

Unconscious bias & challenges to fair assessment



PROFESSOR MAYDIANNE ANDRADE

Professor of Biological Sciences
Acting Vice Principal Academic & Dean
Vice Dean Faculty Affairs & Equity

PROFESSOR BRYAN GAENSLER

Professor of Astronomy
Director Dunlap Institute for
Astronomy and Astrophysics



Unconscious bias & challenges to fair assessment



- 1. Patterns of representation**
- 2. Why consider representation?**
- 3. Schema & Unconscious bias**
- 4. Case studies: Assessment challenges**
- 5. Moving forward**

Canadians value equity & diversity



Reflecting this diversity in our own community is uniquely valuable to the University as it contributes to the diversification of ideas and perspectives and thereby enriches our scholarship, teaching and other activities. We will proactively seek to increase diversity among our community members...

University of Toronto Governing Council, 2006

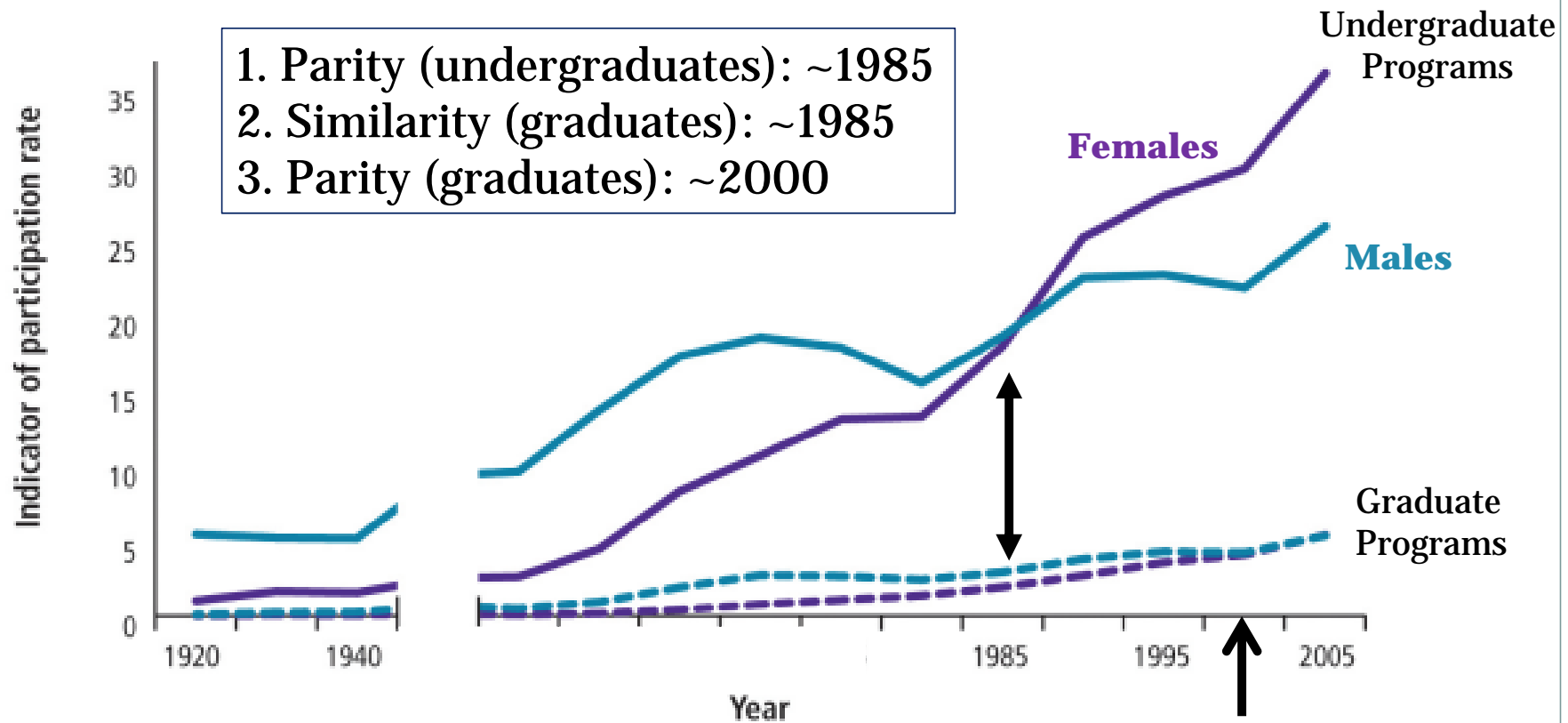
And yet...

Under-representation is pervasive in Canada* in the professoriate, corporations, management/leadership, politics...

*<http://www.catalyst.org/>; Statistics Canada, *Diversity Leads 2013/2014*, Ryerson



