefit its constituent SIGs. Responding to a report by Alex Roland, vice president, the Executive Council voted to help SIGs contact people newly joining SHOT and to assist formal SIGs, such as the Mercurians, in several ways. These include giving session proposals from formal SIGs priority over other proposals of identical quality in setting programs for SHOT's annual meetings. SIGs may also ask the SHOT treasurer to manage their funds, and the Mercurians' savings account has been transferred into the able hands of Jim Williams.

In addition to these very important institutional supports, SHOT now offers its formal SIGs matching funds up to $300 annually. These funds can be used for appropriate professional activities, such as a newsletter, other communications and publications, workshops, fellowships, and prizes. Between now and the next annual meeting, *Antenna* will be the beneficiary of our allotment. After thinking about our options, we can make this an important agenda item at our meeting next year.

In the meantime, to demonstrate **membership support** to both UC/Denver and to SHOT, the Mercurians continue to require a small fee as dues and newsletter subscription. A two-year subscription is $5 within the U.S., $6 in Canada and Mexico, and $8 elsewhere; please make checks in US dollars payable to SHOT. People whose original subscription runs out with this issue should have received a remittance envelope with this issue. Please be sure to indicate whether or not you are SHOT member when you respond. While we welcome non-SHOT members as before, keeping track of SHOT affiliation is now a requirement for formal SIG status.

Options for future improvements include developing regular features in *Antenna*, such as book or museum review sections, and outreach to other professionals in the history of communication technologies. We are eager to explore the possibilities with you, so let us know if you would like to work on such projects. As always, we want to hear from you if you would like to contribute a book or museum review, a report on your recent achievements, or an article on your current project. We are always glad to receive information that pertains to the many interests that Mercurians share. Please contact either Lori Breslow or Pam Laird if you would like to contribute.

Finally, but very importantly, anyone interested in organizing or participating in a **sponsored session at the October 6-9, 1994, SHOT meeting in Lowell, Massachusetts,** please contact Pam Laird with a preliminary proposal by January 15.

Mercurians' Latest Projects

Leigh Edmonds of the Centre for Western Australian History, University of Western Australia, wrote from home after attending the 1993 SHOT meeting to inform us of his current projects relating to communications. He is currently writing an article for the 1995 issue of *Studies in Western Australian History* on the ways in which the introduction of radio changed the lives of people living in remote areas of that region up until about 1939. This includes broadcast radio and two-way communication through the flying doctor radio network. He has also been commissioned to write a history of Australian aviation history which will include some material on Australian involvement in space activities and the uses and abuses of communication satellites, including Aussat.

Paul Israel has recently published *From Machines Shop to Industrial Laboratory: Telegraphy and the Changing Context of American Invention* [see p. 8 for more information]. He is assistant editor of the Thomas A. Edison Papers where the ongoing processing of documents will produce Volume 3 of the book edition and Part III of the microfilm edition this year. Since the SHOT meeting, Paul and Bernard S. Finn, Curator of Electricity at the National Museum of American History, have successfully completed negotiations with Western Union which has donated its 19th-century corporate records to the Smithsonian Archives. Paul is currently working on a new biography of Edison that will not only extensively use the inventor's massive archival materials, but will be the first to place Edison in the context provided by recent literature in a number of historical fields, not the least of these being the history of technology.

Stephen B. Johnson is a graduate student in the Program in the History of Science and Technology at the University of Minnesota. His dissertation will involve a comparative study of the European space programs and the American space programs from the early 1970s to the early 1980s. One possible focus for either this or later work will be the development of communications satellites in the US and Europe, one of the major factors in troubled relations between the US and Europe starting in the mid 1960s. Stephen's e-mail address is john0730@gold.tc.umn.edu.

David J. Whalen has been working as a space systems engineer for the last two decades—primarily in the communications satellite field. It had always been his intention to spend half of his career as a scientist/engineer and half as an historian of science/engineering. Much to his surprise, the second half has arrived. He is currently finishing a dissertation on the origins of communications satellite technology at George Washington University. He is also interested in the broader history of long-distance/trans-oceanic telecommunications. Specific topics of interest include the early history of ITT (Puerto Rico Telephone) and the Key West-Havana telephone cable.

