

1 GENDERED LABOR IN COMPUTING

The #MeToo movement, feminist activism with strong public support to end gender violence, has positioned us at a critical juncture in research on broadening participation in computing. We must better understand why, when it comes to access, some science, technology, engineering, and mathematics (STEM) disciplines (e.g., biology) are examples of gender parity while other disciplines—computer science and engineering, for example—remain stubbornly segregated (Cheryan et al. 2017; Gibbons 2009; Wajcman 2009). While others argue that the answer lies in women’s lack of experience, self-efficacy, and comfort with computing culture, I contend that computing culture reinforces gender violence. Not only are individual women harmed in computing workplaces through a combination of bias, discrimination, and harassment but the failure to rectify the occupational segregation in the field undermines feminists’ efforts to increase women’s earning capacities, access to power, and our political and bodily sovereignty in broader culture. Further, due to a combination of massive wealth accumulation and masterful branding that suggests a cosmological power to which it is in our best interests to submit, computing workplaces are bathed in a halo of exceptionalism and thus shielded from regulation and inoculated from ill-repute more than other fields.

Gender in the world of computing is an advantageous standpoint from which to demystify the power of this technology and its owners and outputs. My feminist ethnography unearthed several core values driving culture in computing production, including precision, abstraction, aggression, a love of machines, and a disdain for behaviors or ideas that may threaten the

marriage between masculinity and technical competency. I call these values and the ways they are policed in technological work the “Bro Code,” and I use the term to refer to the performance and norms of gender enacted by straight cisgender men from dominant racial groups in computing organizations and values that privilege masculinist identities, instrumental rationality, and binary thinking. It is influenced by norms in broader society governing technology, race, and gender and also exports its values to help shape society. It’s the secret to why computing remains stubbornly sexist and uneven in its distribution of opportunity, resources, and regard.

THE SIGNIFICANCE OF THE BRO CODE

Why is “bro culture” in the computing industry particularly important to study? I am often asked, “What about white men’s shitty behavior in finance, for example?” My answer is threefold. First, “every company wants to be a tech company” (Tarnoff and Weigel 2020, 8). JPMorgan employs more software engineers than most Big Tech corporations, blurring the boundaries between the finance sector of the economy and computing domains (Tarnoff and Weigel 2020). Given how the solvency of many industries now rely on algorithmic infrastructure, the Bro Code permeates many other influential fields beyond the major Big Tech corporations, and thus cracking it will have wide impact.

Second, computer technology companies tolerate discrimination and harassment more than non-tech companies (Scott, Klein, and Onovakpuri 2017). Women of color in technical fields experience the greatest amount of mistreatment, including being blocked from advancing into leadership and targeted by sexual harassment and stereotyping (National Academies 2022). In this way, the Bro Code impedes racial justice and the accumulation of generational wealth in communities of color.

Finally, since technical skills are in demand in many arenas in the US economy, denying women the opportunity to develop and perfect the skills required for leadership in the twenty-first century stands to roll back decades of progress toward a more just, egalitarian society.

Computing is a field that floods the market with unregulated commodities with seismic social impacts. This is why, in addition to studying technological things and their social impact, the conditions under which computing artifacts are made are important to examine, too. Who produces

computing knowledge affects what is made and toward what ends it is used. Workplace values become encoded in computing commodities. Given the vast domains on which computers have influence, their reach makes the Bro Code a problem of global proportions. Along with digital artifacts and infrastructures, the Bro Code may be considered another significant output of computing, one of the factors contributing to extreme disparities of wealth and opportunities in the US, especially along vectors of gender and race.

In the 1940s and 1950s, women made up the ranks of computer programmers, a fact that has been erased or downplayed in computing lore (D'Ignazio and Klein 2020; Abbate 2012; Hicks 2017; Ensmenger 2010b). Once the level of intellectual demand and skill required for this labor were recognized, software programming, like other scientific fields, followed a pattern that devalued women's contributions as the discipline inversely rose to prominence (Etzkowitz 2008). Computer programming was redesigned as men's work (Kraft 1979; Daub 2021). The erasure of computing pioneers contributes to the exclusion and harassment of the women who persist in computing today. This radical swing in labor value in the field also contributes to a peremptory form of fragility that, according to my experience, characterizes the attitudes of Bro Coders. In other words, the mendacious myth that the computer's origins are solely patrilineal stems from a gender politics that fashions and fortifies the Bro Code.

All-male cabals are nothing new. They are cornerstones of societies that reproduce patriarchal structures of power (e.g., Western science, the Catholic Church, and the nerve center of global finance—Wall Street). Here I advance a theory of the Bro Code built on five arguments related to its unique characteristics and why it is worth exploring. First, women who navigate, resist, and subvert male hegemony to persist as workers in computing have a unique standpoint in US society and the potential to transform, institutionally and interpersonally, unjust social relations. Second, interview protocols, long hours, precision questioning, combative work styles, and the logical and abstract approaches to knowledge production prized over creative ones reproduce the ideological union between masculine ideals and competency in the field. These rituals also serve to indoctrinate computing workers to the core values in computing commodity production, including constant observation, intense evaluations of others, and the devaluation of sociality. Third, participants' emotions allowed me to locate and interpret the conflicts and contradictions in women's lives. Many of

these contradictions signal a rupture as women struggle to navigate the bifurcated nature of their workplace role, feeling at once privileged to be agents in a powerful field and marginalized as members of this field (Smith 1990). These sites of rupture are areas ripe for social change activism. Fourth, the majority of my participants have social change aspirations. They want to use their computing skills to make the world a better place. These aspirations correlate with a commitment to support other women in computing, both on an interpersonal level and in congress with others. Navigating the experience of rupture, combined with a yearning for social justice, may ignite feminist consciousness in women computer scientists, which can lead to collective action in pursuit not only of equality in computing but in broader cultural domains. Finally, I argue that social change aspirations are a collective form of reproductive aspirations—shared yearning to contribute to the collective well-being of society around which computing workers can effectively organize.

