

RHIC USERS MEETING
JUNE 10, 2016

DIVERSITY AND INCLUSION IN PHYSICS

ÁGNES MÓCSY
www.agnesmocsy.com

Pratt

BROOKHAVEN
NATIONAL LABORATORY

Yale University

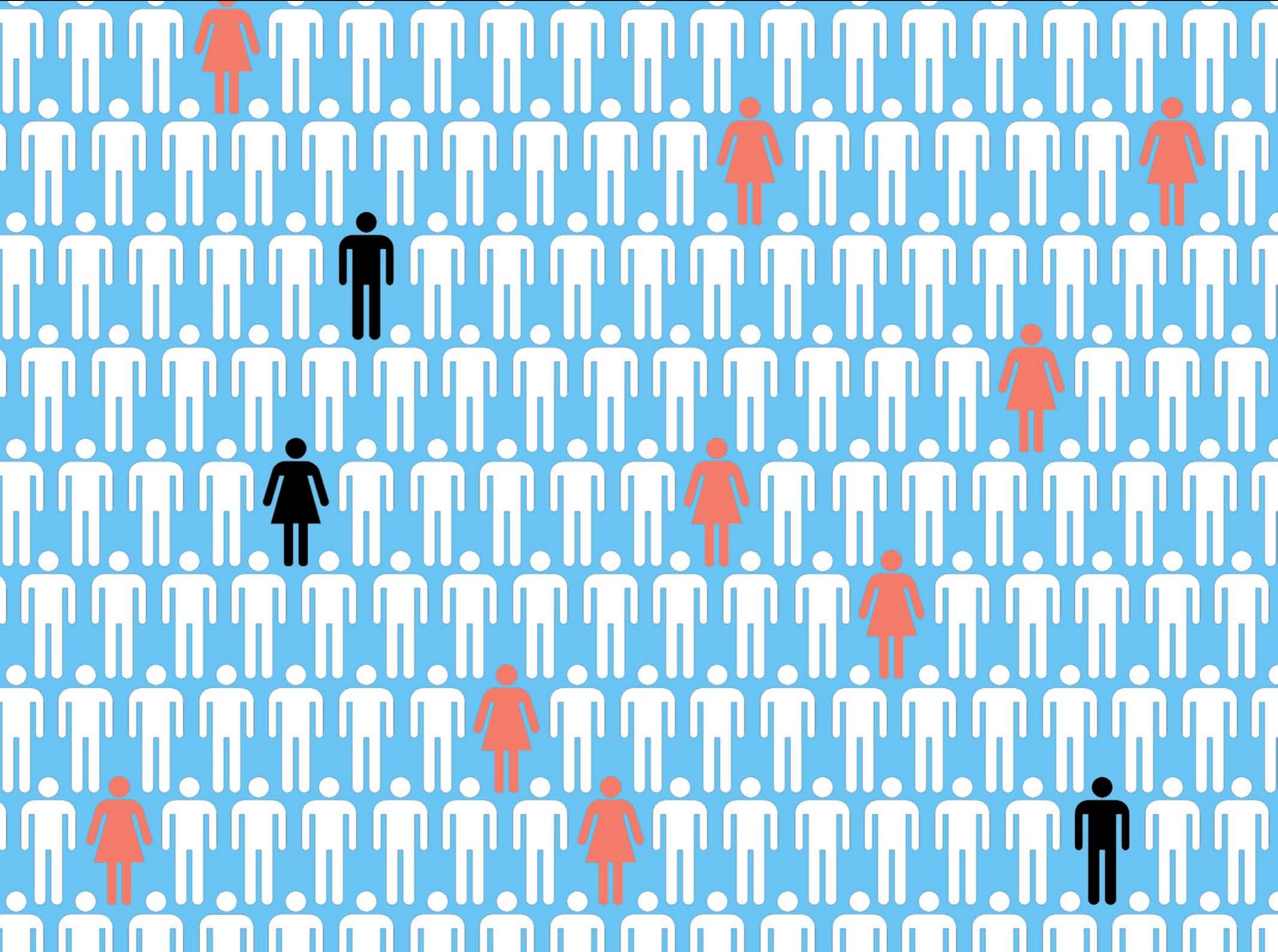
WHAT IF YOU WERE THE ONLY...



MELLODY HOBSON
PRESIDENT OF AREAL INVESTMENTS

http://www.ted.com/talks/mellody_hobson_color_blind_or_color_brave?language=en

Diversity = willingness to learn from others who are not the same as we are



diverse cultural opportunities, and a unique blend of convenient urban and rural living settings. This appointment is expected to begin August 1, 2016.

The University welcomes and honors people of all races, creeds, cultures, and sexual orientations, and values intellectual curiosity, pursuit of knowledge, and academic freedom and integrity. The Knoxville campus of the University of Tennessee is seeking candidates who have the ability to contribute in meaningful ways to the diversity and intercultural goals of the University. Applicants should send a cover letter, CV, list of publications, a description of teaching and research experience, and of the proposed research program, and also arrange for at least three letters of reference to be submitted separately. All application materials should be submitted via email to

The successful candidate will be supported by a start-up package and could be nominated for a Canada Research Chair.

McGill University is committed to diversity and equity in employment. It welcomes applications from: women, Aboriginal persons, persons with disabilities, ethnic minorities, persons of minority sexual orientation or gender identity, visible minorities, and others who may contribute to diversification. All qualified candidates are encouraged to apply; however, in accordance with Canadian immigration requirements, Canadian citizens and perm

All applicants should demonstrate commitment to excellence in teaching Theoretical Physics both at the undergraduate and graduate level.

Applications from suitably qualified handicapped and severely handicapped persons are explicitly encouraged.

Bielefeld University has been repeatedly awarded for succeeding in equal opportunities and has been certified as a family friendly university. Applications of women are appreciated. This especially applies to the scientific sector as well as to those of technology, IT and crafts.

Applications are treated according to the regulations of the Landesgleichstellungs-gesetz (North-Rhine-Westphalian Equal Opportunities Act).

“We’ve been talking about this for ten years.
What has happened? ”

–JOHN HARRIS

CAN WE DO BETTER FOR OTHERS?



Workshop

WHEN: June 8, 2016, from 2:00 – 6:00 PM

WHERE: Physics Large Seminar Room, Bldg. 510

Who is Doing Science, Who Isn't and Why?

Cocktail and Discussion

WHEN: June 9, 2016 at 5:30 PM

WHERE: Lobby, Berkner Hall

All-Inclusive Physics - How to Get There



Priyamvada Natarajan
Yale University



Marci Lobel
Stony Brook University



Paul Sorensen
BNL Physics



Rachel Ivie
American Inst. of Physics



John Harris
Yale University



Rosi Reed
Lehigh University



Catherine Good
Baruch College, CUNY

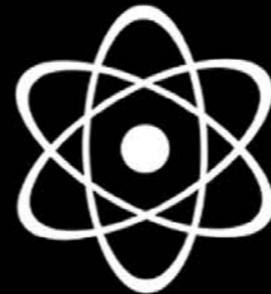


Lauren Aguilar
Stanford University



Bachelor's in science and engineering earned by women

50.4%



Bachelor's in Physics earned by women

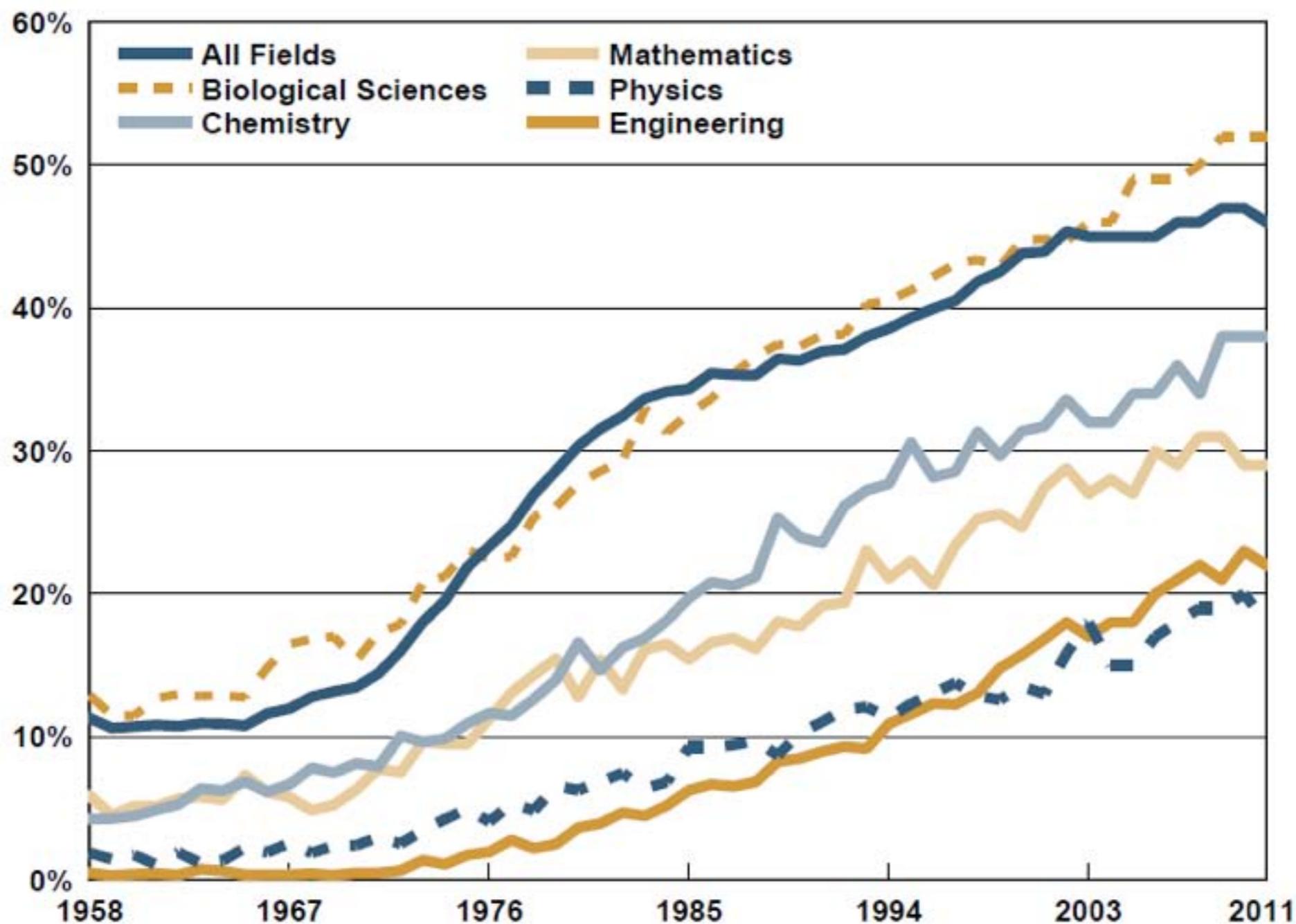
19.1%



Bachelor's in Physics awarded to URMs

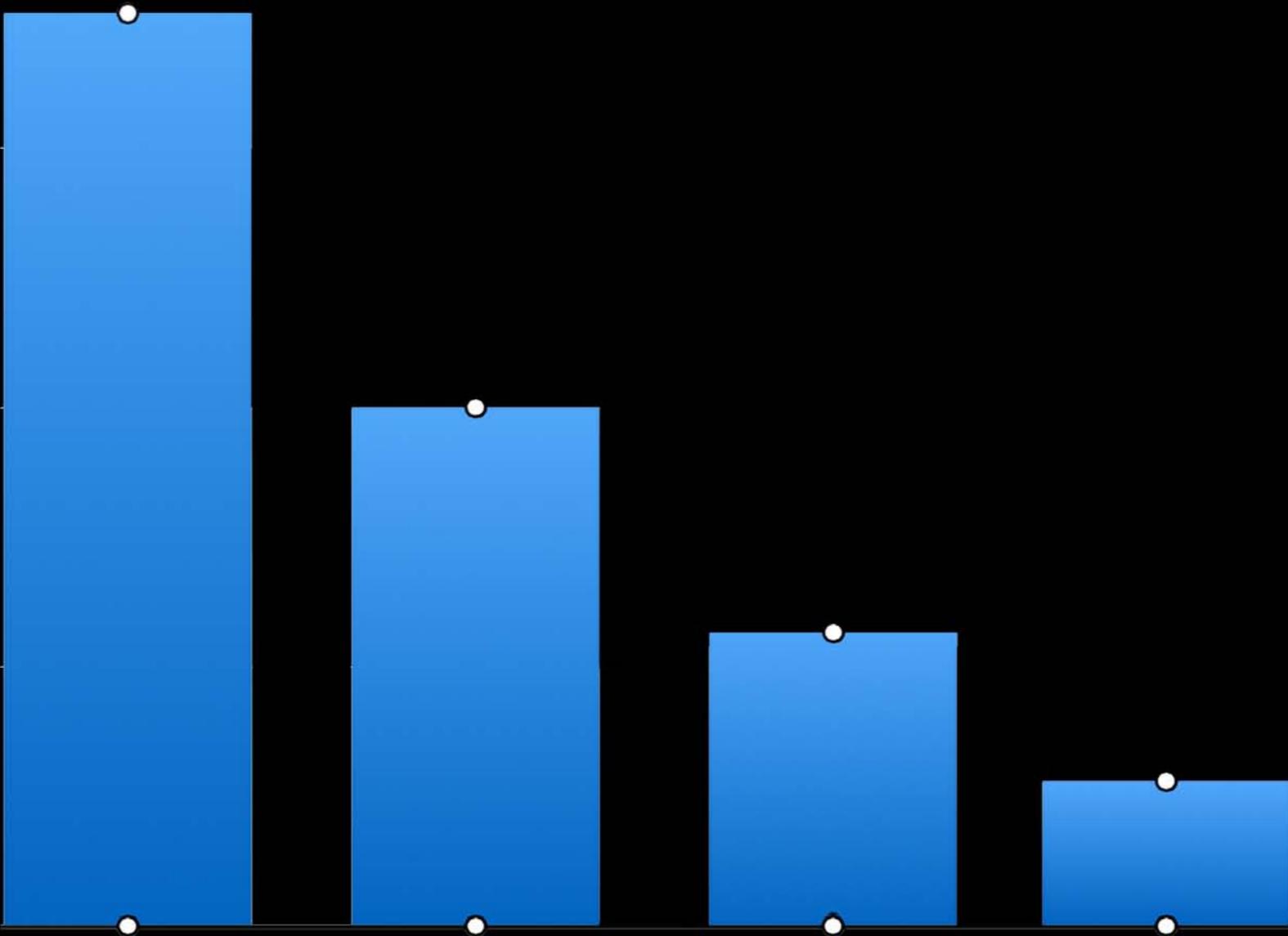
9.5 %

Percent of PhDs Earned by Women in Selected Fields, 1958-2011.



Source: National Science Foundation. Compiled by AIP Statistical Research Center.

