

### 3 CONTRADICTIONS OF CARE: ALTRUISTIC ASPIRATIONS AND REPRODUCTIVE POLITICS IN COMPUTING

Talented girls and women are wondering: What are the social contributions of computer science and engineering? Some conclude it is a field detached from communal and civil engagement and lacking moral purpose. This can lead these high performers to choose to invest their talent in other fields. In other words, computing's contribution to humans and society is not clear, despite the fortune that computing bosses have spent promoting a myth that computers are a critical means "to renew participatory democracy" (Dean 2009, 36). Worse, the workplace culture in the technological fields often contradicts the munificent claims from Big Tech leaders that computers and algorithmic systems are best positioned to solve the world's most complex social ills. How can this claim be credible when computing departments and workplaces fail, year after year, to solve the participation and harassment problems in their own backyards?

In this chapter, I argue four points. First, fixating on *possible* benefits that computing bosses may offer society perpetuates a fantasy that distracts from the harms caused to women of color and other historically disenfranchised scientists in the computing workforce. Second, these harms are penalties meted out by dominant groups as payment for daring to transgress labor norms in the neoliberal economy, a market dependent on stereotypes and a scientific worldview that hews to Cartesian schisms between mind and body, the social and the technical. Third, this technocratic fantasy merges with positivist fervor in a moment of soaring inequities to produce a discrete form of patriarchy that, much like its antecedents, nonetheless relies on vast volumes of exploited, unremunerated labor. Finally, the way

to untangle this knot of synergistic structures of domination is by paying attention to the altruism of my participants.

We know that altruistic aspirations play a role in the underrepresentation of women in computing (Carlone and Johnson 2007; Diekman et al. 2010; Cuny and Aspray 2001; Margolis, Fisher, and Miller 2000; Carrigan 2017). Many nonbinary and women tech workers who persist in these careers yearn to use their technical skills in service of social change in their workplaces, communities, and the world at large. In this chapter, I reimagine segregation and sexism in high-tech as a reproductive justice issue. I argue that nonbinary and women tech workers, regardless of race, sexuality, or parenthood status, must grapple with three intersecting phenomena: a culture of overwork; preconceived notions of gender that permeate computing culture; and finally, a contradiction of care between their own values and aspirations and those of their bosses. Big Tech talks a big game about its socially revolutionary impact, but my participants felt thwarted when trying to use their technical skills to serve others.

This contradiction of care between the public welfare aspirations of some technologists and their bosses is a promising site for collective action in Big Tech. I frame the oppositional consciousness of historically disenfranchised technologists as a contradiction of care, whereby some workers who yearn to contribute to the reproduction of society's collective well-being—to *further the public welfare*—confront Big Tech's bottom line objectives. This contradiction of care in computing workspaces takes place in the larger context of digital capitalism, which demands the individuation of workers and the privatization of social systems of support—the *infrastructures of public welfare*—so that people are expected to provide for themselves and any dependents via the patriarchal family (Brown 2019). Not only does Big Tech fail to live up to its widely publicized altruism, but it tries to conceal its social harms (Nafus 2018; Benjamin 2019; Noble 2018; Carrigan, Green, and Rahman-Davies 2021). These transgressions account not only for why the field of computing remains segregated, but they also reveal how the field contributes to right-wing economic politics that disenfranchises and impoverishes communities of color and women who are economically independent.

Mediating these contradictions of care can catalyze an oppositional consciousness that could transform individual tech workers into resistant and

collective subjects (Hartsock 1998; Sandoval 2000). To do so, I propose that we take seriously the public welfare aspirations of technologists who are historically disenfranchised from high-tech and organize around them in order to hold computing merchants accountable to the public. Antiquated gender stereotypes in tech workspaces are a symptom of neoliberal politics driving computing corporations and orchestrating the redistribution of wealth upward, consolidating it into fewer hands and constraining access to networks of computing architecture to an elite few from majority groups. To understand how these forces operate at a global scale, we must first understand the particulars of the contradictions of care and reproductive politics in the workspaces of computer science and engineering. This demand for reproductive justice in digital capitalism needs amplification if workers worldwide hope to galvanize the political force needed to level the economic playing field and redistribute the fruits of the Age of Information more fairly.

#### YEARNING TO GIVE BACK

What is the benefit of all this? There's *no social impact*. I'm just helping to make [the corporation] money. Helping the customer is not enough, because it's all about the bottom line—only [the corporation] benefits. . . . I believe in the importance of giving back. It's a huge part of my story.

Olivia, an African American mid-career professional, left her job as a software engineer at a renowned Fortune 50 tech company because she “yearned to give back.” This painful contradiction of care was a significant theme in many of my participants’ stories. Olivia questioned how she was benefiting society and if the computing commodities she helped create were even benefiting customers. Because Olivia yearned to make social contributions but did not have the opportunity to do so as a software engineer in industry, she returned to university to earn a doctorate in human computer interaction (HCI), a subfield in computer science and engineering that integrates the social and technical aspects of computing. By switching from software engineering to HCI, Olivia persisted in the computing field while reconciling her work with her “altruistic identity,” which Heidi Carlone and Angela Johnson (2007, 1199) define as women of color who use “science in direct service of humanity.” Science in service of others is a form of collective care, a way to give back to others and find meaning in one’s work.