What makes patriarchal culture in computing unique can be found in the stories of my ethnographic participants—stories of navigating a work culture dominated by the Bro Code. In these pages, you will learn how these values manifest in daily work relations and how they can result in unjust labor relations and stubborn segregation.

Cracking the Bro Code offers portraits of technologists who in one way or another oppose the Bro Code and persist in one of the most powerful, influential workforces in the world. You will meet a white transgender woman and early-career scholar whose nonplussed attitude toward her male peers and the incivility of advisers is a master class on handling white male fragility. You will meet a Black cisgender woman who off-ramped from software engineering in industry into academia in order to align her career with her altruistic values to make the world a better place. You will meet a cisgender woman from Russia in the high-tech world of finance with a shrewd take on reproductive politics in the computer science workforce. You will meet a cisgender man from Ghana who takes special care in his dress and associations at his software engineering job to mitigate racism.

The technologists who participated in my study generally respond to workplace exploitation, including stereotyping, discrimination, and sexual and gender harassment, in four ways, which I list in order of high to low risk of attrition from computing: they internalize, desensitize, criticize, or collectivize, and some employ a combination of these strategies. In the chapters

ahead, you will meet people who respond to the Bro Code by *internalizing* its hostility, which manifests in the impostor syndrome and the sense that one does not belong. Others respond by *desensitizing*, which means acting as “gender agnostics,” people who care not to see sexism or gender in computer engineering. Only white cisgender women computer scientists exhibited these desensitization tactics. These participants avoided considerations of gender at work as a persistence mechanism, one predicated on the privileges of whiteness and heterosexuality. However, many of this study’s research participants *criticize* inequitable labor relations in computing. Critical interlocutors in this study also tended to *collectivize*—that is, they organize in groups to fight for, support, and advance women in computing and destabilize the imposition of the Bro Code. In the chapters ahead, I will share evidence of these four types of responses and explain how they illuminate the connections between technology, gender, and race, thus perpetuating segregation within computing organizations. In addition, I explore efficacious pathways for developing collective oppositional perspectives to address these complex injustices.

Technological workers have unique standpoints that can help us understand how power operates within its cybernetic citadels. Their stories suggest a connection between sites of computing production and the further enclosure of social life within the digital economy. As important, some of these computer scientists and engineers have values that directly contradict the corporate, technocratic values of their organizations. People inside the exclusive domains of computer production provide essential checks and balances for those of us who are operating from outside these fields as we endeavor to reshape technology cultures and determine the societal purposes for which computers will be used.

THE BRO CODE: WHAT DO WE KNOW? WHAT DO WE NEED TO LEARN TO CRACK IT?

This book is concerned not only with sexism in technoscience but also with how it creates unjust labor conditions for workers and students historically disenfranchised from US computing. I reckon with the social inequities inside computing classrooms and workplaces that are made possible by the Bro Code. Enacting justice inside the walls of my field sites may help to advance justice in the realms of human health, social justice, as well as state

and global politics. I ask two questions: (1) How do gender and race intersect to influence outcomes in the production of computer technology? (2) How can we transform computing sites of knowledge production and fairly distribute their power and influence on our world?

I am conflicted about asking more women to lend their talent to computing organizations dominated by the Bro Code because I know, from both my own professional experience and years of ethnographic research into computing culture, just how hard it is and how much resiliency it takes to persist and thrive. On the one hand, we need women working from within computing to make change. Representation does matter; a *critical mass* of women in STEM influence design outcomes and organizational culture, resulting in more egalitarian outcomes (Carrigan, Quinn, and Riskin 2011; Margolis and Fisher 2003; Etzkowitz, Kemelgor, and Uzzi 2000). On the other hand, given that technocracy—the pervasive belief that more technology is better and technology always benefits the social good—how can I advocate for women to make machines that do harm to historically disenfranchised groups for the enrichment and advancement of a powerful elite?

I make no claim that women's inclusion is a good idea for corporate profit or shareholder value because I care not for capitalists' enrichment but for the well-being of women in computing who exercise their right to participate in shaping the future of digital life, often at great costs.

I center the lives and voices of group members marginalized in a powerful field because they bring a new and different perspective on power relations. Their perspective can generate new knowledge and applications of existing tools. Computational machinery can be tools of social control. In order to interrupt and destabilize the reproduction of unregulated algorithmic artifacts and obedient participants in the technocratic neoliberal order, the folks marginalized in the field must have their say.

Women's persistence and achievement in high-tech has broader economic implications. Economic independence hinges on women's ability to earn a living wage, something that is made infinitely easier as a technologist. Denying women jobs in computing or harassing them out of these positions are forms of economic injustice that disenfranchise both individuals and generations to come. The accumulation of disadvantages resulting from such exclusions is also a form of reproductive injustice. Systematic denial of access to high wages, steady employment, wealth, and leadership opportunities causes women to become more vulnerable to poverty and

patriarchal demands that coerce many into the provision of nonreciprocated, morally coded goods and caring labor to male-dominated institutions. The people who took the time to share their experiences with me for this research are trailblazers with more courage and grit than I have. Unlike my research participants, I leaned out. I did not persist.

