
DIVERSITY, SCIENCE / TECH, TOP 10 OF 2018

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Why Women Don't Code

written by **Stuart Reges**



Ever since Google fired James Damore for “advancing harmful gender stereotypes in our workplace,” those of us working in tech have been trying to figure out what we can and cannot

say on the subject of diversity. You might imagine that a university would be more open to discussing his ideas, but my experience suggests otherwise.

For the last ten months I have been discussing this issue at the Allen School of Computer Science & Engineering where I work. I have tried to understand why Damore's opinions generated such anger and have struggled to decide what I want to do in response. As a result of my attempts to discuss this, our mailing list known as 'diversity-allies' is now a moderated list to prevent "nuanced, and potentially hurtful, discussion." Instead, I have been encouraged to participate in face-to-face meetings that have often been tense, but which have helped me to understand where others are coming from.

I embarked on this journey because I worry that tech companies and universities are increasingly embracing an imposed silence, in which one is not permitted to question the prevailing wisdom on how to achieve diversity goals. I intend to fight this imposed silence and I encourage others to do the same. We can't allow the Damore incident to establish a precedent. Damore's twitter handle briefly claimed that he had been "fired for truth," but really he was fired for honesty. Those of us who disagree with current diversity efforts need to speak up and share our honest opinions, even if doing so puts us at risk.

Saying controversial things that might get me fired is nothing new for me. I've been doing it most of my adult life and usually my comments have generated a big yawn. I experienced a notable exception in a 1991 case that received national attention, when I was fired from Stanford University for "violating campus drug policy" as a means of challenging the assumptions of the war on drugs. My attitude in all of these cases has been that I need to speak up and give my honest opinion on controversial issues. Most often nothing comes of it, but if I can be punished for expressing such ideas, then it is even more important to speak up and try to make the injustice plain.

So let me go once more unto the breach by stating publicly that I believe that women are less likely than men to want to major in computer science and less likely to pursue a career as a software engineer and that this difference between men and women accounts for most of the gender gap we see in computer science degree programs and in Silicon Valley companies.

My Diversity Work

My friends advise me that only someone who has fought for diversity can discuss the state of the movement, so let me describe some details of my 32-year career teaching computer science. I worked for ten years at Stanford managing introductory computer science courses, receiving the Dinkelspiel Award for Outstanding Service to Undergraduate Education along the way. I spent eight years at the University of Arizona doing similar work where I won the College of Science Distinguished Teaching Award and the Honors College Outstanding Advisor Award. For the last fourteen years I have worked at the University of Washington where I manage introductory computer science courses, winning the Distinguished Teaching Award in 2014.

I have been a champion of using undergraduate TAs in introductory programming classes. I set up undergraduate TA programs at Stanford and Arizona that continue to this day and we have a thriving program at UW. I was co-author of an IEEE article entitled, “Broadening Participation: The Why and the How.” My work with introductory courses and undergraduate TAs factored into the selection in 2015 of UW as the inaugural winner of the Excellence in Promoting Women in Undergraduate Computing prize awarded by NCWIT (the National Center for Women & Information Technology).

In my years of teaching nothing has brought me more joy and sense of accomplishment than helping young people discover a love of computer science. Many of them have been men but more often they have been women. I have helped hundreds of women to learn to love computer science and for most it has been life changing.

As a result, I am absolutely convinced that for many years there have been—and even today still are—many women who have not yet discovered the bright future they can have in the field of computer science. Half of the women in our undergraduate major are ‘interest changers,’ which means they weren’t intending to apply to the major when they started our first course. For men the figure is closer to 20 percent, so there is a big gender gap.

In short, I have always been and continue to be a strong advocate of many aspects of the diversity agenda.

The Equality Agenda Versus the Equity Agenda

Arguments over diversity have been going on for decades at universities with bitter fights along the way over affirmative action, political correctness, and speech codes. These arguments have acquired renewed urgency as major tech companies have joined the fray in response to increased scrutiny from the media about the lack of diversity in their workforce.

