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## CODING IS NOT EMPOWERMENT

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“Learn to code and change the world!”<sup>1</sup> Does this slogan sound familiar? In the 2010s, the tech industry and nonprofits such as Code.org, Girls Who Code, and #YesWeCode popularized the notion of coding as a way to empower women, African Americans, Latinxs, and other groups underrepresented in computing. Even US President Barack Obama participated in an “Hour of Code” in 2014, posing for photos with young Black students and declaring, “Learning these skills isn’t just important for your future—it’s important for our country’s future.”<sup>2</sup> Media stories and widespread hands-on activities reinforce the message that teaching kids to code will solve the tech industry’s diversity problems and ensure well-paying jobs for all Americans.<sup>3</sup>

Are these realistic claims that should guide education and workforce policy? Or does the focus on technical skill as a solution to social and economic disparities sidestep more awkward—but urgent—discussions about biases and misconceptions in tech? Mastering simple programming commands and seeing an immediate response on the screen can be exciting and fun for kids, and learning to code may even, with time and further training, lead to a well-paying job in computing. But the popular rhetoric of coding as empowerment glosses over some serious obstacles on the road to employment or entrepreneurship. First, the focus on introductory training hides the industry’s failure to hire, retain, and promote already-trained women and minorities. Blaming the educational pipeline for not supplying underrepresented workers deflects attention from the discrimination still faced by those who emerge from it. Second, technical training by itself does not challenge race- and gender-biased ideas

about what technically skilled people look like and what constitutes “merit” in the tech workplace. These biased standards perpetuate hiring and promotion disparities. Third, the coding movement’s focus on acquiring skills avoids culturally loaded questions about the purpose of software and the social goals it might serve. The preferences of a privileged few tend to shape what types of software are created and made widely available, so that the needs of people lacking access to social and economic services are overshadowed by apps promising entertainment or faster shopping. If we do not take these issues of power and purpose seriously and acknowledge that real solutions may require dominant groups to make uncomfortable changes, the coding movement may simply reproduce current inequities.

### **DECODING SUPPLY-SIDE ARGUMENTS: IS THE INTERNET A SERIES OF PIPELINES?**

Like California’s wildfires, the software industry’s lack of diversity has generated a lot of heat but no real solutions. NSF data show that between 1993 and 2013, the percentage of women in computer science occupations actually declined from 31 percent to 24 percent.<sup>4</sup> Scandals rocked Silicon Valley in 2017: former Uber engineer Susan Fowler divulged a pattern of sustained and egregious sexual harassment at that company; leading venture capitalists were ousted for sexual misconduct; and a viral Google memo argued that “biological causes . . . may explain why we don’t see equal representation of women in tech and leadership.”<sup>5</sup> But data points to society—not biology—as the cause, since the proportions are very different in some other countries: in Malaysia, for example, half of all computer science degrees are earned by women.<sup>6</sup> For years the big tech companies resisted disclosing their embarrassingly low diversity numbers, until civil rights activist Reverend Jesse Jackson appeared at a Google shareholders’ meeting in May 2014 and demanded the release of this data. Tellingly, Google’s agreement may only have happened because there was an African American at Google with enough power to arrange it: David Drummond, “the company’s only black high-level executive” and “an old friend of the reverend.”<sup>7</sup> Google’s disclosure broke the silence, and further pushing from Jackson and his allies led Apple, Facebook, Amazon, Microsoft, and Twitter to follow suit. While everyone seems to agree that the US tech industry’s diversity numbers are abysmally low, there is no consensus on the causes and possible cures.

Could early exposure to coding overcome these racial and gender gaps? The logic of this claim rests on an assumption that the main reason women and minorities

