

Only the Clothes Changed: Women Operators in British Computing and Advertising, 1950–1970

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The use of women workers in early computing and advertising ironically may have hurt their long-term professional position in the field because it reflected, and helped shape, their role as low-cost, unskilled workers. This article traces the relationship between advertising images of women used to sell data processing equipment and the early, feminized, data processing labor force in Great Britain.

British computing boasts several historical firsts—from the first digital, electronic, programmable computer used during World War II to the first dedicated electronic business computer in 1951.¹ Although these machines and their designers have been the subjects of multiple histories, the workers who provided the day-to-day operating and input labor have understandably garnered less attention compared to the elites in the field and the hardware they helped create.² Yet, our understanding of electronic computing as revolutionary is powerfully informed not only by its design, but by its use, particularly its effects on labor forces and work organization.

After World War II, both Conservative and Labour governments in Britain broadly agreed that computing would be key to helping the country strengthen its role as a world power.³ Applying computerized methods to industry at home and selling computing solutions abroad were essential to this vision of a modern Britain.⁴ Harold Wilson famously articulated this need in the 1963 Labour Party platform, in which he called for a technological revolution with a “white heat” that would forge a new and better Britain.⁵ Wilson’s rhetoric reflected a growing desire for change in British society, whose captains of industry had watched continental Europe rise from the ashes while they still struggled to modernize and increase productivity.⁶ Indeed, this period would witness significant technological change in Britain. It also, however, would see long-held beliefs about labor force

control and organization reinstitutionalized within the emerging standards of this new technological revolution.

Recently, many studies have argued that looking at both institutional users and labor contexts within computing is necessary to understanding the workings of the technological system.⁷ By asking questions about the social construction of large technological systems and the importance of users to the history of computing, these studies focus on the heterogeneous engineering of computing environments as much as the engineering of the machines themselves. By centering social context in the deployment and growth of computing systems, this focus has also helped to invigorate the analysis of class, gender, and cultural context in computing history.⁸ In particular, many studies have attempted to untangle the relationship of masculinity and femininity with particular skills and work expectations in an effort to better understand, and potentially change, current labor patterns in computing fields.⁹

Attention to the historical specifics of the earliest computing labor contexts can help correct received images of computing as an inherently masculine field by explaining the gendered changes that developed as the field professionalized. As Sally Hacker, Cynthia Cockburn, and others have noted, various economic and cultural constraints interleave to produce technological changes, and often technological reskilling and displacement is more tightly linked to the gendered organization of work than might be initially assumed.¹⁰

These studies have also found that, for all but the most exceptional practitioners, popular discourses surrounding technology, skill, and gender role can serve to powerfully reinforce certain outcomes and effectively shut down other possibilities for both individuals and institutions.¹¹ This article looks at one such historical example: it is a case study of how advertising both reflected and potentially affected early British computing labor by creating certain imagery and cultural models for workers, and by influencing management expectations.

The alignment of women workers with computing systems in early advertisements and media reflected—and helped shape—their role as low-cost, high-turnover, relatively unskilled workers. These workers met the needs of early computing systems well and encouraged management's understanding of these technological systems as evolutionary rather than revolutionary. As the field professionalized, advertising discourses may have helped perpetuate gendered job divisions that had long been present in pre-electronic data processing, locating women, in the aggregate, in less-skilled jobs and fostering an understanding of the “real” work of computing as outside of their collective reach.¹²

By linking these labor changes with the changing imagery of computing labor in industry publicity, we can see how the public face of the field seemed to downgrade women's labor by using stereotypes that often reflected reality imperfectly, magnifying certain elements and minimizing others in order to sell a product. As has been shown elsewhere, images artfully conveyed in advertising, however inaccurate they might be, help to shape cultural perceptions.¹³ The evidence in this case suggests that advertising tropes for data processing systems might have shaped management expectations and thereby had a material effect on the labor force. Elucidating the role of advertising and publicity imagery could help shed light on the process by which certain labor ideals became reinstitutionalized during a period of significant technological change, and how seemingly timeless labor practices within British computing were constructed.

Gendered hiring in practice and imagery, 1944–1959

Perhaps surprisingly, the labor contexts for each of Britain's computing firsts were not wholly male-dominated. For instance,

scores of women provided the operator labor for the Colossi during the war, while at the other end of the spectrum, dozens of women managed data for the original Leo's nightly stocktaking.¹⁴ The government, including the Post Office, nationalized industries, and the National Health Service was the largest British employer of computing labor at this time. Its departments utilized women computer operators far more often than men.¹⁵ These predominantly female labor pools were a holdover from earlier electro-mechanical data processing work.¹⁶

In 1948, the British government had institutionalized its overwhelmingly female office machine workforce in a new, explicitly feminized set of job categories called the “machine grades.”¹⁷ This reorganization of workers was an attempt to further subdivide and Taylorize automated accounting and computation jobs to save money and make workers in this young, female, and high-turnover labor force more interchangeable.¹⁸ Most labor for government computer operation, input, and programming came from these grades until the mid-1960s.¹⁹

Most business computer manufacturers built their advertising on labor expectations that had served managers well in the pre-electronic era, self-consciously continuing to associate women workers with their office computing products.²⁰ From punching and verifying to programming, plugging, and operating electronic computers, computing companies strove to display a labor context for electronic office automation products that was little different from prior automation products.²⁰

Selling early office computing

From the 1950s through the mid-1960s, photographs used to sell and showcase computers pictured relatively plain female workforces as they stood working at the machines.^{20,21} The British-owned subsidiary of Powers-Samas office machines, which joined with British Tabulating Machines in 1959 to create International Computers and Tabulators (ICT), consolidated this trope early on with the creation of the “Powers Girl” character.²²