No company has done more than Google to create and share resources in this space. They developed a popular workshop on unconscious bias that has been copied by many other organizations, and they extended those ideas to create a second workshop called “Bias Busters” that many universities have also adopted.

Like most of us who work in tech, I heard mention of these things but didn't take the time to investigate them. But when Damore was fired, I started looking more closely at the content of these workshops and I found much to criticize. In talking to professional staff who work in this area and students and faculty who are deeply committed to this issue, I have found that there are two visions of diversity and inclusion.

I favor what I call the ‘equality agenda’ in computer science. Advocates of the equality agenda want to see the most talented and passionate individuals joining us regardless of their life circumstances or unalterable characteristics. For us, diversity has its usual dictionary definition of having a variety of individuals, which implies racial, ethnic, and gender diversity but also political and religious diversity. Inclusion involves welcoming a broad range of individuals to consider pursuing computer science as a career. The equality agenda, then, is about encouragement and removal of artificial barriers.

Professionals and activists who work in this area tend to see it differently. For them, diversity involves a commitment to righting the wrongs of the past. Political and religious diversity are not on their list because they don't represent the immutable characteristics previously used to justify discrimination. They may concede that Damore's claim that Google has become an echo chamber might be an issue worth addressing, but they will deny that this is a diversity issue. By contrast, working with the LGBTQ community is important because of the historical oppression they have experienced even though there is no evidence that LGBTQ individuals are currently discriminated against in the field.

Their understanding of inclusion is also quite different. Inclusion is about culture, and in a twist worthy of Orwell, inclusion often demands the exclusion of ideas and opinions. Google's Bias Busters workshop trains people to intervene when they hear examples of bias. Microaggression training fosters inclusion by preparing people to recognize and eliminate small slights that could make some people uncomfortable. Google CEO Sundar Pichai used the word in this sense when he justified Damore's firing with the observation that, "It's important for the women at Google, and all the people at Google, that we want to make an inclusive environment."

The word 'equity' has the most variability in how it is understood. For example, Steven Pinker uses the term 'equity feminism' to refer to something similar to what I am calling the equality agenda. But among professionals and activists, 'equity' has the specific meaning of working to dismantle existing power structures as a way to redress privilege.

I refer to this combination of ideas as the 'equity agenda.' While the equality agenda focuses on equality of opportunity, the equity agenda is concerned with outcomes. Its proponents don't demand equal outcomes but instead use unequal outcomes as evidence that there is more work to be done. So, unless or until we reach perfect gender parity, they will continue to argue for more diversity programs for women.

Why So Much Anger?

When I tried to discuss Damore at my school, I found it almost impossible. As a thought experiment, I asked how we could make someone like Damore feel welcome in our community. The pushback was intense. My question was labeled an “inflammatory example” and my comments were described as “hurtful” to women. When I mentioned that perhaps we could invite Damore to speak at UW, a faculty member responded, “If he comes here, we’ll hurt him.” She was joking, but the sentiment was clear.

One faculty member gave a particularly cogent response. She said, “Is it our job to make someone with those opinions feel welcome? I’m not sure whether academic freedom dictates that.” She argued that because we know that women have traditionally been discriminated against, perhaps it is more important to support them because the environment will not be sufficiently inclusive if they have to deal with someone like Damore. She said it “is up to us” to decide, but that, “choosing to hold a viewpoint does not necessarily give you the right to feel comfortable.”

As Damore mentions in his essay, this issue has acquired a moral dimension, which is why the response is often anger. Jonathan Haidt, author of *The Righteous Mind*, has described this as elevating certain ideas to a sacred status. In this case, suggesting that men and women are different either in interests or abilities is considered blasphemy. So let me commit some blasphemy.

