How to stop driving women out of computing

What happens in your backyard matters!

Panelists

Sarita Adve, Illinois

James Allan, UMass Amherst

Kathryn S McKinley, Google

Bobby Schnabel, Colorado

Moshe Vardi, Rice

Fostering Research Integrity

National Academies 2017

objectivity

honesty

openness

accountability

fairness

stewardship

Fostering Research Integrity

National Academies 2017

objectivity
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stewardship

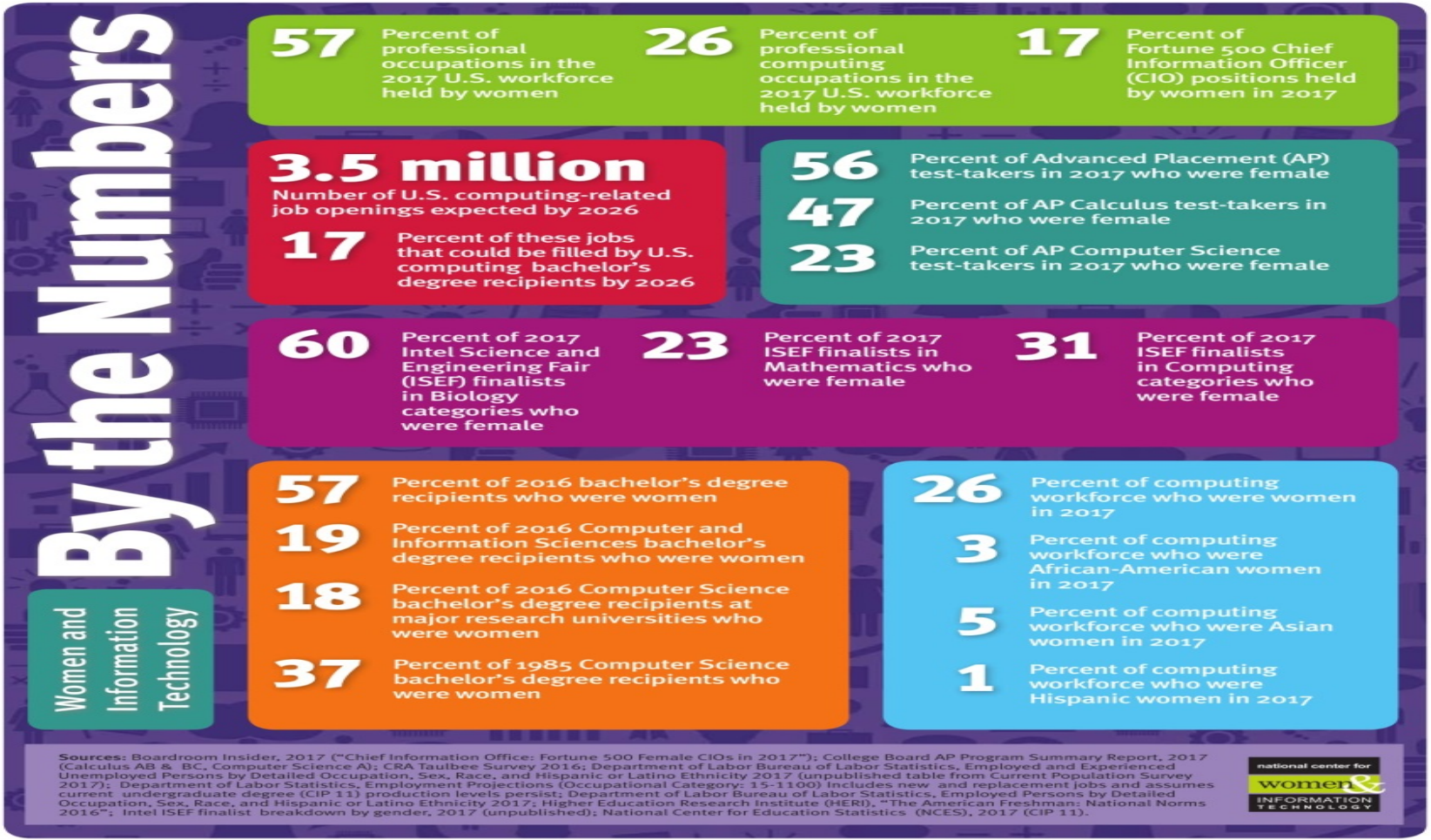
bias, sexism,
gender & sexual harassment
do not fit in

Format: 2 Sections with discussion

1. Driving women out
   Climate
   Harassment
2. Bias in research evaluation
   Data on societies, conferences, and awards
   Mobilizing your community

How We Lost the Women in Computing

Moshe Y. Vardi
Rice University



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Common Perception

“Women are just not interested in computing”

- James Damore, 2017: “The distribution of preferences and abilities of men and women differ in part due to biological causes and these differences may explain why we don’t see equal representation of women in tech and leadership.”
- Stuart Reges, 2018: “Men and women are different, and they make different choices. The different choices they make explain a lot of what we see in terms of lower percentages of women going into tech.”

Women in Computing - History

Reality

- Women were pervasive, even dominant, in the early days of computing.
- The social environment of computing has been and is quite hostile for women.
- Men can be quite oblivious to the existence of such a hostile environment.
- Women did not just leave, they were pushed out.

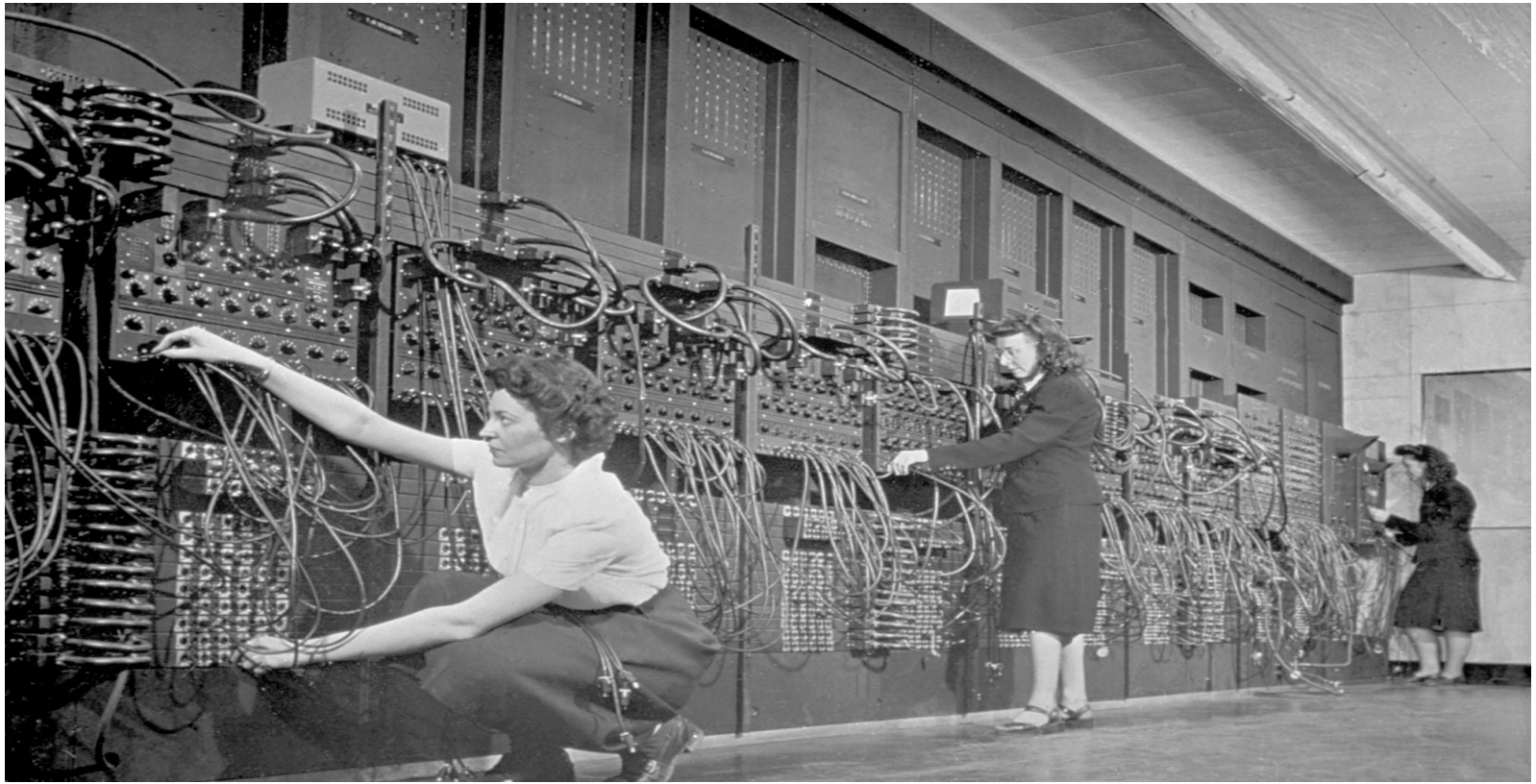
Bletchley Park - WWII

- About 8,000 women worked in Bletchley Park. Women constituted roughly 75% of the workforce there.

Code Girls, 2017

- Over 11,000 women, who comprised more than 70% of U.S. code breakers, served during WWII.