The Powers Girl, a well-known mascot for the company's line of electromechanical tabulating, collating, and printing machines was a visual extension of well-worn hiring preferences: “The conventional method is to hire women trained to operate any of the many machines available on the market,” noted

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Figure 1. Powers-Samas electronic computers images. (a) The advertisement appeared in the *Powers-Samas Magazine* May/June 1958 issue (p. 5). (b) The photo of the real female employee operating the Electronic Multiplying Punch (Emp) at LaPorte Industries appeared in the *Powers-Samas Magazine* June/July 1957 issue (p. 11). (Courtesy of Powers-Samas)

one business commentator discussing the economics of purchasing a new Powers electronic computer.²³

Although women's images have often been used to sell items by fostering a sexual association with the product in the mind of an idealized consumer, who is assumed to be male and heterosexual, this was not the primary role of the women workers pictured in early office machine advertisements. Dressed in crisp ladies' business attire, the women instead represented a hyper-professional image of a stereotypical office worker.²⁴ In addition, they often served a didactic function by demonstrating each step in the data-processing chain, making the systems seem less opaque and intimidating.

Figure 1 juxtaposes a Powers Girl advertisement for an electronic computer with an example of a real-life "Powers Girl" operating the same machine.²⁵ These images appeared in the Powers company magazine, a publication that circulated inside and outside the company. The magazine's feature stories were aimed at current and potential users of Powers equipment—primarily managers who authorized expenditures. The Powers advertisements within their pages also ran in many other publications.²⁶

In the advertising image (Figure 1a), which reflects the norm for computing advertisements in the 1950s and 1960s, the woman demonstrated the machine's ease of use while the accompanying text discussed

the great potential of electronic computing. For obvious reasons, images like these focused on the physical rather than the mental work of operating a computer. The machines were made to look as simple and automatic as possible.

On the surface, the image of the Electronic Multiplying Punch (Emp) in use in Figure 1b seems similar. Again, a young woman worker operates the machine, but two major differences between the advertisement and photo highlight the advertising trope's appeal and purpose. The fully enclosed machine in the advertisement contrasts starkly with the one on the shop floor, which has pieces of its case removed. In addition, while the Powers Girl wears a suit, accessorized with makeup, coiffed hair, and earrings, the woman in the actual workplace is dressed as a machine worker rather than an office worker. She wears coveralls and her hair is pulled back to keep it out of the way, exposing her lack of makeup or jewelry. Although she is a similar age, her appearance and surroundings show that she is not the middle-class, pink-collar professional worker from the ad.²⁷

While the advertising image aligns the intended labor force firmly with the clean, white collar, intellectual work of an office and presents a reassuringly encased machine, the worker and machine in Figure 1b are quite different. Like her machine, this operator is an element of the system with its case off; she lays bare the fact that operating and programming an office computer was only liminally professional work at this time. Indeed, this operator may have had more in common with the working class women who assembled and tested her electronic computer on the line in the Powers Factory.²⁸ Business customers, however, wanted the efficiency and cost benefits of turning the office into a factory without the negatives associated with the shop floor, working class labor, and labor organization.²⁹

Thinking about the machine, but not too much

In the accompanying text for Figure 1b, a tabulating division manager stated, "A good operator thinks about the machine, rather than just working it." Yet both the advertisement and the publicity photo focus on operators who seem to be "just working" the machines. Indeed, the same manager goes on to say that although the electronic computers they use "are so complex," nonetheless, "a girl can be taught how to work

them in only ten minutes."³⁰ Powers advertised that one operator could "cope with all" of the machines in a typical installation depending on work volume.³¹ Throughout Powers advertisements, Power Girls cheerfully conveyed that their machinery was conducive to employment patterns that squeezed labor and favored relatively deskilled, high-turnover workers.³² Women also had lower rates of trade union participation, which could only enhance their appeal in the eyes of efficiency-minded managers.³³

A constant tension emerged between touting the machine's ability to perform complex tasks and convincing potential buyers that training low skill, inexpensive, and easily replaceable labor to use them would not present difficulty. Unlike those working at computer companies, there was no career path for workers who used early administrative computers in government and industry.³⁴ Emerging from machine-aided calculation work that was overwhelmingly feminized, computing operation and programming was not highly regarded. One government department head dismissed this lack of a career ladder in the mid-1950s, saying, "A high proportion of the [Scientific] Assistants are girls; this appears to be because they like the routine work. The resignation of a large proportion on marriage certainly eases the problem of careers in computing."³⁵ The department's young men were put on other work because machine-aided calculation work had no career trajectory.³⁵

Operators were neither expected nor encouraged to know too much about their machines. A cartoon published in the British Tabulating Machine Company's magazine cheekily illustrated what that might lead to (see Figure 2). In the cartoon, two operators literally dive in to fix their malfunctioning electronic computer using a well-worn feminine standby, the bobby pin. (The artist denotes the machine as electronic with light-bulb-esque vacuum tubes.) Upon arrival, the male technician reacts with shock and confusion to a scene that is both humorous and unsettling. The operators are usurping his job; replacing his tools and skills with hairpins and tinkering. One woman's hand is stained black to show she is really "getting her hands dirty." The comedic effect of the job role reversal traded on gendered assumptions, while the stereotypically feminine tool provided the punch line.



