Women in Physics in the United States: Reaching Towards Equity and Inclusion

Dr. Laura Gladstone
Case Western Reserve University
CENPA Seminar, University of Washington
30 Nov 2017

IOP Institute of Physics

International Conference on Women in Physics

16–20 July 2017, University of Birmingham, Birmingham, UK

- Every 3 years
- ~200 attendees
- 48 countries
- Optimistic!

US Delegation

- ~15 traveling members, plus non-traveling co-authors + administrators
- Applications to the US delegation were due in October for the July conference
- Diverse:
  - ethnic groups
  - professional level
  - school size
  - age
  - geographic home
  - research subject
  - sexuality
  - family life

Funding

- I attended while I was at MIT, (I'm now at Case Western Reserve University) and my funding from the MIT diversity office was based on me giving this talk at several physics departments

EDMUND W. BERTSCHINGER
Institute Community and Equity Officer
Professor of Physics

and US delegate to the last ICWiP, in 2014

US delegation was mostly funded by NSF:

Acknowledgement

This work was supported by the US National Science Foundation (NSF) under grant no. DMR 1661340. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the NSF.

Most other country teams were funded internationally through International Union of Pure and Applied Physics, and their home countries

Conference Structure

- Posters from each country delegation and each delegate's research
  - US poster: I'll cover in detail
  - Other posters: I'll summarize a range
- Presentations were half physics, half social science
- 5 parallel workshops (more later)
- Concluding sessions/ guest speakers

Delegates Mentored Each Other

- Proceedings were peer-reviewed, and we met the peers we edited
- Posters got 2-min presentations with a reception after
- The funding sources and application process were explained in a formal talk: "if you want to do something like this, here's what it takes"
- Social:
  - Everyone stayed in the same dorms & ate together
  - US team had monthly conf calls all year (including after)
  - Many new friends and professional contacts!

Reports from Other Countries

- Great Britain awards structure: come back to this, but abstract is that we get departments to compete for who can be the best at diversity culture
- France: has a charter guaranteeing a certain fraction of women as conference plenary speakers, attendees
- Australia has parity at bachelors, PhD, and near parity at low prof levels
- US.
- Egypt has an amazing fraction, but can't say why. Is it because men aren't interested?
- Finland has had a culture of women working since the 70s, but also has a culture of not speaking openly about problems, so remaining inequalities aren't being addressed (fraction hasn't changed in decades)
- India and Bangladesh struggle with remaining openly-aired patriarchy, e.g. "don't study physics because then you won't have time to do the housework"
- Pakistani women are trying to get the public to widely accept the idea that all women should be allowed to learn to read. Delegates organized the first Pakistani women in phys conference
- Yemeni professors haven't been paid in 9 months because of war, but have to keep going to work or else forfeit their jobs when the war is over

UK: Athena-SWAN and JUNO

- JUNO is just physics, all marginalized groups;
  Athena-SWAN is all STEM fields, just women
- Institutions are reviewed by outside peers to improve climate
- Results in a certification level that can be publicized
- Working amazingly well in the UK
- Working on porting it to the US: just had an NSF grant approved

Prof. Angela Johnson, Dr. Apriel Hodari
Both were conference delegates

Workshops & their Resolutions

- "Improving the Workplace/ Science Practice and Ethics" <— I saw
- Gender Studies and Intersectionality
- Physics/ Science Education
- Cultural Perception and Bias
- Professional Development and Leadership

Resolved: To encourage IUPAP-funded conferences to have a session for all participants on diversity and inclusion in physics
Resolved: To encourage IUPAP-sponsored conferences to include female plenary speakers

For consideration:
[Cultural Awareness]
* Promote workshops based on their own culture
* Organize the conferences of unconscious bias awareness

[Prof.Dev.And Leadership]
* Representation of women/people in industry/teachers at ICWiP
* Additional focus on teaching at ICWiP or other conferences
* Find a mechanism for regional working groups to be implemented under IUPAP, using their logo and endorsed by them
* Career research charter for ensuring fairness and equality, focusing on core values and being considerate about contract terms
* Implementing a dual career network internationally
* Women in physics -- for men
* Training in implicit bias at meetings
* Holding professional development training/ entrepreneur training
* Encouraging training in management for academics (suitably translated?)

My poster:

CUORE 0νββ

L. Gladstone, CWRU

The CUORE Experiment

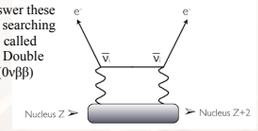
Laura Gladstone for the CUORE collaboration
Massachusetts Institute of Technology, Cambridge, MA 02139, USA

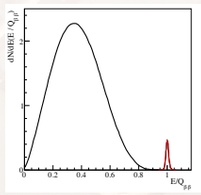
Neutrinoless Double Beta Decay

Some of the most intriguing open questions in modern physics concern neutrinos:

- Is the neutrino its own anti-particle?
- Is lepton number a conserved quantity of nature?
- How did the Universe become matter-dominated?

We try to answer these questions by searching for a process called Neutrinoless Double Beta Decay (0νββ)



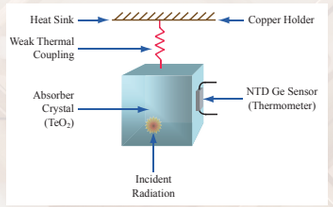


The signal of 0νββ is the telltale bump at the Q-value. [2] Here, the bump is exaggerated ~1000x from the current limits.

Since 2νββ is very rare and 0νββ would be even rarer [3], an experiment searching for 0νββ requires:

- A large mass
- Good energy resolution
- Very low background

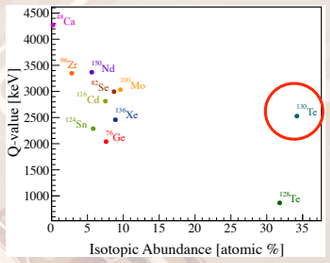
Bolometers satisfy all these conditions!



A bolometer converts the kinetic energy released in a decay into an increase in temperature:

$$C^{-1} \approx 100\mu K \ / \ \mathrm{MeV}$$

Our bolometers are so sensitive that they can detect the decay of a single nucleus within them!

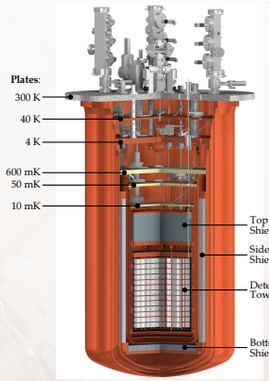


For CUORE, we chose the isotope ^{130}Te from among the available double beta decay candidates because it has both a high natural abundance and a high Q-value.

CUORE

The coldest cubic meter in the known Universe

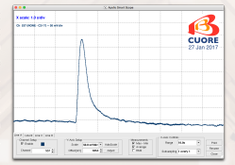
Cryogenic **U**nderground **O**bservatory for **R**are **E**vents



CUORE searches for 0νββ of ^{130}Te. The CUORE detector is an array of 988 TeO_2 bolometers operating 1 mile underground in Gran Sasso, Italy. The array is housed in a cryostat which cools the bolometers to 10mK!

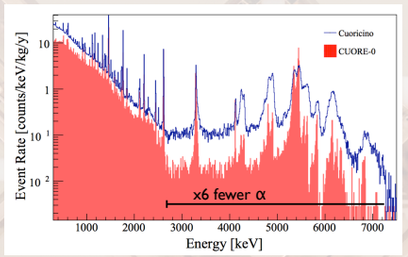
To reduce radioactive background, the entire array is built using ultra-clean materials and is surrounded by a lead shield recovered from an ancient Roman galleon that sunk over 2000 years ago.

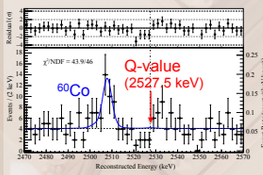
When an atom decays, it produces heat, and we detect the temperature change in the TeO2 crystals. We use NTD resistive thermometers. Then, the crystal thermalizes with its surroundings. CUORE saw its first pulse in January this year.



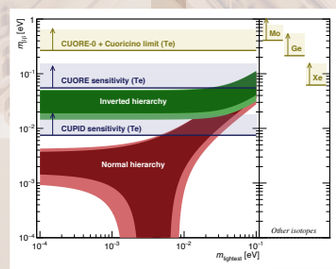
Two previous generations of CUORE-style experiments verify these techniques. Cuoricino and CUORE-0 [4-5] each used a single tower; the CUORE-0 tower was built with improved clean materials and procedures. With 2 years run time (2013-15) CUORE-0:

- Demonstrated >6 times reduction in the α-background
- Achieved an energy resolution of 5 keV at 2.5 MeV (0.2%)
- Surpassed Cuoricino's sensitivity in half the time.
- And CUORE should get there even faster!





The endpoint of the CUORE-0 spectrum, with the Q-value highlighted. If 0νββ had been observed, it would have been at this energy.



The predecessors Cuoricino and CUORE-0 reached a combined sensitivity of:

$$T_{1/2} > 4.0 \times 10^{24}\,\mathrm{yr}\ (90\%\ \mathrm{C.L.})$$

CUORE hopes to be sensitive, after 5 years of running, to a 130Te half-life of:

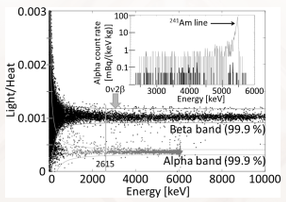
$$T_{1/2} > 9.6 \times 10^{25}\,\mathrm{yr}\ (90\%\ \mathrm{C.L.})$$

CUPID seeks to be ~100 times more sensitive to the half-life. The goal is to probe the entire IH region. The rough timescale for CUPID would be to start in ~2025.

CUPID

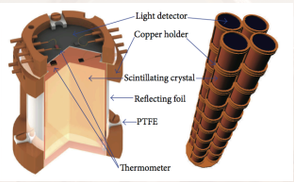
CUORE **U**pgrade with **P**article **ID**entification[1]

The next generation CUORE-style experiment aims to eliminate α background events at the analysis stage by separating them from the β spectrum. Background events have a different light/heat ratio. To identify background events, the new detector will collect both light and heat, either by using a new scintillating crystal or a new sensor technology.



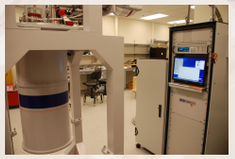
The light/heat ratio is different for α (background) and β (potential signal) events.

Some 2νββ isotopes also form scintillating crystals. $ZnMoO_4$ (shown here), ZnSe, and $LiInSe_2$ could be good candidates for CUPID [6-7]. We are working with a company in Boston, RMD, to grow these crystals.



The new CUPID tower design is centered on adding light collection to the new crystals. It could include secondary light collection crystals [8].

At MIT, we have our own dilution refrigerator in which we can test new technologies for future cryogenic experiments. We call him Olaf! We have amplifying electronics for running CUORE NTDs as well as Transition Edge Sensors, which take advantage of SQUID array amplifiers.



We collaborate closely on this R&D with groups at UCBerkeley, Yale, UCLA, Italy, and France. Many of them have complementary or parallel goals.

Thanks to the CUORE Collaboration, particularly Prof. Lindley Winslow, for supporting me in presenting our collective work.
Thanks to Prof. Edmund Bertschinger, the MIT Community and Equity Officer, for financially supporting my travel to ICWiP.

1. **CUPID** Collaboration, G. Wang *et al.*, "R&D towards CUPID (CUORE Upgrade with Particle IDentification)" arXiv:1504.03612 [physics.ins-det].
2. F. T. Avignone III, S. R. Elliott, and J. Engel, "Double Beta Decay, Majorana Neutrinos, and Neutrino Mass," *Rev.Mod.Phys.* **80** (2008) 481–516, arXiv:0708.1033 [nucl-ex].
3. J. Barea, J. Kotila, and F. Iachello, "Limits on Neutrino Masses from Neutrinoless Double-beta Decay," *Phys. Rev. Lett.* **109** (2012) 042501, arXiv:1506.08533 [nucl-th].
4. **CUORE** Collaboration, K. Alfonso *et al.*, "Search for Neutrinoless Double-Beta Decay of ^{130}Te with CUORE-0," *Phys. Rev. Lett.* **115** no. 10, (2015) 102502, arXiv:1504.02454 [nucl-ex].
5. **CUORE** Collaboration, D. R. Artusa *et al.*, "Initial performance of the CUORE-0 experiment," *Eur. Phys. J.* **C74** no. 8, (2014) 2956, arXiv:1402.0922 [physics.ins-det].
6. **LUCIFER** Collaboration, J. Beeman *et al.*, "Current Status and Future Perspectives of the LUCIFER Experiment," *Adv.High Energy Phys.* **2013** (2013) 237973.
7. **LUMINEAU** Collaboration, J. W. Beeman *et al.*, "Potential of a next generation neutrinoless double beta decay experiment based on $ZnMoO_4$ scintillating bolometers," *Phys. Lett.* **B710** (2012) 318–323, arXiv:1112.3672 [hep-ex].
8. E. V. Hansen and L. Winslow, "Characterization of single layer anti-reflective coatings for bolometer-based rare event searches," arXiv:1609.00720 [physics.ins-det].

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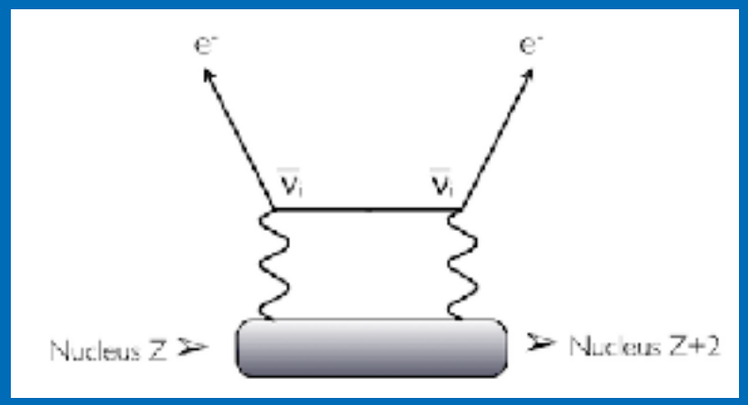
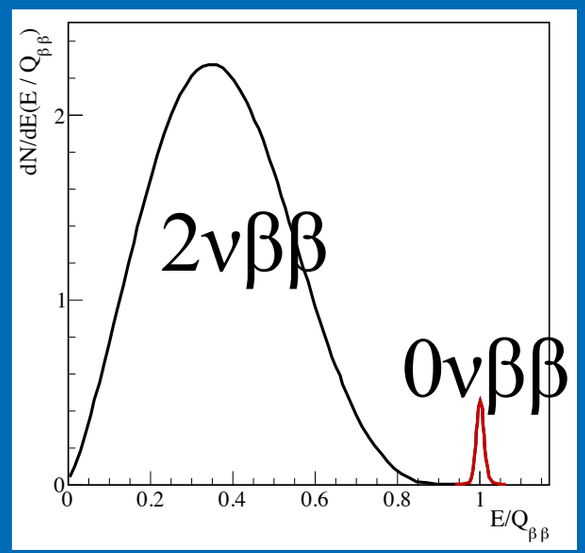
The CUORE Experiment

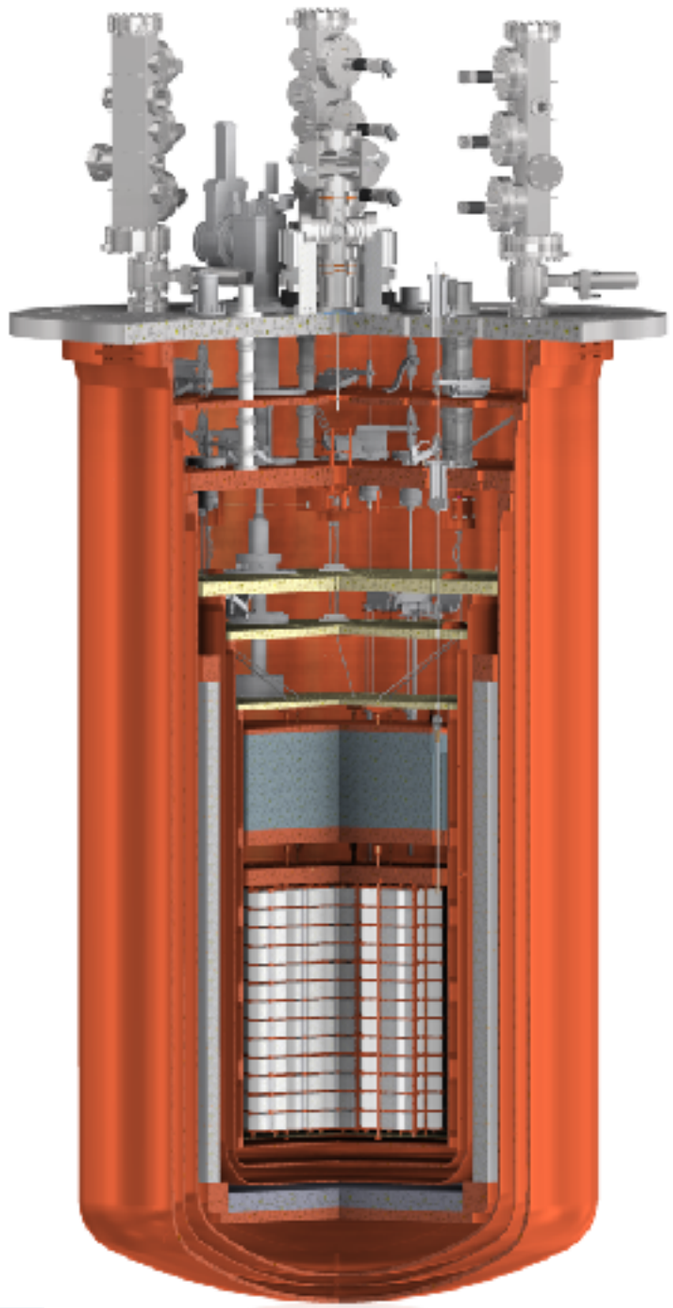
Laura Gladstone

International Conference on Women in Physics - Poster Presentations Wednesday 19th July

