Masculinities in the Histories of Computing(s)

Unpublished Draft for CBI Workshop on History | Gender | Computing, May 2008

Thomas Haigh
thaigh@computer.org www.tomandmaria.com/tom

My aim in this paper is to review the general state of gender analysis in the social history of work and explore ways in which taking gender more seriously might enrich the history of computing. The paper begins with a quick review of the rise of social and gender analysis within American historical scholarship, looking particularly at the emergence of masculinity as a category of historical analysis. It then shifts to illustrate the complexity of gender identity with a review of parallels between the careers of the iconic Grace Hopper and the fictional Susan Calvin. This illustrates the need to look beyond the presence of absence of women in a field to probe the cultural roles available to historical actors and their relation to particular feminine identities.

The remainder of the paper addresses the role of gender in the social history of data processing from the 1940s to the 1960s. Drawing on Michael Mahoney's formulation of the "Histories of Computing(s)" and my own earlier work I argue that administrative computing work is better seen as a continuation of earlier punched card and manual administrative labor than as a continuation of scientific computation. This challenges assumptions that the prevalence of men in corporate application programming jobs resulted from a shift in gender roles rather than the extension of existing practice. Looking deeper into the gender politics of data processing work in the era I explore depictions of key punch work and look at the relationship between this form of feminized labor and the emerging professionalization agenda of data processing supervisors. Within their Data Processing Management Association (formerly the National Machine Accounting Association) women were seen as wives or clerical workers. Its leaders aspired to the managerial masculinity of the organization man, attempting to disassociate themselves from the blue-collar masculinity of machine work and the women's work of key punch operation and clerical drudgery.

I finish by contrasting the masculinity of the organization man with the much-discussed role of nerd or "hacker" culture within programming and computer science. The clash between these two visions of masculinity appears to echo long-running tension between technical and managerial identities in administrative computing. Nerd culture suggests itself as a field in which historians of computing may make important contributions to broader understandings of gender identity in late-twentieth century America.

Gender, Identity and Work

During the 1970s and approach known as the New Social History moved to the mainstream of academic scholarship in the United States. Its proponents were wary of the grand narratives that had traditionally structured American history, be they the patriotic myths of the frontier and the spread of freedom or leftist critiques of the domination of inert masses by a privileged elite. Instead historians embraced the richness and complexity of local stories, delighted to discover wherever they looked that social change was a slow, uneven business and that oppressed groups had their own distinctive cultures and held some historical agency over their own development. In the absence of a shared master narrative the discipline was held together by general acceptance of the primacy of three crucial analytical categories: class, race, and gender.

Collectively they were jokingly referred to as the "Holy Trinity." Any respectable historian had better foreground at least one of these and pay significant attention to the other two.

The focus on class, race, and gender began as a deliberate challenge to earlier historical narratives which were critiqued as the stories of what rich white men had done to each other and to other, less fortunate, social groups. This directed historical attention toward people who were poor or female or not white. The fundamental fairness of this shift toward history "from the bottom up" was hard to dispute, as people throughout history have fallen into at least one of these categories, and many fitted all three. An initial enthusiasm for quantitative and statistical methods to document representative experience had faded by the 1980s, but the focus on class, race, and gender became the new orthodoxy. Historians delved into the paradoxical and socially constructed details of how these identities had interacted and shaped each other over time.

The original motivation of the New Social History was to uncover representative experiences hidden behind a previous focus on a tiny and unrepresentative elite group of rich white men. Applying a similar principle to the history of computing, however, suggests that a quest for representative experience will lead us to devote the bulk of our efforts to writing about reasonably prosperous middle class white men. Which, fortuitously, is exactly what most historians and journalists writing about computing have done. A quantitative analysis would probably reveal that they have spent a disproportionate number of pages on Bill Gates, Steve Jobs, and other enormously rich men and rather too little on the moderately well-to-do technicians and middle managers who make up the middle class of the computing workforce. Data entry clerks and computer operators have gone almost unmentioned.

That would seem to leave us with two choices, neither fully satisfactory. The first is to attempt to better integrate the history of computing into the mainstream of historical scholarship by telling stories about the role of women, non-Caucasians and poor people. This actually has considerable merit, particularly as historians of computing move increasingly to examine the experiences of users of computing technology as well as those of its designers. A focus on the lower-status craft of machine operation and the feminized labor of key-punch operation would be a valuable corrective to the widespread conflation of computer work with programming. But as a dominant mode of analysis for the field it would risk drawing us away from the very focus on representative experiences that led scholars of US history toward class, race, and gender in the first place. It would also risk imposing upon the history of computing a rather generic template of stories about oppression and resistance that could distract scholars from constructing narratives based on the specifics and peculiarities of information technology workers and users during the second half of the twentieth century. The other, and far less attractive, alternative would be to conclude that the approaches of social history have little relevance for this field and to continue with business as usual, in which social historians do not choose to work on topics in the history of computing and historians of computing ghettoize their work by neglecting to frame it in ways that make clear its relevance to historians whose primary interests lie with other areas of society.

What to do? Fortunately another choice presents itself: write a social history of representative experiences around computer technology. This would draw on more recent approaches to social and cultural history. By the end of the 1980s the continuing focus on class, race, and gender as the key axes of social analysis was leading historians toward the inevitable discovery that men are as gendered as women, and, in a parallel process, that white identity is as historically contingent as black identity in the United States and that middle class identity was constructed in

a process just as complex and historically contingent as working class identity.[1] Even rich white men thus have class, gender and racial identities worthy of study (though the nature of American society has been such that they themselves often had the luxury of ignoring this fact). I will focus here on gender, but the rich literatures on whiteness and middle class identity are equally promising resources for the social history of computing and most of the arguments I make below apply in analogous form to class and race in computing as well as to gender.

Discovering Masculinity

Masculinity emerged as a field of study because of the centrality of gender to work on social history, which in turn resulted from the assimilation of women's history into the mainstream of the profession, which in turn resulted from the success of the feminist movement from the late 1960s on. Feminism was most definitely not about men, and feminist writers of the 1970s often accepted the idea that men and women were fundamentally different but to argue that women were at least as good as men and quite possibly better. Women, they argued, were less violent, more socially oriented, more perceptive, instinctively in tune with the environment, and so would do a much better job of running the world than men. In the history and philosophy of science this led to ideas such as "feminine epistemology" and the suggestion that women might have an inherently different cognitive approach to science. Women's history was likewise concerned with uncovering, reporting, and celebrating the forgotten accomplishments of women and demonstrating ways in which their existence had been erased from our historical narratives.

By the late-1980s, however, important divisions had opened within the feminist movement. Scholars increasingly accepted the importance of analytical distinction between sex and gender. Sex is fairly straight forward, usually consisting of a physical state of being either male or female determined by one's chromosomal makeup. (Sex, let me hasten to add, is only *relatively* straightforward, and a great deal has been written on the cultural construction of sex and on special cases such as transsexuals, the intersexed, and eunuchs). Gender, on the other hand, is generally seen as a role or identity that is only very loosely coupled to biological sex. Gender is socially constructed, and very different gender identities have been documented in different societies, at different times in history, and within different socioeconomic groups. Like other cultural identities gender is fundamentally performative, in that gender roles are acted out in every daily routine and social interaction. This notion of gender as performative is associated particularly with the work of Judith Butler, but has obvious resonance with Erving Goffman's classic *The Presentation of Self in Everyday Life.* Structuration theory, an influential sociological metatheory expounded by Anthony Giddens, further implies that minute, incremental change in the way in which these gender roles are enacted can, over time, reshape apparently rigid social institutions. As they have come to accept these distinctions, scholars have grown wary of claims about the essential nature or universal experience of women.[2]

The shift from sex to gender has thus been accompanied by the idea that there is no single feminine identity but rather a broad range of femininities that individuals can choose to enact. A single woman might draw on multiple femininities during the course of a career, or even an

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[1] For a review of the burgeoning historical literature on whiteness see Peter Kolchin, "Whiteness Studies: The New History of Race in America", Journal of American History 89 (June 2002):154-73. The trajectory of work on the American middle class is explored in Melanie Archer and Judith R. Blau, "Class Formation in Nineteenth-century America: The Case of the Middle Class", Annual Review of Sociology 19 1993):17(25).

[2] Obviously in a formal paper I'd need a bunch of references here…

afternoon. It is this realization that opens the door to masculinity as an interesting analytical tool for the historian.

My particular interest here is in showing how gender analysis can be used to illuminate social practices of work. The best starting point here may still be the seminal anthology *Work Engendered* edited by Ava Baron and published in 1991.[3] As Roger Horowitz has written, the book showed "how gender was embedded in daily work practices and class relations…. Baron firmly established among social historians that gender was about men as well as women."[4]

Since the 1970s a rich body of historical work has explored the relationship between work and identity. Most of this has developed at the intersection of labor history and social history, as labor historians have shifted from a traditional focus on strikes, skilled workers and labor unions toward a much richer perspective on working class history. Historians of computing have not so far paid much attention to the labor history literature, aside from a minor and in retrospect unsatisfying flurry of work on software engineering as Taylorist deskilling of craft work.[5] This is a shame, because the history of computing is for the most part the history of work: the work of users, the work of operators, analysts, programmers, systems administrators and keypunch operators, the work of scientists and engineers, salespeople, managers and executives. Admittedly the myopia goes both ways: labor historians have shown very little interest in extending their perspectives to look with sympathy at managers or white collar technical workers.

Before jingoism went out of fashion in most developed countries one of the more popular lines of English poetry was "What they know of England that only England know" from Kipling's 1891 paean to the glories of Empire "The English Flag." I feel the same way about the study of gender within the history of computing. The idea applies on at least two levels. Firstly, one could ask "What should they know of gender that only femininity know." Masculinity and femininity are oppositional categories, with the feminine socially constructed as the not masculine and vice versa. Trying to understand feminine identity and experience in isolation is doomed, particularly in a male dominated field. Second, one could also ask "What should they know of gender that only gender know." Labor historians that identities are complex, multifaceted and often contradictory. A person might shift from moment to moment in identifying as Catholic, male, a trade unionist, a lathe operator, working class, an employee of a particular corporation, a husband, a resident of Pittsburgh, a father, Democratic, Irish, a supporter of a particular sports team, white, or American depending on context and social cues. These identities interact and lead to actions.

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[3] Ava Baron, <u>Work Engendered: Towards a New History of American Labor</u> (Ithaca, NY: Cornell University Press, 1991).

[4] Roger Horowitz, "Introduction", in <u>Boys and their Toys?</u>, ed. Roger Horowitz (New York: Routledge, 2001).

[5] For application of the Marxist perspectives of Harry Braverman to computer personnel see Philip Kraft, "The Industrialization of Computer Programming: From Programming to 'Software Production'", in <u>Case Studies on the Labor Process</u>, ed. Andrew Zimbalist (New York: Monthly Review Press, 1979), Philip Kraft, <u>Programmers and Managers: The Routinization of Computer Programming in the United States</u> (New York: Springer-Verlag, 1977) and Joan Greenbaum, <u>In the Name of Efficiency: Management Theory and Shopfloor Practice in Data-Processing Work</u> (Philadelphia: Temple University Press, 1979). An updated version of the argument is presented in Nathan Ensmenger and William Aspray, "Software as Labor Process", in <u>Mapping the History of Computing: Software Issues</u>, ed. Ulf Hashagen, Reinhard Keil-Slawik, and Arthur L. Norberg (New York: Springer-Verlag, 2002).

To understand the role of gender in the history of computing we have to understand the social history of computing. The challenge is to develop a social history of work that applies the same questions and analytical tools to middle class identity and the many technical and managerial occupations that have developed within the middle reaches of the corporate hierarchy that historians have used to great effect on working class identity and the workers at the base of the corporate hierarchy. We must integrate identities with actions, exploring the complex relationships between the actual organization of work, the ideas and voices of the workers themselves, and different dimensions of identity (occupation, class, gender, region, ethnicity, race, etc). There is no better place to begin this effort than in the history of computing.