ENIAC, 1946



Women of NASA -- 1955

Cosmopolitan, 1967

“A whole new kind of work for women.”

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)

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.

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

Programmed Inequality, 2017

- The British Civil Service sought to create a job category designed to deskill workers and depress wages – creating an intentional gender wage gap.
- “It is evident to common sense that women workers do not regard their career as offering an alternative career to marriage and motherhood”.
- As late as the 1980s, computer trade shows in the UK still used scantily clad young women as marketing gimmicks on their stands.

Brotopia, 2018

"A well-researched history of how Silicon Valley became a glorified frat house":

- Discriminatory hiring practices
  - Documented by a recent Stanford Study
- Continual micro-aggressions and challenges that are hard to pinpoint and harder to call out
- women's ideas more harshly scrutinized; female engineers 35 % more code rejections
- Sexual harassment and online trolling

Mark Zuckerberg and his cofounders moved from Harvard to Palo Alto, California, in March 2004. The whole enterprise began as something of a lark. SCOTT BEALE

BACKCHANNEL 07.18.18 07:00 AM

SEX, BEER, AND CODING: INSIDE FACEBOOK'S WILD EARLY DAYS

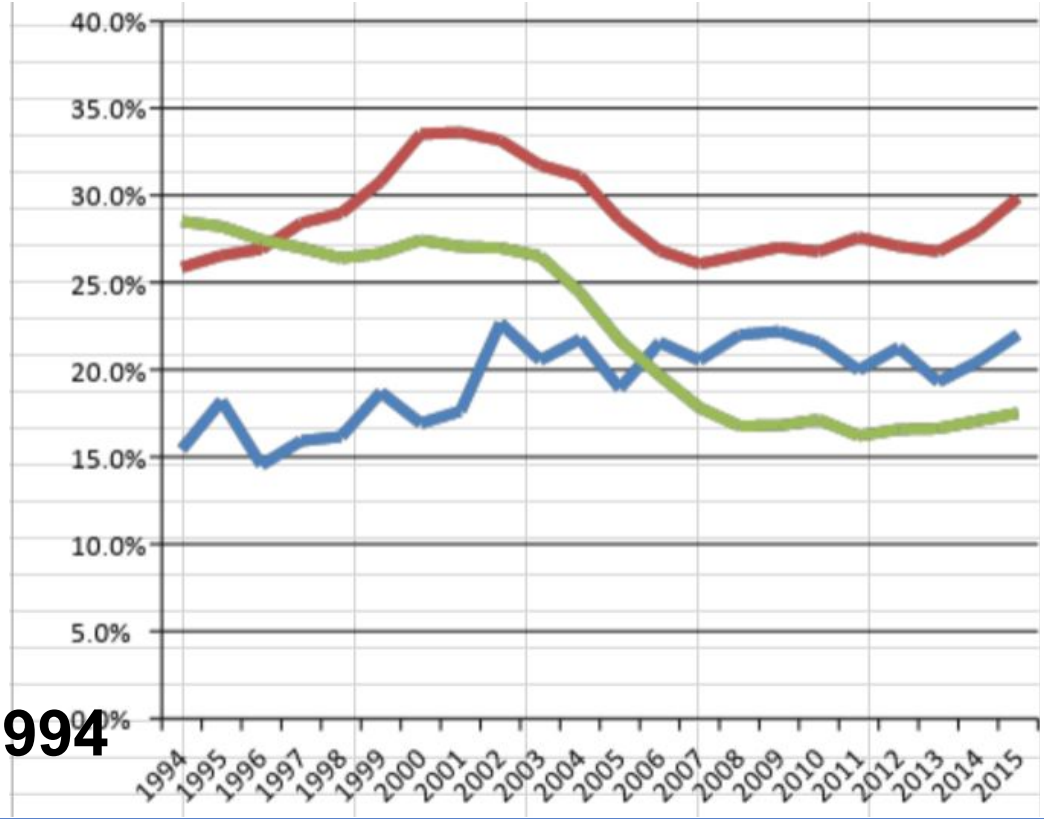
When the young Mark Zuckerberg moved to Palo Alto in 2004, he and his buddies built a corporate proto-culture that continues to influence the company today.

BY ADAM FISHER

EVERYONE WHO HAS seen *The Social Network* knows the story of Facebook's founding. It was at Harvard in the spring semester of 2004. What people tend to forget, however, is that Facebook was only based in Cambridge for a few short months. Back then

Women in CS is not only a pipeline problem

% CS Degrees to Women
Yet Women Full Professors ~15%



Masters

PhD

Undergraduates

1994 2015

Sexual Harassment

- In 25 years in academia I have seen/heard of no instance of sexual harassment.

BUT

- 2018 National Academies Report: “In a survey conducted by the University of Texas System, more than a quarter of female engineering students experienced sexual harassment from faculty or staff.”
- **Bottom Line**: It is very easy to be oblivious!

Kathryn S McKinley, Google

Harassment in your backyard

Sexual Harassment of Women: Climate, Culture, and Consequences in Academic Sciences, Engineering, and Medicine," National Academies, 2018.