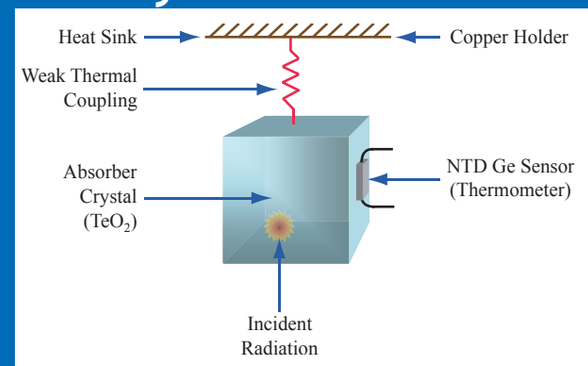
Neutrinoless Double Beta Decay:

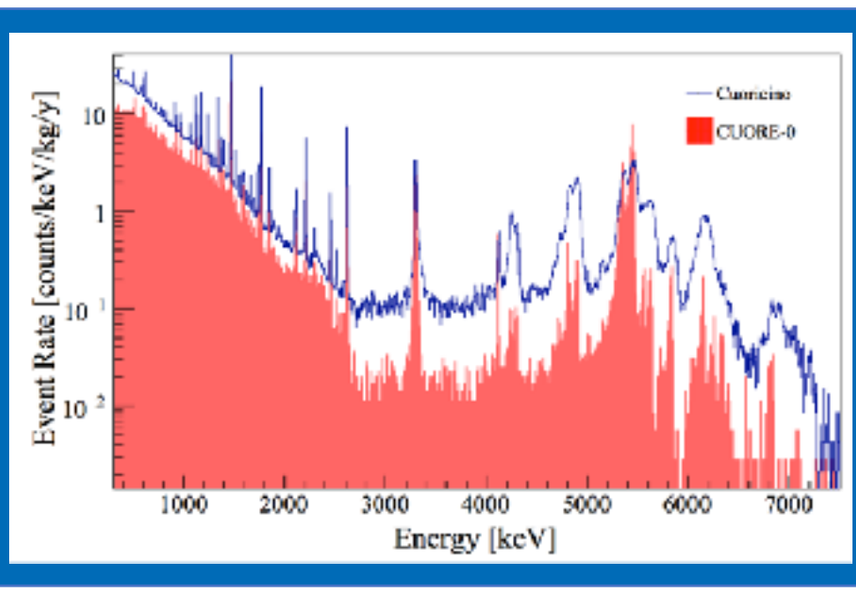






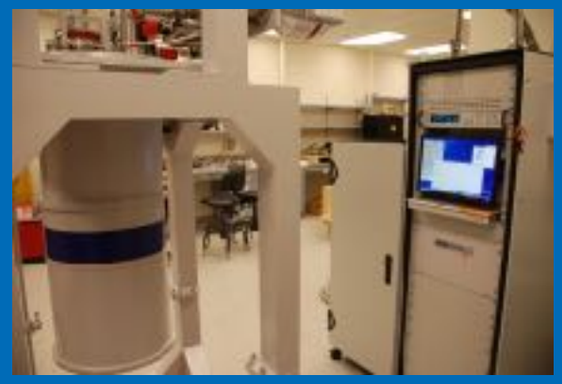
A Crystal Measures Heat

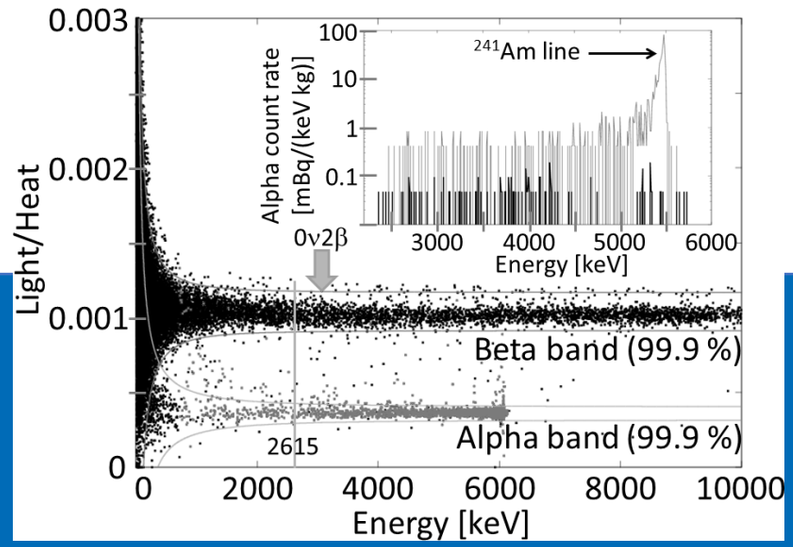




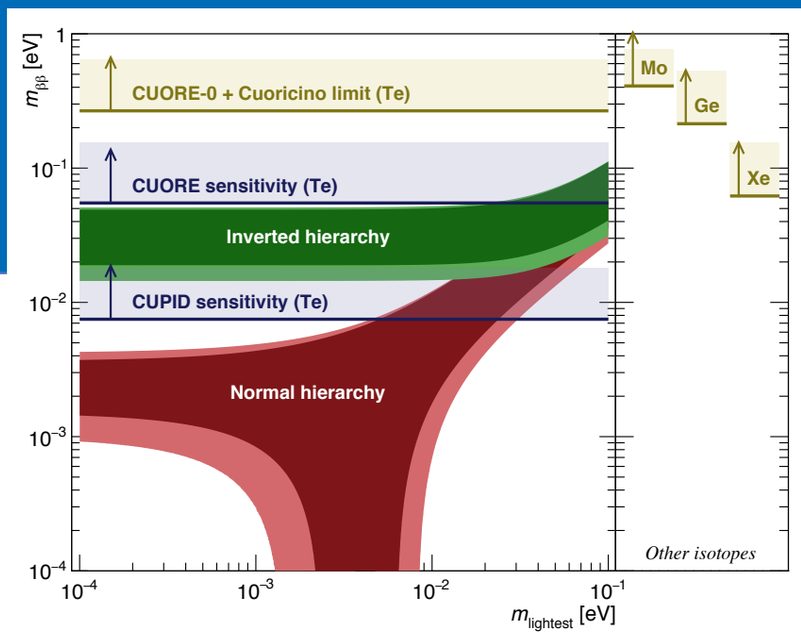
International Conference on Women in Physics - Poster Presentations Wednesday 19th July

Testing New 2νββ Crystals





Simulated Result



Projected Sensitivity

Special Guest: Burnell

- Prof. Dame Jocelyn Bell Burnell, who discovered pulsars,
  (for which her advisor got the Nobel Prize)
  was awarded the U.K. Institute of Physics President's Medal

- Discovery of 4 pulsars - 5.8 km of chart paper from Cambridge radio telescope - small, massive, dense objects
- Moved as husband changed jobs. Career like "game of snakes and ladders"
- Athena SWAN + Project Juno:
  "until there was money attached, no changes"
- Question "How do you manage to keep your temper?"
  JB answer " A sense of humor is a great help!"

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  "until there w
  changes"
- Question "Ho
  your temper?
  JB answer " A
  help!"

Surprise guest Malala Yuousafzai

Malala, with

the US poster,

me, and Angela*

* who just got the grant to bring better review programs to the US based on ATHENA/SWAN and JUNO from the UK

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Now the Weeds!

US Delegation Poster (outline)

- Let us know if you'd like a copy to put up locally
- Major blocks:
  - Inherent Gender Bias
  - Discouragement
  - A Lack of Role Models
  - Intense Competition
  - Microaggressions
  - Questioned Competence
  - Work-life Balance
- Suggestions for Progress

more later

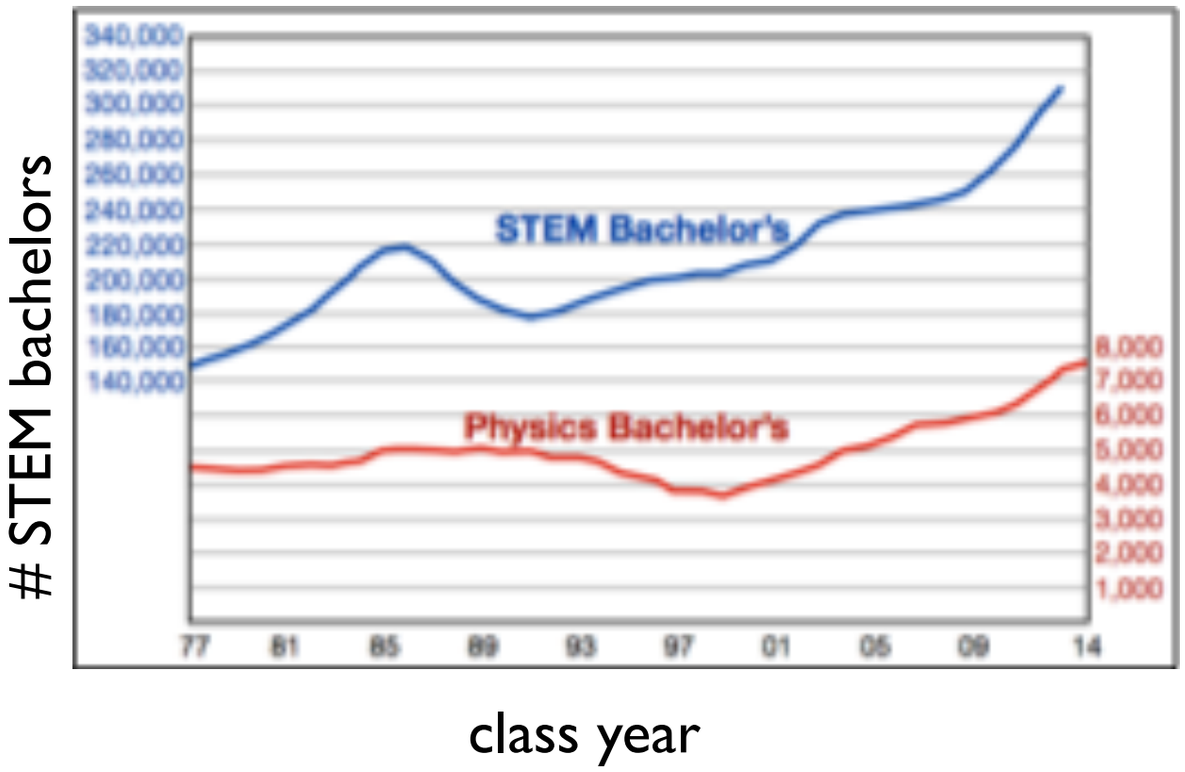
more later

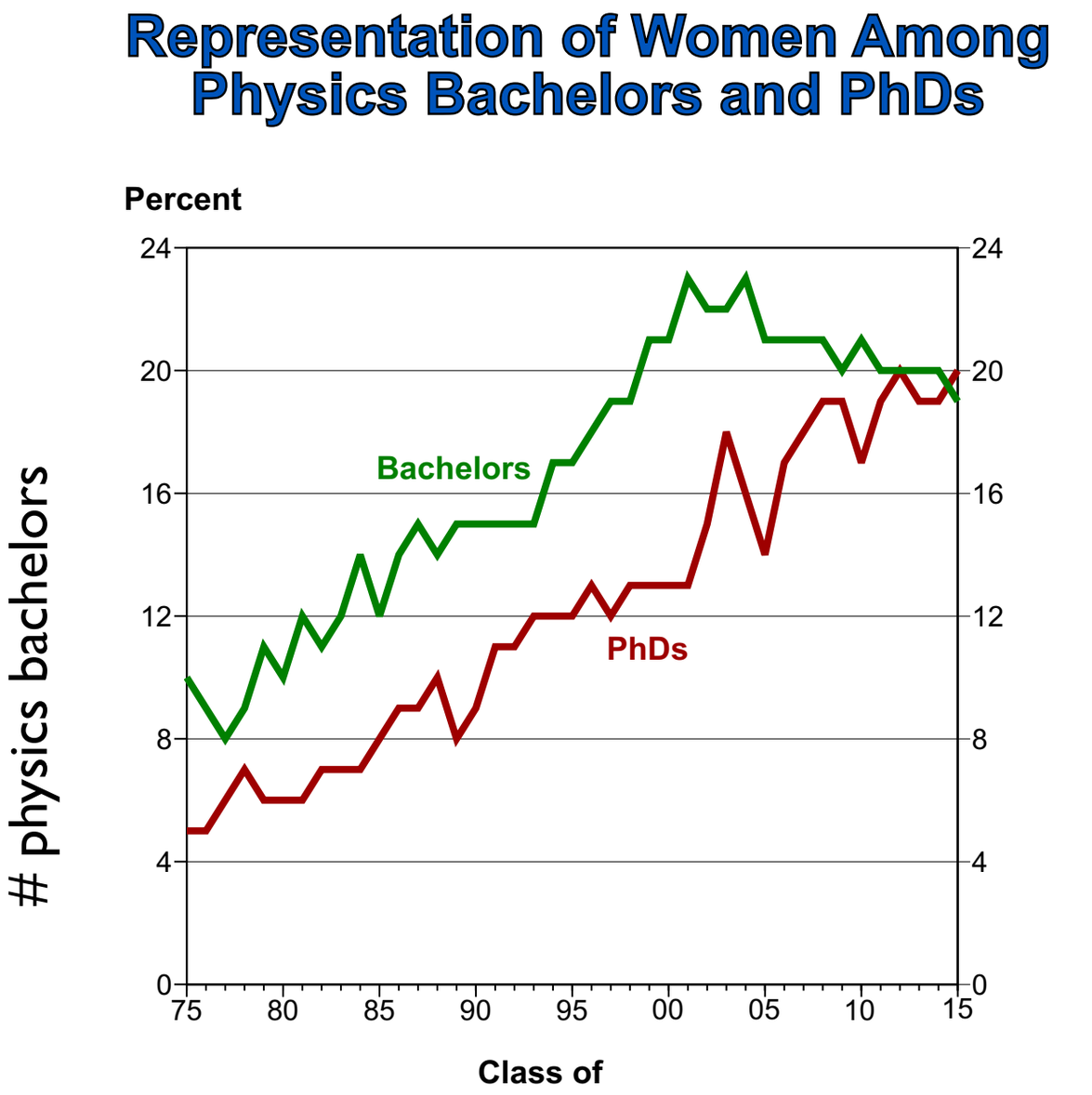
more later

more later

Status in the US

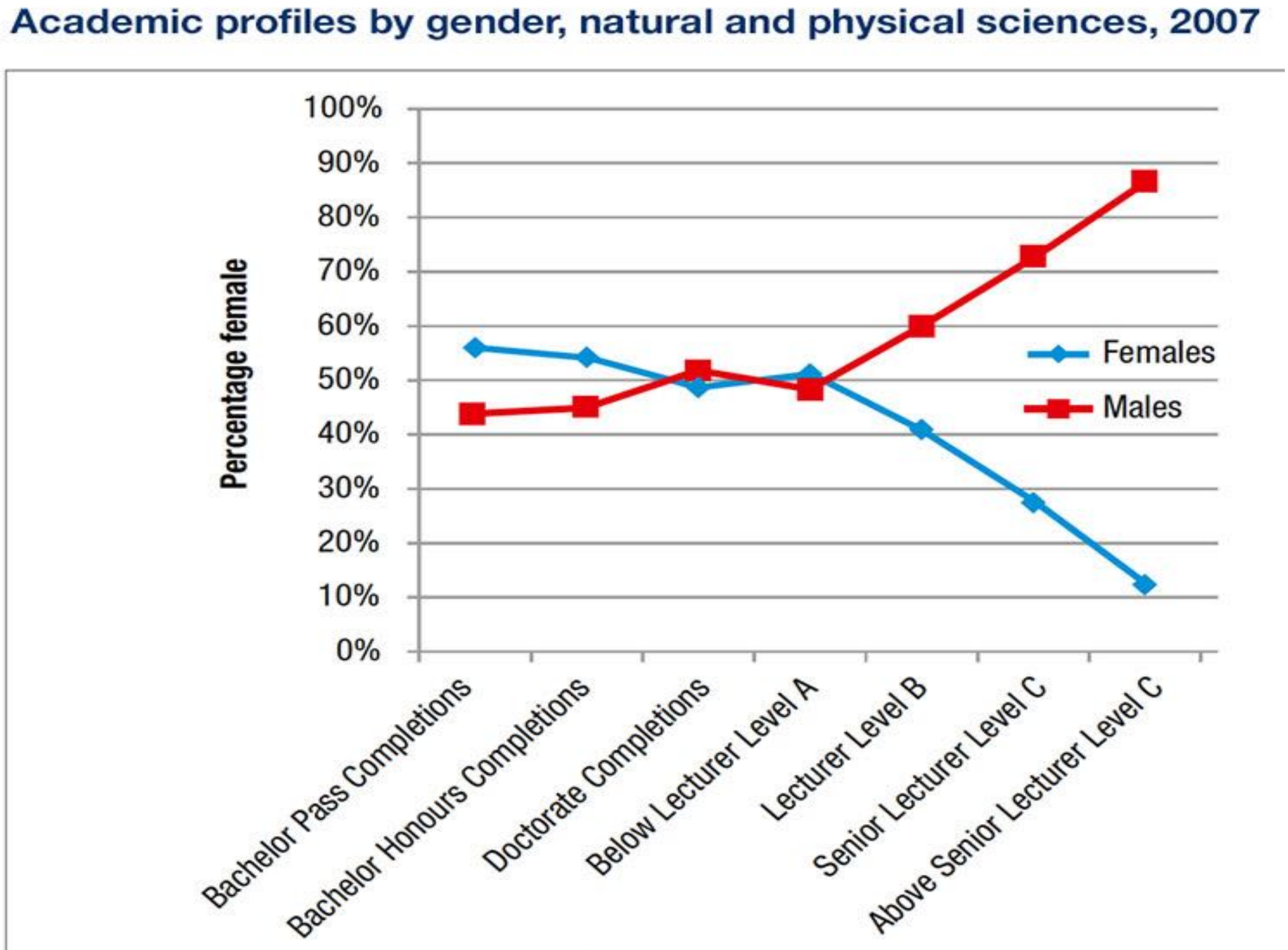
- 20% at bachelors, grad, and asst. prof
  Less for full profs: ~10%
  Profs total: 16% in 2014
- Number is going up,
  but % is decreasing





The number of women receiving physics PhDs and bachelor's degrees are both at all-time highs, 365 and 1,550 respectively. The percentage of physics PhDs awarded to women has been increasing, whereas the percentage of physics bachelors awarded to women has been declining in recent years.

