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Review of 'Recoding Gender: Women's Changing Participation in Computing' by Janet Abbate

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REVIEW

Although we have long recognized persistent gender gaps in a number of scientific, technology, engineering, and mathematics (STEM) fields, computing presents the most egregious and perhaps the most intractable case. It is a painful paradox to contemplate: while many women have contributed to the development of the computer, to its applications, and to computational theory at critical moments in the last two hundred years, women are now significantly underrepresented in educational and corporate realms of computing. As early as 1990, the Association for Computing Machinery (ACM) acknowledged the leaky pipeline in academic computer science, pointing to the decreasing numbers of women entering the field, the masculinist bias evident in studies of software design, and the discrimination confronting girls and women in computing classes (Frenkel, 1990). Historians and sociologists studying technology have analyzed earlier circumstances when female inventors, theoreticians, scholars, and entrepreneurs have been present in larger proportions in the field but not acknowledged in their own time. For example, the history of the ENIAC (Electronic Numerical Integrator And Computer) calculators, which includes the captioned illustrations of identified men and unidentified women with the room-size computers reminds us that access is not enough (Wajcman, 1991; Light, 2003).

The challenge of attracting women to study computing and to join its workforce has been a matter of national interest. A 2009 National Science Foundation announcement of MIT professor Barbara Liskov's Turing Award acknowledges this persistent challenge: "the field of computer science has seen astonishing changes and advances that have touched every field of science and modern life. Yet for all of this progress, one stubborn fact remains the same--relatively few women are studying computer science as their academic major."(NSF, 2013). The NSF announcement points to "dull" middle school and high school classes, the common perception that computing is "not fun", and stereotypes falsely identifying women as not good at math and science as factors discouraging females from pursuing these careers. Computer scientist Maria Klawe, now president of Harvey Mudd College, recently collaborated with other notable U.S. women in technology to mentor female undergraduates and graduate students studying STEM by promoting online discussion on WitsOn, a mentoring program conducted via Piazza web chat (*WitsOn, 2012)*.

A number of recent scholarly accounts, including articles in and books reviewed in this journal, identify cultural dimensions of computing's gender problem. An excellent 2010 anthology, *Gender Codes*, published by IEEE provides national and international perspectives identifying social and political contexts of the barriers that women have faced over time in different countries (Misa, 2010; Webster, 2011). As my book *Toys and Tools* argues, cultural narratives in fictions, films and television shows represent such stereotypes in detailing women's engagement with science and technology; these representations affect perceptions of who belongs in these fields (Colatrella, 2011). Fictional and film narratives also depict women in computing fields as blending feminine stereotypes with technical wizardry, as prominent female characters in *Desk Set*, *Disclosure*, *The Net*, *Buffy the Vampire Slayer*, and a host of television detective and medical shows demonstrate (Cardiff School, 2008). Media gossip often plays up gender stereotypes of women in technical corporations as less competent, overly aggressive, and out of sync with industry and academic conventions. As I write this review in January 2013, business periodicals are abuzz with the complaint that Yahoo CEO Marissa Mayer, formerly of Google, is consistently late to meetings and disrespectful of her employees' schedules. In July 2012, news stories focused on Mayer's history-making appointment as the first pregnant CEO of a Fortune 500 company and speculated about whether this first-time mother could manage to turn around the struggling company.

As this lengthy introduction suggests, given the longstanding attention paid to the problem of low numbers of women in computing and the number of analyses delineating causes and recommending solutions, one wonders what more there is to be said on the subject. Plenty, as readers of Janet Abbate's latest book will learn. Useful for novices and experts, *Recoding Gender* dissects significant moments in the history of computing and analyzes the linked social and technical factors that affect women's participation in the evolving field to provide fresh insights about the past and the present.