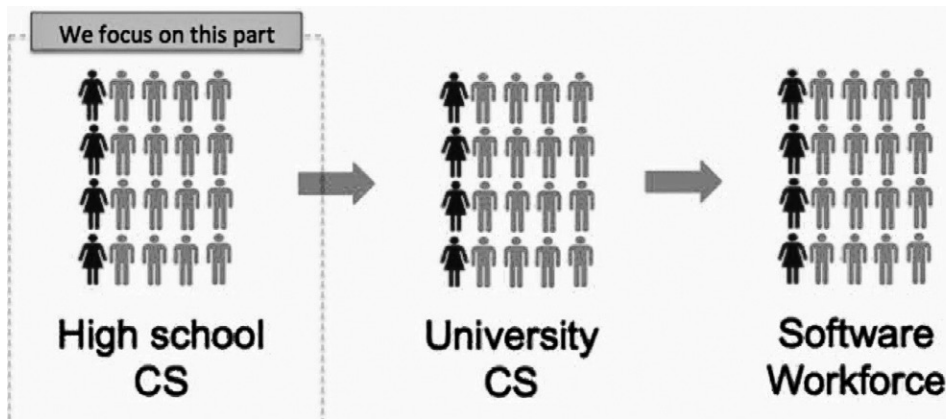


Figure 12.1 The pipeline model. (Source: Code.org.)

are underrepresented in computing is that they fail to enter the “pipeline” of technological training at an early enough age, which prevents them from acquiring the necessary credentials to land a job. Code.org, for example, focuses its efforts on “the education pipeline,” where, it claims, “the diversity problem begins”; its website displays a diagram with arrows pointing to a simple linear progression from “High School CS” to “University CS” to “Software Workforce” (fig. 12.1).<sup>8</sup>

But the pipeline argument is contradicted by both data and logic. If underrepresentation were simply a supply problem, women and minorities with CS training would be snapped up by employers, but they are not. In fact, a 2016 study found that Blacks and Latinxs were hired by big tech companies at only half the rate at which they received CS degrees.<sup>9</sup> Girls Who Code founder Reshma Saujani notes that the “pipeline” loses women and minorities between training and hiring: “If you were to look at the gender makeup and the racial makeup up of technical interns versus who gets hired [afterward], there’s a huge drop.”<sup>10</sup> Rachel Sklar, an activist for women in tech, calls attention to a double standard whereby women on venture capital boards are expected to have technical degrees while men are not. “There are a ton of qualified women out there, women who can measure up to any similarly-situated man—as long as they’re being judged by the same criteria.” Sklar adds that industry support for coding efforts, while valuable, is not a substitute for reform: “Support for next-gen orgs like Girls Who Code and Yes We Code and Code 2040 and Black Girls Code is fantastic but does not address the very real problems with *this* gen.”<sup>11</sup>

The pipeline argument implicitly blames women and minorities themselves for not preparing sufficiently. It also reinforces stereotypes about the kinds of people who succeed in tech, equating the masculine pattern of early, obsessive interest in computers with talent and commitment. Influential venture capitalist Paul Graham exemplifies this circular logic in a 2013 interview, saying, “If you go look at the bios of successful founders this is invariably the case, they were all hacking on computers at age 13.” Asserting that “if you want to be really good at programming, you have to love it for itself,” he assumes that this love for coding will manifest itself at a young age, leading him to dismiss the people who do not learn to program until college—disproportionately women and minorities. This privileged viewpoint ignores the possibility that lack of early involvement could be due to lack of resources or encouragement, rather than lack of interest or talent. Not all thirteen-year-olds have free rein to hack on computers, and young women in particular may be initially turned off by negative stereotypes about computing.<sup>12</sup> While the coding movement will likely help more girls and minority youth spark an interest in coding at a young age, we should beware of assuming that *only* those who show an early interest have the potential to succeed, or that good coders can only be motivated by a love for hacking itself. Like other skilled professionals, such as lawyers or doctors, programmers can be driven to excellence by a desire to serve human needs rather than a fascination with the technical details of their work.

By focusing attention on earlier stages of the pipeline, comments like Graham’s shift the responsibility to secondary education: “What that means is the problem is 10 years upstream of us. If we really wanted to fix this problem, what we would have to do is not encourage women to start startups now. It’s already too late. What we should be doing is somehow changing the middle school computer science curriculum.”<sup>13</sup> A survey of tech company founders by venture capital firm First Round found a similar tendency for male respondents to shift the blame for “tech’s diversity problem” from gender bias to early training: “Men are more likely to blame the pipeline into tech; women place greater emphasis on unconscious bias and lack of role models.”<sup>14</sup> As Shanley Kane, a tech veteran and cofounder of feminist website *Model View Culture*, argues, “You see venture capitalists talk about the need to get more 10-year-old girls into programming, and that’s so far removed from their direct sphere of influence. Meanwhile, there is attrition in every stage of the career path of women once they get into the industry. . . . We are not getting hired, and we are not getting promoted.”<sup>15</sup> Sreela Sarkar (ch. 14 in this volume) describes a similar dynamic in India, where training programs that promise to “flatten economic and

