Torchbox

Breaking the Stereotype: Examining the Evolution and Persistence of Gender Bias in the Tech Industry

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About Me

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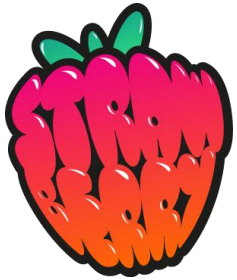
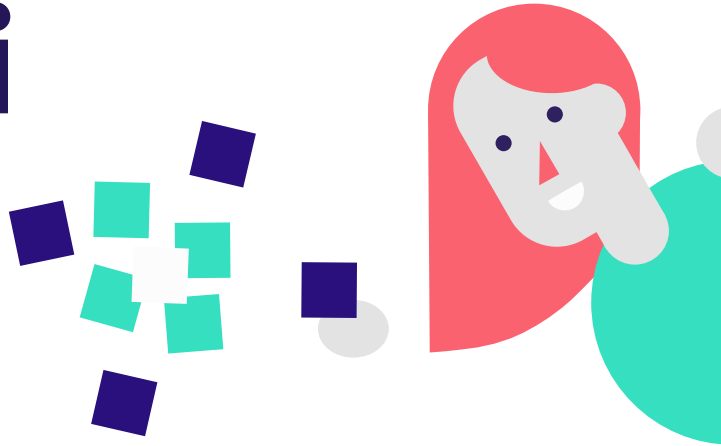
Python Italia