Abbate delineates the vicissitudes in women's participation in computer science over the last 70 years, starting from their work as calculators during World War II and concluding with a consideration of the contemporary environment for women in academic computing. The book's historical details are valuable evidence supporting its persuasive argument, for this information documents the ways in which women's contributions are often constrained by individuals and systems. Evidence and argument correct the existing historical record. Abbate's account acknowledges

women's hard-won achievements in developing computer hardware, software, and business enterprises, while recognizing that the barriers are not yet eliminated. Organized chronologically, *Recoding Gender* does not claim to be a comprehensive history of computer science, although it does offer an accessible, engaging narrative of episodes in computing since World War II. Each historical case acknowledges how women's participation has been treated in different professional and academic contexts. The first substantive chapter compares gender dimensions of the Colossus project at Bletchley Park in Great Britain with the American ENIAC project developed at the University of Pennsylvania "to demonstrate how assumptions about the gendered nature of technical skill . . . could constrain women's options and lead to an undervaluation of their contributions" (Abbate, 2012).

The mechanisms used to judge programming skills and to define the "perfect programmer" in the two countries during the post-war period embed gender bias. According to the second chapter, college degrees, which only exceptional women obtained, were assumed to be accurate proxies for skills, which many women demonstrated on aptitude tests and at work. Here Abbate tracks the competing visions of computer programming that identified certain competences with feminine ("patience or attention to detail") "traits or skills" (p.69). Chapter 3 follows developments in programming from the early 1950s to the early 1970s, paying attention to "contested meanings of such terms as *automation*, *crisis*, and *engineering* to show how the ongoing debate over programming methods was also a struggle to define the programmer's professional and social identity" (p.73-74).

Abbate's chapters are, as readers of her earlier work expect, trenchant, precise, and compelling, for she carefully connects technical considerations with social dimensions to provide thick description of behaviors in action. In this way, the book benefits significantly from the inclusion of eyewitness testimony. Funded by NSF, Abbate interviewed 52 women pioneers in computing; transcripts of the interviews are online at the IEEE Global History Network (IEEE, 2013). Valuable testimonials from many previously unsung women enable readers to better understand the circumstances they confronted and the battles they won. Abbate judiciously quotes these American and British pioneers as they reflect on the barriers and facilitators they encountered in education and the workforce.

In my view, the final two chapters (4 and 5) benefit most from the interviews. Chapter 4 explores "the lives of female software entrepreneurs to illustrate both the problems that working mothers faced in the 1960s and 1970s and the innovative strategies they employed to surmount them" (p.113). Abbate notes that "the ideal worker—the worker who would be preferentially hired, promoted, and rewarded—as someone who could work full-time at the worksite" was "not gender neutral," as "it required the worker to have a mate at home—implicitly a wife—to provide for their physical and social needs as well as care for their children" (p.118). The anecdotes women provided regarding their solutions, including entrepreneurial efforts to create manageable working conditions and the mechanisms they improvised, along with this chapter's concise analysis of the bias and barriers they confronted, make the book worth purchasing.

Chapter 5 is also compelling in recuperating women's successes in computing and offering prospects for improving their educational and working conditions. Titled "Gender in Academic Computing: Alternative Paths and Norms," it presents recent statistics and research concerning the academic pipeline. The chapter resists "viewing women as victims" and "highlights some of the creative strategies that they have

adopted to overcome these obstacles and to challenge stereotypes that favor men" (p.147). Women managed to become computer science faculty despite being denied "traditional academic credentials". Professional societies such as the Association for Computing Machinery (ACM) "provided an environment where women can meet female peers and build professional networks", the latter sometimes created by the women themselves (p.147).

Abbate's brief conclusion consists of an epigraph and two paragraphs. In it she makes two critical recommendations drawn from her historical research that could improve the participation of women, and likely men, in computing. She identifies "social support from spouses, managers, colleagues, and networks of female peers," including "conferences and mentoring programs", as critical to this improvement. She also points to "the need to support computer scientists' ability to be parents, through provisions such as on-site childcare and flexible or reduced hours". Although her book celebrates "remarkable women [who] managed to thrive in computer science despite the odds", Abbate hopes that "their stories can inspire future initiatives toward gender equity" (p.175). So do I.

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