Some people in this study felt frustrated in their attempts to combine their computer science identity with an altruistic identity because the field lacks a reputation for altruism. For example, Lynn, a white software developer at a high-tech corporation, said she is anxious that her occupation is not recognized as one that contributes to the social good.

LYNN: In the field of medicine you can say, “I’m working on a cure for cancer,” or “I’m helping people,” and people might not know the details, they might not know the science behind it, but they understand the goal.

COLEEN: Right, right. Which is . . . ?

LYNN: Some kind of social good, or leaving the world a better place . . .

Perhaps this desire for one’s social contribution to be recognized is why a significant number of participants in this study saw the biomedical field as a viable avenue by which to contribute to the social good. Biomedicine in the US has “evolved out of tradition of service to suffering humanity” (Loustau-nau and Sobo 1997, 126) and thus may be at an advantage for attracting people who yearn to use their skills in service of the higher good. For example, Sylvia, an African American doctoral student, wants to use computer technology to enhance public health infrastructures. She explains:

Because that’s kind of just who I am. But it’s also my mentor. She always talked about [how] “you really need to do something that would affect everyone; you don’t want to just . . . write it in a paper and then nothing happens. . . . You need to apply it, and you need to be helpful.” That’s why I’ve been working with the public health department.

Sylvia not only aspires to enhance public welfare; she also had the encouragement from a trusted female mentor who overcame the challenges of the “double bind” (Malcom 1976; Ong et al. 2011) to do the same. Sylvia’s mentor gave heartfelt advice to apply her technical skills to a collective endeavor serving public welfare, perhaps as a means of investing in her student’s persistence and success in computing (National Academies 2022; Carlone and Johnson 2007). Regina, a doctoral student from Taiwan, explained: “I want to go into biotech because I’m really interested in biology, so if I do a start-up, I think it will be related to nutrition. . . . I really like to see what people eat, how it changes their system, and how that turns into diseases.” Becca, a white doctoral student, also wanted a technical career in health: “What I want to do is accessible health stuff. I feel like the technology there has more potential with people who are blind and low

vision. . . . I want to be enabling people who have an impairment to have easier access to health.”

#### CONTRADICTION OF CARE AND THE GLAMOUR OF THE SOCIAL GOOD

Becca’s and Regina’s altruistic aspirations are admirable, but will they be able to find such fulfillment? Paying attention to contradictions of care along fault lines of altruism highlighted a gap between the noblesse oblige touted by Big Tech bosses and how participants in this study described their work and outputs. One pattern I noticed was that when computing bosses exalted the social benefit of their commodities, all too often, they were referring to its *potential* social benefit, with no mention of risks or societal side effects. While aspiring to contribute to the well-being of society is indeed a lofty goal, computing leaders deliver promises instead of evidence that they serve the social good. In this section, I focus on current working conditions in computing—not digital merchants’ best intentions dressed up by world-class flacks. I offer evidence as to why we should be skeptical of Big Tech’s glamour of altruism and its claim that its leaders are destined to lead humanity forward.

For example, Microsoft Research produces an expensive booklet (some of its pages are three-dimensional) to advertise to computer science and engineering faculty the social benefits of the work they do: “We collaborate with leading researchers in medicine, education and earth and environmental sciences to transform society for the better through technology” (Mundie and Hey 2011, 3). The booklet is a promotional tool to convince professors that Microsoft Research’s investigations have the potential to be useful for both “commodity computing and . . . the creation of knowledge services that are relevant to the research community” (17). For example, sensor nodes in the Amazon “could help scientists develop better solutions to climate issues” (21); biosensors embedded in contact lenses “could help monitor glucose levels in diabetic patients” (39); and “robots can be used to explore areas too dangerous or difficult for human teams to search” (41).

While it may be true that some computing commodities like those featured in Microsoft Research’s PR packet have potential benefits to humans and society, the most profitable uses for these technologies take priority. Lynn, a white early-career software engineer, told me that she and one of her professors built an application for an eye-tracking device intended to

help people with disabilities, but the application was eventually developed for marketing purposes in order “to track where people look on the screen for retrospective [marketing] analysis.” Her collaboration with this professor was a success, and she was pleased that they published their findings. However, Lynn reflected that her colleagues seemed to like the idea or the *potential* of applications for people with disabilities much more than the actual implementation of such applications:

I wanted to do something for people with disabilities, and I felt like I got all this positive experience in academia for it, and my perception of industry was [that it was] not going to care so much; it's not going to be a priority to serve people with disabilities, because it's expensive and probably not on their priority list. So then I went into academia, and I realized people in academia also don't care about the disabled as much as I might have thought. They liked the drawing program with the eyes because it was exciting and sexy, but when you start talking about, like, practical accessibility issues, people kind of turn off.