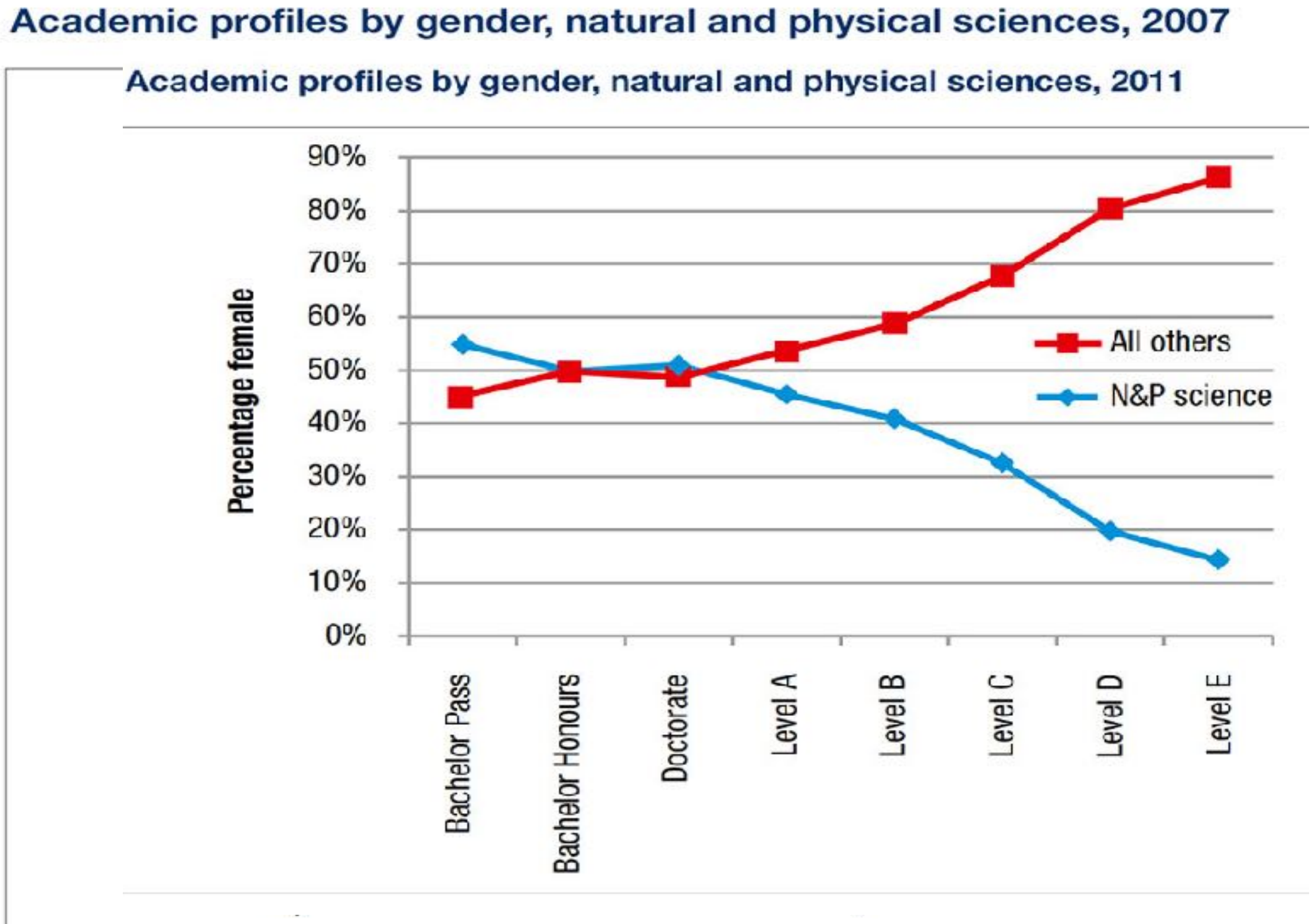
Scissors: Status in Australia



http://www.womeninscienceresearch.org.au/intro-scissorsGraphs.html

Women in the Science Research Workforce: Identifying and Sustaining the Diversity Advantage, was funded as an ARC Linkage project 2011-2014 (LP110200480).

Scissors: Status in Australia



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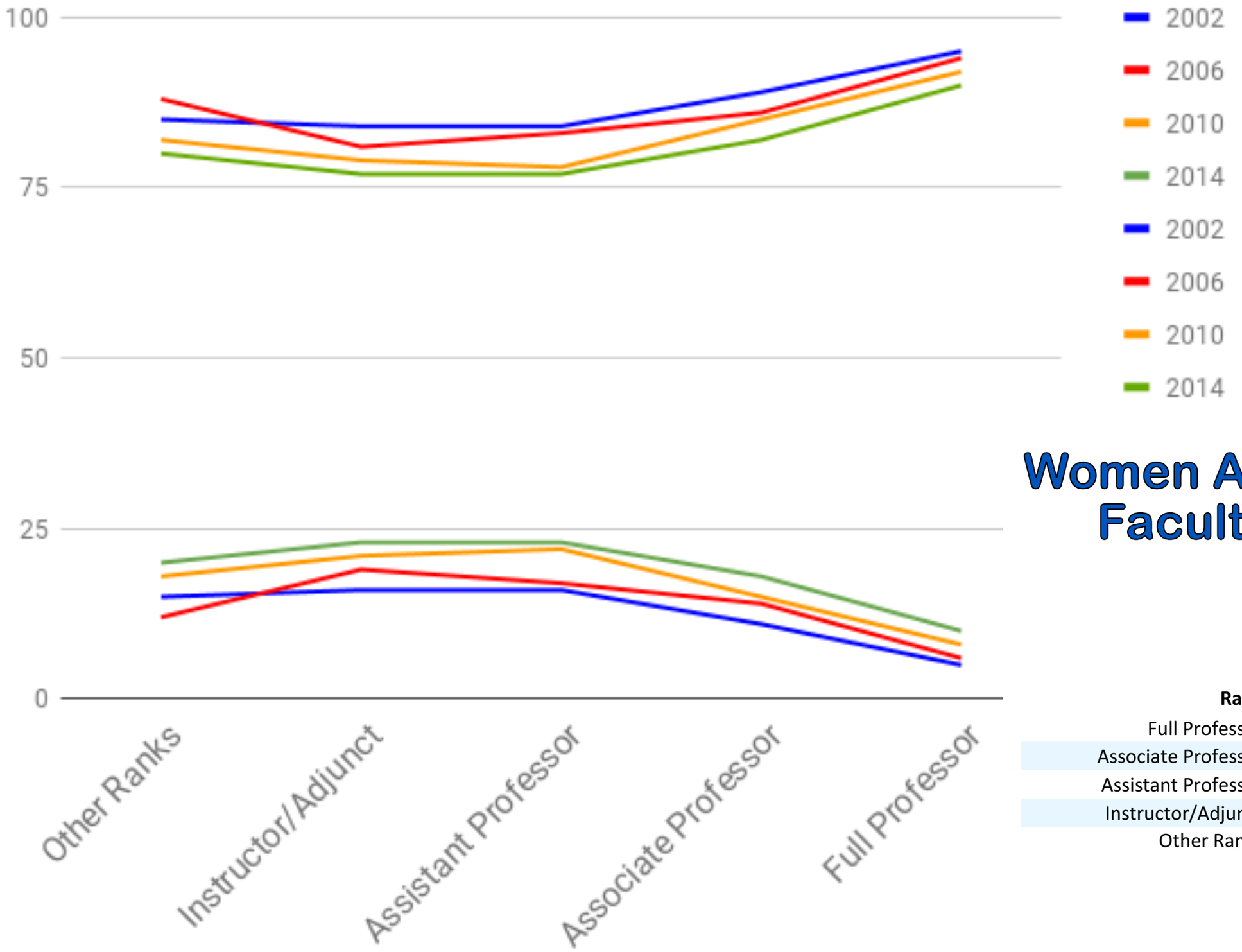
Scissors plots for the US



Women Among Physics Faculty Members

Rank	Year 2002 (%)	2006 (%)	2010 (%)	2014 (%)
Full Professor	5	6	8	10
Associate Professor	11	14	15	18
Assistant Professor	16	17	22	23
Instructor/Adjunct	16	19	21	23
Other Ranks	15	12	18	20

Vocab: "Growth mindset"

- Defined: focus on learning, changing, and continuing growth
- Opposite of "fixed mindset" with inherent talent, genius, or stupidity
- If you've focused on growth, then when you fail at something it's ok to keep going and try again; it avoids catastrophe in the face of challenge
- Cultivating a growth mentality in the classroom creates better student learning outcomes

A social-cognitive approach to motivation and personality.
Carol S Dweck, Ellen L Leggett - Psychological review, 1988
Cited by 9270

Bonus: this is well expressed in the Shakira song "Try Everything" featured in the movie Zootopia, which includes the lines "I'll keep on making those new mistakes, …I want to try even though I could fail"

Growth Mindset 2

- Fields that venerate genius over inclusivity have less less diversity
- It's healthier & more inclusive to value "growth" rather than "genius"

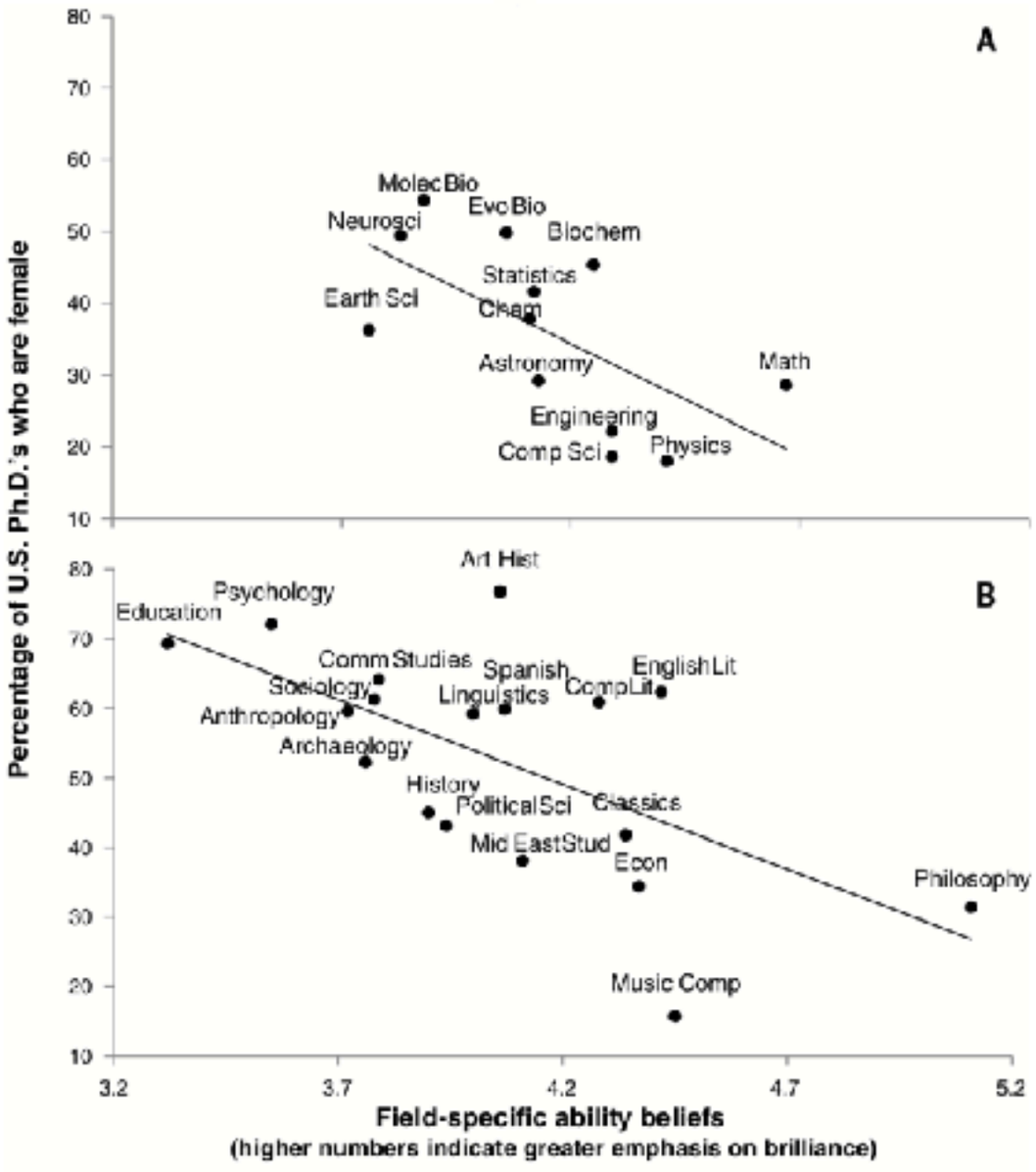


Fig. 1. Field-specific ability beliefs and the percentage of female 2011 U.S. Ph.D.'s in (A) STEM and (B) Social Science and Humanities.

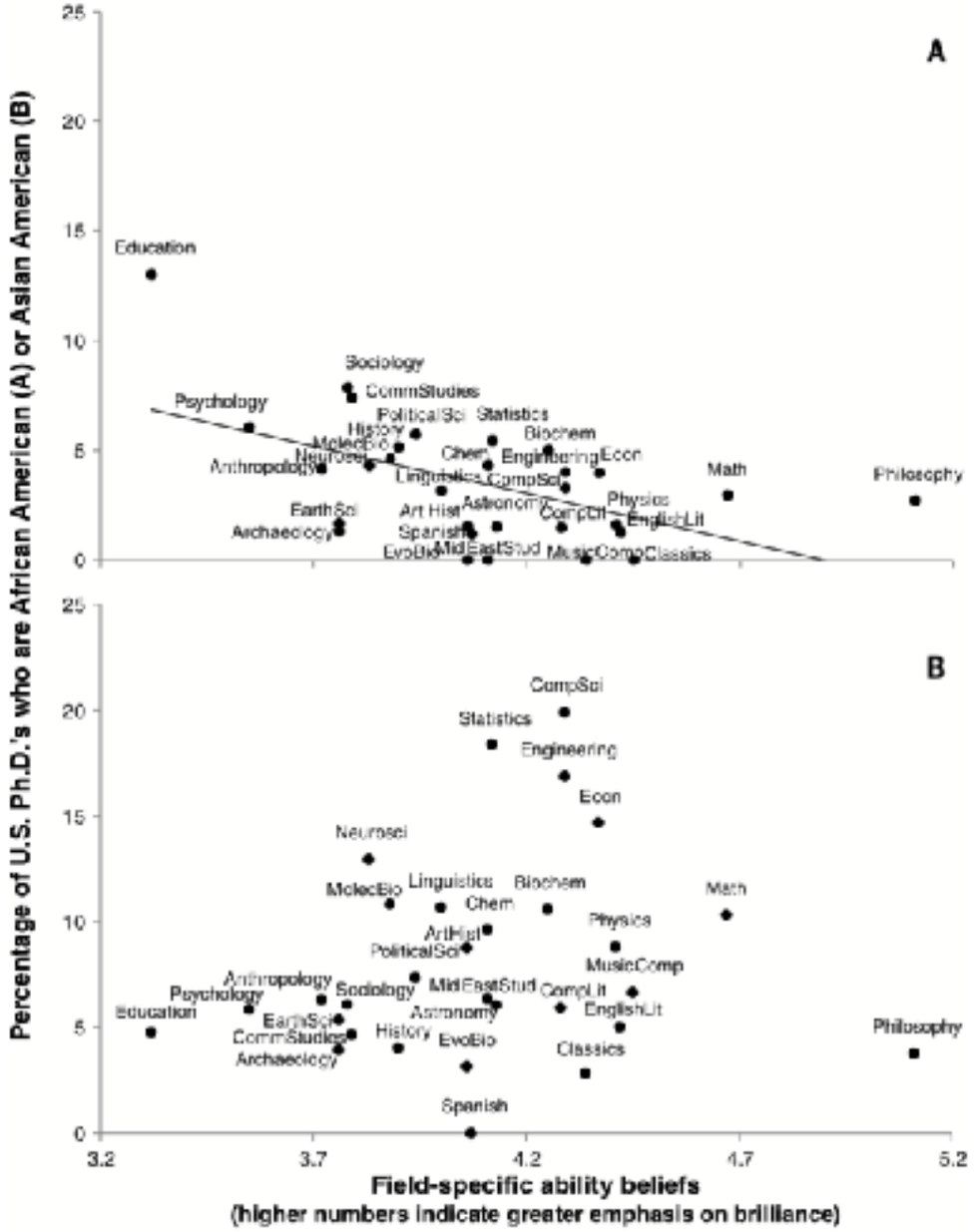


Fig. 2. Field-specific ability beliefs and the percentage of 2011 U.S. Ph.D.'s who are (A) African American and (B) Asian American.