social barriers for low-income youth” are undermined by the tech industry’s bias toward applicants from elite castes and universities. While improving STEM education for girls and African American and Latinx youth is surely desirable, this alone will not result in equality unless the behavior of employers and startup funders is also addressed.

Unconscious bias in hiring is a well-established phenomenon. Numerous studies have found that even employers who advocate for diversity will favor applicants who appear white or male over applicants who have female or “ethnic-sounding” names.<sup>16</sup> In Silicon Valley, race and gender characteristics are combined with behavioral stereotypes to create a model of the ideal coder; this practice is often referred to by the technical term “pattern matching” to give it a gloss of insight and objectivity.<sup>17</sup> Venture capitalists such as John Doerr have openly acknowledged that they favor candidates who fit a particular profile, noting that the founders of big companies such as Amazon, Netscape, Yahoo, or Google “all seem to be white, male, nerds who’ve dropped out of Harvard or Stanford and they absolutely have no social life. So when I see that pattern coming in—which was true of Google—it was very easy to decide to invest.”<sup>18</sup> The tech industry has responded to accusations of exclusion and mistreatment of women and minorities through widespread adoption of implicit bias training programs, yet most of these techniques have no research demonstrating their effectiveness. Such training may even make matters worse: a 2014 study found that when individuals were informed that stereotyping was prevalent, they treated it as normal and felt freer to express biased views and treat others in discriminatory ways.<sup>19</sup>

A more promising alternative is to identify and combat bias in the *practices* involved in recruiting, hiring, promotion, and funding. The problem begins with recruiting. Big tech companies recruit heavily from elite universities like Stanford, Berkeley, or Carnegie Mellon, rather than historically Black colleges and universities or liberal arts colleges where more women and minorities might be found.<sup>20</sup> Job ads use language meant to appeal to men, seeking “rock stars” and “ninjas” who can “crush code.” Employers often seek job referrals from their current employees’ social networks, which tends to reproduce existing race and gender imbalances. As Catherine Ashcraft of the National Center for Women & Information Technology argues, when employers use the pipeline argument, “It tends to mean that you’re not looking in the right places. . . . You haven’t done a lot of things to actively expand your networks and look at your job descriptions for bias and be more creative about where you’re hiring.”<sup>21</sup>

Interview practices often reflect and reward narrow and even counterproductive notions of skill. A standard part of the hiring process is the “whiteboard interview,” in which interviewers pose a coding problem and the job candidate must stand at a whiteboard and write code to solve it, using algorithms drawn from memory. Whiteboarding has been criticized as irrelevant to real-world job requirements; as coding instructor Quincy Larson quipped, “The only world where you would actually need to be able to recall an algorithm would be a post-apocalyptic one, where the hard drives of all the computers connected to the internet were fried.”<sup>22</sup> In addition, whiteboarding as an artificial, high-stress performance tests the candidate’s self-confidence as much as their fitness for the job, and thereby favors white or Asian males who are bombarded with the message that they are naturally better at coding. Diversity consultant Joelle Emerson of Paradigm argues that “whiteboard interviews increase the likelihood of ‘stereotype threat,’ an anxiety among non-traditional candidates that they’ll confirm negative stereotypes about their group.”<sup>23</sup> In early 2017 a group of software experts drew attention to the way whiteboarding can unfairly reject good candidates, “confessing” in a series of tweets how they themselves—successful white men—would likely fail such a test. A typical tweet read, “I would fail to write bubble sort on a whiteboard. I look code up on the internet all the time. I don’t do riddles.” As white men, these coders knew that they would get the benefit of the doubt in interviews, but others would not be so lucky. Indeed, female coders who declined to “confess” pointed out that even lightheartedly admitting inadequacies was a male privilege: “As a woman in tech I don’t announce my code shortcomings for fear of consequences”; “If I told you what things I still have to Google, you’d try to use it as ‘evidence’ that I’m not a ‘real’ engineer.”<sup>24</sup> Potentially less discriminatory alternatives to the whiteboard ritual are available: they include having applicants present a coding project they previously completed; asking them to solve a real coding problem on a computer using the normal development tools; or having the candidate review an existing piece of code.<sup>25</sup>