In this study, I represent myself in two ways. First, as a narrator who interprets participants' experiences through a prism refracting my lived experiences as a white woman and a feminist scholar. My whiteness influenced my relations in the field and what I learned from participants who are and are not white. Given the legacies of white supremacy in the academy and white women's role in upholding these relations today, my whiteness likely impeded trust with some participants of color. Also, my feminism was sometimes an impediment in the recruitment phase of the study, turning off gender agnostics who feign not to see gender in their classrooms or workplaces. Second, I also represent myself as a woman worker who has experienced and resisted gender and sexual harassment and wage exploitation in Big Tech. Gender harassment is a form of sexual harassment, but the disparaging conduct is not intended to elicit sex. Instead, it consists in verbal, physical, and symbolic behaviors that convey hostile and exclusionary attitudes toward women. I use legal documents and journal entries that I wrote while employed as a project manager and acting senior manager at Colossus to demonstrate how interpersonal and structural sexism operated in order to contribute to and reproduce patriarchal relations in corporate high-tech.

Cracking the Bro Code thus examines phenomena that contribute to the reasons that women's attrition in technical fields is 50 percent higher than men's (Fouad et al. 2017). The Bro Code is not just about repelling any infiltration of femme-identified programmers; it is also about preserving a particular kind of sanctuary—a Geek temple, as it were. The book moves upstream from corporate or nationalist logics common in gender equity scholarship to explore how the reign of the Bro Code in high-tech workplaces and classrooms is simply cultural, and culture is nothing but in flux. My aim is to use this fact to destabilize harassment in the field and shine a spotlight on people who historically made computers possible and continue to do so today.

DISENFRANCHISEMENT

According to the National Center for Women & Information Technology (NCWIT), “women’s proportional representation in STEM disciplines at the bachelor’s level has generally risen since the mid-1990s—except in computer and information sciences (CIS) and mathematics” (DuBow and Gonzalez 2020, 4). In 2019, women earned only 21.5 percent of the bachelor’s degrees in computing in the US compared to 37 percent in 1985 (Zweben and Bizot 2020). The year before, 2018, was the first time in 33 years when the number of women earning bachelor’s degrees in computing “had exceeded the 1985 historic peak of 13,733” (DuBow and Gonzalez 2020, 5). In contrast, the number of bachelor’s degrees awarded to men has more than doubled since its 1987 historic peak of 25,887 (DuBow and Gonzalez 2020). Only 9 percent of all computing degrees are awarded to African Americans, with only 2 percent of those being African American women (Hamrick 2019).

Such stark underrepresentation permeates the workforce as well. Women make up only 25 percent of the computing workforce at large (Ashcraft, McLain, and Eger 2016). Only 21 percent of computer programming positions are held by women (Ashcraft, McLain, and Eger 2016). Of that 21 percent, only 2 percent are African American, and only 1 percent are Latina (Ashcraft, McLain, and Eger 2016); furthermore, 50 percent of women in technology have felt discriminated against in their job because of their gender, and African American women and Latinas with degrees in computing are hired less often and paid significantly less than their white peers (Urwin 2023). During the COVID-19 pandemic, women in computing were twice as likely to be furloughed or fired compared with men. They are also 65 percent more likely than their male peers to be impacted by mass layoffs in the computing industry (Urwin 2023). Those who did retain their jobs found remote work challenging. For example, women of color in tech were far more likely than white women to report that the pandemic took a serious toll on their work-life balance and to express dissatisfaction with their managers’ efforts to connect and communicate with them (Awad et al. 2022). These dismal trends are especially disturbing in light of the fact that computer science and engineering is one of the degrees with the highest earnings (Hess 2019), allowing degree holders to accumulate economic and cultural capital. Even when women gain entry to these

prestigious worksites, they are paid less than their male peers. For example, “an audit of Google’s pay practices by the Department of Labor found six to seven standard deviations between pay for men and women in nearly every job category” (West, Whittaker, and Crawford 2019, 9). Across commercial tech firms, women coders of color earn less than their male peers and white women (West, Whittaker, and Crawford 2019). Understanding how discrimination in computing is maintained and reproduced stands to contribute to closing the gap between what computer science leaders say computers do for society and the field’s actual application, outputs, and outcomes.

In this lucrative field with enormous influence on wealth creation, women’s perspectives are missing to the detriment of many (Chang 2018; Margolis and Fisher 2003). The consequences of the segregated high-tech workforce invite further scrutiny of computing artifacts, which can threaten people’s safety and well-being. For example, popular search engines stereotype and demean people of color, especially women of color, while reproducing whiteness and maleness as normative (Noble 2018). Google’s search algorithms mislabel Black people as gorillas (Simonite 2018), and corporate systems using artificial intelligence (AI) significantly misgender women and darker-skinned individuals (Buolamwini and Gebru 2018). Suzanne, a white, mid-career executive at Facebook who participated in this study, described how she was at a design team meeting tasked with developing a tracking device for a mobile phone application that would allow users to meet up with friends while out on the town. She was the only woman on the team, and she became frustrated that the men on the team were all extremely enthusiastic about the potential of this feature, without reservation or ethical considerations. She finally interjected and asked the men: “Have you ever been stalked, harassed, or afraid for your life? Women deal with fear of male violence every day, and we need to give our users a sense of security. We must make privacy paramount.” If she had not been in that planning meeting, millions of women worldwide who participate in Facebook’s platform would have been put at greater risk. Segregation in technology is not only a matter of justice for workers in computing fields; it is also a matter of life and death for users of computer technology.

