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Social Inequality in High Tech: How Gender, Race, and Ethnicity Structure the World's Most Powerful Industry

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Abstract

The high-tech industry is the world's most powerful and profitable industry, and it is almost entirely dominated by white, Asian American, and Asian men. This article reviews research on social inequality in the high-tech industry, focusing on gender and race/ethnicity. It begins with a discussion of alternative ways of defining the sector and an overview of its history and employment demographics. Next is an analysis of gendered and racialized pathways into high-paying jobs in the industry, followed by a review of research on workplace organization that emphasizes how sexism and racism are embedded inside the firm and beyond it, through the design of high-tech products and services. Finally, gender and racial disparities in attrition rates are discussed. The conclusion calls for future research on social inequality and the funding structure of the industry, age discrimination inside tech, effective diversity policies, and labor movement activism throughout the high-tech industry.

INTRODUCTION

Over the past two decades, the high-tech industry has become the most powerful and profitable industry in the world. Jobs in tech have been exalted as the ideal work of the new economy—creative, high-wage, and knowledge-based. However, as much as the high-tech industry seeks to distinguish itself from employment practices of the past, a closer look reveals familiar patterns of exclusion.

While leading tech companies align themselves with the goals of racial and gender equity, their commitment appears to be largely discursive. The most striking workplace development in recent years may well be the surfacing of a culture of gloves-off sexism and racism at some firms. As reported by the *New York Times*, tech leaders like Kraken chief executive officer Jesse Powell now wonder aloud whether all women are "brainwashed" and whether racial slurs should be allowed at work, inviting anyone who disagrees with this culture to leave (Mac & Yaffe-Bellany 2022).

This article reviews recent research on social inequality in the high-tech industry, with a focus on the inequalities of gender and race/ethnicity. We begin by defining the tech industry, reviewing competing definitions, and explaining why they matter for research on social inequality.

Regardless of definition, researchers agree that white, Asian American, and Asian men dominate the tech industry in the United States (Alegria 2020, Han & Tomaskovic-Devey 2022). We explore the reasons for this, beginning with a brief overview of the history of the industry, followed by a discussion of research on pathways into the industry. Getting a good job in a US tech firm typically involves (*a*) obtaining educational credentials in science, technology, engineering, and mathematics (STEM), (*b*) cultivating personal networks, and/or (*c*) immigrating on employer-sponsored work visas. All three pathways pose barriers to women and racial/ethnic minority men and favor white, Asian American, and Asian men.

The next section examines how tech companies entrench and legitimize social inequalities through employment practices. Many tech firms started with the promise to disrupt business as usual by dismantling hierarchies, emphasizing teamwork, and valorizing flexibility and informality. Some scholars believe that these innovations promote gender and racial/ethnic diversity, but little evidence supports this. This section also explores workplace culture inside high-tech organizations—such as the notorious "brogrammer" ideal worker norm—that reproduces sexism and racism within the firm and beyond it, through the design of high-tech products and services.

Finally, social inequalities in the tech industry stem from different rates of attrition. Tech workers experience one of the highest turnover rates of all professional groups. The precariousness of tech funding, along with frequent mergers and acquisitions, results in periodic downsizing and layoffs, which target workers based on gender, race/ethnicity, and age, further entrenching social inequality in the industry.

In our conclusion, we discuss avenues for additional research. We call for greater attention to linking social inequality to the political economy of the industry, including its funding structure, more research on age discrimination inside tech, identification of effective policies to diversify the industry, and labor movement activism by workers up and down the tech hierarchy.

DEFINING "HIGH TECH"

What is the high-tech industry? In popular discourse, "tech," more than anything, denotes economic activity that is new. The tech industry is understood to be the tip of the spear of what pundits and politicians since the 1990s have variably called the "new economy," the "knowledge economy," or the "innovation economy." While these vague monikers have historically been associated with the commercialization of the Internet, they hardly constitute a social scientific category of study.

How have sociologists conceived of the tech industry? Social scientists have taken two tacks toward a definition. The first approach begins from economic categories created by state agencies. In one version, this means defining tech as the information and communication technologies (ICT) sector (Barefoot et al. 2018). Another approach in this vein is to derive a definition from the occupational makeup of firms. A 2016 US Equal Employment Opportunity Commission (EEOC) report, for instance, defines the tech sector as the aggregate of industries that employ a high concentration of STEM workers (at least 25%) and work on "electronic and computer-based production methods" (EEOC 2016). The 25% cutoff is arbitrary yet necessary since practically all companies today have technical departments tasked with cybersecurity, e-commerce, and website development, for example. Some sociologists studying tech point to these administrative data-centric definitions when explaining their case of interest (Alegria 2019, 2020; Mickey 2019).

The second, often more implicit, definition of the tech industry focuses on organizational form and work culture. In this view, companies are in tech if they work broadly in the Internet economy and cultivate the work style associated with Silicon Valley startups. While this is an admittedly fuzzy category, Silicon Valley startups have consistently branded themselves as "flat" (antibureaucratic) organizations, informal and playful in work style, and oriented toward a normative vision—making the world a better place. This approach thus defines a tech company less by what is produced and more by how work is being done. Qualitative sociologists studying high tech tend to gesture at these general characteristics or the geographic region of Silicon Valley when defining their case (Alfrey & Twine 2017, Chen 2022, Cooper 2000, Kunda 1992, Neff 2012, Turco 2016).

These two definitions have pros and cons. The first is easier to match to data from the Bureau of Labor Statistics or other administrative sources, allowing for the broad analysis of employment and compensation trends. However, this kind of definition may be too expansive for the analytical object intended: ICT sector definitions include firms ranging from semiconductor manufacturing plants to social media startups, and occupational definitions include industries such as pharmaceutical manufacturing. It thus casts a wide net in terms of types of organizations and workers involved.

