Day 17: A Feature, Not a Bug – Technology's Stories

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December 4th, 2017 by: Mar Hicks

Technology's Stories vol. 5, no. 4 – DOI: 10.15763/jou.ts.2017.12.04.01

PDF: Hicks_Feature Not a Bug

Until recently, the idea that Silicon Valley was a meritocracy seemed firmly enshrined in mainstream U.S. culture. Despite decades of research by sociologists, cultural anthropologists, and historians, popular press often focused on talent more than privilege to explain the successes of our new generation of Silicon Valley elites. Within the past year and a half, however, the idea that intelligence and talent account for the lion's share of a tech entrepreneur's success has come under fire. A string of examples showing Silicon Valley's vapidity and myopia—as well as its rampant sexism, classism, and racism—have made headlines, while the negative, unintended effects of social media corporations' platforms on US democracy have helped the nation reach a crisis point.[1]

While the wider world wakes up to the idea that high tech economies are not predicated on skill and intelligence—and therefore are not meritocracies that stabilize civil society—it's worth looking to history to explain how computing industries have always had a fraught relationship with meritocracy, often professing it but rarely executing it.[2] Far from simply falling short, these

failures of meritocracy are in fact integral components of systems designed to concentrate power, inevitably taking power from some and concentrating it in the hands of others. Technologies designed to reorient the ways we live, work, and think more often than not are created to model or enhance older forms of power and prestige.

One of the clearest examples of this designed-in inequality comes in the form of gender-based discrimination, which is tightly linked to discrimination on the basis of sexuality. Women workers were—and still are—often viewed first and foremost as women, who are assumed to be heterosexual (and thus assumed to want to leave the workforce to marry) and only secondarily as workers.[3] The few women who managed to break this mold, popular historical figures like Ada Lovelace and Grace Hopper, fill an important space in the cultural imaginary as heroes and role models. Yet, they also paradoxically contribute to the problem: by positioning exceptions to the rule as the way women succeed in computing, heroine narratives that focus on singular white women reproduce the problem of normalizing masculine stereotypes, male dominance, and existing patterns of privilege along lines of race and class.

These examples also often fail to reckon with the fact that women were long favored for early computing jobs because they were seen as less intelligent, less valuable workers.[4] As computing work professionalized and rose in status in the late 20th century, women workers did not rise with the tide.[5] Instead, women became viewed as no longer being a good fit for the job.[6] Refocusing our historical gaze not on individual women, but on classes of workers, helps us see that the sexism built into computing is not an ancillary problem that can be overcome by focusing on a few successful women and increasing their number bit by bit. Rather, gender discrimination is baked in to the structures of high tech economies themselves, a critical part of their focus on concentrating power in the hands of those who already traditionally wield it. Gender discrimination is not a bug—it's a feature.

The UK, our closest historical cousin, provides a compelling and cautionary tale in the history of computing. In 1959, a woman computer programmer trained two men with no computing experience to take over as managers in the computing installation in the British government that she was in charge of in all but name. After she had trained them and they stepped into management roles, she was demoted to an assistantship below them. Behind the scenes, her supervisors discussed her talents candidly, and also the fact that as a woman she was not suitable for higher-level positions that might involve more responsibility or—heaven forbid—managing men employees. Her supervisors wrote to each other about when she might likely leave to get married, hoping turnover through marriage would take care of the problem of what to do with her.[7]

This computer programmer was not unique, however. Rather, she was part of a broad class of women initially known as the "Machine Grades" within the British government. Thanks to separate entrance and promotion exams in the nominal meritocracy of the Civil Service, these women were tasked with

what was then viewed as the unintellectual, unimportant work of computation, and later computing. From operating to programming, and from testing to systems analysis, the machines on which the government ran relied on women's labor.

As the earliest and largest computer user in the nation, the government needed massive amounts of skilled technical workers, but because they were women, they were not seen as truly valuable. When the government introduced equal pay for its women employees in the mid 1950s, after a decades-long campaign by women labor unionists, the Machine Grades changed names—to "The Excluded Grades." They were so named because they were explicitly excluded from the provisions of Equal Pay Act. The government contended that women had been doing this work for so long, and in such majority, that their lower wage was now the market rate for the job, even though there were higher male pay scales for the work on the books. Women were so concentrated in machine work that this exclusion meant the majority of women working for the government did not in fact get equal pay when "equal pay" was introduced.[8]

By the time that the computer operator mentioned above trained her replacements, the prestige of computer work was starting to rise. But the work itself remained the same. Women began to lose out to men who had different titles and often were given management responsibilities in addition to technical work, not because women lacked technical skills but because they were seen as lacking in the ability, or suitability, to rise into management. As late as the 1980s the idea of a woman managing men was viewed by many men in management as unsavory and inappropriate.