TECHNOCRACY AND TECH FETISHISM

Scholarship is now proliferating on how racism and sexism are encoded in computing artifacts and disseminated widely through “user experience” with digital platforms.¹ This ethnography, like Sareeta Amrute’s 2016 book *Encoding Race, Encoding Class*, focuses on the computing workplace and its disenfranchised workers forced to either uphold exploitative relations or contest them at great cost. *Cracking the Bro Code* decenters the artifacts of technology to interrogate instead the social architecture of labor involved in creating and making computing technology. I also prioritize producers of technology over consumers because the conditions of computing workplaces matter in our society. If these workplaces can become more just, fair, and equitable in terms of who is welcomed, celebrated, and compensated in technological creation, then these creations may better serve society. The voices of my participants (and my own) may not have been worthy of consideration at the lab benches and boardroom tables in our worksites. Here, we offer our stories and perspectives to those who seek to challenge the Bro Code.

Computing culture prizes objectivism, and yet computer scientists love mythologizing and spinning fantastical stories about its contributions to society. Technocratic ideals are as ubiquitous as computing commodities, cultural fabrications that both engender and buttress Big Tech’s power in the world. But beyond the noisy rhetoric on the “revolutionary” power and promise of “magical” technology lay hidden abodes of exploitation. To understand what work this rhetoric does in the world, I analyze it in relation to labor conditions described by my research participants in computing workplaces, classrooms, and labs. In other words, I mind the gaps between what computer scientists say they do for society and their actual impacts. I begin with the ways that computing leaders influence the knowledge workers who create their products and generate profits for them. This assessment requires opening the black box containing the matrix of intersecting structures of power governing labor in computer science education and Big Tech.

Big Tech’s promulgations are no longer dogmatic, and studies on its negative effects on society—for example, exacerbating racist and sexist harms and expanding surveillance, privacy transgressions, wealth disparities, climate degradation, extremist ideology, and labor exploitation—are having

wide uptake (Bender et al. 2021; Noble 2018; Roberts 2019; Hicks 2017; Benjamin 2019; Broussard 2018; Sadowski 2020; O’Neil 2017; D’Ignazio and Klein 2020). Activists, tech workers, and scholars are not only debating the sophisticated mechanisms of these harm but also forming coalitions to resist inequities in data science classrooms and workplaces (Costanza-Chock 2020). Extending earlier scholarship (Adam 1998), these critiques disrupt the ennobling discourse of the benevolent influence of data science in US society. Still, the munificence of computer technology and the speculative belief that computational machinery is a “magic” panacea to social problems are too often assumed.² Worse, sexual harassment in the computing workplace is unrelenting, perpetuated by a culture of “open secrets” and meritocracy that pervade the field (West, Whittaker, and Crawford 2019; Molina and Sussman 2021; Carrigan, Green, and Rahman-Davies 2021).

Technocracy and tech fetishism are two repertoires helpful to understanding the ways people are enchanted to think, act, and feel about computer technology and the opportunities and constraints it (unevenly) offers humanity (cf. Hess 2007). Technocracy is an ideology where technological progress is equated with human advancement (Davis-Floyd 1992). Technocracy is a concept similar to what Meredith Broussard (2018) coined as technochauvinism, in which technology is always the best solution.³ Importantly, to technochauvinists, the adherents of technocracy, there is no alternative to the growth of computer systems. Any problems with technology are assumed to be social, a pollutant that can be purified through a more rigorous logical process—a technical fix—to eliminate it. The virtual is sacred; the material is profane. This reigning ideology is a source of power for the high-tech ruling class, foreclosing opportunities for transparency and public deliberations on and resistance to the incursions of technological forces. Further, the elite workers who look like their Big Tech bosses and help make their riches possible perform their power in US culture with such keen vigor as to deserve recognition. I have named these types of performances the *geek mystique* in order to excavate a subterranean postulate informing the practices and principles of technochauvinism.

The geek mystique is a halo effect around white geeks in hoodies created by the Bro Code, naturalizing their outputs as wholly benevolent and rigorous evidence of unfolding progress, divine and linear, which is always already manifesting a higher good. In this way, computing commodities are produced, circulated, and fetishized. The geek mystique is specific form

of power and authority imbued not just in technological artifacts (Winner 2010) but also in those who created such artifacts. There is a common base note of fundamentalism in these principal logics undergirding the digital economy. This element makes the geek mystique a logical application of scientific rationalism in service of an economy that is oriented around principles aiming to reduce labor costs, externalize the costs of social reproduction to precarious workers, and financialize human behavior and relations. In the Age of Information, leaders believe themselves to be wizards or priests (Ensmenger 2010a). They lean into authoritarianism, prompted to repress complaints and resistance (Sadowski 2020; Bourdieu 2003). The wattage of the geek's halo has been obscuring an amalgamation of race, gender, technology, and economics at play in the making of computer technology. Through my participants' stories evincing the geek mystique, these intersecting structures of power will come into sharper relief, especially in chapter 4.

The second repertoire key to opening the black box of labor in computer science is tech fetishism. The Bro Code relies on not just the imposition of technocracy but also a myth-making process that involves the circulation and promotion of aggrandized narratives. Much like religious belief systems, technocratic dogma is seeded culturally using myths of cosmic scale. "We must incorporate communications, advertising and marketing in our analyses. The production of desire is its own big business—with complex links to culture, subjectivity and power" (Peterson 2003, 77). The hegemony of technocracy is enforced by this fetishism, the mythification surrounding a new form of commodity—the digital commodity—that I articulate from a feminist standpoint. Mythification is an implacable public relations campaign pushing a "grift . . . a presentation of civility that masks a politics of cruelty . . . and bloodthirsty capitalist intentions" (Dubal 2020).