American society offers many different masculinities, with new identities being invented and shifting in popularity. Unsurprisingly, gender identities are impossible to separate from class and race identities. Historians have, for example, identified the emergence of a "respectable" working class masculinity during Victorian times as a socially legitimate alternative to the more traditional embrace of drinking, hunting, and fighting as enactments of masculinity.[6] This development has an obvious relevance for the history of technology, and the history of technological occupations. Historians have also argued for a shift during the mid-twentieth century from work-based masculine identity to consumption-based masculine identity, a shift epitomized by the rise of Playboy magazine.[7] Much work on the second half of the twentieth century has stressed the fragmentation of masculine identities within American society during this period.[8]

The multifaceted nature of gender identity is also important in our analysis of men in computer-related occupations. Most of these occupations have been filled largely with men throughout their existence. Yet while jobs such as business application programmer, UNIX systems administration or hardware support technician have been overwhelmingly male their identities are not grounded in traditional masculinities. Our mental picture of the programmer has little in common with icons of rugged American masculinity such as Clint Eastwood, the Marlboro Man or Bruce Willis. He is not a powerful, lone figure able to do what must be done to protect the innocent. He is, admittedly, likely to be a man of few words. The programmer works in the world of the technical but his creations lack the epic mastery of man over nature associated with civil engineers in the early twentieth-century or the romantic blending of creativity and technology today granted the architect. He lacks the masculine authority of the uniformed and military occupations, and the hands-on mastery of the mechanical we admire in the greasy yet manly world of the auto mechanic. Corporate managers, while distanced from the rugged masculinity of manual work, can appeal to different masculine ideals. They have command over other people, and might demonstrate refined masculinity through the conspicuous consumption of expensive goods and services. In contrast the stereotypical programmer commands machines rather than people and is rarely assumed to be unusually accomplished in terms of social graces.

My own experience as a computer science student at the University of Manchester in the first half of the 1990s was that the cultural interests of the student body skewed in a distinct direction. The population was perhaps 90% male, and most of the female students were overseas nationals

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[6] See discussion in {Meyer, 2001 #4437}.

[7] Bill Osgerby, <u>Playboys in Paradise: Masculinity, Youth, and Leisure-Style in Modern America</u> (New York: Oxford University Press, 2001).

[8] James Burkhart Gilbert, <u>Men in the Middle : Searching for Masculinity in the 1950s</u> (Chicago: University of Chicago Press, 2005).

from former British colonies such as Malaysia, the Maldives or South Africa who generally worked hard but floated outside the departmental culture. Monty Python, Pink Floyd, Red Dwarf, the Hitchhiker's Guide to the Galaxy and Star Trek were key cultural reference points. Few students showed an interest in politics or the arts. Non-descript, ill-assorted clothes were the norm although distinct subcultures rebelled against this by adopting neo-hippy garb, heavy metal gear, or a punkish and pierced identity. Few students had girlfriends or significant social contact with women. Only one of my male friends, a Welsh would-be transsexual, projected a strong sexual identity and even (s)he was far more active in theory than practice. A significant minority embraced the hacker lifestyle, crowding the labs until eviction time each day to use the computers recreationally. As a recovering nerd and editor of the departmental magazine I gently mocked this strange world in what I have since learned is a long tradition of self-loathing humor among engineering students.[9]
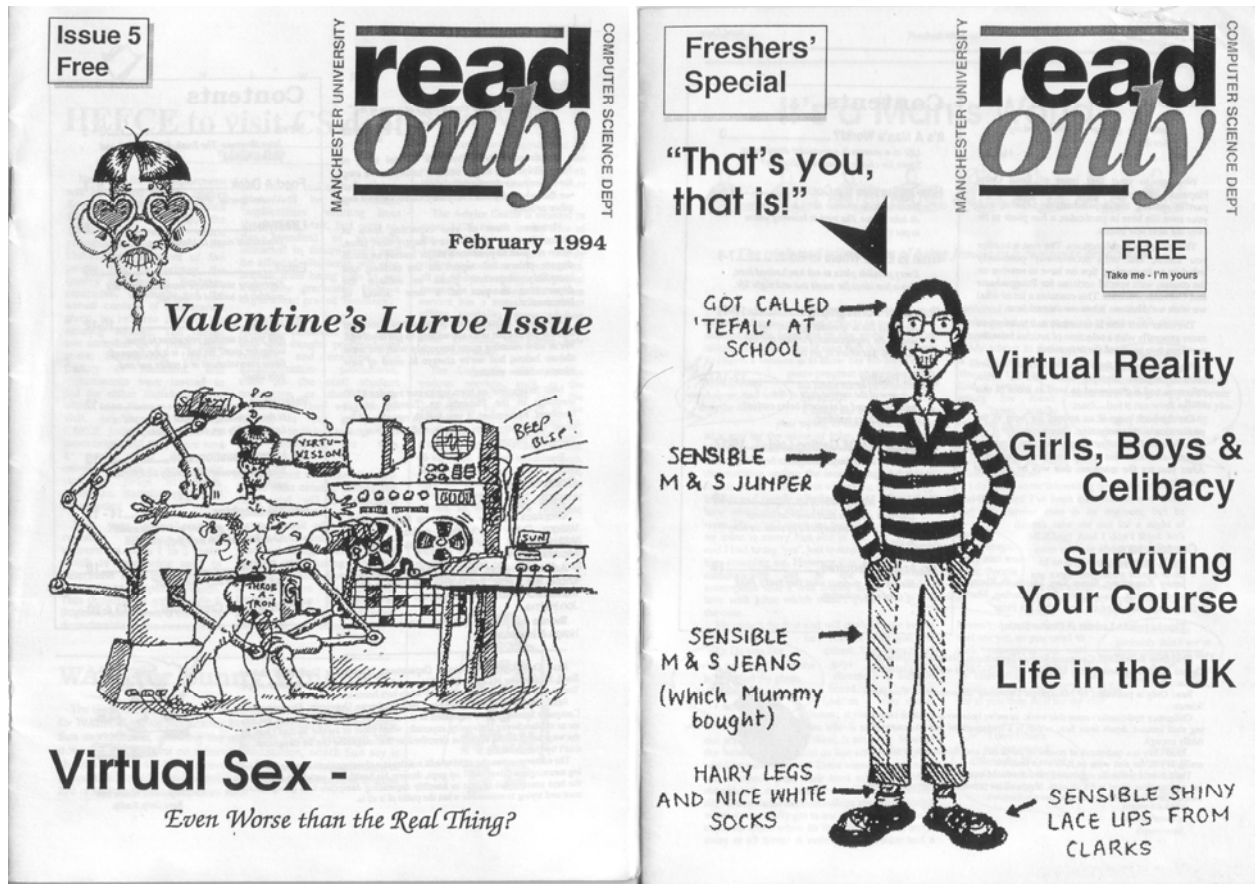
ReadOnly, the magazine of Manchester University's Computer Science department from 1992 to 1996, often featured satires of the masculine culture of computer science students.

Satire notwithstanding this culture seemed somewhat inhospitable and upon receiving my degrees I jumped ship for my Ph.D. to the equally exotic worlds of the USA and the humanities. There is an ironic twist though. While this dramatic physical and cultural relocation certainly worked wonders for my ability to meet women I ultimately found my wife in the next cubicle in

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[9] Our magazine, *Read Only* 1992-1996 had significant overlap in tone with the 1950s RPI publication *The Bachelor* discussed in Benjamin Nugent, American Nerd: The Story of My People (New York: Scribner, 2008), 57-60.

the basement of the Wharton school. We were both working as IT system developers. At the wedding reception she charmed our friends by telling them that I wrote the best code and had the greatest debugging skills of anyone she had met. Maybe I was just running from my inner self.

Gender in the History of Computing

Writing on gender in computing has so far focused almost exclusively (autobiography aside) on three specific topics: Ada Lovelace and her authorship of what has sometimes been called the first programming manual, the Women of ENIAC and their work configuring the machine to run particular tasks, and Grace Hopper and her work as a data processing pioneer at Harvard, Univac, and in the US Navy. For the most part the actual topic has been women, rather than gender itself.

As lone pioneers in a field dominated by men these women have been given iconic status. Lovelace has been honored with the programming language ADA, created by a huge effort by from Defense Department to impose a standard language for real-time programming systems. (In what might be a bizarre pun another programming system, Linda, has been named after the most famous twentieth-century Lovelace). The Association for Women in Computing offered an Ada Lovelace award. The Women of ENIAC have yet to achieve such celebrity, though they have carved out a niche in discussion of the history of computer programming.[10] Grace Hopper, aptly characterized by Michael Mahoney as having "achieved something akin to canonization in her own lifetime" has achieved a still more prominent cultural position in death.[11] The largest and most lavish annual meeting for women in computing is the Grace Hopper Celebration of Women in Computing.

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[10] W Barkley Fritz, "The Women of ENIAC", <u>IEEE Annals of the History of Computing</u> 18, no. 3 (Fall 1996):13-28.

[11] {Mahoney, 2001 #4438}.
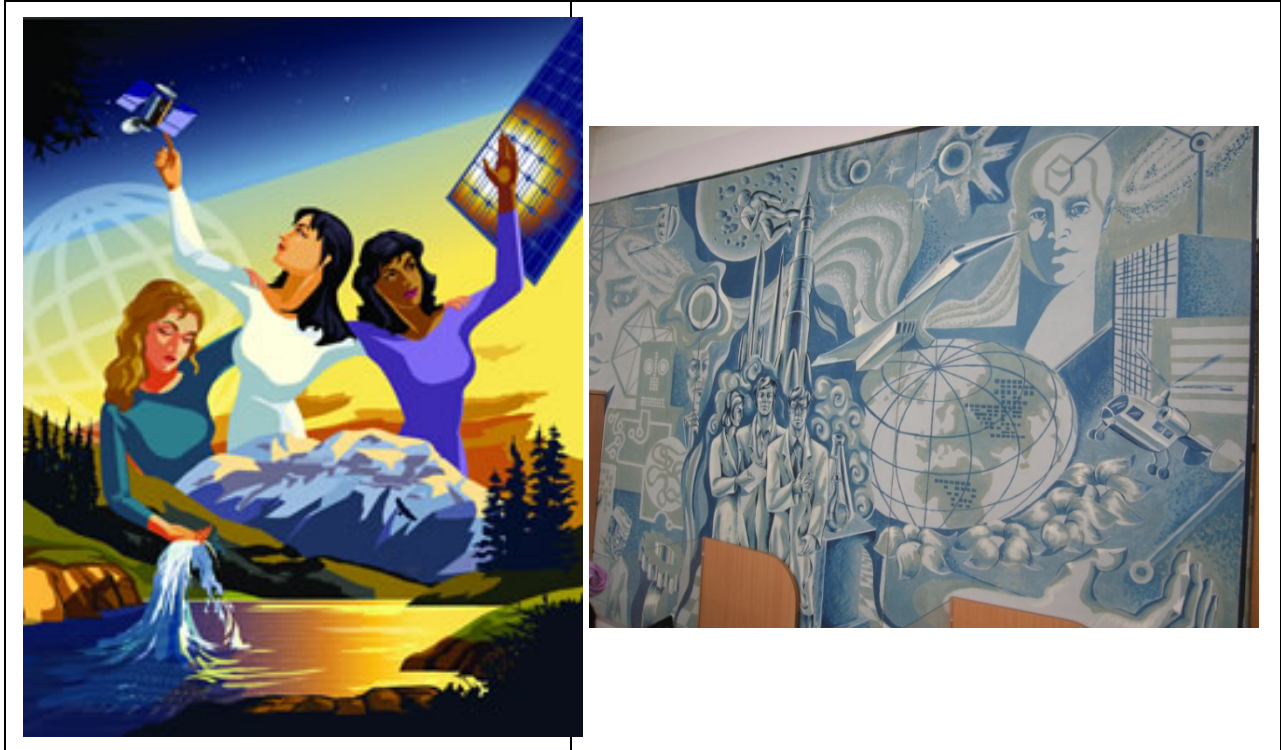
The quasi-Soviet imagery of the 2008 Grace Hopper Celebration of Women in Computing Conference shows giant multicolored women bridging the gap between nature and high technology. (On the right a giant Soviet-era image fills the wall of a classroom at the National Aerospace University in Kiev, Ukraine)

The ACM recently sent me a Grace Hopper mug to celebrate the my fourth anniversary as a member, and commemorates Hopper in a more conventional fashion with its an award named after her. "Amazing Grace" t-shirts abound at industry events.