S. Leslie, A. Cimpian *et al* "Expectations of brilliance underlie gender distributions across academic disciplines" *Science* 16 January 2015, vol 347 Issue 6219 p262

Vocab: "Intersectionality"

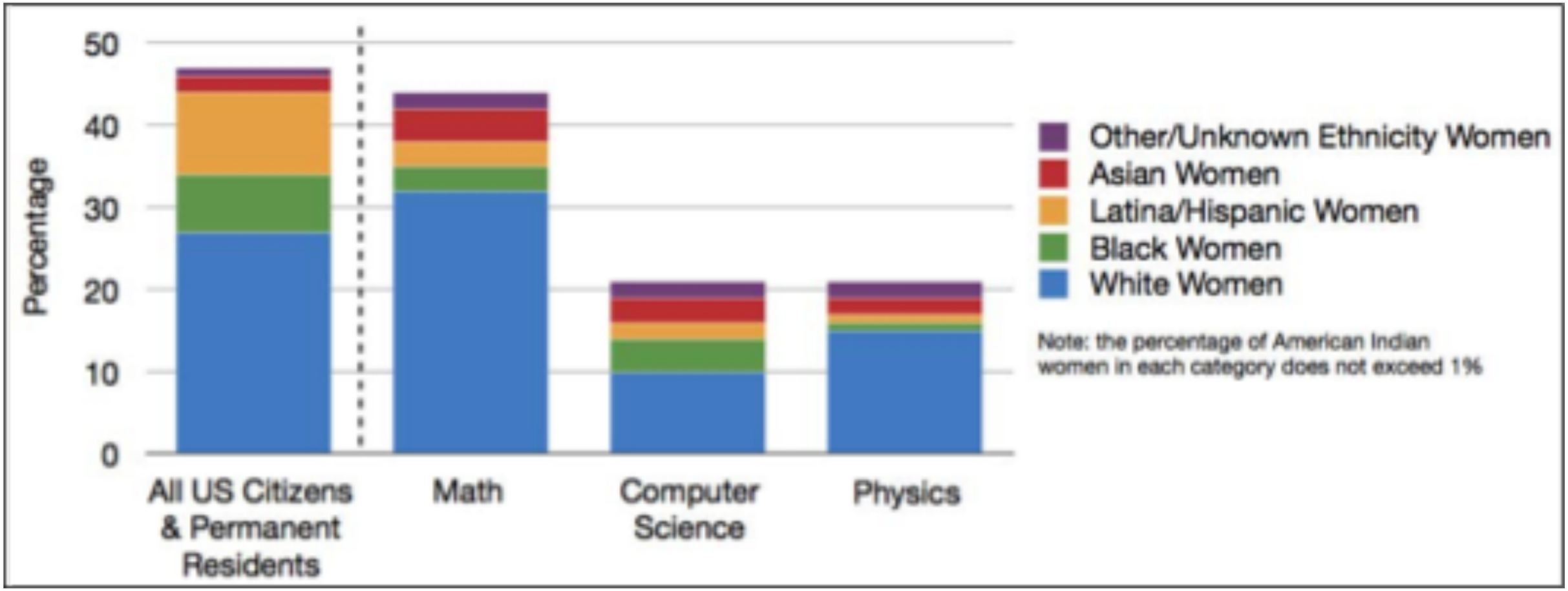
- Other identities (beyond gender) can feel the effects of implicit bias and stereotype threat:
- The effects are compounded
- Systematic fixes can help everybody, and help the most effected people the most.
- Examples of possible identities:

race	religious belief
gender	religious practice
sexual identity	ethnicity
nationality	physical disability
immigration status	mental health
economic history	English lang. proficiency

Gender and Race

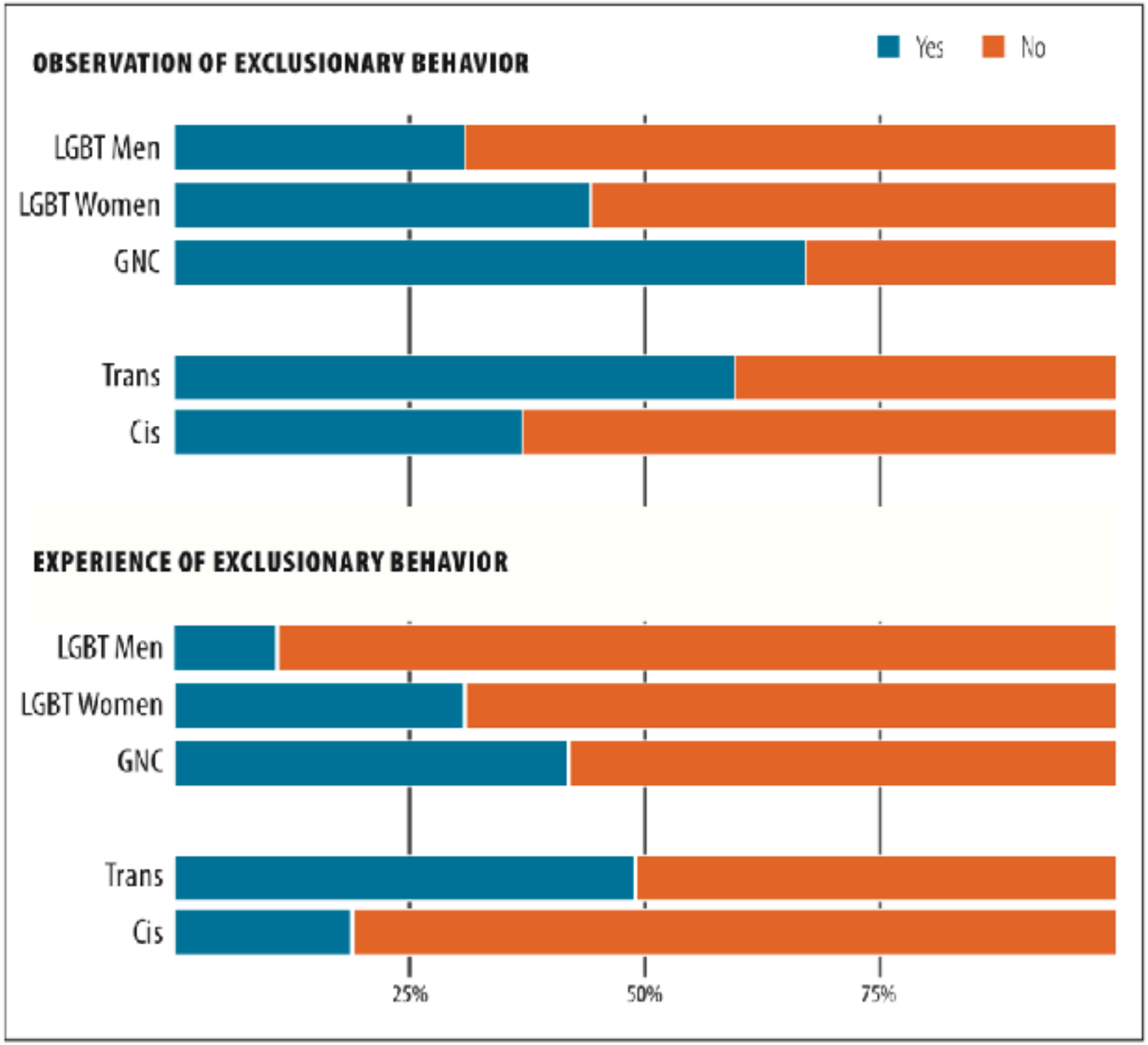
- Of the physics bachelor's degrees going to women, a disproportionate fraction are earned by white women compared to the general population of the U.S.

Women Bachelor's Degree Recipients in U.S. (2002-2012)



Gender and Sexuality

- Gay women in physics observe & experience more exclusionary behavior (~30%) than gay men do (~10%)



2015, N=324, asking about the previous year

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Vocab: "Micro-aggressions"

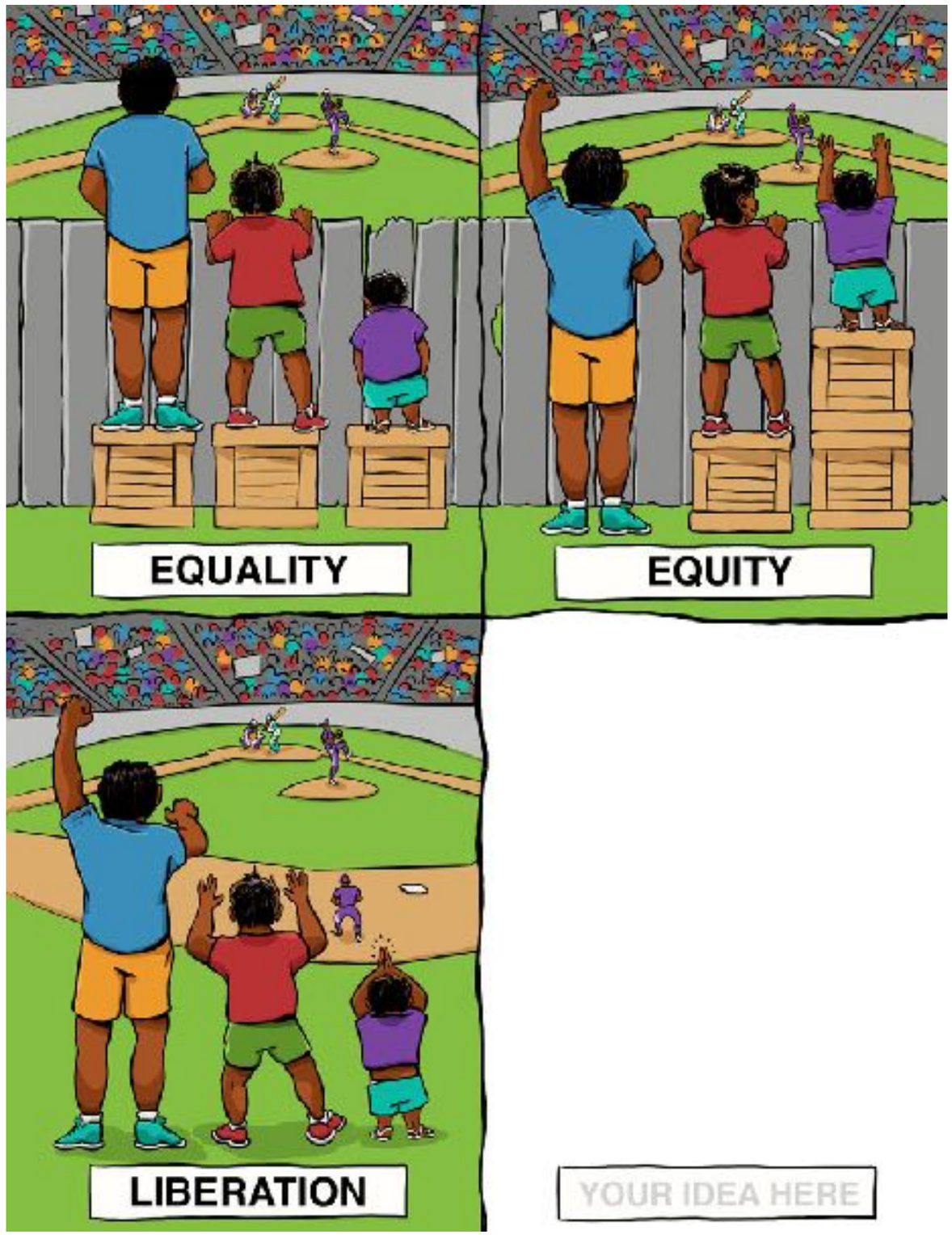
*"A micro-aggression is a brief and commonplace daily verbal, behavioral, or environmental indignity, whether **intentional** or **unintentional**, that communicates a hostile, derogatory, or negative slight or insult toward people of non-dominant identities."*

Selections from the Microaggressions Blog at Columbia University
http://www.microaggressions.com/

- "Your english is excellent"
- "Are you sure you have the right room? This is the honors section"
- "You look way too young to be a professor"
- "Can you copy this for me?"
- "Wow, you're really good at this!"
- "Do you work here [cafeteria]? I'm trying to find the soup…"
- Little insults might seem sub-threshold, but they add up like bug bites

Vocab: "Equity" versus "equality"

- "Equal" is different than "fair", because we're dealing with a lot of history and cultural momentum



Implicit Bias

"But scientists are trained to be objective!"

- "We all have bias. It's not as if men are wrong and women are right, but rather we are all wrong, quite often."
- e.g: Double Resumes study re: science students Moss-Racusin *et al.* (2012) *PNAS*

CVs designed to have identical qualifications BUT with **male name** or **female name**

DEMOGRAPHICS
Participant ID #: 149
Name: Jennifer [redacted]
Gender: Female
Ethnic Background: Caucasian
Age: 22
Degree: Bachelors of Science, obtained May 2011 from [redacted] University

BACKGROUND
GPA: 3.2
GRE score: 650 verbal, 780 quant
Awards/honors: President's Service Award, Rotary Club College Scholarship
Previous research experience: 2 years as a research assistant working with 2 different faculty mentors
Academic standing: appears from Jennifer's transcript that she was in good standing upon graduation, but withdrew from 1 class prior to final
Letters of recommendation: 3 (2 from former faculty research supervisors, 1 from an intro science course professor), all supportive
Future plans: apply to doctoral programs
Extracurricular activities: student government, college learning center tutor
Position sought: Lab Manager
Position duration: 2 years, with possibility of renewal pending satisfactory performance

STATEMENTS/LETTERS
Excerpt from student statement: "I am a motivated student and would make the most of the opportunity to serve as your lab manager. After spending a semester working in Dr. [redacted]'s lab and another year doing research with Dr. [redacted], I have gained valuable technical skills, co-authored a journal article, and am now committed to an academic research career…as someone focused on improving my standing and enhancing my research experience, this lab manager position would provide the perfect opportunity to hone the necessary skills to make me competitive for graduate school applications… additionally, the fascinating research taking place in your lab is directly in line with my interests and experiences…in short, I am focused, motivated, organized and dedicated to improving my research skills. I am enthusiastic about the opportunity to fill the lab manager position and collaborate with you on future research."

Excerpt from faculty recommendation letter: "…although Jennifer admittedly took a bit longer than some students to get serious about her studies early in college, she has impressed me by improving over the last two years of her science coursework and has made every effort to make up for lost ground…she has been a strong research assistant in my lab, and I know she is capable of serving as a dedicated lab manager."

NB: this is "implicit" not "subtle"

Implicit Bias

Moss-Racusin *et al.* (2012) *PNAS*

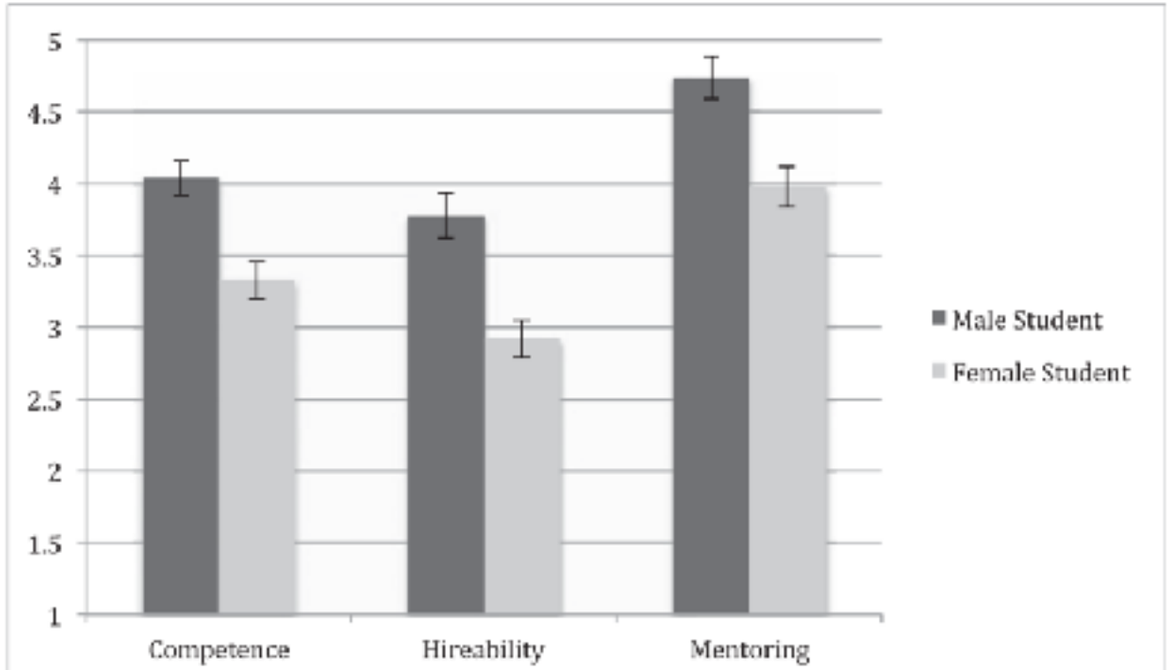


Fig. 1. Competence, hireability, and mentoring by student gender condition (collapsed across faculty gender). All student gender differences are significant ($P < 0.001$). Scales range from 1 to 7, with higher numbers reflecting a greater extent of each variable. Error bars represent SEs. $n_{\text{male student condition}} = 63$, $n_{\text{female student condition}} = 64$.