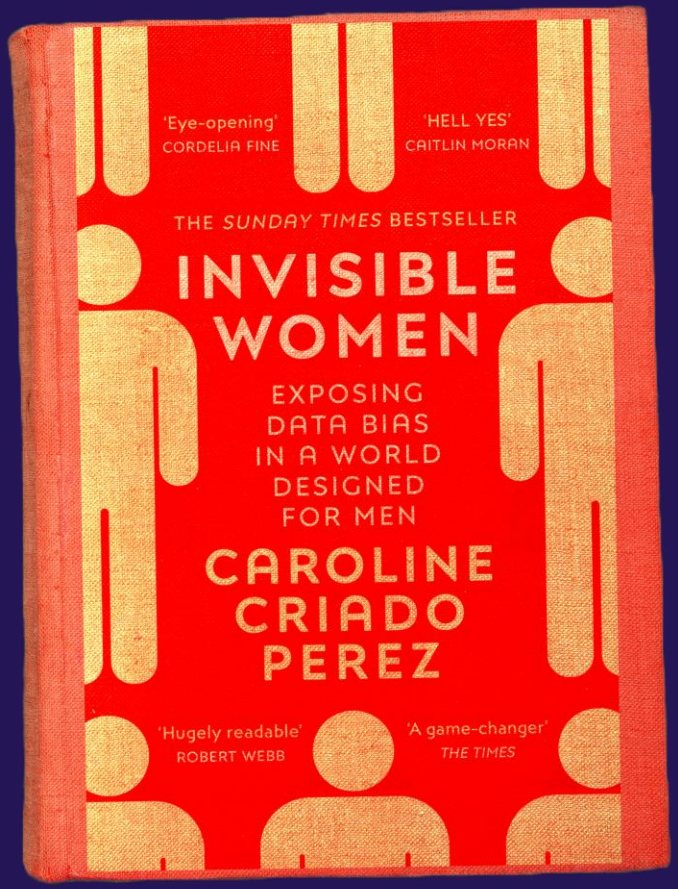


Strawberry GraphQL

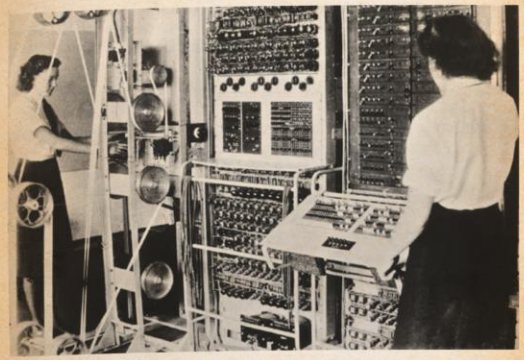
Wagtail



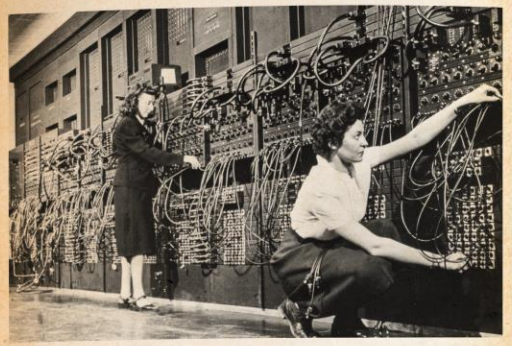
https://torchbox.com/careers/jobs


'Eye-opening'
CORDELIA FINE
'HELL YES'
CAITLIN MORAN
THE SUNDAY TIMES BESTSELLER
INVISIBLE WOMEN
EXPOSING DATA BIAS IN A WORLD DESIGNED FOR MEN
CAROLINE CRIADO PEREZ
'Hugely readable'
ROBERT WEBB
'A game-changer'
THE TIMES

Hamilton in 1969, standing next to listings of the software she and her MIT team produced for the Apollo project



Colossus operated by Dorothy Du Boisson (left), and an unidentified Wren.



Marlyn Wescoff [left] and Ruth Lichterman were two of the female programmers of ENIAC.

Grace Murray Hopper presiding over the programming group at Eckert-Mauchly Computer Corporation (EMCC), ca. 1949.

Grace Hopper with a UNIVAC computer 1961

The Computer Girls

BY LOIS MANDEL

A trainee gets $8,000 a year ...a girl "senior systems analyst" gets $20,000—and up! Maybe it's time to investigate....

Ann Richardson, IBM systems engineer, designs a bridge via computer. Above (left) she checks her facts with fellow systems engineer, Marvin V. Fuchs. Right, she feeds facts into the computer. Below, Ann demonstrates on a viewing screen how her facts designed the bridge, and makes changes with a "light pen."

Twenty years ago, a girl could be a secretary, a school teacher . . . maybe a librarian, a social worker or a nurse. If she was really ambitious, she could go into the professions and compete with men . . . usually working harder and longer to earn less pay for the same job.

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 woman's work—well, it just is.

("I had this idea I'd be standing at a big machine and pressing buttons all day long," says a girl who programs for a Los Angeles bank. I couldn't have been further off the track. I figure out how the computer can solve a problem, and then instruct the machine to do it."

"It's just like planning a dinner," explains Dr. Grace Hopper, now a staff scientist in systems programming for Univac. (She helped develop the first electronic digital computer, the Eniac, in 1946.) "You have to plan ahead and schedule everything so it's ready when you need it. Programming requires patience and the ability to handle detail. Women are 'naturals' at computer programming."

What she's talking about is *aptitude*—the one most important quality a girl needs to become a programmer. She also needs a keen, logical mind. And if that zeroes out the old Billie Burke-Gracie Allen image of femininity, it's about time, because this is the age of the Computer Girls. There are twenty thousand of them in the United *(cont. on page 54)*

Photos by Henry Grossman. Dress by Gino Charles.

The first page of "The Computer Girls" article by Lois Mandel in the April 1967 issue of Cosmopolitan.

Examining the historical and social context

Why women were dominant in early computing?

- While men were drafted during World War II, women took up technical roles
- Technical roles, including programming early computers like ENIAC and Colossus
- Post-war, those with experience had more opportunities in technical fields
- Programming was viewed as less prestigious than hardware engineering, a more traditionally masculine field
- The comparison of programming to clerical work, traditionally female-dominated, contributed to the feminisation of programming.