Yet at the risk of seeming churlish, let me suggest the increasing fame of these icons may act at cross purpose to the historian's interest in more nuanced gender analysis. The celebratory and inspirational cultural niche of a role model as the personification of a "useful past" for a particular community does not always fit well with the complexity of scholarly work. In *Computer*, the standard introductory text for the history of computing, Martin Campbell-Kelly and William Aspray note that "the extent of Lovelace's intellectual contribution… has been much exaggerated in recent years. She has been pronounced the world's first programmer… Scholarship of the last decade has shown that all of the technical content and all of the programs in the Sketch were Babbage's work." [12]

The computing fields of the 1940s and 1950s were unwelcoming territory not just for women but also for feminine identities. More critical scholarly analysis may well show that Hopper's career success as a woman came not just by challenging and overcoming deeply grounded gender assumptions within the organizational cultures of Univac and the US Navy but also by enacting

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[12] Martin Campbell-Kelly and William Aspray, Computer: A History of the Information Machine (New York, NY: Basic Books, 1996), 57.

and appropriating elements of traditionally masculine identity. Hopper, who was rarely photographed out of uniform, blazed a trail but it was not one that other women outside her immediate circle found easy to follow. She provided an exemplar of female success but not one compatible with the conventional feminine identities of the era. To the extent that an accepted cultural niche did exist for women within high technology business it was for the emotionless, childless and unmarried (Hopper herself was divorced but encouraged the belief that she was widowed).

According to Hopper's biography, during the later, iconic, stage of her career she looked "ten years older than her age, an impression surely affected by years of heavy smoking and drinking. At this point in her life Hopper wore little makeup and no lipstick." [13]

Hopper had little time for the women's rights movement of the 1970s, insisting that success would come to women if they worked hard and decrying the "ridiculous extremes" of feminism." Her biographer concludes that naming a warship after her was "very fitting'" because "both she and the guided-missile destroyer were lean, purposeful, and high-tech." [14] Hopper's identity strongly parallels the discussion of pioneering women managers by Michael Roper in *Masculinity and the British Organization Man since 1945*.[15] Roper noted that "The post-war generation of women managers in many ways shared the anti-feminism of their male contemporaries…. Some provided graphic illustrations of discrimination but responded negatively to my direct question of 'did you ever feel disadvantaged in any way being a woman in management." He notes that one interviewee "reacted to her marginalization by mastering the cult of toughness…. At the same time she felt unsure about whether it was right to act in this 'masculine' way.'"[16] Like their male counterparts, women did not always believe it was possible to combine feminine gender identities with the occupational and organizational identities prevalent in traditionally masculine fields.

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[13] Kathleen Broome Williams, Grace Hopper: Admiral of the Cyber SeaUS Naval Institute Press, 2004), 169.

[14] Ibid, 193.

[15] Michael Roper, Masculinity and the British organization man since 1945 (Oxford ; New York: Oxford University Press, 1994). The classic work on managerial culture in the 1970s is Rosabeth Moss Kanter, Men and Women of the Corporation (New York: Basic Books, 1977).

[16] Roper, Masculinity and the British organization man since 1945, 196.

The kinds of gender identity available to a female computing pioneer during the 1940s and 50s becomes more apparent in in the career of another woman from this area who, though fictional, earns more exact matches on Google than real life pioneers Maurice Wilkes and John V. Atanasoff combined. Dr. Susan Calvin was created by hugely popular science fiction writer Isaac Asimov in his 1945 story "Evidence" and played a key role in many of the short stories he wrote around his "Three Laws of Robotics" over subsequent years. When these stories were collected together for the book *I Robot* in 1950 Asimov used the framing device of an elderly Calvin giving an interview to a reporter on the eve of her retirement from US Robots and Mechanical Men.[17]

Asimov himself earned a Ph.D. from Columbia University in 1948 and was a tenured associate professor at Boston University's medical school until realizing in 1958 that the emerging market for science fiction books and his gift for popular science writing would support him in a life of reasonable comfort. So his ideas both reflected the scientific culture of his generation and shaped the feelings of millions of, overwhelming male, young people many of whom embarked on their own careers in science and technology over the next half century. At least two successful companies have been named after these stories: U.S. Robotics, which dominated the high-end modem market during the 1990s, and iRobot, purveyors of the Roomba vacuum machines. Indeed, Asimov is credited with coining the word "robotics."

As a "robo-psychologist," Calvin might be assumed to represent the softer, more feminine side of robotics in contrast to the harder science and engineering tasks undertaken by others within the company. But Asimov wastes few opportunities to show us that Calvin is so good at her job precisely because she is herself more than a little robotic. She is introduced in the framing narrative as "a frosty girl, plain and colorless, who protected herself against a world she disliked by a mask-like expression and hypertrophy of intellect." Notes the narrator, "She didn't smile at me. I don't think she ever smiles." She expresses surprise that a human interest story is being planned on her career, saying "Human interest out of robots? A contradiction….Surely you've been told that I'm not human." (ix). Her first appearance in the book's internal chronology is as "girl in her mid teens" who "allowed a look of intense concentration to cross her thin, plain face." (p21) Early in her career she "understands a robot like a sister." Later in life she shocks her colleagues by forming a strong relationship with a potentially brilliant but developmentally arrested robot. All is revealed when, at the end of the story, they overhear him calling her "Mamma."[18] Toward the end of her career, faced with evidence that the leading presidential candidate is actually a robot, she is asked "Are robots so different from men?" She replies "Worlds different. Robots are essentially *decent*." At the end of the book robot minds appear to have stealthily taken command of the world government, manipulating the economy to steer humans toward peace and prosperity. Calvin has few doubts about the desirability of this situation – although to be fair Asimov himself appeared to share her sentiment.

The only time in her that emotion clouds her judgment in dealing with a malfunctioning robot is when, at the age of thirty-eight, she is faced with a telepathic model who turns out to be telling people what they want to hear. In her case this is that her romantic feelings for a younger colleague are reciprocated. Describing her feelings "the wistfulness in her voice drowned out everything else. Some of the woman peered through the layer of doctor-hood." Calvin protests that she is "not what you would call—attractive" and that she is a "shriveled sixty as far as my

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[17] {Asimov, 1991 #4419}.
[18] "Lenny" in Isaac Asimov, The Rest of the Robots (New York: Collins, 1968).

emotional outlook on life is concerned." When struck with the force of her suppressed emotion the poor robot "cowered at the outburst." Encouraged by its misinformation she wears "inexpertly applied rouge" in "a pair of nasty red splotches on her chalk white face." But when the deception is discovered she gives a sudden "high-pitched and semi-hysterical" laugh and, losing her "mental equilibrium" in an "access (sic?) of bitterness" and rage, uses her insights into robot psychology to drive the robot into a permanent catatonic state leaving him "collapsed into a huddled heap of motionless metal." Unlike her male colleagues, Calvin can function professionally only by burying her womanhood beneath a layer of doctorhood. When her femininity is finally unleashed the results are scary, even to a robot, and ultimately deadly.

Hopper was not Calvin. But the stories of both women reflected the difficulty that people of their generation, even those who like Asimov believed a woman could be a brilliant technologist, had imagining a kind of femininity compatible with technical excellence. My main point here is that women working in technical fields during pre-feminist decades of the mid-twentieth century had no choice but to shape their careers and identities using cultural resources already at hand. To win acceptance a woman had to prove herself "one of the boys." Her individual success did not necessarily threaten conventional gender roles, and may even have reinforced them. By separating sex from gender and linking gender identities within computing to broader social history we can begin to develop a richer understanding of the past. It may not be easy to combine this project with presentist pressures to present female pioneers as all-purpose role models for contemporary women.
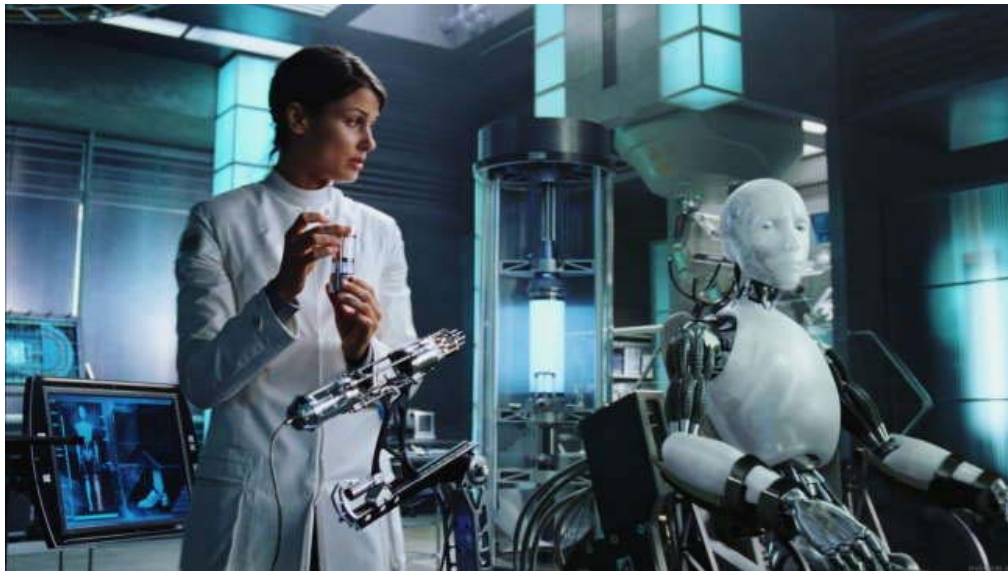
Bridget Moynahan explores Calvin's less shriveled side in the film I Robot.

In an interesting reflection of changing gender norms and the commercial imperatives of Hollywood, the part of Calvin was played in the recent film of I Robot by cover model turned actress Bridget Moynahan. She wore a white coat but otherwise had little in common with Asimov's vision of the tragic spinsters of science. While no serious romance develops between Calvin and costar Will Smith, Smith himself attributed this to Hollywood's lingering fear of

interracial sex ("there's the issue of the black guy and the white girl, in American movies") rather than to any lack of feminine allure on Calvin's part.[19]

Gendered Histories of Computing(s)

Most attention so far to women in the early history of electronic computing has been focused on their involvement in one-off computer projects such as ENIAC and the Harvard Mark I. Their participation here was by no means unprecedented. These early computers were constructed as scientific instruments, in laboratory or laboratory-like settings. Applied mathematics had relatively hospitable to women during the first half of the twentieth century when compared to engineering or the hard sciences. The high proportion of women among the ranks of human "computers" carrying out laborious and repetitive calculations is well known.[20] And the needs of wartime temporarily opened doors to women seeking work in many areas for which they were qualified but for which they had not previously been considered suitable.

The gendered division of labor in data processing, in contrast, has been little discussed.[21] We often speak of our field as being "the history of computing," as if computing is something with a singular history. In an earlier paper, "The Chromium-Plated Tabulator" I looked at the origins of data processing. Electronic data processing was the application of computers to administrative work, which in the US was first performed in 1954. (Punched card work was then renamed "data processing" to emphasize its close relationship with computing). Within a few years administrative applications such as payroll processing, billing, and accounting had replaced scientific and technical computation as the dominant tasks for which organizations ordered computers and staffed computing installations.[22]

In that paper I suggested that there can be no singular history of the computer in use:

> *The use of computer technology in a particular social space (such as the laboratory, office, or factory) cannot be addressed without also studying the earlier history of this setting, the people in it, and the objectives to which the machine is put. So, while coherent one-volume histories of the computer hardware industry and its technologies can be written, it seems unlikely that we can produce a single coherent narrative about the use of computers or of associated tasks such as analysis, programming, or operation.[23]*

Michael Mahoney developed a parallel insight in his aptly named paper "The Histories of Computing(s)."[24] He boils the historiographic argument down to two charts. The first summarizes the machine-centric viewpoint around which synthetic histories of computing have traditionally been structured.

