Gender Bias in Physics: Issues and Actions

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- WELCOME!

Why talk about gender bias in physics?

Women are:
5% of Professors
19% of Senior Lecturers
19% of Researchers
(2014)

IOP Membership: 17% women

35% of women, 26% of men have caring responsibilities

35% of Honorary Fellows are women

SoPA:

Women are:
~30% undergrads
~35% post-grad research students
~30% taught postgrad

SoPA:

Women are:
~10-20% Lecturers
~12% Reader/Senior Lecturer
~20% Professor

Why should we care about gender bias?

- Waste of talent
  - What ideas have been lost?
  - How much has progress been slowed?
  - How much energy has been diverted from physics?
  - How much money has been diverted from physics?
- Moral issue
  - Serious inequity
  - Social justice issue
  - Part of systemic sexism, racism, etc.

How do we do it?

- Find out what helps
- Find out what hurts

- Start building awareness
- Motivate
- Offer actions
- Measure effects

Definitions

- EQUALITY
- EQUITY
- JUSTICE
- DIVERSITY
- INCLUSION
- INTERSECTIONALITY

Equity and equality

Equality

The assumption is that everyone benefits from the same supports. This is equal treatment.

Equity

Everyone gets the supports they need (this is the concept of "affirmative action"), thus producing equity.

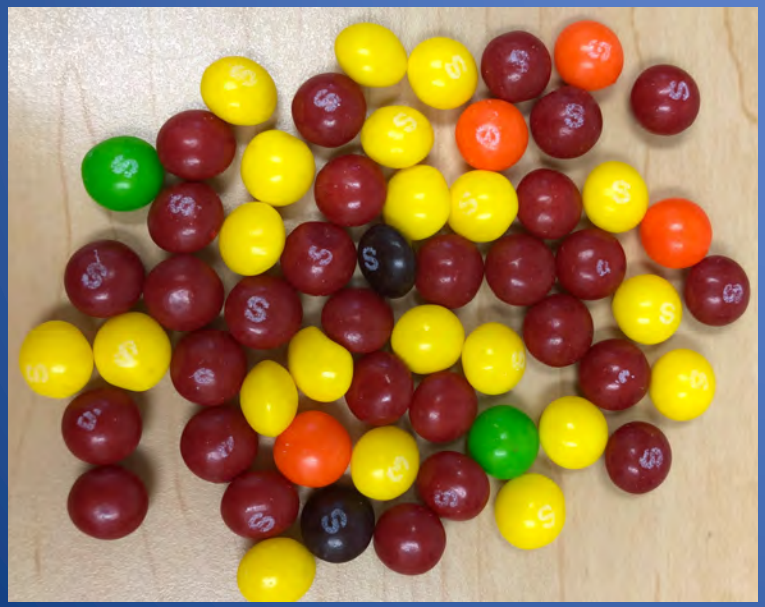
Justice

All 3 can see the game without supports or accommodations because the cause(s) of the inequity was addressed. The systemic barrier has been removed.

Diversity vs. Inclusion

Diversity is inviting someone to the party. Inclusion is asking them to dance. –Verna Myers

Gender and Intersectionality



Boosts for women

- Sense of belonging
- Self-identity as a scientist
- Talking about the topic
- Growth mindset

APS STEP-UP: https://engage.aps.org/stepup/home

Barriers for women

- Harassment* (3/4 of US undergrad physics women!)
- Fixed mindset**
- Microaggressions***
- Lack of role models
- Lack of/poor mentorship

*Aycock, Hazari, Brewe, Clancy, Hodapp, Goertzen. PHYSICAL REVIEW PHYSICS EDUCATION RESEARCH 15, 010121 (2019)

**https://www.ted.com/talks/russell_mcclain_implicit_bias_stereotype_threat_and_higher_education

***Barthelemy, McCormick, Henderson doi:10.1119/perc.2014.pr.005

Fix the culture, not the women

- All factors are cultural
- No biological basis for over-representation of white males

- What's up with the culture of physics?
  - Hint: It's not just physics.

