

GENDER DIVERSITY IN COMPUTING

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International Women's Day, 6 March 2015



WOMEN IN THE TECH INDUSTRY

<https://github.com/triketora/women-in-software-eng> (October 2014)

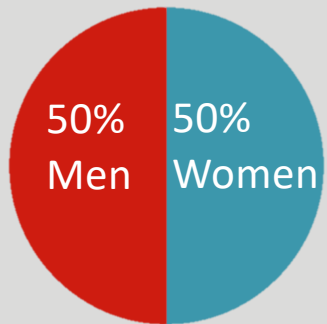
Google	17%	Etsy	13%	Activision	3%
Apple	20%	Zendesk	18%	Tapad	3%
Facebook	15%	POPSUGAR	17%	Perforce	13%
Twitter	10%	Monetate	17%	Venmo	16%
Microsoft	17%	SurveyMonkey	17%	Rent the Runway	22%
Yahoo	15%	Capsher Technology	7%	Manilla, LLC	31%
LinkedIn	17%	Elemental Tech	1%	Inkling	3%
Pandora	18%	Rdio	1%	Quora	11%
Pinterest	21%	Dropbox	1%	Supply Measured	17%
HP	18%	HubSpot	1%	TheLadders	17%
Pinterest	17%	Practice Fusion	17%	uSwitch, London	3%
New Relic	20%	Airbnb	13%	Khan Academy	26%
GitHub	6%	Rhapsody	18%	Outpace Systems	10%
Yelp	8%	Wikimedia Found	11%	HootSuite	15%
Dropbox	9%	foursquare	7%	Yahoo	10%
Qualcomm	6%	Gilt	10%	Redfin	23%
Mozilla	9%	Quantcast	13%	Edmodo	2%
ThoughtWorks	24%	Guidewire Software	17%	thoughtbot	11%

14.88%

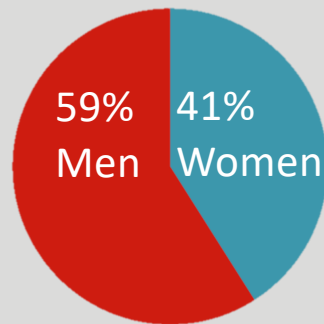
WHY SO FEW WOMEN?

~~Men are innately better programmers than women are~~

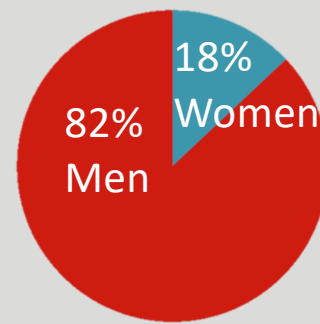
~~Women are much less interested than men in computing~~



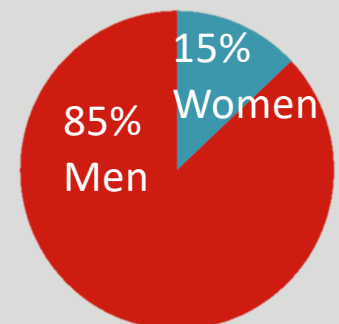
Grade School (Math)



University (Technical)



University (Computing)



Workplace (Computing)