Representation: patterns

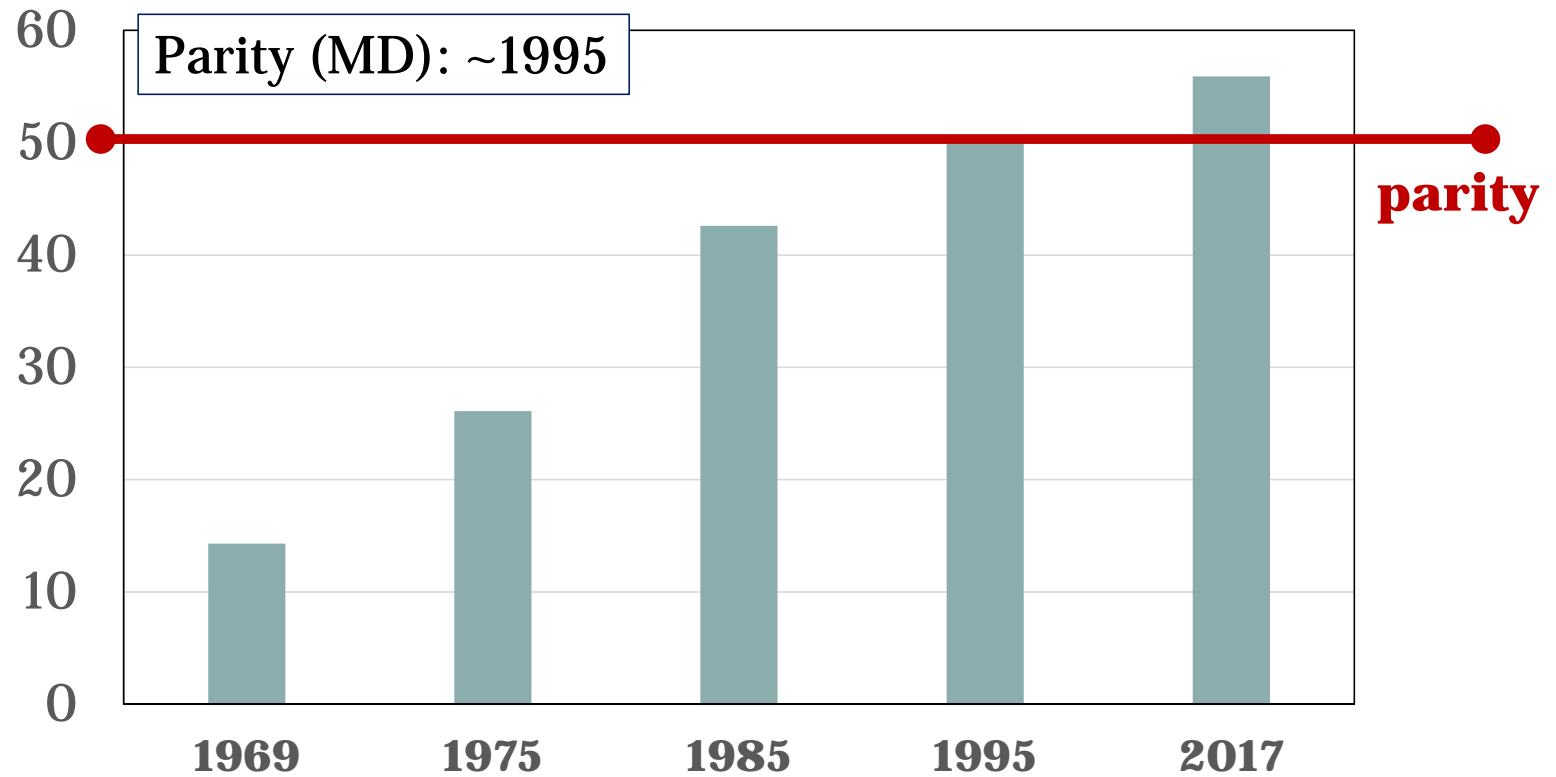




Representation: patterns



% Women enrolled in MD programs in Canada

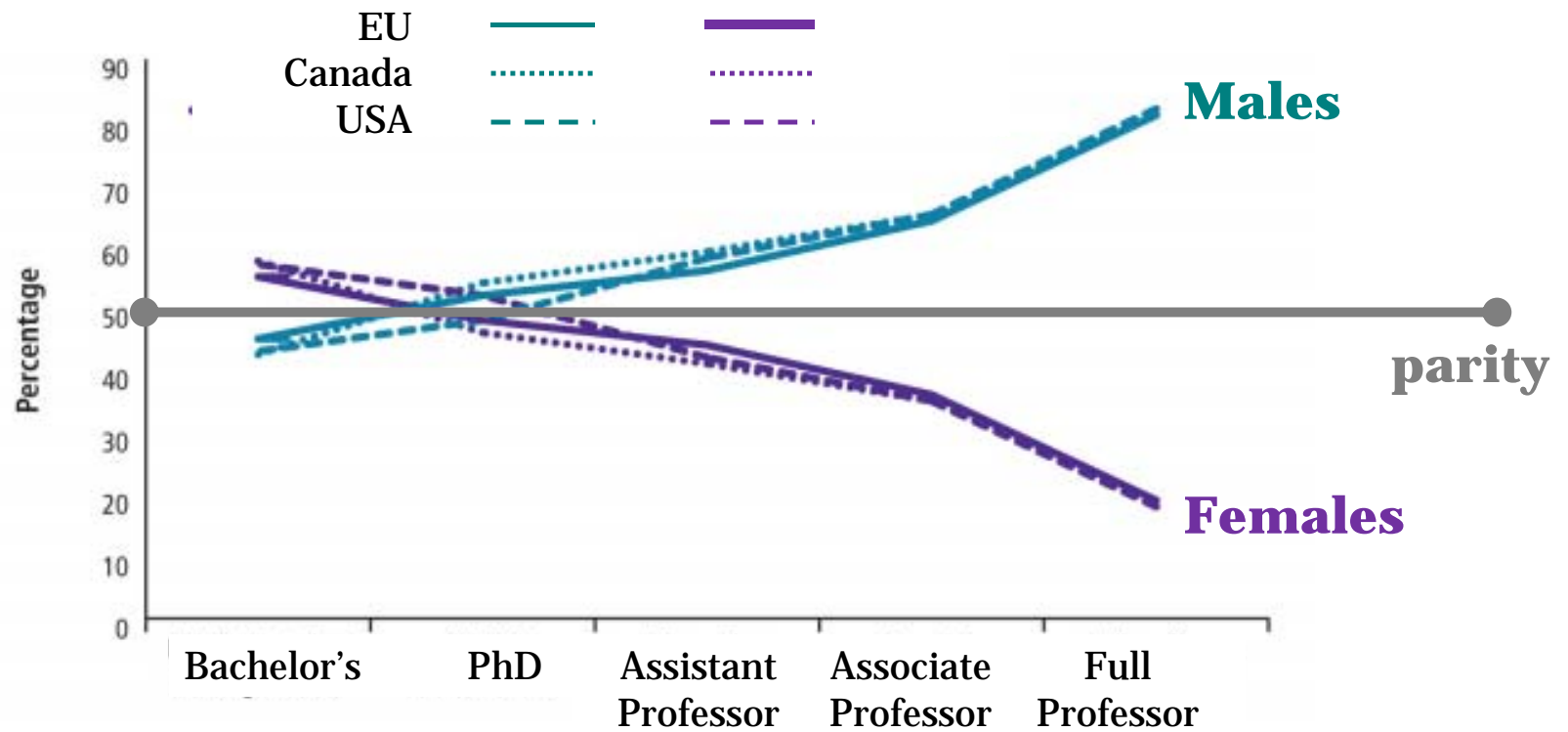




Academic rank: current patterns

• **22 years** after graduate enrollment similarity
• **7 years** after graduate enrolment parity