Cultural issues

- Implicit bias
- Stereotype threat

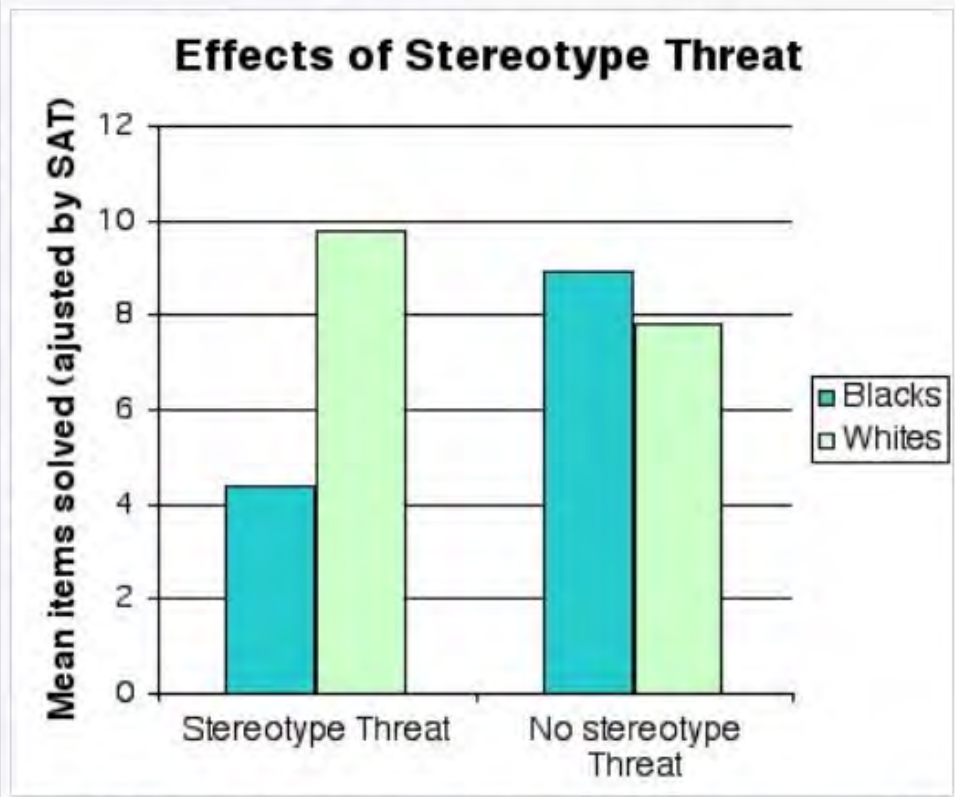
It's all about the bias

- Implicit/Unconscious/Unintentional/Unexamined bias
  - Growing up → culturally instilled values
  - Pervasive: everyone has them
  - Separate from explicit biases (can be same or different)
  - May differ from our declared beliefs
  - Tend to favor our own in-group
  - Malleable—thank goodness!

http://kirwaninstitute.osu.edu/research/understanding-implicit-bias

Stereotype Threat

- Risk of confirming a negative stereotype
- Triggered by mentioning stereotype (or even being unconsciously aware of it)
- Changes performance of stereotyped groups



"The Effects of Stereotype Threat on the Standardized Test Performance of College Students (adjusted for group differences on SAT)". From J. Aronson, C.M. Steele, M.F. Salinas, M.J. Lustina, *Readings About the Social Animal*, 8th edition, ed. E. Aronson