The organizational culture definition may be beneficial in that it more closely aligns with popular understandings of a tech company, allowing for a targeted study and critique of the organizational practices celebrated in the popular imagination. However, scholars must be cautious with this approach. Because the idea of a tech startup has enjoyed a generally positive valence in the popular press, all kinds of firms—even real estate firms, in the case of WeWork (Govindarajan & Srivastava 2019)—have tried, with varying degrees of success, to brand themselves as tech companies. By calling a firm a tech startup, the scholar is already echoing a prestige-laden term that has allowed many such firms to escape scrutiny and to pump up equity valuations with hype (Harnett 2020).

Moreover, startups represent a single phase in the life of a tech firm, meaning they are not necessarily representative of the tech industry. While most startups fail, successful startups usually become more conventional bureaucracies as they expand and go public—that is, change from a venture capital (VC)–driven funding model to selling shares on a public stock exchange. A focus on the startup phase elides the power of today's legacy tech corporations, such as IBM and Microsoft, as well as firms that have more recently gained monopsony positions, such as Google and Facebook/Meta.

Another drawback of both definitions is that they highlight the relatively small number of high-wage jobs in tech firms while pushing out of the frame the many low-wage tasks that are outsourced or subcontracted despite being central to firm success. As discussed briefly below, Silicon Valley–based tech companies have long been pioneers in building shadow workforces

out of women and nonwhite men who labor as temporary workers (temps) or under piecework contracts outside of formal employment relationships (Hyman 2018, Pellow & Park 2002). For example, Google, one of the most profitable firms in the world, employs more temps and contractors (~121,000) than it does full-time employees (~102,000) (Wakabayashi 2019). Uber, an unprofitable but highly capitalized firm, formally employs fewer than 30,000 workers but directs the labor of almost four million drivers worldwide through its platform. Although the study of platform and gig work is its own rapidly developing field (Vallas & Schor 2020), any definition of tech that focuses solely on high-wage professionals will reinforce an artificial separation. Some scholars are developing promising empirical and theoretical connections between these worlds that demonstrate how these different spheres of work are co-constitutive (Gray & Suri 2019, Irani 2015, Shestakofsky 2017, Shestakofsky & Kelkar 2020).

The question of definition, then, becomes a matter of the sociologist's interests. If one is interested in the employment fate of workers with STEM credentials, then beginning with occupational makeup may be the most suitable approach. If one seeks to analyze the work practices that have emerged in Silicon Valley and are spreading across sectors, then the organizational culture definition is appropriate. And if one is trying to place the tech industry within broader trends in employment and political economy, shadow workforces must be included in the analysis.

In the following review, we do not seek to adjudicate between these definitions; we include insights from research using overlapping definitions. In the following section on employment demographics, we necessarily lean toward an occupational-makeup definition. However, the rest of the article primarily reviews research that defines high-tech firms in terms of having an organizational form and work style associated with Silicon Valley. Although we are not strictly separating definitions for the purposes of this review, we encourage further research that seeks out patterns in findings across alternative definitions.

WHO IS EMPLOYED IN THE HIGH-TECH INDUSTRY?

Using the first definition described above—occupational categories created by state agencies—scholars describe two general trends in the tech workforce. First, workers directly employed in tech firms earn high salaries. One recent study of the digital economy finds that workers earned an average annual compensation of $114,275 compared with the economy-wide average of $66,498 (Barefoot et al. 2018). Second, the tech industry across the United States is more white, more Asian (a category that includes Asian Americans and Asian immigrants), and more male than the private sector generally. An EEOC (2016) survey of the top 75 tech firms in Silicon Valley found that women represent only 30% of the workforce; white workers are overrepresented (as 47% of workers compared to 41% of the regional population), Asian workers constitute 41% (nearly double their representation in the region), Hispanic workers represent 6% (despite being 22% of the region), and Black workers hold 3% of positions (versus 8% in the region).

Highly paid roles defined as technical are held almost exclusively by white and Asian workers, the vast majority men. At Google, for instance, white and Asian workers hold 50% and 44% of technical roles, respectively, and men hold 74% of all technical roles (Google 2022). At the level of leadership, however, white workers in these Silicon Valley firms hold a full 83% of positions; Asian representation falls to only 11%, Hispanic to 3%, and Black to less than 2%. Thus, all racial/ethnic groups except for white workers are underrepresented in the transition from technical to leadership roles, with Asians experiencing the steepest decline. Regarding gender, women make up only 20% of executive, senior, and managerial positions (EEOC 2016).

It is important to emphasize that while Asians and Asian Americans are overrepresented in leadership roles in high-tech companies compared with their numbers in the labor force overall, they

remain underrepresented in leadership roles compared with their numbers in tech—indicating the existence of occupational segregation and discrimination against Asians and Asian Americans in these companies (Alegria 2020, Chin 2020, Chow 2023, Lee 2013). One industry study of a sample of big tech firms found that white men and women are 154% more likely to be an executive than their Asian and Asian American counterparts (Gee & Peck 2017).

In 2014, in response to public pressure, some leading tech firms such as Google and Facebook began to disclose workforce demographics alongside pledges to do better. The stated goal of such companies has been to increase diversity in technical jobs, but these firms have made remarkably little progress since. There have been mere fractions-of-a-percent increases in Black and Latina/o representation in these positions. The largest gain in gender representation has been Facebook increasing its share of women in technical jobs from 15% to 25% from 2014 to 2021, according to its annual diversity report (Harrison 2019). Most of this increase is among white women. Women of color have not experienced similar progress, despite most of these companies expanding their workforces significantly over these years.