2007

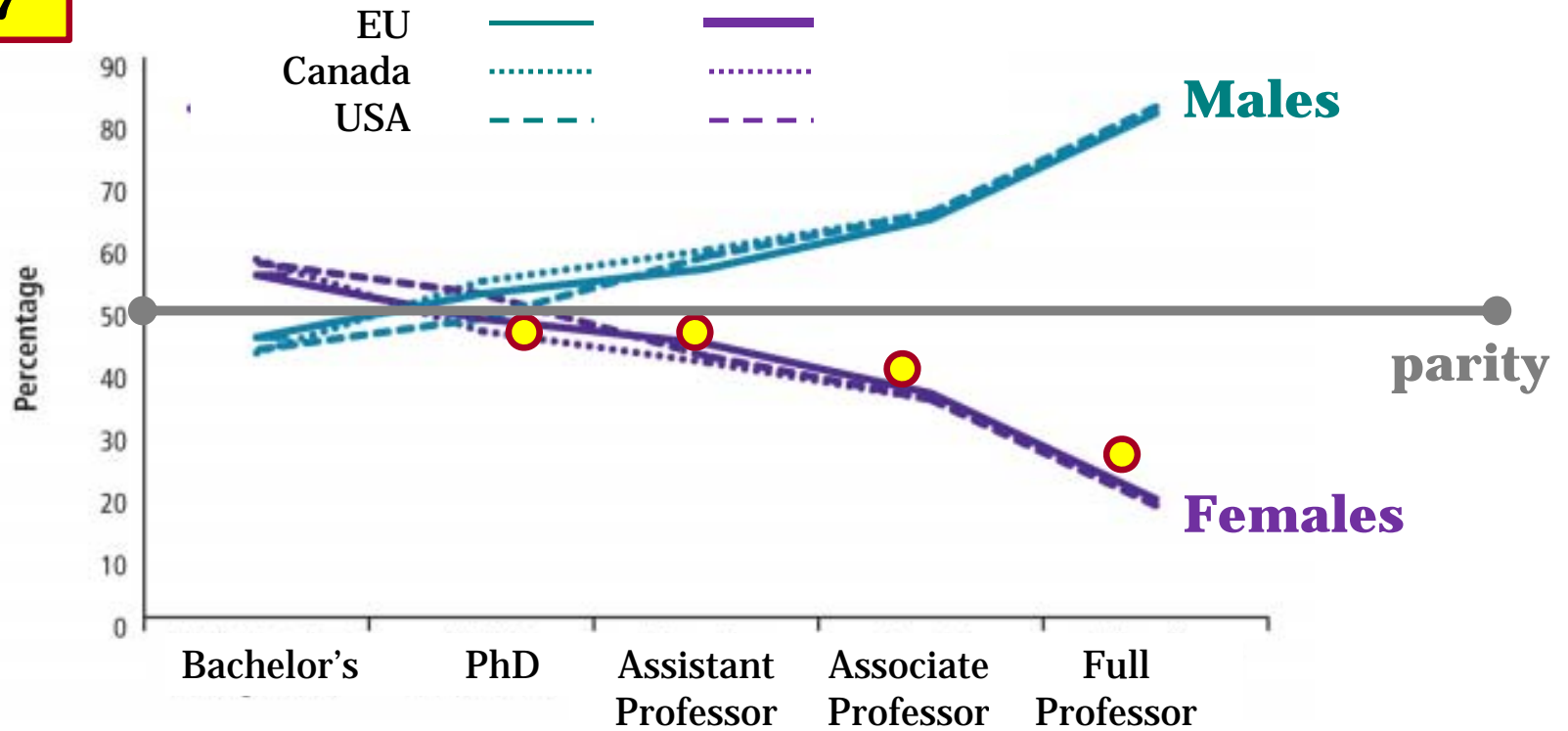




Academic rank: current patterns

•**31 years** after graduate enrollment similarity
•**16 years** after graduate enrolment parity