Underestimating the complexity of women’s work

There was already a gender bias in action within the computing industry, which led to underestimating the complexity of women's work.

Q: When you say you programmed the machine, did that mean physically that you took these plugs from one place and plugged them into another place?

[Ruth Lichterman]: Well, now, program means several things. . . . You got a problem, and you started with pencil and paper, and you decided how you were going to do this problem and which numbers went where. . . . [Y]ou drew a diagram of all this stuff and then you actually went on the machine, and we call that “plugging in” rather than “program.”

#SchittsCreek
I'VE SEEN THIS MOVIE BEFORE

Betty Holberton ♡

American computer scientist, one of the six original programmers of the first general-purpose electronic digital computer, ENIAC

Invented a technique involving stopping the machine in the middle of the program to check intermediate results...

Software gap– a growing crisis for computers

Shortage of programmers—and the fruits of their solitary art—is stunting growth of computer use and costing industry hard cash

The computer, man's most complex industrial product, can be cranked out in quantity by mass-production techniques. But it is powerless to solve problems, sort data, or store information without instructions.

The process of writing instructions—or programs—is a new human intellectual art, not a mechanical or electronic skill. And this factor is setting limits on the usefulness of the computer far below those imposed by electronic technology.

David B. Hertz, a consultant at McKinsey & Co., summed up the problem at an American Management Assn. meeting earlier this year: "The overriding issue is people—specifically, skilled computer personnel . . . Already, the supply is far short of the demand, and the gap is widening inexorably. For the foreseeable future, there is literally no possibility that we shall have enough trained people to go around."

The implication of this gap for business and science, he added, is

Flow-chart shows the program s

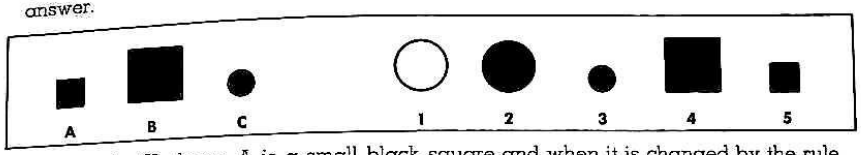
The software crisis

In the 1950s and became a popular business technology, leading to a high demand for skilled programmers to develop custom software.

INSTRUCTIONS FOR PART II

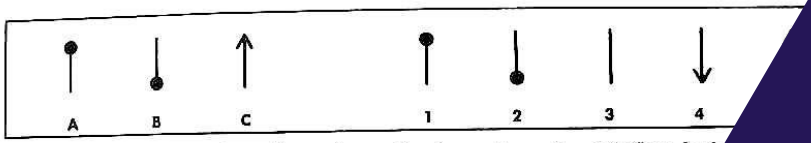
On the next four pages you will be given some problems like those on this page. Each row is a problem in which A is related to B in some way. You are to find the rule by which A is changed to make B. Then use the same rule to find how C should be changed. One of the numbered figures at the right side of the page is the correct answer.

W.



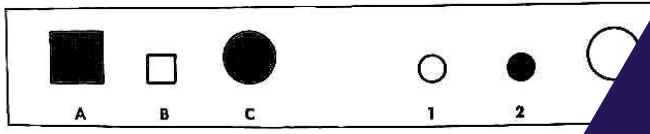
In Example W above, A is a small black square and when it is changed by the rule "make it larger," we have B. Now look at C. It is a small black circle and when it is changed by the rule "make it larger," the correct answer is Figure 2, which is indicated on your answer sheet.

X.



In Example X, the rule is "turn A upside down to make B." Now look
change it by the same rule it will look like 4, which has been marked
answer.

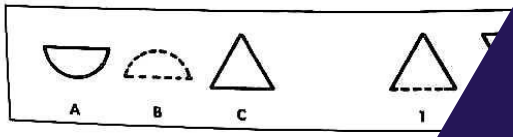
Y.