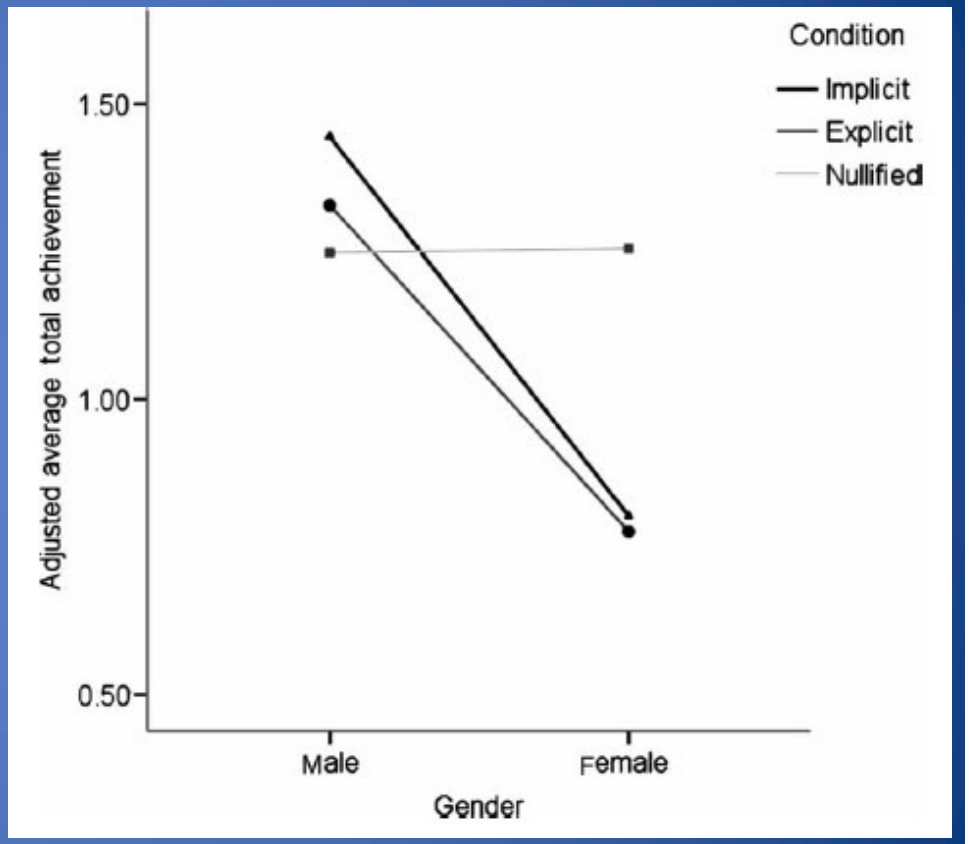
http://www.reducingstereotypethreat.org/
https://en.wikipedia.org/wiki/Stereotype_threat

Stereotype Threat in Physics

Implicit: You will be given four physics problems to solve. These problems are based on physics material that you have already covered.

Explicit: [Implicit plus:] This test has shown gender differences with males outperforming females on the problems.

Nullified: [Implicit plus:] No gender differences in performance have been found on this test.



(HS physics students in US)

Gwen C. Marchand & Gita Taasoobshirazi (2012): Stereotype Threat and Women's Performance in Physics, International Journal of Science Education

How do these affect women?

- Implicit bias:
  - Women get lower evaluations, lower starting salaries, fewer job offers, etc.
  - Women's work is valued less than men's
  - Women do more service work

- Stereotype threat:
  - Women's performance is lower than it should be
  - Self-doubt, less connection to field, less sense of belonging

What helps: students

- Open study/support groups
- Undergraduate lounge
- “Safe face” program
- Career advising
- Mentoring (peer or otherwise)
- Engaged faculty
- CUWiP
- Advisor education

“What Works?” Whitten et al. 2003

What helps: careers

- Value service obligations
- Observations: who talks? who is the social secretary?
- Data! (Climate survey)
- Spousal hires (Women 204% more likely to relocate for a spouse)
- Spend resources on equity
- Acknowledge employees are human
- Avoid comparing people to people; compare people to specific goals/objectives

What can individuals do?

- Find your biases! Take the Implicit Association Test.
- Look for counterexamples to stereotypes and share them widely
- Collaborate, support, promote
- Watch for bad language, interruptions, assumptions
- Ensure seminar/conference speakers represent many groups

https://implicit.harvard.edu/implicit/
https://www.aps.org/publications/apsnews/202110/profile.cfm

Improving campus/department climate

- Start with your goal: what does your ideal environment look like? What types of diversity do you want?
- Who are your stakeholders?
- Who are the controllers?
- What resources are needed?
- Research: what opposes, what boosts
- What is shown to work?
- Remember the ”first” has a really rough time! (Pixar’s short film Purl)
- Having a woman in a position doesn’t guarantee the culture will let her excel/move upward/stay

Other useful ideas

- Assessing equity
  - Lab space
  - Start up funding
  - Student researchers
  - TAs/LAs
- Talk about it!
  - Create a safe space
  - Have safe confidante for people in subordinate positions
- Focus on retention, then recruitment

Caveats

- Not the women's job to push for change
- Change is slow
- Learning about this never stops (not a one-and-done)
- Can be frustrating
- Having implicit bias doesn't mean you're a bad person
- Don't assume intent (ignorance a better guess)

Takeaways

- Women are seriously under-represented in physics
- Caused by cultural factors
- Bias and stereotype threat are barriers
- Sense of belonging is boost
- Many actions for individuals and departments to take
- It’s everyone’s job to work for equity

Thank you!

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