A final point on workforce demographics concerns age. Tech firms maintain a shockingly young labor force. The median age of employees in top tech firms hovers around 32, a full decade below the median age in the labor market (Pelisson & Hartmans 2017). This is true of leadership as well as managers and lower-level workers (Frick 2014). We return to this point in the sections on precarious work and future research, but this demographic anomaly (especially as compared with other high-wage professional work) deserves further scholarly attention.

It is once again important to note that the workforce demographics just reviewed reflect the narrow definition of employment that the tech industry seeks to establish as normative. These numbers represent the high-wage and often idealized jobs in tech. The armies of workers who do the lower-wage, contingent, gig, and platform labor that these firms rely on skew much more toward women of all racial/ethnic backgrounds and men of color (Alimahomed-Wilson & Reese 2021, Ravenelle 2019, Schor 2020).

To illustrate, Amazon features stark disparities between corporate office workers, warehouse workers (many of whom are seasonal workers), and the third-party sellers whom Amazon charges a cut to sell at below-market rates. Drawing from in-depth interviews with Amazon warehouse workers, Alimahomed-Wilson & Reese (2021, p. 69) conclude that because of the disparate burden on Black and Latina/o warehouse workers, "Amazon exemplifies contemporary, neoliberal racial capitalism, which interacts with other systems of oppression to produce glaring inequalities across race, gender and nativity across Amazon's workforce."

Similarly, Schor (2020) identifies how racial discrimination is rampant in platform work, making it more difficult (and less lucrative) for Black hosts to rent out their homes on Airbnb, for example. Platform work is also gendered, with fewer women drivers for Uber and more women performing household work on TaskRabbit. Ravenelle (2019, p. 11) found that gig workers of color were economically vulnerable, had lower median net worth than white gig workers, and were all "strugglers and strivers"—those who "turned to the sharing economy in a fit of desperation." Moreover, she finds that the physical isolation of gig work combined with the politeness required of gig workers makes women vulnerable to sexual harassment. Despite these glaring downsides to the gig economy, Schor (2020) imagines a future in which regulatory reforms and cooperative platforms make for fairer labor practices.

Thus, jobs in the high-tech industry run a gamut from highly paid professional positions—which employ mostly white, Asian American and Asian men—to far more numerous low-paid, temporary positions, where men and women of color are clustered. The following sections focus on gender and racial inequalities in the top tier professional jobs in the industry.

HISTORICAL ROOTS OF CONTEMPORARY INEQUALITY

Much of the hype and brand of the high-tech industry depends on a cultivated image of newness and innovation—a narrative that these firms are changing all the rules of work. For this reason, serious sociological critique must properly historicize high tech to demystify industry claims and better grasp the roots of inequality in the contemporary industry. In recent decades, scholarship scattered across the social sciences has advanced a critical history of tech and drawn out important insights that we briefly review here.

First, the innovations that form the basis of computers and the Internet were developed in the crucible of the Cold War. During the two decades following World War II, the federal government organized massive investments in research and development to support engineering efforts, most notably at Stanford University. From the beginning, then, funding and employment for modern technology companies were directed at the young white men who populated postwar engineering departments. Counter to industry-led narratives of private sector brilliance, the most important technological advancements in semiconductors, computers, and later Internet infrastructures were bankrolled directly by the federal government (Lécuyer 2005, O'Mara 2019). The links between the military and tech continue to the present day (Harris 2023).

Second, the enormous wealth produced from the commercialization of such developments was hoarded by private actors (engineers and engineering managers) who went on to fund successive technological advances through portfolios of private equity that would come to be called "venture capital" (Malone 1985, Nicholas 2019, O'Mara 2019). The firms established and funded in this manner from the 1960s on were celebrated in the popular press for their supposedly antibureaucratic cultures and the visionary genius of their leaders (Wolfe 1983). The cycles of capital accumulation and reinvestment realized through these firms followed the logic of patrimonialism (Neely 2018, 2022) and flowed to subsequent generations of young white men thought to resemble the last generation of entrepreneurs (O'Mara 2019). This form of patrimonial investment was also enabled by federal tax policy, which continually encouraged VC investments by loosening regulations and lowering tax rates on capital gains in the late 1970s (Kenney 2000, O'Mara 2019).

Third, while the prestige and profits of new technologies coalesced around a core of white male engineers, the sector increasingly relied on an exploitative guest worker program that prioritized entry for East and South Asian engineers starting in the 1960s (Rudrappa 2010). Tech firms also grew reliant on the low-wage labor of racially marginalized women and men to assemble their products. From the 1950s through the 1990s, the dirty and dangerous work of cutting semiconductor chips and assembling computers was subcontracted to firms that hired and exploited immigrant women of Filipina, Mexican, and Vietnamese descent in the San Francisco Bay Area (Pellow & Park 2002), to factories built on Navajo land in Arizona (Nakamura 2014), and to plants in South Korea (Lécuyer 2005). In contrast to the celebrated, democratic workplaces populated by engineers, these workplaces were despotic regimes characterized by low wages, precarity, and unregulated toxic exposure (Hayes 1999; Hossfeld 1994, 1995; Hyman 2018; Pellow & Park 2002). This work and these workers were intentionally pushed out of the frame as the industry sought public recognition and further funding.