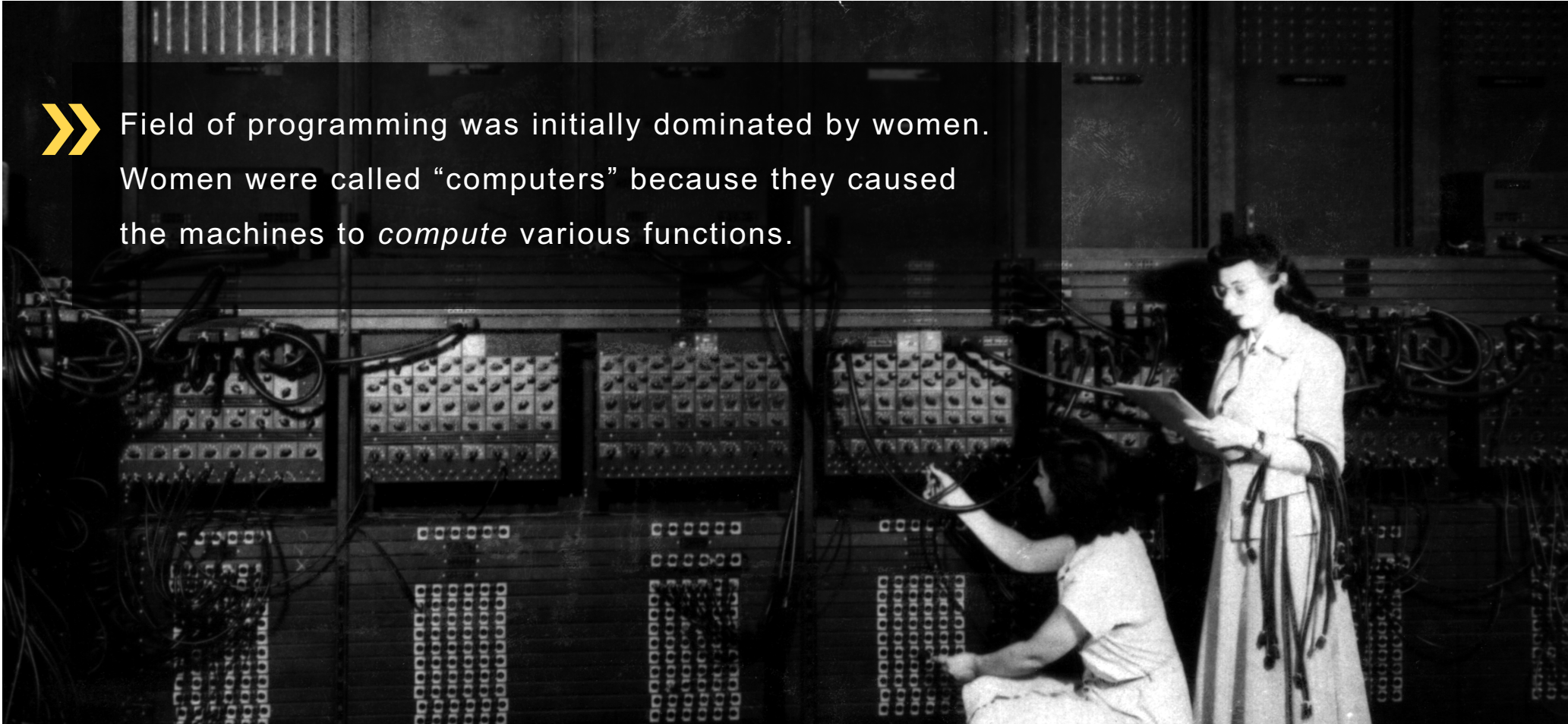


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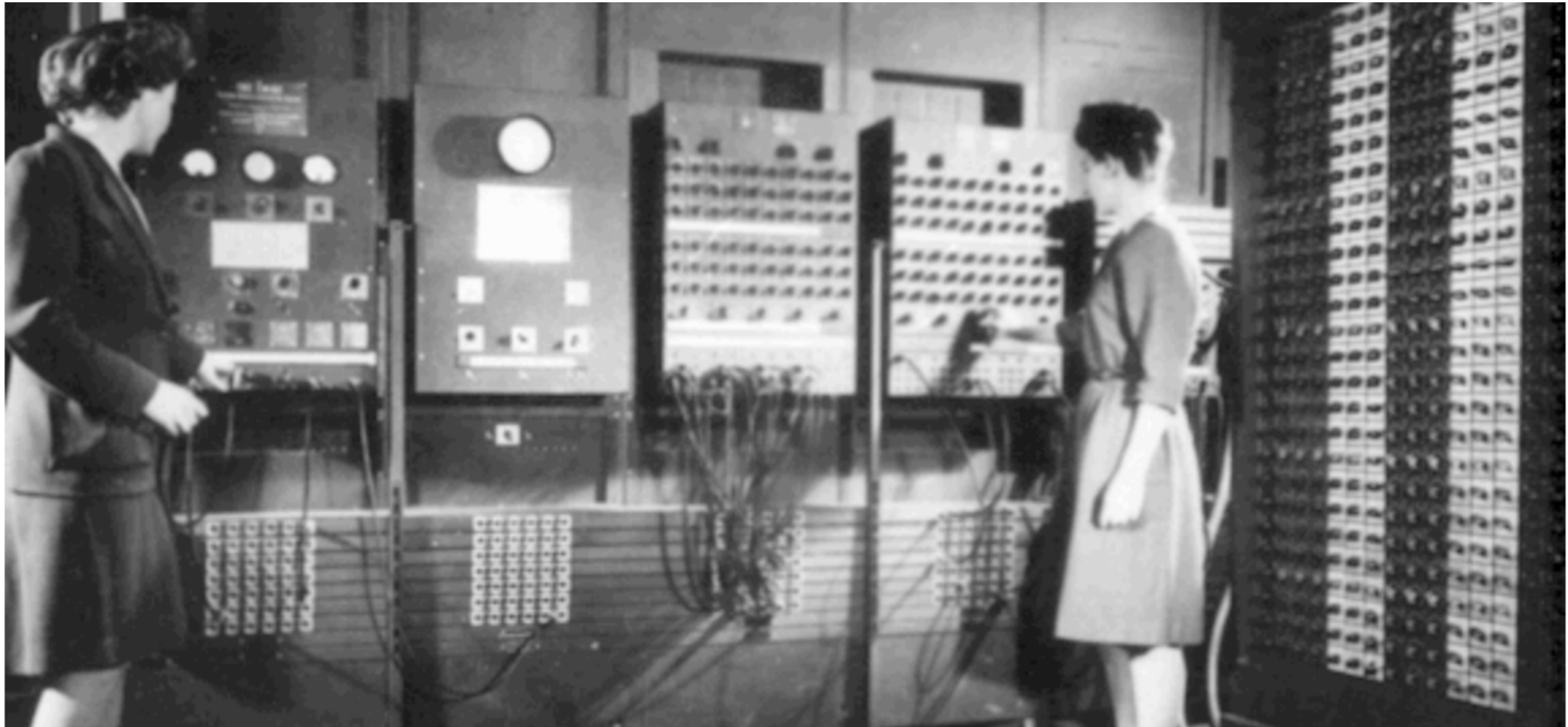
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» Field of programming was initially dominated by women. Women were called “computers” because they caused the machines to *compute* various functions.