Figure 2. "Another Bobby Pin." This cartoon appeared in the British Tabulating Machine Company magazine *Tabacus* in January 1957 (p. 13). (Courtesy of the British Tabulating Machine Company)

In many ways, this cartoon mirrored concerns brought up by women trade unionists at their 1960 congress. Trying to position young women for better work and careers, the trade unionists argued that secondary school graduates were not needed as untrained, "cheap labor but as qualified technicians." If they remained in feminized jobs that were perceived as deskilled, they would continue to lose out in the workforce. "More trained technicians and technologists are required in this country and many girls are capable of qualifying for work of a technical character if given suitable opportunity," the congress declared.³⁶

Creating suitable workers for a new system

Women trainees, however, were not easily incorporated into fields perceived as masculine. In general, employers were unwilling to invest in workers they perceived as unreliable, unlikely to have long working lives, or unwilling to commit to a career. The idea that women's high turnover necessarily excluded them from the career opportunities, however, tended to become a self-fulfilling prophecy. With no potential for advancement, most had little incentive to stay in the same job for long.

In fact, there was a management movement afoot to remove women from even

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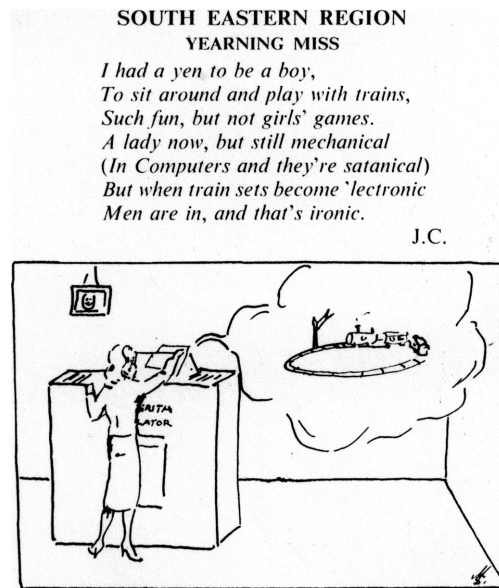


Figure 3. “Yearning Miss.” This cartoon appeared in the British Tabulating Machine Company magazine *Tabacus* in May 1957 (p. 4). (Courtesy of the British Tabulating Machine Company)

long-feminized office machine operator and programming jobs.³⁷ Reflecting changes in industry, government documents began to sketch out desired changes in their computing labor force as early as the late 1950s, discussing in detail how to professionalize certain computing jobs and elevate a new breed of career “computer men” into the executive structure.³⁸

In 1959, the government’s Central Computing Bureau (called the Central Tabulating Installation until 1965) began to reevaluate its staffing methods. Although senior machine operators had previously done all programming work, more expensive and complex machinery had begun to engender an expectation of higher wages and more responsibility. As a result, managers now wanted higher-level civil servants from the executive chain of command.³⁹

None of these workers, however, had any of the needed technical skills. The manager put in charge of programming and operating for a new computer section at the bureau was described as “new and inexperienced” by his hiring superior, who noted that “for the next six months we must regard him as under training.” Another manager who was added to help supervise was also described as completely without experience: “He too will require a long period of training and ‘running in’” lamented bureau supervisors.⁴⁰

Why then, were these men hired? And who would train them and do the programming and operation work these jobs required? The answer to the second question was in fact linked to the first. The training, and the current programming work, was done by the senior machine operator (SMO) already in the job. She was described as having “a good brain and a special flair for this type of work,” and the new recruits relied heavily on her. While training them and doing all the programming, she was also “responsible for setting up and testing programs on the electronic calculators.”⁴⁰

This worker was not given one of the new management-level computing jobs despite having all the necessary, scarce, technical qualifications. Her identity as a feminized, “subprofessional” machine-grade worker meant she could not be a viable candidate. As discussed later on, as computing gained momentum, gender and class expectations combined with technological and institutional ideals to downgrade technical workers like this SMO because they lacked what had come to be valued most in government computing workforces: the ability to make workflow more efficient by being able to manage personnel in addition to data. Whether the new recruits could do these things remained an open question, but they were perceived as having that potential.⁴¹

In the end, rather than gaining a promotion, the SMO was temporarily given a bonus plus “the normal allowance for more difficult SMO work.” After an extended period of doing all the programming and training her replacements, she was demoted to an assistant position under one of her former trainees: “We can leave the SMO on programming until the supervisory EO [executive officer] recommended for [programming] in our report is fully trained, say nine months, and then replace her with an EO... The SMO will eventually become an assistant to the EO on programming work.”⁴¹

While surprising, this case was not unusual; women’s talents were often squandered as managers focused on “professional” workers who were expected to have long-term career and management potential. Gender functioned as a classed category, relegating most women to certain lower-level jobs. A memorable cartoon in one computing company’s magazine even mocked the issue, critiquing the straight-jacketing effect of gender roles with a ditty about a woman computer operator (see Figure 3).



Figure 4. ICT demonstration team. This photo appeared in *ICT Magazine* in 1964. (Courtesy of International Computers and Tabulators)

Demonstrators, but not real computer workers

The SMO who trained her replacements, like the women portrayed operating machinery in ads, fulfilled the role of a mediator between the machines and new users. In this way, they were at once critical to the technological package of business computing and not seen as “real” technologists in their own right, but merely intermediaries.

ICT, and the merged company International Computers Limited (ICL) of which it later became a part, had young, female “demonstration teams” to present electronic computing to the interested public. These workers showed the “ease” with which existing feminized labor forces could run the new machines and served as nonthreatening ambassadors for more complex office automation technology.

Figure 4 shows the ICT’s 1964 demonstration team at a trade show playing with paper output.⁴² The caption recorded the individual names of all the “girls,” a relatively rare sign of respect, as operators often were not identified. The team was attired in modest, dark suits with knee-length skirts and ICT lapel pins. Although the demonstrators operated in a setting where the audience was mostly older men, the uniform did not draw an undue amount of attention to the fact that the team was made up exclusively of young women.