Shawna, a white, early-career transgender woman, had an experience similar to Lynn's, except her colleagues were more than indifferent—they were hostile. Shawna teamed up with an HCI professor to create applications for disabled computer users. In this collaboration, she not only faced resistance from her theory/algorithms adviser, but she also faced resistance from her peers:

SHAWNA: The lab itself was always a bit boisterous. . . . They just really were pushing the technology and focusing more on the computer part, as opposed to the human part. And I felt that whenever I brought up the human issues that they were ignored, mainly. In fact, I earned the moniker, “Accessibility Bitch.”

COLEEN: Oh, my God! That is so offensive.

SHAWNA: Yeah, actually, I took it as a compliment.

COLEEN: Really, even with the “B” word?

SHAWNA: Hey, I subscribe to the magazine.

Shawna's and Lynn's views from inside the computing workplace invite skepticism about the viability of computing commodities' service to humanity. If these altruistic efforts and the people leading them are maligned and discredited in the workplace culture, how will such aspirations actually come to pass?

These contradictions of care—between the *potential* of computers to serve humanity and the actual work being performed in computing work-sites today—need to be reconciled in order to crack the Bro Code. The speculative promise of computer commodities’ advancement of the social good does not stand up under scrutiny. Such promises cannot be kept under the current labor conditions in which computers are designed. For example, Microsoft Research recognizes its high performers with prestigious technical recognition awards. They claim that these awards recognize “*work that changes our world for the better*” (Microsoft 2013, A9). In 2013, an all-male, majority white Kinect skeletal tracking team received this widely publicized award for developing video game technology that tracks players’ movements. How exactly do video games that track players’ movements change the world? Apparently, by shifting the “paradigm for the entertainment industry . . . and selling 18 million units” that year (Microsoft 2013, A9). Microsoft continues to leverage this technology to read gamers’ body language as they consume advertisement messages in order to promote more personalized choices for their consumptive habits. I am sure the company’s stockholders are proud, but boosting sales for video games hardly qualifies as a service for humanity.

Google also uses fanciful rhetoric that connotes service and magnanimousness to promote its products. For example, at a Google I/O conference in 2014, a singular message thrummed throughout the three-day event: *ubiquitous computing will solve the problem of “disconnection.”* The company said it will unify consumers’ work and personal lives. David, a white male director of engineering, framed the company’s wearable products as “revolutionary,” their tracking of their wearers’ behaviors and vitals as a “contextual stream,” vowing to achieve the “seamless integration of users’ personal and digital lives in an intrinsically human, delightful way.” Much like Microsoft’s award fanfare, Google’s performance of altruism is misleading. The computer merchant is hawking data collection tools of human behavior that drive the corporation’s operations and on which its profits depend (Zuboff 2019; Carrigan, Green, and Rahman-Davies 2021).

The gossamer-thin guise of “doing good” crafted by Big Tech’s marketing teams works to blur the potential benefits of ubiquitous tech with evidence of impact. This wide gap between computing’s promise and its actual impact on humans and society is driving the contradictions of care in

computing workspaces. Instead of fixating on *possible* benefits to humanity that computing commodities might offer in the future, the present is at stake, fraught with actual detriments to society. Women of color and other disenfranchised members of the field who yearn to combine their technical identities with their altruistic ones and create meaningful impacts with computers can illuminate what needs attention in the here and now—actions key to cracking the Bro Code.

## REPRODUCTION RENDERED INVISIBLE

Big Tech is not only failing to meet the collective reproductive aspirations of its workers. It is also failing to support the work necessary for its workers to care for themselves, their families, and their communities. The field's conservative reproductive politics are more evidence that computer technology is not amply meeting human needs. In this section, I pivot from the politics of reproduction regarding public welfare in computing to examine the contradiction of care in terms of reproductive labor, subsistence work that reproduces the labor force, both on a day-to-day basis and generationally.

Jobs within computing organizations are extremely time-consuming and designed for workers with little to no reproductive responsibilities. It is a framework that assumes a particular gendered organization of social reproduction (Valian 1999; Williams 2000; Acker 1990). This framework, based on sexism rather than any biological imperative of women and men, governs organizational behaviors and role assignments in prestigious fields (Acker 2000). This cultural process is further exacerbated by broader heterosexist codes that assign women primary responsibility for labor in the home and helps explain the persistent gender gap in computing fields (Watt and Eccles 2008; Xie and Shauman 2003; Valian 1999; Schiebinger 1999).

It's no secret that long hours are required in computer science institutions. Carla, a white senior leader in industry, joked that in her spare time she likes to overwork. Pei, an Asian American senior leader, confirmed Carla's sentiment: "The work is endless. I work even on my days off." My study's participants did not frame the work-life binary as a balancing act but instead challenge us to reframe reproductive labor in terms of compromises and trade-offs. This lens makes space in the work/life debate for inquiry into the politics governing reproduction, work, and leisure time in



the US. Furthermore, challenging these politics has the potential for broad-based coalition-building. Kelly, a white senior technical fellow in the corporate sector, admits to working a hundred hours a week for many years:

I have no personal life. I am not an example of work-life balance. . . . You can't have it all. Women wreck their lives trying to be superwoman. I never wanted kids, never felt like I needed a husband to be complete. Over the years, I've seen that women who want family life must carry the burden of this cultural baggage.