DATA FROM NSF, APS, RHIC UEC



39.6%

of chemistry PhDs
are awarded to
women in US

18.8%

of physics PhDs
are awarded to
women in US

14%

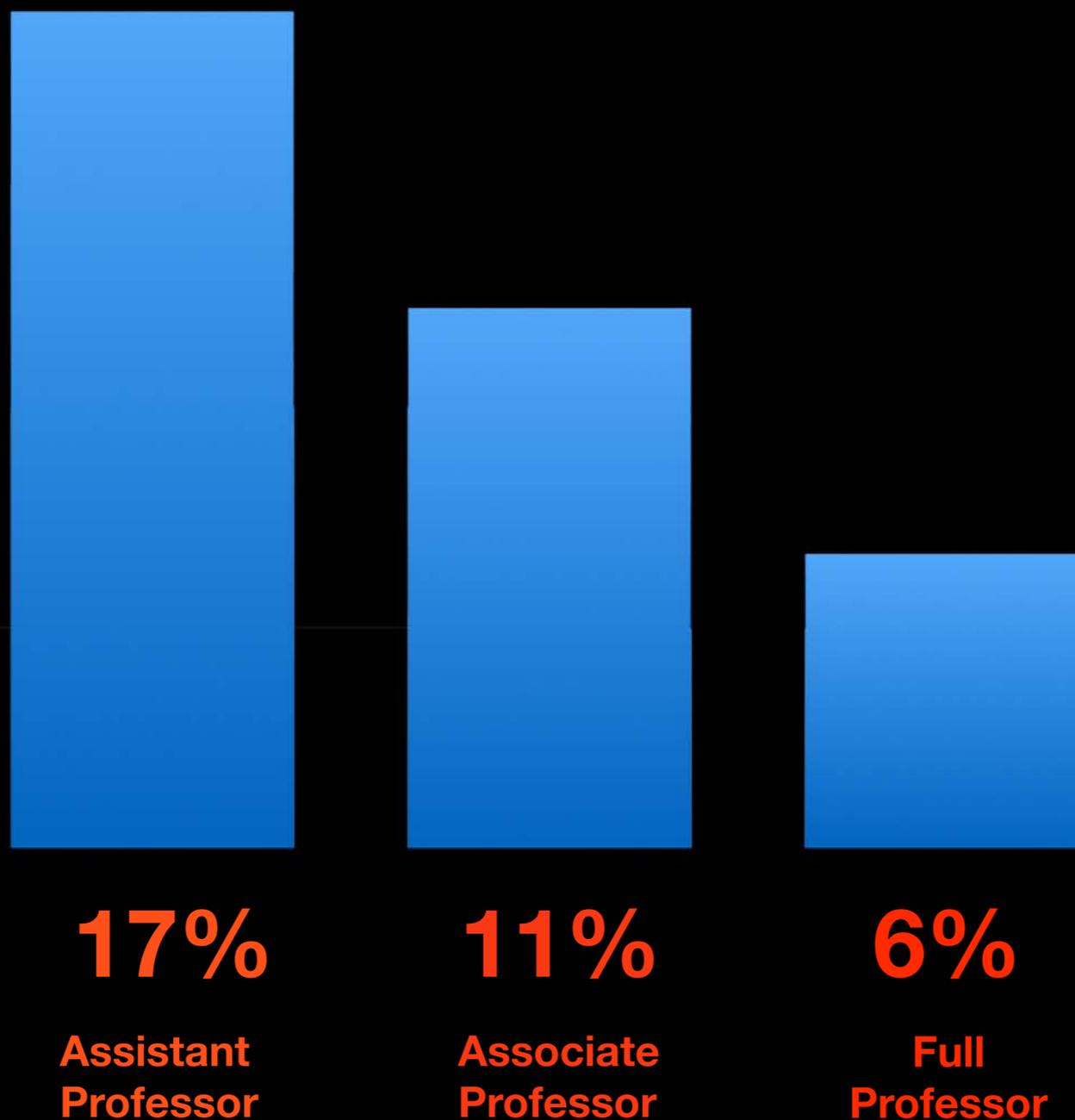
14% of RHIC
Users are
women

8.7%

of Heavy Ion
Theorists are
women

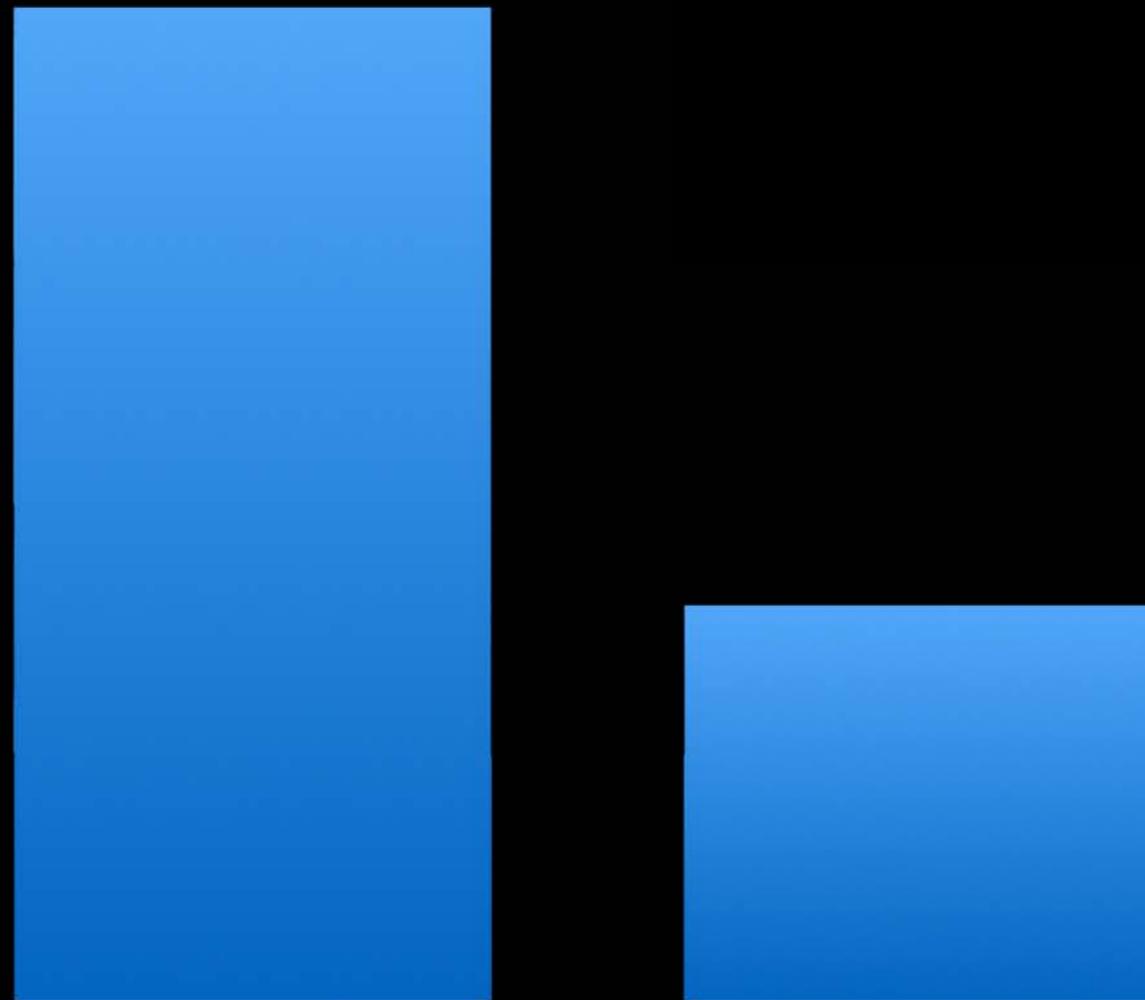
FEMALE FACULTY IN PHYSICS

WWW.APS.ORG/PROGRAMS/EDUCATION/STATISTICS



FEMALE IN HEAVY-ION THEORY USA

DATA SELF-COLLECTED



15%

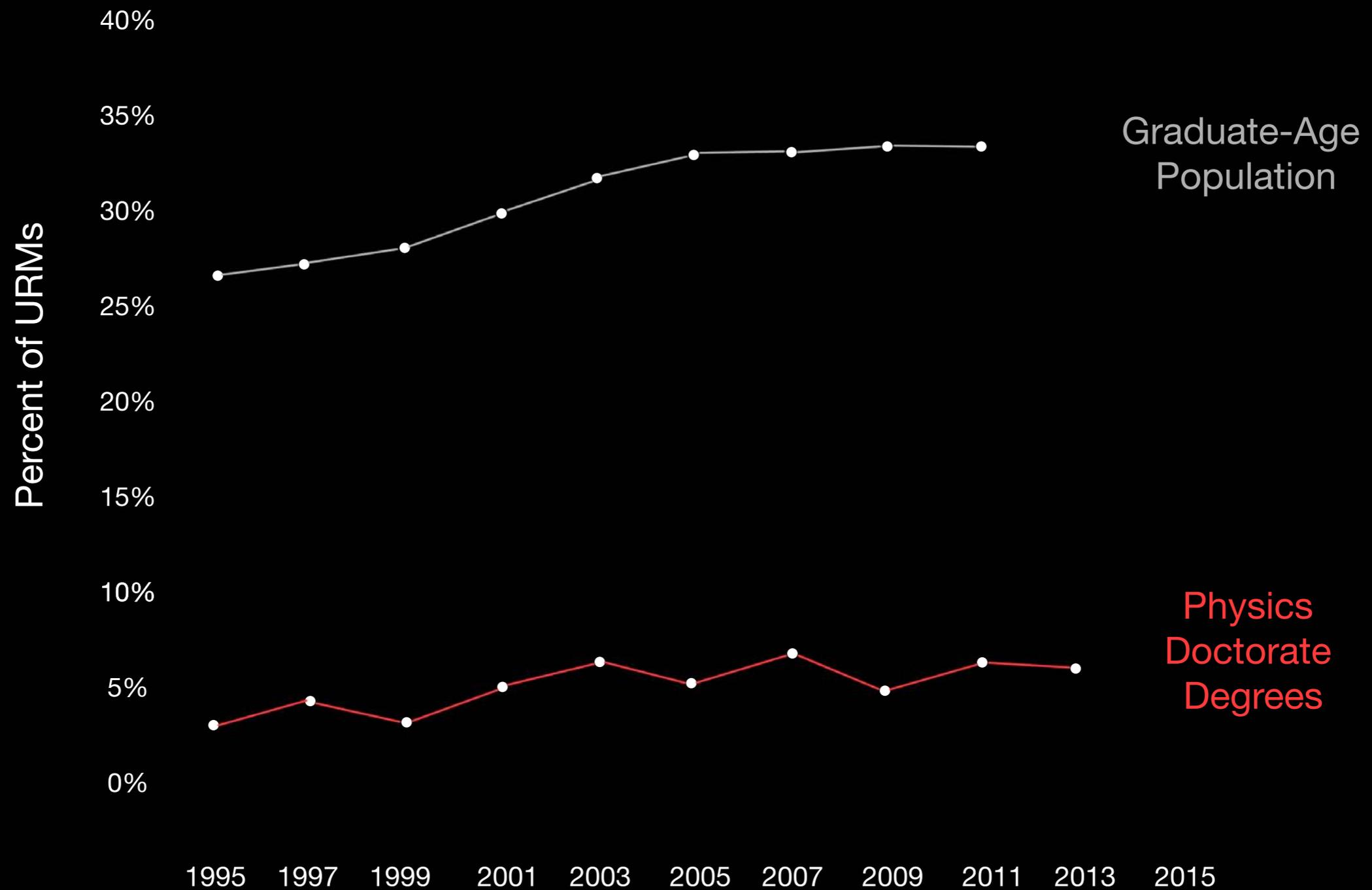
Postdocs

6%

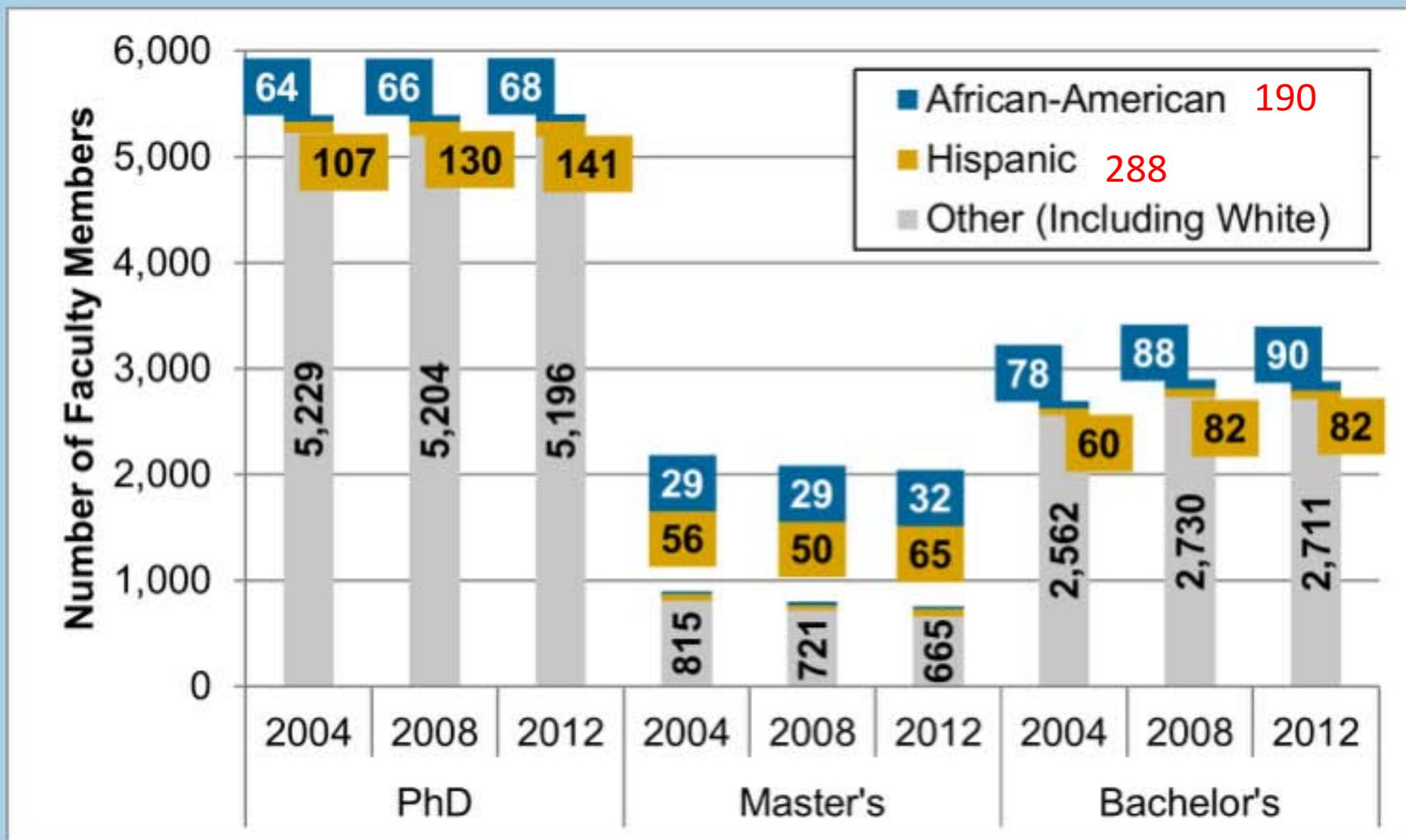
All Professors

DOCTORATES TO URM IN THE US

WWW.APS.ORG/PROGRAMS/EDUCATION/STATISTICS



Number of African-American and Hispanic Physics Faculty by Highest Degree Awarded by Department, 2012