Finally, the gender composition of the computational workforce changed over time. As the production of computers expanded, firms across the economy integrated them into business processes, creating more jobs in programming and operating computer software, or what was commonly called data processing. In early years, computer programming work was done primarily by women, and the work was symbolically feminized and subordinated to the production of hardware, which was framed as the most valuable and masculine part of computing. Over the decades, groups seeking to professionalize computer programming strategically sought to masculinize the work;

the ideal computer programmer was redrawn from a feminized clerical worker to the masculine, logical, detached, and antisocial nerd. In these ways, the emergent profession of computer programming (rebranding itself as software engineering) shed its women and recruited new classes of men as it took a more central place in the US economy (Ensmenger 2012, Misa 2010).

These historical insights—of federal government support, patrimonial investment in white male engineers, a temporary immigration program that favored East and South Asian men, the strategic erasure of low-wage work done by nonwhite women and men, and the ejection of women from computer programming jobs—are critical to understanding the roots of the inequality regimes that shape the contemporary tech industry. Further scholarship is welcome in this historical vein, particularly in linking the industry's origins in VC to the broader sociological literature on financialization of the economy. Having reviewed some definitional and historical antecedents, we turn now to research on racial and gender inequality in the contemporary high-tech industry.

PATHWAYS INTO THE TECH INDUSTRY

How do people access professional jobs in tech companies today? To understand social inequality in the high-paying sector of the tech industry, scholars investigate three pathways into the industry: (*a*) STEM education, (*b*) industry recruitment practices, and (*c*) immigration programs. Each of these presents barriers to women of all backgrounds and to racial/ethnic minority men, and favors white, Asian American, and Asian men.

The first recognized pathway into the tech industry is through obtaining a college degree in a STEM field. Studies of STEM education explore how these disciplines construct barriers to women and minority men (Branch 2016). Scholars have examined biases in science classrooms starting as early as elementary school. For example, schools perpetuate gender stereotypes of scientists and engineers. Many girls grow up thinking that these subjects are for boys; they get the message that they are incapable of excelling in math (Hill et al. 2010). These stereotypes persist despite the fact that girls are now just as likely as boys to take and excel in advanced math classes in high school; women also make up almost half of all math majors in college (Riegle-Crumb & Humphries 2012, Riegle-Crumb & Moore 2014). However, once they enroll in college STEM programs, many women become demoralized by the sexist environment they encounter and end up switching majors (Hill et al. 2010). They can lose confidence in their abilities when they feel isolated and marginalized by their male professors and peers (Cech 2015, Cech et al. 2011).

Furthermore, schools serving Black and Latina/o children often lack the resources—qualified teachers, instructional materials, laboratory space—that they need to develop interest in and appreciation for science and engineering (Carter 2009). Prescod-Weinstein (2021) draws attention to the myriad barriers that constrain Black youth from pursuing STEM careers, indicting the whole society, not just the schools, for these failures. Instilling curiosity about science and engineering is currently a luxury granted only to the most privileged members of society.

These systemic disparities have gained attention in recent decades and have drawn some institutional responses. In the early 2000s, the National Science Foundation launched the ADVANCE program, a federally funded effort to investigate barriers that women in general face in academic STEM disciplines; in recent years, the program has adopted an intersectional lens and a focus on women of color. This programmatic effort invested over $270 million to support 275 ADVANCE awards to nearly 200 colleges, universities, and nonprofit organizations. Studies funded by these awards investigate the chilly climate for women in these academic disciplines and recommend specific policies to make these spaces more welcoming, including mentoring programs, networking opportunities, and implicit bias training (Nelson & Zippel 2021).

Despite efforts like these to end gender and racial disparities in STEM education, acquiring the right credential does not always result in favorable job placement in tech. Twine (2022) studied

women in Silicon Valley tech firms and found that disparities in STEM education cannot explain their underrepresentation in the industry. She observes that privileged men who lack the appropriate credentials can gain access, suggesting that on-the-job training may be sufficient for many positions. Such opportunities are readily available to white and Asian American men but inaccessible to other groups (see also Luhr 2019). To Twine (2022, p. 65), the idea of an education pipeline is a myth that distracts researchers from investigating the true obstacles facing marginalized groups; she argues that it is not "their limited human capital that is the problem," but rather discrimination in hiring, recruitment, and retention. Twine (2022, p. 16) points out that ten large Silicon Valley tech companies have zero Black women employees, while at Google—with its highly touted diversity programs—Black women make up only 1% of the global workforce, a vivid example of social closure mechanisms at work.

A second strain of research on pathways into the industry focuses on mechanisms of inequality at the point of recruitment and hiring in high tech. Scholars have identified forms of social closure operating through the kinds of colleges and universities that firms go to in search of new hires. Many companies prefer to hire graduates of top US universities, including Stanford and MIT, where the majority of students are white and Asian American. Historically Black colleges and universities graduate 20% of Black computer scientists, but tech firms do not prioritize these institutions when recruiting. These schools rank at the bottom in terms of prestige by the major Silicon Valley firms (Twine 2022, p. 40).

Tech firms hold recruiting sessions at the top universities in the hopes of attracting new graduates. Wynn & Correll (2018) observed these sessions and found that they alienate the few women and minority men who attend. Recruiters engaged in off-putting behaviors known to contribute to chilly climates at work. For instance, firms sent white men to give technical presentations. These men made joking geek culture references laden with gender and racial stereotypes, bragged about perks like foosball tables and beer fridges, and enthused about the fraternity culture of pulling all-nighters. In these recruiting sessions, recruiters conveyed the "sort of person likely to fit in their workplace"—elite young men—and sent the message that other groups would not be welcome (Wynn & Correll 2018, p. 161).