Valerie, a foreign national from Russia and information technology (IT) leader who has worked on Wall Street for over 25 years, never wanted to work in a female-dominated job and never wanted to have kids. She compared high-tech work to doctors' long hours: "But at least doctors have shifts; in the tech world, you have no life. You are like a dog on a leash. The only people here with kids are men with wives. How do women in IT with kids do it?" She said many more women worked in computing in Russia when she was in her early-career stage, and the culture was collegial and less punishing than US computing culture. She attributed the culture of overwork to the overrepresentation of men in US computing.

To extend Valerie's question, how do high-tech companies account for the social reproduction of their laborers and their future workforce? The common stereotype of the individual computer scientist is someone who, in essence, eschews normal habits of social reproduction: bathing, eating well, and kinship. I call this cultural trope the *geek mystique*, and part of its beguiling heroism lies in the power to refuse the culturally devalued labors of care. This geek stereotype is also reflected in computing institutionally. Its culture of overwork signals the lack of regard that computing corporations and academic institutions have toward modes of reproduction in our society. Given the great influence computer technology has on our society, the effacement of social reproduction reflects and reproduces labor value within the US more broadly.

Kelly's and Valerie's experiences as senior computing professionals and child-free women bring attention to a critical failing of computing institutions—the diametrical opposition of social reproduction and technical production and the associated cost for both women and men in the high-tech sector, including the gig economy (Sharma 2018). Kelly's use of the phrase "the burden of this cultural baggage" is a negative reference to women's primary responsibilities for social and biological reproduction.

Valerie's description of the culture of overwork is no less grim and brings to mind David Floyd's (1992, 46–47) argument that technology entails a low valuation of women and care work because it is “embedded in and created out of society's dominant belief systems.” Other scholars support this claim, documenting how computing reproduces structural racism and sexism (Noble 2018; Roberts 2019; Benjamin 2019; Hicks 2017). Adding the politics of reproductive labor to this conversation may help reorient conversations of labor exploitation in computing so that its workplace culture might be transformed to care for “the social and how the social is reproduced through care” (Sharma 2018).

### SEGREGATION AS REPRODUCTIVE INJUSTICE

When technical women talk about gender in the context of work and gather together as women, they often talk about reproductive politics. The time- and energy-consuming unwaged labor to reproduce the labor force—or what Kelly, the white senior fellow in industry quoted above, called “the burden of cultural baggage”—is a site of struggle. Through a lens of reproduction, the cultural mechanisms that tolerate and support patriarchal politics in computing become clearer. In this section, I demonstrate how the means of reproduction influence participants' decisions and experiences in computing culture.

### LEFT BEHIND AND INTEGRATED

In addition to the culture of overwork, computing bosses are famous for designing their commodities in terms of planned obsolescence, which can differentially affect mothers in computing. For example, Pei, the Asian American senior leader quoted earlier in this chapter, notes, “If you are in high-tech, you have to constantly learn new technologies. For example, an operating system can be obsolete in five years; a language is replaced by another in maybe seven years. It takes a lot of study time, which is challenging for a woman who has young kids.” Illuminating the reproductive domains of planned obsolescence, Pei shows us how it operates to favor the young male worker who is well steeped in the latest technologies and systems organization (Cooley and Cooley 1980). Rajasree, a full professor with a large lab, put it more bluntly: “Motherhood means you are left behind.”

For consumers, it is hard to keep up with every upgrade to your software products and the cost of machines that have a life span of a few years and a far shorter cultural value. From a labor perspective, it is an intensification of a computer scientist's work. In addition to the long hours and the requirement to always be improving, upgrading, or rendered obsolete, computing workers are, in many ways, virtually tethered to their workplace. Many participants remarked that a large part of the struggle around reproduction in high-tech centers on the increased workload by virtue of always being connected. Tony, a white male senior leader, claimed that he tried not to work on weekends. I asked, "What about email?" He replied wryly, "Well, that doesn't count." Despite Google's promise that the seamless integration of our personal and professional lives through digital commodities is revolutionary and delightful, always being accessible to your boss is a drag for anyone, regardless of gender. Heterosexual, cisgender men however, are rewarded culturally for being a breadwinner in ways that women are not. Often, they are sailing up the ranks with a "flow of family work" at their backs (Williams 2000, 5). Thus they are better positioned to withstand an intense culture of overwork and endless accessibility. Women who enter male-dominated computing fields must withstand intense expectations at work *and* social penalties for transgressing patriarchal role allocations in the labor force. Women of color are also targeted by a combination of racism and sexism and the consequences of being highly visible, which amplifies the harms of inhospitable workplace cultures.