2016/2017



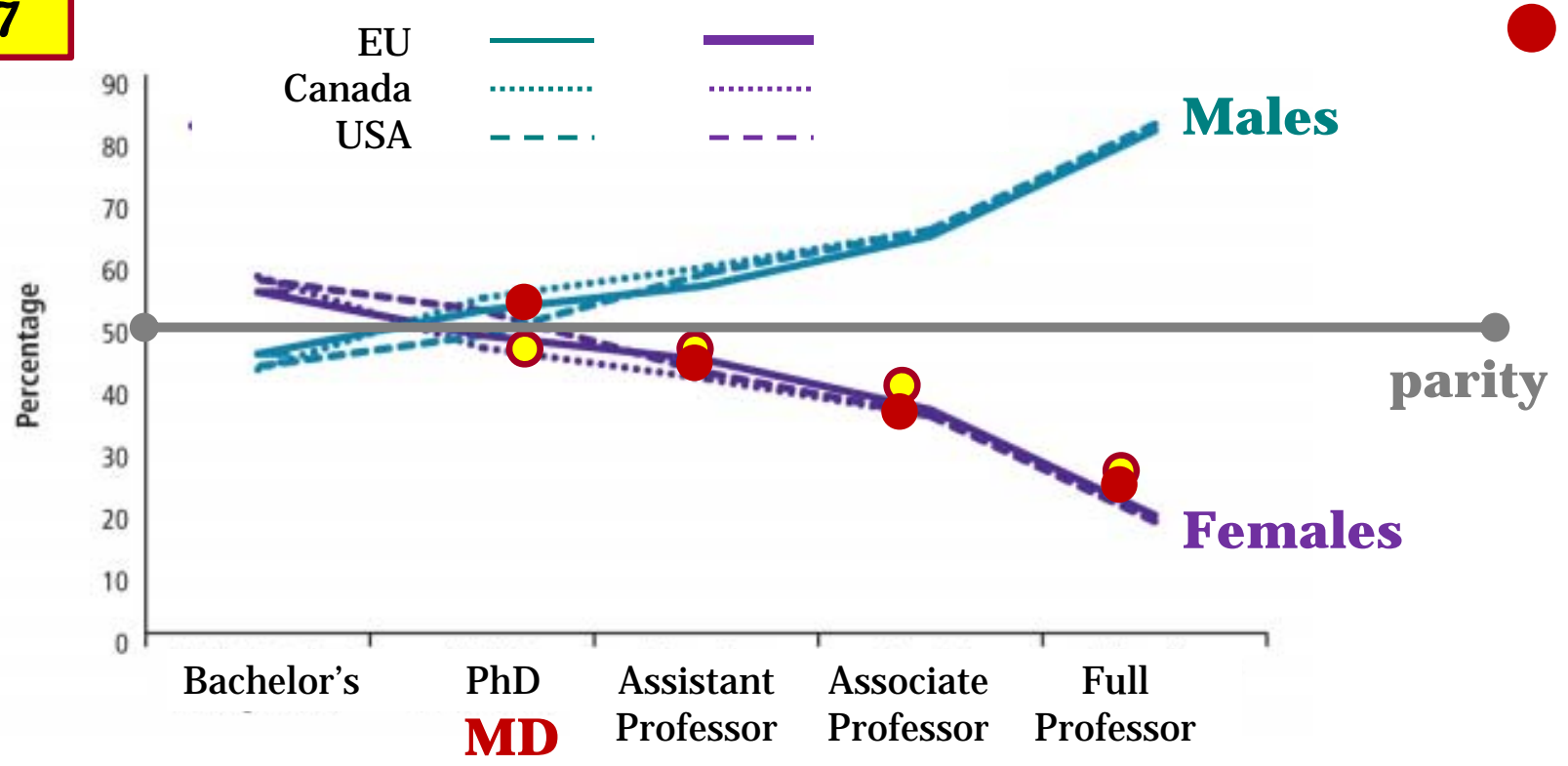


Academic rank: current patterns



•21 years after MD enrollment parity

2016/2017



Leadership: current patterns



Council of Canadian Academies, 2012

Strengthening Canada's Research Capacity: the Gender dimension



STRENGTHENING CANADA'S RESEARCH CAPACITY:
THE GENDER DIMENSION

The Expert Panel on Women
in University Research



Council of Canadian Academies
Conseil des académies canadiennes

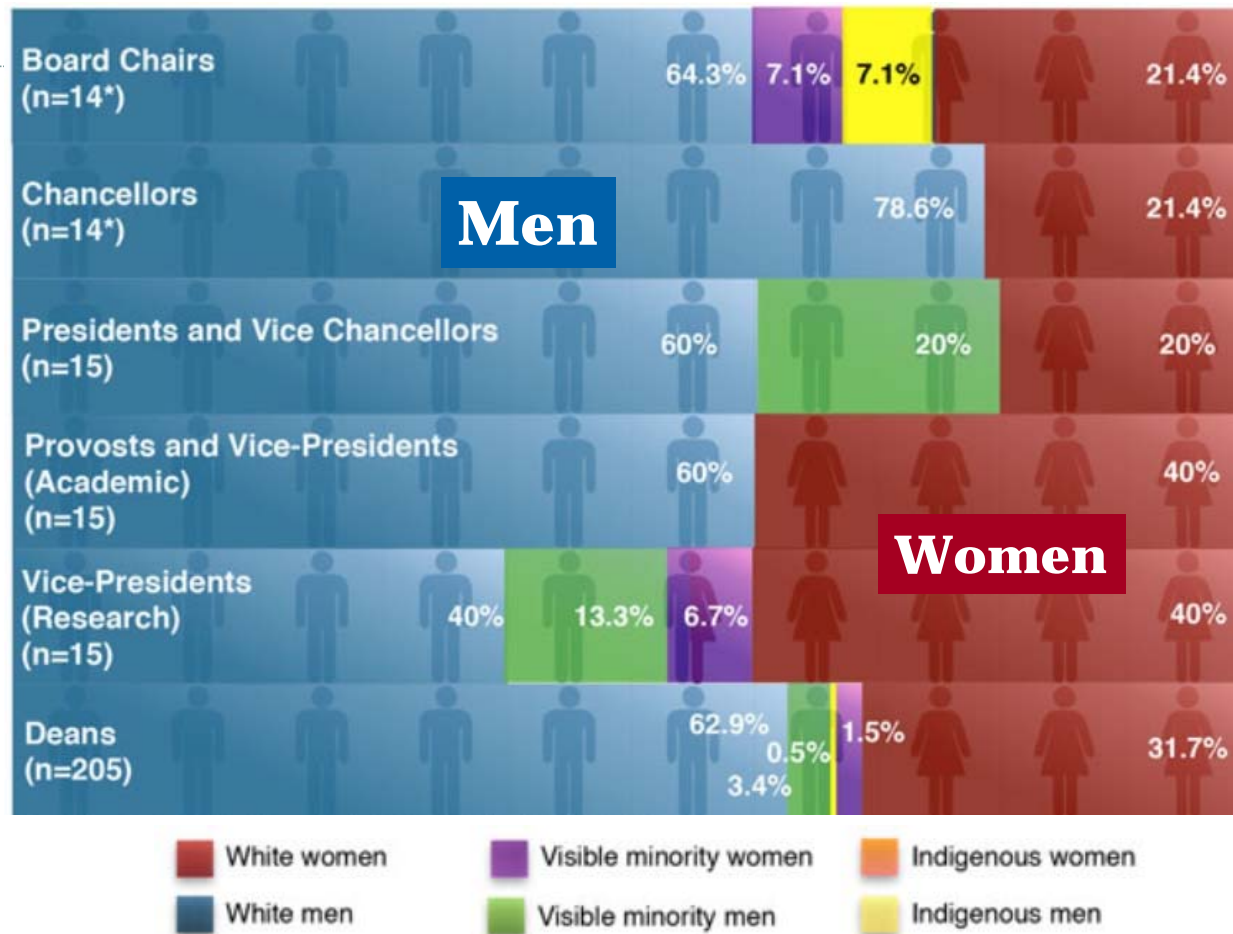
Science Advice in the Public Interest

The higher in the ranks one looks, the fewer women are present in comparison to men in positions such as full professors and presidents of universities, leaders of government agencies, and CEOs of private sector companies.