Men and Women are Different

As Sundar Pichai said in his memo to employees explaining why he fired Damore, “To suggest a group of our colleagues have traits that make them less biologically suited to that work is offensive and not OK.” This is a fairly egregious misrepresentation of what Damore actually

wrote, but fortunately we don't need to turn to biology or Damore for evidence that men and women are different. The gender diversity movement itself has spent the better part of 30 years cataloguing differences between men and women. Indeed, the entire goal of achieving gender diversity makes no sense unless you believe that men and women work in fundamentally different ways.

One of the earliest ideas I encountered was that men believe in their successes and discount their failures while women believe in their failures and discount their successes. If you attend almost any diversity event today you will hear that 'stereotype threat' and 'imposter syndrome' should be discussed with our students because women disproportionately suffer from these problems. Lack of confidence, therefore, is held to be a particular problem for women.

The diversity literature also discusses how men and women have different priorities, as in this passage from the seminal book *Unlocking the Clubhouse* by Jane Margolis and Allan Fisher:

A critical part of attracting more girls and women to computer science is providing multiple ways to “be in” computer science. Concern for people, family, “balance in life,” novels, and a good night's sleep should not come at the cost of success in computer science. But the full acceptance of this proposition cuts across the dominant culture of the field.

They claim that men have created a culture that matches their values and interests. How is that possible if men and women don't differ in fundamental ways?

Diversity advocates have also started claiming that diverse teams perform better. In a CNBC interview discussing her book *Own It: The Power of Women at Work*, Wall Street veteran Sallie Krawcheck said, “It's the qualities that women bring to the workforce—not better than the men, but somewhat different than the men—where our holistic decision making, our risk awareness, our relationship orientation skills that we tend to bring are becoming actually more valuable going forward, not less valuable.”

The Oppression Narrative

A dangerous narrative has been taking hold in recent years that the gender gap is mostly the fault of men and the patriarchal organizations they have built to serve their interests. Emily Chang's new book *Brotopia* asserts that, "the environment in the tech industry has become toxic for women," and that, "women have been systematically excluded from the greatest wealth creation in the history of the world and denied a voice in the rapid remolding of our global culture."

Chang and I clearly know different people because the women I talk to who are working in Silicon Valley are enjoying their experiences as software engineers. Certainly there are bad actors and companies where the culture is broken, but the vast majority of women work at companies that make significant efforts to provide a supportive work experience.

Another example of this false narrative comes from NPR's *Planet Money*, which produced a segment entitled "When Women Stopped Coding." They identify 1984 as the year that "something changed" and they highlight a theory that around that time the personal computer revolution was affecting college campuses. Young men were arriving who had used personal computers young women lacked because families disproportionately bought computers for boys. NPR claims that, "As personal computers became more common, computer science professors increasingly assumed that their students had grown up playing with computers at home," and includes an anecdote from a woman who had a bad experience in her introductory programming class. I don't doubt that this woman had a bad experience, but the claim that computer science faculty were gearing their courses towards men with prior experience is simply not true.

