The lack of women involved in technological professions and companies has always perplexed me. When other fields are male-dominated, it can be attributed to tradition, carried on from a time when many women had to stay at home with the children and were discouraged from working professional jobs once they got married. But computers emerged into the mainstream *after* the women's liberation movement. If masses of women were inspired by Betty Friedan telling them they could do any man's job just as well in the 60's and 70's, and the computer industry did not boom until the 80's, how come women were seemingly absent? The fresh market had no previous gender stigma attached — it was the perfect opportunity, and yet women were still cast out from the start.

Computer science is, intentionally or not, taught as a man's field. When I learned computer history, I learned that the computer was first envisioned by Charles Babbage, known as "the father of the computer". In December, I wrote a term paper for my digital media class arguing that it was in fact Vannevar Bush who came up with the idea of the modern computer. Upon research specifically of women in technology, I realized that neither is responsible for conceiving the machines we use today. The first to propose that idea was mathematician and writer Ada Lovelace, in her correspondence with Charles Babbage. She offered that Babbage's "computing machine" had potential to do more than just calculations, and while translating notes for Babbage, wrote the first ever computer program.

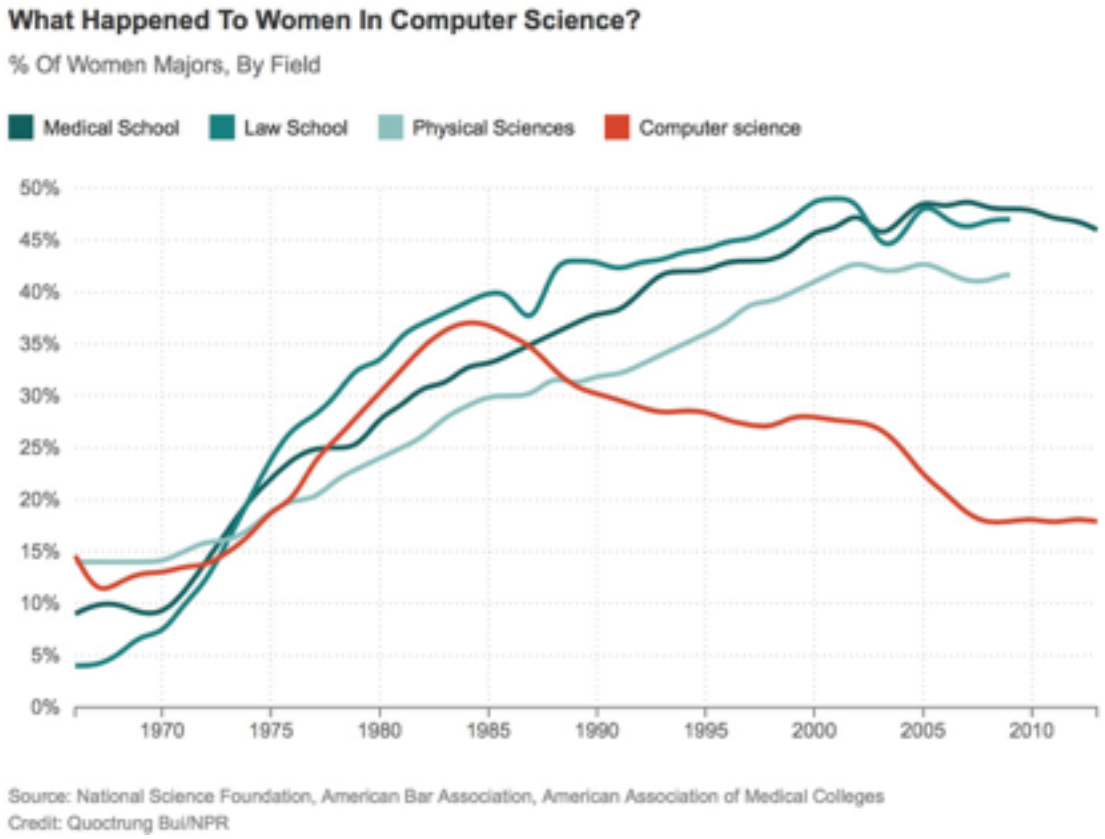
NPR did a special podcast in July called "When Women Stopped Coding". It featured an interview with programmer Elaine Kamowitz, who, in 1958, was hired to Elise Shutt's corporation CompInc., one of the first software companies in the world. Elise started the company when she left her full-time job working on the ENIAC to have a baby. She, Elise, and