During the 1960s, the heyday of the mainframe era, this gendered replacement trend continued, with trained, technical women losing out to untrained, nontechnical men candidates. As computing professionalized, women remained largely untouched by the benefits of professionalization, until, that is, discarding the main technical workforce during a time of increasing computerization began to catch up with British government and industry. The sheer poor planning of starving a nascent field of the required skilled workers resulted in women gaining more ground, and more opportunities for higher-level work, in the mid-1960s at the height of the nation's programmer labor shortage. Once that shortage subsided, however, the pattern of replacing qualified women with semi-qualified men continued, and it became institutionalized through a new class of "automatic data processing" grades in the Civil Service. By the 1970s, this had resulted not only in a dire high tech labor situation but also the implosion of the British computing industry.[9]

Yet we do not need to look across the Atlantic to see the negative effects of discriminating against women as a class of workers in high technology fields. Margot Lee Shetterly's masterwork of history of technology, *Hidden Figures*, shows how the struggles of black women impacted technological advance in ways that we still do not pay enough attention to.[10] In popular lore, the US "won" the Space Race by landing a man on the moon first, besting our

Soviet rivals. But in fact the US did not win the Space Race in any sort of simple or clear sense. Early on, the US lost out repeatedly as the USSR made advance after advance. The terror caused by the launch of Sputnik, and the fact that the Russians had also put the first person into orbit, lit a fire under the US government and caused the frenzy of activity described in Shetterly's book. (The USSR, by contrast, made a point of putting women front and center alongside men from the beginning of the Space Race.)

Shetterly's work shows the importance of attending to the intersection of race, gender, class, and nationality. By focusing on a specifically African American story, Shetterly's institutional and cultural history makes readers confront the racism inherent in our technological ideals.[11] Given that the US came out of World War II relatively unscathed while the infrastructure and economies of its rivals had been devastated, the US could well have been expected to do far better in the Space Race than it did relative to its main rival. The women in Shetterly's book lived in segregated communities and struggled to function to their full potential in a society that designated them second class citizens on the basis of both their race and their gender. At work, the sheer brilliance of a woman like Katherine Johnson might have been recognized during a crisis period, but the intelligence and talents of many other women, like Dorothy Vaughan, were not only mostly unnoticed by those in power but actively suppressed and discouraged when they were noticed. The US rose in the post WWII period because nearly all of its rivals were struggling to recover from a war that had been fought primarily on their soil and with their citizens' lives. Had the US undone more of the sexism and racism of its technological institutions there is no doubt it would have been able to leverage the talents of many more black women, black men, white women, and others to better effect.

While the history of UK computing and the US space sector clearly show us how technology intersects with, and builds upon, categories of oppression, we still struggle to understand why gender, race, and class make a big difference to technological success today.[12] Most recently, we've seen how a failure to pay attention to abuse of people of color and white women online fostered a training ground for shock-troops bent on undermining US political stability, with the aid of the built-in discriminatory mechanisms of major computing platforms. From white supremacists to Russian bots, Twitter and Facebook in 2016 were a perfect example of how fast and far systems can decline when they rely on misogyny and racism as part of their business model.[13] Their example shows how technological systems, far from being meritocratic, co-construct themselves with systems of privilege already in existence in order to gain power.[14] In most cases, these technosocial systems have the effect of heightening existing distinctions and discrimination: the tech sector bootstraps itself and secures its success by adopting, and enhancing, models of domination that other older, more regulated industries have been forced to abandon.[15]

Though the history of computing shows us that discrimination along the lines of race, gender, class, and many other categories hurt nations' technological output, and indeed their economies as a whole, the larger historical—and

contemporary—issue is the way in which technological systems concentrate and exercise power in extra-judicial ways that subvert and subsume the structures of governance. Civil rights are in danger in the current technological landscape not because of technological oversights or mistakes, but because fast-moving, socially-integrated technological systems tend to require the domination of many for the profit of a few. These extreme power differentials, the centralization of decision-making, and the insistence on black-boxing the technology, are themes that resonate throughout the history of computing.

In hindsight, we can see how the sexism and racism baked into computing systems was not only misguided but destructive. Yet, we struggle to see that this discrimination was, and still is, an integral, foundational part of most of the computing systems we think of as successful—and even essential—today. Until we reorient our understanding of the history of computing to explain how the architecture of our current computing landscape came about, and how it is not merely buggy, but in fact designed to leverage and heighten existing discrimination, we will continue to be trapped by its negative effects. [16]

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Suggested Readings

Marie Hicks, *Programmed Inequality: How Britain Discarded Women Technologists and Lost Its Edge in Computing* (Cambridge: MIT Press, 2017).