The expert panel on women in University research, 2012



Leadership: Canadian U15 Universities



2017

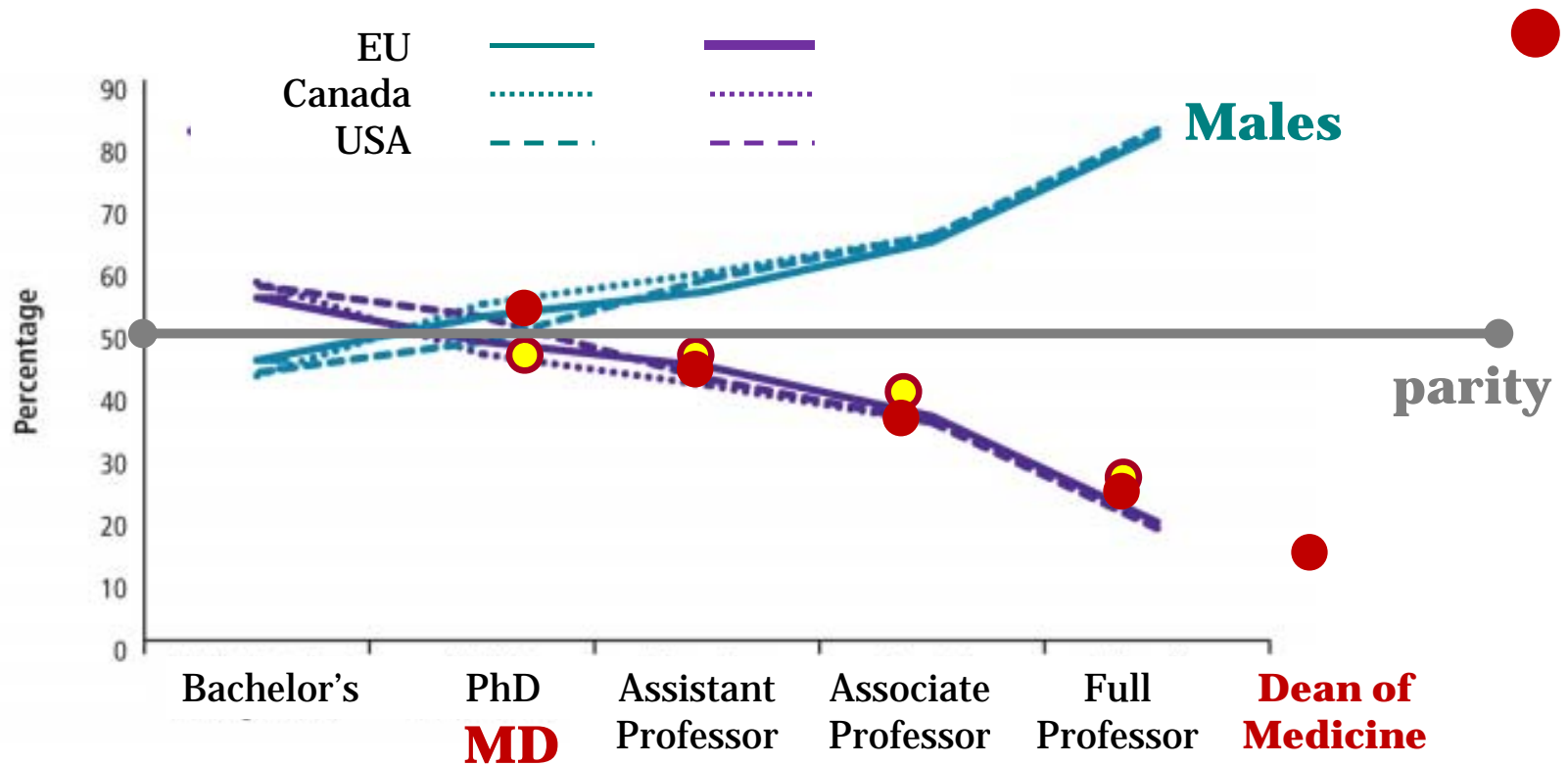


Leadership: current patterns



•22 years after MD enrollment parity

2018



Unconscious bias & challenges to fair assessment



1. Patterns of representation

2. Why consider representation?

3. Schema & Unconscious bias

4. Case studies: Assessment challenges, gender & race

5. Moving forward: The Leadership Challenge

Why is equity & diversity desirable?



1. Fairness

- Human rights

2. Incentives

- ‘The business case’
- Improved patient care
- Focus of federal assessments & granting agencies (CRC, CIHR)

3. Innovation

- Utilize available talent
- Increased creativity
- Innovative problem-solving

Diversity & Problem Solving



5 – 10%

Current patterns



Why?

- The pool?
- Interest & chosen fields/career paths?
- Paid-Work-life balance & institutional culture
- Harassment
- ‘The glass ceiling’
 - Biases in assessment

Unconscious bias & challenges to fair assessment



1. Patterns of representation
2. Why consider representation?
3. Schema & Unconscious bias
4. Case studies: Assessment challenges, gender & race
5. Moving forward: The Leadership Challenge

Bias



Differential evaluation of one group and its members
relative to another

Explicit/ Conscious

Person is aware of their evaluation

Expression of bias is intentional

e.g. racism, sexism, homophobia, transphobia

*modified from T De Mello

MCB Andrade 2016



Schema & Unconscious bias



- **Schema:** categorical assessments of individuals and relationships between individuals
 - *Shape expectations & evaluations*
- **Expectations & evaluations based on group identification lead to *unconscious or implicit bias***

Bias



Differential evaluation of one group and its members relative to another

Implicit/Unconscious Bias :

- Person does not perceive or endorse evaluation

Expressions are:

- Not related to self-identified group of evaluator
- Unintentional, automatic
- Often contradictory to conscious beliefs