www.aip.org/statistics

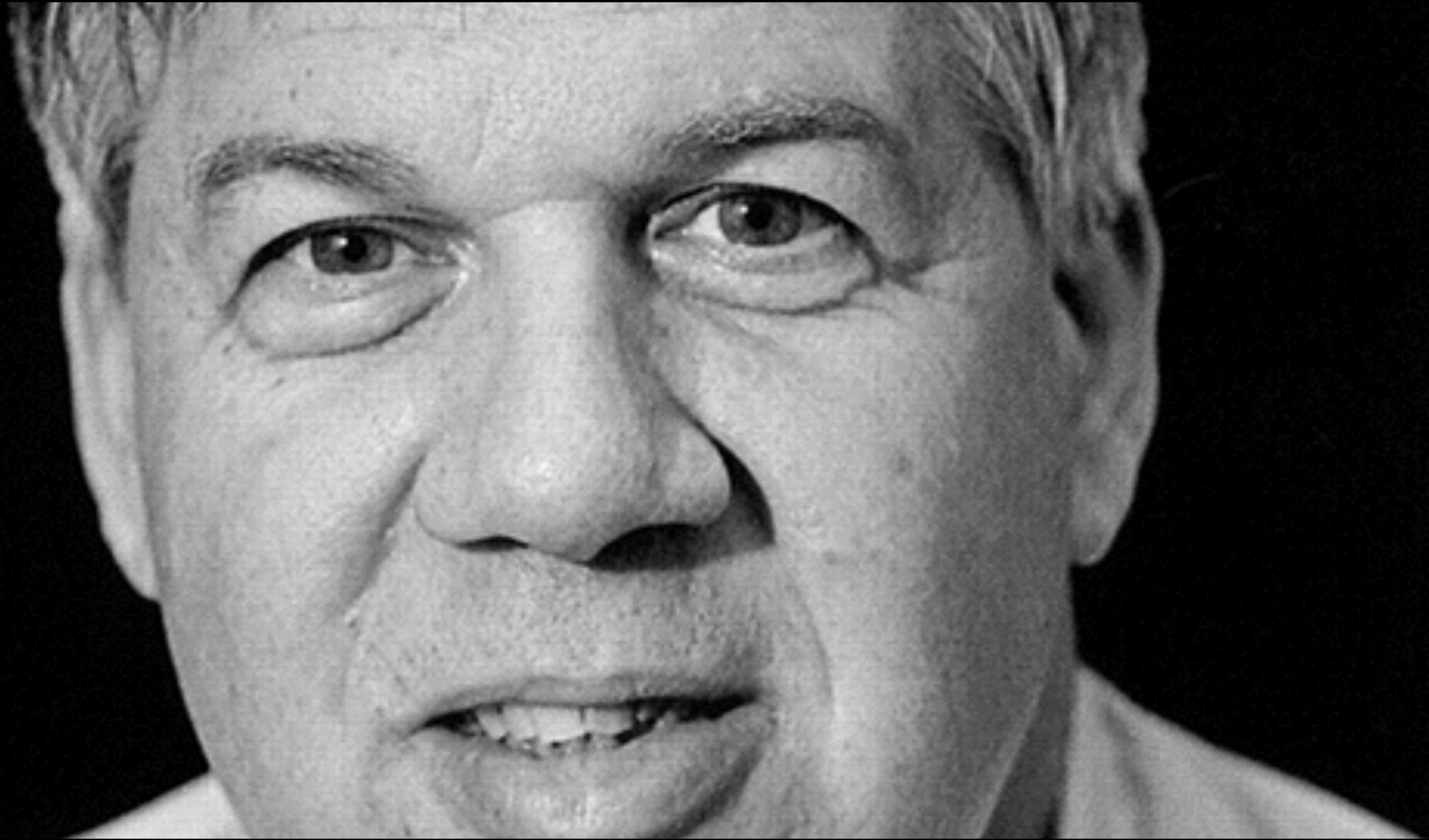
Percentage of respondents with access to key resources

	Less Developed		Very Highly Developed	
	Women	Men	Women	Men
Funding	34	51	52	60
Office space	64	74	72	77
Lab space	42	47	46	52
Equipment	42	49	58	64
Travel money	31	47	57	64
Clerical support	22	38	30	43
Employees or students	42	53	33	43

THE IMPORTANCE OF DIVERSITY

“Few tragedies can be more extensive than the stunting of life, few injustices deeper than the denial of an opportunity to strive or even to hope, by a limit imposed from without, but falsely identified as lying within.”

–STEPHEN JAY GOULD



Why Care about Social Diversity?



- Exposure to diversity provokes personal & group thinking
 - Comments/criticism from others who do not look like us are taken more seriously!
 - Improved problem-solving performance for heterogeneous (experience, age, gender, race) vs homogeneous groups
 - In a group with different perspectives
 - people recognize there are other views
 - changes group behavior & expectations
 - understand each other's views & reach consensus sooner
 - So, people work harder in diverse groups both socially (more information flow) and cognitively – critical thinking, teamwork
 - These improve overall quality of education, training, & science
- Improves creativity, problem solving, ability to defend decisions

RECRUIT
BUT ALSO
RETAIN

“Not everyone is going through the same field.
We go through it differently, with different experiences”

- PAUL SORENSEN

The first step to solve any kind of problem is to to hide from it. So the first step to any kind of action is awareness.

WHAT BARRIERS PREVENT MINORITIES FROM THRIVING IN PHYSICS?

- Biases, from explicit to implicit
- Stereotype-threat
- The lone-genius paradigm
- Microaggressions
- Impostor syndrome

PREJUDICE IS DEEPLY ROOTED

Paul Sorensen

theguardian

Women in Leadership

67% of Europeans don't believe women have the skills to be scientists

A new survey from L'Oreal looks at the public's perception of female scientists with shocking results. Particularly if you live in China

Professor Dame Athene Donald

Professor of experimental physics at the University of Cambridge

Thursday 24 September 2015 07.14 BST



< Shares 5572 Comments 70



Most popular



Svetlana Alexievich wins 2015 Nobel prize in literature



Sepp Blatter, Michel Platini and Jérôme Valcke suspended for 90 days



Harvard's prestigious debate team loses to

DISCOURAGEMENT OF GIRLS

Carnegie Science Center

October 2014

Science With a Sparkle

Oct. 11

1 – 4 pm

Ages – 8-12

Prepare to be dazzled! Dive into chemistry and learn how science relates to health and beauty products. Become a cosmetic chemist and concoct your own creations to take home.

Workshops for Scouts

Learn about tons of science topics, satisfy badge requirements, and bond with friends.

Cost: \$20/session unless otherwise noted

BOY SCOUTS

- | | |
|---------|---|
| Oct. 25 | Chemistry: 9 am – noon
Cub Scouts Science: 1 – 4 pm |
| Nov. 1 | Webelos Scientist: 9 am – noon
Webelos Engineering: 1 – 4 pm |
| Nov. 8 | Engineering: 1 – 4 pm |
| Nov. 9 | Astronomy: noon – 3 pm |
| Nov. 22 | Cub Scout Weather: 9 am – noon |
| Dec. 6 | Webelos Scientist: 1 – 4 pm |

-
- | | |
|------------|--|
| Oct. 11–12 | Robotics: 10 am – 3 pm
Cost: \$45 for both days |
|------------|--|
-

GIRL SCOUTS

- | | |
|---------|---|
| Oct. 11 | Science with a Sparkle: 1 – 4 pm
(ages 8–12) |
|---------|---|

STEREOTYPES EXIST

Paul Sorensen

Original Photo

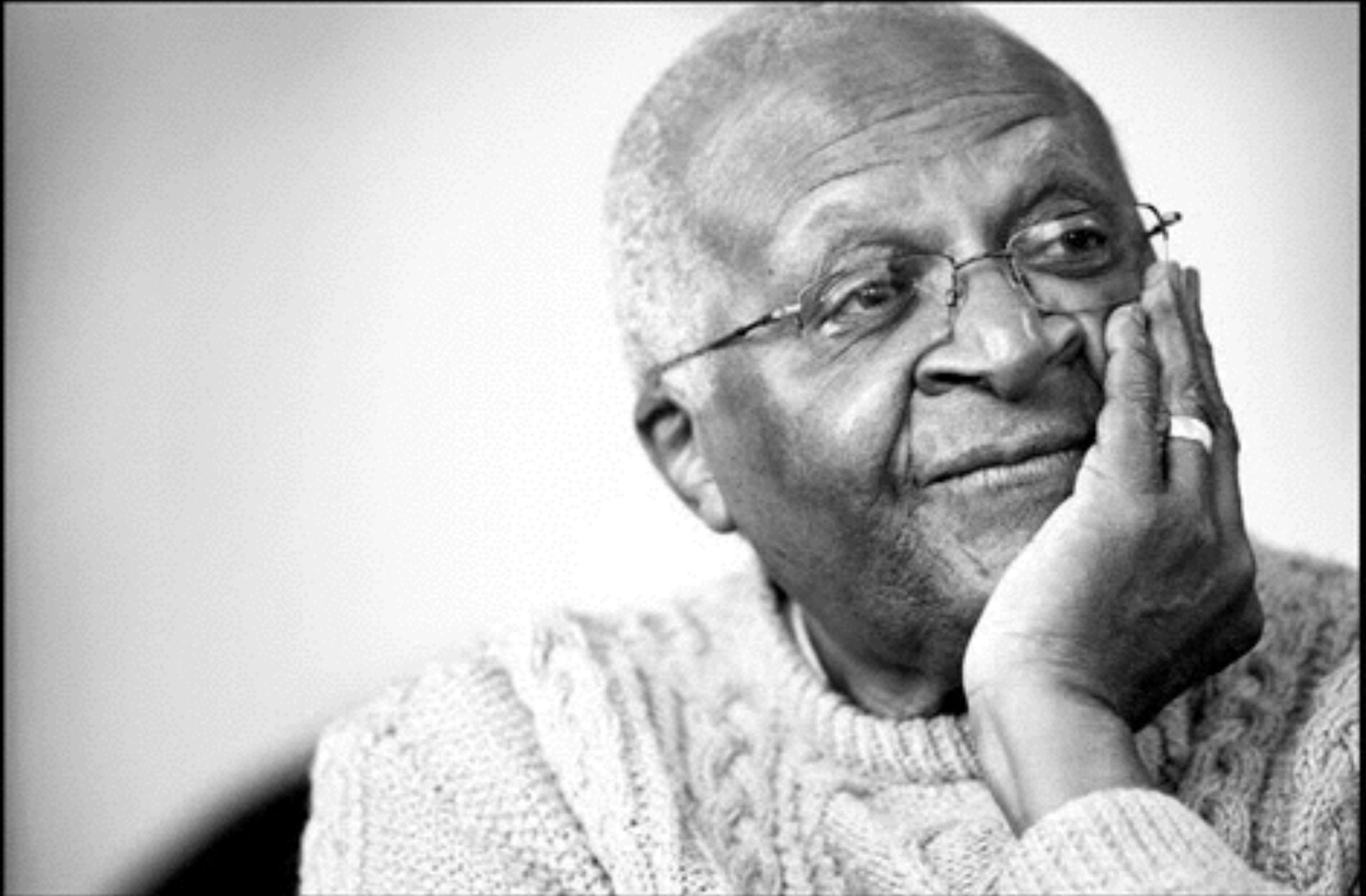


Subliminal Queue:

Educated → recollection of the photo →

← recollection of the photo ← **Ignorant**

ARCHBISHOP DESMOND TUTU — ON THE PSYCHOLOGICAL
DAMAGE OF APARTHEID - NPR "ON BEING" MARCH 2014

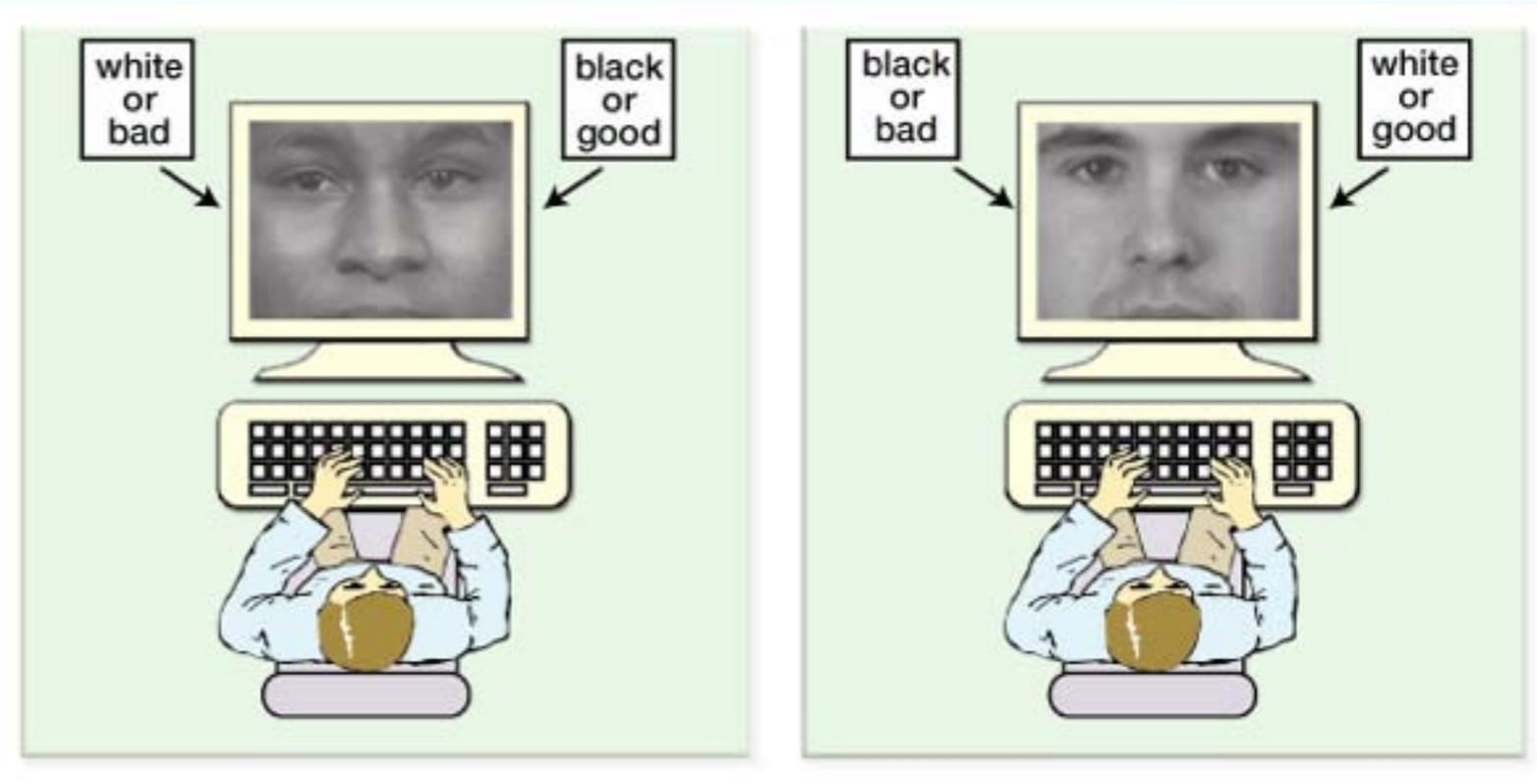


thanks to Sarah Demers (Yale)