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[19] Smith is quoted in http://www.blackfilm.com/20040709/features/willsmith.shtml. For a critical perspective see http://dir.salon.com/story/ent/movies/review/2004/07/16/i_robot/index.html.
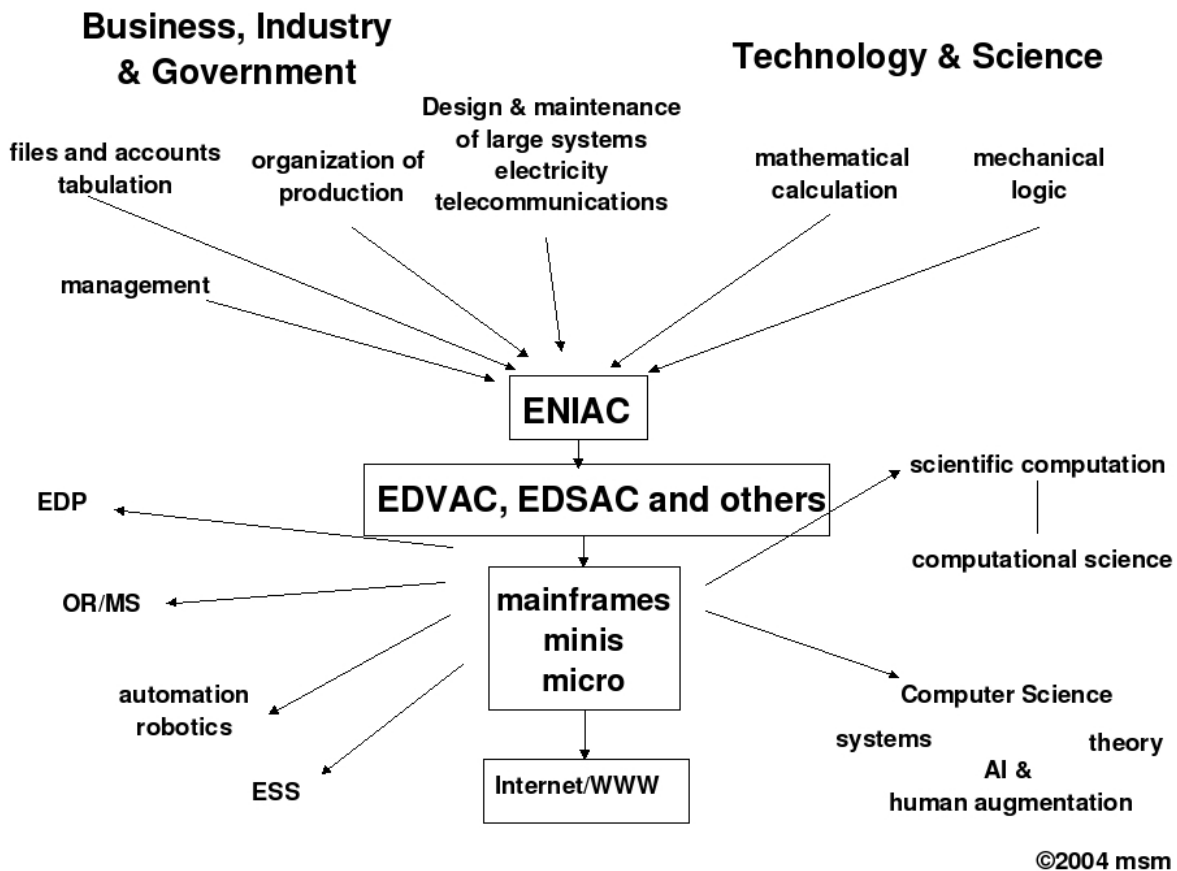
[20] David Alan Grier, When Computers Were Human (Princeton, NJ: Princeton University Press, 2006).

[21] The main exception to this is Greenbaum, In the Name of Efficiency: Management Theory and Shopfloor Practice in Data-Processing Work.

[22] Thomas Haigh, "The Chromium-Plated Tabulator: Institutionalizing an Electronic Revolution, 1954-1958", IEEE Annals of the History of Computing 23, no. 4 (October-December 2001):75-104.

[23] Ibid, page 95.

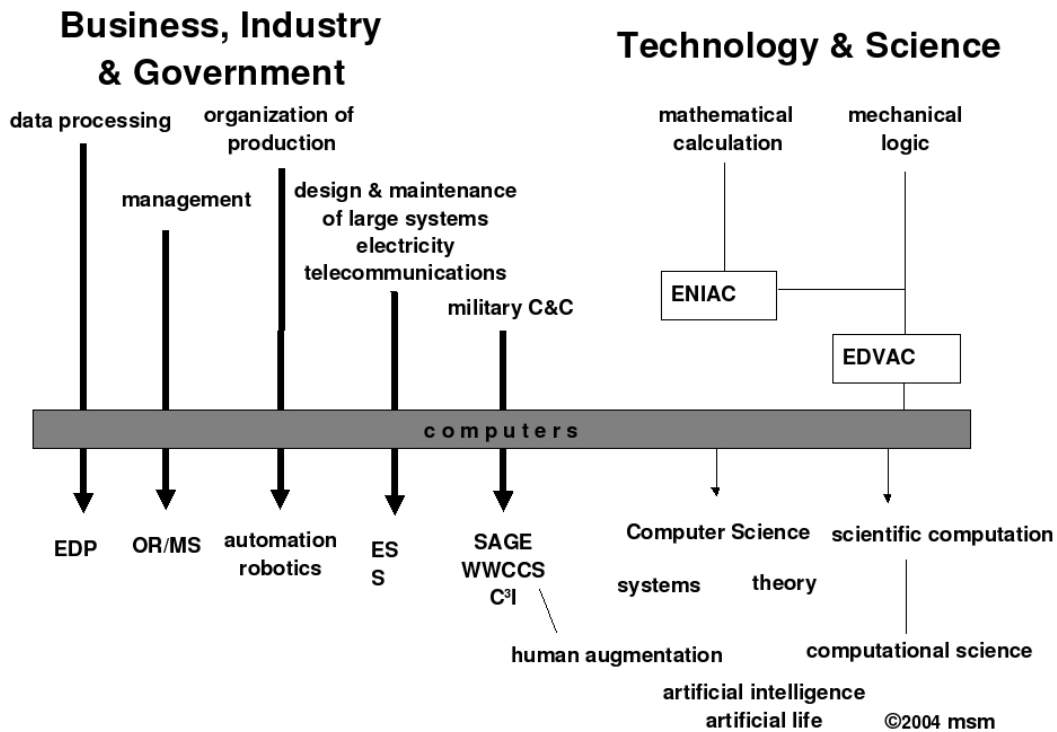[24] Michael S Mahoney, "The Histories of Computing(s)", Interdisciplinary Science Review 30, no. 2 2005):119-35.

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of large systems
electricity
telecommunications

files and accounts
tabulation

organization of
production

mathematical
calculation

mechanical
logic

management

ENIAC

EDVAC, EDSAC and others

EDP

scientific computation

computational science

OR/MS

mainframes
minis
micro

automation
robotics

Computer Science

systems   theory
AI &
human augmentation

ESS

Internet/WWW

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From "The Histories of Computing(s),
http://www.princeton.edu/~mike/articles/histories/converge.jpg

This structure can be seen in the chapter structure of standard texts, such as the Campbell-Kelly/Aspray classic *Computer*. It was literally embodied in the 1990s Smithsonian exhibition *The Information Machine* in which wide galleries showcasing the technologies of calculation, administration, and communication in the early decades of the twentieth-century literally narrowed to force the visitor to march through a partial reconstruction of the ENIAC. After passing through the ENIAC the exhibit broadened out again, to reflect the spread of digital computers into different fields.

Mahoney argues that a better graphical representation of the actual historical experiences of computing is given in the following diagram. Rather than detouring through ENIAC, these lines of historical development stress a multiplicity of separate historical stories as computer technology is introduced into different fields of human activity.

Business, Industry & Government

data processing   organization of production

management   design & maintenance of large systems electricity telecommunications

military C&C

Technology & Science

mathematical calculation   mechanical logic

ENIAC

EDVAC

c o m p u t e r s

EDP   OR/MS   automation robotics   ES S   SAGE WWCCS C³I   Computer Science   scientific computation

systems   theory

human augmentation   computational science

artificial intelligence
artificial life   ©2004 msm

From "The Histories of Computing(s),
http://www.princeton.edu/~mike/articles/histories/histories.jpg

Why is this relevant? Because discussion of the role of women in the history of computing has tended to proceed on the implicit assumption that there is a single history of computing. Its key question has thus been "where did all the women go?" This question has dominated discussion of gender in the history of computing. The CBI newsletter announcement of this workshop posits it as follows: "Women were active participants in building and programming the first electronic digital computers, and notably prominent in the first generation of computer programmers in the 1950s…. How and when did a male-coded world of computing emerge? How and why has it has continued?" Tom Misa's announcement to the SIGCIS Members list made a similar promise that presenters "will observe that women were active participants in the early days of computer programming, but examine why computing today is one of the most gender-segregated domains of modern life."

The question makes sense only if we imagine computing as a single coherent field of activity the gender composition of which has shifted over time. Following Mahoney's formulation of the "Histories of Computing(s)" leads us instead to see computing as a mass of largely unconnected fields of human activity. Why on earth should we expect a insurance company's staffing of its electronic data processing department in the late 1950s to be influenced by the fact that a decade earlier the military/academic leaders of the experimental ENIAC project had been persuaded that female mathematicians had an aptitude for translating mathematical methods into switch and wire configurations? Insurance companies looked to their own personnel and understood

computer technology through the prism of their own organizational memories.[25] The place in which one might expect the tradition of female computation to have an impact would be in the development of scientific programming, particularly software for numerical analysis. My impression is that this field remained relatively more open to women during the 1960s and 1970s than did most areas of computer science. One might also expect that, like many of their male counterparts, some of the women involved in seminal computing projects might find employment in computer manufacturing companies – exactly the career path followed by Grace Hopper.

As I showed in "The Chromium-Plated Tabulator" work practices and occupational identities in data processing evolved from those already established for administrative work rather than being transplanted along with the computer itself from the laboratory. The most successful computer models of the 1950s and early 1960s (IBM's 650 and 1401 machines) were sold as complements to, and extensions of, its existing lines of punched card machines. Staff and managers for administrative computing installations usually came from a mixture of two sources: existing punched card machine installations within the company and mid-level staff from the departments being computerized.

When firms first computerized they frequently carried over the personnel and culture of the existing tabulating department into their new electronic data processing department. During their heyday in the 1940s and 1950s, America's punched card departments blended a masculine technical culture with routinized feminine clerical work. Supervisors and department heads were almost overwhelmingly male. Punched card work involved a great deal of hands on configuration and operation of specialized machines such as sorters, collators, multiplies, and tabulators. To run a single job machine staff had to feed decks of cards through these machines many times in an elaborate sequence of operations. These machine operators were usually male.

In larger companies planning for new administrative procedures and the design of new punched card applications was carried out by specialists in "systems and procedures" work, a field that boomed after World War II. These specialists called themselves the "Systems Men," which gives you a fair idea of their gender composition.[26] With computerization the systems men spent more and more of their time working on the design of data processing applications, and their groups were often merged into data processing departments. Within data processing their work was usually called "systems analysis."