Implicit bias



Project Implicit®

Implicit association tests

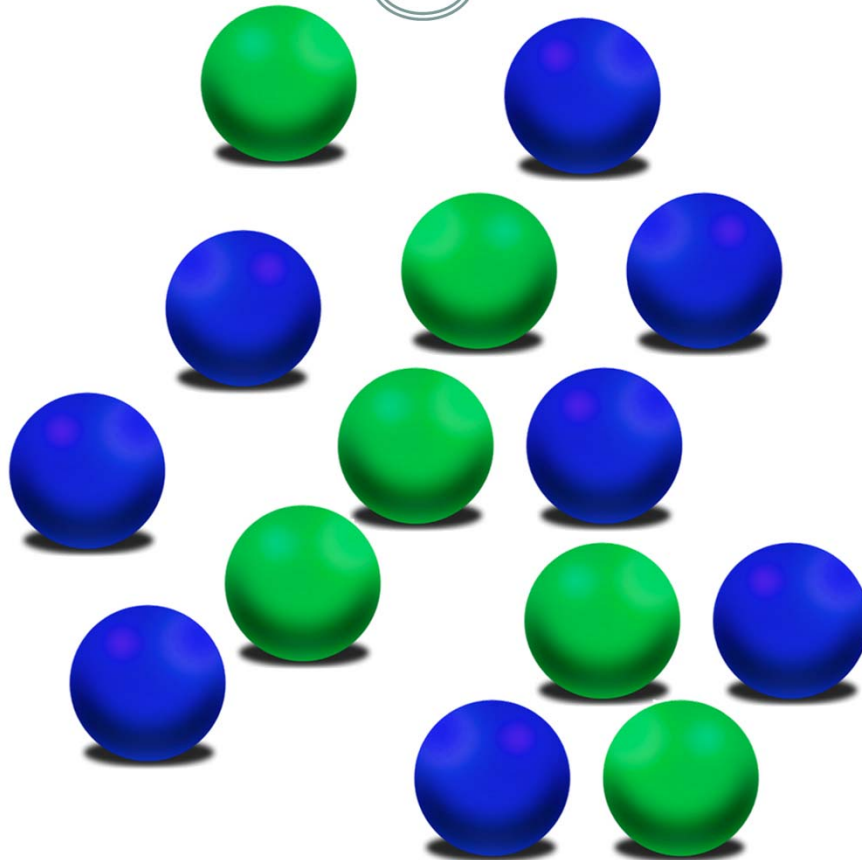
- **Task:** instructed to associate images and words with categories
 - Consistent or contrary to stereotypes
- **Measurement:** variation in response speed & error rates

Stroop Effect



Blue

Green



Implicit Association Tests



Against Stereotype

African American
or
Good

European American
or
Bad



Stereotype

European American
or
Good

African American
or
Bad



Greenwald et al 1998

Anti-black implicit bias



Strong implicit bias for **black**

- 2.0

No bias



Strong implicit bias for **white**

2.0

>3 million scores (2002-2015)

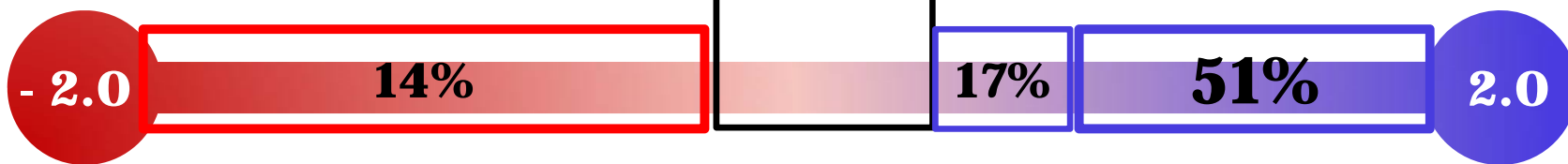
Anti-black implicit bias



Strong implicit bias for **black**



Strong implicit bias for **white**



>3 million scores (2002-2015)

Unconscious bias: Height



Average height of
American men:

5'9"

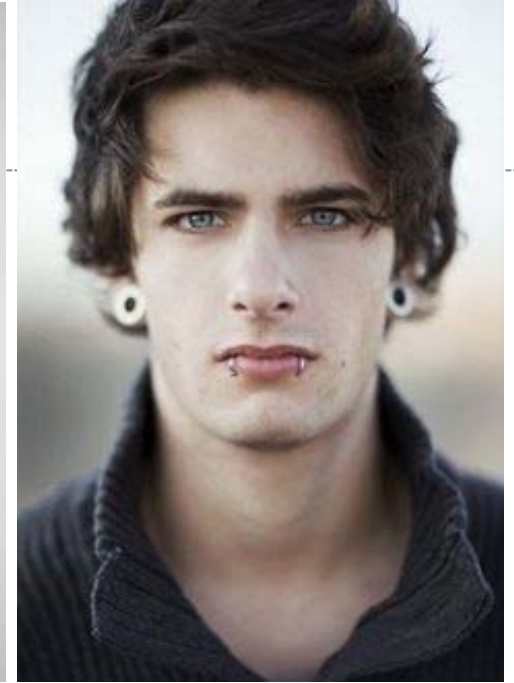
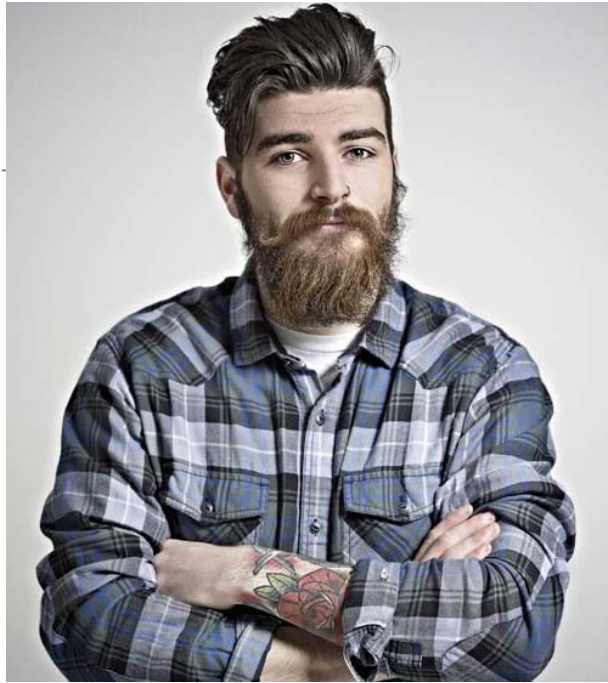
An inch of
height is worth
\$789/year in
salary



Average height
Fortune 500 CEO's

6'

Unconscious bias: not just gender & race



Gender expression, race, ethnicity, sexual orientation, age, socio-economic status....

Unconscious bias & challenges to fair assessment



1. Patterns of representation
2. Why consider representation?
3. Schema & Unconscious bias
4. **Case studies: Assessment challenges**
5. Moving forward



Assessing excellence: gender bias

nature

Fellowship applications

- Swedish Medical Research Council
- 1995 Research fellowship competition

Success rate:

8% of female applicants

24% of male applicants



- **Biggest gender differential in scores were for Scientific excellence**

Did women publish fewer high-impact papers?