Tech fetishism is a belief system, a force that envelops Big Tech with a mystical sheen that repels scrutiny and accountability, two elements that are crucial to the power it wields in society (Carrigan, Green, and Rahman-Davies 2021).

The tech fetish is predicated on two other long-standing myths. The first is the naturalization of reproductive labor as women's destined capacity for servility. I use the term "reproductive labor" to define labor in the realm of necessity—the work and relationships of social reproduction: attending to sustenance needs like food production, provision, and preparation;

providing care for others' physical, mental, and emotional well-being; maintaining kin and community ties; and reproducing the labor force, both on a day-to-day basis and generationally. This broadly defined definition of reproductive labor demands that we spotlight structures of power that deny people meaningful ways to subsist. Feminist anthropologists have long challenged the validity of the public/private binary and framed the family as an economic unit, thereby connecting reproduction to the economic relations of production (Rosaldo, Lamphere, and Bamberger 1974; Leacock 1981; Rapp 1979; Ginsburg and Rapp 1991; Moore 1988; Sargent and Browner 2005; Sanger 2003; Browner 2001; Bray 2007). Steep barriers to women of color, white women, and nonbinary people participating in computer science constitute both an economic *and* reproductive injustice because occupational segregation and sexual harassment deny people the opportunity to do meaningful work without harm or economic impoverishment.

The second myth at the heart of tech fetishism, one widely circulated in US society, is that it is not only *best* but inevitable to organize economic relations in society so that many are subjugated for the excessive enrichment of a few. If we are to hold computing bosses accountable to society, ethically and democratically, we must regulate them through civic channels, incentivizing them to care about public welfare.

The Age of Information is haunted by the absences of women. Susan Leigh Star encourages us to borrow a methodological tool from Mary Daly—spooking—to ameliorate these kinds of hauntings. Spooking means elucidating that which haunts certain forms of knowledge and culture so one can “spark” and make meaning from how these “absences or silences . . . creatively work together” (Bauchspies and Puig de la Bellacasa 2009, 335; Daly and Caputi 1987). To do this, I dig into three levels of violence that disappear women from full participation in public life. First, there is material violence, which is evident in the uneven distribution of resources. Second is epistemic violence, which excludes women and people of color from a system of knowledge and justifies these exclusions as “natural.” Lastly, our society's dominant belief system is predicated on what anthropologists Faye Ginsburg and Rayna Rapp (1995, 4) call “euphemized violence”—the structures of power that efface the centrality of women to our society and fail to acknowledge the impact of this effacement on the lives of women, families, and communities. I hope these conceptual tools of spooking the

Bro Code and sparking significant connections between its comprising elements will further a collective “spinning,” the creation of new meanings, the weaving of new modes on knowledge of technology and gender (Bauchspies and Puig de la Bellacasa 2009; Daly and Caputi 1987).

FEMINIST ETHNOGRAPHY

Feminist ethnographers spend time in communities to get to know research participants in-depth, and often, we unsettle the boundaries of insider/outsider and self/other in research (Abu-Lughod 1990; Davis and Craven 2016). Feminist ethnography involves putting oneself on the same plane as one’s participants, taking part in and observing informal situations to make the familiar strange (Forsythe and Hess 2001). Finally, feminist ethnography transgresses the false binary between public and private spheres, dissolving preconceived notions that people’s professional and personal lives are separate.

In accordance with these principles, I designed this study cross-sectionally to investigate the personal and professional aspirations of knowledge workers in computing at different points along a life course, including training initiation, labor market participation, and career advancement. This book offers portraits of people at various points of time in a computing career, bypassing the constraints of a longitudinal study, to compare different groups along markers of gender, race, and sexuality in order to understand the Bro Code in computing worksites.

Effective solutions to the entrenched problem of Bro Code culture require intersectionality, a Black feminist approach that forefronts the ways in which structures governing race, sexuality, and gender interweave and relate (Mullings and Schultz 2006; Cho, Crenshaw, and McCall 2013; Crenshaw 1991; Metcalf, Russell, and Hill 2018). The cross-sectional design (described above) buttressed my intersectional analytic strategy, thereby providing data for a systems-level analysis of the Bro Code and its differential effects on high-tech workers (Collins 2015). The analytics of intersectionality are essential to not only challenging inequitable power relations in technoscience but also understanding its multidimensional and far-reaching impacts (Subramaniam et al. 2017).

Because I once was an insider in high-tech and have since stepped out and trained as an anthropologist, I bring to this study both my “insider” experiences in computing and a structural analysis made possible from an

outsider's perspective. Even though I did not persist in the field, my experience witnessing technical knowledge being practiced and performed from *inside* a Big Tech corporation is a perspective that I can offer the study of computer technology. Being a target of gender and sexual harassment in Big Tech elevated my critical capacities in this feminist project and also inspired me to care about the health of those disenfranchised in computer science and engineering. For example, I mapped women's mental, emotional, and physical well-being; paid close attention to signals in my dataset of women's strain and stress; and traced the implications. Unsettling the boundaries of insider/outsider helps me to understand how identity-based harassment in computing workspaces is a public health issue as well as a social, political, epistemic, and economic one.

My career as an anthropologist of science and technology has been motivated by the desire to contribute to efforts to regulate and desegregate computing (Hess 2007). I bring a feminist perspective to the social study of technoscience and a political economic perspective to gender equity theory on representational harms in computing. Finally, as an anthropologist, I bring a fascination with kinship and cosmology and a critical methodological approach forged in the crucible of anthropology's reckoning with colonialism and patriarchy.