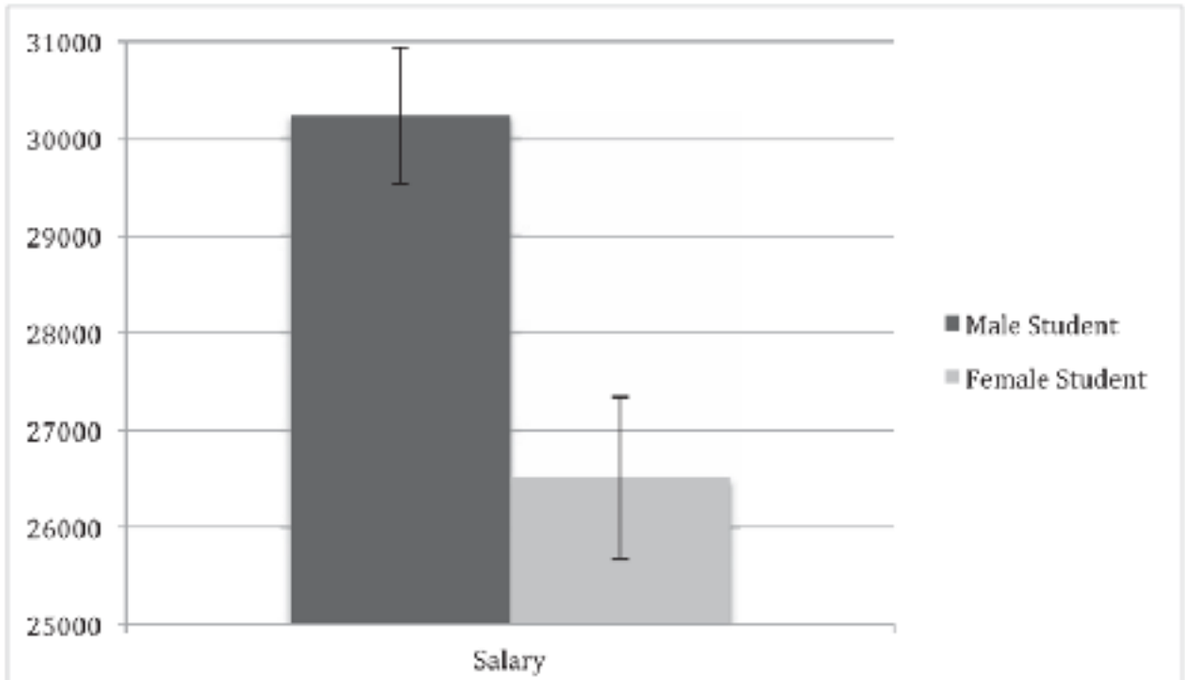
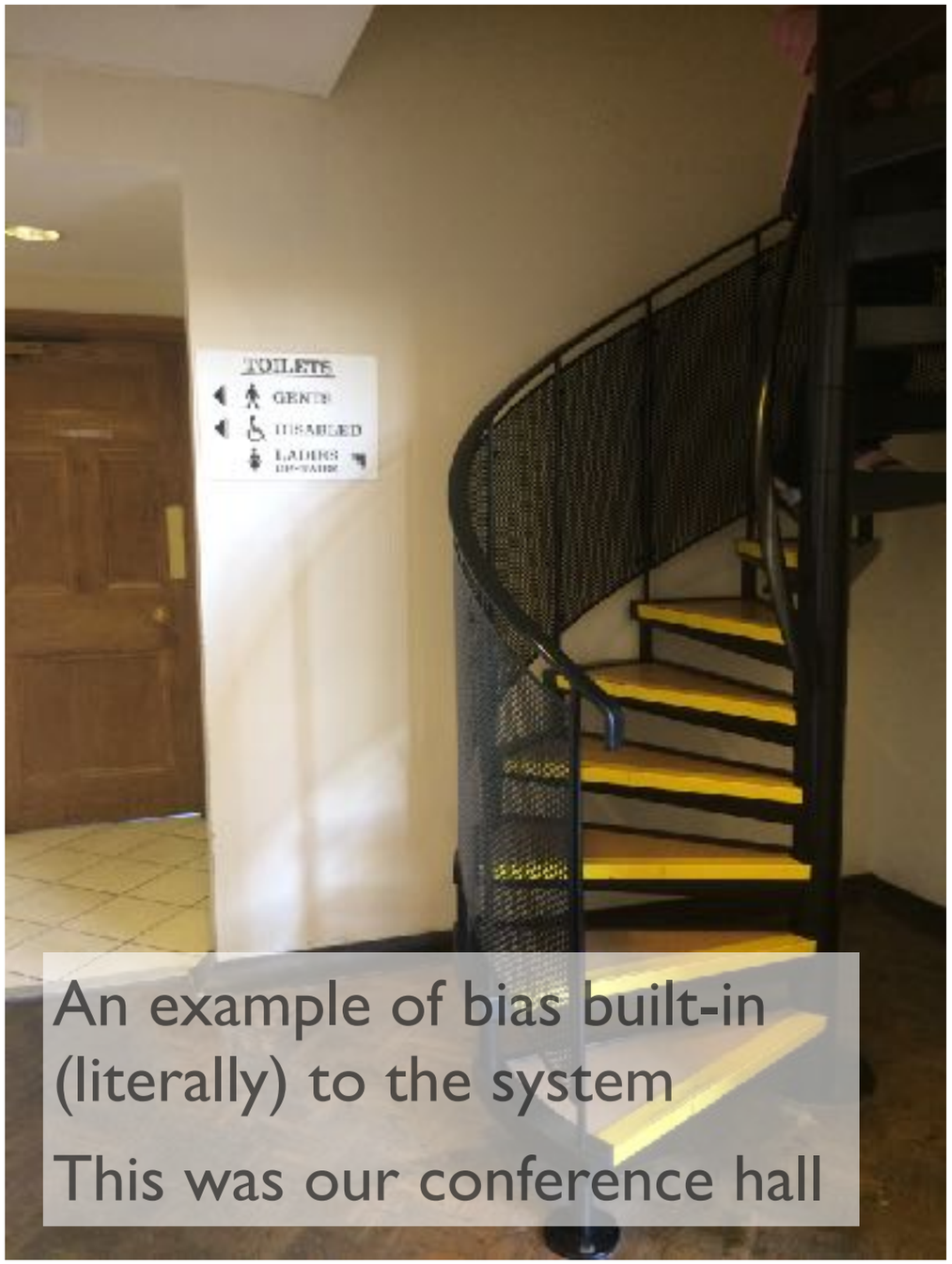


Fig. 2. Salary conferral by student gender condition (collapsed across faculty gender). The student gender difference is significant ($P < 0.01$). The scale ranges from \$15,000 to \$50,000. Error bars represent SEs. $n_{\text{male student condition}} = 63$, $n_{\text{female student condition}} = 64$.

- Faculty gender had no significant effect on these measurements (we all do this)
- Combat it: whenever possible, don't make important decisions implicit.
  Come up with considered metrics, not gut feelings
  Question your colleagues (and self) when you find moments of bias.

What creates implicit bias?

- Literally millennia of culture.



An example of bias built-in (literally) to the system

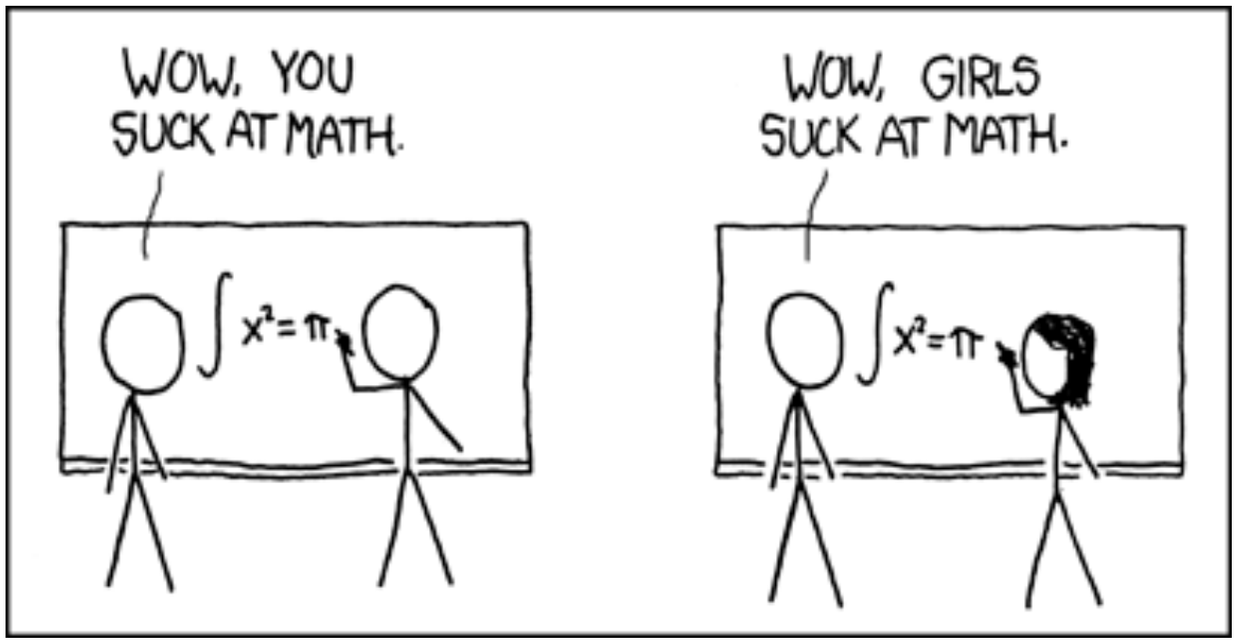
This was our conference hall

At UW: tampon machine broken since May

(but free ones are available, so perhaps it's ok)

Stereotype Threat

- Stereotype threat is the *perceived risk* of confirming a negative stereotype
- Increases the cognitive load on people who perceive themselves as under threat
- It constantly runs in the back of your head until the environment can be trusted, and that trust can be shattered



Stereotype Threat: We're not making this up.

Occurs in many different settings:

- math, physics
- the SAT and GRE
- test again, with race (instead of gender)
- surgical referrals ★
- athletics
- athletics, with race

citations	
~3k	Spencer *et al* 1999, Journal of Experimental Social Psychology, Volume 35, Issue 1, January 1999, Pages 4-28 "Stereotype Threat and Women's Math Performance"
60	Rydell *et al* 2010, PNAS, Vol 37 no 32 p14042 "Stereotype threat prevents perceptual learning"
7k+	Steele, C. M., & Aronson, J. (1995). Stereotype threat and the intellectual test performance of African Americans. *Journal of Personality and Social Psychology, 69*(5), 797-811.
	Sarsons H. Interpreting Signals in the Labor Market: Evidence from Medical Referrals [Job Market Paper]. Working Paper, Nov 2017 https://scholar.harvard.edu/sarsons/publications/interpreting-signals-evidence-medical-referrals
46	Hively, El-Alayli 2014, Psychology of Sport and Exercise Volume 15, Issue 1, January 2014, Pages 48-55 "You throw like a girl:" The effect of stereotype threat on women's athletic performance and gender stereotypes
186	Jeff Stone, W. Perry & John M. Darley "White Men Can't Jump": Evidence for the Perceptual Confirmation of Racial Stereotypes Following a Basketball Game Basic and Applied Social Psychology Vol. 19 , Iss. 3,1997

★ Surgery data shows PCPs punishing all female surgeons for the mistakes of one; this is the "threat" of "stereotype threat"

mention: me & Lindley get mixed up

Stereotype Threat

- Prof. Dame Jocelyn Bell Burnell says she experienced internalized stereotype threat as an Irish northerner in Cambridge

National/Regional identity felt like a bigger deal to her than gender, despite how we're portraying her in history

Stereotype Threat In Action

The female trainee thinks:

"I wish he cared that much about my project!

"It's just not fair."

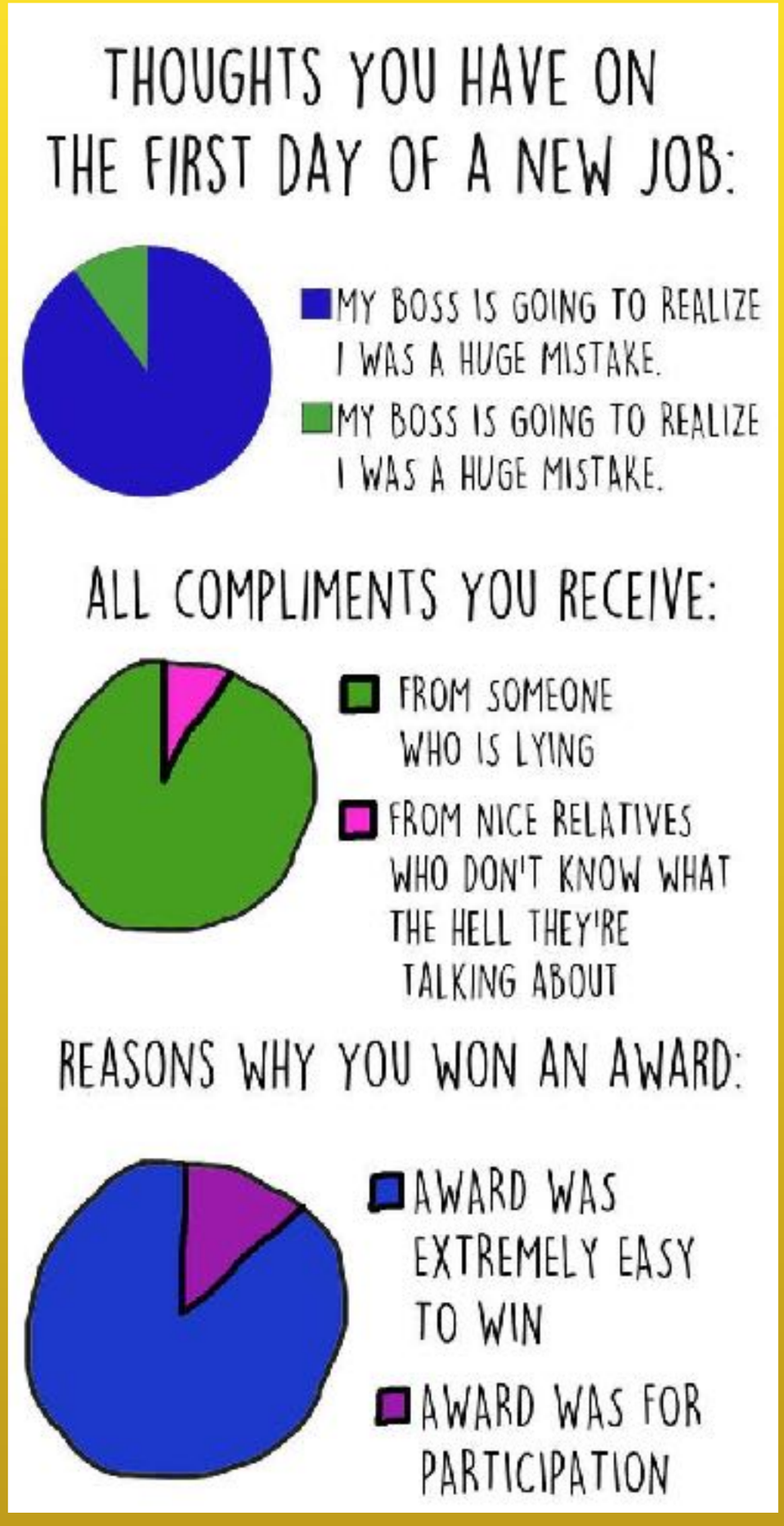
The male trainee thinks:

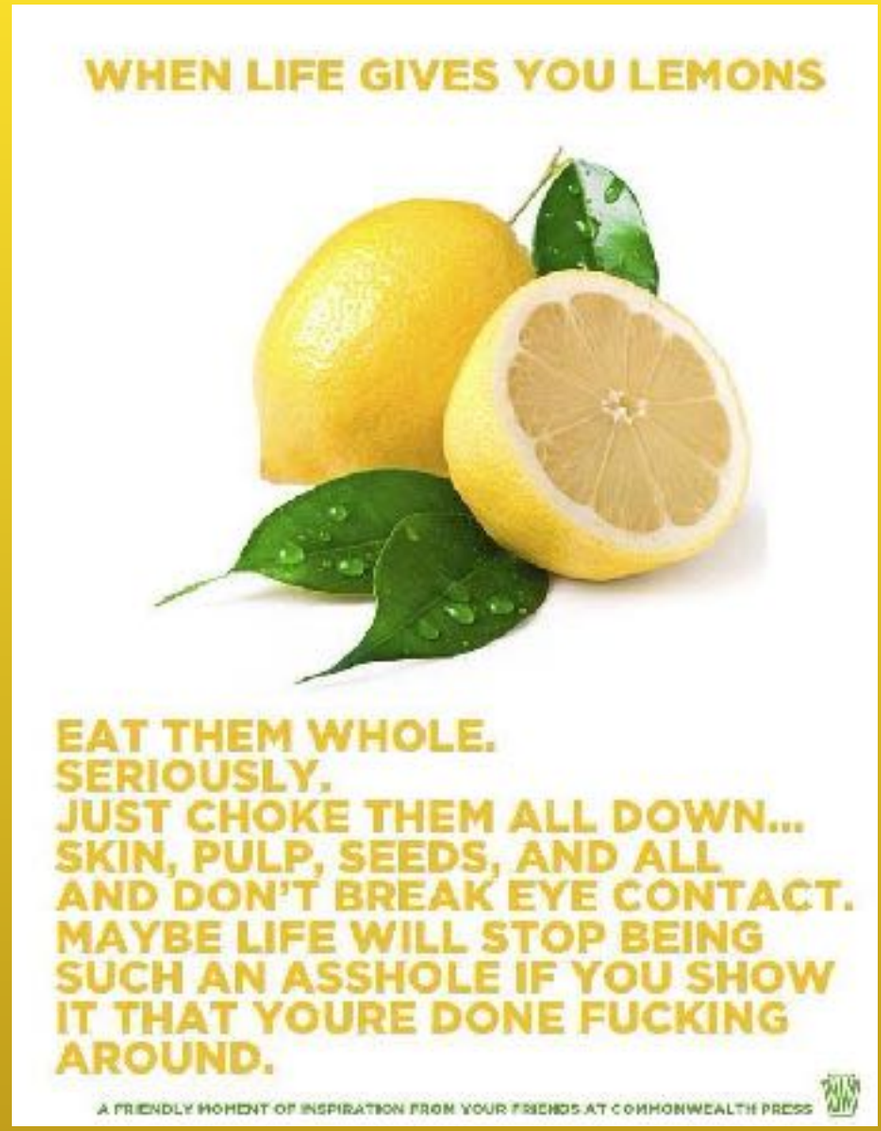
"He NEVER yells at the girls like that. Her project isn't going any better than mine.
"It's just not fair."

The professor thinks:

"I haven't yelled at or discouraged a woman pursuing a career in science."
"I am being fair."