The Charles Babbage Institute

The Charles Babbage Institute (CBI) is a research institute dedicated to promoting study of the history of information processing. It brings an historical perspective to the study of information processing and its impact on society and preserves documentation relating to the development and application of the computer. An alliance of industrialists, professionals, and academicians with a common purpose—to record and study the evolution of the digital computer and modern electronic communications—formed the Institute in the late 1970s. CBI has both archival and historical research components, and the interaction between them is a crucial part of CBI's philosophy.

Historical Research Since its founding, members of CBI's staff have engaged in significant historical research related to technical developments, industrial growth, technology transfer, and the government's role in technological change. CBI's staff, at times cooperating with colleagues at other institutions, have produced several historical studies which span the period from 1800 to the present. Recent efforts include a study of the origins of the computer industry, a new project on the history of women in computing, and an investigation of the computer activities of the Advanced Research Projects Agency (ARPA).

Archival Collection The primary components of the archival collection are: (1) collections of records documenting computer organizations and businesses, industry involvement in antitrust and patent litigation, and individuals' records; (2) a collection of printed matter including manuals, product literature, publications related to market analysis, third-party surveys of computing machinery, and serial publications; (3) oral histories; (4) a photograph, 16mm film, and video collection; and (5) general reference materials including biographical, company, and subject files.

Encouraging research and interest CBI fosters research in the history of information processing in many ways. It currently offers the Adelle and Erwin Tomash Graduate Fellowship in the History of Information Processing [see below]. Another important part of CBI's work develops tools to aid historical research, including oral history interviews, biographical and company information files, and bibliographies and guides. CBI has also produced a sixteen-volume *Reprint Series in the History of Computing* which makes scarce materials available to a wide audience.

CBI encourages and facilitates information interchange among people interested in the history of information processing. It sponsors or helps to organize conferences and symposia. Its educational program includes teaching at the University of Minnesota and sponsoring lectures. Visitors, both national and international, can conduct research at CBI. The CBI staff responds to hundreds of research requests from diverse groups including people in the industry, historians, sociologists, archivists and records managers, journalists, lawyers, hobbyists, and the general public.

The *CBI Newsletter*, published quarterly, informs the community of work in the field, conferences, publications of interest, and its own activities. This free publication also serves as the newsletter for the Information, Computing, and Society Special Interest Group within SHOT.

CBI's archival collection in Minneapolis is open to all researchers. Prospective visitors should consult the archival staff in advance to ensure that relevant materials are available and open. The archives staff also attends to the needs of researchers unable to visit the Institute personally.

The CBI Friends program provides a variety of ways for individuals to support our work directly. In addition, we encourage inquiries about donating pertinent records.

The Adelle & Erwin Tomash Graduate Fellowship in the History of Information Processing will be awarded for the 1994-1995 academic year to a graduate student whose dissertation will address some aspect of the history of computers and information processing. Topics may be chosen from the technical history of hardware or software, economic or business aspects of the industry, or social, institutional, or legal contexts of computing.

There are no restrictions on the venue of the fellowship. It may be held at any location where there are appropriate research facilities. The stipend will be $10,000, plus an amount up to $2,000 for tuition, fees, travel to CBI and relevant archives, and other approved research expenses.

There is no special application form. Applicants should send biographical data and a research plan containing a statement and justification of the research problem, a discussion of procedure for research and writing, information on availability of research materials, and evidence of faculty support for the project. Applicants should arrange for three reference letters, certified transcripts of college credits, and GRE scores to be sent directly to the Institute. All materials should be received by January 15, 1994.

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Judy E. O'Neill is the Associate Director of the Charles Babbage Institute. She holds degrees in computer science and computational mathematics as well as in the history of science and technology. O'Neill is completing a book with Arthur L. Norberg on the history of the Advanced Research Projects Agency's computing activities from 1962-1985.