Key punch operators did what would later be called data entry work, pushing keys to enter data onto punched cards. Until the 1970s this was how almost all information on things like new products, account activity or hours worked made its way into computer systems. Key punch operators were invariably female, as this work was culturally constructed as an extension of typing. When people spoke of "punched card machine operators" they meant people working sorters, tabulators, collators, and other machines that processed the already-punched cards. "Key punch operator" was an entirely different job, albeit one within the same department. Key punch workers accounted for around 37% of the workforce in the punched card installations of the

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[25] JoAnne Yates, Structuring the Information Age (Baltimore: Johns Hopkins Press, 2005).

[26] The systems men are discussed in Thomas Haigh, "Inventing Information Systems: The Systems Men and the Computer, 1950-1968", Business History Review 75, no. 1 (Spring 2001):15-61 and in more detail in Thomas Haigh, "Technology, Information and Power: Managerial Technicians in Corporate America" (Ph.D., University of Pennsylvania, 2003), ch. 3.

1950s.[27] The shift from punched card machines to computers did little to change the nature of gender composition of key punch work, though it did trigger a major expansion of the occupation as the changeover to computer operations generally required a huge amount of new data entry work. In 1971 key punch operators accounted for 31% of a much enlarged population of data processing workers.[28]

Programming was constructed very differently in data processing from its conception in scientific computing as a kind of routine mathematical labor. The main jobs within the electronic data processing departments of the 1950s and 1960s were (in increasing order of pay and prestige) key punch operator, computer/punched card machine operator, computer programmer, systems analyst, and manager/supervisor. Of these jobs only programming was unfamiliar from the punched card era. Even this was seen as a hybrid of aspects of the work previously carried out by operators and systems analysts. The programmer's perceived job was to take detailed flow-charts created by the analyst and turn them into program code. The detailed series of commands created by the programmer had previously been carried out by the human operator rather than by the machine itself. So in the transition from punched card work some skill and control was transferred from the operator to the programmer. But while programming bundled together existing activities in new ways it was not, within data processing, seen as requiring fundamentally new skills or identities. It inherited the existing gendered division of work.

In "The Chromium-Plated Tabulator" this led me to conclude that

> *The male domination of corporate computer programming should not…. be surprising. Jennifer S. Light has recently argued that "the job of programmer, perceived in recent years as masculine work, originated as feminized clerical labor." Whatever the merits of this argument with respect to ENIAC, the focus of her paper, it is clearly not viable in the context of corporate applications programming—the dominant programming activity from the mid-1950s on. Applications programming evolved at the fuzzy interface between punched card machine operation (a predominantly masculine activity) and systems and procedures analysis (an almost exclusively masculine one). The clerical job was that of keypunch operator—feminized in the punched card era, feminized after the computer arrived, and (as data entry clerk) feminized to this day. Given that few corporations relied on mathematicians as administrative programmers, the influence of human scientific "computers," whether male or female, on the culture of rank-and-file administrative applications programmers is marginal at best.*

In that paper I was concerned only with the first generation of electronic data processing, though 1958. But the gender composition of the administrative computing workforce seems to have remained remarkably constant. A 1958 survey of tabulating departments in Oklahoma City found that only 24% of punched card machine operators were female.[29] Computerization changed little. Business Automation's 1971 salary survey, based on data concerning more than sixty thousand workers in 1,443 data processing installations, found that women made up 14% of systems

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[27] Based on survey data for Oklahoma City in 1958 contained in Melvin Lloyd Edwards, "The Effect of Automation on Accounting Jobs" (Doctor of Education, University of Oklahoma, 1959). This includes the related data-entry tasks of verifier operator and card-a-type operator.

[28] Anonymous, "Data Processing Salaries Report-1971", <u>Business Automation</u> 18, no. 8 (June 1 1971):18-29.

[29] Edwards, "The Effect of Automation" . This excludes key punch and verifier operators, who were 100% female.

analysts and 21% of computer programmers.[30] A 1974 survey found that 20% of business application programmers were female.[31] The 2007 Scorecard from the National Center for Women in Information Technology notes, based on Bureau of Labor Statistics data, that women make up 26% of computer programmers and 18.5% of systems administrators – the two contemporary jobs that are closest to the functions performed by punched card machine operators in the 1950s.

So the much ballyhooed exodus of women from computing would appear to be an artifact caused by a failure to use coherent analytical categories across time. It disappears if one looks at a coherent set of tasks in a specific social space. (The proportion of computer science students who are female has indeed fallen in recent years, but at no time in history have computer science graduates been the main source of computer staff. Beware also slippage from "programming" to "computing"-- programmers have never been close to a majority of the computing workforce and now constitute around 20%). We are left with a different question: why has the gender breakdown in administrative computing remained so constant over time even as women's labor force participation has risen so dramatically elsewhere.

The Gender Politics of Data Processing Labor

My arguments above imply that to understand gender roles in data processing we should look more to the history of gender roles in management, white collar work, punched card installations and clerical labor than to the history of gender roles in universities, applied mathematics and research laboratories. Shifting from "women in the history of computing" to "masculinities and femininities in the histories of computing(s)" does rather complicate things, but it is an essential step if our field is to produce scholarship of real insight and broad interest.

Most punched card workers had a high school education and were hired as clerical works before shifting to the machine room. They learned their trade on the job, beginning with simple routine jobs and progressing to more complicated tasks and the creation or adaptation of procedures. The masculine work culture of the tabulating room seems to have had a lot in common with that of other skilled craft occupations. One punched card worker of the 1940s recalled that "When the weather got too hot (and after the women secretaries, control clerks left), we men would strip down to our shorts." [32]

The career path led upward to supervisory positions and eventually to department head. A survey in 1958 found that of fifty-three punched card supervisors twenty-three had originally been hired by their employer as general clerks and nine had been hired as punched card machine operators. Of 115 punched card machine operators included in the survey only four had originally been hired as key punch operators reflecting the rigid segregation preserved between the feminized clerical work of data entry and the technical, mechanical, and largely masculine realm of punched card machine operation.[33]

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[30] Anonymous, "Data Processing Salaries Report-1971".

[31] Attribution is indirect for the 1974 survey – it is apparently quoted in a story in Computerworld, March 3, 1977 that is in turn quoted in Greenbaum, <u>In the Name of Efficiency: Management Theory and Shopfloor Practice in Data-Processing Work</u>.

[32] John J. McCaffrey, <u>From Punched Cards to Personal Computers</u>, 1989, contained in John J. McCaffrey Memoirs (CBI 47), Charles Babbage Institute, University of Minnesota, Minneapolis.

[33] Edwards, "The Effect of Automation" .

No department supervisor had worked as a key punch operator. However five of the supervisors were female so advancement was not entirely impossible for women who had entered punched card work via another route. Punched card installations varied greatly in size. By 1951 Prudential Insurance had thirteen separate punched card centers, which between them employed six hundred people and more than a thousand machines.[34] In contrast, the detailed survey of the punched card installations of Oklahoma City found that the median staff size was just seven people.[35] Gender roles seem to have been less rigidly defined in the smallest departments though I know of no figures to support this anecdotal observation. When the Terre Haute Brewing Company established its punched card center it employed a supervisor, a single female assistant to help operate the machines, and a number of key punch women.[36]

One of the most relevant insights from the body of work on labor and gender is that the gender segregation of different kinds of work has usually been presented as based on the natural aptitudes of men and women. But closer analysis reveals that definitions of these aptitudes shift and that a particular activity can be described in different ways to emphasize characteristics associated with either sex.[37]

The data processing trade literature served to codify reinforce these gender divisions. Publications such as *Datamation*, *Business Automation* and *Office Executive* were full of well illustrated reports on data processing work within particular companies and advertisements for data processing products. Office machines such as copying machines, filing systems, and dictating machines were usually shown with attractive young women in fashionable clothes.[38] Women were also pictured next to printers, data entry devices, and tape reels in advertisements for products of a basically clerical nature. On the other hand when computers were advertised or exemplary computer installations were profiled they were usually accompanied by pictures of white men in dark suits. Occasionally, as in the advertisement below, these depictions included specifically sexual references. Far more often they passed without explicit reference to the gender of the subjects. This kind of endless symbolic repetition naturalized the gendered segregation of the data processing workplace, reflecting and reinforcing the taken-for-granted associations of certain jobs and machines with men and other jobs and machines with women.

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[34] For the Prudential figures, see F. M. Johnson, "Control of Machine Accounting Equipment", Systems and Procedures Quarterly 4, no. 2 (May 1953):18-22, 26.

[35] Edwards, "The Effect of Automation" .

[36] McCaffrey, From Punched Cards.

[37] See, for example, Ruth Milkman, Gender at Work: The Dynamics of Job Seggregation by Sex During World War II (Champaign, Illinois: University of Illinois Press, 1987).

[38] A similar conclusion was reached in William Aspray and Donald deB Beaver, "Marketing The Monster: Advertising Computer Technology", Annals of the History of Computing 8, no. 2 1986):127-43 and this point is obvious to anyone who has glanced at publications from the era so I will not belabor it here.

An advertisement from Journal of Data Management, July 1966. This rather strained piece of humor suggests that the data processing department will work more effectively with FORMSCARDS "the only continuous tabulating cards that have no wasteful medial strips…. So cut out the strip in your office."

Terminal firm Entrex ran a series of advertisements announcing that "We taught our data entry system to speak a new language: Dumb Blond." The advert stated "To her it's a typewriter and a nifty little tv screen. (She can be the dumbest blond you can find.) To you it's a CRT-to-disk data entry validate verify system…") [39]

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[39] Business Automation, July 1970, page 49.

Proximity to key punch work remained a threat to masculinity into the 1960s and beyond. This advertisement ran in a minor trade publication in 1966. Standard Register, a venerable supplier of office forms and related equipment, had come up with a new kind of punch that produced both a paper form and a punched card for electronic processing. This was a small step in the direction of today's world, where users key data directly rather than passing paper copies to key punch women. But as key punch operation was a low status, feminized job one can imagine user resistance to the idea. So Standard Register tried to use humor to defuse the threat to masculinity, showing that proximity to the punch had not rendered this collection of smoking, tattooed, overweight and unsmiling blue-collar workers any less butch. As its copy noted, the new system was "not for sissies…. With this machine any red-blooded guy can simultaneously punch and print…" The machine, it concluded, would "fit in just like one of the boys."

Advertisement for Source Register Punch by Standard Register, from Data Processing Magazine, September 1966, v8n1.

The presence of key punch women in data processing departments may even have lowered the status of the field in the eyes of academic computer specialists. Consultant Walter M. Carlson, later chair of the Association for Computing Machinery recalls the reaction from members of the ACM Council when in 1960 he presented a proposal that the association create a system of interest groups to accommodate members with interests in such areas. "Insofar as business data processing was concerned, many of the ACM leaders I talked to spoke of "super bookkeepers," and some of them even reflected on joint Chapter meetings with punched-card people, where the managers usually brought along their best looking keypunch operator."[40]

Perceived ties to key punch work delegitimized women from programming work. A humorous 1962 article, "How to Hire a Programmer," presented the misadventures of the fictional Ball-of-Wax Manufacturing Company as it launched on a comically ill-considered automation drive. The firm's three candidates represent the era's archetypal inept programmers. One is an arrogant, inexperienced male student in need of "a haircut and a bath." Another has terrible academic qualifications but invents experience. The final candidate

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[40] Walter Carlson, "ACM and Special Interest Groups", Data Base 25, no. 2 1994):9-12.