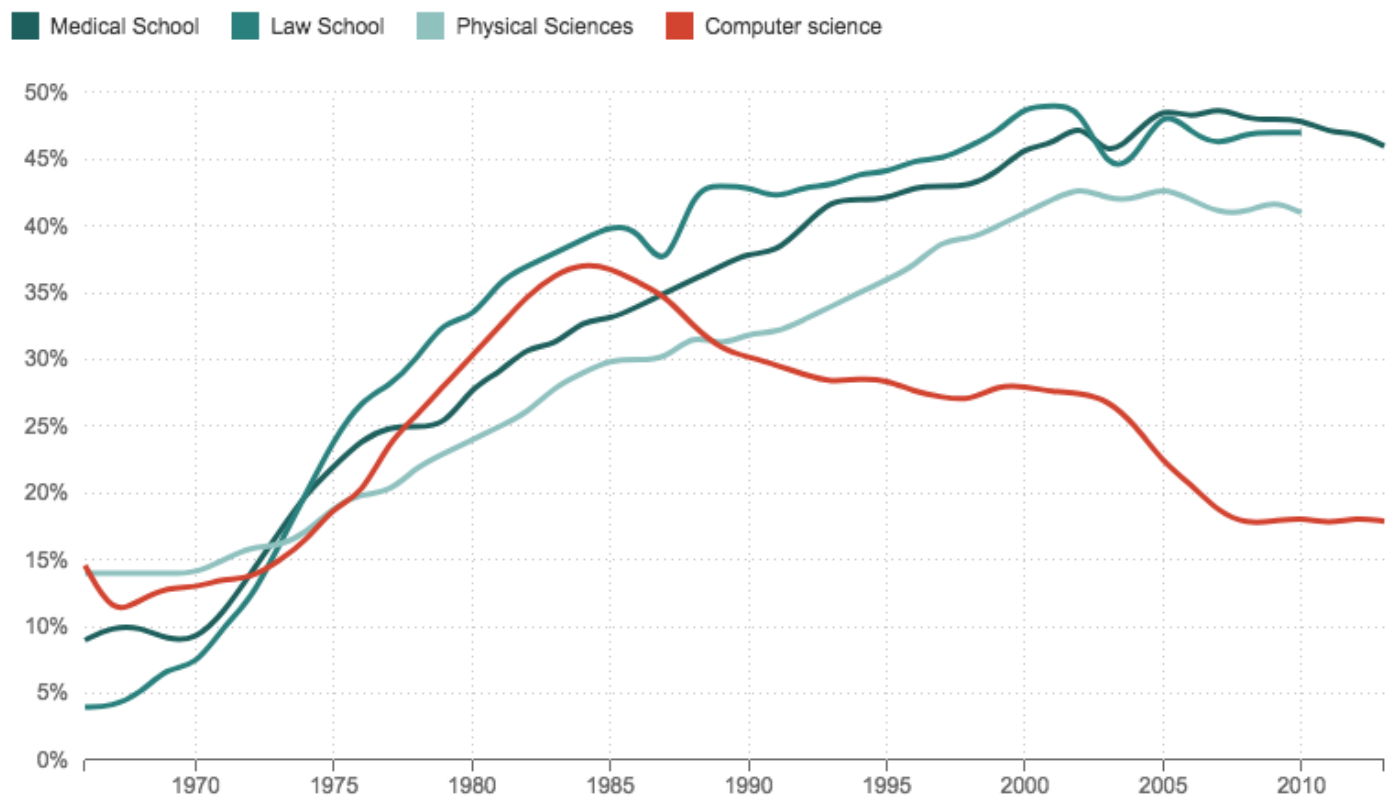
I ran the introductory programming courses at Stanford in the 1980s and I met regularly with faculty who taught introductory programming at other schools. We were on a mission to

make CS1 a universal course taken by a broad range of students. We loved Rich Pattis's 1981 book, *Karel the Robot*, because it was, as its subtitle claimed, "A Gentle Introduction to the Art of Computer Programming." Many schools were experimenting with new courses, new textbooks, and new programming environments, all of which were intended to make it easier for novices to learn how to program.

The NPR piece also noted that we have experienced a slow but steady decrease in women majoring in computer science since 1984, as indicated in the graph below.

What Happened To Women In Computer Science?

% Of Women Majors, By Field



Source: National Science Foundation, American Bar Association, American Association of Medical Colleges