19th-Century Small Presses

THE EXCELSIOR is especially recommended for . . . Agents, Advertisers, Amateurs, Business Men, Booksellers and Stationers, Boys, Country Towns, Druggists, Doctors, Manufacturers, Postmasters, Political Work, Photographers, Seedsmen, Societies, Sunday School and Church Work, Wholesale Merchants. . .

(W. A. Kelsey, *Catalogue*, Meriden, Ct, 1874)

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Executive Mansion, Washington D.C. June 3, 1869
Sir
Please send by express, "Collect on delivery," one of your Novelty Printing Presses, price $15. The press is for the son of the President. Please address it to "The President, Executive Mansion, Washington D.C. . . ."

(Letter cited by Benjamin Woods in his catalogue, about 1870)

Part of the history of the American small printing presses of the nineteenth century—the "boy's press"—has been developed into an exhibition that is now in the National Museum of American History. But small presses were not only for children. They were among a group of printing devices centered around two characteristically nineteenth-century phenomena: the business office, and the daring attitude that allowed businessmen to think they could print their own billheads. Those devices, including typewriters, numbering machines, date and seal stamps, card presses, printing wheels, and various duplicating systems, were just as much part of the nineteenth century as the huge contemporary machines that printed mountains of newspapers overnight.

Most of these small office printers were not strictly printing presses. Perhaps they did not even form a class, through they all met some of the new needs of commerce left untouched by the conventional printing trade. They were grouped by convenience—then as now, small things seem to get pushed together. Thus, the 1860s maker of stencil plates (to mark crates and boxes) might add rubber type and date stamps to his line of office supplies, then a card press or two to follow the do-it-yourself fashion, and by 1880 some printing wheels for plastering advertising slogans on sidewalks and fences.

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Small meant cheap, and that did indeed give access to a market that the large-scale printing industry had priced itself above. Small press makers made the most of it. "It pays!" shouted William Kelsey in his Excelsior catalogue. "Think of it a moment! What ever your occupation, you can do the printing you need at QUARTER printers' prices!" And back came the echo from a happy customer: "The Excelsior. . . has enabled us to save many hundreds of dollars for printing, which previous to that we were compelled to have done at a printing office, to say nothing of being able to have the work where we are not dependent, and subject to the delays of the printer" (E.B. Cowles, Meriden Fire Insurance Company, to Kelsey, 1877).

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The trade printers, or at least their spokesmen, were surprisingly sensitive to this mite-sized irritant. The newcomers were "amateurs": the hackers of the day. "No parent who has a sincere regard for the welfare of his son will permit him to start out as an amateur printer," advised a writer in *The Typefounder* in 1878. A few years later the advice was less kind. "Toy presses may have their uses, through we doubt and have never seen it proven. Amateurism, *we know*, is a curse to all concerned, and the work done disgraceful. . . . The evil has grown to large proportions—much more than is generally supposed—and should be stamped out" (*Inland Printer*, November 1887). And finally, "In spite of all advice to the contrary, we propose whenever we see an amateur head to 'whack' it, because it is the only argument it can appreciate" (*Inland Printer*, December 1888).

This was an interesting but confusing reaction. Was it the standard nasty response of professionals to amateurs, whatever the trade (engineers to train buffs, royalty to royalists, historians to . . . historians)? Were the amateurs and children threatening a closed club? Or was it simply conservatism and the fear of change? Was the biggest noise coming from the most fearful? There was enough noise, anyway, for William Golding, a Boston press manufacturer, publicly to foreswear his connection with the "amateur bugaboo" in 1886 when he decided to redirect his company towards large presses, and for Kelsey in later years to insist that his trade had always been in supplies: the sale of presses was only a way of creating customers for those supplies, and he would sell anything else just as happily (as he did, from patent medicine to Swiss watches).