Imposter Thoughts versus Grit (triggers fight-or-flight)





Benevolent Bias/ Organizational Paternalism

- Definition: Helping people when they don't want help, and in doing so, hurting them
- eg: hiring committees don't hire partnered women unless they can make a job offer to the partner/husband, but don't consider this factor for men.
- Note: this is illegal, even if the woman volunteers her relationship status (ie, it's not just illegal to ask for the info, it's illegal to use it)
- Solution: stop that! Bad committee! No!
  It's fine to help partners find jobs if requested, but don't require it
  When she says she's willing to move, learn to take "yes" for an answer

Bonus idea: when possible, offer 2 positions at once

When Two Bodies Are (Not) a Problem: Gender and Relationship Status Discrimination in Academic Hiring
Lauren A. Rivera

American Sociological Review
Vol 82, Issue 6, pp. 1111 - 1138
First Published October 25, 2017
https://doi.org/10.1177/0003122417739294

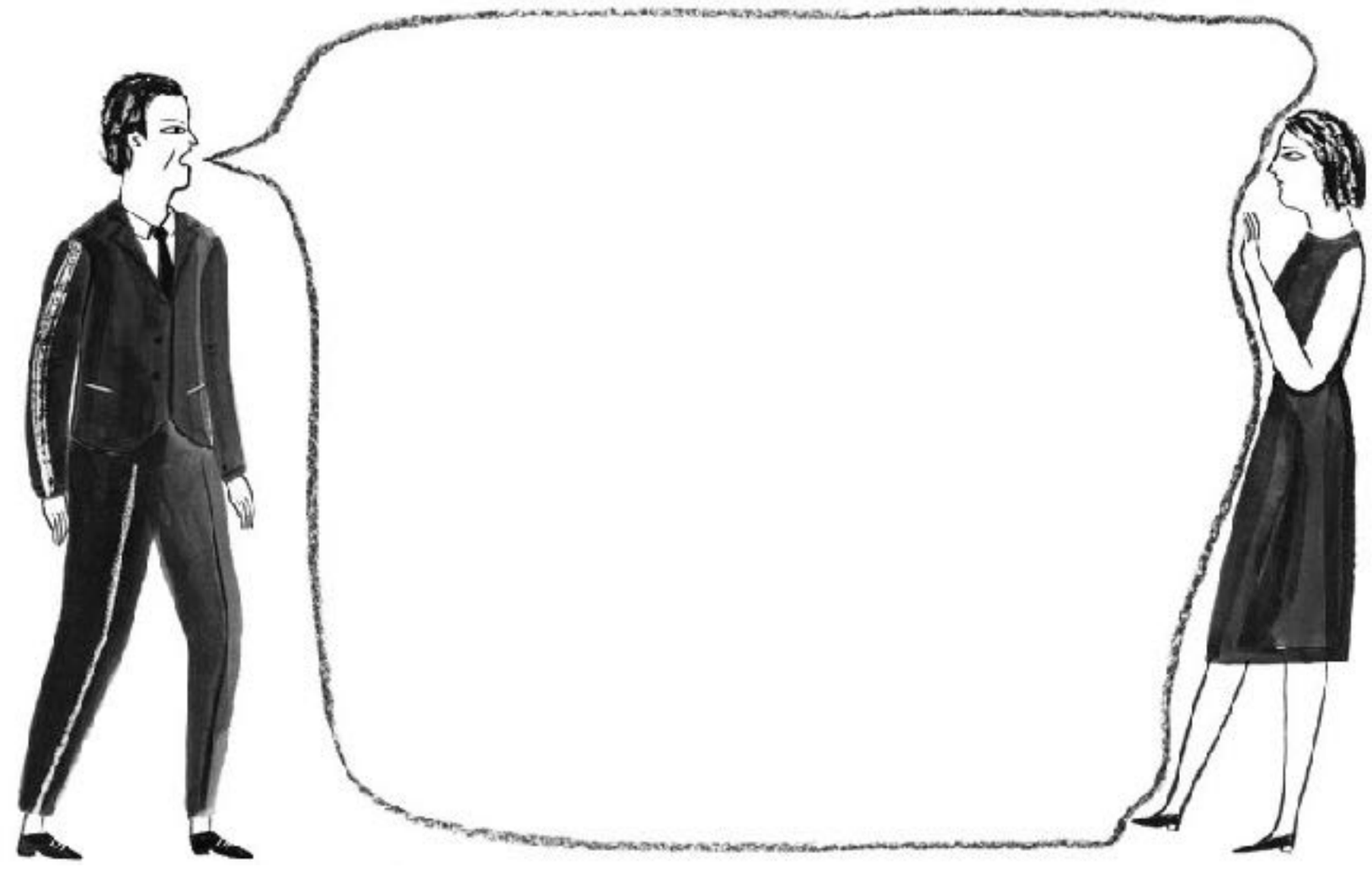
Resources and Solutions





Warm Atmosphere

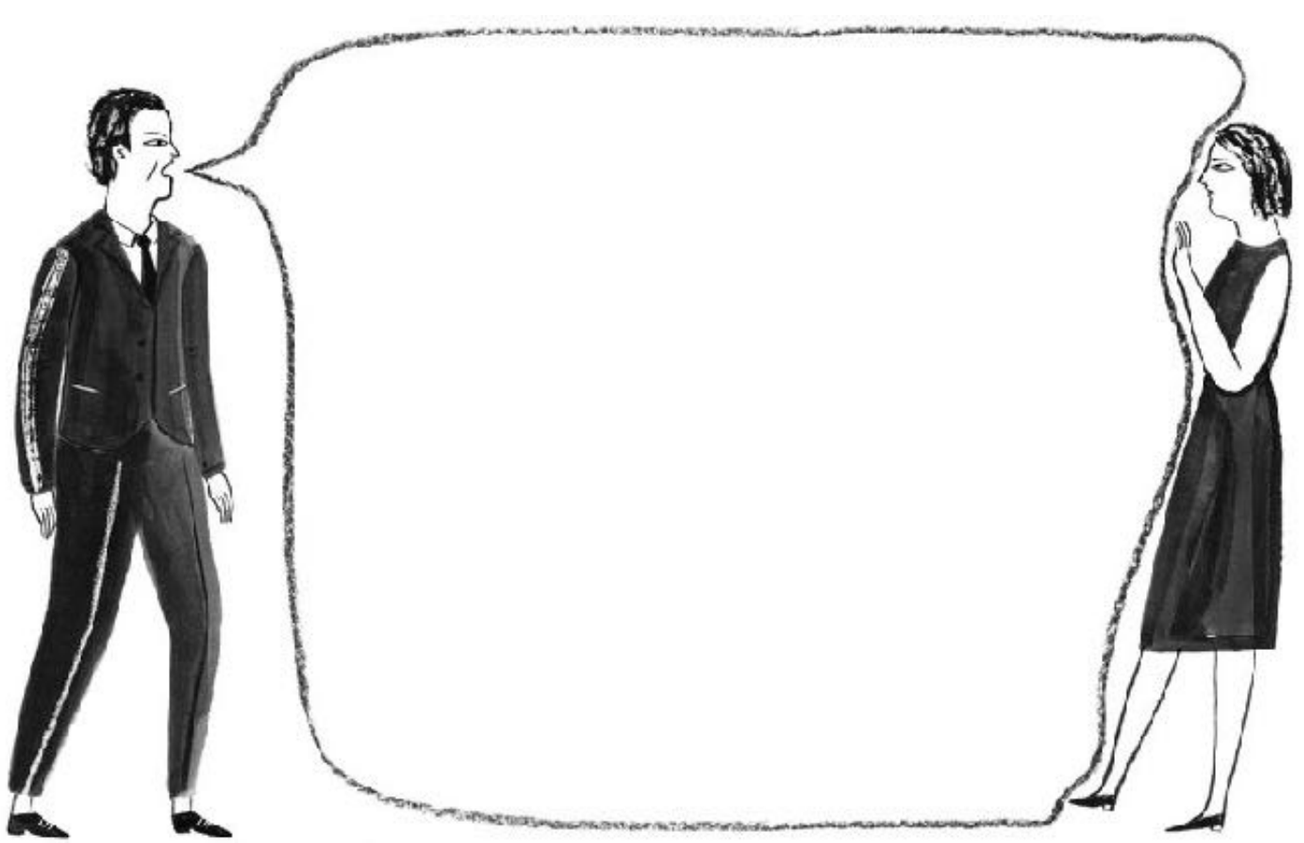
- Be nice & considerate
- Solicit opinions from everyone
- Don’t hog conversations
- Shift conversations away from hogs



Warm Atmosphere

Warm syllabi explain expectations in a clear and friendly fashion, encourage and motivate students, and anticipate positive student outcomes, rather than merely attempting to prevent problems. They are associated with positive student outcomes.
(Littlefield 1999a; Collins 1997; Tinto 1993).

- Tell students in detail on the first day of class how they will be graded



Wise Criticism

- Criticism where you explicitly let the student know they are capable of a higher level of achievement.

- "Sam, based on your participation in recitation, I know you have the potential to succeed in this class. On the exam, you really struggled with the concept of a control volume, which is a critical concept. Please come to office hours so we can work on this."

- "I really liked the journal article you selected for your presentation. You need to work on how you present the data, however, since you spent so long on the first figure and left out some of the critical data from the follow-up experiments."

- "I noticed that you lost a lot of points on the acid-base section of the problem set. You should make sure to work through the extra practice problems that I posted, since this is a topic that will be on the next exam."

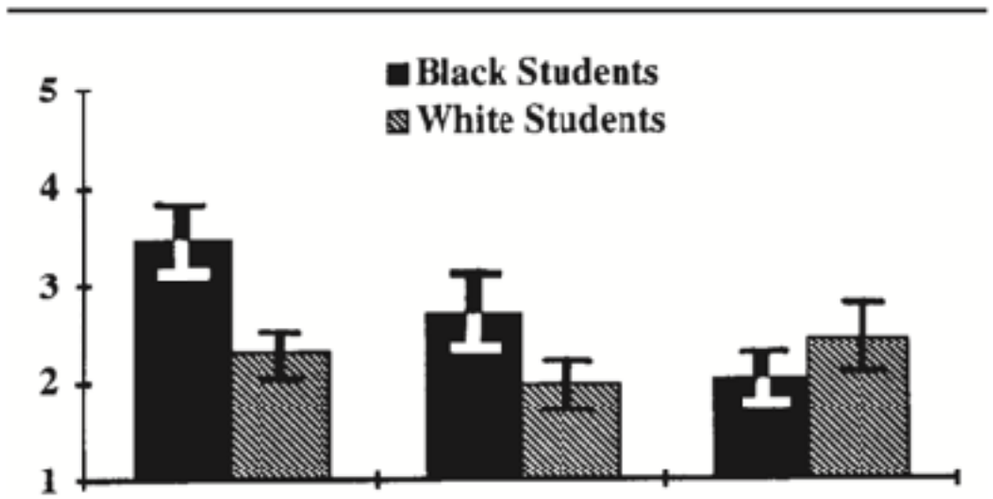


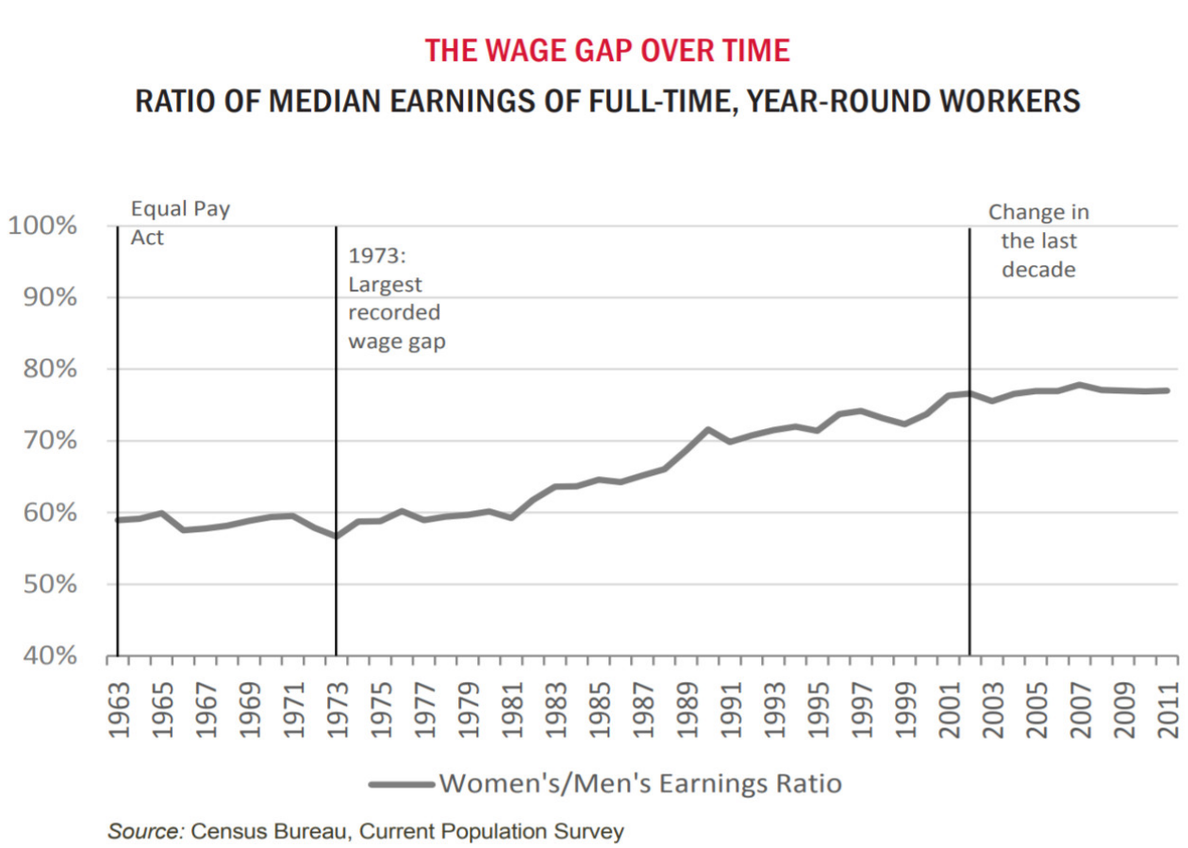
Figure 1 Ratings of bias as a function of race and feedback condition in Study 1.

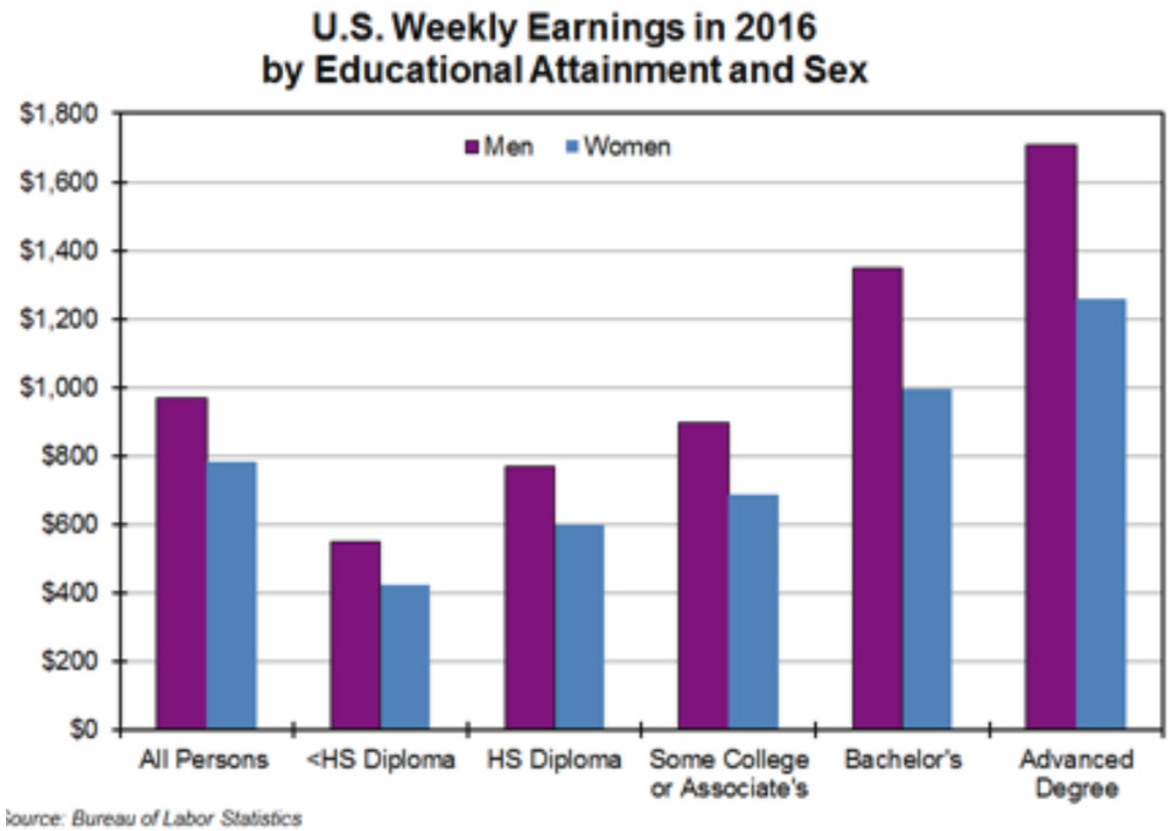
The Mentor's Dilemma: Providing Critical Feedback Across the Racial Divide
Geoffrey L. CohenClaude M. SteeleLee D. Ross

Personality and Social Psychology Bulletin
Vol 25, Issue 10, pp. 1302 - 1318
First Published October 1, 1999
https://doi.org/10.1177/0146167299258011

Talk Openly About Pay

- Be clear and transparent about how much different people get paid, and why. If we don't know, we'll assume the worst
- Write and explain policies for promotion, so different groups don't get treated differently
- If you're afraid for you employees to know about each other's pay, then you are the problem.