As the swinging sixties wore on, however, ICL aimed to capitalize more on the youth and sex appeal of their female operators.⁴³ The 1970 ICL demonstration team shows the sea change in cultural norms that occurred in Britain in the mid to late 1960s, as well as the utilization of popular fashions to help

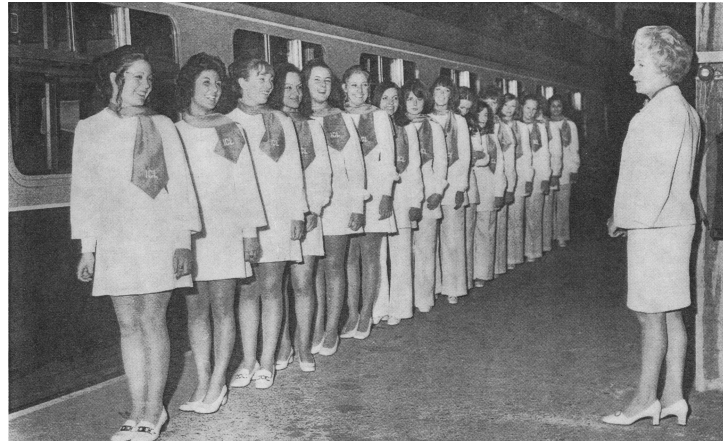


Figure 5. ICL 1970 demonstration team. Compared to its 1964 counterpart, this picture (which appeared in *ICL News*, 1970) uses sexuality and popular fashions to help sell the company’s systems. (Courtesy of International Computers and Tabulators)

sell the company’s systems (see Figure 5). Unlike the earlier photograph, the women in the 1970 team photo were not referred to by name.

Even the arrangement of the photograph uses sexuality to draw interest. Rather than taking the photograph with the line of operators parallel to the camera’s lens, the publicity image highlighted some team members and made others recede into the background. Although only a minority were attired in the mini-dress uniforms, those young women were deliberately placed in the photo’s foreground. The majority, in the pantsuit uniform, were placed at the back of the line.

Although the effect is obvious, the agency behind it is harder to pin down. ICL’s all-male upper management was not solely responsible for injecting sex appeal into the demonstration team’s mission; the older woman on the right, head of the ICL demonstration room, was credited with choosing the mod white outfits and flashy, bright orange scarves embroidered with the company’s name. While the fashions reflected larger cultural shifts, focusing on women’s bodies in this professional context might also have marginalized many women who were not interested in being cheesecake. By pitching to a certain kind of customer, ICL effectively sent the message that women in computing were valued largely for their appearances.

Computing careers versus working with computers

This marginalization was mirrored in labor changes within the government and

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nationalized industries, with the institutionalization of certain standards and expectations for computer workers. Into the mid-1960s, many departments regarded programming as appropriate work for higher machine operator posts, a logical progression from machine operator work.⁴⁴ Aptitude testing proved an unreliable measure of new recruits' future success, whereas familiarity with the departmental installations tended to produce programming trainees more easily.⁴⁵

In 1962, an overview of government computing policy reported that the government now aimed to recruit most programmers from the ranks of the 70,000 workers within the executive class, the middle managers who dealt with long-term departmental goals and the development of processes for greater efficiency.⁴⁶ Hiring calls implementing the policy followed.⁴⁷ These workers did not share any particular skill set commonly associated with early programming expertise. More than 90 percent of the executive class workers were men, although women formed the majority in the lower grades of the civil service.⁴⁸ This broad institutional change, more than any direct discrimination, hurt women workers because it shifted hiring to grades in which men held the vast majority of positions.

Government organization specialists recognized, however, that the limited career prospects offered to computer workers were inadequate even for machine-grade workers, so it came as little surprise that higher-level workers feared stalling their careers and "getting in a 'backwater'" by working as computer operators and programmers.⁴⁹ Management potential, and a broad understanding of the workings of government agencies, started to become key qualities for new computing hires, but in the early and mid-1960s, career trajectories did not yet exist.

As the government struggled with computerization, the theory of an all-executive programmer class did not easily translate into reality. Programmer and operator labor shortages became acute in the mid-1960s, pushing concerns about shaping a professional, career computing class in the civil service to the back burner. As late as 1967, the Central Computing Bureau (CCB) noted that they were "pleased to see that the quality" of their "girl trainees" was "still very high" and began to send larger complements of operators from the machine grades for programming training in NICOL (Nineteen Hundred Commercial Language), a language

developed by the British ICT for programming their 1900 series of mainframe computers.⁵⁰ At the same time, the CCB sent several executive officers for Cobol training.⁵¹

Management could only hope that both groups of trainees would stay long enough to provide a return on the investment. Surprisingly, the turnover rate for men trainees from the higher levels of the service was far greater than women's, even when turnover due to marriage was taken into account. New executive-level programmer trainees often looked for better jobs in industry after taking advantage of government training, leaving at a rate of nearly 40 percent in 1970.⁵²

A 1967 Air Force report related that their mostly female workforce had served well during periods when careers for computer operators and programmers were not easily found in the civil service. Indeed, the Air Force felt that if computer "operators are required who have no career ambitions and simply want to earn a bit of money, then the best bet is the middle-aged married woman" because these workers were unlikely to have high turnover or leave to seek better positions.⁵³

Even so, by the late 1960s when programmer shortages lessened, the Air Force began to feel pressure to bring themselves into line with other government departments: "The majority of other organizations considered during this investigation recruit young men as machine operators," and in order to groom computing professionals, "they offer a complete career to such people." The report explains the practice simply by saying "it is felt that the computer field generally is a young man's domain.... The young man seems to represent the 'best bet' if career opportunities and financial rewards are satisfactory."⁵³ From 1965 to 1975, executive-class programmers and systems analysts increased fivefold, and executive class operators increased by almost fourteenfold.⁵⁴ But why were young men now seen as the "best bet"?