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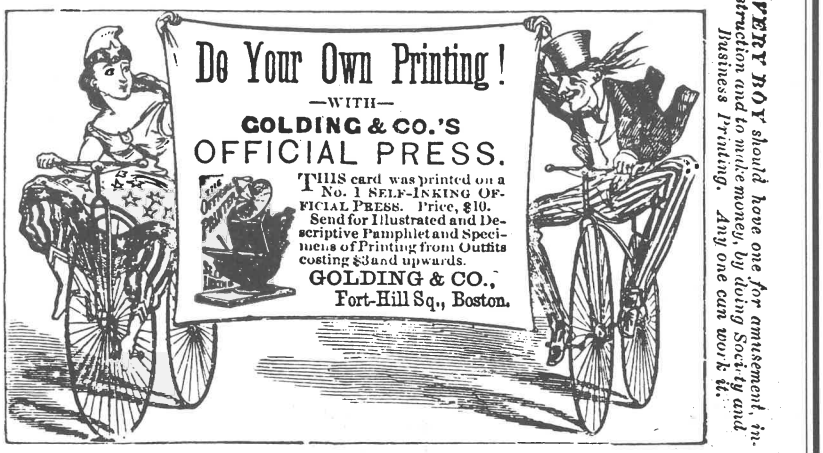
The amateurs themselves were blissfully unaware of the trouble they caused their betters, though L. M. Barnes, dealer in music and jewelry, ordered his press in an unmarked box because "there are several Small Presses in town which are laughed at, and I would not be among that number" (1876). Some of their printing was indeed abysmal—but that was not the point. The doctors and druggists got their letterheads, young boys learned a little about spelling and banking. "I have made very near $1 and I have only had it 3 days and I have went to school too," wrote Joseph Sleeper to Kelsey. The sisters of these little boys continued to play with cook-sets, as little girls should, only occasionally interfering with the printing game: "Will you please send me another Circular. . . . Through the carelessness of my Sister the other one was burnt" (Willie Slosson, 1873).



Golding & Co. advertisement, circa 1880
Courtesy Division of Graphic Arts, National Museum of American History.

H. L. Mencken credited his boyhood printing with determining "the whole course of my future life." Among other very young printers who grew to fame and fortune were Thomas Edison, who printed a newssheet on a small galley proofing press while working as a newsboy on the railroad in 1862; William Gillette, the future actor, who at twelve printed a paper called *Hail Columbia* (1866); and Lyman Frank Baum, author of *The Wizard of Oz*, who printed *The Rose Home Journal* in 1868, at thirteen. Orville and Wilbur Wright ran a small press as teenagers. Josephus Daniels, later of the U.S. Navy, printed on a Novelty press at age thirteen. Charles Scribner, founder of *Scribner's Magazine*, was a printer as a boy; so were Frank Brett Noyes of the *Washington Star*; Frederick Ives, inventor of the half-tone screen; John Wanamaker of Philadelphia; Cornelius Vanderbilt; and Henry Gordon Selfridge.

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By the end of the century, the fashion was fading. Rubber type replaced foundry type in the play room, other processes provided cheap letterheads, and the several dozen small-press manufacturers had been reduced to a handful as large fish swallowed smaller ones. The last fish in the pool was, ironically, Kelsey—the press maker who saw presses as a means to other business. Three years ago, after 120 years, Kelsey's company finally closed its doors to presses and went into the sports clothing mail order business. The computer did it in.

Elizabeth Harris is a curator in the Division of Graphic Arts of the Smithsonian's National Museum of American History. She developed the exhibition "A Boy and his Press" which is on view in the Graphic Arts Hall of the National Museum of American History through summer 1994 (extended). The catalogue, same name, is available from the Division for $3.95.
***Cover image** from a Kelsey Press ad, 1874. Courtesy, Division of Graphic Arts, NMAH.*

Scholarly Perspectives on the Information Highway—A Call for Ideas

As many of you know, the Society for the History of Technology (SHOT) is currently exploring the positive and negative potentials entailed in electronic networking activities such as electronic publishing, distributing announcements, and archiving databases. Participants in SHOT's 1993 annual meeting received a questionnaire asking for their opinions, and all SHOT members will get the questionnaire in their December newsletter. *Antenna*'s editors invite you, both SHOT members and others, to send us your reactions to these possibilities for electronic networking, particularly if you belong to other organizations that have incorporated electronic networking into their means of communicating with and between members.