A common recruiting practice used by tech firms is to incentivize existing employees to identify future hires. Workers who recommend potential recruits to the hiring department can receive cash bonuses if they provide successful leads. Existing employees tap into their personal networks and consider cultural fit as well as merit when considering whom to recommend—a practice observed by Mickey (2018) in her study of a Boston tech firm. She found that internal recruitment resulted in the preferential hiring of young white men from Ivy League schools at the firm. Because employee networks tend to be highly gendered and racialized (Williams et al. 2012), this practice can lock in homogeneity.

Although Asians and Asian Americans are overrepresented in high-tech firms, the requirement of cultural fit can discriminate against these job candidates, according to Chavez (2021). At the tech firm he studied, interviewers were required to evaluate candidates on both technical ability and cultural fit, which were equally rated considerations. During hiring deliberations, committees relied on their intuitive sense of "chemistry" to determine whom to hire, a practice that favored white applicants. Furthermore, companies that prioritized diversity when hiring engineers targeted white women over other marginalized groups (Chavez et al. 2022). This research demonstrates how sexism and racism can be baked into the hiring process.

A third pathway into the tech industry is through the temporary visa program for skilled international workers. US companies are able to hire highly skilled immigrants through the mechanism of the H-1B work visa. This program is popular with tech employers (Rudrappa 2010), who support expanding the program because not enough skilled American applicants apply for their

available jobs, a claim disputed by labor economists (Teitelbaum 2014). Tech workers from India are the largest group hired in this way (Ruiz 2017), and most are men from elite backgrounds (Banerjee 2022).

Gaining entry into tech firms through this pathway into the industry is a mixed opportunity. Those admitted through the H-1B visa program are vulnerable to exploitation, downward mobility, and racial marginalization (Banerjee & Rincón 2019). Because of their precarious legal situation, these workers must agree to work longer hours and for less pay than their American counterparts or else face deportation. Some men resent this overwork, but others embrace it, identifying as a model minority and aspiring to follow in the footsteps of fellow immigrants who today lead major tech companies (Banerjee 2022). Having a nonworking wife at home—a condition of the H-4 visa granted to the tech worker's spouse—can further bolster their sense of masculine achievement (Banerjee 2022).

Far fewer women take this pathway into the industry. Women are less able than men are to relocate for temporary contracts and to work extended hours, especially if they are married (Banerjee 2006). The women tech workers who manage to enter on H-1B visas share similar elite backgrounds as their male counterparts. Ironically, these immigrant workers may represent diversity in tech firms that openly discriminate against racial/ethnic minorities in the United States. However, they show little interest in feminist or antiracist organizing in the workplace (Twine 2022)—actions that could heighten their risk of deportation. While all workers face employer retaliation for protesting their working conditions, the stakes are especially high for these immigrant workers who face deportation if fired from their jobs.

In sum, the pathways into the tech industry are gendered and racialized. STEM education and industry recruiting contribute to social inequality in tech by privileging white and Asian American men, while the temporary worker programs prioritize immigrant men from India, who nevertheless face exploitative conditions of employment. In the next section, we explore the mechanisms that drive inequalities for those working within these firms.

WORKPLACE ORGANIZATION AND CULTURE

Many high-tech firms began with the promise to disrupt business as usual. The tech industry promotes an image of itself as open, flexible, nonauthoritarian, antibureaucratic, and informal—qualities that, in theory, have the potential to break down social hierarchies in the workplace (Banerjee 2006).

Some scholars claim that the flexible organizational forms favored by the tech industry are conducive to gender equality. Smith-Doerr (2004) studied biotechnology firms and found that women scientists thrive in tech firms offering flexibility, collaboration, teamwork, clearer and fewer rules, less internal politics, and flatter job ladders. While biotech firms are not havens of gender equality, Smith-Doerr concludes that they are better for women scientists than the more bureaucratized alternatives of academia and large drug companies. However, she adds an important caveat: These benefits can be overwhelmed by "an exclusionist cultural frame of masculinity" (Smith-Doerr & Croissant 2011, p. 256), a characteristic of many high-tech startups that we discuss further below.

Similarly, in an ethnography of a startup transitioning into a publicly traded company, Mickey (2019) found that white women tech workers preferred the informality of startups compared with the bureaucracy that replaced it (few people of color worked at the firm she studied). During the startup phase, these women enjoyed expanded roles, high visibility, and participation in decision making. An all-hands-on-deck mentality at times undermined gender segregation in jobs. Although they experienced a sexist culture in the early days of the firm (described below), women felt valued and perceived opportunities for career growth. When the company bureaucratized

during its initial public offering (IPO), women were slotted into low-status specialized positions where they struggled to gain new opportunities and fell behind their male colleagues in career development.

While these scholars find that the tech industry's new organizational forms may favor women, others are not so sanguine. Ridgeway (2011) calls attention to how status hierarchies—including those based on gender and race/ethnicity—can become more salient in uncertain, uncoordinated, and flexible contexts like those in high-tech firms. Although bureaucracy brings its own set of challenges to women's career development, some scholars find that, in general, the absence of formalization, in tech and beyond, can amplify bias by designating a higher bar, extra scrutiny, shifting criteria, or double standards for those outside the dominant group (Correll 2017).

These biases are evident in the workings of the team structure, which is ubiquitous in startup firms. Although both men and women prefer to work on teams rather than in isolated jobs (Simard et al. 2007), research finds that the team structure can pose obstacles for women and minority men, as well as for members of the lesbian, gay, bisexual, transgender, and queer (LGBTQ) community. By its very nature, teamwork obscures the individual's contribution to the final product, so members of the team must engage in self-promotion to receive credit and rewards for their personal effort. Self-promotion is difficult for women and minority men when working on teams dominated by white men, as they may be perceived as overly pushy or aggressive for promoting their accomplishments, with negative career consequences (Williams 2021, Williams et al. 2012). They may be shuffled into deferential and/or familial roles as a result (Ollilainen & Calasanti 2007). LGBTQ professionals in STEM also report more marginalization on teams compared with traditional work units (Cech & Waidzunas 2022).