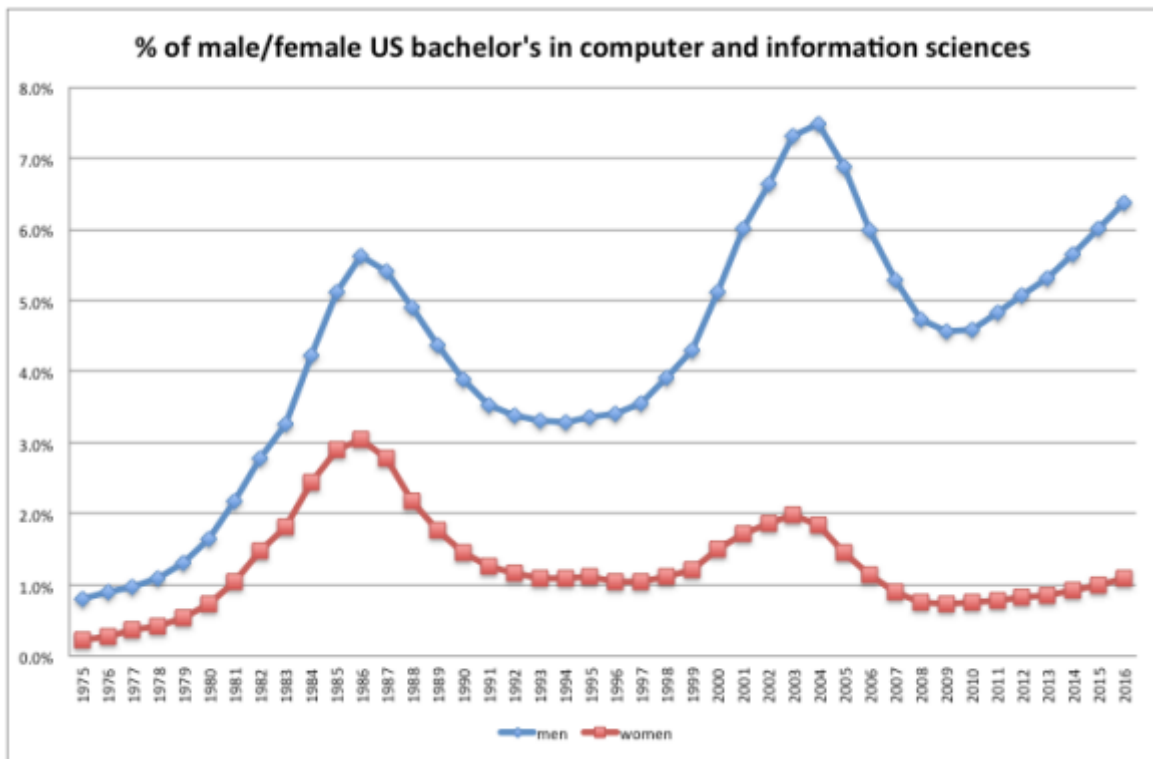
Credit: Quoc Trung Bui/NPR

Pictures help to tell stories and this one drives home the point that even as women were taking a greater share of slots in medicine, law, and the physical sciences, they represented a decreasing percentage of computer science degrees. This is consistent with the idea that women simply chose to pursue other interests, but NPR chose to highlight the suggestion that professors teaching introductory courses were creating courses unfriendly to women.

It's Complicated

The more I study the gender gap in computer science the more I become convinced that there are no simple answers. When I hear a claim or encounter a graph, I find that it takes a great deal of effort to drill down into the details and I almost always end up concluding, “It’s complicated.” This article would become a book if I were to drill down on everything, but the NPR graph provides a nice example of what you find when you dig into the data.

To better understand the level of interest by gender, I used data from the same source, the Digest of Education Statistics put out annually by the National Center for Education Statistics. I computed separate statistics for the percentage of men and women obtaining computing degrees, comparing men against other men and women against other women. A new pattern emerges in the resulting graph:



Graphing the data this way allows us to see a phenomenon that those of us who lived through these years understand all too well. Computer science has gone through two major boom and bust cycles in the last 40 years. The idea that men drove women from the field is not supported by the data. There has been no period of time when men have been increasing while women have been decreasing. In 48 of the last 50 years the trend was the same for men and women with the percentage of women going up at the same time that the percentage of men went up and the percentage of women going down when the percentage of men went down. But while the trend has been the same, the magnitude of the response has differed significantly.

In both cycles, men disproportionately reacted to the boom part of the cycle and women disproportionately reacted to the bust. And as the graph illustrates, men are once again responding faster and more forcefully to the new boom we are experiencing today. The cumulative effect of these differences has been devastating for the goal of increasing the participation of women in computer science.