In Example Y above, the rule has two parts, "make A sm
Apply the rule to C and indicate the correct answer on

Now do Example Z below and indicate your answer

Z.



How to find good programmers?

The industry used aptitude tests and personality profiles to evaluate potential programmers.

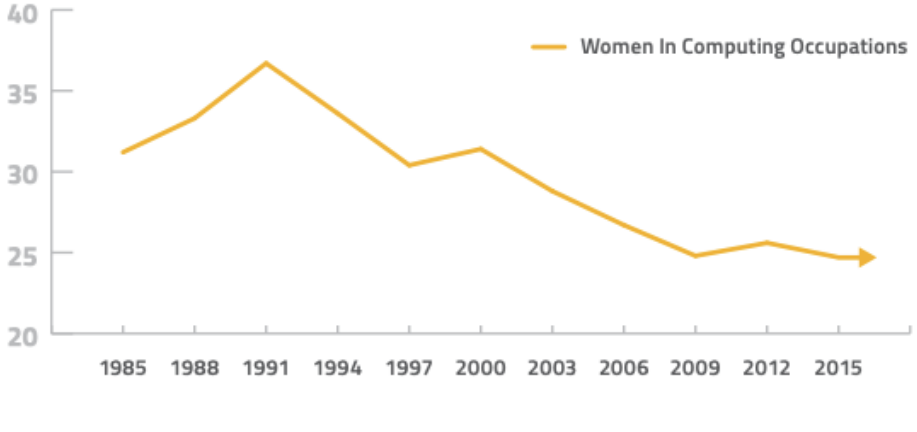
Criticisms of aptitude tests

The “boy hacker” icon

The definition of the stereotype of the "antisocial" or "nerdy" programmer: **a socially awkward male programmer obsessed with computers and coding**.

Percentage of Computing Occupations Held By Women Has Been Declining Since 1991

Tech industry's gender shift



©NCWIT. Bureau of Labor, 2016.

Stereotypes and biases in the tech industry today

Unconscious bias

Can lead to **unfair assumptions and missed opportunities**. Recognising and addressing these hidden barriers is essential for fostering a diverse and inclusive tech industry

Gender stereotypes

The lingering stereotype of the "antisocial" or "nerdy" male programmer may discourage women and other underrepresented groups from pursuing careers in tech.

These stereotypes can create a perception that the tech industry is not welcoming or inclusive, leading to self-selection bias where individuals from diverse backgrounds may opt out of pursuing tech careers.

The Case of LinkedIn

Gender bias in algorithms

In 2018, a study by the University of Southern California found that LinkedIn's search **algorithm was more likely to suggest male candidates for specific job titles than female candidates**, especially in male-dominated industries.

The company has since taken steps to address gender bias. However, a 2020 report found that its ad targeting system still showed bias towards male users. LinkedIn has responded by introducing new gender-based targeting options for advertisers.

The paradox of meritocracy

When a company emphasised meritocracy as a core value, men were offered higher bonuses on average compared to women with equivalent performance.

This highlights the importance of recognising and addressing hidden biases in organisations, as overconfidence in meritocracy can unintentionally worsen gender disparities.

Therefore, **company values are more than just words. They shape the organisation's culture and should be carefully evaluated to prevent such biases.**

Negative Impacts on Innovation

What are the consequences?

- Example: Facial recognition algorithms may be less accurate in identifying people with darker skin, leading to misidentification and discrimination.
- Example: Health technologies, such as wearable fitness trackers and health apps, may be less effective for women and people of colour.
- In general, lack of varied perspectives and approaches to problem-solving.
- Will result in less innovation and creativity in the industry, which can negatively affect society.

Why we need to fix the gender gap

Gender diversity is essential for creating a more inclusive and innovative workplace.
Companies that prioritise gender diversity reap significant benefits that contribute to their overall success.

Impact of on profitability

Why inclusion matters?