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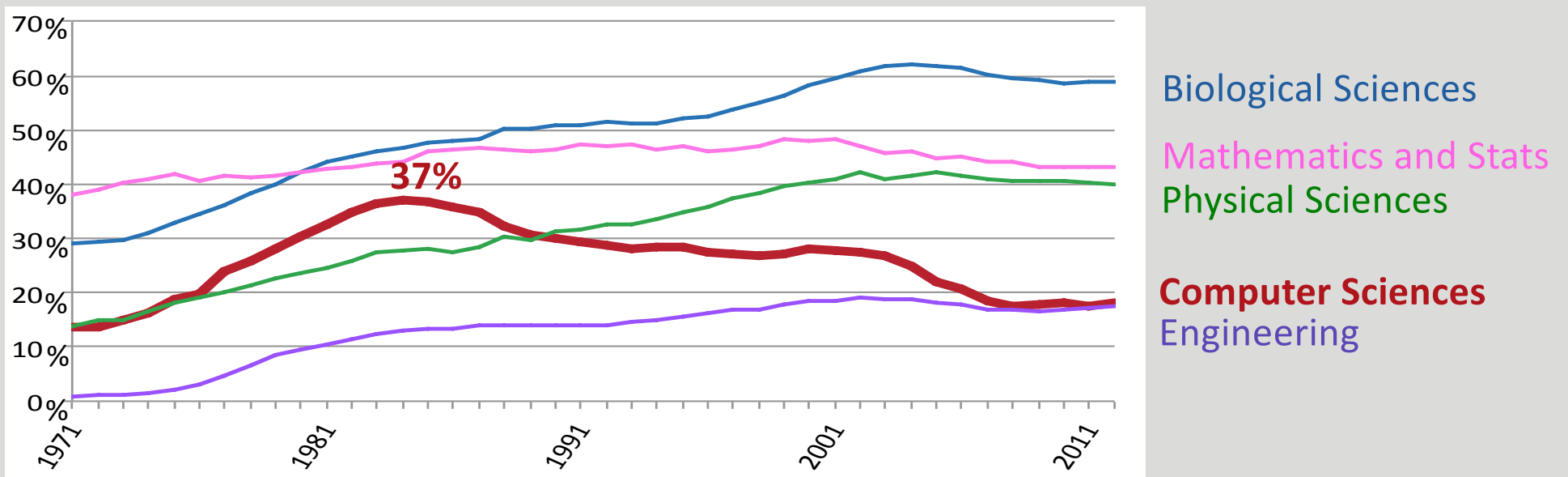


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WOMEN IN UNIVERSITY CS PROGRAMS