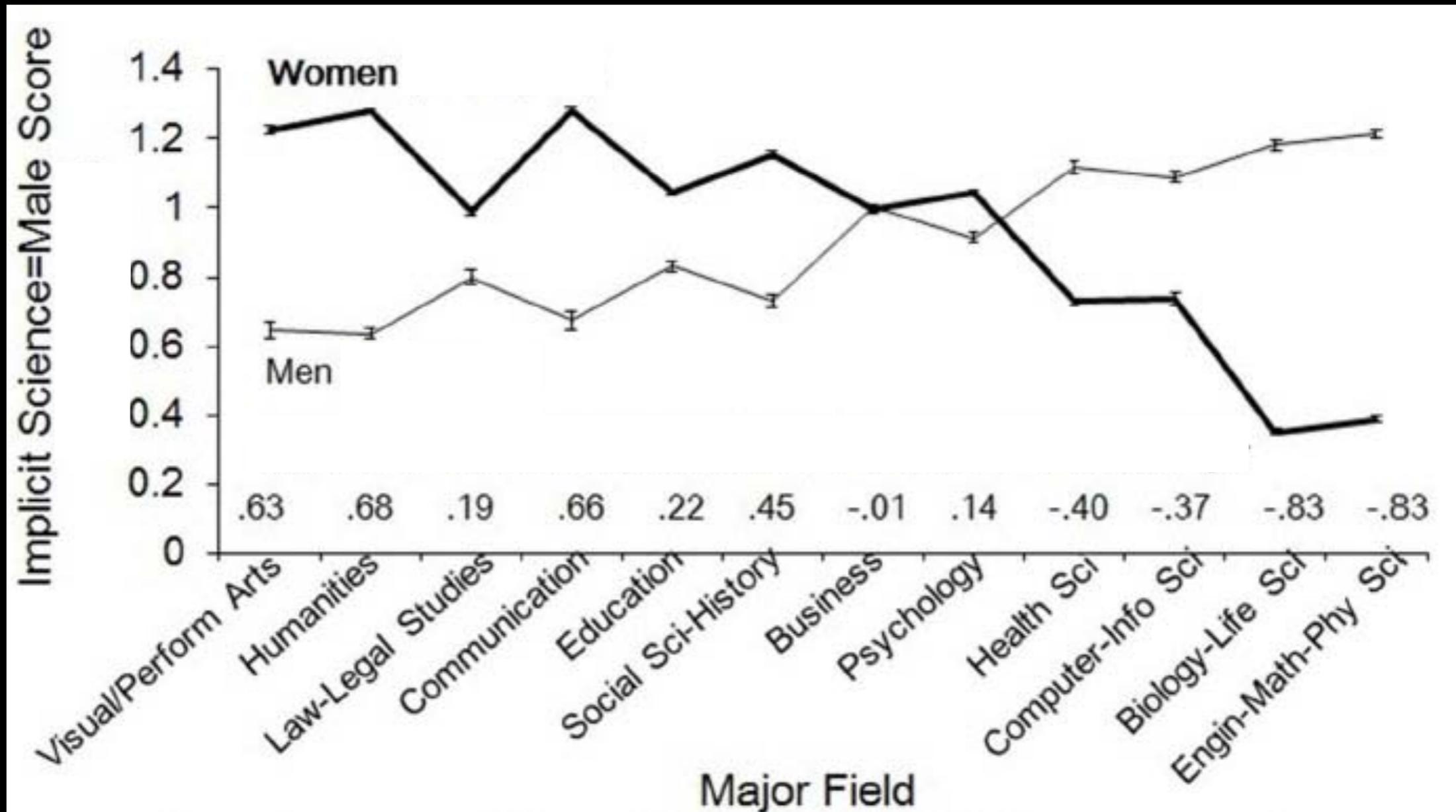
IAT → Studies of Bias

- **70-90% of people** show gender and race bias
- Across hundreds of studies the Implicit Association Test (IAT) predicts judgments of women and people of color.
- Millions of participants

Take the IAT free at
implicit.harvard.edu/implicit/

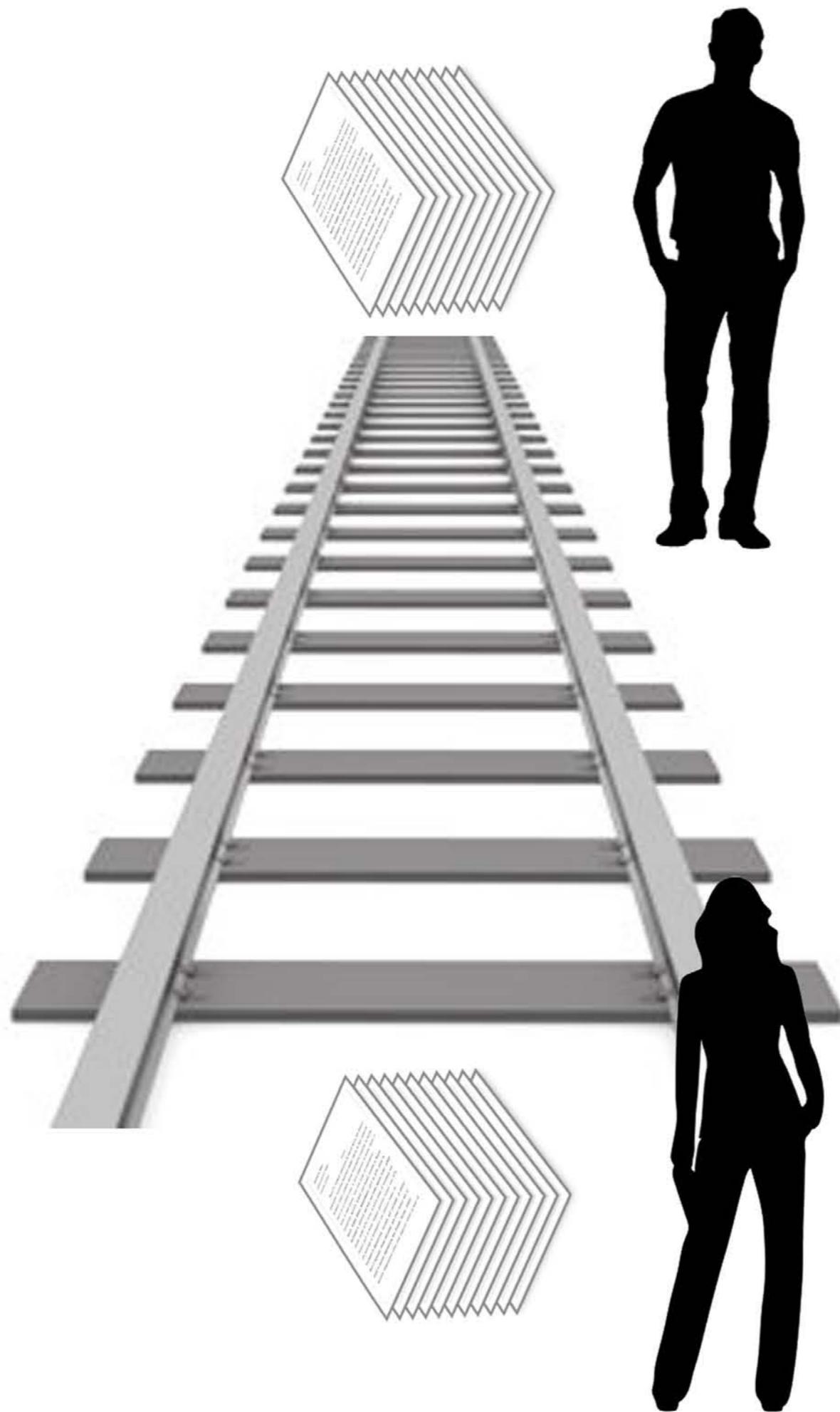


IMPLICIT BIASES



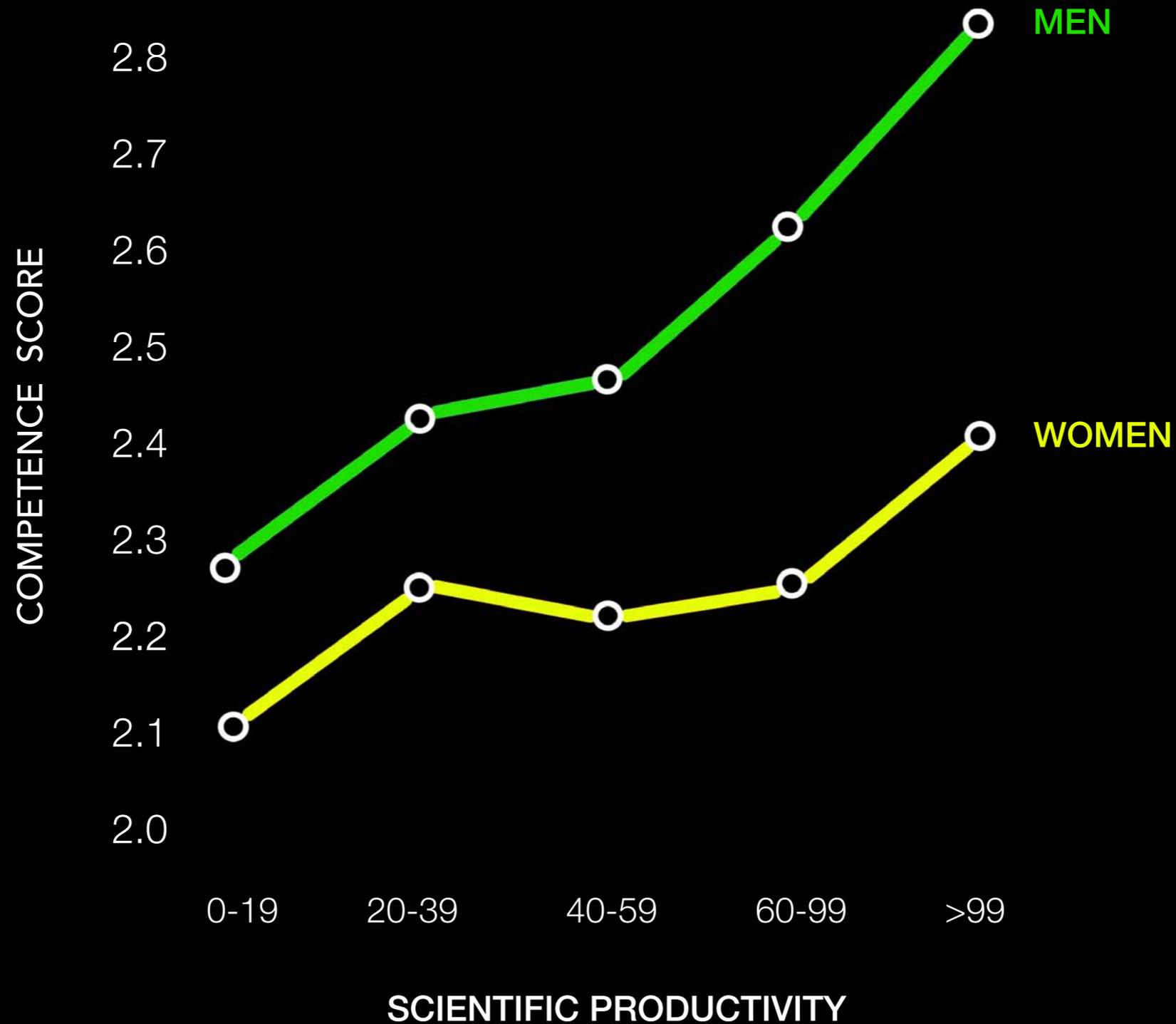
male scientists and female artists are most biased
 male artists and female scientists less so...





PEER REVIEW SHOWS GENDER BIAS BY BOTH GENDERS

BIASED JUDGEMENTS OF WORK



WENNERAS AND WOLD, NATURE 387 (1997)

John, Ph.D.

Nashville, TN 37215
 E-mail: manscientist@gmail.com
 Phone: (615) 517 1356

Objective

Obtain a research scientist position that will utilize my 6 years of experience in molecular/cell biology and neuroscience to discover and develop new therapeutic avenues

Key accomplishments

- Conducted research in cell & molecular biology in international and national settings, including studies on ovarian surface epithelium (OSE) and human embryonic stem cells (hESC)
- Utilized cell biology techniques to establish the role of the primary cilia in hESCs for the first time
- 1 year experience in neuroscience characterizing the roles of 3 critical genes during cerebellar development and in the pathology of medulloblastomas

Research experience

2011-2012 Vanderbilt University, Department of Neurosurgery
 Postdoctoral Research Fellow, Anna Kenney lab

- Utilized mouse techniques (e.g. mouse husbandry, genotyping, mouse perfusions/dissections) to analyze the roles of 3 genes (hippo and hedgehog pathways) essential for CNS development and in the pathology of medulloblastoma
- Established that the lethal hydrocephaly phenotype of a YAP1^{flax/flax}; nestin-cre mutant was due to buildup of cerebrospinal fluid in the choroid plexus (CP) due to YAP1's role in maintenance of epithelial integrity
- Demonstrated an important role for HIF1 during cerebellar development and tumorigenesis under normoxic conditions for first time
- Proved the efficacy of a p38 inhibitor *in vitro* to specifically inhibit medulloblastoma tumor cells while having minimal effect on non-tumor cells
- Formulated novel media for primary cultures of medulloblastoma and CP cells
- Engineered 3 DNA constructs for transfection / infection

2009-2011 Universidad Autonoma (Spain), Department of Development
 Postdoctoral Research Fellow, Isabel Guerrero lab

- Conducted investigations into the roles of mammalian hedgehog signal transductions proteins (Cdo and Boc)
- Showed that the overexpression of these receptors resulted in massive filopodial outgrowths due to the role of these hedgehog receptors in the Cdc42 pathway
- Observed additional colocalization of both receptors to the primary cilia for the first time
- Designed and expressed 2 lentiviral constructs for virus production and infection of CHO and U87 cell lines

Jennifer, Ph.D.

Nashville, TN 37215
 E-mail: womanscientist@gmail.com
 Phone: (615) 517 1356

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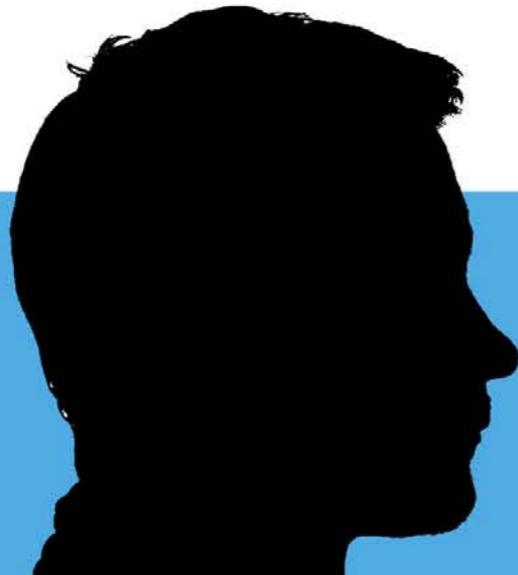
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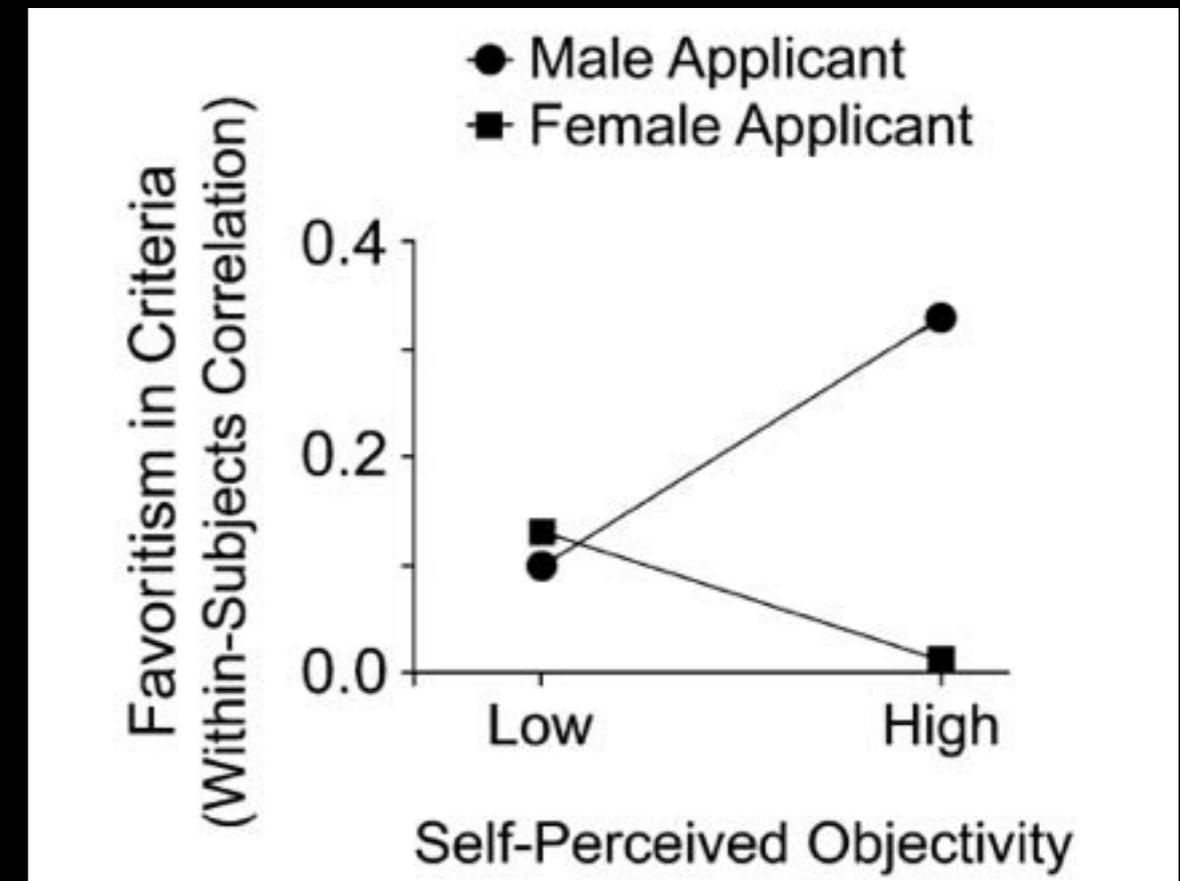
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GENDER-STEREOTYPICAL JOB