Retention and promotion are further problems that fall within the employer’s part of the pipeline. A 2017 study using a representative nationwide sample found that tech workers who voluntarily left jobs most often did so (42%) because of hostile work environments. The experiences most likely to drive workers to quit—stereotyping, bullying, sexual harassment, and being passed over for promotion—affected women, LGBT, and minority workers roughly twice as much as white males. The report concludes that “diversity numbers may not be changing at least in part because tech companies have become a revolving door for underrepresented groups.”<sup>26</sup> The 2015

“Elephant in the Valley” survey found that senior women at tech firms experienced rampant sexist behavior that impaired their advancement and satisfaction at work. Eighty-four percent of women surveyed had been told they were “too aggressive”; 88 percent had had clients or colleagues address questions to male coworkers that should have been addressed to them; 60 percent reported unwanted sexual advances; 75 percent were asked illegal questions about marital status or children in interviews; and 66 percent felt excluded from key networking opportunities because of gender.<sup>27</sup> Combating entrenched discrimination means firms must hold employees accountable for bad behavior—even if they are star performers—and hold managers accountable for diversity results, not just productivity.<sup>28</sup>

The pipeline argument puts the onus on underrepresented groups to solve their own exclusion by learning computer skills at an early age. Coding efforts do have value: underrepresentation is a multipronged problem, and equal access to training is an important part of the solution. But the job-market advantages of white and Asian males go far beyond coding skills: they include fitting the stereotype of what computer expertise “looks like,” attending elite schools, having the right social networks, and conforming to the industry’s cultural codes. Teaching employers to recruit, hire, promote, retain, and fund minority coders might prove more empowering than teaching minorities to code.

### **BELIEF IN MERITOCRACY CONSIDERED HARMFUL**

“The central issue to the lack of diversity in tech is the tenacious myth that Silicon Valley and tech more broadly are perfect meritocracies.”<sup>29</sup> This analysis by Freada Kapor Klein of the Kapor Center for Social Impact critiques the oft-heard message that hiring and promotion are driven solely by talent and performance. While many Americans express faith in economic mobility and a level playing field, this faith seems especially fervent in the tech sector, in part because it rides on a cultural belief that machines are objective and socially neutral.<sup>30</sup> Code.org’s Hadi Partovi has argued, “It is one of these skills where the computer doesn’t care if you are black or white or a girl or boy or old or young: as long as you know how to speak the language of code, the computer will do what you want.”<sup>31</sup> This faith in the fairness of machines is naïve; indeed, when computers are used to select job candidates, the result can be *increased* discrimination. Algorithms are trained using past decisions as models; if employers have historically discriminated against job applicants with “ethnic-sounding” names or degrees from women’s colleges, the computer

may flag these candidates as less qualified, perpetuating social bias while appearing neutral.<sup>32</sup> Computer experts may also feel that they themselves are strongly rational and objective by virtue of their technical training or scientific outlook. As Jacob Kaplan-Moss, an open-source software pioneer, comments, “Programmers like to think they work in a field that is logical and analytical, but the truth is that there is no way to even talk about programming ability in a systematic way. When humans don’t have any data, they make up stories, but those stories are simplistic and stereotyped.”<sup>33</sup> As Mar Hicks observes (ch. 6 in this volume), sexist views of merit have become so ingrained that gender disparities seem “natural and unchangeable.”