Recent harassment in our community

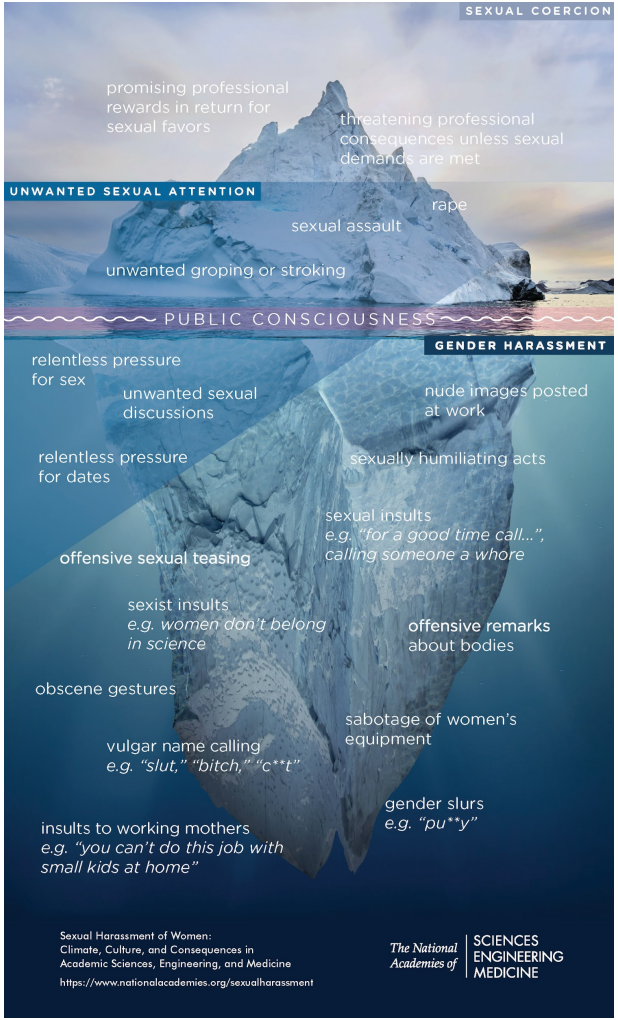
Harassment is

Sexual coercion

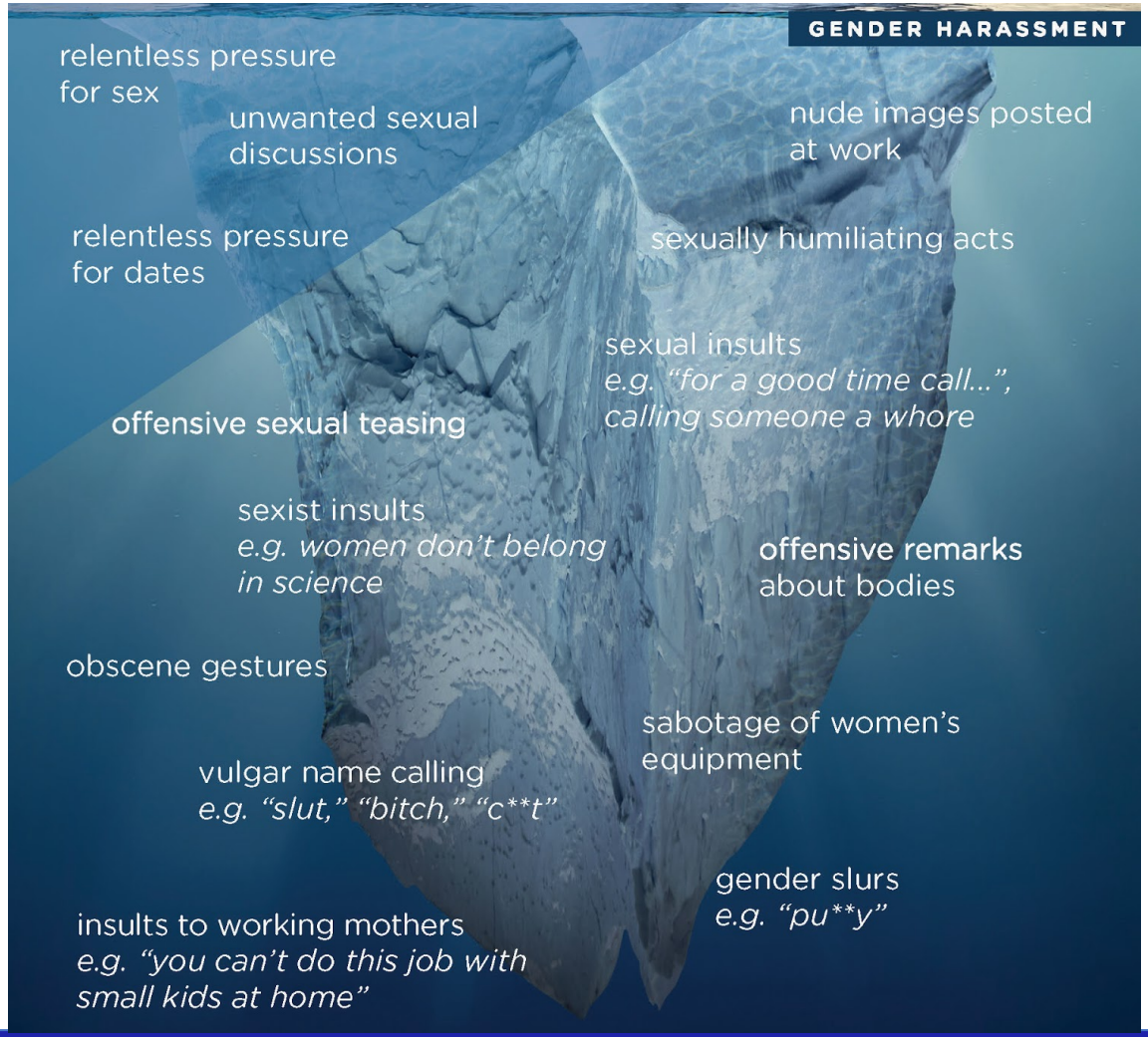
Unwanted sexual attention

Gender harassment

Sexual Harassment of Women: Climate, Culture, and Consequences in Academic Sciences, Engineering, and Medicine," National Academies, 2018.




SEXUAL COERCION
promising professional rewards in return for sexual favors
threatening professional consequences unless sexual demands are met
UNWANTED SEXUAL ATTENTION
rape
sexual assault
unwanted groping or stroking
PUBLIC CONSCIOUSNESS
GENDER HARASSMENT
relentless pressure


GENDER HARASSMENT
relentless pressure for sex
unwanted sexual discussions
nude images posted at work
relentless pressure for dates
sexually humiliating acts
sexual insults
e.g. "for a good time call...", calling someone a whore
offensive sexual teasing
sexist insults
e.g. women don't belong in science
offensive remarks about bodies
obscene gestures
sabotage of women's equipment
vulgar name calling
e.g. "slut," "bitch," "c**t"
gender slurs
e.g. "pu**y"
insults to working mothers
e.g. "you can't do this job with small kids at home"

Finding

Sexual harassment is common in academic science, engineering, and medicine

- 50% of women faculty and staff experience it (meta analysis 2003)
- 20 to 50% of students experience it from faculty & staff
- Rates of harassment are NOT decreasing

Finding and Recommendations

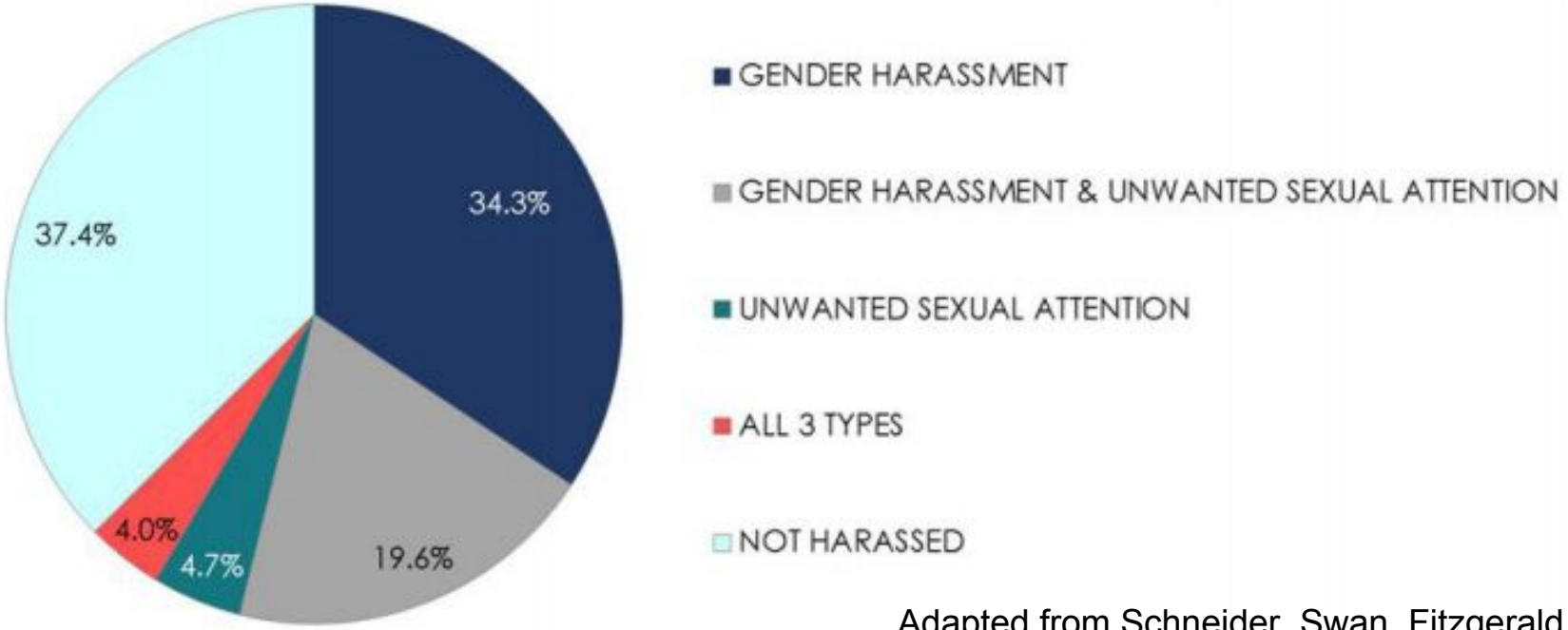
The legal system alone is inadequate for reducing or preventing harassment

Recommendations

- Go beyond protecting the “University/institutions”
- Address culture and climate.
- Add a code of ethics and research integrity.
- Hold PIs of Federal grants responsible.
- Professional societies have a role.

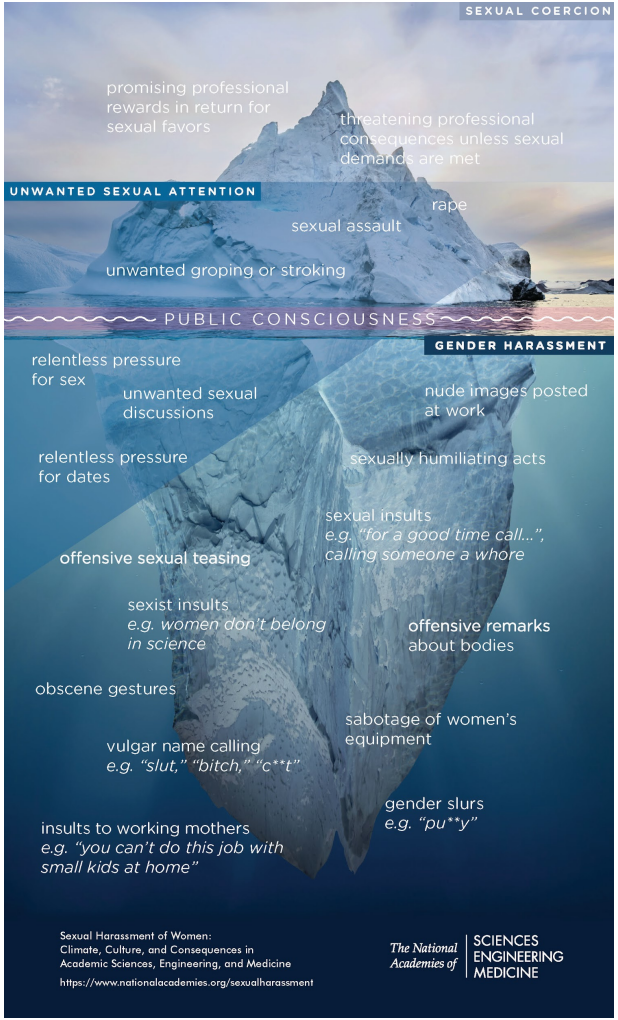
Women University Employees

Sciences, Engineering & Medicine



Adapted from Schneider, Swan, Fitzgerald 1997

Severe or frequent *gender harassment* can result in the same level of negative professional and psychological outcomes as isolated instances of sexual coercion.



Finding

Sexual harassment undermines women's professional and education attainment and mental and physical health.