During the time of this study, I was a member of the National Science Foundation's ADVANCE community, working to broaden women's participation in academic STEM careers in the US as part of a social and intellectual movement.⁴ This group membership afforded me opportunities to attend conferences around the country hosted by academic and industry organizations and have informal conversations with hundreds of technoscientists about gender, race, and power in the field. I also performed participant observation at these conferences that are organized around the goal of transforming the social barriers that keep technoscience segregated. Of note are the National Center for Women & Information Technology (NCWIT); American Association of University Women; National Science Foundation ADVANCE PI (Principal Investigator) conferences; IEEE Women in Engineering and Google events; Society of Women Engineers; American Society for Engineering Education; Anita Borg Institute; Women in Engineering Pro-Active Network; and dozens of lunches, retreats, and conferences hosted by the center at which I worked for eight years—the University of Washington ADVANCE Center for Institutional Change.

This study also relies on lived experiences as told to me in 43 semi-structured interviews, conducted from 2011 to 2013, with people who work as technical professionals in elite corporations and universities. More than half of these participants had some association with the groups enumerated above, all of which are organized around efforts to broaden participation in US technoscience. Throughout this book, I use pseudonyms to refer to my research participants. My participants were extremely accomplished. When I decided to “study up,” I decided to really go for it. Most of my academic participants were either trained in or working for computer science departments that *US News and World Report* deems the “most competitive” in the US, like the Massachusetts Institute of Technology, the University of Wisconsin at Madison, Carnegie Mellon, the University of Washington, Stanford, and the Georgia Institute of Technology, to name a few. My non-academic industry participants work for companies that most Americans recognize and solicit services from, including Intel, Microsoft, Amazon .com, Hewlett-Packard, Google, Adobe, Cisco, and Facebook. My sampling strategy is in no way aimed at reproducing the elitism that these institutions represent. Rather, I seek to critically examine the prestige and influence of these high-tech institutions:

The “high-IT core” workforce includes computer programmers, computer scientists, computer engineers and systems analysts whose jobs are directly involved in the study, design, development, implementation, support or management of computer-based information systems, particularly software applications and computer hardware. (Tam and Bassett, as cited in Bystydzienski and Bird 2006, 108)

When I use the terms computer science and engineering, computing, and “high-tech,” I am referring to these types of jobs. The high-tech workforce has seen the greatest increases in employment and wages of any occupation. When I use the term “Big Tech,” I am referring the aforementioned companies that employ technologists in high-tech jobs to create software applications, algorithmic architecture, and computer hardware.

I also recruited participants from my social networks in the tech industry in Seattle and performed participant observation in computing classrooms, workplaces, and technology conferences. I oversampled women—93 percent of participants identified as either cis- or transgender women. I interviewed four African Americans, four Latinas, six Asian Americans, five foreign nationals from three continents, 22 white Americans, and two participants whose racial/ethnic identities I could not confirm. Four participants were

out members of the LGBTQIA community. I chose this sampling strategy in order to solicit insights into computing technology from people who must navigate both privilege and marginalization to persist in their field of choice. These “outside within” standpoints (Collins 2004) give my participants a dual consciousness within computing classrooms and workplaces that generates a unique perspective on social arrangements, one that a dominant group member or entirely dispossessed member of society could not perceive.

On the one hand, inquiry into the working conditions and lived experiences of these highly educated and very privileged women can provide insights into the institutions that shape the structures of power governing gender, race, and technology in the US and how particular kinds of laborers are reproduced in a range of elite sites. On the other hand, focusing on elite workers may limit the imaginative possibilities of transforming computing technology because participants are embedded in structures erected to maintain status quo relations of power. My participants bear the responsibility of building the infrastructure of globalized capital, and while they do not always critique power asymmetries in this economic system, they signal to the rest of us the importance of the ruptures that technologists experience between the constraints of their positions and the contributions they want to make. Understanding *why* and *how* they are thwarted in using their expert technical skills for the public good can tell us much about human society and its prevailing structures of meaning and power.

The technologists who shared their stories with me are sharp-witted and dynamic. In general, they were quick to respond, not afraid to challenge me, and had strong opinions. I am grateful to have heard these stories. To open up about one’s accomplishments, one’s fears and failures, one’s life course, and the web of relations that keep us alive and sometimes even allow us to thrive—this is intimacy. This intimacy allowed me to know my participants and share their stories with reverence and respect. Participants also had many interests outside of their jobs. I spoke with a marathon runner, a trapeze artist, a pilot, a sculptor, high-performing athletes, two poets, and two race car drivers.

Keeping in mind the disparity in social power between high-tech managers and technical workers, I am careful in this research to categorize my participants as “laborers.” Technical intelligence and skill give high-tech workers a unique viewpoint into the cyber-optic infrastructure of

institutions of power in the US. Therefore, one of the contributions of this book is to show how high-tech workers can be powerful allies to both the dominant class and those who challenge dominant class rule. When a marginalized member of computing offers her intellectual labor to workers' movements to challenge technologic conditions of profit and social control, it has the potential to bring about social changes. What kind of social change can happen? Possible answers to this question emerge in my participants' stories, which help explain the significant contradiction between the social power of computing and the social constraints of this "highly rational" field organized along industrial lines.