We don't yet understand why men rush in during the boom years and why women turn away during the bust years, but it seems likely that multiple factors are at work. Men disproportionately respond to economic incentives, so they are more likely to respond favorably to reports of high salaries for tech workers. Women tend, on average, to be more risk averse, and are more likely to respond strongly to negative stories about dwindling job prospects in tech. Perhaps women also react differently to changes in messaging as

departments desperate to meet demand during the boom part of the cycle shift from an attitude of welcoming prospective students to one of pushing them away.

The Free Choice Explanation

I suggest a variation of Hanlon's Razor that one should never attribute to oppression that which is adequately explained by free choice. If men and women are different, then we should expect them to make different choices. In 2010, the National Academy of Sciences published a paper entitled "Understanding Current Causes of Women's Under-Representation in Science." As in the NPR piece, the authors describe the great success women have had in other fields:

Since 1970, women have made dramatic gains in science. Today, half of all MD degrees and 52 percent of PhDs in life sciences are awarded to women, as are 57 percent of PhDs in social sciences, 71 percent of PhDs to psychologists, and 77 percent of DVMs to veterinarians. Forty years ago, women's presence in most of these fields was several orders of magnitude less; e.g., in 1970 only 13 percent of PhDs in life sciences went to women. In the most math-intensive fields, however, women's growth has been less pronounced.

But they reject discrimination as an explanation:

We conclude that past initiatives to combat discrimination against women in science appear to have been highly successful. Women's current underrepresentation in math-intensive fields is not caused by discrimination in these domains, but rather to sex differences in resources, abilities, and choices (whether free or constrained).

In 2013, *Psychological Science* published a paper that explored this question further entitled "Not Lack of Ability but More Choice: Individual and Gender Differences in Choice of Careers

in Science, Technology, Engineering, and Mathematics.” The authors included Jacquelynne Eccles who is well known for a career spanning decades studying student motivation and gender differences.

They concluded that women may choose non-STEM careers because they have academic strengths that many men lack. They found that individuals with high math ability but only moderate verbal ability were the most likely to choose a career in STEM (49 percent) and that this group included more men than women (70 percent men). By contrast, individuals with both high math ability and high verbal ability were less likely to pursue a career in STEM (34 percent) and this group had more women than men (63 percent women). They write that, “Our study provides evidence that it is not lack of ability that causes females to pursue non-STEM careers, but rather the greater likelihood that females with high math ability also have high verbal ability and thus can consider a wider range of occupations.”

In 2018, another paper explored the same question from a different perspective using international data from the PISA survey (the Programme for International Student Assessment). Olga Khazan summarized the paper well in [an article for the *Atlantic*](#):

The issue doesn't appear to be girls' aptitude for STEM professions. In looking at test scores across 67 countries and regions, Stoet and Geary found that girls performed about as well or better than boys did on science in most countries, and in almost all countries, girls would have been capable of college-level science and math classes if they had enrolled in them.

But when it comes to their *relative* strengths, in almost all the countries—all except Romania and Lebanon—boys' best subject was science, and girls' was reading. (That is, even if an average girl was as good as an average boy at science, she was still likely to be even better at reading.) Across all countries, 24 percent of girls had science as their best

subject, 25 percent of girls' strength was math, and 51 percent excelled in reading. For boys, the percentages were 38 for science, 42 for math, and 20 for reading.

The study found that gender differences increased in countries that have greater gender equality as measured by the World Economic Forum's annual *Global Gender Gap Report*. They noted that countries with the highest gender equality tend to be "welfare states...with a high level of social security for all its citizens," which they believe can influence women's choices. They describe this as a paradox because it implies that the more progress we make towards achieving the equality agenda, the further we are likely to be from achieving the equity agenda. As Khazan says in the conclusion to her article, "it could just be that, feeling financially secure and on equal footing with men, some women will always choose to follow their passions, rather than whatever labor economists recommend. And those passions don't always lie within science."