The cumulative effect is significant damage to research integrity and a costly loss of talent

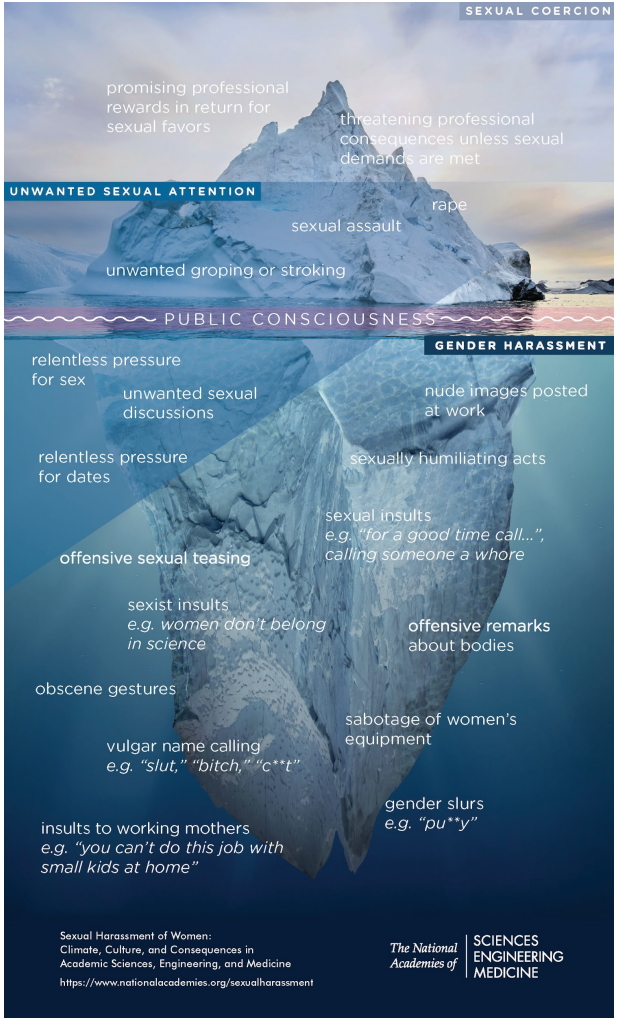
Finding

Two characteristics most associated with high rates of sexual harassment are
(a) male-dominated gender ratios and leadership
(b) organizational climate that communicates tolerance of sexual harassment

Organizational climate is the greatest predictor

for Institutions

- Create diverse, inclusive, respectful environments
- Diffuse hierarchical and dependent relations between trainees and faculty
- Provide support for targets
- Improve transparency and accountability
- Strive for strong and diverse leadership
- Make the entire academic community responsible for reducing and preventing harassment



In your backyard

PhD student at NIPS by famous Google researcher

Fired by Google

Princeton PhD student by Princeton advisor.

Light Penalty

Some rally to his defense

In your backyard

MIT PhD student at SIGGRAPH by famous Berkeley Professor

Under investigation

Research Excellent Assoc. Prof at PC meeting by Assist. Prof.

Not reported

Findings on reporting harassment

Estimated 11% of harassment reported

- Retaliation
- No consequences, no transparency
- Reliving harassment many, many times

Legal requirements Title IX office of offenders at US Universities, regardless of target's affiliation. US human resource offices everywhere

for Broader Community

- Title IX reports back to funding agencies
- NSF new policy on reporting
- Geo physical society policies on ethics and sexual harassment
- ACM new policy with consequences such as losing publishing rights
- SIGARCH / SIGMICRO CARES committee

Discussion

Bias in Research Evaluation

Is CS evaluation really a meritocracy?

Bobby Schnabel,
University of Colorado, Boulder

Bias in Evaluation, Promotion and Recognition

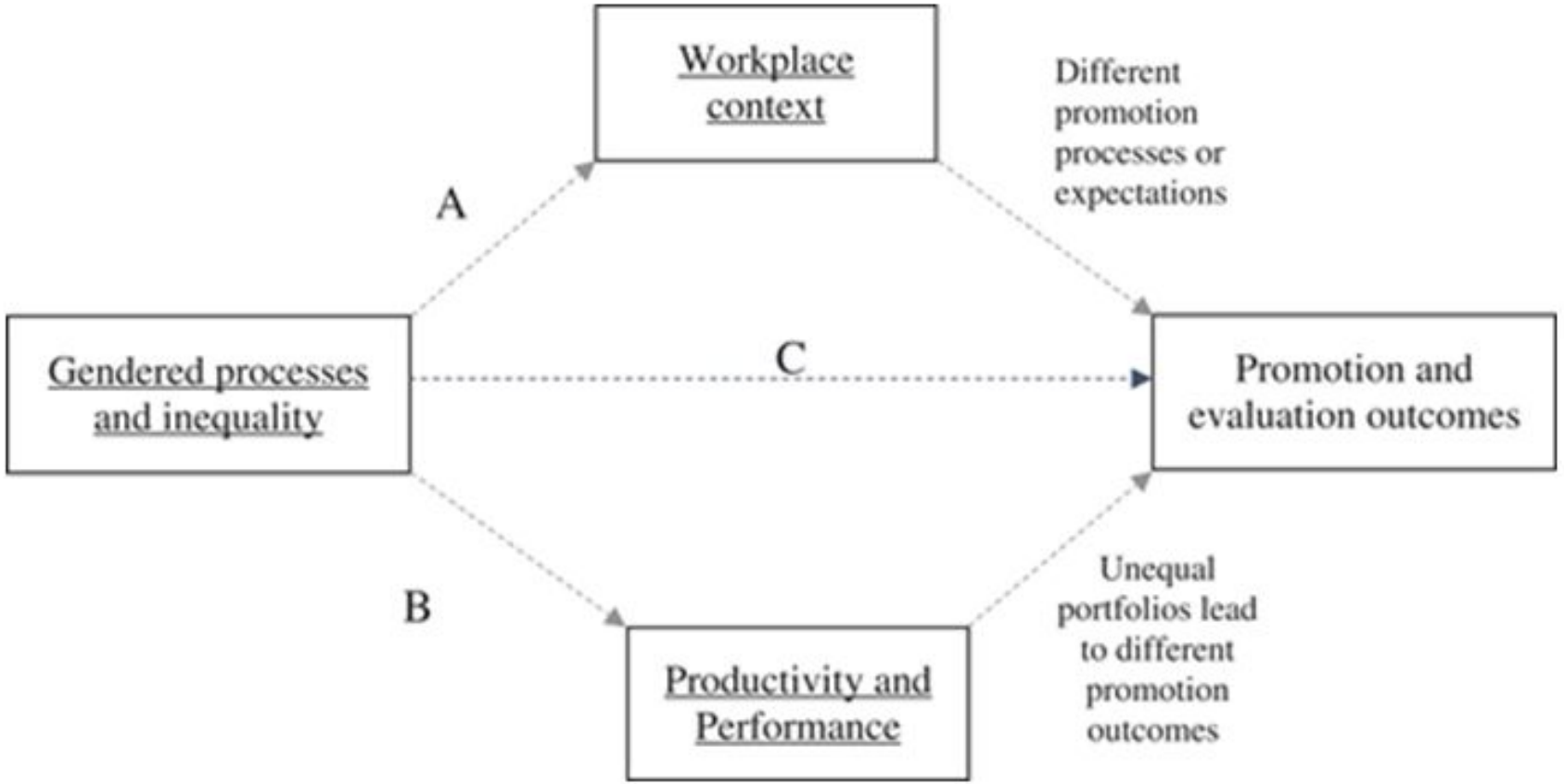
Insight from two recent studies, and what we can do

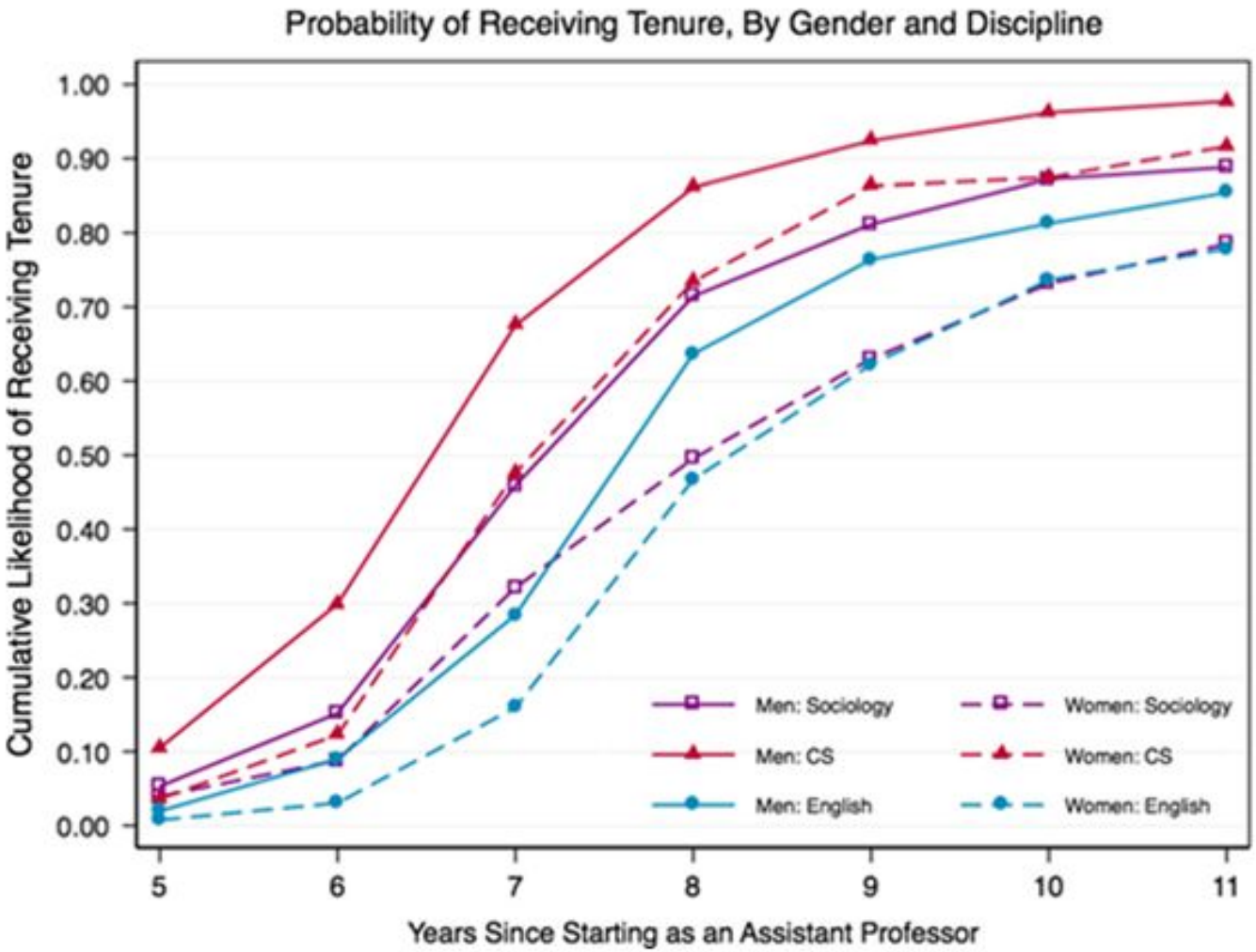
Katherine Weisshaar: "Publish *and* Perish: An Assessment of Gender Gaps in Promotion to Tenure in Academia"