The widely held belief that the tech industry is a meritocracy is both false and harmful. As described above, far from being judged solely on merit, women and minorities face obstacles and double standards at every stage of their educational and employment journey. Laura Weidman—cofounder of Code2040, which promotes Latinxs and African Americans in tech—argues that performance is a function of opportunity: “At Code2040 we believe strongly in the importance of making it on the strength of one’s merits. However, the ability to do just that is predicated on having the opportunity to showcase one’s merits in the first place.” Organizations like Code2040 that base their training and advocacy on the real-life experiences of underrepresented groups can expose inequities that may be invisible to Silicon Valley insiders. Weidman points out how the “old boy network,” in which “companies tend to look to their employees’ networks for potential hires,” reproduces the largely white/Asian male workforce. For minority candidates, “it can be hard to even figure out which companies are hiring or could be a good fit for you without someone to help you navigate the waters.”<sup>34</sup>

The dangers of a misguided belief in meritocracy come in many forms. Kapur Klein points out that it has the effect of blaming the victims: “The implication of that is that there’s something wrong with African Americans, Latinos, and women from all backgrounds, as opposed to there being something deeply biased about tech.”<sup>35</sup> Minorities are judged as “less qualified” for not having had access to educational and work experiences that white male candidates and hiring managers take for granted. When privilege is equated with talent, “diversity” is framed as incompatible with merit, a “lowering of the bar.” The racial logic whereby merit is equated with credentials inaccessible to many minority individuals is made painfully clear in a blog post by Leslie Miley, who had been the only Black engineering manager at Twitter until he quit in 2015. Explaining why he had left, Miley recalled:



Hiring Committee meetings that became contentious when I advocated for diverse candidates. Candidates who were dinged for not being fast enough to solve problems, not having internships at “strong” companies and who took too long to finish their degree. . . . A particularly low moment was having my question about what specific steps Twitter engineering was taking to increase diversity answered . . . with, “Diversity is important, but we can’t lower the bar.”<sup>36</sup>

If the exclusion of minorities is naturalized as reflecting their lack of merit, rather than a moral failing within the industry, then diversity initiatives can only be justified in economic terms—as a strategy to improve products or make companies more competitive. In diversity scholar Ellen Berrey’s words, “Rather than a righteous fight for justice or effective anti-discrimination laws, we get a celebration of cultural difference as a competitive advantage. Diversity, we are told, is an end goal with instrumental pay-offs.”<sup>37</sup> Programs to teach coding are often framed in those terms—as a business case rather than a fairness issue—and even groups serving minorities seem obliged to repeat that rationale.<sup>38</sup> While the business case for diversity may indeed be compelling, making profitability the main argument for inclusion is problematic. What if a business had no competitive advantage to gain from diversity—would that make discrimination acceptable? Refusing to recognize bias as an ethical problem draws attention away from needed changes in business practices and cultures.

Distorted ideas about meritocracy can foster hostile work environments in a number of ways. Tech companies sometimes interpret “meritocracy” to mean cutthroat competition between employees—exemplified by companies like Uber and Amazon, where zero-sum employee evaluations reward backstabbing coworkers.<sup>39</sup> Do such Darwinian practices really select for the best talent, or do they push out equally capable employees who are unable or unwilling to tolerate these aggressive interactions? Tech startup Zymergen illustrates the opposite approach to pursuing meritocracy. One-third of Zymergen’s technical workforce is female—double the industry average—a feat the company managed in part by emphasizing collaborative skills as part of “merit” and valuing “experience and maturity over a hot-shot, one-man show.” Zymergen CEO and cofounder Joshua Hoffman argues that his broader view of merit opens up a bigger pool of talent and thereby yields a higher-quality workforce.<sup>40</sup>

The unfounded belief that an organization or industry is meritocratic can lead not just to inaction on diversity but to increased discrimination. This “paradox of meritocracy” was demonstrated in a 2010 study showing that “when an organization is explicitly *presented* as meritocratic, individuals in managerial positions favor a male employee over an equally qualified female employee.” The authors suggest

that the mantle of meritocracy gives decision makers an unearned sense of “personal objectivity” and “moral credentials” that make them more likely to act on the biases they actually hold.<sup>41</sup> Paradoxically, believing that one’s culture is prejudiced (implicit bias) and believing one’s culture is *not* prejudiced (meritocracy) both lead to the same result—complacency—unless the desire for fairness is backed up by procedural changes and accountability.