> *Is female—Miss Sallyann Bunch from East Passerk, New Jersey. Sallyann has had a lot of computer-related experience: two years in the key punch pool of the Unforegivable Assurance Association of North America, Newark, and seven months in charge of tab board wire storage with Automobile Catastrophic Statistical Society, Orange. Also she is a graduate of Princeton (South Princeton Philosophic Junior College) with a major in Oriental Basketry.*
>
> *Sallyann wears flat shows, and she is a little cross-eyed. Her figure resembles a full potato sack. Her dress and makeup indicate that she is a solid, plain-thinking person with no frills at all. Miss Bunch is the spitting (she chews Copenhagen) image of a lady programmer.*
>
> *An offer is made to Sallyann, and she goes home to ask her mother about it.[41]*

A 1963 article published in Datamation suggested that, while the default identity of programming was male, companies were willing to hire female programmers. Its author, a woman, used beliefs about the gendered nature of abilities and personality to argue for the desirability of hiring women. "While some companies are still hesitant at hiring women programmers, a few have expressed a preference for the distaff side. They have found that women are less aggressive and more content to remain in one position. Many women chose not to advance in position... others feel that promotion is a threat to their femininity." As a result "there is a considerably lower turnover rate in women programmers." She also noted that "women have greater patience than men and are better at details….it is also felt that women have a humanizing influence, making working conditions more pleasant."[42]

The Masculinity of the Machine Accountant

Let me offer a preliminary sketch of the historical context that gave rise to the data processing departments of the 1950s and 1960s. The gendered division of office labor in the mid-twentieth century is well understood. Historians have explored in detail its evolution from the 1870s, when clerical work was an overwhelmingly male activity seen as a good starting point for the apprentice business man, to the 1920s when most clerical jobs were low-paid dead-end positions filled with women. Pay differentials, policies such as the firing of women upon marriage, and the explicit statement of gender requirements on help-wanted advertisements maintained a strict segregation of gendered occupations. Executives and professionals were almost invariably male, while secretaries and typists were almost invariably female. [43]

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[41] Jackson W. Granholm, "How to Hire a Programmer", <u>Datamation</u> 8, no. 8 (August 1962):31-32.

[42] Valerie Rockmael, "The Woman Programmer: A Subjective Reflection", <u>Datamation</u> 9, no. 1 (January 1963):41.

[43] The literature on women's office labor is voluminous and of a generally high standard. Its initial questions were set by Harry Braverman, <u>Labor and Monopoly Capital: The Degradation of Work in the Twentieth Century</u> (New York: Monthly Review Press, 1974) and articulated most programmatically in Margery W. Davies, <u>Woman's Place is at the Typewriter: Office Work and Office Workers, 1870-1930</u> (Philadelphia, PA: Temple University Press, 1982). Sharon Strom, <u>Beyond the Typewriter: Gender, Class and the Origins of Modern American Office Work, 1900-1930</u> (Urbana, IL: University of Illinois Press, 1992) and Lisa M Fine, <u>Souls of the Skyscraper: Female Clerical Workers in Chicago, 1870-1930</u> (Philadelphia: Temple University Press, 1990) give social histories. Elyce J. Rotella, <u>From Home to Work: U.S. Women at Work, 1870-1930</u> (Ann Arbor: UMI Research Press, 1981) and Irene de Vault, <u>Sons and Daughters of Labor</u> (Ithaca: Cornell University Press, 1990) provide quantitative analysis and situate office work with respect to other forms of work. A cultural history with a strong gender focus is

The masculine status of white collar office work was less clear. Historians have documented a number of different masculine identities in the late nineteenth century, including the "rough" working class masculinity of unskilled workers, the "refined" working-class mobility of the upwardly mobile skilled worker, the capitalist masculinity of the successful businessman and the genteel masculinity of the traditional middle-class. Beyond possession of a penis, the most obvious uniting factor here is the crucial importance of autonomy to masculine identity. Skilled workers sought to minimize their reliance on the whims of employers. Unions often defined masculinity in terms of pride, competence and the ability to provide for one's family. And of course the businessman was celebrated as captain of his own ship.

The rise of big business and corporate capitalism from the 1880s onward created many new kinds of job, but none of them fitted well with demands for rugged autonomy. One of these was the career manager, whose authority came not from owning a business but from a particular position on the organization chart. He exerted power over those below him, but only when acting in the name of those above. Further down the organization pyramid, men were embarking on white collar careers in unprecedented numbers. In *Company Men*, Clark Davis gave an elegant explanation of the gender identity shifts necessary to legitimate corporate white collar work as manly.

> Businesssmen attempted to demonstrate white-collar work's masculine nature by careful (sic.) excluding women from most middle- and upper-level positions…. While Americans came to view management as distinctly masculine, most firms recruited all new hires into lower-level positions. Companies thus had to convince these young men that entry-level posts offered manly opportunities The very fact that some women held these jobs, however, called into question the acceptability of such work for men…. Seeking to combat such gender-related anxieties, companies physically separated men and women and often retitled positions based on the holders' sex.[44]

Davis adds that companies

> constructed within their corporate cultures a distinct new vision of white-collar manhood. They did this by arguing that white-collar tasks called for the very best attributes of manhood…. The corporation provided a ladder, they argued. There were high rungs and low rungs, but they were all part of the same ascension toward a noble, manly identity. [45]

According to this interpretation the masculinity of the white collar worker rose in direct proportion to his position in the organizational hierarchy. The struggle of ambitious men to rise up the organizational pyramid becomes a matter not just of seeking money or power but of affirming one's masculine identity.

I argue here that a similar process was at work in data processing. But as well as individual men seeking personal advancement, a parallel mechanism was at work on the group level. Data processing managers and senior staff sought to raise the status of their corporate function, arguing that the increasing importance of data processing justified a more exalted place on the

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provided by Angel Kwolek-Folland, Engendering Business: Men and Women in the Corporate Office, 1870-1930 (Baltimore, MD: Johns Hopkins University Press, 1994).
    [44] Clark Davis, Company Men : White-collar Life and Corporate Cultures in Los Angeles, 1892-1941, Studies in industry and society (Baltimore, Md.: Johns Hopkins University Press, 2000), 145.
        [45] Ibid, 146.

organization chart for them and their departments. Class and gender identities blurred to threaten the position of the punched card men within the social world of the corporation.

One of their main vehicles for collective mobility was the National Machine Accountants Association, founded in 1951 as an extension of the slightly older Machine Accountants Association of Chicago. It was intended for the supervisors of punched card machine departments. During the late-1950s it became the main association for senior staff within administrative computing installations, leading to a name change in 1963 to the Data Processing Management Association.[46] As one can see from the picture below its founders appear to have been uniformly male.

The punched card installation supervisors of the National Machine Accounting Association gather at its 1951 Annual Meeting. From CBI DPMA collection.

From the beginning the explicit goal of the National Machine Accounting Association was to raise the status of its occupation. The interest of data processing supervisors in upward mobility required them to distinguish the putatively managerial, high-level aspects of the department's work from its less exalted technical and clerical activities. Lester E. Hill, the Chief of Tabulating for Ryan Aeronautical and one of the leaders of the national association was not afraid of hyperbole. "The machine accountant in the punched card field," he told his members in 1957, "is a combination of an industrial management engineer, an industrial accountant, and industrial

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[46] The history of the NMAA/DPMA is summarized by a participant in Sonya Lee Anderson, "The Data Processing Management Association: A Vital Force in the Development of Data Processing Management and Professionalism" (Ph.D. Dissertation, The Claremont Graduate University, 1987). A more critical look is given in Haigh, "Technology, Information and Power", 558-734.

engineer, general accountant, cost accountant, office manager, and executive administrator, as well as being a first rate technician. Believe me, this is some man!"[47] All of the diverse occupational identities to which Hill appealed were strongly masculine.

Attention to the specifics of gender identity in particular areas of computer use also suggests ways in which masculine identity and status anxiety may have evolved together. In *Beyond the Typewriter* Sharon Strom has written persuasively about the gender dimensions of professionalization efforts in the accounting field in the early twentieth century. Strom shows that much of the impetus for accountants to create legal barriers to entry and demarcate an exclusive area of professional knowledge came from an influx of women into the bookkeeping field.[48] There is no inherent point of separation between the work of the accountant and the work of the bookkeeper. But constructing an impermeable professional barrier protected the authority and earnings of male accountants. Likewise the scientific office management movement of the 1910s and 1920s, led by William Henry Leffingwell, has sometimes been explained as an effort by senior male clerks to recapture some of the authority and autonomy that was being stripped from their occupation by upgrading the position of head clerk to that of office manager. The office manager was to be an expert in the modern and masculine areas of systems, technology and science. This rhetoric sharpened the distance between the would-be office executive and the ranks of women toiling in dead-end jobs under his command.

A similar dynamic may have been at work in the 1950s. Punched card machine operation was still men's work in most companies. But operation of other kinds of administrative machinery such as typewriters, bookkeeping machines, dictating machines, addressing machines, copiers, and of course key punches was overwhelmingly feminized. The operation of these machines was seen as low-paid work that a woman would do for a few years before marriage, and the jobs had no prospect for advancement beyond the supervision of other clerical workers. The realities of the clerical labor market surely put pressure on punched card supervisors to maintain a firm gender divide between key punch operation and other kinds of punched card work and to stress the masculine nature of their craft. After all, punched card work was the only kind of office machine labor not highly feminized. If a rigid separation from key punching was not preserved then the masculine identity of punched card work could suffer a precipitous collapse.

Key punch workers were most definitely not welcome as members of the National Machine Accountants Association. The first issue of "The Hopper," published in 1950, included a questions and answers section. This defined "Machine Accountants" as "those men who are directly connected with the operation and supervision of punched card accounting machines in a supervisory capacity." The question "Are tabulating machine operators eligible for membership" met with the reply "The association has restricted membership to applicants in the supervisory capacity. It was thought that this would enable the Association to have a better selection of men who are experienced in tabulating methods and procedures and who have closer contact with top management." It did not even both to pose the question of membership for key punch operators, though it did note that "membership is available to either sex providing their qualifications meet with the requisites of the MAA."[49] As with other kinds of first line clerical management jobs, the position of key punch supervisor was often filled by women who had advanced from clerical

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[47] Lester E. Hill, "The Machine Accountant and his "Electronic" Opportunity", <u>Journal of Machine Accounting</u> 8, no. 1 (January 1957):12-14, 23-25, 12.

[48] Strom, <u>Beyond the Typewriter</u>.

[49] Anonymous, "Questions and Answers", <u>The Hopper</u> 1, no. 1 (September 1950):2.

positions. In later years the associations leaders were unsure as to whether the supervisors of key punch workers should be eligible for membership. In 1962 one spoke of the need to "upgrade the Association… and get a better caliber of person interested. I think we could well lose some key punch supervisors and pick up systems analysts as we gain on this…" [50]

The association's publications mirrored the masculine craft culture of punched card work. The first few issues of The Hopper, the newsletter of the National Machine Accountants Association, scattered studio publicity photographs of minor Hollywood starlets to fill blank space throughout the publication as a kind of pin-up.


Pages from the first issue of The Hopper, 1950. The publicity photo of the starlet ran with the caption "We don't know whether this will help you keep our mind on your figures or not."

In the institutions of data processing, as in corporate administration and management more broadly, women were granted power as appendages of men, either as secretaries who would follow their bosses from job to job or as wives who would apply themselves to boosting their

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[50] National Machine Accountants Association, Executive Committee Meeting Minutes, 21 Feb -- Verbatim, 1962, contained in Data Processing Management Association Records (CBI 88), Charles Babbage Institute, University of Minnesota, Minneapolis page 59. For a discussion of the management of key punch workers that makes clear its ties with established office management techniques see Rita Bushyhead, "Automatic Supervision for the Keypunch Department", in Data Processing: 1959 Proceedings, ed. Charles H. Johnson (Chicago: National Machine Accountants Association, 1959).

husbands' careers through entertaining and the display of social graces. The main activity entrusted to women within the NMAA/DPMA was the organization of the "Ladies Program" for its annual meeting, a stream of activities designed to entertain wives. According to executive committee minutes from December 7, 1957, "The Ladies Program Chairman, Mrs. Odams, reviewed the plans to date which include a Hospitality Room with a local girl in attendance to advise the women on the things to see in Atlantic City. She said that on Wednesday there will be a luncheon and fashion show and Thursday will include a brunch and an interior decorating talk at the 500 Club. Friday, a session entitled "Women and Automation" conducted by Mr. Eugene Murphy is to be held…" The ladies program was still running strong for the 1966 meeting in Chicago, where three and a half days of busy programming included a visit to the Sara Lee bakeries, a "lecture on gourmet dining and living," and an excursion to the Arlington Race Track. According to the announcement for this event "the feature race of the day will be named in honor of the DPMA Ladies group and several ladies will be selected to step into the winner's circle."
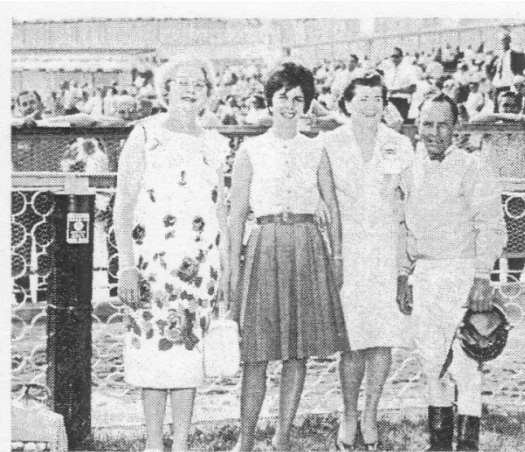
Ladies Program feature included special "DPMA" race at Arlington.