Arvid Nelson, "Race & Computing: the Problem of Sources, the Potential of Prosopography, and the Lesson of Ebony Magazine," IEEE Annals of the History of Computing 39:1 (January-March 2017), 29-51.

Margot Lee Shetterly, *Hidden Figures: The American Dream and the Untold Story of the Black Women Mathematicians Who Helped Win the Space Race* (New York: William Morrow, 2016).

Safiya Noble and Brendesha M. Tynes, *The Intersectional Internet: Race, Sex, Class and Culture Online* (New York: Peter Lang, 2016).

Janet Abbate, *Recoding Gender: Women's Changing Participation in Computing* (Cambridge: MIT Press, 2012).

Amy Slaton, *Race, Rigor, and Selectivity in U.S. Engineering: The History of*

an Occupational Color Line (Cambridge: Harvard University Press, 2010).

[1] See for example—ranging from less to more serious—the Juicero fiasco (http://www.motherjones.com/kevin-drum/2017/04/silicon-valley-has-cold-pressed-juicing-scandal/), Uber's virulent sexism and labor rights violations (http://www.newsweek.com/why-has-uber-ceo-travis-kalanick-resigned-timeline-ride-sharing-apps-pr-woes-627802), Twitter's network of Russian bots that sowed discord before the Brexit referendum (https://www.theguardian.com/world/2017/nov/14/how-400-russia-run-fake-accounts-posted-bogus-brexit-tweets) and the U.S. presidential election (https://www.theguardian.com/us-news/2017/oct/14/russia-us-politics-social-media-facebook), and Facebook's cooperation with Russia to interfere in the U.S. presidential election (https://www.nytimes.com/2017/10/30/technology/facebook-google-russia.html).

[2] Marie Hicks, "Against Meritocracy in the History of Computing," *CORE* Magazine, Summer 2016.

[3] Barbara F. Reskin and Patricia Roos, eds. *Job Queues, Gender Queues: Explaining Women's Inroads into Male Occupations* (Philadelphia: Temple University Press, 1990).

[4] Jennifer Light, "When Computers Were Women," *Technology and Culture* 40:3 (July 1999): 455-483.

[5] **See Janet Abbate,** *Recoding Gender: Women's Changing Participation in Computing* (Cambridge, MA: MIT Press, 2012), and Marie Hicks, *Programmed Inequality: How Britain Discarded Women Technologists and Lost Its Edge in Computing* (Cambridge: MIT Press, 2017).

[6] Nathan Ensmenger, *The Computer Boys Take Over: Computers, Programmers, and the Politics of Technical Expertise* (Cambridge: MIT Press, 2012).

[7] Hicks, *Programmed Inequality*, 1-3, 157-160.

[8] Ibid*.* See especially chapters 1-2.

[9] Ibid.*.* See especially chapters 3-5.

[10] Margot Lee Shetterly, *Hidden Figures: The American Dream and the Untold Story of the Black Women Mathematicians Who Helped Win the Space Race* (New York: William Morrow, 2016).

[11] For more on this idea, see the "Decolonizing Science Reading List" constructed and maintained by Chanda Prescod-Weinstein, a black theoretical astrophysicist who works on both physics and STS: https://medium.com/@chanda/decolonising-science-reading-list-339fb773d51f

[12] Researchers like Latanya Sweeney have shown how the structural

inequalities of US society are built into prominent Silicon Valley technologies, and how this affects everything from labor markets to political representation. See Latanya Sweeney, "Discrimination in online ad delivery." *Communications of the ACM* 56:5 (2013): 44-54.

[13] Both Leslie Miley, Twitter's only black management-level engineer, and Lindy West, a white feminist who was a prominent target of misogynist abuse on Twitter, tried to warn the company of its toxic problems with lack of diversity. Miley left the company over it, while West deleted her Twitter account in protest. See: https://www.npr.org/sections/codeswitch/2015/11/06/454949422/a-q-a-with-lesley-miley-the-black-twitter-engineer-who-left-over-diversity-probl and https://www.theguardian.com/commentisfree/2017/jan/03/ive-left-twitter-unusable-anyone-but-trolls-robots-dictators-lindy-west

[14] See, for example: Safiya Noble, *Algorithms of Oppression* (New York: NYU Press, forthcoming, 2018).

[15] For further discussion, see for example: Sara Wachter-Boettcher, *Technically Wrong: Sexist Apps, Biased Algorithms, and Other Threats of Toxic Tech* (New York: W.W. Norton, 2017).

[16] For some of the most recent and relevant work addressing this issue, see, for example: Noble, *Algorithms of Oppression,* and Noble and Brendesha M. Tynes, *The Intersectional Internet: Race, Sex, Class and Culture Online* (New York: Peter Lang, 2016).