Sociology PhD Thesis, Stanford, 2016 – published in: *Social Forces*, 96-2, Dec. 2017, pp. 529-560

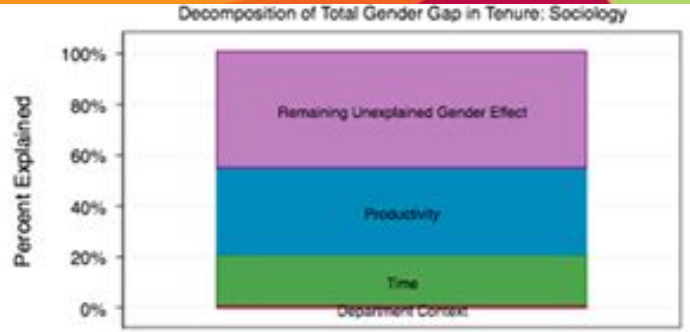
- **Longitudinal study: tenure outcomes of ~1600 faculty, assistant profs in Computer Science, English and Sociology in 2000-2004**
- **Research productivity from CVs, concentrating on publications**

Theoretical Model:

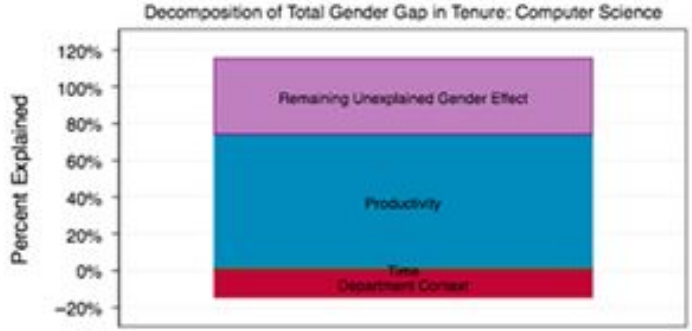



Probability of Receiving Tenure, By Gender and Discipline
Cumulative Likelihood of Receiving Tenure
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
5
6
7
8
9
10
11
Years Since Starting as an Assistant Professor
Men: Sociology
Women: Sociology
Men: CS
Women: CS
Men: English
Women: English

Sociology



Computer Science

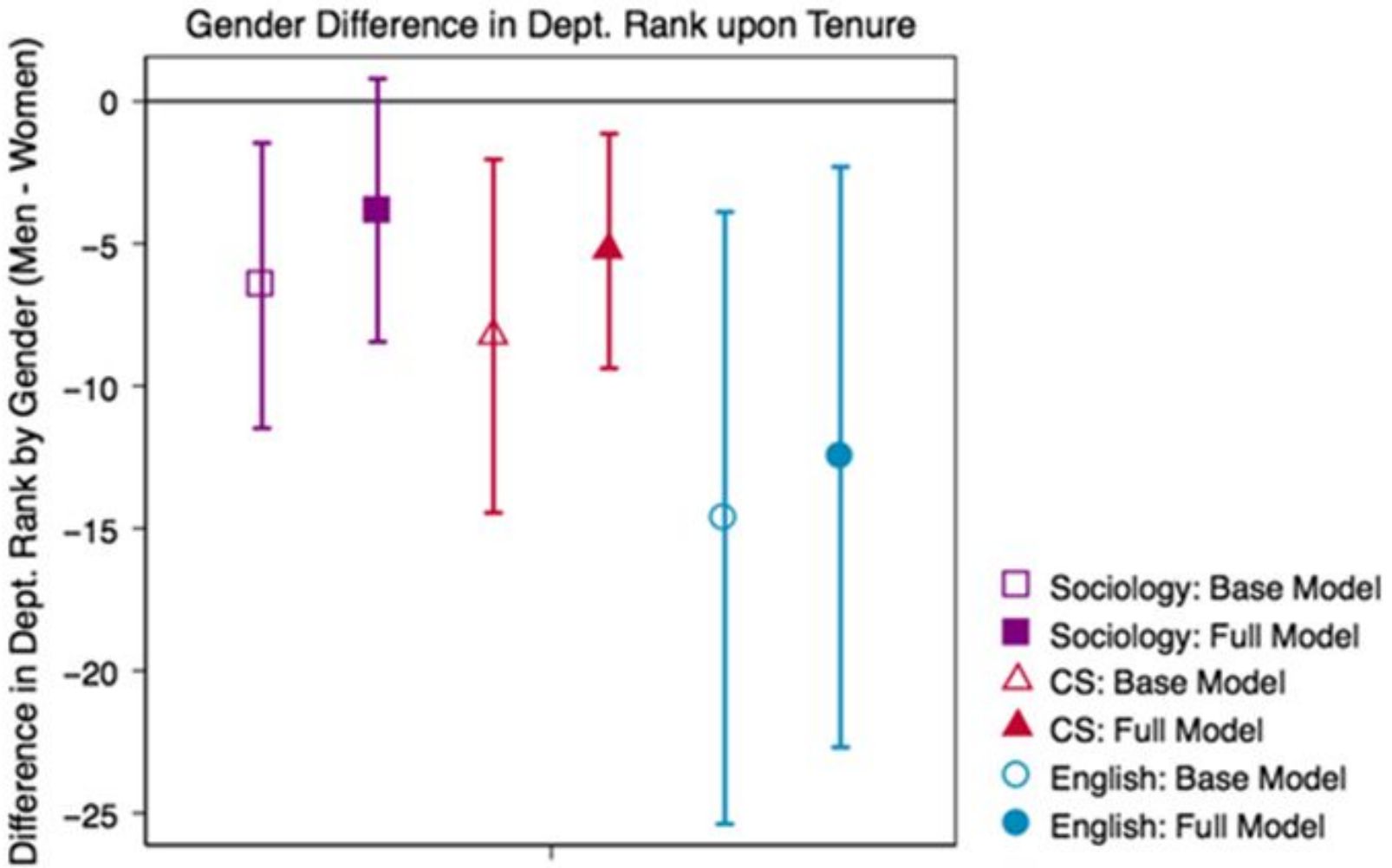


English

Decomposition of Total Gender Gap

Blue:
% explained by Productivity

Purple:
% not explained by measurable factors ("gender effect")


Gender Difference in Dept. Rank upon Tenure
Difference in Dept. Rank by Gender (Men - Women)
0
-5
-10
-15
-20
-25
Sociology: Base Model
Sociology: Full Model
CS: Base Model
CS: Full Model
English: Base Model
English: Full Model

Possible Explanations (Weisshaar):

- Likely not "motivated bias" (cites references)
- Likely "subtle and/or unconscious gender bias"
  - Overly scrutinizing women's work
  - Questioning research contributions
  - Differences in recommendation levels
  - Differences in visibility and social networks

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Recommendation Letters

"Raising Doubt in Letters of Recommendation for Academia: Gender Differences and Their Impact"

Juan Madera, Michelle Hebl, Heather Dial, Randi Martin, Virginia Valian, *Journal of Business and Psychology*, Apr, 2018, pp. 1-17

- **624 letters of rec'n for 174 job applicants to 8 faculty positions in psychology at single research university in U.S. south**
- **Applicants ~50/50 Male/Female; Letter writers ~ 70/30 M/F**
- **Analysis controlled for 10 academic performance variables**

Analysis in Study:

- No difference by gender in performance variables
- "Doubt-raisers" per letter: 0.55 men applicants, 0.69 women
- Percentage of letters containing:

	Negativity	Hedging	Faint Praise	Irrelevancy
Men	10%	15%	24%	16%
Women	14%	20%	30%	12%