several other early employees were all new mothers, doing freelance programming to keep their minds active. The company grew steadily, picking up women mostly by word of mouth, until they received widespread recognition in BusinessWeek in 1963. Throughout the span of CompInc. they were contracted by the U.S. government, the Army Corps of Engineers, and the U.S. space program.

When I looked up Computations Incorporated, information was few and far between. It seems that all that has been said about the company since the 1970s comes from interviews with its employees. The same goes for other revolutionary women in the field and their creations. Dina Vaughan St Johnston, after realizing there was little room to advance while working for early computing company Elliot Brothers, founded Vaughan Programming Services, the first software house in the United Kingdom. She programmed the first real-time train information system, a model still used today, and led her company to write the first software for the BBC. The history of these products and the company (now a part of General Electric— more on them later) is written, but Dina seems to receive minimal acknowledgement when they are. The same goes for Dame Stephanie "Steve" Shirley, founder of the all-female company Freelance Programmers, who spent eight years building computers from scratch and writing her own coding language.

When Britain's Sex Discrimination Act of 1975 forced Freelance Programmers to integrate, their 300 female employees could not have realized how it would impact their daughters. While the Civil Rights Act was a crucial American development, the female programming companies never recovered. Their names and stories dropped from computer culture, and soon after, the boys took over.

Men and women worked together on consolidating computers until they could be marketed to families. Television advertisements for computers featured men and boys, and when a family purchased one, these sexist expectations led to it being placed in the father or boy's room. Suddenly, what was once an even playing field had a bias, as boys were using the computer more at home and learning how it worked, leaving girls beginning their studies in information technology already a giant step behind their male classmates.



This graph displays the impact of such a disadvantage. While the rates of women graduating with degrees in other professional fields steadily increase, the line for computer science peaks in 1984. In the following 35 years, the percentage of female computer science graduates regresses to what it was in 1965. This is even more dramatic considering that from

1965 to 2015 women went from representing 38% of total college graduates to representing 57% (US Department of Education via The Boston Globe).

Upon studying this setback, in 1995 Allan Fisher and Jane Margolis from the Carnegie Mellon School of Computer Science started courses for students without former computer knowledge to catch up to their more experience peers. In 2000— within just five years of this class and a greater consciousness of the technological gender gap among staff— women went from comprising 8% of Carnegie Mellon computer science graduates to 42%.

Women like Ada Lovelace, Elise Shutt, Steve Shirley, and Dina St Johnson show the critical role women hold in the existence of modern technology. Yet with the latter three at the perfect age to be the *mother* of Steve Jobs or Bill Gates, the men became household names, whereas the women do not have widespread recognition, biographies, or even fair credit for their work in many cases. Their Wikipedia pages are scarce (a page does not exist for Elise Shutt or her company Computations Incorporated), and though Wikipedia is not the be all and end all of information, if a story is not told there, few people are exposed to it. With these women off the map, and only a rare occurrence of a female face representing a technological company, girls have few role models to look towards in the computer industry.

Of the S&P 500 companies, women make up only 4% of all CEOS. And of the 90 of these companies that are technology related, only five are headed by women (HP, IBM, Yahoo!, Oracle, and Xerox). This is *not* a coincidence, and this is *not* an ideation of intelligence or capability. This is an illustration of how women were swept from the center of the computer industry.