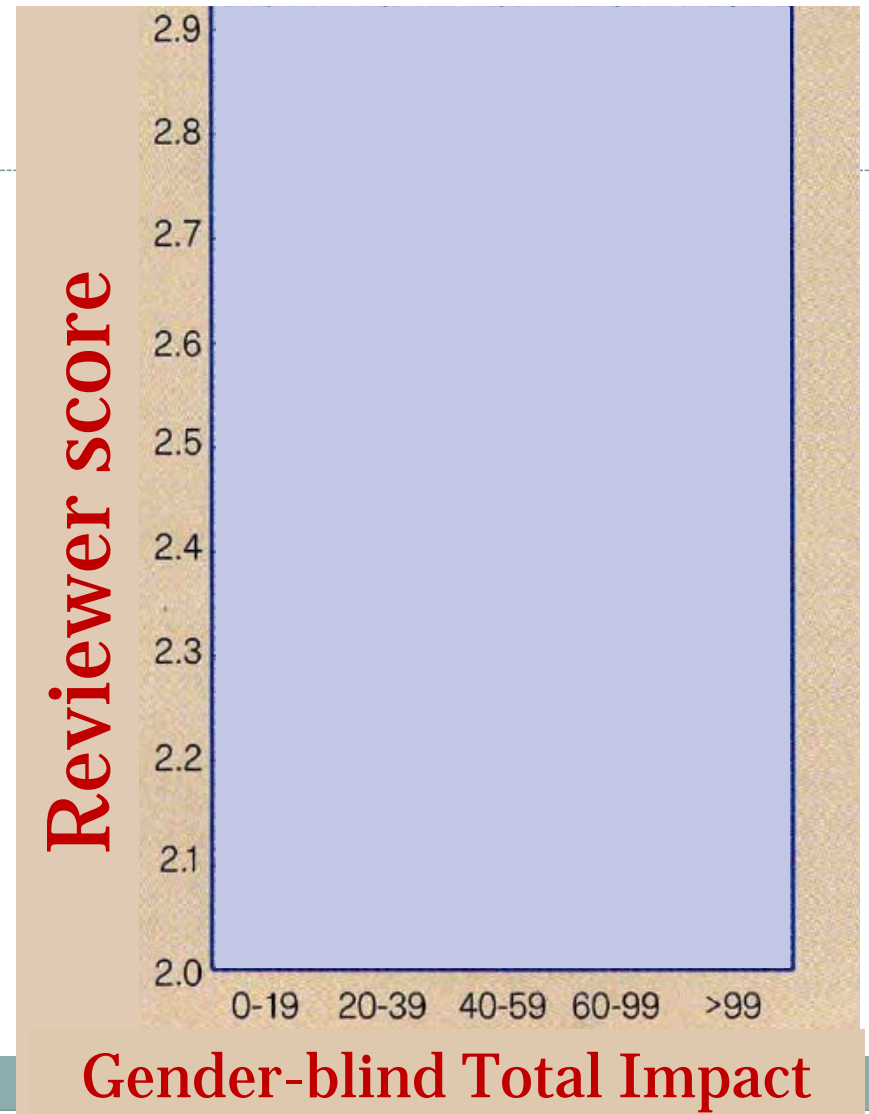
Wennerås & Wold. 1997. *Nature*



1. Calculate total gender-blind impact:

- # publications
- Journal impact

2. Compare to reviewer scores



Wennerås & Wold. 1997. *Nature*

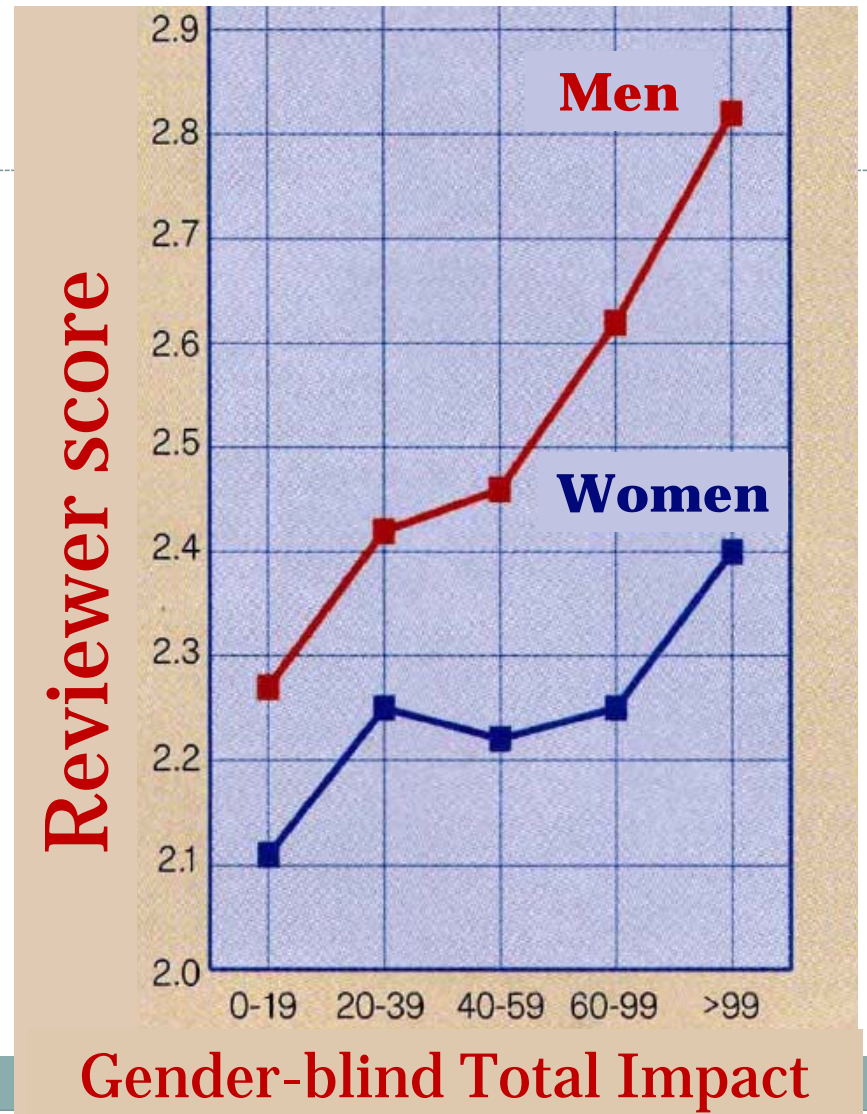
© MCB Andrade 2017



“...strongly suggests peer reviewers **cannot** judge scientific merit independent of gender.”