First 3 statistically significant to outcome, first 2 most important

What we can do:

- Tenure and recommendation letters
- Networking

Bias in Awards and Honors

James Allan
Univ. of Massachusetts Amherst

Looking at society level

- Organization level
  - ACM, IEEE, AAAI, …
- SIG-level awards (“in your backyard”)
  - SIGPLAN, SIGMOD, …

A word about the data

Few groups keep data at this level

Some scraped by hand

- Tedious and error-prone
- Thank you to my fellow panelists

Some provided by representatives

- Thank you to Greg Byrd, Jim Crowley, Carol Hamilton, Brian Noble, John White, and probably others

Take all numbers with a grain of salt

SIAM (major awards)

Award	Year(s)	Men	Women	Pct women
Major awards	1970-1979			0%
(not those given out	1980-1989			0%
by activity groups)	1990-1999			7.1%
	2000-2009			14.3%
	2010-			25.4%

IEEE Computer Society

Award	Men	Women	Pct women
Technical Achievement, CS	75	14	16%
Entrepreneur, Entrpreneurship	24	2	8%
Harry H. Goode, Information Processing	51	1	2%
W. Wallace McDowell, CS	50	1	2%
Harlan D. Mills, Information Science	13	5	28%
Pioneer, CS	94	7	7%
Sidney Fernbach, High Performance Computers	25	1	4%
Seymour Cray, High Performance Comp Sys	18	0	0%
B. Ramakrishna Rau, Microarchitecture	7	0	0%

IEEE Computer Society

Award	Men	Women	Pct women
Ken Kennedy (with ACM), HPC Prog/Prod	5	4	44%
Hans Karlsson, Standards	14	2	13%
Charles Babbage, Parallel Computing	26	1	4%
Eckert-Mauchly (with ACM), Computer Arch.	39	1	3%
Watts S. Humphrey (with SEI), Software Process	32	10	24%
Undergraduate teaching	14	4	22%
Taylor Booth (CSE education)	26	2	7%
Total	513	55	10%

IEEE CS, by level

Level	% women
Fellow	7.1%
Senior Member	7.8%
Other Member	7.5%
Student	28.0%
TOTAL	9.1%

Usenix

Award	Year(s)	Men	Women	Pct women
FLAME (lifetime achievement)		15	1	6%
LISA (outstanding contribution)		21	7	25%

AAAI awards

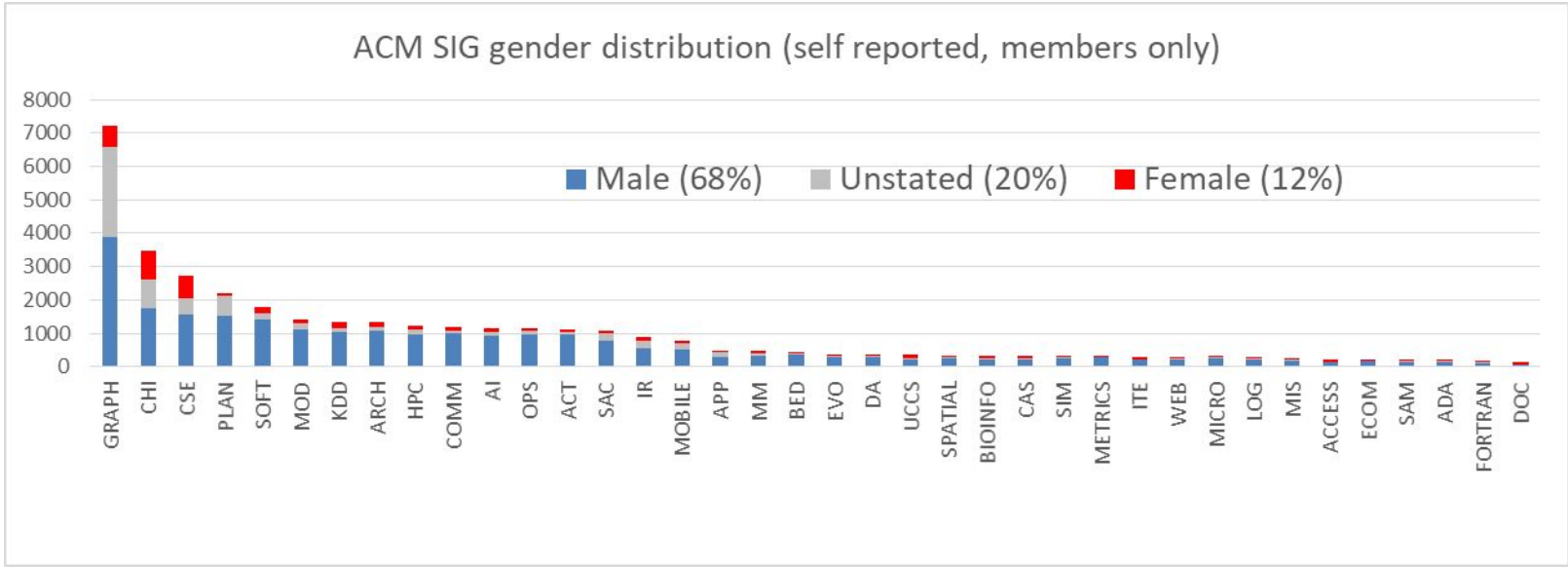
Award	Year(s)	Men	Women	Pct women
Fellows	2013-2018	38	10	21%
Classic paper	2013-2018	10	3	23%
Distinguished service	2016-2017	2	1	33%
Feigenbaum Prize	2011-2017	3	0	0%
Engelmore award	2003-2018	14	1	7%
Senior member (self-nominated)	2015-2018	36	10	21%

ACM-level awards

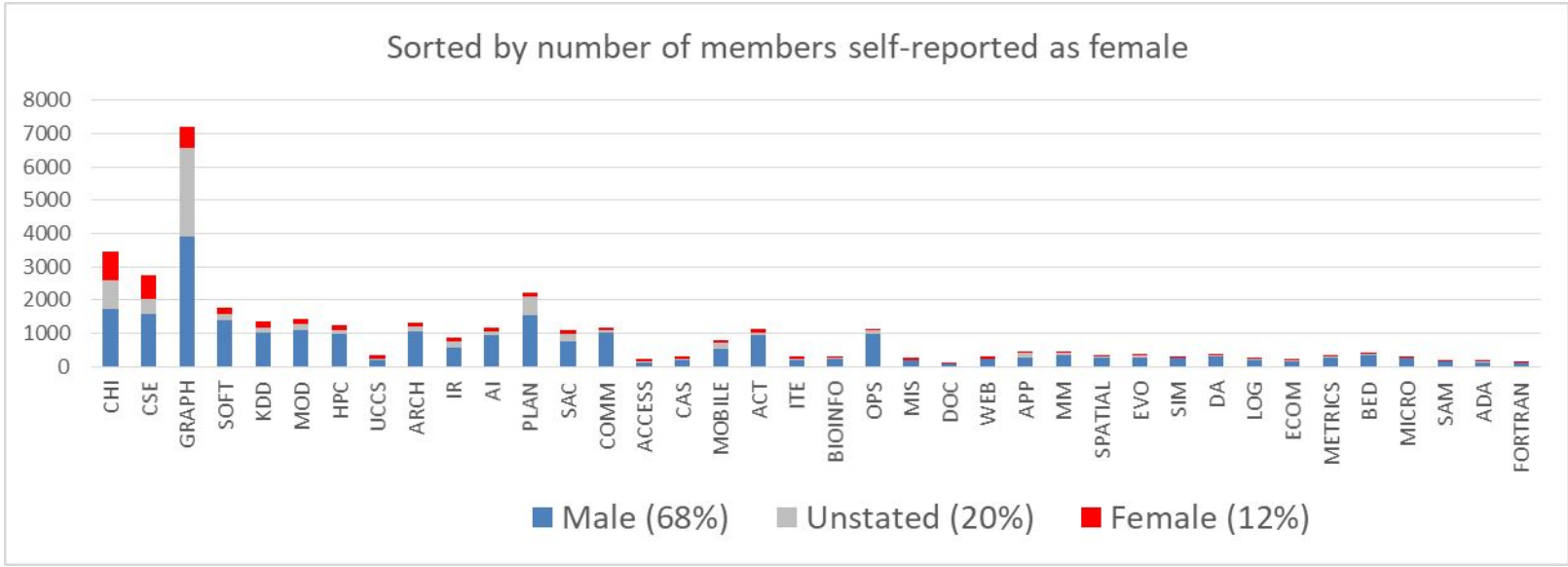
Award	Year(s)	Men	Women	Pct women
Across 16 major awards	**16 years**	**281**	**61**	**18%**
Turing		21	3	13%
Research (incl. Turning)		198	39	16%
Research (w/o Athena)		198	23	10%
Doctoral dissertation		16	0	0%
Education		21	4	16%
Service		46	18	28%
Fellows	**25 years**	**889**	**132**	**13%**
	2017 only	42	12	22%