- companies in the top quartile for gender diversity on their executive teams were **25% more likely to experience above-average profitability** than companies in the bottom quartile

- companies with more gender diversity in technical roles had **higher levels of innovation and improved operational and financial performance**

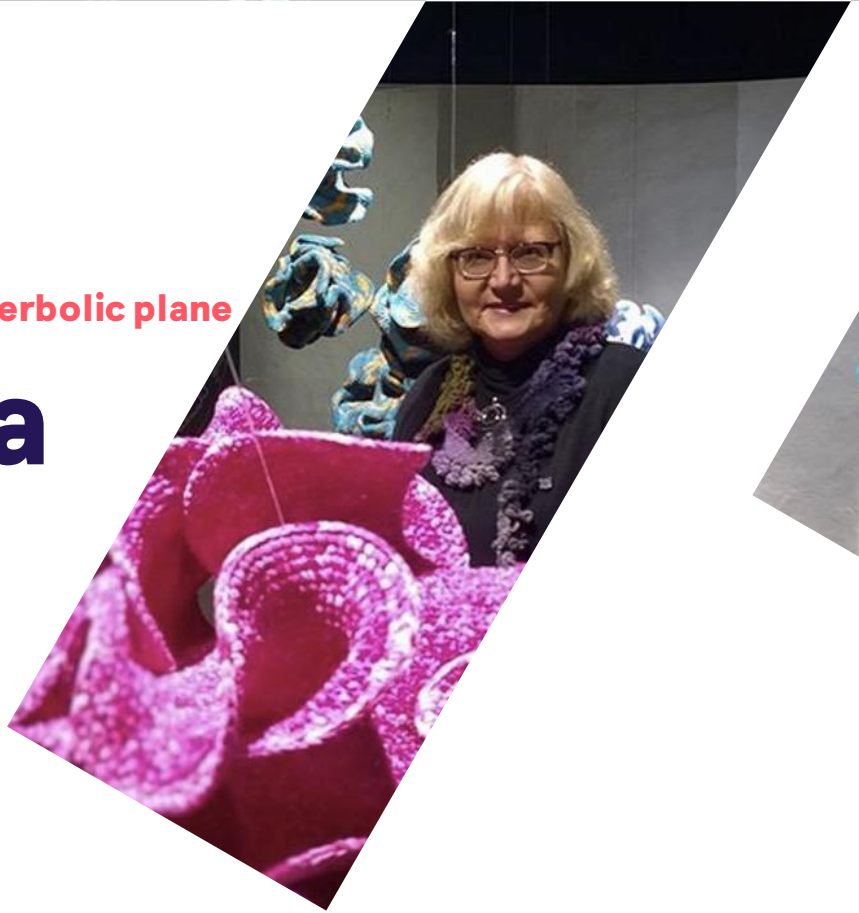
- Women bring unique perspectives, experiences, and skills to the table; they can **help to better understand and meet the needs of their diverse customers.**

...and because discriminate people is just wrong!

The example of Daina Taimiņa and the hyperbolic plane

DainaTaimiņa

Daina Taimiņa, a Latvian mathematician, used her crochet skills to create a physical model of the hyperbolic plane. This innovative approach **helped solve a long-standing mathematical problem and demonstrated the value of diverse perspectives and skills in problem-solving**.



What should we actually do in our organisation then?

Let's explore concrete steps we can take to address and interrupt these biases

Let's fix it!

The job description

Writing inclusive job descriptions is essential to attracting a diverse range of candidates.
By using gender-neutral language, focusing on essential qualifications, and emphasising a commitment to diversity and inclusion, organisations can create a more welcoming environment for all applicants, regardless of their gender.

Women and job requirements

Women often don't apply for jobs unless they meet all listed qualifications, while men will apply even if they only meet some.

To address this, **revise job descriptions to include only essential qualifications** rather than an extensive list of "nice-to-have" skills that may discourage qualified women from applying.