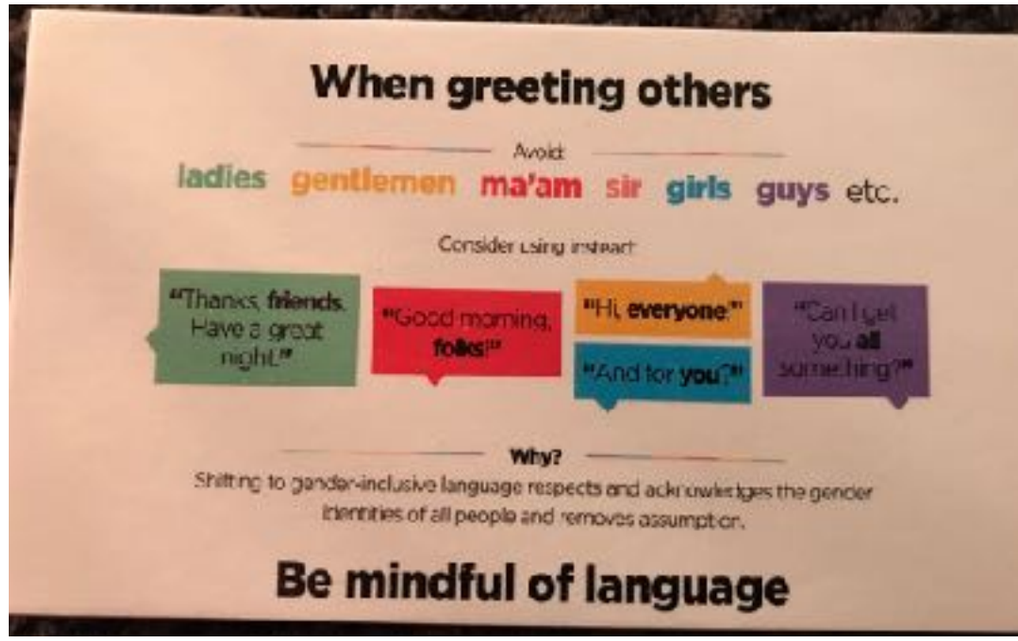
Word Choice Suggestions

- Address people for why they're there:
  - "students" not "boys and girls",
    "hello and welcome"
    "fellow neutrinos enthusiasts" not "ladies and gentlemen",
- Many sentences don't need gender:
  - "personnel", "FTE", or "brainpower", not "manpower"
- Avoid judgmental constructions:

  "this is easy"
  "you should already know this"
  "details aren't important, but…"
  "I'll go through this quickly…"

- Instead:

  "We're going to talk about…"
  "Let's look at…"
  "If you don't know this, here's…[a resource]"



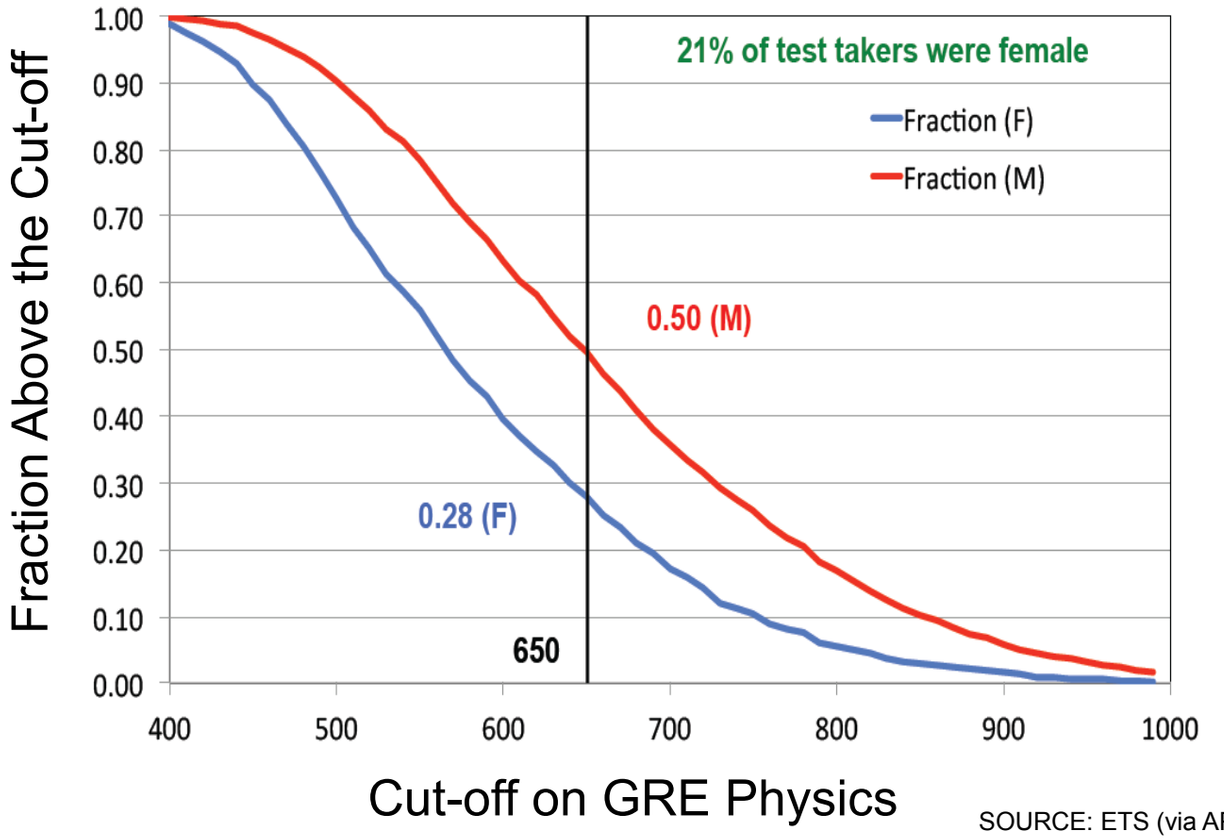
GREs

Whenever possible, de-emphasize or remove the GRE from the admissions process.

"In simple terms, the GRE is a better indicator of sex and skin colour than of ability and ultimate success."

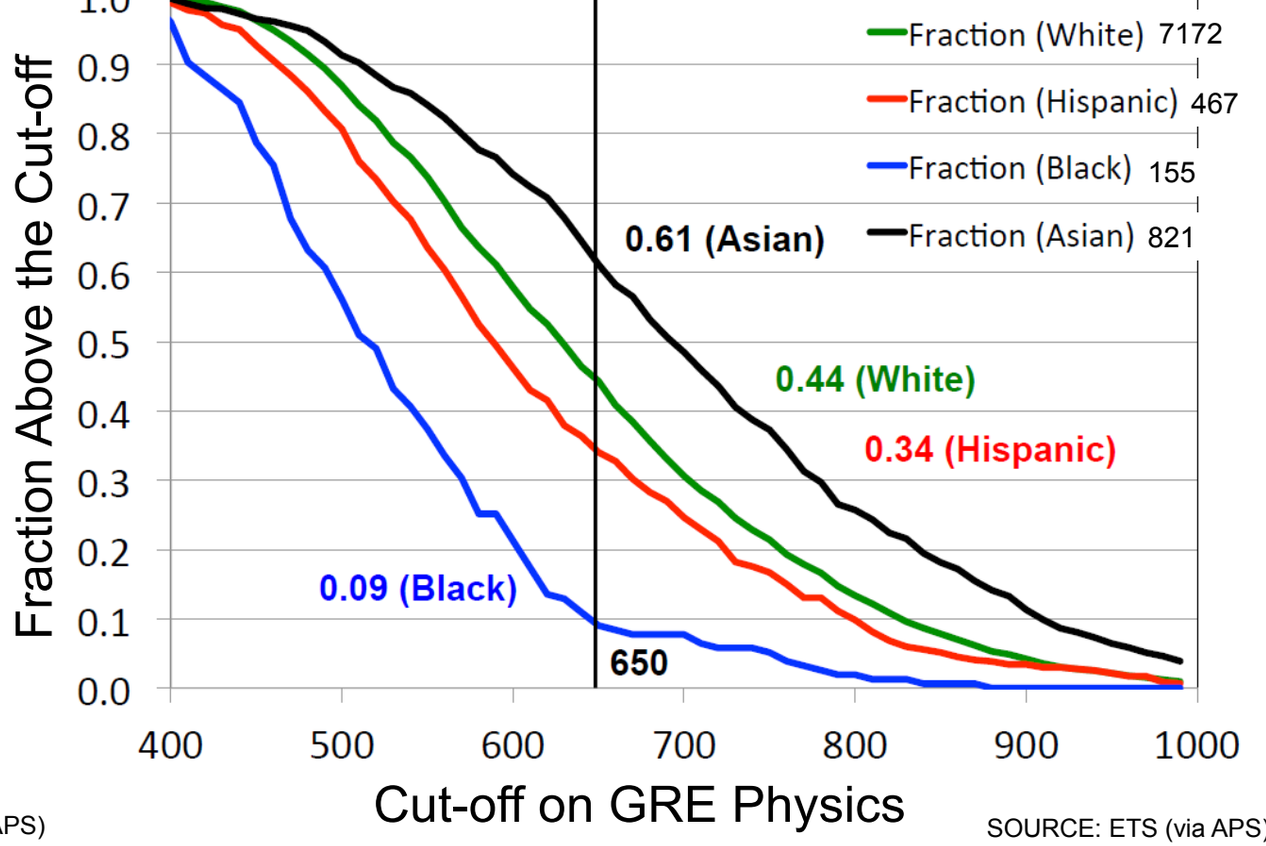
Miller & Stassun (2014)

GRE Physics Subject Test



SOURCE: ETS (via APS)

GRE Physics Subject Test



SOURCE: ETS (via APS)

Set Study Group expectations

- Remind students that they are expected to do psets in groups
- Remind them that study groups are professional spaces,
  and to treat each other like colleagues
- Tell everyone that people don't get admitted/hired as tokens, they got there on their own merits
- Keep a conversation open with student reps:
  is the study space welcoming to all students?

Comment your Code

- Documentation helps everyone,
- and it helps marginalized groups the most, which closes gaps
- It's the nice thing to do.
- Keep an open conversation with new software users- can they pick it up easily?

Experimental Collaborations

- Agree on authorship order before investing tons of work in a paper
- Write by-laws for experimental collaborations as soon as possible, before there are conflicts motivating each detail
- Keep an open conversation with new and young collaborators
  - early career representative on boards
  - early career networking (social?) and mentoring

Junior Faculty

- Put junior faculty on powerful committees (colloquium, admissions…) so they can network and be mentored by senior faculty
- Give credit for the extra student mentoring that nice faculty do — but not at the expense of letting them network up
- If they speak up about climate, listen! Fresh eyes have extra value

Hera McLeod "Create culture of inclusion if you want true workplace diversity", Seattle Times, Fri November 24, 2017, op-ed

"I've heard a lot of recruiters talk about how to improve diversity,
but not enough about how to prevent those of us who bring diversity from leaving."

"All employers and employees must take responsibility for creating a safe and inclusive environment,
instead of placing the task of calling out culturally destructive behavior on the shoulders of minorities."

How to counter "Mansplaining"

- First try: I interrupt a lot, early and often, before it's awkward
  e.g. "I know, that was my thesis"
- 2nd try: "yes AND": try to move the conversation beyond that point
- 3rd try: yell, walk away, and/or pass the convo to an Old White Male

Other Resources

Athena-SWAN and JUNO

- JUNO is just physics, all marginalized groups;
  Athena-SWAN is all STEM fields, just women
- Institutions are reviewed by outside peers to improve climate
- Results in a certification level that can be publicized
  bronze, silver, gold; or supporter, practitioner, champion
- "Race to the Top": share best practices, instead of requiring a minimum
  "get them to fight over the award of a crystal rose bowl, instead of threatening their funding"
- … but then also tie it to funding.

Athena SWAN ("Scientific Women's Academic Network") started 2005
Expanded in 2015 to non-STEM schools and to professional and support staff

Project JUNO established in 2007 to recognize and reward departments that have demonstrated they have taken actions to address the under-representation of women in university physics and
to encourage better practices for both women and men.
These offer grants to those returning to work,
CV mentoring, plus promotion sessions Workshops on confidence building, imposter syndrome

project juno

thanks to Jess Wade for slide

Project Juno has **five core principles,** which all must be embedded to achieve Champion status:

1. A robust organisational framework to deliver equality of opportunity and reward
2. Appointment and selection processes and procedures that encourage men and women to apply for academic posts at all levels
3. Departmental structures and systems which support and encourage the career progression and promotion of all staff and enable men and women to progress and continue in their careers
4. Departmental organisation, structure, management arrangements and culture that are open, inclusive and transparent and encourage the participation of all staff
5. Flexible approaches and provisions that enable individuals, at all career and life stages, to optimise their contribution to their department, institution and to SET

	Number of Physics Departments
Supporter	17
Practioner	14
Champion	18
Total	49

The Juno Code of Practice available on the IOP website offers a detailed guide to the application process.

Timeline

2007: Project Juno is introduced

2008: 19 departments in "Supporter" category

2009: First Juno Champions are awarded – University of Warwick and Imperial College

2017: *Current status:* **58 departments offering undergraduate courses in physics**, **49 are currently engaged with Juno.**

athena swan

thanks to Jess Wade for slide

* Equality Challenge Unit's **Athena SWAN Charter** was established in 2005
* To encourage and recognise commitment to advancing the careers of women in science, technology, engineering, maths and medicine (STEMM) employment in higher education and research.
* Depend on **institutional engagement** with the scheme: to receive an award, the institution must have at least an Athena SWAN Bronze
* **Three levels of award**: Bronze, Silver and Gold based on **10 principles**

	Number of Physics Departments
Bronze	11
Silver	15
Gold	1
Total	27

- 143 Athena SWAN institutional Charter members
- 27 out of 58 UK physics departments holding awards

Timeline

2005: Athena SWAN Charter introduced

2015: Charter expanded to recognise work undertaken in arts, humanities, social sciences, business and law (AHSSBL), and in professional and support roles, and for trans staff and students

2016: Charter expanded to include trans staff at the institutional level and professional and support staff across all awards

Similar Reviews in the US

- APS Committee on the Status of Women in Physics
  can do site visits, but results are a report instead of an award level
- New review programs are being started now, but not yet tied to $$$
  - Pilot this year: "STEM Equity Achievement Change" (SEA Change)
  - Pilot developing: "Centering Women of Color in STEM: Identifying and Scaling Up What Helps Women of Color Thrive"
    300k$ NSF award 1712531 to ICWiP attendees Apriel Hodari & Angela Johnson

"UK gender-equality scheme spreads across the world"

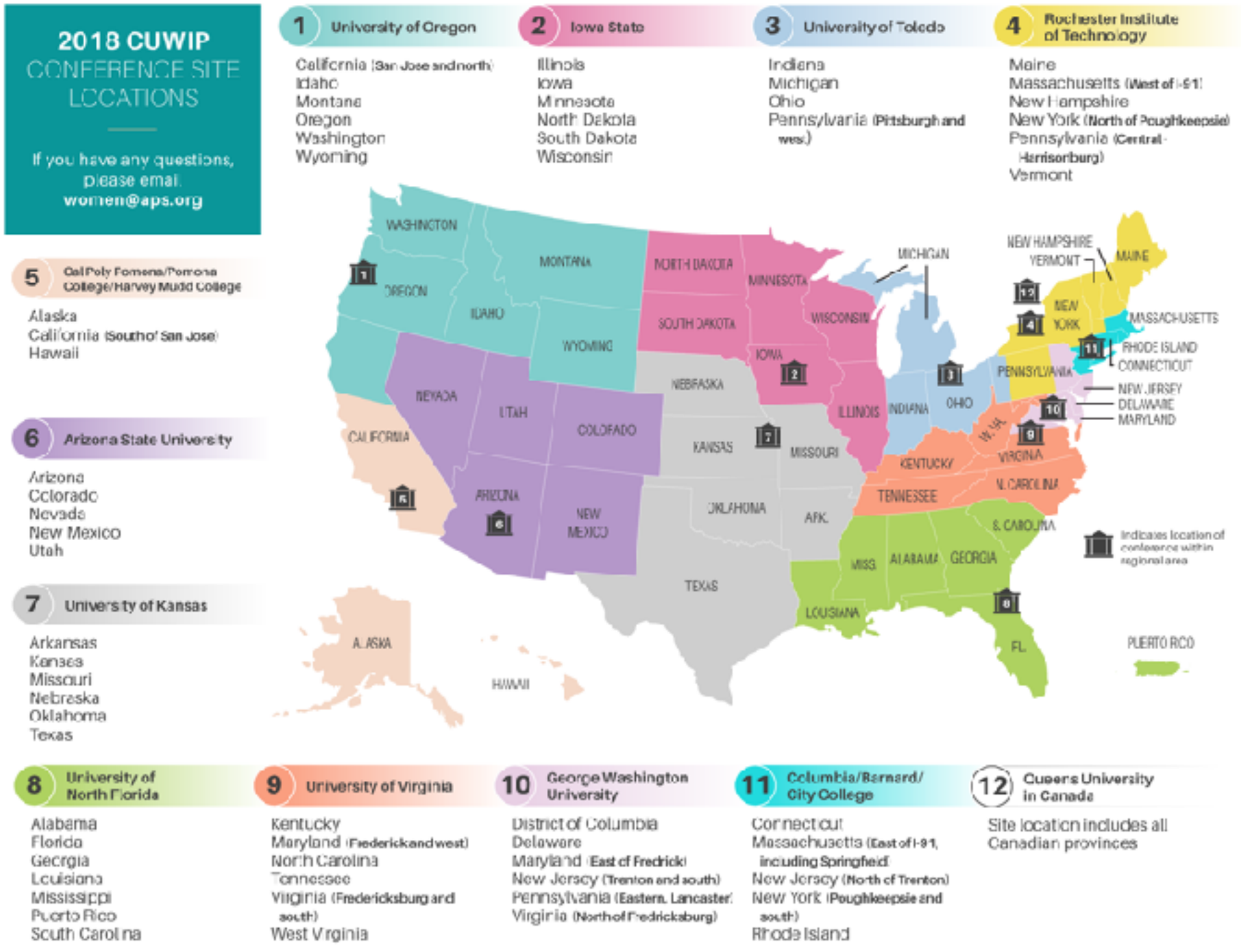
Nature **549,** 143–144 (14 September 2017) doi:10.1038/549143a

https://www.nature.com/news/uk-gender-equality-scheme-spreads-across-the-world-1.22599

Waterloo Charter

- Originally drafted at the last IWCiP, following recommendations rom Balitmore & Pasedena charters
- A series of recommendations to enable woemn to succeed in physics, and for diversity to develop fully
- 2014 draft can be found at: http://wgwip.df.uba.ar/Waterloo Charter_Ver5p.pdf
- Currently focused mostly on developed nations and academia
- Over this year, we're revising it for organization, clarity, and generality, but it already has many good ideas