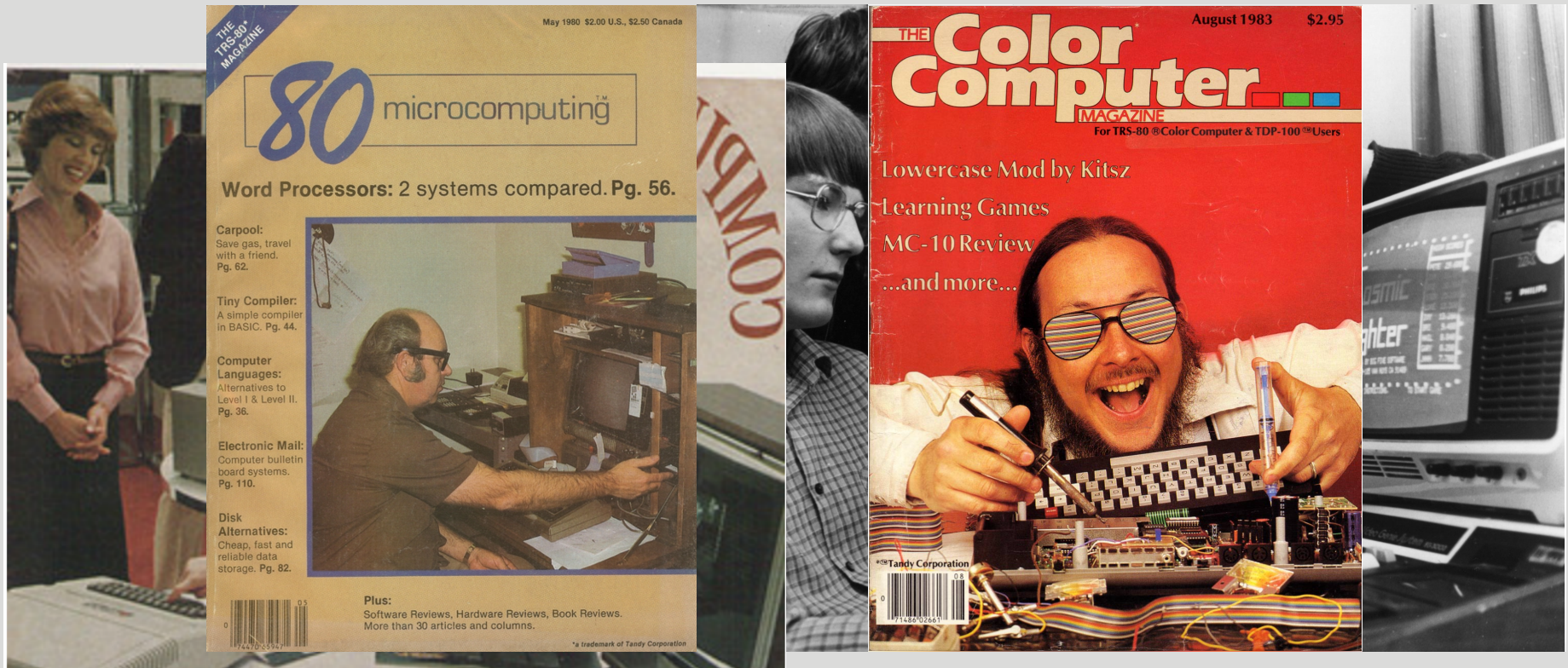


http://nces.ed.gov/programs/digest/2013menu_tables.asp

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DECLINE OF WOMEN IN CS



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»» Nowadays, social media, rather than computer games, is the gateway to heavy usage of computers.

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WOMEN CATCH UP

- Start university with less programming experience
- Report nearly equal mastery of programming concepts after intro courses
- Have equal CS GPAs on graduation