SHIFTING CRITERIA/NON-OBJECTIVITY

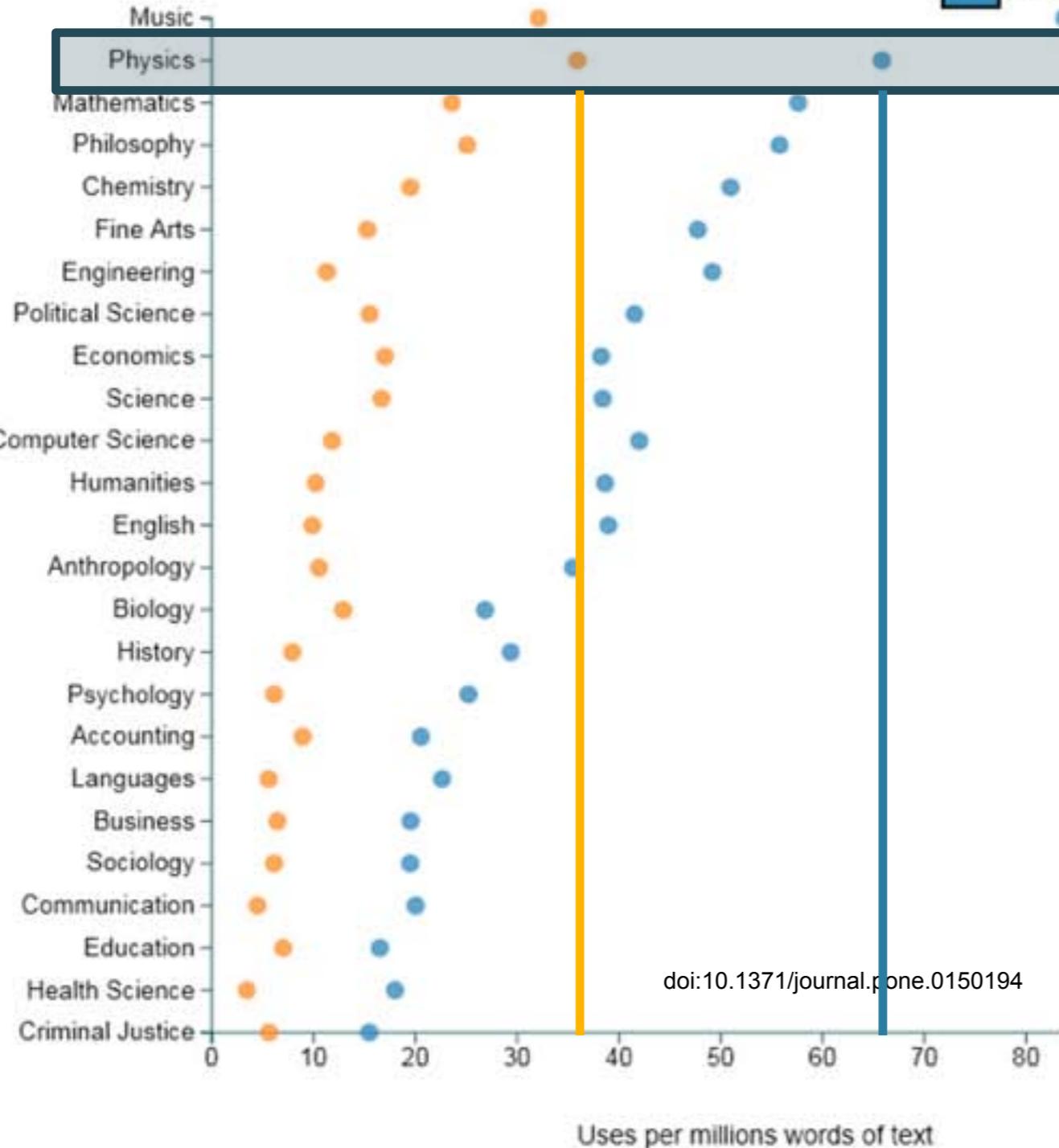


Job criteria shifted so the applicant from the desired group appears most qualified

Shifting criteria can be traced to those claiming the most objectivity

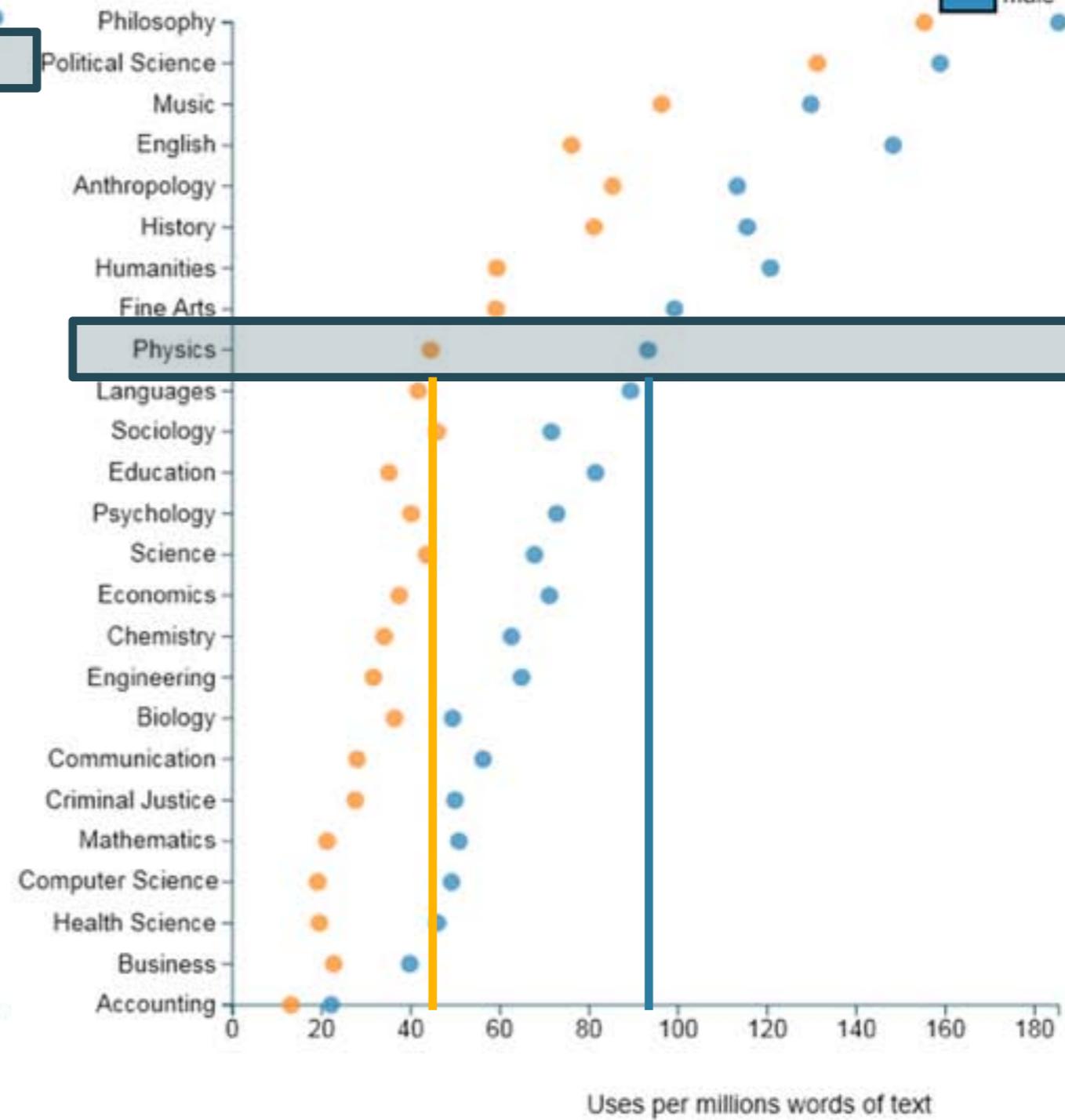
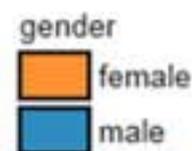
Implicit Bias Example

Genius



doi:10.1371/journal.pone.0150194

Brilliant



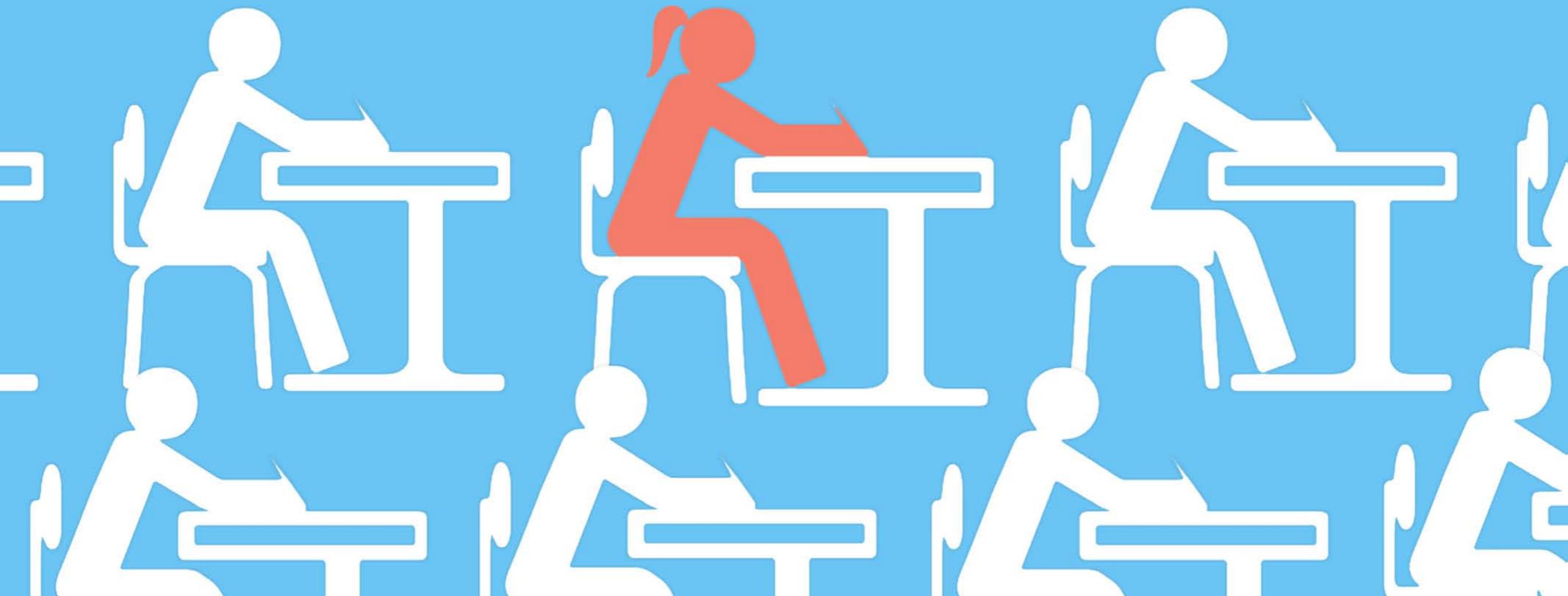
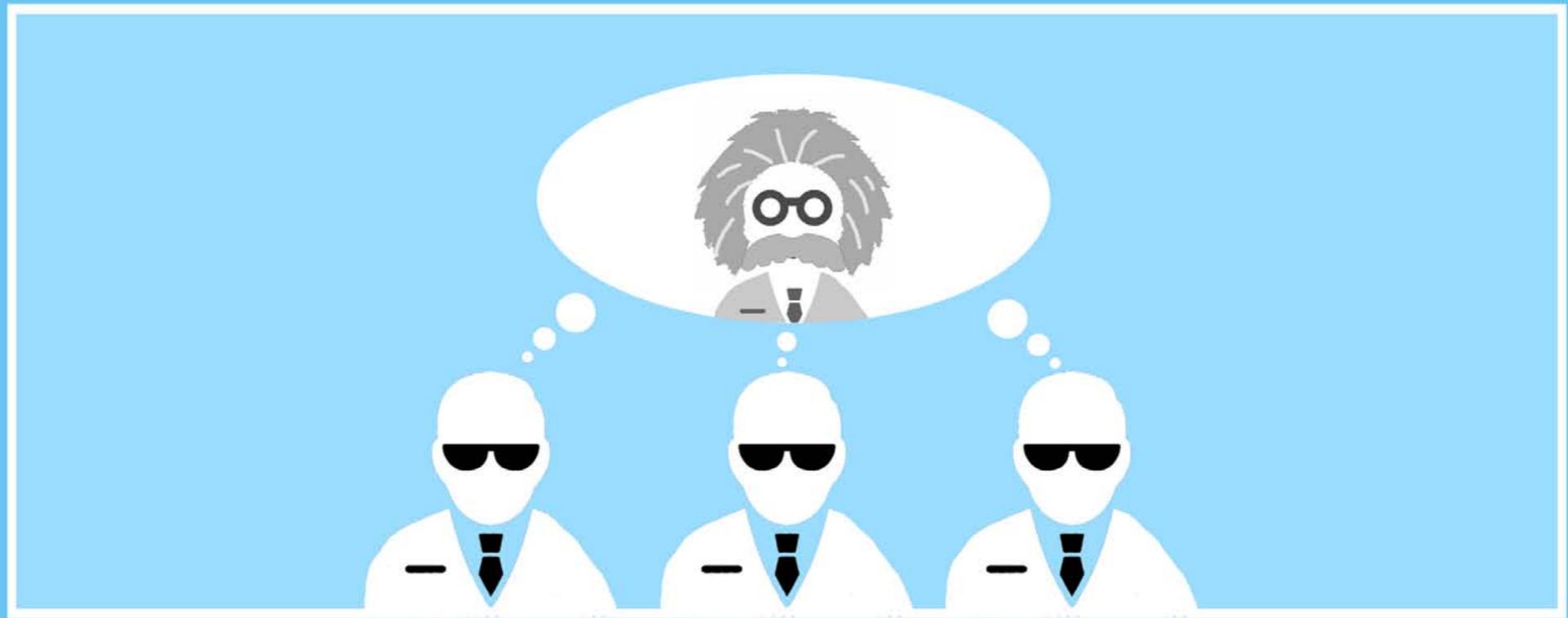
Student descriptions of their professors on RateMyProfessors.com (14M reviews)

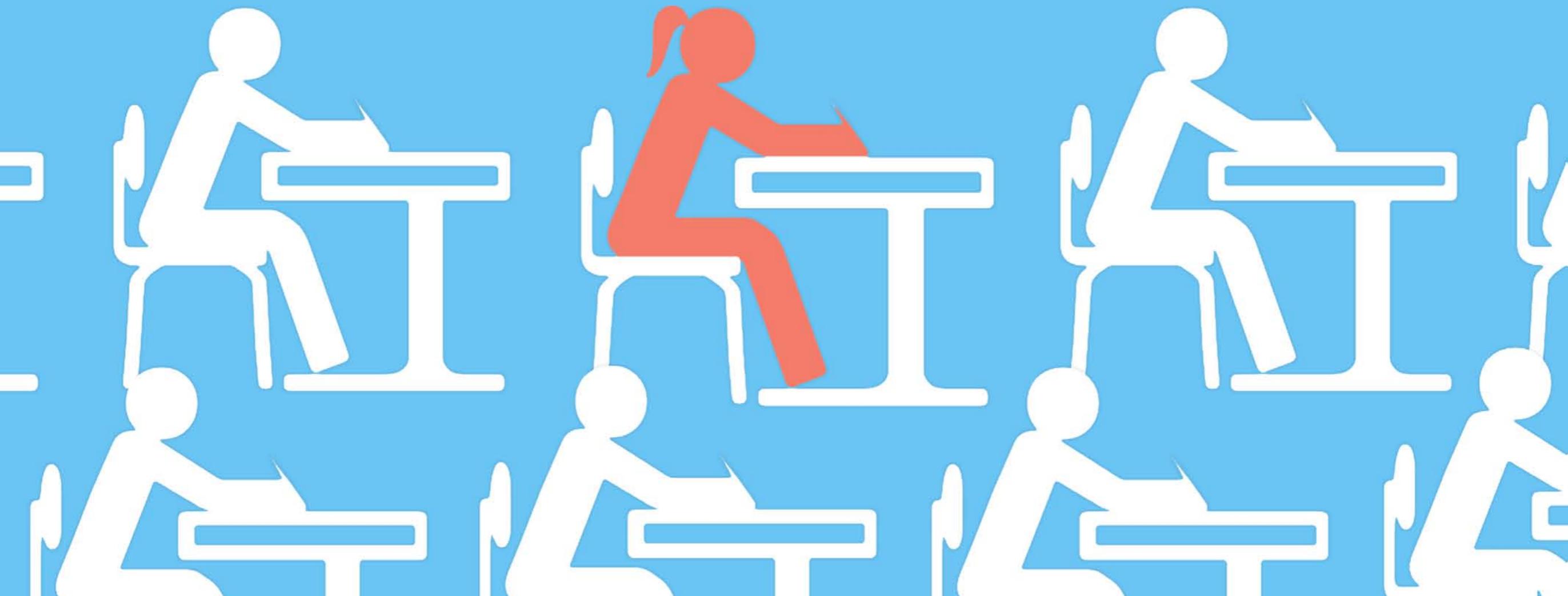
As the applause died down after his seminar at MIT, a friend later told him, one scientist turned to another and remarked what a great seminar it had been, adding, "Ben Barres's work is much better than his sister's."