Silicon Valley’s self-image as a meritocracy rests on a lopsided view of merit that valorizes narrow technical skills at the expense of social skills that may be equally crucial to the success of a software project.<sup>42</sup> Indeed, social and technical skills are inseparable; communication and cooperation are required both to conceptualize and to successfully implement a software project. The “lone superstar” is wrongly valued over the team player, in part because of a widely held notion that some programmers are ten times as productive as others and therefore hold the key to a company’s success. But skeptics have offered a number of reasons to question the existence or value of the “10x” coder. In the first place, coding productivity cannot be measured quantitatively, since what superior programmers produce is not necessarily *more* code but better code. A seemingly brilliant innovation may prove costly in the long run if it is difficult to maintain due to the coder’s poor communication skills. And even if a programmer is truly a superstar, the potential benefit of this is lost if the programmer alienates teammates. Kaplan-Moss urges managers to reject “the myth of the brilliant asshole” or “‘10x programmer’ who is so good at his job that people have to work with him even though his behavior is toxic.”<sup>43</sup> As open-source engineer Ryan Scott Brown told a conference audience, “If you have a 10x developer, who is also a 10x jerk and they have driven away nine contributors from your project, he’s now a 1x developer, and still a jerk.”<sup>44</sup>

The myth of the superstar coder encourages managers to reward men’s “heroic” last-minute problem-solving over women’s proactive efforts to prevent crises from occurring in the first place. Macho heroics that substitute for collaborative problem-solving have been debunked as dysfunctional since at least 1979, when software engineering pioneer Barry Boehm dubbed such behavior “the Wyatt Earp Syndrome.”<sup>45</sup> Yet they are still overvalued as a sign of talent and commitment, as described by Ann Mei Chang, a former senior engineering director at Google. “The people who are most recognized and rewarded are often the guys who pull the all-nighter to fix the bug right before it’s supposed to ship or go live. . . . Women are more likely to have tested stuff and worked hard all along the way to make sure there wouldn’t be problems at the very end, and that kind of work style is not always as rewarded.”<sup>46</sup> In

addition to perpetuating counterproductive work styles, favoring heroic last-minute efforts penalizes women (and men) whose family commitments make all-nighters a hardship.

One of the biggest problems with defining merit in terms of heroic solo coding is that it undervalues essential people skills. Referring to the 2017 Google memo controversy, reporter Brian Feldman noted that its sexism reflected Silicon Valley's biased ideas of merit: "The computer industry is built upon the myth of a few anti-social hackers in a garage, creating entire worlds on their own. Qualities like narrowly defined rationality are prized, while qualities like empathy or social aptitude are regarded as irrelevant."<sup>47</sup> Kaplan-Moss argues that "coding is just a small part" of overall programming skill and that communication skills are equally important.<sup>48</sup> A similar belief motivated Zymergen executives to abandon the whiteboard interview: "It doesn't test for things that are important in a workplace. . . . We want to see how well do people perform in a team and perform real work."<sup>49</sup> Zymergen substituted job talks that allow candidates to present past accomplishments on real work projects and describe how they have handled collaborative challenges.

The importance of integrating interpersonal and algorithmic skills is acknowledged in some corners of the coding movement. For example, the curriculum for Girls Who Code Clubs includes typical elements like programming languages and computer science concepts, but also "soft skills" such as leadership, presentation skills, "willingness to ask for help," and "positive attitude."<sup>50</sup> Yet the fact that these vital skills are confined to girls only highlights how they are devalued in masculine computing culture. By and large, computer science classes and coding activities for children teach mastery of tools with little attention to collaborative skills. Focusing on the supposed technical deficiency of women and minorities, while ignoring the well-documented social and cultural deficiencies of the majority, reinforces the assumption that women and minorities need to be "fixed" but the white males who dominate tech are just fine. We have Black Girls Code, but we don't have "White Boys Collaborate" or "White Boys Learn Respect." Why not, if we want to nurture the full set of skills needed in computing?