Susie and the typist of the future

As hiring changes gathered momentum in the late 1960s, the feminized labor forces that provided much computing labor failed to see improved career opportunities. Although women had attained equal pay in the clerical grades of the civil service in the 1950s, the persistent division of "machine" and

This typist
can control
your invoicing,
stock records and
sales statistics
all at once... *electronically*

but not without help
from **Susie** her computer

Susie looks like a desk, is used like a typewriter and costs from just £7,100 (less, if you allow for Investment Grant). Yet Susie stores numerical AND alphabetical data—already works on Sterling AND Decimal currencies—is programmed in plain language from tape or by the typist—produces tape, cards or printed output—has modular storage to expand step by step with your business growth—reads and prints any stored information at seconds' notice—... And as sophisticated as it is, Susie is operated by a typist—not highly paid programmers and controllers. Find out what Susie can do for you! There's the coupon.

BRITISH MADE BY SYSTEMATION

SADIE & SUSIE

BUSINESS MECHANISATION LIMITED
180 Tottenham Ct. Rd., W.1 Tel. 01-580 8361

BIRMINGHAM LEEDS MANCHESTER
BRISTOL NEWCASTLE
DUBLIN SOUTHAMPTON
GLASGOW

NAME _____ COMPANY _____ ADDRESS _____
Please send your *Sadie* brochure DM48

**This is all the staff you need to
process orders, produce invoices,
check credit, check and analyse sales,
check stocks, produce despatch
notes and operate a computer.**

INTERACT 75 makes it possible.
The Baric INTERACT 75 service gives you direct access to a major computer system from your own office. Easily. Quickly. And economically.
But the real advantage of INTERACT 75 is the fact that the computer you plug into is already programmed to carry out the day-to-day commercial processes involved in running your business.
Like recording invoices. Issuing orders. Updating stock records. Checking customer credit limits. And calculating discounts.
In the opening phase of INTERACT 75 we are offering this Commercial Management Service to a limited number of customers.
These will probably be companies with about 200-2,000 personnel; selling from stock; and coping with an invoicing problem.
Briefly, this is how it works.
All your orders, from whatever source, are passed to the girl operator at your INTERACT 75 terminal. She transfers the order data to the computer, via the terminal. The computer immediately checks

all the data against permanent file information.
If something is amiss, such as an item being out of stock, it advises her immediately.
If not, her single entry starts a number of balls rolling.
The computer records all the information on the user's private file: quantity, ledger entry, customer's name and address and so on, allowing for later detailed analysis for management reports, stock control, etc.
The computer then scans the file to prepare the invoice, noting any discount arrangements and adjusting the account.
Within seconds it passes the information back to the user's office where it prints out the completed invoice automatically.
The implications are obvious to every businessman.
Unfortunately we can only serve a few. So we would urge you to be quick about writing for details to
Baric Computing Services Limited,
68 Newman Street, London W1P 4EH.
An ICL/Barclays Company.

BARIC

INTERACT 75 Europe's first commercial time-sharing system.

Figure 6. Computer company ads. (a) The "Susie" advertisement, which appeared in *Office Methods and Machines Magazine* in September 1967 (p. 33), and (b) the BARIC advertisement, which appeared in *ICL Computers International* in September 1970 (p. 3), continue to use "girl operators" to convince potential customers that the systems are easy to staff. (Courtesy of Business Mechanisation and International Computers and Tabulators, respectively.)

"clerical" work silently perpetuated pay and promotion inequities in computing jobs.⁵⁵ In the private sector, untouched by equal pay legislation until 1975, pay inequality was often openly discussed. In 1965, the chief accountant of a major British company wrote in an important trade journal that women's unequal pay made them a bargain for efficiency-minded employers: "Because female clerks can be obtained at a cheaper price than males, and may be just as good if given the same opportunities and training, it should be your policy to employ them wherever possible."⁵⁶

Computing companies also self-consciously continued the association of these less-expensive workers with their products, even as labor trends began to shift. As computing professionalized and government and industry managers looked for career-oriented young men, the British company Systemation used young women in their ads and even called their systems by women's names (Betsie, Sadie, and Susie). By assuring the potential consumer that "as sophisticated as it is, Susie is operated by a typist—not highly-paid programmers and controllers,"

the ad in Figure 6a sells the feminized role of the "typist" along with the machine. The text notes the computer can be programmed from tape "or by the typist" and lists off the tasks it can help automate, from accounting to invoicing.⁵⁷

While the worker pictured next to the keyboard in Figure 6a did much more than a typist, she was still viewed and remunerated as one. Similarly, ads for BARIC, touted by ICL as "Europe's first commercial time-sharing system," used the term "girl operator" and made her the ad's centerpiece: a smiling, young, blond woman in a mini-dress perches on an office chair with no terminal in sight (see Figure 6b). The text describes step by step how the system works and why "this is all the staff you need to process orders, produce invoices, check credit, check and analyze sales, check stocks, produce dispatch notes, and operate a computer."⁵⁸

With the help of time sharing, the "girl operator" could fulfill functions that had previously required many more staff. Although seeming to center women workers, these ads denied them any of the status that new computing skills might bring, cutting them

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out of the process of professionalization and reinforcing expectations that women would fulfill the same roles in the workplace hierarchy even if the content of their work changed.