#### THE LARRY SUMMERS HYPOTHESIS

One such social penalty (described extensively in chapter 2) is the Larry Summers Hypothesis. The viciously persistent myth that women are genetically designed to be bad at math and exceptional at wiping noses and cleaning toilets is so ingrained in the collective imagination of American society that even women who have overcome barriers to participating in computing have internalized this ideology that is critical to perpetuating occupational segregation in the US workforce. After I gave a talk on my research to a group of female electrical and computer science engineers, Kathy, a white mid-career professional at a Fortune 50 social media corporation, approached me to discuss the dearth of women at her company.

After describing her experience as the only woman on her team in a company where only five out of 800 managers were women, Kathy asked me, “But isn’t it true that men’s and women’s brains work differently?” I asked her to explain what she meant, and she said, “Isn’t there research that supports men are more logical and women more emotional and social?” Even though women have all but closed the math achievement gap, the stereotype that women are not good at abstract reasoning still persists (Barres 2006). In fact, when I told Karen, a white woman with an advanced degree, that studies on the math achievement gap showed that there was no such gap, she was skeptical.<sup>1</sup>

The Larry Summers Hypothesis is painful to women. Anita, a mid-career woman of color in computer engineering, shared her feelings about having her advanced spatial abilities dismissed because of her gender: “I hate being told that the people that scored at the very, very high end of the mathematics tests are almost all men. Well, it’s like, ‘Excuse me, I scored at the top end, too.’ That hurts me.”

Anita’s emotions illuminate how the Larry Summers Hypothesis is a form of gender violence that makes advanced skills in mathematics incommensurable with women. Ideologies of science and gender are constructed to reinforce one another and exclude any threats to the feminine/masculine binary. For example, Tara, a white early-career professor, recalls:

I was talking about applying to grad school with a faculty member . . . and he said, “Well, what are some of the things you’re looking at [in graduate programs]?” I said, “Well, one of the things is how many women there are in the program.” He said, “Oh, so how are we doing here?” I said, “We’re doing really well at this school; we’re almost at 30 percent.” And one of the students popped up from the back of the room saying, “We must be making it *too easy*, then.” And the professor just lets it stand.

The male student saw women’s participation in computer education as a decrease in the rigor and quality of the department’s pedagogy. The male professor failed to disabuse the male student of his prejudice targeting another student. The male student’s logic also illuminates a structural level of violence at work here, one that strives to purge computing of undesirable elements, which, in this instance, correlates with femaleness. This is evidence that men pursuing computing careers benefit from a presumed competence that gives them unearned respect and an advantage in the world of computing, while women do not. When viewed through a multilayered

framework of violence, these stories also illuminate the tightly woven ideological strands that uphold cultural assumptions regarding masculinity, scientific competency, and disciplinary prestige.

### DOUBLE STANDARD

Put simply, women and nonbinary technologists are treated differently as cognitive laborers than their cisgender male peers. As Anita's experience with the Larry Summers Hypothesis shows, sexist ideology claims that men are better at math, ipso facto, they are entitled to dominate the ranks of computing and thus empowered to decide the future of humanity in homosocial congress. Tara again reflects on her experiences of bias in graduate school: "I wouldn't say that anybody went out and did anything on purpose—right? But certainly, there were things that I think happened that would not have happened had I been a guy." Tara uses the logic of unexamined bias theory, which stress that microaggressions can be perpetrated without perpetrators being aware of their actions. Reflecting on another level of sexism in her field, Carol, a white senior software engineer working in industry, shared one of her mentor's experiences:

She was way older than me, and as far as I was concerned the system had eaten her up and spit her out. She wasn't married. You know, she didn't get the career advancement that she wanted, and I have no doubt would have got, if she had been a guy.

Carol's metaphor of her mentor's career experience is an example of the outcomes of symbolic violence in computing worksites, the way power operates to confer status, resources, and power to the superordinate members of groups (Bourdieu 1989). The vicious language that Carol uses to describe her mentor's experience as a computer scientist—not only devoured but also discarded—speaks to the brutality used to maintain the hierarchal status quo between genders in high-tech and to legitimate who matters in computing. A similar form of symbolic violence is also at play in the ways in which the pioneers of the computer science and engineering field have been black-boxed in the annals of the field's history because of their race and gender. The erasure of the contributions of women and technologists of color to the field in its nascent stages operates to legitimize who matters in US history.

Ben Barres, a white transgender man, found that passing as a cisgender man in the world of science protected him from sexism. He observed, "People treat me with much more respect: I can even complete a whole

sentence without being interrupted by a man” (Barres 2006, 135). Shawna, a white early-career academic and transgender woman, confirms Barres’ experience:

But the really sort of interesting thing in all this is that I have had that perspective. You know, I was, like, coming from both sides. It’s one of those [situations] where I’m like the classic resume studies . . . where they just changed the name. . . . And I can honestly say, “Yeah, guys aren’t treated this way.”