—BEN BARRES, CHAIR OF NEUROBIOLOGY AT STANFORD



First openly transgender scientist in the US NAS

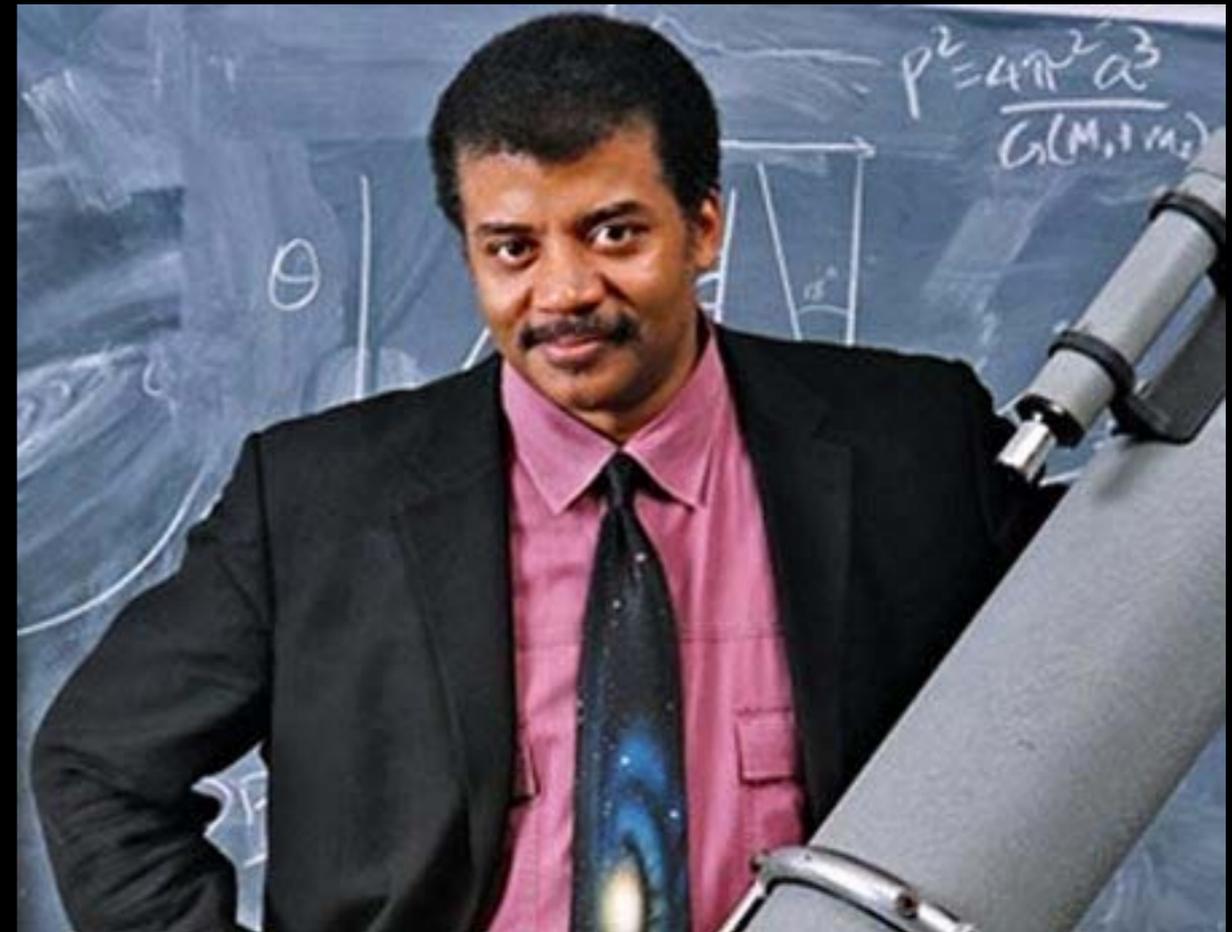






“In the perception of society my athletic talents are genetic; I am a likely mugger-rapist; my academic failures are expected; and my academic successes are attributed to others. To spend most of my life fighting these attitudes levies an **emotional tax** that is a form of **intellectual emasculation**”

-Dr. Neil de Grasse Tyson

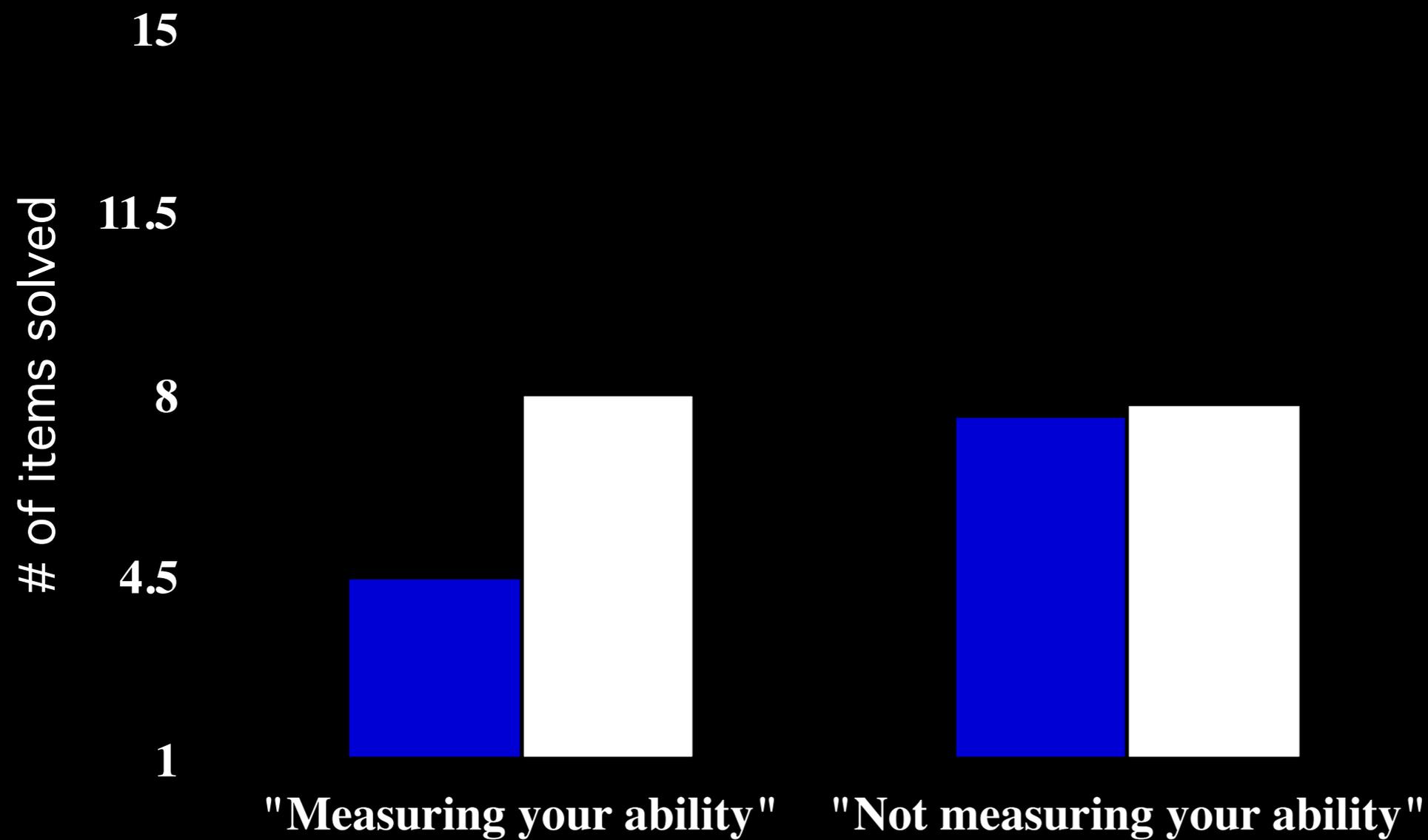


Stereotype Threat

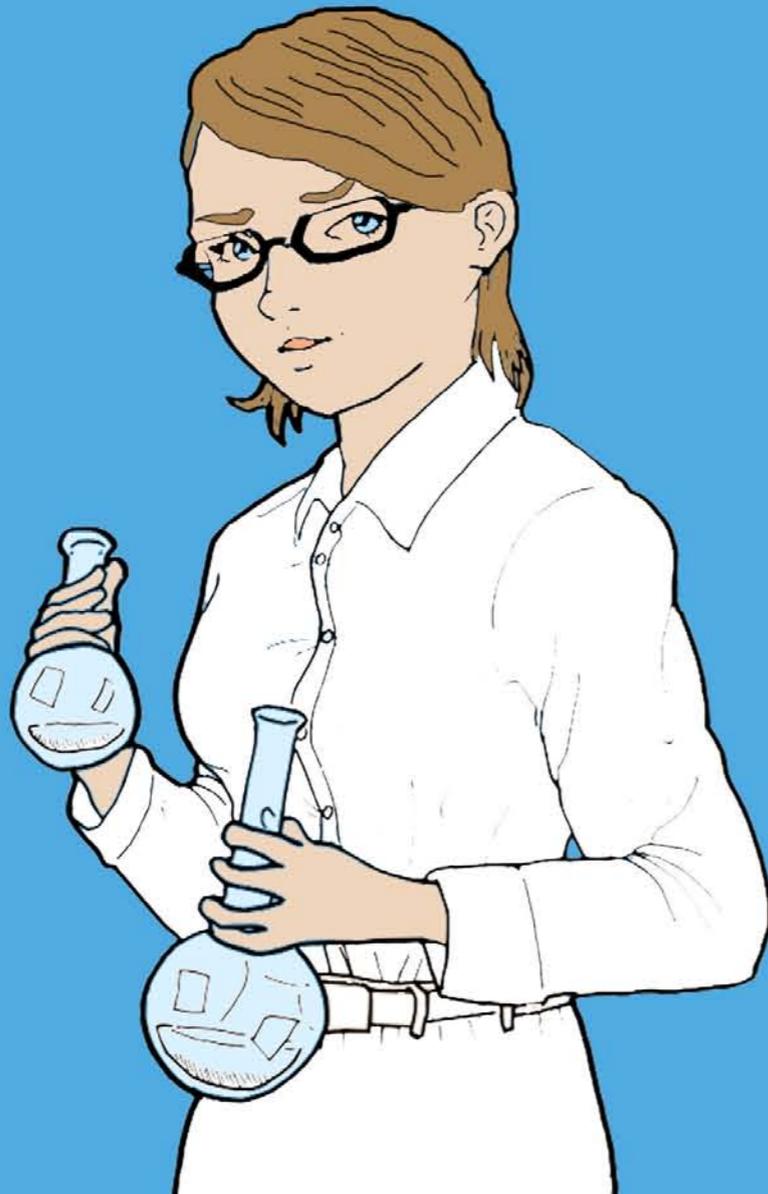
Steele & Aronson, 1995

Unpleasant apprehension arising from the awareness of a negative ability stereotype in a situation where the stereotype is relevant, and thus confirmable.

Stereotype Threat Effects on Black Students' Performance



Am I less capable than John?