In reality, women computer workers also found that their technical competencies did not transcend gendered expectations about their worth. In 1969, acrimony over computer operator pay erupted from the ranks of management within the civil service. Despite poor career prospects, the pay for operators was high in relation to other women's jobs in government, and even some men's jobs.

Even though the pay for these jobs was often below fair market rate for the private sector, several department heads felt that these "girls" were getting too much money. After rapidly hiring many operators for the CCB's new location, managers complained that although they were

quite satisfied that the MOs being promoted are fully capable of doing SMO work, we are not happy with the size of the group we are building up receiving pay on a scale starting at £814 per annum. It is out of proportion that these girls, academically unqualified compared with clerical staff, should so quickly be able to reach salary levels above those of clerical officers and even executive officers.⁵⁹

At a time when male clerical officers wrote angry letters to civil service union newsletters complaining their salaries meant they could not "afford to keep a wife" or support a family, some believed that market forces had taken things in an unsavory direction.⁶⁰ Many felt that how these young, liminally working class women were being paid for their skills contradicted their proper social role. Even more worrisome, having no further promotion outlets in the machine operator grade, these workers might try to move into the clerical or executive classes.

In response to the quick rate of promotion of fewer than 200 workers, treasury officials attempted to decrement pay scales, slow down all promotions, and throttle back the flow of young women into high computing operation positions at the CCB. "Where it is not absolutely essential that we fill posts now, we will defer appointments," wrote the CCB manager.⁵⁹ Less than a year later, in 1970, when the government established a new "Automatic Data Processing" grade to cater to the elevated pay and career

needs of programmers and systems analysts, machine operators like these were not allowed to compete for jobs in the new, professionalized class.⁶¹

Conclusion

In an era of massive social and technological change, women's images in computing advertising are notable for seeming to stand still in a maelstrom—little more than the fashions they wore changed, while their roles as helpers, demonstrators, and subprofessional factotums remained the same. Over the span of an arguably revolutionary two decades, women's roles within computing advertisements failed to progress beyond representing them as low-cost and relatively low-skill workers. At the same time, managers within the government's sprawling bureaucracy, the only major employer in the nation that ostensibly did not engage in sex discrimination, reinstitutionalized gendered labor hierarchies as the field of computing professionalized. These changes stranded women, even those with the requisite technical skills, at the bottom of the job pyramid—both in image and reality.

In order for a revolutionary technological change to take hold, it must appeal to potential users on the basis of what they already understand and value, strengthening the current mode of understanding even while promising change.⁶² In the British case, a feminized workforce was a powerful link between pre-electronic and electronic office computing. This imagery, widely used in print advertising and live demonstrations, made women ambassadors for the technology and portrayed them as part of the system. Indeed, government managers shaped their hiring and training policies around expected workers as much as actual ones.⁶³

As the field of computing professionalized, however, these "ideal" machine workers served only to foster a downgraded image of women's labor and abilities. These visual representations helped construct an image of women workers that unexpectedly consigned them to the margins of the high tech system even as it focused on their labor.

Although helping to shape management and worker expectations, advertising discourses cannot tell the whole story. Contemporaneous examples of actual labor forces show how the early feminization of computer operation work served to hinder women's later advancement, even while complicating received images of computing

as a masculine field of endeavor. Both in image and reality, it was nearly impossible for women workers, in the aggregate, to shake the expectation that they were low-cost, high-turnover, and low-skill; as such they did not fit the powerful, new image of the technocrat in Britain's era of "white heat."⁶⁴ Paradoxically, a technology that held a place of pride in a technological revolution meant to "burn up" inequalities of birth and foster meritocracy instead witnessed old divisions and inequalities reinstitutionalized as part and parcel of attempts to make sense of a new technological system.⁶⁵

