

STRONG FEMALE LEAD

THE FASCINATING EVOLUTION OF PROGRAMMING AND THE FIGHT TO GET WOMEN BACK

IN THE 1960S WOMEN MADE UP ABOUT 50% OF ALL COMPUTER PROGRAMMERS, SO WHAT HAPPENED?

BY JANE PORTER

Since her 20-year-old daughter told her she was dropping her computer science major in college, Robin Hauser Reynolds has made it her mission to understand why the coding industry can be so unwelcoming to women.

Why is it that while 37% of U.S. college computer science grads in 1985 were women, today only 17% are?

Reynolds has talked to women coders, historians, neuroscientists, psychologists, and people working inside some of the biggest tech companies in Silicon Valley, looking for answers. The result is a documentary film, *CODE*, that recently raised more than \$86,000 through an Indiegogo campaign.

Reynolds and the film's coproducer, Staci Hartman, who also has a daughter in her 20s working in the tech industry, were driven by more than just personal connections. As they started investigating, the data they came across suggested this was more than just a women's issue.

The figure to convince them: the U.S. Bureau of Labor Statistics' projection that by 2020, there will be 1.4 million computer science jobs and only 400,000 computer scientists to fill them. "That's a million unfilled jobs," says Reynolds.

Why aren't women getting more involved in an industry where the need and growth potential is so great?

PROGRAMMING IS A RELATIVELY NEW PHENOMENON

Believe it or not, programming hasn't always been such a male-dominated field. The world's first computer programmers, according to historian Nathan Ensmenger, author of *The Computer Boys Take Over*, were six women who ran one of the first electronic computers, an ENIAC machine, at the University of Pennsylvania in the early 1940s. By the 1960s, women made up 30% to 50% of all programmers, according to Ensmenger, who appears in the film, *CODE*.

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At the time, programming was seen as the ideal career for women. Take, for instance, a 1967 article in *Cosmopolitan* magazine called "The Computer Girls," that makes a case for why coding is the perfect work for women:

"Now have come the big, dazzling computers —and a whole new kind of work for women: programming. Telling the miracle machines

what to do and how to do it. Anything from predicting the weather to sending out billing notices from the local department store. And if it doesn't sound like women's work—well, it just is."

How did programming as "women's work" become such a given in those early days? "The lack of a fully established scientific or engineering identity left space open for women," writes Ensmenger. As coding was professionalized from the 1960s onward, people in the industry started drawing connections to skills like chess playing and solving math puzzles, hence where the programmer-as-boy-nerd culture was born.

NEGATIVE STEREOTYPES CAN BE SELF-FULFILLING

Beyond investigating how programming became such a male-

focused field, Reynolds also unpacks some of the complicated issues around why women continue to avoid the industry.

Researchers have proven that negative stereotypes can negatively affect the performance of those people being stereotyped. Social psychologists call this phenomenon "stereotype threat," the psychological pressure from a negative stereotype that can actually damage performance. In a study of stereotype threat and women's performance on math tests, social psychologist Claude Steele and a team of researchers found that women who were told they were being tested for gender differences in math performance did significantly worse on math tests than women who weren't told about a gender comparison before taking the test.

"When women perform math, unlike men, they risk being judged by the negative stereotype that women have weaker math ability," the researchers write. It's this apprehension that can have a real negative effect on women's test-taking results.

Aliya Rahman, program director for Code For Progress, is no stranger to the challenges women have faced in the tech industry.

"There's this assumption that I brought the coffee," she says at one point in *CODE*.

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AMBIANCE MATTERS

Another factor to consider: The messages, subliminal or direct, sent to people in a coding or computer science space. Subtle cues can have a profound impact on people in a room. Researchers call this "ambient belonging."

In a study to test how stereotypical cues impact gender participation in computer science, researchers found that simply changing the objects in a university classroom from stereotypical computer science-related objects (*Star Trek* posters and videogames) to non-stereotypical items (nature posters and phone books) made a difference in the number of women in the room who expressed interest in majoring in computer science.

"Objects can come to broadcast stereotypes of a group, which in turn can deter people who do not identify with these stereotypes from joining that group," the researchers write.

That means the environment created through literal physical objects has an impact on people. At Google's headquarters, in order to try to fix this situation, a number of the conference rooms, which are named after scientists, were renamed so that male and female scientists were more equally represented. "Whether you're comfortable with your environment has a lot to do with performance," says Reynolds.

THE DANGERS OF IMPOSTOR SYNDROME

Another issue *CODE* takes on is impostor syndrome: The well-documented phenomenon in which even wildly successful people admit to feeling like frauds. Some of the greatest women leaders, of course, have fessed up to such feelings. Sheryl Sandberg, for example, has talked about a speech on impostor syndrome given by the research scientist Peggy McIntosh that changed her life. "I believe that had I not heard that speech, I would not have the job that I have," Sandberg told *Salon*.

"I'm not claiming that I feel self-confident all the time. To this day, I don't. But I can see and I can remember and I can take a step back, and when I'm about to not ask a question or not volunteer to do something, I can remember," she said.

Not all women, we know, are as ready to speak up as Sandberg. This can perhaps be one explanation why women often don't apply for jobs unless they meet 100% of the listed requirements, while men only need to meet 60% before they feel qualified enough to put their name in the running.

INNATE ABILITIES AREN'T THE PROBLEM

The question of men's innate ability in science and math over women may seem preposterous to many, but as Larry Summers proved, it's still out there. In *CODE*, Reynolds tries to dissect this issue. She talks with neuroscientist Jennifer Raymond, among others, who has studied gender biases in science. Raymond was interested in the

biases about competency that we possess and found that across 34 countries, 70% of men and women view science as more male than female.

It's not innate ability that makes us believe men are better in science and math than women, she says, it's deeply embedded cultural biases. There's no true way to measure differences in innate ability because those cultural biases and influences start taking effect almost immediately in a person's life. "It really starts with our bringing boys home in blue blankets and bringing girls home in pink blankets," says Reynolds.

IT'S A HEALTH AND SOCIAL HAZARD

One thing is certain—the shortage of women in science and technology jobs is problematic when it comes to understanding and meeting social needs through design. There are classic examples from the past that show the dangers of not having a diverse design team. When airbags were first developed, for example, the specs were designed with the average engineer's body in mind. With a group of all male designers that meant the first airbags were fatal to women and children, says Reynolds, who also examines why diversity in the coding industry is so crucial in her film. "You need a broad and diverse perspective at the design and coding level," she says.

Steps in the right direction are being made. Organizations like Code For Progress work with communities that have been historically excluded from technology development—women, people of color, low-income people, and LGBTQ individuals.

Hopefully by 2020, closer to 50% of those 1.4 million computer science jobs will held by women.

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