Gender distribution in ACM SIGs

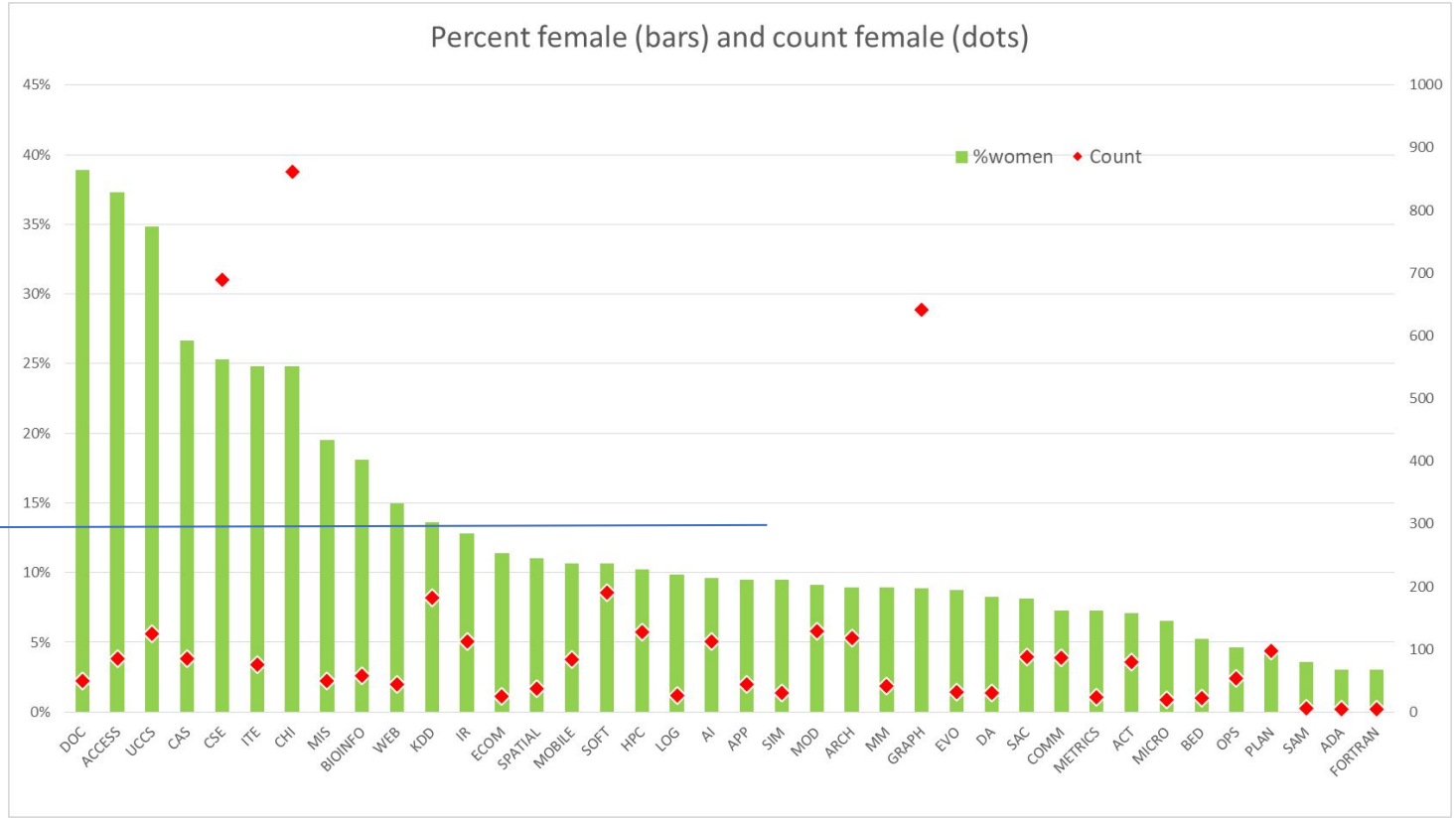
Interpret cautiously



Gender distribution in ACM SIGs



Gender distribution in ACM SIGs



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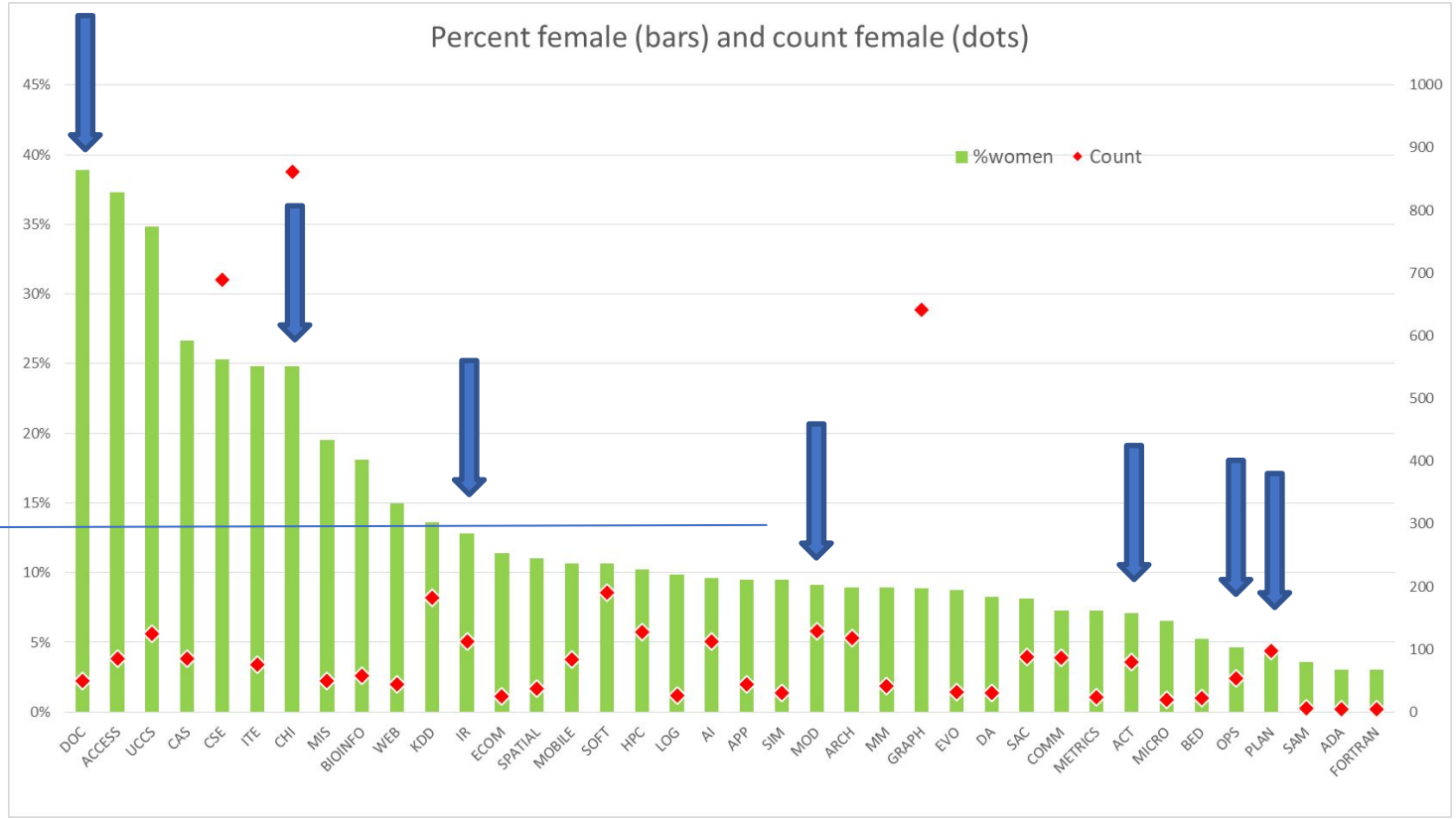


SIGPLAN (programming languages)

Award	Year(s)	Men	Women	Pct women
PL Achievement	1997-2017	21	6 (3 joint)	30%
Milner Young Researcher	2012-2017	5	1	17%
Reynolds Dissertation	2001-2017	19	0	0%
Service	1996-2016	15	7	32%
Total		60	17	22%
Total research		45	10	18%

SIGOPS (operating systems)

Award	Year(s)	Men	Women	Pct women
Mark Weiser (innovation)	2001-2017	17	1	6%
Ritchie (dissertation)	2013-2017	4	1	20%

SIGACT (theory)

Award	Year(s)	Men	Women	Pct women
Knuth (contributions)	1996-2017	16	1	6%

SIGMOD (management of data)

Award	Year(s)	Men	Women	Pct women
Codd Innovations award	1992-2018	24	3	11%
Jim Gray Dissertation award	2006-2018	13	0	0%

SIGIR (information retrieval)

Award	Year(s)	Men	Women	Pct women
Salton (lifetime achievement)	**Triennial**	**10**	**2**	**17%**
Test of time	**Since 1980**	**23**	**17**	**42%**
Female lead/sole author		33	7	18%
Best paper awards	**Since 1996**	**18**	**5**	**22%**
Female lead/sole author		22	1	4%

SIGDOC (design of communication)

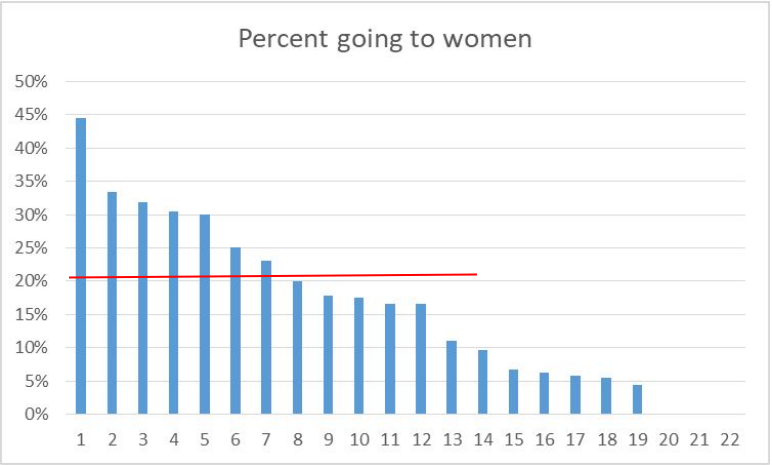
Award	Year(s)	Men	Women	Pct women
Rigo award (lifetime contribution)	1998-2018	15	12	44%

SIGCHI (human-computer interaction)

Award	Year(s)	Men	Women	Pct women
CHI Academy		**87**	**38**	**30%**
	2001-2005	26	5	16%
	2006-2010	24	8	25%
	2011-2015	26	12	32%
	2016-2018	11	13	54%

Summary of those tables

- ~20% of PhDs go to women (~18 years)
- Around 15% of awards go to women
  - Varies widely
- Is that OK?