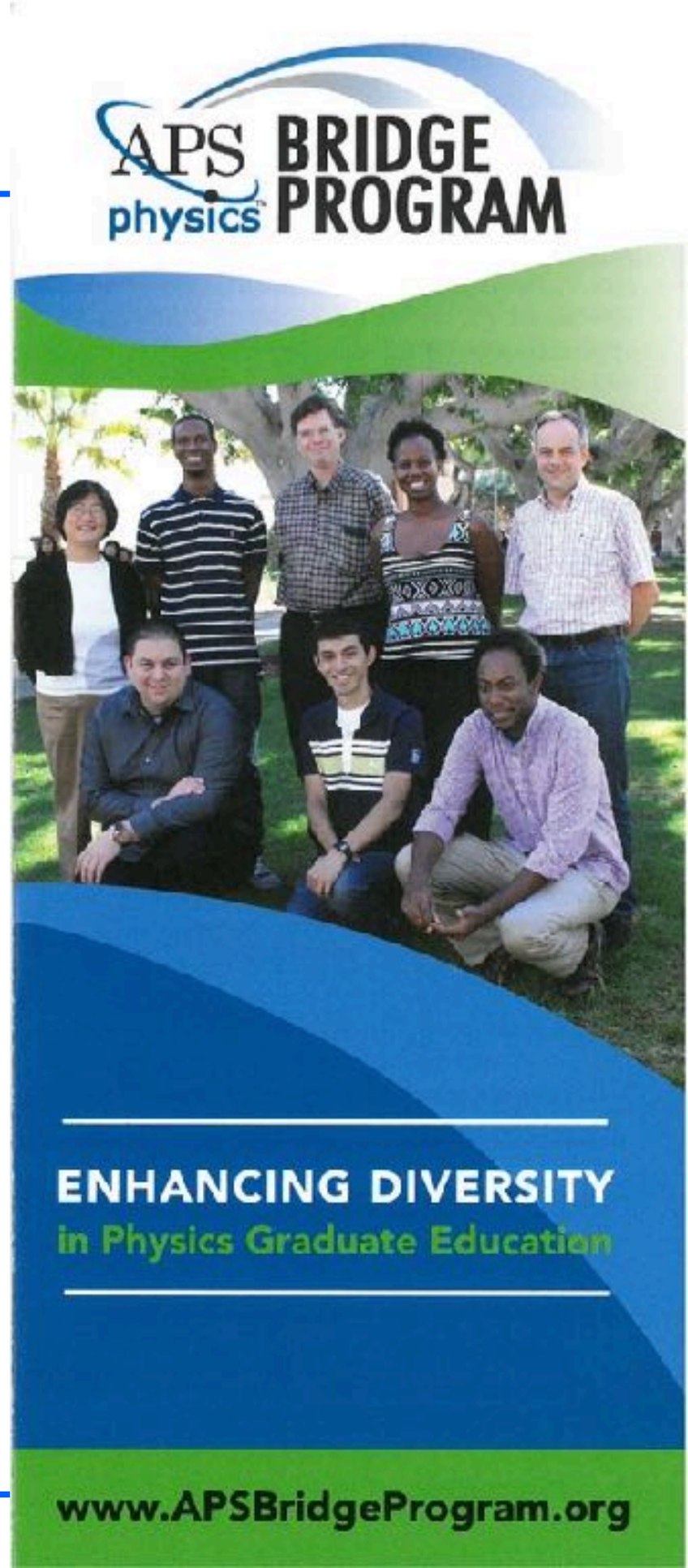
Conference for Undergraduate Women in Physics



- Started in 2006 with 1 site, 29 attendees;
- This year (2017) 10 sites, 1500+ (reaching nearly every female physics undergrad).
- Three days of lab tours, poster sessions, presentations, panels, and networking events.

APS Bridge Program

- Bridge Program sites provide coursework, research experiences, and mentoring to students who have potential for success in doctoral education to clarify the transition to graduate school with the goal of increasing the number of physics degrees earned by students from ethnic groups that are underrepresented in physics.



Gender Bias in Physics Website

- https://genderbias.compadre.org
- Created by delegation members as a "broader impact" of the travel grant
- Moderated forum for documenting and discussing instances of bias
- Links to resources for reducing bias

Acknowledgement

This work was supported by the US National Science Foundation (NSF) under grant no. DMR 1661340. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the NSF.

My Personal Favorite Resources

- APS Committee on the Status of Women in Physics
  can do site visits on request and at cost https://www.aps.org/programs/women/sitevisits
  hosts a Best Practices site: https://www.aps.org/programs/women/reports/bestpractices
- AWIS: sends bi-monthly newsletters. I encourage at least one member to forward it to anyone who's interested http://www.awis.org
- Facebook group "Equity and Inclusion in Physics and Astronomy" membership is moderated, with basic reading required before entry
- League of Women Voters, for general non-partisan feminism in politics, especially "vote411.org"

Further Reading

- UW Professor Ann Nelson in Physics Today
  "Commentary: Diversity in physics: Are you part of the problem?"
  http://physicstoday.scitation.org/doi/10.1063/PT.3.3536 spoiler: if you have to ask, then yes.
- Seattle Times this week:
  - Kristi Coulter "Writer is navigating tech's male culture from within", Seattle Times, Tues Nov 28, 2017, front page
  - Hera McLeod "Create culture of inclusion if you want true workplace diversity", Seattle Times, Fri November 24, 2017, op-ed
    "All employers and employees must take responsibility for creating a safe and inclusive environment, instead of placing the task of calling out culturally destructive behavior on the shoulders of minorities."
- Basic feminism essay: "unpacking the invisible knapsack"
- Case study: CMU increased the number of undergrad women in computer science from 7% to 48% in 5 years
  see eg: "Kicking Butt in Computer Science: Women in Computing at Carnegie Mellon University" by Carol Frieze, Jeria Quesenberry

#Just1Action4WiS: Ideas

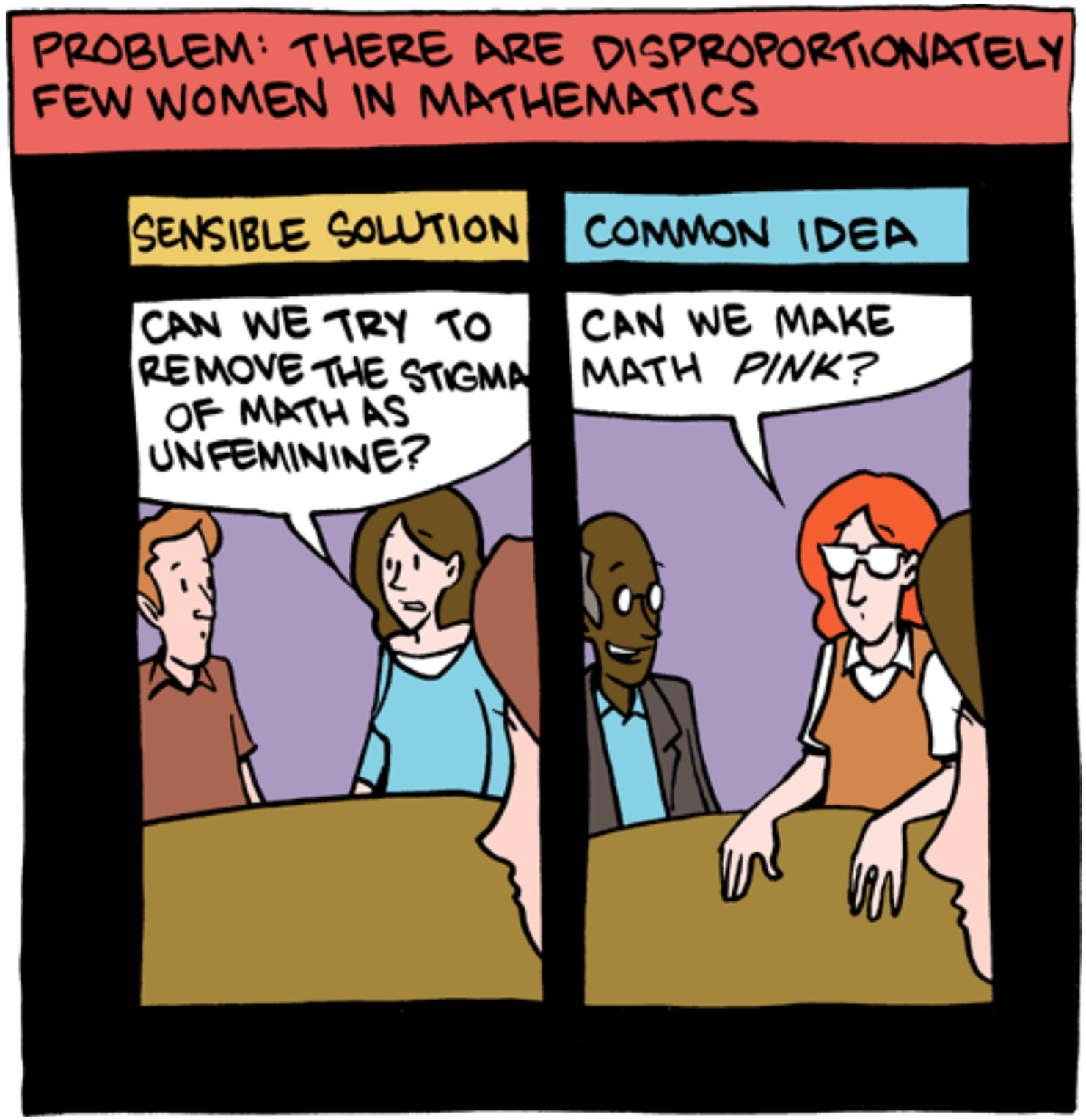
- Call out bad behavior
- Encourage women to dare, to take risks
- Act as a sponsor or mentor
- Don't let team members get away with demeaning behavior
- Seek out and remove micro-inequities
- Refuse to serve on single sex panels or at conferences without an appropriate level of female invited speakers
- Consider the imagery in your department
- Consider the daily working environment to see if anything inappropriate is lurking. If so, do something about it
- Demand/require mandatory unconscious bias training, in particular for appointment and promotion panels
- Call out teachers who tell girls they can't/ shouldn't do math, physics, etc.
- Don't let the bold (male or female) monopolize the conversation
- Keep student study groups welcoming and professional
- Ask schools about their progression rates for girls into the traditionally male subjects
- Nominate women for prizes, fellowships etc
- Tap women individually to encourage them to apply for opportunities
- Move the dialogue from part-time working equates to "isn't serious" to part-time working means balancing different demands
- Recognize the importance of family (and even love) for men and women
- Be prepared to be a visible role model
- Gather evidence, data and anecdote, to provide ammunition for management to change
- Listen and act if a woman starts hinting that there are problems. Don't be dismissive just because it makes you uncomfortable
- Think broadly when asked to make suggestions of names for any position or role

Conclusions

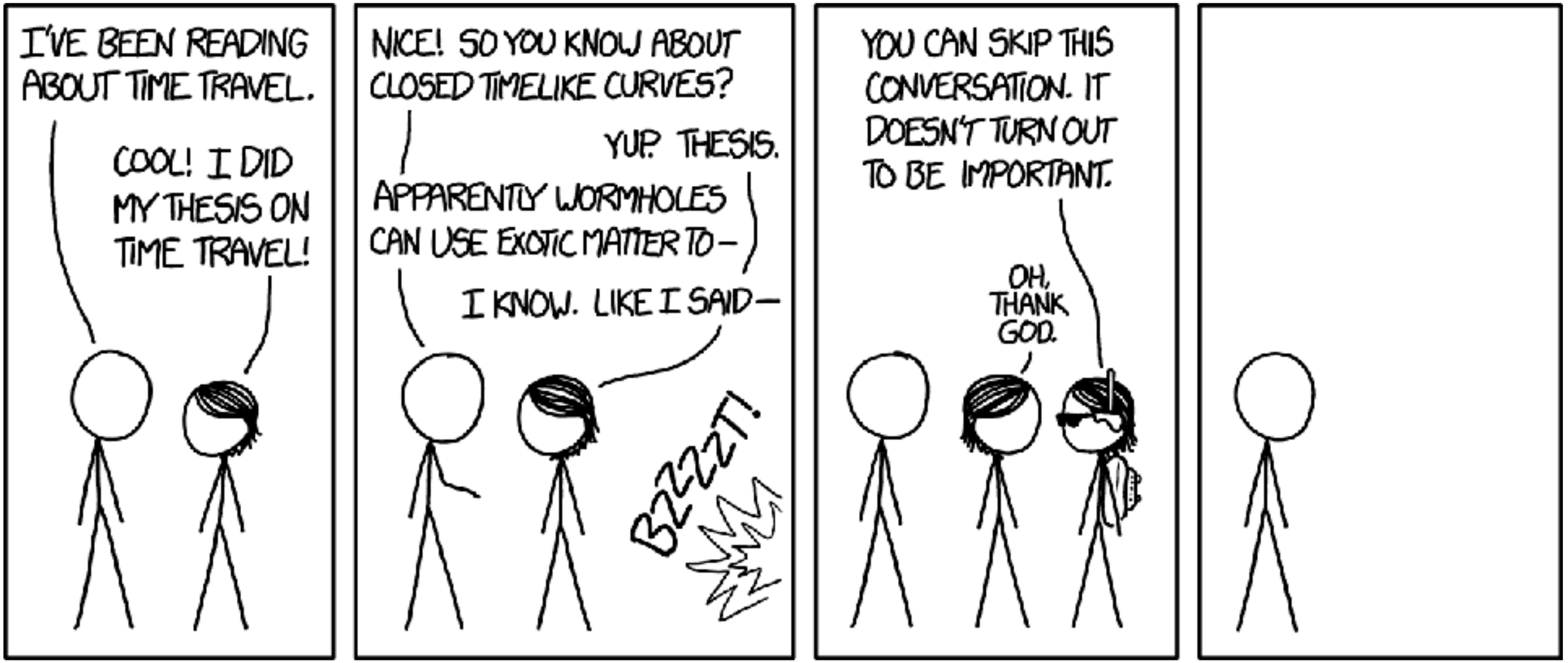
- Increased participation of women in physics requires a multi-pronged approach
- There are resources
- There is hope
- This is worth it—
  for women, and for physics

- Look for Athena-SWAN—style reviews coming to the US soon
- Apply to attend the next ICWiP, Fall 2019 for summer 2020

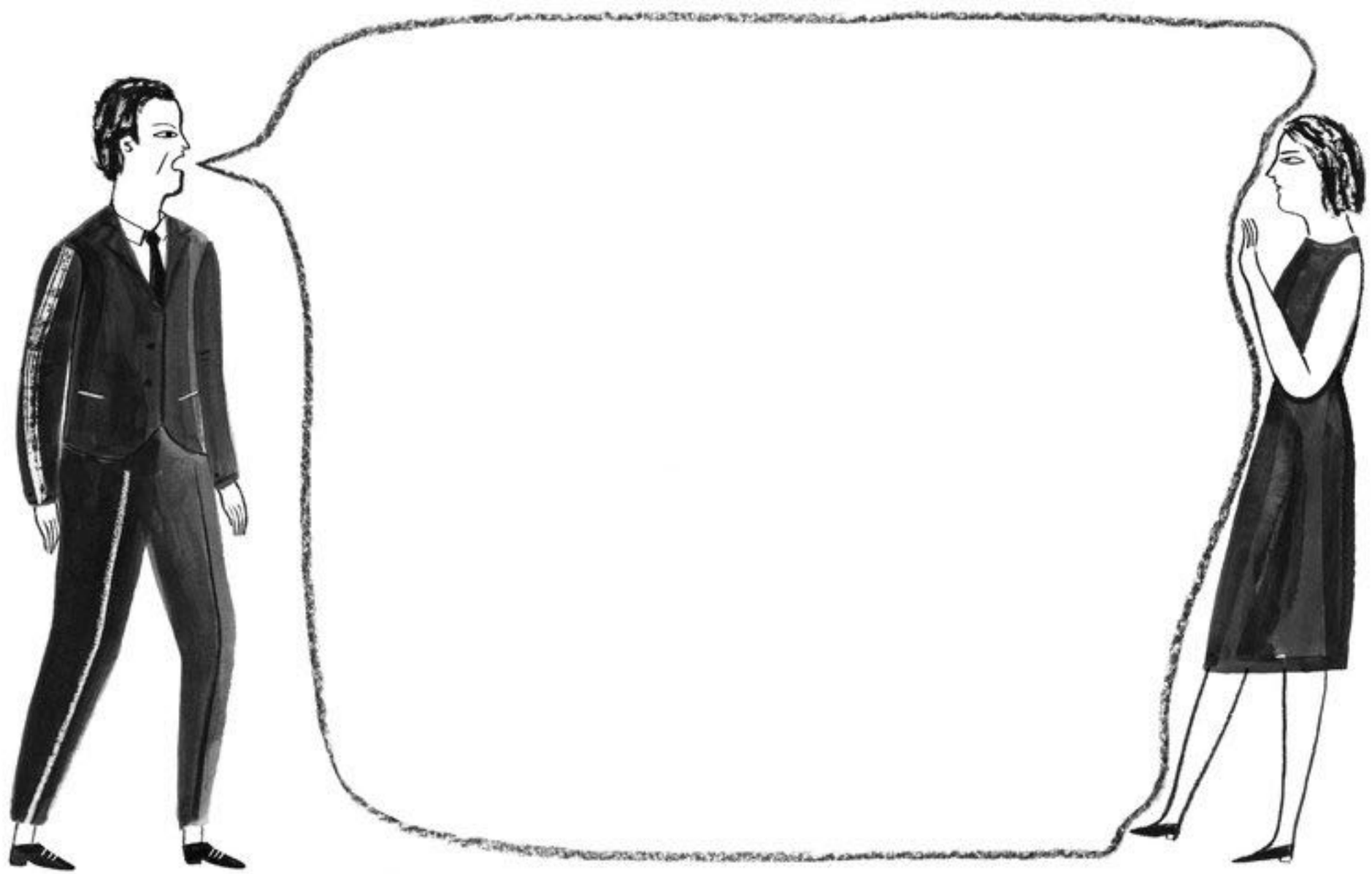
Discuss?


PROBLEM: THERE ARE DISPROPORTIONATELY FEW WOMEN IN MATHEMATICS
SENSIBLE SOLUTION
CAN WE TRY TO REMOVE THE STIGMA OF MATH AS UNFEMININE?
COMMON IDEA
CAN WE MAKE MATH PINK?

Mansplaining too



'Hey, what are those futuristic goggle for, anyway?' 'Oh, this is just a broken Google Glass. It was 2010's night at the club.'



"Could you not do that? Keeping babies alive in public makes me uncomfortable."