References and notes

1. For more information on the Colossus and Leo, see B.J. Copeland, ed., *Colossus: The Secrets of Bletchley Park's Codebreaking Computers*, Oxford Univ. Press, 2006, and P.J. Bird, *Leo: The First Business Computer*, Hasler Publishing Ltd., 1994.
2. Two landmark examples are M. Campbell-Kelly, *ICL: A Business and Technical History*, Oxford Univ. Press, 1989, and M. Campbell-Kelly and W. Aspray, *Computer: A History of the Information Machine*, Basic Books, 1996. J. Abbate has argued that emphasis on hardware in the history of computing has had the unintended consequence of obscuring women's work: "Women and Gender in the History of Computing," *IEEE Annals of the History of Computing*, vol. 25, no. 4, 2003, pp. 4–8.
3. J. Tomlinson points out the congruence between Conservative and Labour views on technology from the 1950s through the 1970s in "Conservative Modernization: Too Little Too Late," *Contemporary British History*, vol. 33, no. 3, 1997, pp. 18–38.
4. For example, "Britain Must Lead the Computer Race: Mr. Wilson's Warning," *Times* (London), 17 Jul. 1965, p. 4, and Delhi Correspondent, "The Eastern Trade: British Markets Threatened in India and Pakistan," *Times* (London), 23 Dec. 1952, p. 5.
5. T. Jones, *Remaking the Labour Party: From Gait-skill to Blair*, Routledge, 1996; H. Wilson, *The New Britain: Labour's Plan Outlined by Harold Wilson*, Penguin, 1964.
6. W. Philip Ziegler, *The Authorized Life of Lord Wilson of Rievaulx*, Weidenfeld and Nicolson, 1993. A key counterpoint to the decline argument is that Britain did not decline in actual terms following World War II, but only relative to their economic rivals' explosive rates of growth. See A. Sked and C. Cook, *Postwar Britain: A Political History*, Penguin, 1984.
7. For instance, N. Ensmenger, "Letting the 'Computer Boys' Take Over: Technology and the Politics of Organizational Transformation," *International Review of Social History (IRSH)*, 48 Supplement, 2003, pp. 153–180; T. Haigh, "Inventing Information Systems: The Systems Men and the Computer, 1950–1968," *Business History Rev.*, vol. 75, no. 1, 2001, pp. 15–61; and J. Light, "When Computers Were Women," *Technology and Culture*, vol. 40, no. 3, 1999, pp. 455–483.
8. For example, E. Medina, "Designing Freedom, Regulating a Nation: Socialist Cybernetics in Allende's Chile," *J. Latin Am. Studies*, vol. 38, no. 3, 2006, pp. 571–606, and C. Freeman, *High Tech and High Heels in the Global Economy*, Duke Univ. Press, 2000.
9. See J. McGrath Cohoon and W. Aspray, eds., *Women And Information Technology: Research on Underrepresentation*, MIT Press, 2006; J. Margolis and A. Fisher, *Unlocking the Clubhouse: Women in Computing*, MIT Press, 2003; and T. Misa, ed., *Gender Codes: Why Women Are Leaving Computing*, IEEE-Wiley, 2010.
10. For instance, see S. Hacker, "Sex Stratification, Technology and Organizational Change: A Longitudinal Case Study of AT&T," *Social Problems*, vol. 26, no. 5, 1979, pp. 539–557; C. Cockburn, "Women and Technology: Opportunity Is Not Enough," *The Changing Experience of Employment*, Kate Purcell et al., ed., Macmillan, 1986; and L. Lee Downs, "Industrial Decline, Rationalization and Equal Pay: The Bedaux Strike at Rover Automobile Company," *Social History*, vol. 15, no. 1, 1990, pp. 45–73.
11. For instance, following R. Milkman, J. Light shows how "sex-typing" affected ENIAC workers, arguing that postwar culture effectively closed off career options for women in computing and even tended to dismiss or obscure work they had done in computing during the war. N. Ensmenger shows how gendered ideals formed a critical part of the professionalization process of computer workers in *The Computer Boys Take Over*, MIT Press, 2010.
12. For a fuller discussion of the material aspects of this change, see M. Hicks, "Compiling Inequalities: Computerization in the British Civil Service and Nationalized Industries, 1940–1979," doctoral dissertation, History Dept., Duke Univ., 2009.
13. For instance, J. Wosk (*Women and the Machine: Representations from the Spinning Wheel to the Electronic Age*, Johns Hopkins Press, 2003) points out the formative role that wartime photographs and advertisements had in constructing a perception of women as helpers, trainees, and temporary stand-ins whose true roles were

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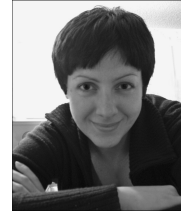
- outside of the paid labor force. For more on the material effects of discourse, see R. Schwartz Cowan, "The 'Industrial Revolution' in the Home: Household Technology and Social Change in the 20th Century," *Technology and Culture*, vol. 17, no. 1, 1976, pp. 1–23, and R. Oldenziel, *Making Technology Masculine: Men, Women and Modern Machines in America, 1870–1945*, Amsterdam Univ. Press, 1999.
14. I.J. Good, D. Michie, and G. Timms, "General Report on Tunny With Emphasis on Statistical Methods," 1945, HW 25/5, The Nat'l Archives of the UK (TNA), p. 276, and G. Ferry, *A Computer Called LEO: Lyons Teashop and the World's First Office Computer*, Fourth Estate, 2003. In the case of the Colossi, wartime labor exigencies also played a role, although work was still often sex-typed; for instance, only young men were sent for engineering training during the war, while only women did food service work.
 15. The central government alone (not including the nationalized industries or the National Health Service used 5 percent of all the nation's computers in 1970. "Down Among the Data-crats," *Civil Service Opinion*, vol. 48, no. 557, 1970, p. 54, HN 1/67, TNA. A snapshot of the government's gendered hiring practices can be found in the files of the Central Computing Bureau; other departments mirrored these practices. See "STAT Series: Records of the Stationery Office," particularly STAT 14/2727, STAT 14/2765, STAT 14/2972, STAT 14/3093, STAT 14/3093, STAT 14/3303, STAT 14/3484, and STAT 14/632, TNA.
 16. This was the case in both government and industry. For the government case, see M. Hicks's "Compiling Inequalities," and for an industry example, see I. Martin, "Britain's First Computer Centre for Banking: What Did this Building Do?" to be published in *Technological Innovation in Retail Finance*, B. Batiz-Lazo et al., ed., Routledge, 2011, pp. 53–54.
 17. "Duplicator Operators and Machine Operators (Clerical) 1943–1956," OS 1/656, TNA.
 18. The machine grades' feminization excluded them from the Equal Pay Act of 1954. The government reasoned that the women's rate in this case (not the men's) was the fair market price for the work. This meant 54 percent of women in the civil service were unaffected by equal pay. "Royal Commission on Equal Pay, 1944–46," report, HMSO, 1946, p. 9.
 19. D.W.G. Wass, Treasury, confidential letter to P.W. Buckerfield, HMSO, 14 Jun. 1963, STAT 14/2765, and "ADP Staffing and Projects," Jul. 1968, HN 1/67, TNA.
 20. For instance, ICT, "Progress in the North," advertising brochure, 1962, NAHC/ICT/C96 ICL Advertisements, Nat'l Archive for the History of Computing, Manchester, UK (NAHCM), or "EE-LEO brochure for LECTOR System," NAHC/LEO/D2, NAHCM. ICT's advertising showed women workers operating machines and described the labor in the same terms as before; advertising for other companies was similar. See also Powers advertisements held at the Vickers Archive in Cambridge, UK, and the LEO and ICT/ICL brochure collections at the NAHCM.
 21. Most women working in computing at this time did punching and verifying work. Although they also powerfully constructed the feminized image of early computing work, I have focused on computer operators here to address the twin issues of professionalization and masculinization.
 22. "The Powers Girl," *Vickers News*, Jan. 1951, front cover, pp. 2–4. During the 1960s, ICT absorbed EMI, GEC, and Ferranti's data processing divisions, with government encouragement. The only other principal player in British computing by 1967 was English Electric, itself a merged company comprised of the former Leo Computer Company and the original English Electric, with Marconi and Elliott Automation's data processing interests absorbed in the 1960s. In 1968, the government's Ministry of Technology helped merge ICT and English Electric to create ICL (International Computers Limited), ostensibly to compete with IBM.
 23. C.H. Angell, "Practical Economics of the EMP," *Powers Magazine*, May 1955, p. 7.
 24. Women made up 60 percent of all clerical workers in the 1950s and more than 70 percent by the 1970s. J.E. Lewis, "Women Clerical Workers in the Late Nineteenth and Early Twentieth Centuries," *The White-Blouse Revolution: Female Office Workers since 1870*, G. Anderson, ed., Manchester Univ. Press, 1988, p. 34.
 25. The Electronic Multiplying Punch (Emp), an electronic calculator with more than 700 vacuum tubes, multiplied information on one punched card, adding the results onto the card. This saved a calculating department of women working with desktop calculating machines and a punching department from doing this work. The Emp, marketed for payroll calculations and currency conversions, could do 120,000 calculations in its 17-hour work "week." C.H. Angell, "Practical Economics of the 'Emp,'" *Powers-Samas Magazine*, May 1955, p. 7.
 26. Both images had wider traction beyond the Powers' magazine: one was reprinted from an accounting conference paper, while the other came from another company's house magazine.
 27. Many photos of workers were similar. For example, "The Emp at BOAC," *Powers-Samas*