These stories all share a common theme of comparing the interpersonal and institutional experiences of women and men in computing careers. To persist in computing careers, women must bear the brunt of a range of gender violence, from being interrupted frequently to being energetically devoured and discarded. This violence denies women agency, competency, good health, prestige, and compensation in technical careers. Further, it robs their families and communities of generational wealth and reproduces the racial and gender ideologies that continue a legacy of exploitation in the US labor force.

#### GENDER IDEOLOGIES IN TECH WORK

During the Age of Reason and the advent of colonialism, philosophy and science divided the mind from the body at the same time the state divorced agrarian women and men from the land (Federici 2004). Together, these forces combined to subjugate and reify the natural world. In ancient times, Greek patriarchy exalted abstract reason and isolated themselves from nature, female power, and reproductive labor (Hartsock 1998). Today, gender politics in computing continue these legacies and enable men from dominant groups to participate in the life of the mind while externalizing their material needs to people who have been historically exploited. I argue that computer science and engineering is an example of the mind-body schism par excellence, evinced in its values regarding the technical and the social and an epistemological preference for the virtual over the material or social.

Women are often steered into performing “caretaking” tasks while men are steered into more technical work in the paid labor force. Tara’s experience exemplifies this perfectly:

My adviser at the time had two PhD students: myself and a guy. We were working on a big project and he said, “I’m going to put Jack in charge of these things, and I’m going to put you in charge of these things.” I looked at him and I said, “So

basically you're putting Jack in charge of all the technical stuff, and you're putting me in charge of all the content." Yeah.

Even though Tara stuck up for herself and managed to prove her competence as a technical scholar, her adviser still undermined her by ignoring her technical skills and calling attention instead to her culinary talents. Tara again:

A Turing Award winner came to visit my group, and my adviser was going around and he was saying things about each of the students. When it came to my turn, it was, "This is Tara, and she makes a great lasagna." And then, after stewing on it for a while, I said basically, you know, "I'm glad that you like the lasagna; I like to make it. But I really can't have this being the only thing that you're going to tell about me to other visitors." And he responds to this, "Fine, but aren't we being a bit oversensitive?"

His act of overlooking her technical talent and relegating her status to culturally appropriate labor roles is ignored, and he goes on to compound the problem with even more stereotypes about women's tender dispositions. Many other participants in this study reported being called oversensitive when confronting a male colleague about his sexism. These men's responses, reminiscent of victim-blaming techniques, serve to reinforce the bond between masculine identity and technical competency. Anne, a white senior leader in industry, succinctly describes how this hurts women: "Technical women must live with wrong assumptions that because they are women, they can't be as technical as men." To persist in computing, women must find ways to endure peers' and superiors' sexist assumptions regarding their talents and abilities and be prepared to be dismissed when resisting such sexism.

Stereotypes that cement technical competency with masculinity offer males preferential access to leadership positions in high-tech. The glass ceiling in tech has costs not just for individual women and their careers but also for the fight for women's equality in the US. Sheryl Sandberg, a white professional and the former chief operating officer of Facebook, in her keynote address at the 2011 Grace Hopper Celebration of Women in Computing conference, said:

Technical jobs get paid a lot more, and they're where all the growth is. If we continue to have so few women go into and stay in technical careers, eventually the wage gap progress is going to go the other way. And we fought long and hard to get women as leaders; we don't have enough of them, but if technical skills

are increasingly important for leadership in every sector of the economy, if we don't have enough women in technology, we're not going to have enough future leaders.

In other words, the cultural tolerance in computing for mechanisms that put women at risk of attrition from the field affects women's ability to ascend to leadership roles in lots of different fields. At the time of this writing, news broke that the US Supreme Court overturned *Roe v. Wade*, the landmark reproductive rights law; this decision was penned in a fundamentalist fervor of moral outrage, no less. Segregation in a powerful field such as computing is symptomatic of the far-right politics of reproduction that now dominates US culture. The rarefied realms of leadership in intersecting structures of power bar a critical mass of technologists from groups historically disenfranchised from computer science. I emphasize "critical mass" here because token representation, like Sandberg's leadership at Facebook, does nothing to advance transformational change in institutions, whereas a critical mass of women's representation results in more fair distribution of role allocations in STEM workplaces (Carrigan, Quinn, and Riskin 2011). Sexist ideologies and policies in a field with an excess of global power intersect with other "configurations of inequality," like class and racial inequalities to constrain queer people, women of color, and white women's life-affirming activities and our choices regarding our bodies, labors, and futures (McCall 2001). These inequalities make us vulnerable to forces of immiseration and exploitation and reproduce systematic forms of injustice.

#### CARRYING THE CULTURAL BAGGAGE OF FAMILY

In the mid-1990s, Faith, a white cisgender academic, was kicked out of her computer engineering doctoral program when her adviser found out she was pregnant. Only after threatening legal action was she reinstated to her program. Not all women face such severe circumstances, but constraints regarding reproduction are acutely felt by many of my participants, especially in the early-career stage when they are planning their future.