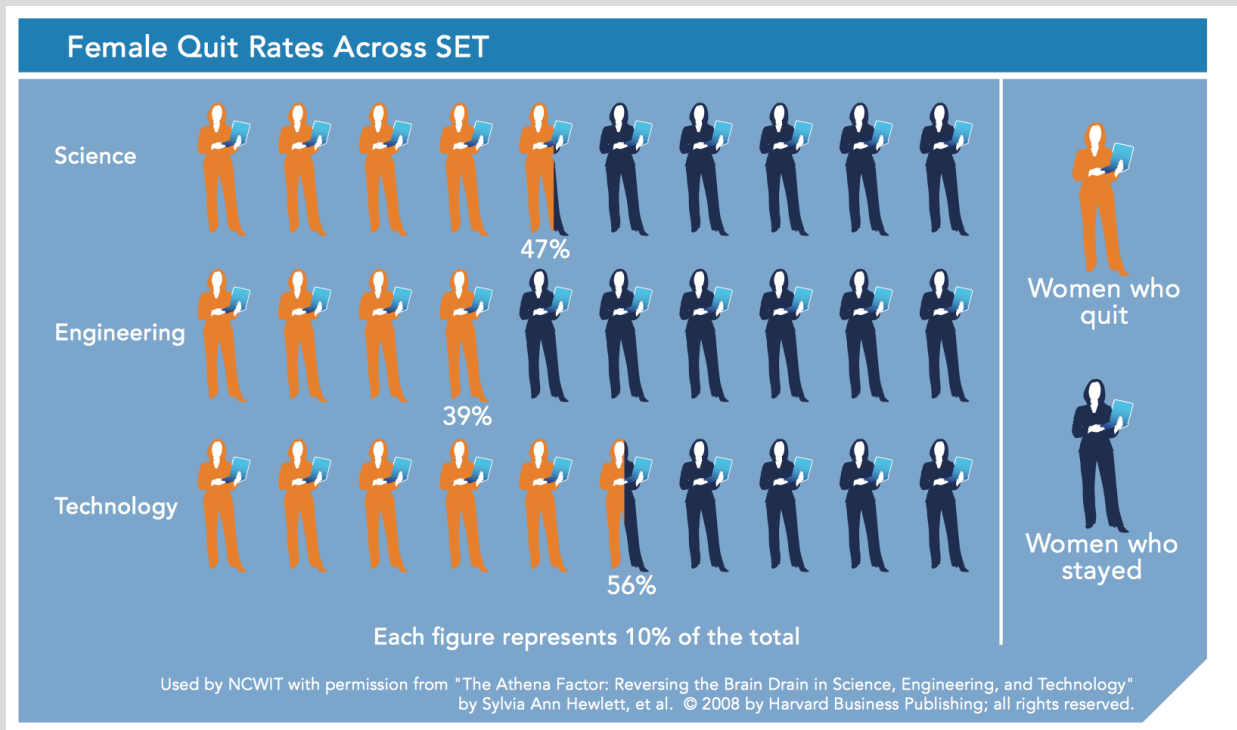


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RETENTION PROBLEM



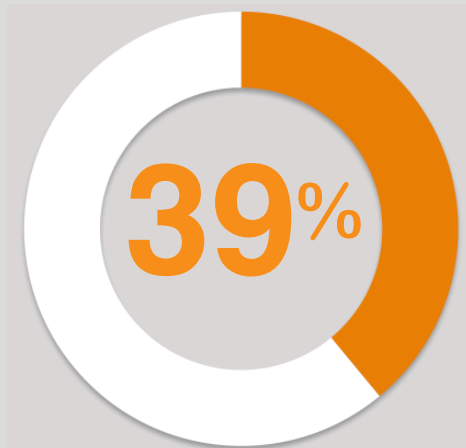
Women
leave the
field at twice
the rate that
men leave



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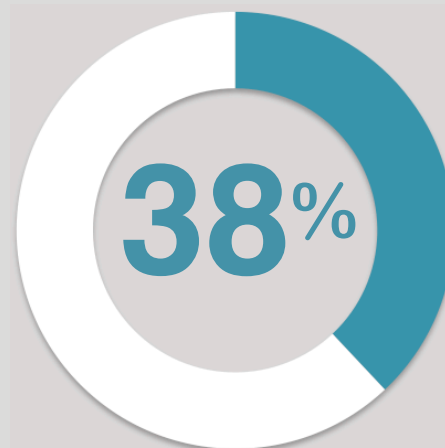


WHY WOMEN LEAVE



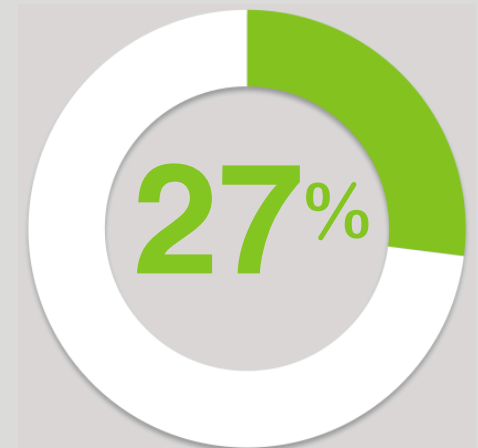
Working Conditions

too many hours, too much travel, be available 24/7



Hostile Culture

feeling isolated, unwanted attention, excluded from "old boy's network"