Below we see the executive committee of the association, current as of the same meeting.

The association's composition and gender balance was slow to change – a 1964 survey found that 73 percent of its members identified themselves with the job category "Manager, supervisor, or director of data processing" and just two percent were female. [51]

Not until around 1970 does any explicit discussion of sexism or the need to examine and redefine gender assumptions appear in the data processing literature. Within the Data Processing Management Association (formerly the NMAA) the shift was dramatic. In 1969 it awarded its very first "Computer Sciences Man of the Year" award to Grace Hopper.[52] In 1971 its magazine ran a positive feature on "Women in EDP Management."[53] A smattering of women even served in elected offices within the national association during the 1970s.

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[51] Data Processing Management Association, Membership Profile, April 1964, 1964, contained in Data Processing Management Association Records (CBI 88), Charles Babbage Institute, University of Minnesota, Minneapolis.

[52] Anonymous, "On the Scene", Journal of Data Management 8, no. 8 (August 1970):36-37.

[53] Helen M Milecki, "Women in EDP Management", Data Management 9, no. 2 (February 1971):18-23.

Grace Hopper is presented with the DPMA's inaugural Computer Sciences Man of the Year award at its 1970 annual meeting in Seattle. She is hugged by Cal Elliot, its executive director. From CBI DPMA collection.

Some within the field were actively hostile to what was then called "women's liberation." Arnold E. Keller, longtime publisher of *Business Automation* repeatedly criticized it in his editorials and in the features his magazine ran. The emergence of this as an explicit debate does not necessarily indicate any fundamental shift in the constitution or experiences of the data processing workforce, but it does indicate a shift in the prevalent rhetoric toward regretting the low participation of women in the field's higher status jobs.

Machine Men or Organization Men?

Punched card departments and early electronic data processing departments tended to under the purview of a corporation's financial staff, with the departmental manager buried somewhere in the organization chart three or four levels below the corporate controller. The men above a data processing supervisor were usually accountants, and so the immediate challenge facing members of the association in their quest to win more respect and higher status was to convince corporate accountants that they deserved more autonomy. In the early 1960s this effort ultimately produced the ill-fated Certificate in Data Processing, intended as a professional certification for data processing supervisors to prove command of a body of knowledge including management, computer technology and punched card techniques.[54] It was explicitly inspired by the CPA. But

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[54] The history of the DPMA's Certificate in Data Processing is given in Haigh, "Technology, Information and Power", 567-610, 63-67 & 89-706 and Anderson, "The Data Processing Management Association", ch. 5&6. It is presented, erroneously, as a test designed to certify programmer competence in Nathan Ensmenger, "The

the status anxiety it addressed had been in evidence since the foundation of the association a decade earlier. Article after article hammered home the message that data processing supervisors must become more professional and managerially-oriented if they were to deserve advancement.[55]

The factory was another popular aspirational model for data processing supervisors during the period. Casting data processing supervisors as administrative plant managers widened the gulf between their work and the feminized labor of routine clerical operations. In 1956, the first computer study sponsored by The Controllership Foundation had found that, a "computer should be regarded as a factory with a very high capital investment and fixed costs, and very low variable costs. As a result its economics are based on maximum productivity." [56] In practice, however, punched card staff often favored more ad-hoc and craft-based approaches to shop floor management. In 1961 an IBM representative at the NMAA conference still had to tell data processing managers that, "[d]istasteful as job cards might seem to you and your operators, they are a must." He warned that the tab room itself often lacked utilization records, scheduling charts or any of the other hallmarks of a well planned operation. Their acceptance by top managers, he suggested, would require them to impose true managerial discipline. "They want these Tab departments run be men who are on the first line management team. They want them run like any other key department. They do not want them to be secret departments or cults."[57]

But managers were not easy to convince. The challenge was clearly stated in 1958 when the association invited James P. Moore, the Vice President and Comptroller of the Mutual Life Benefit Insurance Company, to address its meeting. He challenged their aspirations to class mobility, reminding those he termed the "Machine Men" that "in the recent past such men were regarded by management in very much the same way as management regarded factory workers or automobile mechanics. In other words, they have been thought of in large part, and to the extent they may have been given any though at all, was blue collar workers, or at the very least as having blue piping on their white collars." He conceded that thanks the "electronic boom" they "seem to have a new hairdo, and some mighty attractive clothes which virtually obliterate any of the blue hues" but suggested that to win acceptance they would have to move away from their technical culture to "divest themselves extensively of the aura of technical mystery with which they like to surround themselves." He advised them that "the smartest and most effective approach for Machine Men to follow in up-grading their own status-and realizing their own aspirations to management would be to provide existing management with tangible, continuous,

'Question of Professionalism' in the Computer Fields", IEEE Annals of the History of Computing 23, no. 4 (October-December 2001):56-74.

[55] See Haigh, "Technology, Information and Power", 174-88 & 239-46.

[56] Frank Wallace, Appraising the Economics of Electronic Computers: An Approach for a Company to Determine the Feasibility of Acquiring a Computer (New York: Controllership Foundation, 1956), 59. The problems of quantifying "intangible" benefit were as severe in the 1960s and 1970s as they had been in the 1950s. See John Plummer, "Will Your Computer Pay Its Way?", Business Horizons, no. April 1969):31-36 and Edward J. Menkhaus, "EDP: What's It Worth", Business Automation 16, no. 11 (November 1969):48-54 for examples.

[57] Carl Corocran, "Management of a Data Processing Department: Part 2", in Data Processing 4: Proceedings of the 1961 International Conference of the National Machine Accountants Association (Chicago: National Machine Accountants Association, 1961).

and undeniable evidences of specific contributions to management's objective, namely, the making of profits."[58]

We see here a distinction between two different kinds of masculine identity, fissured along class lines. Moore acknowledges the masculinity of his audience but dismisses them as mere machine men, blue collar tinkerers in love with machinery as an end in itself. He claims for management a different kind of masculinity. Following the title of William H. Whyte's hugely popular book, published just two years earlier, this might be termed the masculinity of the Organization Man. As Whyte wrote, the organization man is proud and ambitious but thoroughly vested in the culture of the organization, a contradiction resolved only by using "the language of individualism to describe the collective."[59]

Attack of the Nerds

The tension between the tinkering, craft-based masculinity of the machine shop and the bottom-line focus of the organization man is a recurring theme in the history of business computer use. From the punched card era to the present day the same message has endlessly been repeated: the day of the technical specialist is over and to thrive in administrative computing in the future you will need to adopt the viewpoint and culture of management rather than indulging a passion for tinkering with the latest technologies.[60] The advice, given by experts, trade journalists, columnists, association speakers and consultants has always seemed reasonable, and in the main career ladder in administrative computing has always granted greater pay and prestige as one moves away from programming or machine operation and into systems analysis or management. Indeed the imminent replacement of the rank-and-file corporate applications programmer by some new technique or other was confidently predicted from the 1950s to the 1990s.[61] Yet no such abrupt shift in the orientation of administrative computing staff or the balance of employment away from technical positions ever took place.

These predictions mirrored the aspirations of the people making them. The claim to possess expertise in administrative computing technology but apply this expertise to the real needs of business has been an enduring cliché of successful computing managers and consulting firms. In my dissertation I traced this all the way back to the scientific office management proponents of the 1910s, arguing that they were the first organized group of corporate employees to try to separate out expertise in the techniques and technologies of efficient administrative systems from the more general role of management and instead make it into the core of a new profession. The same dynamic, I suggested, could be seen at work among the systems and procedures expert, operations research movement and machine accountants of the 1950s, the management information systems movement of the 1960s and the wave of enthusiasm for the new position of Chief Information Officer in the 1980s. The subtitle of my dissertation, "Managerial Technicians in Corporate America" was intended to capture the enduring paradox of trying to legitimate a social claim to authority over vital managerial activities on the basis of esoteric technical

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[58] James P. Moore, Jr., "Management Viewpoints on Men, Machines and Methods", in <u>Data Processing: 1958 Proceedings</u>, ed. Charles H. Johnson (Atlantic City, New Jersey: National Machine Accountants Association, 1958).

[59] William Hollingsworth Whyte, <u>The Organization Man</u> (New York: Simon and Schuster, 1956).

[60] This stream of rhetoric culminated in the Chief Information Officer movement of the 1980s and 1990s. See Haigh, "Technology, Information and Power", ch. 14.

[61] Ibid, 534-43.

knowledge.[62] The "Revolt of the Engineers" during the Progressive era had led to a clear demarcation of technical and managerial authority in the US so that an engineer's upward career path led out of technical work and into management.[63] But here were all these groups working to win executive power on the basis of expertise in the technical dimensions of administration itself. To an extent they succeeded: today no change to business processes or systems can be made without the involvement of computer experts. To an extent they failed: the cultural gulf between IT staff and normal corporate people remains a subject of constant anguish in the trade press.

It now occurs to me to explore the characterization of this tension as an expression of the clash between two distinctive forms of twentieth century identity: the nerd and the organization man. The computer had iconic importance to the development of both. By the 1960s the computer symbolized rationality, central planning, and technocracy. Operations research, strategic planning and simulation promised to turn managerial decision making into a truly objective science. A consensus developed that the proper goal of corporate computing departments was the creation of a "totally integrated management information system" providing real-time access to simulation models and data banks. During his tenure at the Department of Defense Robert McNamara gave a very public face to the computer-assisted masculinity of the organization man, preaching the gospel of systems analysis and rational calculation. To critics of bureaucracy the message printed on punched cards, "Do not fold, spindle, or mutilate" came to represent the soul-crushing nature of the governing "machine". Gordon R. Dickson's 1965 short story "Computers Don't Argue" related in epistolary form the story of a man who, thanks to the ill-fitting gears of computerized bureaucracy, finds himself facing execution as a result of returning a book of the month club selection.[64] During the era of radical student unrest in 1969-70 campus computer centers was tempting targets for protests and, on at least six occasions, bombs, ransoming, burning or acid.[65]

Yet the computer has also played a central role in the emergence of a visible and distinctive nerd culture. Following Seven Levy's 1984 classic *Hackers* a great deal has been written on the cultural identity of the hacker community. "Hacker" here does not reflect the more recent popular usage of the term to describe people who gain unauthorized access to online systems. Levy adopted the term from members of a subculture of computer enthusiasts for whom programming was a vocation and immersion in the world of computer technology was the foundation of their whole lifestyle. His book is a work of popular history, locating the origins of hacker culture among MIT undergraduates of the late-1950s and 1960s before tracing its development through Californian personal computer movement of the 1970s and the home videogame industry of the early 1980s.[66]

Hackers judged each other purely on programming skill and commitment to hacking, rather than on more conventional social markers. Levy writes "computing was much more *important* than getting involved in a romantic relationship. It was a question of priorities. Hacking had replaced

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[62] Ibid, 24-33.