I was curious to see how this relates to computing degrees, so I checked out the data for the top ten countries in terms of gender equality. Of the eight countries that include statistics for undergraduate degrees, the average percentage of women majoring in computing was 1.9 percent versus 8.2 percent for men. Taking into account the higher number of undergraduate degrees received by women, the Nordic countries which have the highest scores for gender equality (Iceland, Norway, and Finland) are producing computing graduates who are 18.6 percent, 17 percent, and 15.9 percent female, respectively. These percentages are very close to what we see in the United States.

Where Do We Go From Here?

I believe we have reached a significant crossroads in the campaign to increase the representation of women in tech. We have harvested the low-hanging fruit by eliminating overt discrimination and revamping policies and procedures that favored men. Now we more often focus on minutia such as replacing Star Trek posters with travel posters. And yet, the campaign has stalled.

At the University of Washington, we have managed over the last ten years to increase the percentage of women taking our first course from 26 percent to 41 percent and to increase the percentage taking the second course from 18 percent to 31 percent. In the early years, we were able to go from 16 percent women in our major to 30 percent, but we have made no additional progress since. I have heard from friends at Stanford that they have been stalled for several years at 30 percent and a colleague at Princeton reports that they are stuck in the mid-30s for percentages of women. CMU and Harvey Mudd have reported percentages at or above

50 percent, but they have a highly selective student body and have put special emphasis on tweaking admissions criteria and creating special programs for women in computing.

The sad truth is that UW, Stanford, and Princeton are among the best performing schools and part of that success is likely due to being a top-10 department. For most schools, the percentage of women is much lower. Over the last ten years the percentage of undergraduate computing degrees going to women nationwide has bounced around in a tight range, varying from 17.6 percent to 18.7 percent.

Computer science departments have never put more attention and resources into the diversity campaign than they have in the last few years, and we have seen a small but steady increase in the percentage of women choosing a computing major, going from 0.9 percent in 2008 to 1.1 percent in 2017. But at the same time, and with no special encouragement from us, the percentage of men choosing a computing major has also increased, going from 5.3 percent in 2008 to 6.4 percent in 2017.

I worry that lack of progress will make us more likely to switch from positive messages about women succeeding in tech to negative stories about men behaving badly in tech, which I think will do more harm than good. Women will find themselves wondering if they should resent men and men will feel guilty for sins committed by other men. Women are not going to find this message appealing and men will find themselves feeling even more awkward around women than they would be otherwise.

Our community must face the difficult truth that we aren't likely to make further progress in attracting women to computer science. Women *can* code, but often they don't *want* to. We will never reach gender parity. You can shame and fire all of the Damores you find, but that won't change the underlying reality.

It's time for everyone to be honest, and my honest view is that having 20 percent women in tech is probably the best we are likely to achieve. Accepting that idea doesn't mean that women should feel unwelcome. Recognizing that women will be in the minority makes me even more appreciative of the women who choose to join us.

Obviously many people will disagree with my assessment. I have already been told that expressing such ideas is hurtful to women. But it is exactly because I care so much about diversity that I value honesty above politeness. To be effective, we have to commit ourselves to a search for the truth and that search can succeed only if everyone feels comfortable sharing their honest opinions.

In the last ten months I have taken the time to talk to those who disagree with me. I welcome such conversations. I have strong opinions, but I also realize that I could be wrong. The big question is whether there is room in tech for a James Damore or for me when we question basic tenets of the equity agenda. I believe that the uproar over Damore's firing underscores how extreme his case was. This article will probably produce a big yawn like most of my other controversial stands over the years. If so, then I encourage all of the closet Damores out there to join the discussion and to let people know what you really think.

Stuart Reges is a Principal Lecturer at the University of Washington where he manages the introductory computer science classes at the Paul G. Allen School of Computer Science & Engineering.

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