TECHNOSCIENCE ON THE CRITICAL EDGE OF CARE

Feminist anthropologists have created groundbreaking scholarship on the intersection between technology and the social dynamics of gender, race, and sexuality (Rapp 1999; Chapman 2003; Ginsburg and Rapp 1995; Martin 1992; Ginsburg 1998; Davis-Floyd 1992; Schepher-Hughes and Lock 1987; Jain 2007; Forsythe and Hess 2001). Because outdated norms and ideologies are shaping the social dynamics of how computers in the US get made, I followed in the footsteps of these trailblazers and placed reproduction at the center of my analysis of computing. I found a story as ancient as Father Time, a bifurcated culture with hierarchies of value. In fortresses guarded by police academy trainees moonlighting as guards in golf shirts, computing culture equates the realm of freedom with the virtual and mechanical. Of course, much like its economic equivalent, neoliberalism—the "free" market—this realm of freedom is only accessible to an elite group while the rest of us encounter surveilled borders. The virtual and the computational machine are rarefied elements more valuable than the material and social aspects of human life, and these values are powered by politics of race and gender that reflect US culture more broadly.

Making reproduction central in anthropological inquiries is an approach that also augments the analytical frameworks in feminist science and technology studies (STS), including "matters of care" (Puig de la Bellacasa 2011; Martin, Myers, and Viseu 2015). Matters of care invite action in knowledge politics. For example, a close examination of the historical and cultural roots of positivism and how this epistemic dimension of scientific values influences who gets to do science (Franklin 1995; Traweek 1988; Bauer 1990;

Rosner 2018a) is, for me, a matter of care. In feminist STS, care is a conceptual resource, a mode of attention with which to explore sociotechnical assemblages. It is not necessarily motivated by a nurturing affect. Care can also be a commitment toward action in the face of injustice or harm (Puig de la Bellacasa 2011; Viseu 2015; Martin, Myers, and Viseu 2015). In essence, sanctifying labor relations in computing as a matter of care seeks to correct undervalued labor and uncover the myths, exclusions, and deletions propagated by the Bro Code and its pernicious effects. Ironically, approaching science as a matter of care is *not* a feminine-coded activity in US culture and thus not rewarded like such activities. Care in the study of science sometimes comes at the cost of being labeled as aggressive, corrosive, unrigorously reflexive, and my favorite, oversensitive (a charge made at me more times than I can count when I interrupted bias and discrimination at Colossus).

This book addresses both dimensions of care: [1] “that which we, as STS scholars, teachers and feminists enact *in our relations with* the worlds we study, and [2] that which *circulates among the actors* in the technoscientific worlds we encounter throughout our studies” (Martin, Myers, and Viseu 2015, 626, *original emphasis*). The first dimension is motivation for this study, reflecting my care for the well-being of people underrepresented in computer science and engineering and to do no harm in this study. My research participants “gaze back,” and I am accountable to them (Harding 2004). The second dimension of matters of care prompts me to investigate both representational harm and allocation harm in technoscience (Barocas et al. 2017). In this way, I am “studying up” (Gusterson 1997; Nader 1972)—that is, studying people who work in a highly prestigious field, one with much power in a US culture, and holding up to scrutiny its social inputs and outputs.

My citation politics in this book are also a matter of care. Technocracy dictates that all computer science and engineering advances are not only divine but also improvements on their predecessors. In this positivistic way of thinking, progress is always linear. Those of us who study scientists can sometimes reproduce its allegiance to positivism, and this is reflected in a citation politics that privileges recent scholarship. These politics remind me of a design principle in technoscience—planned obsolescence—a key element of information and communication infrastructure whereby upgrades render earlier ideas and products useless or meaningless. The theories that

I rely on are often historically groundbreaking and originate with early adopters of a critical approach to computer technology. I seek to (1) honor the voices of those who are (or have been) marginalized in computing and (2) cite interdisciplinary scholarship from the past five decades. Women helped found the field of computing and have been erased from its celebrated lore (D'Ignazio and Klein 2020; Abbate 1999; 2012; Hicks 2017; Ensmenger 2010b). I refuse to reproduce the violence of erasing pioneers in computing and early adopters of tech critique and thus aim to be in conversation with both my peers and our predecessors.

CHAPTER MAP

In the chapters to follow, I explicate the cultural instructions assembling the Bro Code. The narratives that my participants shared with me traverse a wide terrain, from intimate portraits of moments of self-reckoning to bird's-eye views of interconnected systems of power. They suggest the possibilities of both grassroots and regulatory interventions for subverting dominant class rule in computing. In addition to recounting personal strategies of career persistence, I strive to capture the broader social dynamics that women must navigate in several formative stages of a computing career. I document the norms and values of three dimensions of technical knowledge and labor: (1) personal attributes, relationships, experiences, and emotions; (2) internal dimensions of computing; and (3) broader cultural domains.

Chapter 2 asks, "Why Care about Sexism in STEM?" Here, I canvas extant theories on mechanisms that enforce exclusion in technoscience. To do so, I weave together three bodies of literature—equity in STEM, feminist STS, and scholarship on sexual harassment—to explain barriers and constraints to women's full participation in powerful and influential technical fields and what changes we need to demand in order to desegregate computer science and engineering. I argue that sexual harassment is a significant reason why computing remains stubbornly segregated. Its enactment and tolerance are predicated on assumptions about who is a competent knowledge producer and who is not, and whose bounds of privacy and autonomy are respected and whose are transgressed. These assumptions are generated in a social matrix of structures of power and disempowerment along vectors of race, gender, and sexuality. I frame bias and sexual harassment as a matter of care

(Puig de la Bellacasa 2011) in order to undertake an analysis that will verify and fortify a theory on harassment in computing that “can be applied to innovating policy and practice” (Bowleg 2019, 418) and foster greater collegiality in technoscience. Selective incivility must end if we ever hope to transform computer technology into an egalitarian force that serves democratic ideals and social justice.