Gender and racial stereotypes also enter into performance evaluations within tech firms. Correll et al. (2020) studied a Fortune 500 company and found that while men and women were equally likely to be described as having technical ability, evaluators often rated women as too aggressive and men as too soft, thus penalizing those perceived as violating hegemonic gender norms. Similarly, "taking charge" was associated with higher ratings for men but not women. The authors concluded that ambiguous and poorly defined evaluation criteria make it more likely that status beliefs will determine how managers observe, interpret, and value employees.

Marginalized groups perform emotional labor to navigate and survive in these hostile workplace environments. On teams that are dominated by white men, minority men and women may be compelled to engage in "racial tasks" (Wingfield & Alston 2012), including performing degrading interactional work to legitimize the whiteness of their organization, while women of all backgrounds may feel forced to downplay femininity to gain acceptance and credibility (Luhr 2020). In their study of women in Silicon Valley firms, Alfrey & Twine (2017) found that white and Asian American women who identified as LGBTQ reported a greater sense of belonging and acceptance compared with conventionally feminine heterosexual women. However, this was not the experience of Black women, who faced barriers to acceptance and credibility regardless of gender expression.

As Smith-Doerr (2004) showed in her study of biotech firms, teams are not inherently exclusionary, but they are problematic if they operate in a masculine workplace culture. This describes the tech industry, which is notorious for cultivating and celebrating a geek or a brogrammer masculinity (Wiener 2020). The ideal workers at these firms are young white and Asian American men from elite schools who are passionately devoted to work. They practically live at the workplace, which is designed to satisfy their every need to keep them at work (Chen 2022). Idolized as technically brilliant, these young men tough out the long hours and "get the job done" in return for high salaries and the promise of future wealth (Cooper 2000, p. 403).

Deeply ingrained within the brogrammer culture are racist, sexist, and heteronormative banter and ridicule, what Quinn (2000) calls "chain yanking." Mickey (2019) cites examples of this brogrammer culture in a startup: With disdain, women called the startup a "frat house" and a "boys' club," reporting how the boss tasked them with the role of "beer fairy" to serve beer at office parties. Men, however, waxed nostalgic about the early days of "swanky, open bar" parties and bar-hopping every Friday night with coworkers.

This workplace culture enables a climate of sexual harassment and abuse (Benner 2017, Vassallo et al. 2015). A recent industry survey found that 48% of women working in tech, compared with 11% of men, had experienced sexual harassment (Women Who Tech 2020). Hart (2021) interviewed 84 tech workers in the San Francisco Bay Area and found the prevalence of what she calls ambiguously sexual interactions: an interaction with an unwanted sexual subtext that can be plausibly denied. These interactions placed pressure on the target to engage in trajectory guarding, "the interactional process of monitoring and managing ambiguous interactions that may be moving toward explicit harassment" (Hart 2021, p. 272).

The brogrammer ideal is both gendered and racialized, meaning that people of color, especially women, face distinctive hurdles in tech. Black women in all STEM fields experience the interaction of structural sexism, structural racism, and race/gender bias, leading them to report being isolated, stressed, and undersupported (McGee & Bentley 2017). Abad (2022) interviewed Latina, Asian, and Black women working in tech and found that they cultivated "labor market wisdom"—a form of knowledge necessary for navigating and staying in a professional field dominated by white men. One Black woman knew her degree from a historically Black university would penalize her in job applications, so she enrolled in an executive program to add an elite university to her resume. Another said she knew to push for examples when managers provided ambiguous feedback about her "poor performance" and when to seek legal advice from a Black attorney to determine whether her evaluation constituted racial discrimination (her manager said, "I'm afraid of you"). Abad identifies the extra effort demanded of women of color to thrive in this environment, requiring them to develop more than technical knowledge, credentials, industry knowhow, and social ties (see also Shih 2006).

Finally, the high demands for long hours and work infatuation in high-tech firms create obstacles for both mothers (Kelly et al. 2011) and fathers (Cooper 2000) but ultimately have greater negative ramifications for women's careers (Cech & Blair-Loy 2019). Workers who violate the expectations for devotion to work in order to provide care work outside the workplace, or who are perceived to do so, are then penalized by a flexibility stigma (Williams 2001).

IMPACT ON THE TECH

With the rise of the high-tech industry over the past three decades, its products and services have become increasingly central to key elements of social life, from landing a job to finding a romantic partner. The mechanisms of inequality that characterize work in the industry spill over into the broader social world through the technologies these firms produce. Because elite men monopolize the design of technology, the products they invent inevitably reflect their interests (Oldenziel 2004). Even before the general commercialization of the Internet, Wajcman (1991) called attention to how new technologies, from word-processing to self-cleaning devices, reinforced existing gender and class inequalities. On what is at stake in the relationship between technology and gender, she writes, "Drawing more women into design—the configuration of artefacts—is not only an equal employment opportunity issue, but is also crucially about how the world we live in is shaped, and for whom" (Wajcman 2009, p. 151).