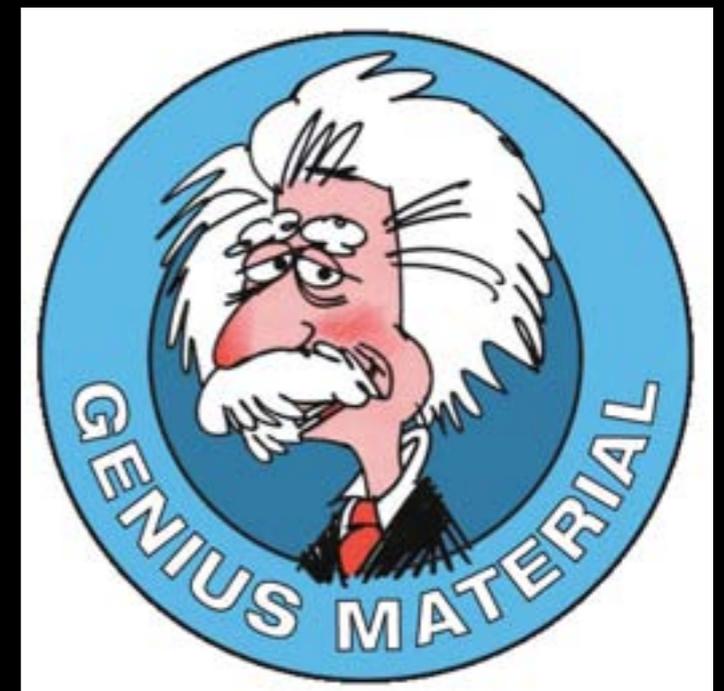
sets up physiological response

Strategies that Reduce Vulnerability to Stereotype Threat

- Encourage Growth Mindsets
- Encourage Belonging Based on Effort/
Engagement

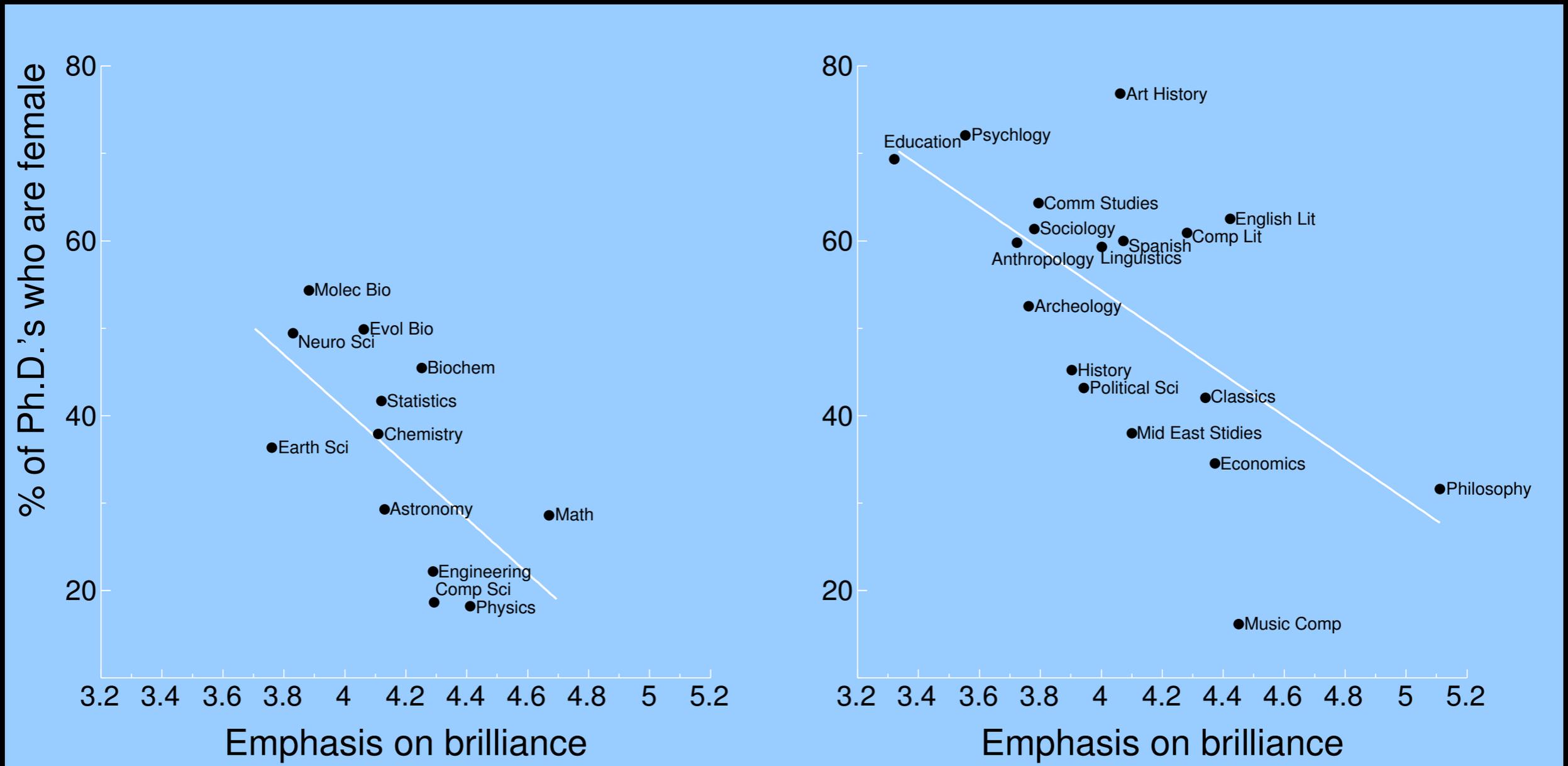
Belonging Mindsets Reduce Stereotype Threat

- Emphasizing effort (rather than ability) as a key determinant for belonging can
 - promote more learning engagement, improve learning
 - reduce stereotype threat
 - perhaps help eliminate the culture of “talent”



FIELD SPECIFIC ABILITY BELIEF

THE "LONE-GENIUS" PARADIGM



No Escape From Black Holes? Stephen Hawking Points to a Possible Exit

By DENNIS OVERBYE JUNE 6, 2016



Gravitational Waves Detected, Confirming Einstein's Theory



Dennis Overbye
OUT THERE FEB. 11, 2016



We don't tell stories about people working together, instead we ask: *who was the genius behind that*

Implying the key to success is innate talent, puts an unnecessary psychological road-block to negatively stereo-typed groups

Emphasizing *this can be learned* creates opportunities for more to thrive

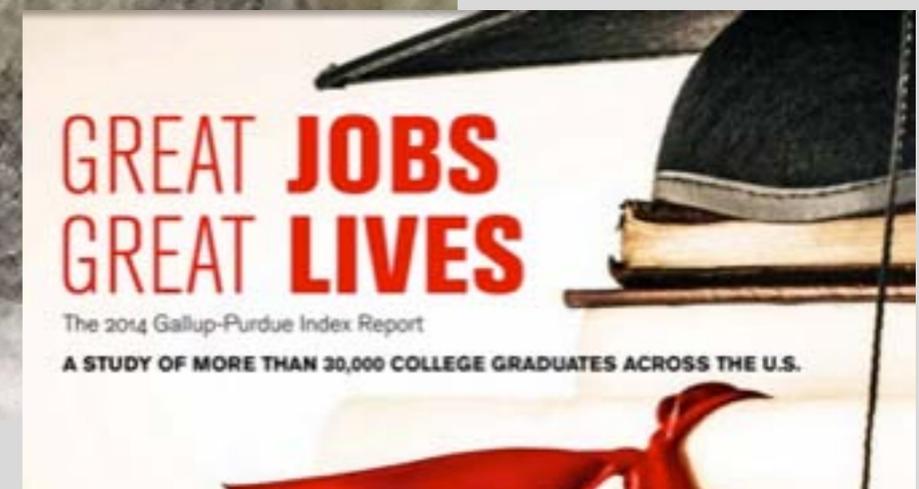
see Catherine Good's Talk

YOUR BELONGING STORY



Lauren Aguilar

FUNDAMENTAL NEED TO BELONG



Lauren Aguilar

QUESTIONS OF BELONGING



- Do I belong in a physics class?
- Will the teacher and the other students respect me?

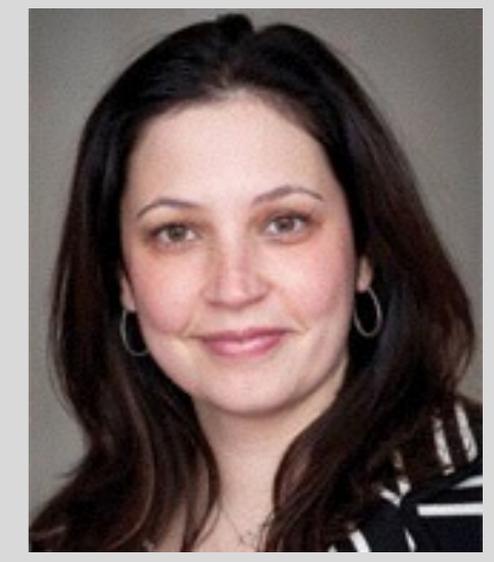
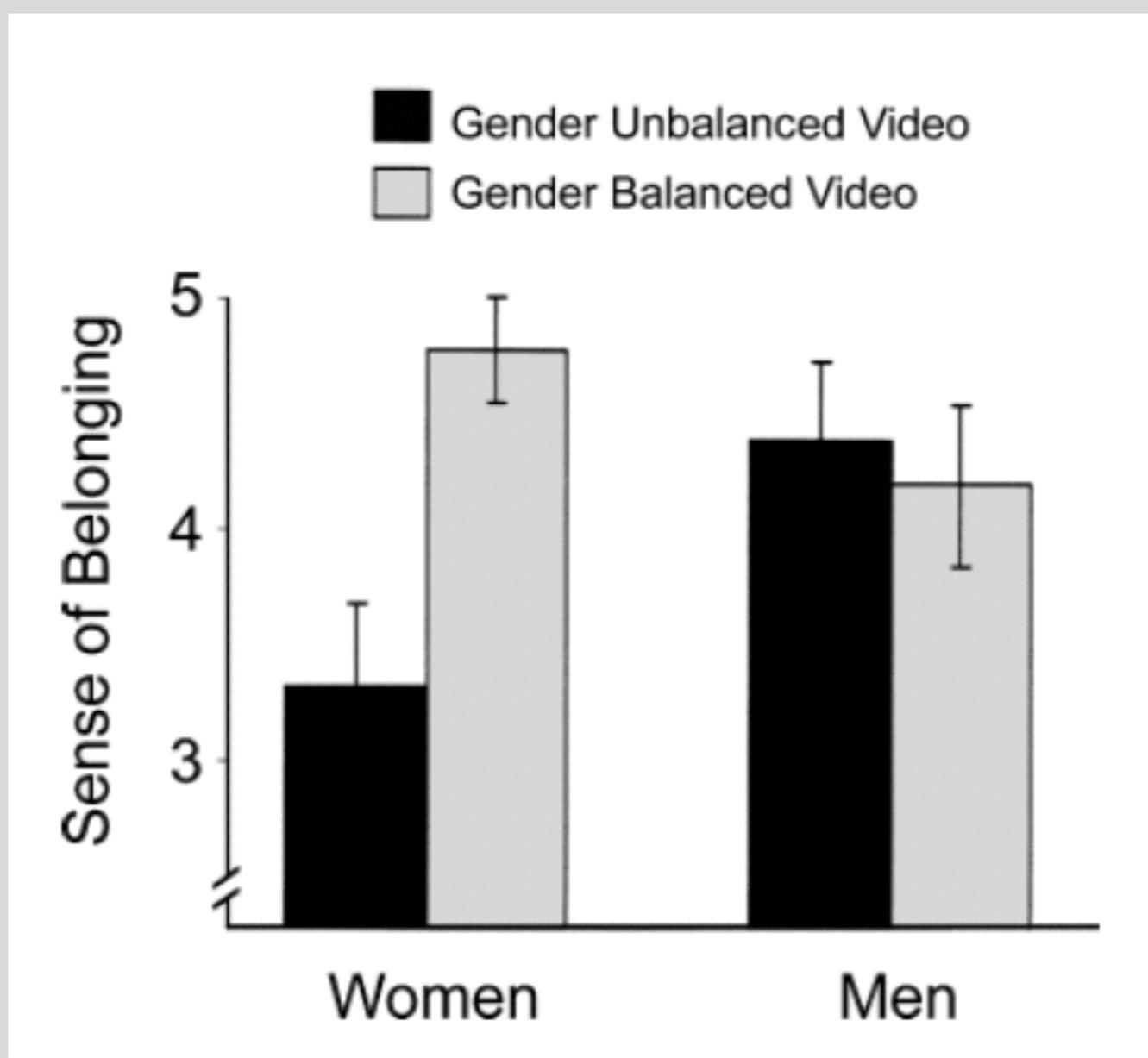
Recognize This Picture?

39 Pictures: 3 women (8%) and 1 non-white person (3%)



It is just one small thing, but it builds a cultural view that minorities do not belong here.

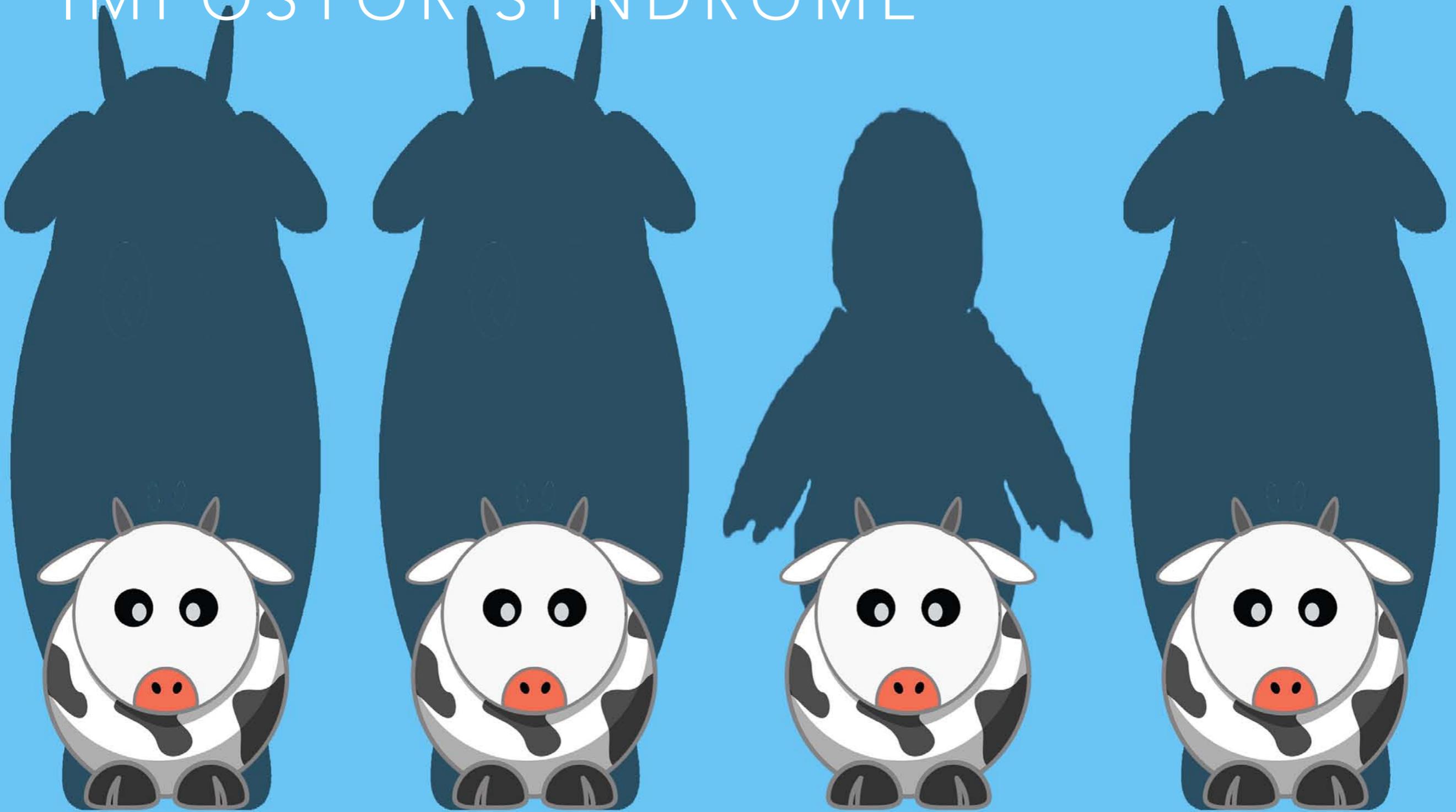
WOULD I BELONG?



EFFECTS OF "LONE GENIUS" PARADIGM

- External doubt, inhospitable environment
- Stereotype-threat
- Impostor syndrome

IMPOSTOR SYNDROME



Sooner or later,
they'll find out I'm
not a cow...



“despite all her success at Princeton, then she went on to Yale Law School where she was at the top of her class in both schools—and despite all of her professional accomplishments, Judge Sotomayor says she still looks over her shoulder and wonders if she measures up”

- MICHELLE OBAMA ABOUT JUSTICE SOTOMAYOR



“I have written eleven books, but each time I think ‘Uh, oh, they’re going to find out now. I’ve run a game on everybody, and they’re going to find me out’”

–MAYA ANGELOU



“The beauty of the impostor syndrome is you vacillate between extreme egomania and a complete feeling of: 'I'm a fraud! Oh God, they're on to me! I'm a fraud!' So you just try to ride the egomania when it comes and enjoy it, and then slide through the idea of fraud.”

- TINA FEY



“You don’t look like a physicist.”