From a broader historical perspective, what insights can historians of communication technologies offer SHOT and other institutions considering moving onto the information highway? What do previous developments in communication technologies tell us? Do you have suggestions for <u>how</u> best to move onto the information highway, if at all? For what should we should be on the alert? For what should we aim? This may be a discussion we can fruitfully develop in *Antenna*. Contact the editors with your ideas for the next issue.

Siphers

The Science Communication Interest Group of the Association for Education in Journalism and Mass Communication publishes *Siphers*. This newsletter includes short articles, book reviews, announcements, and bibliographic listings focusing on the public image—and image making—of science, science policies, and scientific activities. A one-year subscription is $10.00. Contact the editor, Susanna Hornig at the Department of Journalism, Texas A&M University, College Station, TX 77843-4111.

The QWERTY Solution

Today, designers of word processors, computers, and electronic typewriters who focus on ergonomics and biomechanics are splitting, sloping, and tilting keyboards. They are attempting not only to improve efficiency, but to alleviate some of the physical suffering that has plagued office workers since the early nineteenth century. In the 1870s, sales promoters of the typewriter, not yet envisioning it as a quantum leap in office efficiency, prescribed it as a cure for "pen paralysis" and "curvature of the spine," afflictions suffered by nineteenth-century clerks, copyists, and writers of all kinds. But modern day office workers are still not free from pain and discomfort. Many suffer from "carpal tunnel syndrome' (tenosynovitis) and severe neck and backaches brought about, in part, by the inefficient keyboard design designed and implemented by Christopher L. Sholes in the late nineteenth century.

In 1867, Sholes and several collaborators developed numerous experimental models of a typing machine before producing a prototype christened "Type Writer" in 1872. The type writer featured the essential characteristics of the modern machine we know by that name, including the standard keyboard with its characteristic QWERTY arrangement, named for the top left-most row of letters. The keyboard on Sholes's first machine was arranged alphabetically with the bars carrying the type hung upside down in a circle under the carriage and swinging up to the paper to print. The typist could not see the printed words without lifting the carriage. If the operator typed too fast, the typebars became entangled as they fell back into place. To prevent this, Sholes placed common letter pairs on opposite sides of the circle to minimize the clashing of typebars. The result was the QWERTY arrangement.

Speedy "touch typing" was not a consideration in the design of the first typewriters. Although some analysts have speculated that Sholes configured the keyboard to slow typists, it was not until the 1880s that commercial schools started to teach typists to use all the fingers of both hands to improve typing speed. Sholes's reason for forming the keyboard as he did was to correct the technical problem of the clashing typebars. And it may be more than coincidence that the second row of Sholes's arrangement contains all the letters required to spell out "typewriter." A typewriter salesman pitching this new machine could quickly peck out that word to impress skeptical customers.

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Attempts have been made to displace the QWERTY keyboard. The twelve keyboard design patents granted from 1910 to 1940 suggest that a new, more efficient keyboard letter order was desired. However, typing teachers usually were the most visibly opposed to new letter arrangements. Classrooms were equipped with typewriters with QWERTY keyboards, and the teachers preferred to teach a system with which they were most familiar.

Given the popularity of Frederick W. Taylor's scientific management of the factory and William H. Leffingwell's scientific office management, it is difficult to understand why the keyboard has remained the same. In fact in 1916, Dr. Frank Gilbreth, an industrial engineer known for his work with time and motion studies, demonstrated the unnecessary movements caused by the keyboard to the Remington Typewriter Company by photographing the motions of typists with lights on their fingers and foreheads. Despite Gilbreth's conclusions, for unknown reasons, Remington did not change its keyboard design.

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Dr. August Dvorak, a professor at the University of Washington, and Dr. William L. Dealey, who had studied with Gilbreth, devised a new keyboard arrangement for which they received a patent in 1936. Some high schools experimented with the prototype Dvorak Simplified Keyboard (DSK) in 1933-34. Also, the Navy Department, in the closing days of World War II, experienced an extreme shortage of typists and trained office workers on the DSK. The results indicated that typing with the QWERTY arrangement overworked certain fingers and used the left hand more than the right. With schools offering typing courses using the DSK and the U.S. government willing to retool machines and train or retrain typists, it is not clear why a change in keyboard design was not made. One reason may be that the war was ending and fewer typists were needed. Also, typing instruction on the experimental DSK in the schools had been offered to college-bound students with their own machines and not to those looking for jobs as office workers. Typists, stenographers, or secretaries would want to be able to operate the most obtainable typewriter, and that probably would have had a QWERTY layout.