- Magazine*, Aug. 1954, inside front cover; "Reed Paper Group," *Powers-Samas Magazine*, Dec. 1956, p. 10; "Emp for Australian Newspaper," *Powers-Samas Magazine*, Nov./Dec. 1958, p. 8.
28. "The Emp in Production," *Powers-Samas Magazine*, Apr. 1954, inside back cover. Through the 1960s, IBM UK measured production times for computer internals in "girl hours" to highlight their low-cost assembly and testing workforce. "Interdepartmental Study Group on Application of Computer Techniques to Clerical Work: 1956-1957," T 222/1314, TNA.
 29. Meta Zimmeck, "Jobs for the Girls: The Expansion of Clerical Work for Women, 1850-1914," *Unequal Opportunities: Women's Employment in England 1800-1918*, A.V. John, ed., Basil Blackwell, 1986.
 30. Laporte Industries news reprint, "Mechanical Accounting at 'The Rock,'" *Powers-Samas Magazine*, Jun./Jul. 1957, pp. 10-11.
 31. "Single-Demand Billing for Gas, Water, Electricity, and Refuse Collection," *Powers-Samas Magazine*, Mar./Apr. 1957, p. 11.
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 36. Women's Trade Union Congress, *Proc. 1960 Women Workers Meeting at Hastings*, GB0152 MSS.292/4/12/pieces 1-17, Modern Records Center, Coventry, pp. 21-22.
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 38. *Times* (London), "The World of Management, Computers: For the Want of a Man . . .," 29 Jan. 1968, clipping, STAT 14/3484, TNA, and *Observer Weekend Rev.*, "The Computer As Bureaucrat," 18 Feb. 1962, clipping, T 216/710, TNA.
 39. See STAT 14, HN 1, T 162, T 215, and T 222 series, TNA.
 40. Minutes, 20 Apr. 1959, STAT 14/2320, TNA.
 41. The idea that women could not effectively manage mixed personnel remained a major stumbling block for women for decades. T. Rees, *Skill Shortages, Women and the New Information Technologies*, Office for Official Publications of the European Communities, 1992, and A. Hunt, *Management Attitudes and Practices Towards Women at Work*, HMSO, 1975.
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 43. *ICL News*, Nov. 1970, front page.
 44. Treasury, "Machine Grades: Notes of an Interdepartmental Meeting," 8 May 1964, STAT 14/2765, TNA.
 45. "ADP Staffing and Projects," Jul. 1968, HN 1/67, TNA.
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 54. "ADP Staff Return," 1970-71, sections E and F, HN 1/62, TNA.
 55. Letters from Transport Salaried Staffs Association to the Secretary of the British Transport Commission, 18 July 1961 and 15 July 1963, AN 171/398, TNA.
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62. B. Reskin and P. Roos, show how even economic best interest can lose out when employers perceive certain workers as more valuable. *Job Queues, Gender Queues: Explaining Women's Inroads into Male Occupations*, Temple Univ. Press, 1990, pp. 108–109.
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64. In *The Government Machine: A Revolutionary History of the Computer*, MIT Press, 2003, J. Agar discusses the tight relationship between managerial and technological systems within the government.

65. T. Jones, *Remaking the Labour Party: From Gait-skill to Blair*, Routledge, 1996, pp. 77–80.



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