- MANY

MICROAGRESIONS

small, subtle actions/words that makes people feel uncomfortable, unwelcome, because it is just about who they are not what they are doing

unfortunate, misleading terminology

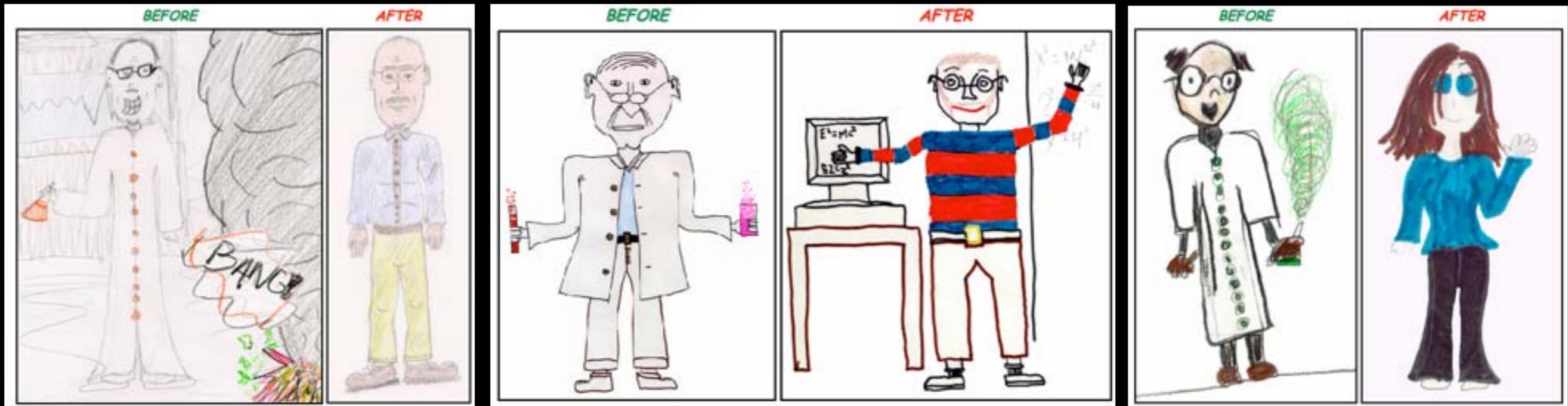
CHANGE PERCEPTIONS

REDUCE STEREOTYPES



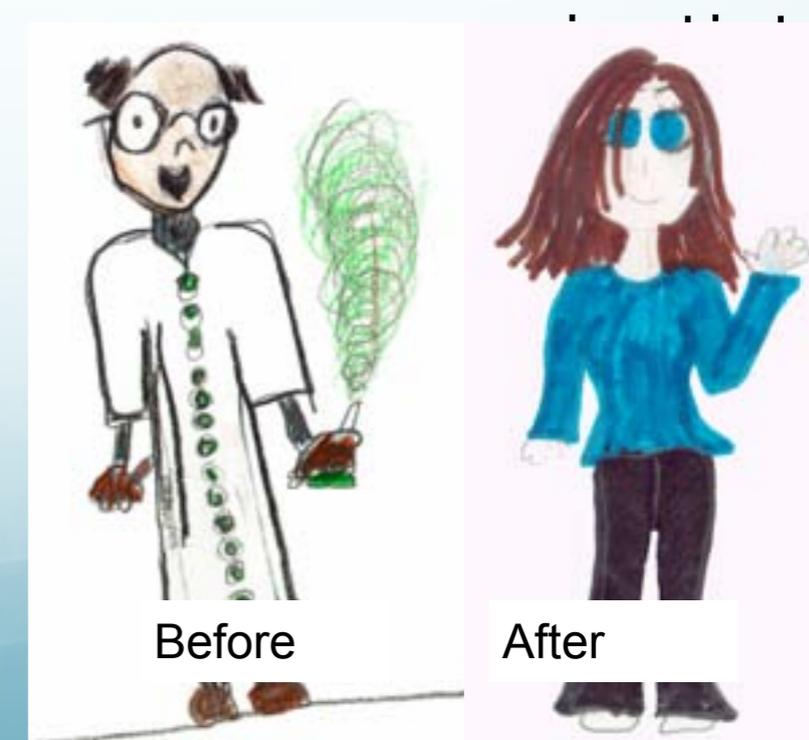
CHANGE PERCEPTIONS

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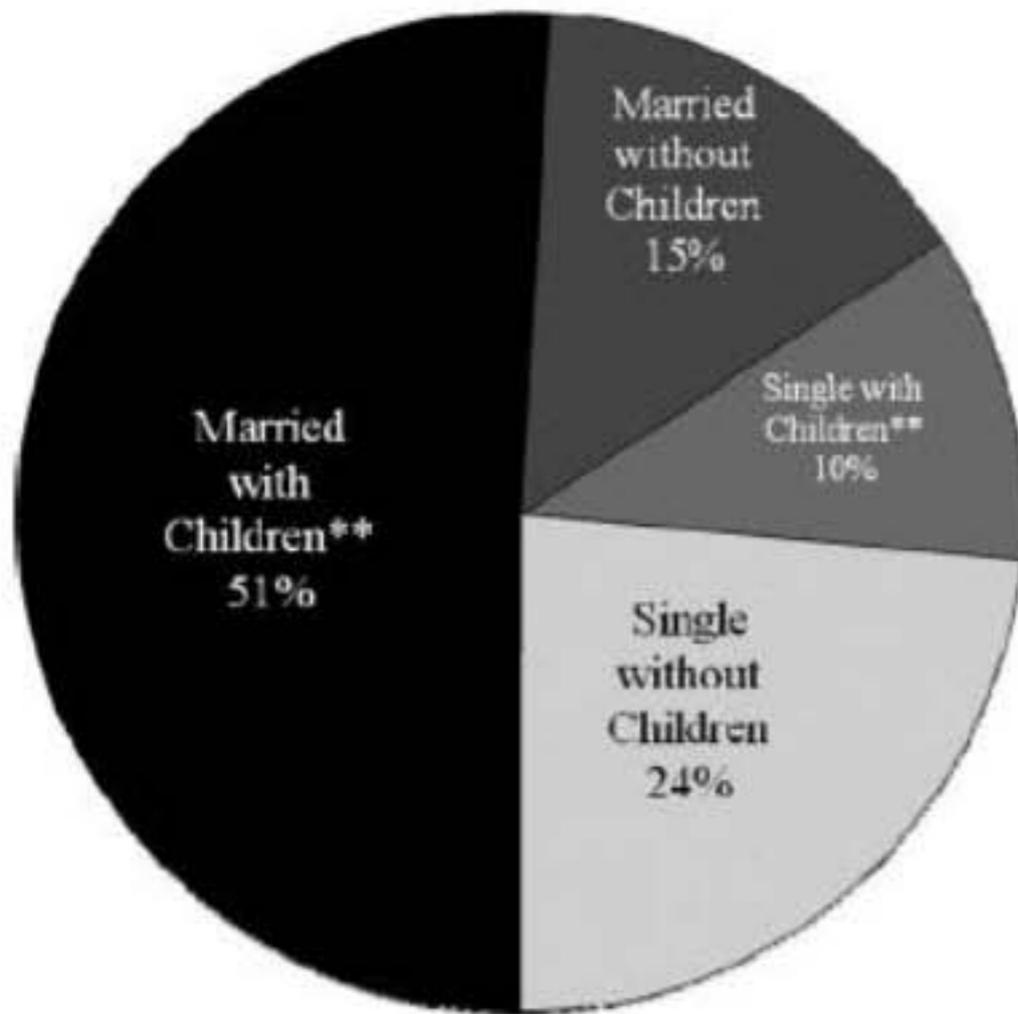
Draw-a-Scientist Test

- Developed by David Wade Chambers in 1983
 - What age does the stereotypic image of a scientist appears?
 - 4807 primary school children in 3 countries completed drawings - 28 girls, and no boys, drew female scientists
 - Only 20 of the 1,600 drawings by both girls and boys depicted scientists of color (Fort and Varney 1989)
- What if they interact with real scientists? 7th graders draw scientists before and after a trip to FermiLab
 - Girls → 36% portrayed a female scientist “before”, 57% portrayed a female scientist “after”
 - Boys → 100% portrayed a male “before”, 100% portrayed a male the “after” drawing
- 2008 – 50 % of girls drew a female
12.5% of boys drew a female



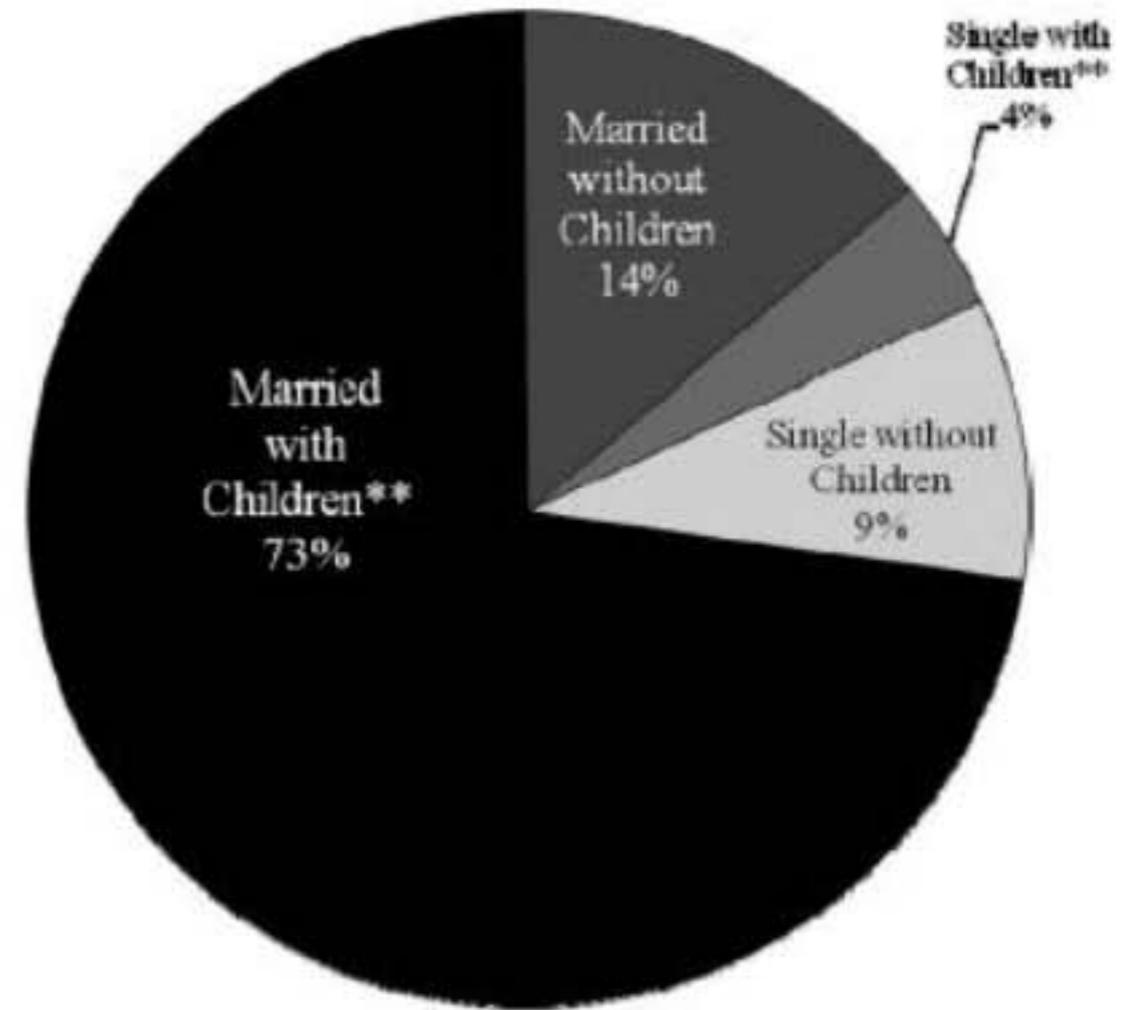
Family Status of Tenured Faculty in the Sciences*

Women



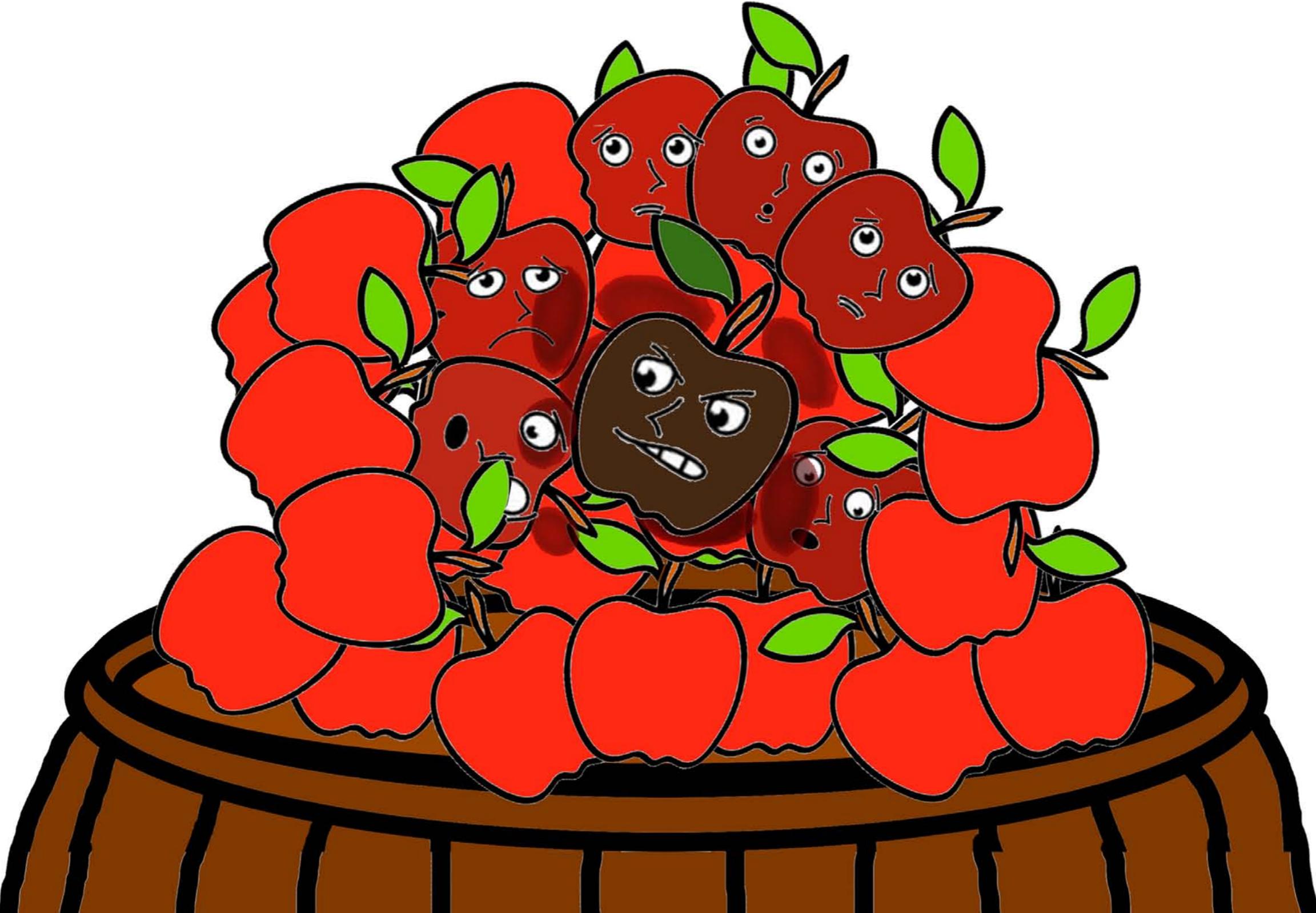
N=4,157

Men



N=19,767

BAD APPLES



WHAT CAN BE DONE?

- The goal should be to create an environment where all groups have an equal opportunity to thrive
- Be mindful of subtle cues that negatively impact under-represented groups: triggering stereotype-threat will decrease the performance of ambitious minorities
- Be willing to question yourself and recognize your own biases, prejudices.
- Emphasize the importance of learning as a process in challenging fields over the emphasis on innate ability

WHAT CAN BE DONE?

- Awareness - of our biases, prejudices - we can unlearn!
- Micro inclusions - belonging, positive reinforcement
- Mentoring + Role models
- Identity-safe (stereotype-safe) environment
- Lone-genius — hard work vs innate ability, malleability
- Call out bad behavior
- Tell your stories - vulnerable, but powerful ...

WHAT CAN BE DONE?

- Top Down:

Diversity treated with same emphasis as safety

“Sensitivity training” overhauled into an evidence-based approach

Thank You



Thank You

with students from a school in the Bronx



**** the end ****