Social reproduction may not be highly valued in computing, but it is a concern for women practitioners. I wonder if part of this anxiety relates to the knowledge that they lack a flow of family work to support their labor-intensive careers, coupled with worries about the cultural consequences of transgressing gender segregation in the workplace. Women in the training and early phases of a computing career trajectory expressed anxiety when



they considered their futures and the potential conflict between remaining the best in their field and realizing their social reproduction aspirations:

CYNTHIA, a white undergraduate: I mean to be married and have both my kids by 33.

AVA, an Asian American undergraduate: Is that right? What if you don't have time? What if you're working up that ladder?

CYNTHIA: I will stop.

AVA: That's not for me. I'd like to [have children], but then at the same time, a lot of my motivation is to get a job—a good job, because I know I'll have to support my parents at a certain time, and you know, if at that time I don't have the money to support children and I need to focus on my career, then I will focus on my career.

Note how both women have social reproduction aspirations. For the white student, Cynthia, childrearing is more important than persisting in her career, whereas Ava, a woman of color, wants to prioritize her career as a means to achieve her reproductive aspiration of eldercare. The differences between these two undergraduate women may be related to race. In this exchange, we can see how care work is allocated across generations in the two women's families. Dominant white culture externalizes eldercare to institutions, whereas communities of color may have less reasons to trust these institutions. White women in this study discussed their family life primarily in terms of the nuclear family unit, whereas kinscripts for women of color included extended family and community ties and strong inclinations to provide for folks in their networks. The ideological and political coercion that assigns women primary care responsibility for unwaged labor in the home affects women differently; thus, organizing around reproductive labor in high-tech worksites must not be reduced to norms within white, Western nuclear family structures.

Shawna, a white transgender academic, expressed her frustration that white, normative family structures were prioritized by feminists in her department. She told me that an event to support women in computing focused exclusively on biological reproduction. She challenged the organizers of a lunch event for graduate students on work-life balance about why one of the few women professors in the department was not asked to speak. “[They did not] invite the one who had an adopted kid,” she said. “This pissed me off. They said adopting kids is not the same as actually going through pregnancy

and maternity leave. Because, you know, the adoption process is so easy.” Shawna’s anger at the marginalization of an adoptive parent from a group discussion on reproduction highlights the fact that “discourses on rights and needs are also stratified and organized in ways which are congruent with societal patterns of dominance and subordination” (Moore 1994, 100). Shawna also argued that work-life balance conversations tend to privilege heterosexual white women and eclipse other violence that women in computing careers must contend with, like transphobia, gender harassment, and racism. In efforts to dismantle institutional sexism, we cannot privilege certain social identities over others, or we risk reproducing racism and heteronormative kinship.

Without exception, professionals with male partners in this study, regardless of their status as parents, had chosen partners who were supportive of their careers. In order to persist in computing, these women rejected role allocations that cleave to the “breadwinner” and “caretaker” binary. For example, Diane, a senior European national and academic leader, discussed how she and her husband negotiated a move across country for her career advancement: “He was not as driven by his career as me, and at that time, we had two very young kids. So he quit his job and we moved out west . . . He did part-time from home, and that was great because we had young kids, and he was at home part-time working.” Diane was not alone in this experience. For example, Carol, a white senior leader in industry with two children, had a stay-at-home husband. Regina is a Taiwanese early-career professional, and when I asked if she and her partner were going to move together for a job she had recently been offered, she said: “He doesn’t believe in long-distance relationships, so he will have to move with me.” Tara, the white early-career academic, reflected on negotiating the job market with her husband, who also earned his PhD in computer science: “My husband had said that he was willing to go wherever I thought I needed to go, because he thought that I cared about my career more than he does about his.” These women’s narratives show that the relations of reproduction are central to women’s participation in computing. Women who persist in this nontraditional field must not only buck the status quo of gender norms in the sphere of production (their computing worksites) but also negotiate equity in the sphere of reproduction (their intimate partnerships).

## CONCLUSION

Too often, women are either not attracted to computing or leave the field because they perceive it as divorced from social concerns and helping people. Some argue that this lack of clarity on how computer science and engineering serve the social good is merely a public relations problem, but I disagree.<sup>2</sup> Women and girls see through the mythologizing propagated by expensive marketing. Women who persist in computing must work long hours while combating discrimination and harassment. They struggle with disillusionment when their altruism is fettered or, as we saw with Shawna, maligned. They must make strategic decisions in their personal lives about whether or not to partner and whether or not to have children. Those who choose to have male partners must successfully negotiate nontraditional role allocations in their homes in order to persist.

Gender segregation in the US workforce is a key strategy in coercing women into doing more than their fair share of reproductive labor. It externalizes and devalues care work in both the home and the digital economy, where caring, service work is taken up by “many women, people of color, and precarious workers” in order to survive (Sharma 2018). It is a process in which people’s options are limited; it is the logics of oppression. The absence of paid parental leave and affordable childcare in the US encourages individuals to make inequitable compromises that reproduce traditional gender roles. Gender segregation is yet another form of structural violence that plays an influential role in whether women can exercise economic independence and reproductive autonomy.