#### **PURPOSE: IF CODING IS THE ANSWER, WHAT IS THE QUESTION?**

What motivates people to learn to code? Many people who love computers from an early age find learning to program intrinsically fascinating and rewarding. Activities aimed at children, such as Hour of Code or coding camps, appeal to that sense of

wonder and the thrill of mastery, and for recreational hackers, fun can be enough of a purpose. Silicon Valley caters to the sensibility of workers who are motivated to create great code and make money but may not care which (if any) end users benefit from their efforts. But other potential software developers are much more concerned with the ultimate purpose of their products, and this tends to be especially true for women and minorities. UC Berkeley was able to equalize male and female enrollment in an introductory computer class in part by placing “more emphasis on the impact and relevance of computing in the world.”<sup>51</sup> NCWIT has found that young women respond to the message that as an IT professional they can create “products and solutions that save lives, solve health problems, improve the environment, and keep us connected” and that “She can use her skills to help solve pressing social problems in a variety of fields.”<sup>52</sup>

One of the most distinctive aspects of coding groups aimed at minorities and women is that they often focus explicitly on how coding skills can be applied to solve social problems that participants care about. Qeyno Group, an organization founded by anti-poverty activist Kalimah Priforce that holds free hackathons for minority youth, describes its events as “teen hackers solving the world’s biggest problems.”<sup>53</sup> The mission statement of #YesWeCode, founded by former Obama advisor Van Jones with an emphasis on training African American youth, explicitly links learning to code with social justice goals: “Many have been searching for ways to uplift today’s urban youth and help them achieve a more promising future. We believe that one solution lies in connecting tech and social justice leaders to spearhead revolutionary tech programs whose benefits extend to the most disadvantaged of society.”<sup>54</sup> Jones argues that showcasing minorities as successful coders can also change stereotypes about technical talent: “The minute we have an African-American Mark Zuckerberg or a Latina Sheryl Sandberg, the conversation will shift.”<sup>55</sup> The point is not that every female or minority coder sees their work in political terms, or that increasing their representation will automatically make computer culture more democratic—but without groups that are led and defined by underrepresented coders, a shift toward equality is unlikely to happen.

The question for these coding groups is not simply, will this software benefit someone? but also—sometimes pointedly—*whom* will it benefit? Whose problems are prioritized? Whose preferences will be catered to? Which markets are targeted, and which are ignored? Coding enthusiasts talk about “changing the world,” but commercial software products and services serve a narrow slice of that world, prioritizing advertisers and consumers with disposable income. Minority coding groups have

called out the racial and class bias of the industry's concept of what makes a software product revolutionary. As #YesWeCode's chief innovation officer, Amy Henderson, points out, "A lot of the people who develop apps today are affluent white men, and so they build apps that solve *their* communities' problems."<sup>56</sup> Qeyno's Priforce rejects the tech industry's overemphasis on providing recreational services for a privileged user community while others are ignored: "We are not interested in launching hackathons to build more photo sharing apps or finding pizza at 3am. We want to build and design technology that makes sense to a population that needs it, and who better to lead the development of this technology than the youth in this community."<sup>57</sup> Jones argues, "Silicon Valley is supposedly built on genius, that's their mythology. But you're not including all the geniuses that are out there. How many products and services is Silicon Valley not creating because they don't have people from different backgrounds in the room to come up with the next big idea?"<sup>58</sup> As Freada Kapor Klein points out, "When you don't have representation, you can't possibly come up with the products and services needed for the population, no matter how popular or trending you might be." Her investment firm funds startups run by women and underrepresented people of color, which are more likely to focus on issues such as "diversity, education, nutrition and community outreach."<sup>59</sup> Including more voices can also avoid what diversity activist Y-Vonne Hutchinson calls the "echo chamber" effect, where bias against underrepresented groups can slip unnoticed into algorithms. "When workforces are as homogenous as they commonly are in the Valley, it is inevitable that the products are full of blindspots," she argues. She points to "the Google Photos facial recognition app that compared black people to gorillas, the Amazon Prime delivery-system that did not serve predominantly black neighborhoods, the AI-driven website, Beauty.AI, which only deemed white people as 'beautiful' and Microsoft's AI-bot, Tay, that posted anti-Semitic content."<sup>60</sup> Halcyon Lawrence (ch. 8 in this volume) demonstrates how voice-recognition apps discriminate against people with "nonstandard" accents, meaning that supposedly universal products malfunction for a significant portion of the population. If even *one* developer had had an accent themselves, would this problem have been caught and fixed?