Technology can serve as a tool of structural inequality. In *Algorithms of Oppression*, Noble (2018) reveals how search engines perpetuate racism and sexism. She gives the examples of typing the phrase "Black girls" into the Google image search engine, which yielded only sexualized photographs, while the term "beautiful" showed only white women. Meanwhile, "professor style" exclusively returned images of white men in suits. As Benjamin (2019) argues, these technologies arise from a strikingly unequal labor force in which white men, and sometimes white women and Asian and Asian American men, get to create and innovate. As a result, Internet technologies use algorithms that simultaneously amplify and obscure racial hierarchies—a process Benjamin calls the New Jim Code. She cites the example of Google's seemingly neutral artificial intelligence recruitment tool that downgraded resumes listing women's colleges or associations. These discriminatory technologies, Benjamin (2019, p. 160) writes, "enter through the backdoor of tech design, in which the humans who create the algorithms are hidden from view." This literature makes clear that the technology itself promotes patriarchy and white supremacy (see also Browne 2015, Daniels 2009, Eubanks 2018). In a similar vein, Alegria (2020) concludes that changing who gets to work in and create tech is vital for addressing social inequality more broadly. Citing what Apple insiders called an omission in Siri's development that resulted in sexist and racist programming, Alegria (2020, p. 10) writes, "these 'unintentional omissions' arise when people of color are excluded from design and decision-making roles."

Workplace organization and culture in tech companies reproduce the social inequalities of race and gender. The technologies invented in this powerful industry reflect the perspectives and the interests of the groups designing it, who are overwhelmingly white, Asian American, and Asian men. Diversifying the creative side of the industry will inevitably transform the products that currently shape our world.

PRECARIOUS WORK IN TECH

As discussed previously, tech firms have replaced standard employment contracts with gig, contract, and temporary jobs. The "Uberization" of the economy means that companies or individuals are able to hire workers without any promise of future employment. In this way, tech firms have expanded precarious employment broadly. Less apparent is that precarity is also common for full-time professional workers, who are our focus here. Available data suggest that turnover in tech companies is among the highest of any professional sector—a full 13% a year according to some sources (Booz 2018). The turbulence of tech, which is rife with mergers, acquisitions, and downsizing, likely exacerbates social inequality (Bosky et al. 2022, Kalev 2014). Research suggests that race, class, gender, parental status, and age influence who can maintain their professional standing during transitions (Williams 2017), whether they are able to make strategic career moves (Neely 2020, Rider et al. 2016), and how they respond to unemployment (Rao 2020, Williams 2017). One study of a startup found that the constant hiring and firing associated with an IPO transition left women more vulnerable to layoffs (Mickey 2019).

Scholars have identified a range of explanations for the extreme instability of employment in tech. First, the industry has normalized temporary work contracts, both for high-wage engineers and for low-wage platform and gig workers. Tech firms were among the first professional organizations to use temps and contractors as regular parts of workforce planning (Hyman 2018). Today, the largest and most profitable tech firms employ most of their workers on short-term contracts. Studies of high-wage contractors in tech report satisfaction with self-direction but also the burden of constantly needing to manage one's employability, as well as the material loss of key fringe benefits (Barley & Kunda 2006, Osnowitz 2010). The literature on lower-wage gig work suggests

that workers face enormous difficulties procuring a stable income as jobs are disassembled into minute tasks (Vallas & Schor 2020).

Second, the much-touted flat structure of tech firms also contributes to employment instability. Antibureaucratic tech firms tend to offer few internal opportunities for advancement, keeping managerial ranks relatively thin and making promotion into those ranks exceptionally difficult. Facing low ceilings within their workplaces, tech workers look to the broader labor market for raises and promotions. Professionals in Silicon Valley prepare for a career in which the ideal is to change firms every two to three years by shoring up large safety nets (Cooper 2014), engaging in personal branding (Gershon 2017), and building networks (Mickey 2022). Twine's (2018) finding that referral networks tend to exclude Black women in tech suggests that strategic career moves from one organization to another may not be a viable option for career advancement for them. However, with respect to job-hopping and networking in the Silicon Valley, Shih (2006) finds that Asian immigrant engineers, both men and women alike, are able to use this turbulence to their advantage.

Third, organizations in the tech industry, especially startups, tend toward volatility, given their relationship to VC. Often oriented to financial markets from their inception, tech firms are constantly pivoting for market fit and growth, a process that offers little job stability and a regular rhythm of "reorgs" and layoffs (Baron et al. 2001). The uncertainties of work in startup firms produce an approach to work that sees employment as investment in a lottery. Neff's (2012) study of workers in 1990s dot-com companies finds that workers perform "venture labor," accepting the precarity of their employment while highlighting the "coolness" of their jobs and the chance that their equity compensation might make them rich, should their firm hit it big.

The volatility of tech firms contributes to the industry's extremely young age profile. In their study of tech startups, Baron et al. (2001) find that, when these companies pivot, the most tenured workers experience the most turnover. Recent class-action lawsuits and investigative reports find that well established tech firms such as IBM target older workers for dismissal during regular reorgs, seeking to cut "old heads" from the employment rolls (Brown 2019, Gosselin & Tobin 2018, Hern 2019). Apart from these lawsuits, tech firms have largely escaped scrutiny for ageist termination practices. Recent studies find that dislocated tech workers enter a world of self-help career coaching that foregrounds self-improvement and discourages collective political action against employers (Sheehan 2021, 2022).