What can you do as chair/head?

- Most awards drawn from nominees
  - Nominate women
    - Awards Committee?
  - (Check language used in nominations!)
- Many awards require membership
  - Encourage joining ACM, IEEE, …
- And now… more ideas

What's in Your Backyard? What Can You Do About It?

Experiences from the Architecture Community

Sarita Adve
University of Illinois

Core collaborators:
Kim Hazelwood, Natalie Enright Jerger, Margaret Martonosi, Kathryn McKinley
Plus SIGARCH EC and Many Supporters

In the last year,
my community shone a light
in its backyard

We found some dark corners

Not because we are worse,
but because we looked

And now we can fix

Takeaways: ***Please look in your own backyard***

There is a lot we can do to fix what's broken

Architecture Community

- Architecture community =
  - ACM SIGARCH, ACM SIGMICRO, IEEE TCCA, IEEE TCuarch

- Four main conferences
  - ISCA → SIGARCH + TCCA
  - Micro → SIGMICRO + Tcuarch
  - HPCA → TCCA
  - ASPLOS → SIGARCH + SIGPLAN + SIGOPS

Key Events Last Year in Architecture Community

ACM SIGARCH JOIN BENEFIT CONTRIBUTE

Computer Architecture Today

Informing the broad computing community about current activities, advances and future directions in computer architec

Gender Diversity in Computer Architecture

by Natalie Enright Jerger and Kim Hazelwood on Sep 28, 2017 | Tags: Conference, Diversity

Study shows poor gender ratios

- Keynotes, PC chairs, Awards
- All conferences must improve
- Micro stands out

Micro50: Legends of Micro panel

- All white, all male

Reading of Diversity Statement

- Call to action
- Clear public support for change

Statement on Diversity at MICRO-50

by Margaret Martonosi on Oct 17, 2017 | Tags: Diversity

SIGARCH works for diversity

But study is wakeup call

SIGARCH Works to Improve Diversity

by Sarita Adve on Oct 20, 2017 | Tags: ACM SIGARCH, Diversity

Inclusion and Conference Governance

by Kathryn McKinley on Feb 19, 2018 | Tags: Conference, Diversity, Opinion

Diversity in conference governance

- Institution, academic lineage, …

Personal accounts of harassment

What Happens to Us Does Not Happen to Most of You

by Kathryn McKinley on Feb 28, 2018 | Tags: Diversity, Harassment

Key Events Last Year in Architecture Community

SIGARCH CARES:
To help report harassment

SIGMICRO joins CARES

WICArch is SIGARCH subcommittee
- **Web portal w/ searchable directory**
- **Strategize diversity efforts**
- **CRA-W + CRA as a template**


What’s in your backyard?
What can you do?

Some Lessons from the Architecture Community

- Data speaks louder than vague perceptions, but HARD to get -- GET DATA!
- SIGARCH Blog: A digital meeting space for the community
- It takes a village to make change: many and diverse supporters
- Sometimes it takes a public statement
- Sometimes it takes personal stories
- Change in large organizations is hard, but small steps matter
- Much work remains but impact already visible
  - Hallway discussions at conferences, panels, bias busting workshop, keynotes, bylaws, …
  - CARES, WICArch
  - Micro instituting new policies
  - Broader engagement: ACM, CRA, NSF, this session, ...

Yes, we can
make a difference

Personal Epiphany: Good Intentions Not Enough

- I thought we (SIGARCH) were doing a lot
  - Careful policies for program chairs, steering committees (for flagship conferences)
  - Strong oversight of flagship events
  - Many programs to increase diversity
    - Pioneered travel grants for childcare, people with disabilities
    - Adjusted eligibility criteria for awards to consider family related leaves
    - Support for CRA-W grad cohort
    - WICArch: Women in Computer Architecture
- But still much room for improvement
  - Women: No recent ISCA keynotes, only one career award, few PC chairs
  - Anecdotal reports of harassment

More work needed

Need a strong foundation of institutional policies

Institutional Policies

Research Society Leaders

- Conference governance, awards, honors - Bylaws for processes
- Code of conduct, reporting violations, enforcing sanctions - CARES
- Awareness, training - Bias busting workshop at ISCA'18
- DATA - ACM will now collect demographic data at registration and membership

Funding Agencies

- NSF's new harassment related policies

Department Chairs, Universities

- Awareness and training
- Awards, honors, compensation processes
- Recognition of efforts to improve diversity - this is hard work!

Individuals: Acknowledge biases, watch out for your own and for others

What's left to do?

A LOT!

Takeaways

What's in your backyard?

Get data first!

What can you do about it?

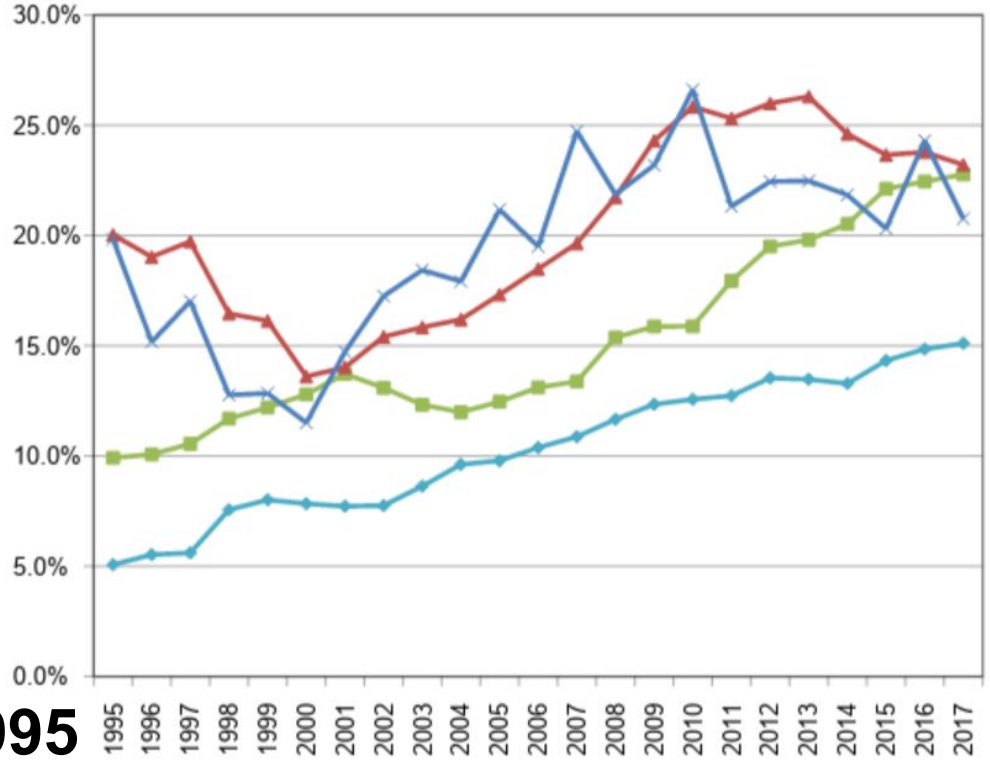
A LOT!

Discussion

Resources

- Sexual Harassment of Women: Climate, Culture, and Consequences in Academic Sciences, Engineering, and Medicine (2018), National Academies
- Gender Diversity in Computer Architecture, Natalie Enright Jerger and Kim Hazelwood
- What Happens to Us Does Not Happen to Most of You, Kathryn S. McKinley
- Statistics, we have a problem, Kristian Lum
- A member of the Theory Community Speaks out, #Metoo, Anonymous post
- Software engineer recalls impact of alleged sex assault from UC Berkeley professor James O'Brien, *Anjali Shrivastava*
- How we Lost the Women in Computing, Moshe Vardi
- Sexual Harassment Explains a Lot About Why Women Get Paid Less, Rebecca Greenfield and Laura Colby
- Summary and Thoughts on the Diversity Conversations in the Architecture Community

% CS/CE Women Faculty - Taulbee



Assistant

Tenure track hires

Associate

Full

1995 **2017**