[63] Edwin T Layton, Jr., The Revolt of the Engineers: Social Responsibility and the American Engineering Profession (Cleveland: Press of Case Western Reserve University, 1971).

[64] Gordon R. Dickinson, "Computers Don't Argue", Analog, September 1965.

[65] A table listing attacks on computers is given in Jack B Rochester and John Gantz, The Naked Computer (London: Arlington Books, 1984), 262-66.

[66] Steven Levy, Hackers: The Heroes of the Digital Revolution (Garden City, NY: Anchor Press/Doubleday, 1984).

sex in their lives." [67] It was also a community in which women were almost invisible. "The sad fact was that there never was a star-quality female hacker. There were women programmers, and some of them were good, but none seemed to take hacking as a holy calling…"[68] The hackers "formed an exclusively male culture." [69] So hacker life was sexless, but it was also highly gendered. Hackers created a new masculine space as culturally distinctive as the traditional military or priesthood. Others have followed Levy with books celebrating his "hacker ethic" as the foundation of a new form of work and the core of a quasi-Marxist *Hacker Manifesto*.[70]

Two other classics of the same era tell a similar story. MIT professor Sherry Turkel presented a memorable picture of the gendered dimensions of MIT's hacker culture in her ethnographic study *The Second Self*. She begins by describing MIT's anti-beauty pageant, an annual competition to choose "The Ugliest Man on Campus." This, she suggests, is evidence of a social illness of self-loathing that "accepts and defensively asserts the need for a severed connection between science and sensuality." [71]Even within the dysfunctional culture of MIT, she suggests, computer science students were the "ostracized of the ostracized… archetypal nerds, loners, and losers…. the ugliest men…." [72]
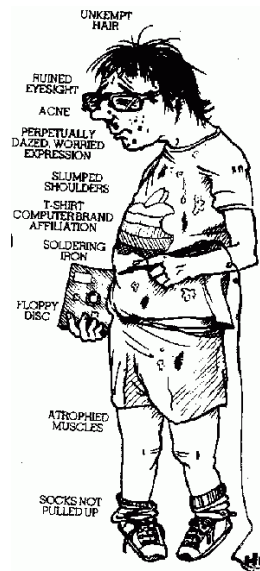
A victim of "Micromania"from a humorous 1984 book on the topic[73].

In his *Soul of a New Machine* Tracy Kidder explored the work culture of hardware engineers designing a new minicomputer. These men were a little older than the students described by Levy and Turkel, and they were doing paid work. But their organizational and occupational cultures led them to a similar fate: total immersion in the world of the computer. The work

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[67] Ibid, 83.

[68] Ibid, 84.

[69] Ibid.

[70] Pekka Himanen, The Hacker Ethic (New York: Random House, 2001) and McKenzie Wark, A Hacker Manifesto (Cambridge, MA: Harvard University Press, 2004).

[71] Sherry Turkle, The Second Self: Computers and the Human Spirit (New York, NY: Simon and Schuster, 1984), 197.

[72] Ibid, 199-200.

[73] Charles Platt and David Langford, Micromania: The Whole Truth about Personal Computers (London: Sphere, 1984).

becomes its own reward, central to the identity of the team members. The project is staffed largely by young men (and one young woman) newly graduated from college. For most the work precludes social life or dating, with the team's secretary, Rosemarie, serving as a "surrogate mother" to the boys.[74]

In recent years these personality traits have increasingly been linked in popular discourse with the suggestion than a large proportion of IT staff suffer from Asperger syndrome, an autism-spectrum disorder more common among males than females that is associated with an obsessive focus on very limited subject areas, poor communication and social skills and physical clumsiness. The widely reported "extreme male brain" theory of autism suggests that the condition is an exaggerated version of the typical male traits of low empathy and a focus on systematization and that it may be caused by prenatal exposure to high testosterone levels. Whether or not this theory is scientifically validated its dissemination fits reinforces gendered assumptions about the successful programmer. According to a Wired magazine on "The Geek Syndrome," "something dark and unsettling is happening in Silicon Valley…. the culture of the area has subtly evolved to meet the social needs of adults in high-functioning regions of the spectrum." [75] The same story noted that the condition appears to be inherited, and that "Microsoft became the first major US corporation to offer its employees insurance benefits to cover the cost of behavioral training for their autistic children."

Programmer Ellen Ullman came up with a more sympathetic description explanation of the alienation of the programmer from normal human concerns. Moving a system under development from specifications to code invariably reveals inconsistencies and ambiguities in human language descriptions. Faced with this gulf,

> the programmer, who needs clarity, who must talk all day to a machine that demands declarations, hunkers down into a low-grade annoyance. It is here that the stereotype of the programmer, sitting in a dim room, growling from behind Coke cans, has its origins. The disorder of the desk, the floor; the yellow Post-it notes everywhere; the whiteboards covered with scrawl: all this is the outward manifestation of the messiness of human thought. The messiness cannot go into the program; it piles up around the programmer. [76]

What we don't yet know is how representative these high profile hackers, workaholic loners, high-functioning autistics and order-seeking slobs are of the broader population of IT workers now estimated to exceed ten million within the United States alone. Within administrative computing the hacker stood for everything data processing managers were trying to avoid: concerned with technical elegance over organizational effectiveness, slovenly and unwashed, unpredictable, and actively hostile to the rituals of bureaucratic life. Clearly exhortations to embrace the masculinity of the organization man and reject the path of the technological tinkerer would not have been so enduring within administrative computing if the perceived problem they addressed had not itself been serious and enduring. But were the data processing departments of corporate America full of bearded unwashed hackers? It seems unlikely, though the archetype might have been pressed into service as a straw man or "other" to scare straying organization men back onto the path of righteousness. Even within the rarified world of MIT computing,

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[74] Tracy Kidder, The Soul of a New Machine (Boston, MA: Little Brown, 1981), 58.

[75] Steve Silberman, "The Geek Syndrome", December 2001.

[76] Ellen Ullman, Close to the Machine : Technophilia and its Discontents (San Francisco: City Lights Books, 1997), 23.

Levy was careful to distinguish the hackers from the ranks of "officially sanctioned users" who merely wanted to solve their research problems and failed to grasp the joy of computing as a lifestyle choice.

As early as 1958, long before hackers or hippies were documented, a Business Week article complained that "computers have been in the wrong hands. Operations were left to the longhairs—electronics engineers and mathematicians…." [77] A decade later the same term was used by leaders of the Data Processing Management Association to characterize the computing researchers of AFIPS.[78] In 1966, as the DPMA began to serious discuss developing a relationship with the ACM, its Immediate Past President mentioned that he had "had previously heard that they were part of the sweatshirt and sneaker group." [79] As a traditional marker of femininity and an emerging hallmark of the counter-culture long hair was, of course, incompatible with the organization man's masculinity in this era.

We should also remember that programmers have never accounted for a majority of what is today called the "IT workforce." Within data processing they never accounted for more than about a quarter of the overall workforce of a typical department. The hacker identity would never have had much resonance for analysts, operators or supervisors, still less for key punch workers. Likewise most scientific users of computing saw the computer as a tool rather than an end in itself.

If fully fledged hacker masculinity was likely a chimera within the data processing departments of the 1950s and 60s it might still be unwise to dismiss the importance of a more general nerd culture among computing staff of this era. The social history of the nerd remains largely terra incognita, despite the recent publication of the entertaining and insightful memoir/popular history *American Nerd: The Story of my People*.[80] Its author highlights the racial dimensions of nerd identity. On one hand, the stigmatization of nerds reflected class and race-based prejudice against the academic striving and economic mobility of first and second-generation Jewish and Asian immigrants. On the other, nerd identity today is "hyper-white" as nerds insist on a formal mode of speech close to written language and reject the appropriate of African-American slang by their middle-class white peers. Does this offer a window into racial analysis of the history of computing?

It is not yet clear how significantly, and in what ways, the nerd culture of the late twentieth century might have differed from early cultures of technological tinkering. In the early twentieth century a hands-on knowledge of automobiles or the repair of farm equipment was a respected blue-collar skill that might lead to a job. We do know that radio technology created a subculture of young male technical enthusiasts similar to that associated with the personal computer a half century later. We also know that inventors such as Thomas Edison were aggressively promoted

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[77] Anonymous, "Business Week Reports To Readers On: Computers", <u>Business Week</u>, 21 June 1958

[78] Data Processing Management Association, <u>Executive Committee Meeting Minutes, 16-18 March</u>, 1967, contained in Data Processing Management Association Records (CBI 88), Charles Babbage Institute, University of Minnesota, Minneapolis.

[79] Data Processing Management Association, <u>Executive Committee Meeting Minutes, 5-6 August</u>, 1966, contained in Data Processing Management Association Records (CBI 88), Charles Babbage Institute, University of Minnesota, Minneapolis.

[80] Nugent, <u>American Nerd: The Story of My People</u>. Historian of technology Mark Clark has been working on the topic and made a number of presentations so perhaps his work will help to clarify things when it appears in print.

as masculine role models for young boys in the early twentieth century, leading to a genre of inventive adventure stories science fiction critic John Clute has dubbed the "edisonade." [81] How and why a love of technology became the hallmark of a socially marginal form of masculinity is a topic of outstanding importance. Only in recent decades have the terms "nerd" and "geek" entered widespread use, and the increasing cultural visibility and pride of nerds has surely been rooted at least in part in the increasing economic importance of computing. Think, for example, of the 1996 PBS series on the personal computer industry, *Triumph of the Nerds*.

Our historical understanding of these topics remains highly sketchy. Was the endurance of great tension between technical and managerial identities in corporate computing a result of something inherent in the nature of computer technology and people's relationship to it, perhaps even (as Wired suggested) a result of genetically determined abnormalities in the minds of IT workers. Or was the stigmatization of technical enthusiasm merely the expression of a corporate career structure in which advancement leads one toward management and away from the machine? How do the masculinities of the nerd and the organization man relate to social class, and perceptions of tinkering with machines as a blue-collar working class activity?

Conclusions

Gender is an important kind of social identity in every human activity. Gender infuses every aspect of life, from architecture to patterns of speech. The core of my argument is that understanding the historical role of gender demands construction of a body of work on the social history of computing, or rather on the social histories of computing(s). Gender is a vital analytical category even when dealing with a single sex work environment. Because society offers a range of masculinities and femininities gender identities are contested even within all-male work cultures. Keeping men's work masculine requires constant cultural labor. So historians should not limit gender analysis exclusively to the careers of women.

We see some of this complexity at work in the social history of data processing from the 1940s to the 1960s. I claim that the gender history of administrative computer programming is best understood not by looking for its origins in scientific computing programming of the 1940s but by looking at the gender history of earlier administrative work. Punched card machine operation and systems analysis both men's work, while key punch operation was feminized. But punched card work was seen by outsiders as a low-status, blue collar occupation. The masculine status of punched card machine work was also threatened by its position as an island of men's work in a sea of female office machine operators. The professionalizational efforts of data processing supervisors reflect this history in a dual focus on separating professional data processing work from the labor of key punch operators and proving their white collar credentials as managerially-oriented organization men.

The masculinity of the organization man contrasts sharply with the nerd masculinity of hacker culture. More work is needed to explore these differences. But the potential for historians of computing to contribute to the broader history of American masculinity is clear. The stigmatization of technological enthusiasm and its exclusion from mainstream masculine identity is a development of great historical interest. This is an area where scholars interested in the history of computing have a real opportunity to break new ground in gender history. It also suggests a way in which historical analysis may contribute to the problem of rapidly falling

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[81] The term is a play on the better known "Robinsonade". John Clute, "Edisonade", in The Encylopedia of Science Fiction (2nd edition), ed. John Clute and Peter Nichols (St Martin's, 1995).

computer science enrollments that is driving much present day concern with gender disparities in computing. The particular masculine identities popularly associated with computing may be putting off boys as well as girls.