While girls were being societally discouraged from entering the field, boys received the opposite message. The lack of female role models allowed them to view technology as a domain they could control, and they subsequently started perceiving the act of coding or programming as a male activity, one that boys were just better suited for. For reasons both internal and external, promotions in computing companies became all but limited to men. In some cases, it was a conscious desire to keep women out of the field (a notion that sounds ridiculous, but that many women—both the ones discussed in this paper and my personal friends— have experienced). In others, it was a subconscious perception of women as less capable. This thought is difficult to pinpoint in the minds of the men who caused it, but the evidence of its presence is not.

As of 2013, among top technology companies, only 10% of all board members and 6% of executive officers were women (Morrissey, 2013 via ncwit.org). This is an astoundingly low percentage. It helps explain one of the other most shocking statistics regarding these women, which is that about 56% of women in technology leave their jobs mid-career, at twice the rate for men. However, only 20% of them leave the workforce, with the rest applying their training at other companies or switching to freelance jobs. The most common reason cited for quitting was "difficulties in accessing the more innovative tasks, assignments, and occupancies", meaning that women who start at the ground level of these companies are not getting offered opportunities for the projects and promotions they aspire to.

Aside is a list of the top positions held by men and women at major technological companies in 2014-15 (Dice). Though the job or creative appeal of each position may not be immediately clear on a broad basis, one factor is: Money. The salaries on the male side range

from $92,245 to $127,750; The salaries of top tech positions held by women range from $43,068 to $98,328.

This explains why a 2014 study by the center for Talent Innovation found that 31% of women in STEM feel “stalled” by their careers, and why so many women leave their companies.

The obstacles impeding progress for women in technology— both those faced by women and men— can be fixed by promoting more women into leadership positions in these fields. One company working towards this goal is Pinterest, who, one year ago, hired their first ever Head of Diversity, Candice Morgan. She is quoted saying "Diverse teams, in terms of demographics and thought, outperform homogeneous teams on innovation and problem solving,” and is helping Pinterest set and achieve goals in the diversity of their interviews and employees. They also launched an apprenticeship program, to “giv[e] engineers from non-traditional or underrepresented backgrounds new opportunities at Pinterest.” In their progress report on the year’s work, they wrote that they increased their hiring rate for women engineers from 21% to 26% and will strive to surpass 30% this year. Additionally, they increased their interns from 32% to 49% women. CEO Ben Silbermann reflects that it created a more inclusive, engaging, and creative environment.

Another company who has realized the gender gap in technology is General Electric. Its CMO Linda Boff says that one of her priorities is "to really make sure that a company like GE with goals of innovation and making the world a better place, is reflected in who we hire". The company aims to increase the number of women in their technological roles by 5,000 (36%) by 2020, and hopefully even reach a 50-50 hiring rate in their technical entry-level workforce by 2030.

However progressive these programs are, they are still battling in a world with mindsets and stereotypes holding women back from success. Many websites framed GE's goal as "discrimination against men". There was an overwhelming amount of commenters in consensus that the quality of GE's products would go down because of this decision, and that people should sell their stocks now. One man wrote that "The future of GE doesn't include me, so it won't include my purchases". Meanwhile I was struck by how these men getting upset at GE's proposal for gender equality were finally getting a taste of the institutional exclusion women in technology have been feeling since the 1970's. There was also a lot of discussion wondering how this decision could possibly be legal. It's purely shocking how people have become so used to looking at technology as a naturally male field to the point where 50-50 hiring reads as "discrimination".

The only way to change this mindset is through demonstration. For the women who do get hired to companies like GE and Pinterest, and to all technological companies, to prove themselves through their achievements and demonstrate the worthiness of their positions. For these women to work their way up in their companies, and become leaders that today's teenage girls can aspire to become. There is nothing inherently gendered about a computer, and Ada

Lovelace and all of her intellectual descendants have made it clear that women have the minds to push technology forward. For 40 years women have arguably been technological companies strongest workers; people who had to fight the status quo, assert their voices, and push through adversity along every step of the way to make it as far as their male counterparts. Encouraging companies to recognize this and start attempting to hire and promote women at an equal rate to men is not a call for a radical change— it is a call for a logical change.

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