A fourth explanation of employment instability in tech points to organizational cultures. Tech firms manage and motivate workers through normative control, a managerial strategy that seeks to drive labor by getting workers to internalize firm goals as their own (Cooper 2000, Kunda 1992). Recent work has compared the culture of work in Silicon Valley to religion: "Maternalistic" firms offer an all-inclusive package to workers that includes building out organizational practices to encourage employees to find friends, romances, and divine purpose in the workplace (Chen 2022). According to Kunda (1992), the result of these organizational practices is that workers lose the ability to distinguish themselves from their employers—to separate their life from their work. The result of this blurring of boundaries is an addiction to work and regular breakdowns, described by workers as burnout, which push workers out of the firm from sheer exhaustion. Through these mechanisms, tech firms induce a high turnover rate that can serve as an avenue for maintaining patterns of inequality within firms.

FUTURE RESEARCH

The high-tech industry has outsized importance in our society. It is an extremely lucrative industry with the best jobs overwhelmingly held by white, Asian American, and Asian men, although again

we point out that the latter two groups are underrepresented in leadership compared with their numbers in tech. Racial/ethnic stereotypes (Chavez 2021, Chow 2023), exploitation engendered by the H-1B visa system (Banerjee 2022), and segregation into ethnic niches (Lee 2013) form persistent barriers to Asians and Asian Americans ascending to decision-making roles (Alegria 2020, Chin 2020). Even with these important studies, additional research on the different experiences of Asian immigrants and Asian Americans is warranted.

In this article, we have reviewed the scholarly literature that documents and analyzes the external and internal processes that result in social inequality in tech. A number of questions remain. In this final section, we describe promising new areas for future research.

First, more research is needed linking social inequality to the political economy of the tech industry, in particular its financing structure and business model. At the beginning of this article, we explained that sociologists currently use two definitions of the tech industry. We suggest a third alternative, focused on the funding model that supports the industry. VC, a form of private equity, has been the primary engine behind the growth of the Internet economy for decades. As Shestakofsky (2020) noted, VC seeks to advance a particular set of political-economic interests that have implications for firm formation, organizational practices, and inequalities in the workplace. In VC, white men manage over 90% of the money (Edwards 2021) and typically fund others like them. Only a tiny share of VC funding goes to white women founders; founders of color are shut out almost entirely (Bittner & Lau 2021, Romburgh 2021). VC investors build portfolios of firms that they consider high risk and high reward, expecting that most investments will fail but that one will provide exponential returns. The field of tech firms in Silicon Valley has been imprinted by this regime of accumulation. Further research should investigate the constitutive role of VC in tech and explore the political-economic context that supports the tech industry. Including VC in definitions of tech—or at least drawing the connections between the two—may help us to more generatively connect the rise of high tech to the literature on financialization (Krippner 2005, Lin & Neely 2020, Lin & Tomaskovic-Devey 2013, van der Zwan 2014). Given the importance of VC to the high-tech industry, further research should address organizational dynamics within VC firms and, like that being done on tech, investigate how those internal dynamics spill out into the broader economy.

Second, future research on the tech industry should further theorize age as an axis of inequality. As noted above, the industry has an extremely young workforce when compared with other industries offering high-wage, professional jobs. While sociology has made great gains in explaining organizational inequalities along lines of race and gender, surprisingly little theoretical work has been done on age and ageism (for exceptions, see Calasanti 2003, Roscigno et al. 2007). Further research could mine this extreme case for insights into how an organizational age regime operates. How do tech firms maintain such a young workforce? What organizational practices and discourses legitimize the regular displacement of older workers? Given the tech industry's symbolic position at the forefront of the US economy, are these practices likely to spread to other industries? And what are the implications for workers' career trajectories? Through these and related questions, further research on the tech industry could launch theoretical advances into underexplored dynamics of workplace inequality today.

Third, we call for additional research on diversity initiatives in tech. In response to criticisms, major tech firms adopted largely ineffective diversity programs; those implemented mainly focused on gender inequality and benefited only a few white women (Chavez et al. 2022, Han & Tomaskovic-Devey 2022). But the very existence of diversity programs—even if ineffective—helps to legitimize the industry in the eyes of many tech workers. Luhr (2023) found that these workers characterize their firms as "better than most," pointing to the large number of international workers employed (who are often hired on temporary contracts and are subject to unique

forms of exploitation). This research suggests the need for scholarship on effective interventions. One promising approach lies in the "small wins" model developed by Correll (2017). Correll and her associates work with managers at tech firms to build change initiatives that reduce bias. By documenting the positive outcomes of these initiatives—called "measurable wins"—they inspire managers to take additional action that can snowball into greater organizational changes. For example, in a midsize tech company, Correll and her team worked with a group of 23 employees to redesign the performance review process, resulting in measurable declines in sexist evaluations. The managers' enthusiasm for the initiative inspired them to address bias in other areas of the company. Such initiatives to mitigate workplace inequity warrant further examination (Kelly & Moen 2020).

A final crucial direction for future research lies in the broader labor movement to improve working conditions and reduce inequality throughout the industry. This is especially important for ameliorating the abysmal conditions faced by gig, retail, warehouse, and outsourced-abroad workers. Schor (2020) identifies how regulatory reforms and cooperative platforms could push for fairer labor practices. Studying examples of these efforts in the United States and abroad would be fruitful, as different national employment regimes can enhance or mitigate social inequality. Moreover, attempts to democratize decision making and set fair compensation in tech warrant additional study. Collective decision making and pay equity are key ways to lessen social inequality at work (Sobering 2019). Media pundits and tech insiders have hyped the promise of "holacratic" workplaces that eliminate hierarchy and redistribute power to all employees (Pisoni 2015). So far, studies of such efforts express both optimism and hesitation about their potential, finding that they often fail to collectivize authority (Turco 2016) and come with implementation challenges (Bernstein et al. 2016). Additional case studies of worker collectives would provide a more complete picture of how change can be imagined and perhaps realized.

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