Since then there have been many proponents of DSK. In the 1970s, Computer Consols, Inc., designed a computerized system using the DSK layout for the Bell Telephone Company. Bell desired a keyboard different from the QWERTY design that would allow their directory assistance operators to respond quickly to telephone number requests. Eventually Bell management, directory assistance operators, and their union

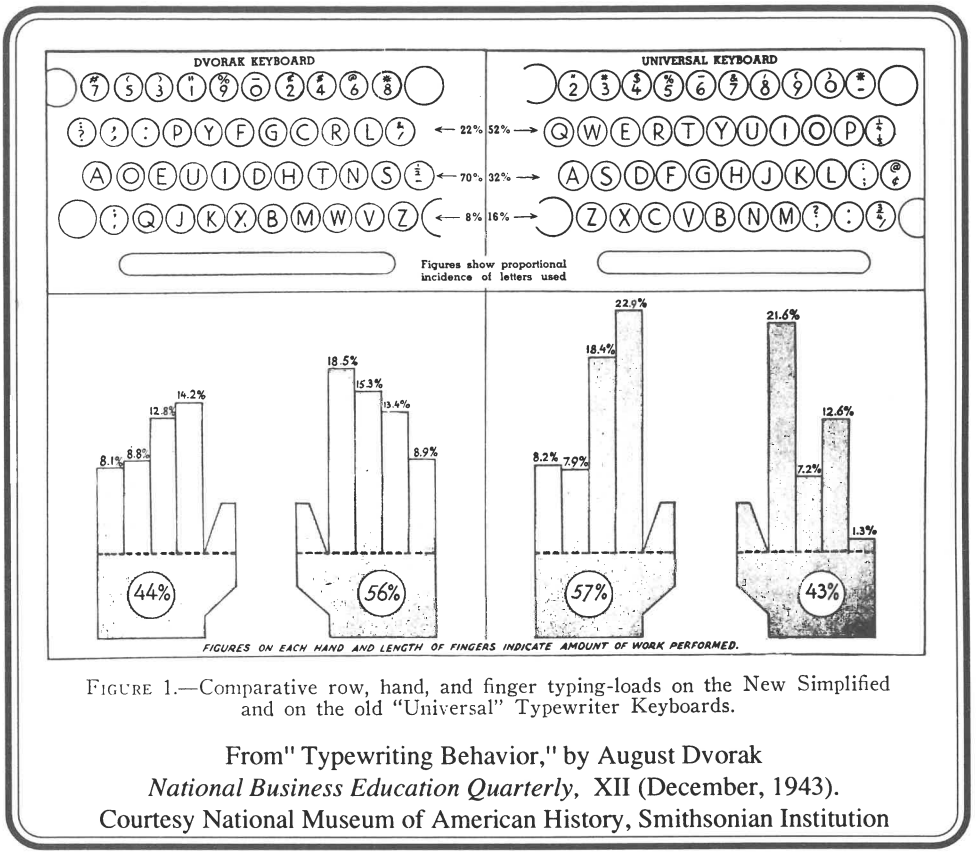

FIGURE 1.—Comparative row, hand, and finger typing-loads on the New Simplified and on the old "Universal" Typewriter Keyboards.

From" Typewriting Behavior," by August Dvorak
National Business Education Quarterly, XII (December, 1943).
Courtesy National Museum of American History, Smithsonian Institution

(Communications Workers of America) concluded that learning DSK may have put directory assistance operators at a disadvantage since, for one reason, tests for higher-grade typist jobs were always administered on QWERTY keyboards. Subsequently, many of Bell's subsidiaries reverted to the old QWERTY design. Aetna Life and Casualty's Computer Training Division in Hartford, Connecticut, tested the DSK layout while trying to overcome their executives' resistance to using personal computers. The Training Division's motivation was to provide an easier and exclusive system for its executives, not to try to change all keyboards at Aetna. This effort had little success.