See @orangefreddyg's reel

Practical Steps

The hiring process

- **Use blind resumes:** Remove personal information, such as name and gender, before they are reviewed by hiring managers
- Develop a **set of standardised questions** that are asked to all candidates to help ensure fairness and consistency
- **Provide unconscious bias training to hiring managers** to help reduce its impact during the hiring process
- Ensure diversity on the interview panel: **Include individuals from diverse backgrounds** on the interview panel to help reduce the impact of unconscious bias.

Encourage STEM education

Empathising that there there are multiple valid ways to be interested in computer science.
Promoting diverse interest computer science by challenging the standard "boy hacker" icon.

https://www.youtube.com/@PythonItalia

Marlene Mhangami

Transcendence:
The Power of Representation

PYCON(IT) 23

Accelerate your career

With the Torchbox Academy

Mentorship programs

Mentorship programs can be a powerful tool in reducing the gender gap.
At Torchbox, we offer the Torchbox **Academy program**, which provides hands-on experience in our tech or digital marketing team.

Building inclusive workplaces

Preaching diversity isn't sufficient. To truly thrive, we must foster an environment where everyone feels heard and respected. Ignoring harassment or discrimination is not an option, even if it's uncomfortable. We must address these issues head-on, promote open dialogue, and create a truly inclusive workplace.

PYCON(IT) 23

Ester Beltrami

Workplace culture is not a fashion trend!

https://www.youtube.com/@PythonItalia

Resources...

- **What Programming's Past Reveals About Today's Gender-Pay Gap – The Atlantic** http://bit.ly/3zQ93uQ
- Ensmenger, Nathan L. (2010), **The Computer Boys Take Over: Computers, Programmers, and the Politics of Technical Expertise**, Cambridge MA
- Layne, K., & Buys, L. (2012), **Recoding gender: Women's changing participation in computing**, Stanford University Press
- Newitz, A. (2019, February 13), **The Secret History of Women in Coding**, The New York Times Magazine. https://nyti.ms/3Ku0n25
- Prechelt, L. (1999). **The anatomy of a design problem: Gender bias in the evaluation of the quality of software design**. http://bit.ly/3zNcKBB
- National Center for Women & Information Technology, (2016), **Women in Tech: The Facts (2016 Update).** http://bit.ly/4006Jfh

… and other Resources

- Castilla, E. J., & Benard, S. (2010), **The paradox of meritocracy in organizations**, Administrative Science Quarterly, 55(4), 543-676. http://bit.ly/3MFQtNx

- Xaquín G.V. (2017, Oct 26). **Can we talk about the gender pay gap?** The Washington Post. https://wapo.st/3UyI7ZV

- Williams, J. C., & Multhaup, M. (2014, October). **Hacking tech's diversity problem. Harvard Business Review**. http://bit.ly/412DHgh

Thank you!

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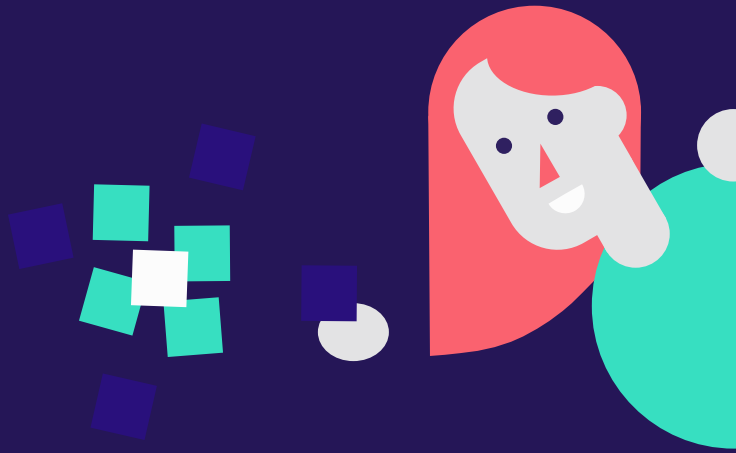

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