In chapter 3, “Contradictions of Care: Altruistic Aspirations and Reproductive Politics in Computing,” I reorient occupational segregation in high-tech as a reproductive justice issue. This lens brings into focus two significant problems that may explain why the field of computing lags behind other technical fields in terms of workplace civility and representational justice. First, women of color and other disenfranchised technologists in this study claim that their collective reproductive aspirations—their altruism to make the world a better place—are being thwarted. Second, gender stereotypes constrain women’s talents to feminine-coded caring services, which not only block pathways to leadership but also distract attention from the larger problems, like a culture of overwork and computing bosses’ failures to significantly manifest their promises to serve the social good. I argue that these contradictions of care between the public welfare aspirations of some technologists and their bosses are a promising site for collective action to transform reproductive politics and tech and, potentially, US society more broadly.

In chapter 4, “Technically, ‘You’re Different, and Different Isn’t Free,’” I walk through different organizational norms and disciplinary values that privilege male hegemony, as depicted through the stories of women who, both individually and collectively, navigate technical terrains of epistemic violence and gender harassment. I further explore geek mystique, a compulsory set of practices, norms, and identities in computing that reflect the new power held by computer scientists and engineers in US culture and the institutions in which they work. I analyze how it operates both symbolically and culturally as a rite of passage (Davis-Floyd 1992), which includes hazing in interviews, bragging, bullying, and eschewing social activities and socially relevant research. These rituals also serve to indoctrinate technical workers to the core values in computing knowledge production, including constant observation, combative work styles, and male hegemony. These rituals promote and fortify an exclusive brotherhood. How women navigate high-tech fields, marked and constrained by difference, and evaluate

their experiences of being in the minority can inform strategies that eradicate the barriers excluding them from these powerful, lucrative positions. From the stories of my participants, I excavate the standpoint of dominant group members, revealing how sexual harassment and its tolerance reveal the fragility of the Bro Code and masculinity of its adherents.

Chapter 5, “Women Making Culture: Profiles of Persistence in Computing,” features excerpts from my life history interviews and the lived experiences of those who persist in computing. These are workers on the front lines in the fight to desegregate this powerful workforce. I pay particular attention not only to women’s vulnerabilities and resiliencies but also to their skills, passions, and aspirations. I share life histories to painstakingly document how research participants navigate through their career and reproductive trajectories and negotiate the social dynamics within cultures of computing across multiple levels of power. I connect altruism, computing, race, and gender to advance the theory that social purpose is an important factor to consider in working toward gender equity in computing. I explore powerful themes that emerged from my data regarding emotions, sponsorship, yearning for collective action, social aspirations, and intrinsic resources that offer insights into the potential of transforming the use of computing skills and technologies to advance social justice.

In chapter 6, “Transforming the Computing Workforce and the Social Architecture of Its Labor Value,” which forms the book’s conclusion, I stress the need to further organize around the issue of labor and gender harassment to disrupt the Bro Code. Based on participants’ testimonies and the demonstrable success of collective action by Big Tech workers, I make the case that my participants’ yearning for social justice could ignite a feminist consciousness in technical workers, which can lead to collective action in pursuit not only of equality in technical workspaces but also in broader cultural domains. I stress how public welfare aspirations are a form of reproductive politics critical to collective leadership that demands and enacts institutional change in high-tech. Centering reproduction engenders *Cracking the Bro Code* as a political economic critique, connecting sexism within the field to power relations in the digital economy. In this way, the book makes suggestions for interventions that blend feminist critiques of computing with political and economic ones, positioning the social movement for equity in the computing field to fruitfully align with other organized movements for justice.

CONCLUSION

The narratives of technical workers marginalized in cultures of computing knowledge production help us to analyze the co-construction of class, gender, race, and technology and the effects of living in a world mediated by ubiquitous technology created by an elite few. These elite operate according to the Bro Code, a white male hegemonic culture that draws its power from an amalgamation of structures of powers, including those governing gender, race, state, religion, and economics. I place the newly powerful geek and his imperial domains at the center of a critique of segregation in the US workforce. In the chapters ahead, I describe significant patterns in the trials that some women have endured in computing within the context of navigating inequitable structures of power pertaining to technology, gender, and labor value. Attracting and retaining women in computing is critical to ensuring a fair and just society—one in which women of all classes and races have the opportunity to influence the design and application of technology and use it toward ends that benefit many. However, it is not only insufficient but irresponsible to champion women's participation in the US computing labor force without studying the ways that high-tech corporations reproduce inequitable relations of power in their workplaces and, by extension, their domains of influence.

My central critique is focused on gender politics within the organizations of high-tech, which I use as a fulcrum from which to leverage a broader socioeconomic critique. I claim that Big Tech can be dangerous for women scientists and engineers, especially women of color, but also for broader populations of the globe, in terms of surveillance, erosion of civil rights, hoarding of wealth and opportunities, exploitation, and amplification of capital and its power. The Bro Code is a critical apparatus in divorcing the US from social realities and promoting the cultural acceptance of neoliberal austerity measures that shift the burden of social reproduction from the state to individual households, which differentially affects women. Set apart from the profanity of materiality of life and those assigned to care for this aspect of being human, the Bro Code, in its sanctity, sets its own rules and makes up its own myths that mask corporate activism as public welfare. I interrogate Big Tech's values within broader social priorities and practices governing not only computing but also modes of reproduction and economic labor relations. This book is a contribution to social

movements reckoning with the costs of high-tech effects on human health, social relations, and state and global politics. I hope that by beginning with how the Bro Code operates within computer science and engineering work-sites, this book can support current and future efforts to debunk Big Tech's mythologies, combat its harmful practices, and uncrown its most favored beneficiaries.

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