Many typists are enthusiastic about the DSK because it is easier to learn, faster to type with, and less fatiguing than QWERTY. However, QWERTY keyboards have always far outnumbered DSK boards, as well as any other arrangement, and remain the standard. In "Understanding the Economics of QWERTY: The Necessity of History" (*Economic History and the Modern Economist,* William N. Parker, ed., [1986]), Paul A. David talks about the considerable leverage given a "numerically tiny cadre of pioneer touch-typing teachers who had become habituated to using the QWERTY keyboard." These teachers were obviously influential with "both prospective employers and typewriter companies' sales agencies."

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Regardless of the fact that there are apparently more efficient letter order keyboards, none have been able to replace QWERTY. The Underwood typewriter's upstrike design in 1895 corrected the mechanical problem of jamming typebars, but Mr. Sholes's original keyboard layout continued to be the one of choice by both buyers and sales promoters. Does the old keyboard design remain the same because instructors want to use a keyboard which is so common most people have at least some experience with its letter order? Do the computer and typewriter industries want to continue to market a standard keyboard which has been successful in the past?

Professor Hugh G. J. Aitken provided an answer in his reply to the note about "The Perplexing Keyboard" in *Antenna* (December 1992). "What 'survives' is not necessarily the 'fittest' but (sometimes) the one that was adopted first and that users learned first. . . . As David succinctly puts it, 'History Matters'!" Today, when designers and manufacturers are producing more advanced computer technologies at an ever accelerating rate, the keyboard may no longer be an integral element for producing printed words. Other data entry devices, such as voice translators, scanners, and electronic pencils, may make the keyboard obsolete. The window of opportunity and necessity to change the standard QWERTY keyboard may have passed.

Kay Youngflesh is Museum Specialist in the Division of Engineering and Industry of the Smithsonian's National Museum of American History. She researched and prepared an exhibition, on view through 1994, entitled, "The Case Against QWERTY—The Typewriter Keyboard Layout in the 20th Century."

Mercurians' Recent Books

Paul Israel. ***From Machine Shop to Industrial Laboratory: Telegraph and the Changing Context of American Invention, 1830-1930.*** **Johns Hopkins University Press, 1992.**

Paul Israel argues that not only did the telegraph play a crucial role in the transition from print to electric communication media, but that it was also central to the reorganization of technology research and development by corporate capitalism. He shows how telegraphy, even though it emerged from scientific research, retained mechanical characteristics that helped to keep workplace communities of operating rooms and machine shops the center of telegraph invention. He also shows how telegraph invention was shaped by the social and cultural values that affected telegraph use, which in the United States was principally by businessmen and newspapers. The urban environment of both users and the industry's companies and inventors led to a host of new telegraph inventions which provided market reports, private lines, plus messenger, alarm, and other services. Israel then examines telegraph invention within the emerging corporate context of American business, showing how Western Union became the first truly national corporation. He explains that Western Union and its corporate competitors began to alter the tradition of workplace invention, fostering the creation of new institutions such as Edison's Menlo Park Laboratory. Nonetheless, Israel argues that the relationship between invention, manufacturing, and use that lay at the heart of American inventive practice in the 19th century continues to be significant.

Robert W. McChesney. ***Telecommunication, Mass Media, and Democracy: The Battle for the Control of U.S. Broadcasting, 1928-1935.*** **Oxford University Press, 1993.**

The process by which U. S. commercial broadcasting emerged and became consolidated was met by organized opposition and general public antipathy, according to Robert McChesney. He investigates the economic, political, and ideological aspects of the early broadcast reform movement of the 1930s. The reformers argued that commercial broadcasting was inimical to the communication requirements of a democratic society and that the only solution was for nonprofit and noncommercial broadcasting to have a dominant role. Although the movement failed, McChesney holds that it provides important lessons not only for communication historians and policy makers, but for those concerned with media and how they are used.

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