Compensation

no advancement, low salary, career stalled

SYSTEMIC DISCRIMINATION

- Hiring and promotion
 - » male *and female* managers are more likely to hire a man for a technical position
 - Reuben et al. “How stereotypes impair women’s careers in science”, *Proceedings of the National Academy of Sciences*, 2014
 - Yurkiewicz, “Study shows gender bias in science is real,” *Scientific American*, 2012



SYSTEMIC DISCRIMINATION

- Salary
 - » gender gap in salary for technical positions (e.g., software architect, software engineer)
 - Goldin, “A Grand Gender Convergence: Its Last Chapter”, *American Economic Review*, 2014.
 - <http://www.payscale.com/data-packages/gender-wage-gap/job-distribution-by-gender>

SYSTEMIC DISCRIMINATION

- Performance evaluation
 - » male *and female* managers are more likely to evaluate male employees more favourably, constructively
 - *Williams, "Hacking Tech's Diversity Problem", Harvard Business Review, 2014.*
 - *Castilla et al., "The Paradox of Meritocracy", Administrative Science Quarterly, 2010*



SYSTEMIC DISCRIMINATION

- Fewer opportunities for advancement
 - » technical men are 2.7 times more likely to hold high-level positions than technical women
- Implicit Bias
 - » unintentional, deep-seated bias



“BROGRAMMER” BEHAVIOUR

- public sexual jokes and innuendo
- networking socials in strip clubs
- “booth babes” at trade shows
- boorish come-ons, sexual harassment
- online bullying and threats against women who speak out against sexism and misogyny



WHY IS DIVERSITY IMPORTANT?

Ethically – creative, interesting, and lucrative tech careers should be open to women and minorities

Economically – companies with greater racial and gender diversity have greater

Innovation – diversity adds multiple perspectives to problem solving and product design; improves innovation

Sales revenue, Number of customers, Relative profitability, Relative market share, Return on invested capital

- McKinsey & Company, “Women Matter” series, 2007, 2008, 2010, 2011, 2012, 2013, 2014
- *McKinsey Quarterly*, “The Differentiated Power of Diversity: Companies that Embrace Diversity Perform Better and Drive Growth”, 2004
- *Harvard Business Review*, “Does Diversity Drive Profitability and Market Growth?”, Center for Innovation, 2013
- *Sociological Review*, 2009



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DIVERSITY ENHANCES PERFORMANCE

Strongest Correlation	Moderate Correlation	No Correlation
Average social intelligence of group members	Average intelligence of group members	Group cohesion
Equal distribution of how often each member speaks	Maximum intelligence of group members	Motivation
Proportion of females in the group		Satisfaction

- *Hong and Page, "Groups of Diverse Problem Solvers can Outperform Groups of High-ability Problem Solvers", National Academies of Science, 2004*
- *Woolley et al., "Evidence for a Collective Intelligence Factor in the Performance of Human Groups", Science, 2010.*



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CRITICAL MASS (15%-35%)

Skewed group (15% vs 85%)

- dominants control the group and its culture
- members of underrepresented type treated as “tokens”

Tilted group (35% vs 65%)

- dominants are simply a “majority”
- minority members can influence group’s culture
- minority members are individuals rather than tokens

Balanced group (40% vs 60%)

- “majority” and “minority” are simply potential “subgroups”
- issues centre around other structural and personal factors

• *Kanter, Men and Women of the Corporation, Basic Books, 1977*



WHAT YOU CAN DO TO HELP

- Speak out against sexist behaviour that you witness
- Draw attention to your company's demographics
- Advocate for a Code of Conduct at work, at conferences
- Request (management) training on diversity, sexism, racism, and explicit and implicit bias
<https://www.youtube.com/watch?v=nLjFTHTgEVU>
- Create teams that have a critical mass of females
- Promote good work that is done by women



HOPEFUL FOR THE FUTURE

Positive trends in

- girls' participation in computing activities, camps
- percentage of females in university computing courses, programs
- corporate goals in hiring, retaining, and promoting women in tech