Examples from projects run by African Americans offer a vision of how coding can immediately and concretely help people who are most in need and least served by commercial software offerings. #YesWeCode's first hackathon at the 2014 Essence Festival in New Orleans produced apps focused on health issues affecting the Black community, such as obesity, diabetes, and a lack of fresh food; services for youth in foster care; and help for victims of human trafficking. At a hackathon in Philadelphia

the following November, the winning app, called Creating Your Community, allowed young people to take photos of derelict buildings and propose new uses for them while also connecting with local developers, designers, and contractors who could make the vision a reality. #YesWeCode's Kwame Anku described the app as a tool for community self-determination: "We talk about gentrification, but these young people are saying, 'Hey, we can transform our own community, conceptualize what we want, and then be able to have the local dollars stay in the community and have the community we want.'"<sup>61</sup> Perhaps the most striking example of the gap between the needs of underserved communities and the users privileged by Silicon Valley came from Qeyno's 2015 Oakland Hackathon, where the Best Impact winner was an app addressing the life-or-death implications of Black youths' encounters with police in the wake of nationally publicized shootings. Fourteen-year-old George Hofstetter designed "a mobile application for teenagers like myself—African American—to help them figure out how to act . . . towards police officers. So much has happened over the past few years that have resulted in death, that have to do with teenagers around my age. I would like to help them to know what to do."<sup>62</sup> Extending its efforts to the Latinx community, Qeyno's 2018 #DREAMerHack mobilized code to help children of undocumented immigrants, inviting participants "to build 'sanctuary' apps to address the growing insecurities and safety-risks for those affected by forced displacement. . . . In the tradition of the hackers who conducted the Underground Railroad, #DREAMerHack is focused on 'hacking alienation.'"<sup>63</sup>

These young coders and their mentors define empowerment in a much more radical way than getting an entry-level job in Silicon Valley. By making purpose an essential part of the coding conversation, they challenge the goals and culture of the tech industry, rather than simply training underrepresented groups to conform to the status quo. Coding efforts led by women and minorities—and designed specifically with their interests, strengths, and constraints in mind—can provide a more holistic approach that addresses structural and cultural obstacles to participation in computing. The software industry is unlikely to achieve equal representation until computer work is equally *meaningful* for groups who do not necessarily share the values and priorities that currently dominate Silicon Valley.

## CONCLUSION: WE CAN AIM HIGHER

Teaching more girls and African American and Latinx youth to code is a positive step toward correcting both Silicon Valley's lack of diversity and the unequal earning

power of women and minorities. But superficial claims that learning to code will automatically be empowering can mask a lack of commitment to structural change. To focus only on getting individuals into the training pipeline ignores systemic bias in hiring and promotion, reinforces narrow conceptions of merit and skill, and pushes solutions into the future.

Companies can do more right now to increase diversity. Instead of confining recruitment efforts to children's activities, entry-level hires, or other junior people who don't threaten the dominance of established groups, companies could focus on hiring and promoting women and minorities into senior positions. Firms can map out plans for having underrepresented people lead technical teams, make product design decisions, and serve on venture capital boards, where they can weigh in on the social utility of proposed innovations. They can treat cultural competence as part of the programming skill set and be willing to fire employees—even "superstars"—who harass or demean women and minorities.<sup>64</sup> And the public can hold tech firms more accountable, refusing to accept facile excuses about meritocracy and pipelines. Pointing to changes at Uber after public outrage over its sexual harassment scandal, Y-Vonne Hutchinson argues, "If we want more diversity in the tech industry and high-skilled sector in general, we need to demand it and put pressure on them."<sup>65</sup>

Racial and gender inequality in the workplace is a complex problem with no quick fix, and real solutions may require uncomfortable changes from currently privileged groups. The knee-jerk reaction is to retreat, but this is exactly the wrong response.<sup>66</sup> Our discomfort is not a problem but rather a measure of the seriousness of the issue and a necessary first step toward change. The way forward is not denial but concrete, committed action. Unless there is a systemic realignment of opportunities, rewards, and values in the tech industry, training individual women and minorities will do little to shift the culture. Coding by itself is not empowerment.

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