Reproductive labor is more than childbearing and childrearing. It is an also an economic question about the role allocation of the care work done to ensure human subsistence. Making reproductive labor a matter of care in computer science knowledge production is an extension of work done by other feminist anthropologists who insist that reproduction is not to be ignored in political economic analyses (Ginsburg and Rapp 1995; Browner 2001). I see a correlation between the concentration of power and wealth in the hands of white men in high-tech and the heavy lifting that precarious workers do for reproductive labor in society. This role allocation is distributed unevenly across race, ethnicity, gender, and sexuality, and the intersection of multiple oppressions can leave fewer options for economic independence for women of color and lesbian, bisexual, and transgender

women than white cisgender heterosexual people. The labor required to maintain and reproduce the labor force, both on a day-to-day basis and generationally, is assigned to women through cultural sexism and the legacies of colonialism, thus denying the majority of the population rewarding and lucrative career opportunities. These stereotypes not only block efforts to fairly distribute the rewards and benefits of computing technology but also distract attention from the larger problems of a culture of overwork demanded by computing bosses and their inability to manifest their promises to serve the social good.

This culture of overwork in the US labor force correlates with the defunding of social resources by forces of neoliberalism, which has intensified unpaid work in homes and communities—a burden that women disproportionately shoulder, filling in the gaps between the state and the market in order to maintain the well-being of their families and communities (Benería 1999; Katz 2001; Bakker and Gill 2003; Ehrenreich and Hochschild 2004). For these reasons, among many, women of color organizing around reproductive justice do not separate reproduction from their economic lives (Silliman et al. 2004). Anti-racist activists insist that reproductive control means not only having access to legal abortion and contraception but also access to the economic means to bear and raise healthy, wanted children (Nelson 2003)—and, I would add, the choice to remain child-free.

Understanding women’s experiences persisting in computer science and engineering is critical to broadening participation efforts because they are members of computing with a unique insight into US culture. They are outliers—at once the “coding elite” helping to fashion the infrastructure powering algorithmic societies (Burrell and Fourcade 2021). But they are also transgressors who contribute to a field with great sway, a field with a considerable amount of force to exercise over individuals, communities, and the multitudes of global society. Most importantly, women of color, nonbinary, and white women technologists who persist in computing have powerful, multidimensional viewpoints on our society and can therefore offer a unique perspective on cultural norms and values.

Paying attention to these workers’ experiences illuminated a contradiction of care that is troubling. Some of computing’s most disenfranchised workers care about matters that are different from their Big Tech bosses. In fact, a good number of technologists have goals in direct contradiction to their organizations’ deepest-held values, which are a fusion of corporatism

and technofetishism. Workers are targeted when they challenge the authority of digital bosses or the story that computational machines are magic and the salvation to the wicked problems that face life on this planet. Retaliations, such as Google boss Jeff Dean's firing of Drs. Timnit Gebru and Margaret Mitchell from their leadership roles at the company's AI ethics team for writing about the environmental and social threats posed by large language models, make it difficult for individual workers to successfully use their technical skills in service to the social good.

In this chapter, I have pivoted away from traditional topics around reproduction common in gender equity spaces—namely, motherhood. Instead, I have probed two other dimensions of reproduction that play a role in the stubborn segregation of computing: (1) the stereotypes that operate in computing workspaces to constrain women's talents to feminine-coded caring services and (2) the thwarting of tech workers' collective altruistic aspirations. Work-life balance and parenting, while important to moving the needle on inclusion in computing, cannot be the only demand we make on computer science and engineering institutions. We must also organize around collective altruistic aspirations in Big Tech. Feminist activism is both an attempt to reconcile a yearning to make social change within the individualistic norms that govern computing cultures and, concurrently, an attempt to reconcile the paradox of being part of a highly privileged class of workers and, as women, being ruled by men from dominant racial groups. Navigating the terrain of rupture, combined with aspirations for transformative action, may be the incendiary combination that ignites feminist consciousness—and one that can lead to collective action in pursuit not just of gender equity in computing but reproductive justice in broader cultural domains.

What would a world look like where all women were financially independent and free from the threat of poverty? What would meaningful work for all people look like, and what relationships and labor allocations would support the regeneration of human life and the fair distribution of wealth, opportunities, and resources? What role would computers play in this more just world? Based on the evidence that I presented in this chapter, I conclude that the ubiquity of computer technology in our culture has not helped our society make great strides toward either economic or reproductive justice. In fact, given the ubiquity of computing and the exclusion of women from leadership roles in a range of influential

fields that required technical skills, Big Tech's regressive reproductive politics may be contributing to the rise of policies and laws restricting women's access privacy and reproductive health care. To remedy this, we must continue to consider reproductive justice within the context of a society that fetishizes computer technology, reveres its makers, and tolerates harms targeting those who question such relations of power. Transforming the value of social reproduction requires reimagining what, if anything, computing technology can offer those who do altruistic labor that cares for others and society. Broadening participation in computing requires centering the altruism of its more marginalized workers, which could very well transform societal values in the US and the technological tools we use to reflect and honor these values.

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# Cracking the Bro Code

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