Wennerås & Wold. 1997. *Nature*

© MCB Andrade 2017





Assessing excellence: gender bias

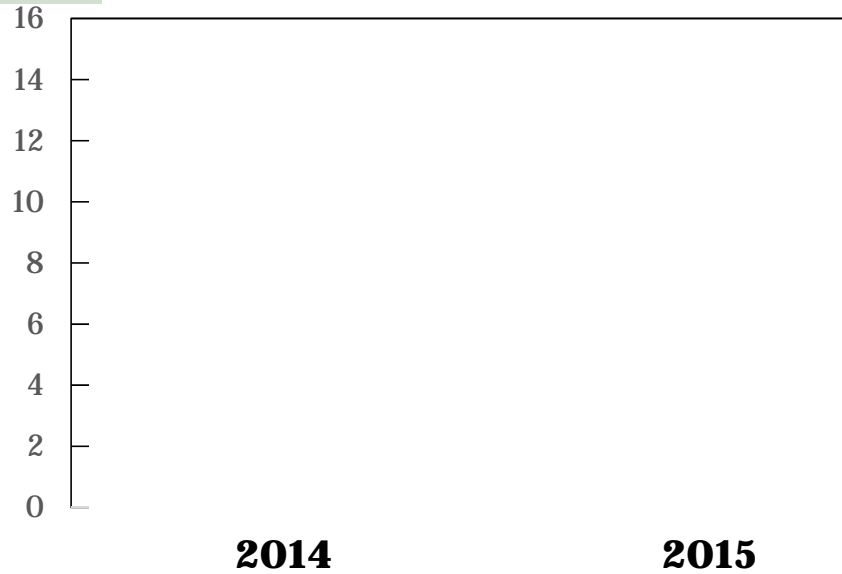
THE LANCET

No gender difference in granting:
primary focus on
**excellence of research
proposal**



○
**'Foundations'
2014 & 2015
Excellence of
Researcher**

Success
Rate (%)



23,918 grant applications



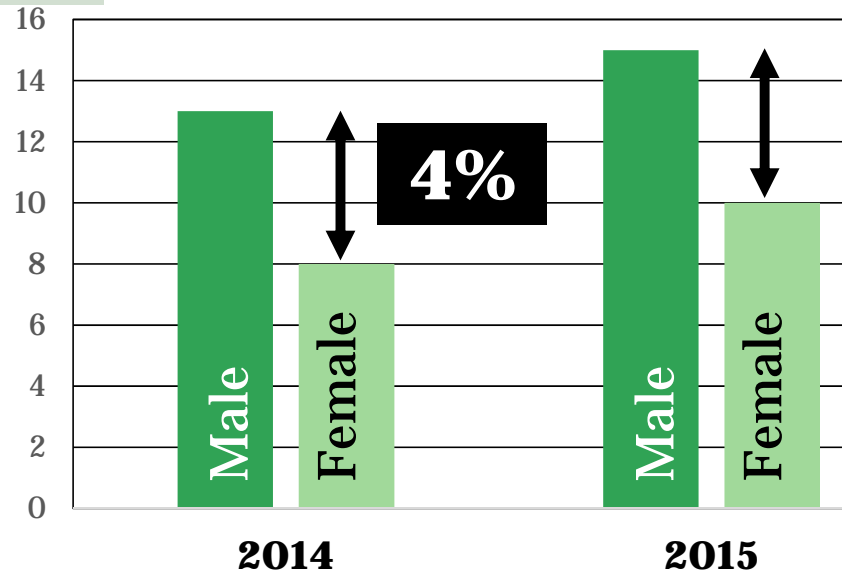
Assessing excellence: gender bias

No gender difference in granting:
primary focus on
excellence of research proposal



'Foundations'
2014 & 2015
**Excellence of
Researcher**

Success
Rate (%)



23,918 grant applications



Assessing excellence: gender bias

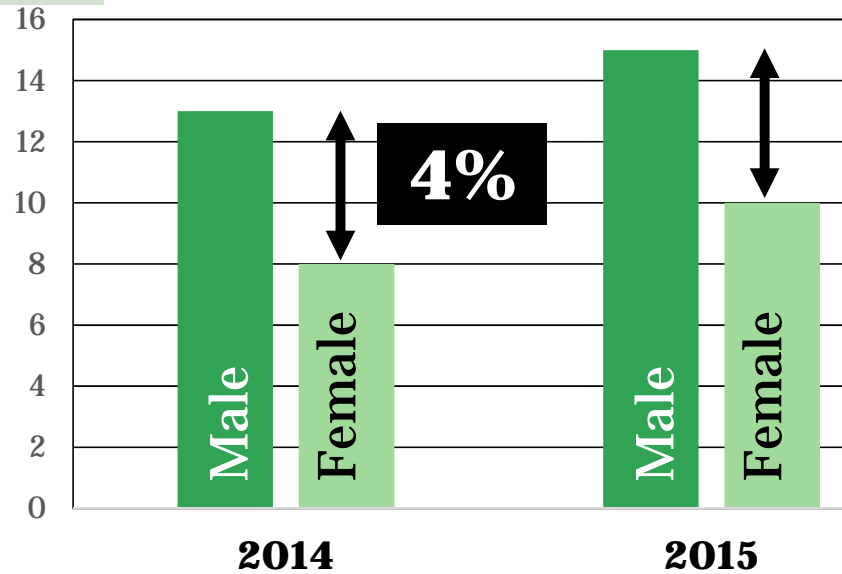
THE LANCET

No gender difference in granting: primary focus on excellence of research proposal



'Foundations' 2014 & 2015
Excellence of Researcher

Success Rate (%)



Similar results:



Netherlands Organisation of Scientific research (NWO)
Van der Lee & Ellemers (2015)



Ahlqvist et al., 2015



SHE figures. European Commission 2015.



CIHR IRSC
Canadian Institutes of Health Research
Instituts de recherche en santé du Canada



Assessing excellence: racial & gender bias



We hypothesized that scientists of different races and ethnicities with similar research records and affiliations would have similar likelihoods of being awarded research grants.

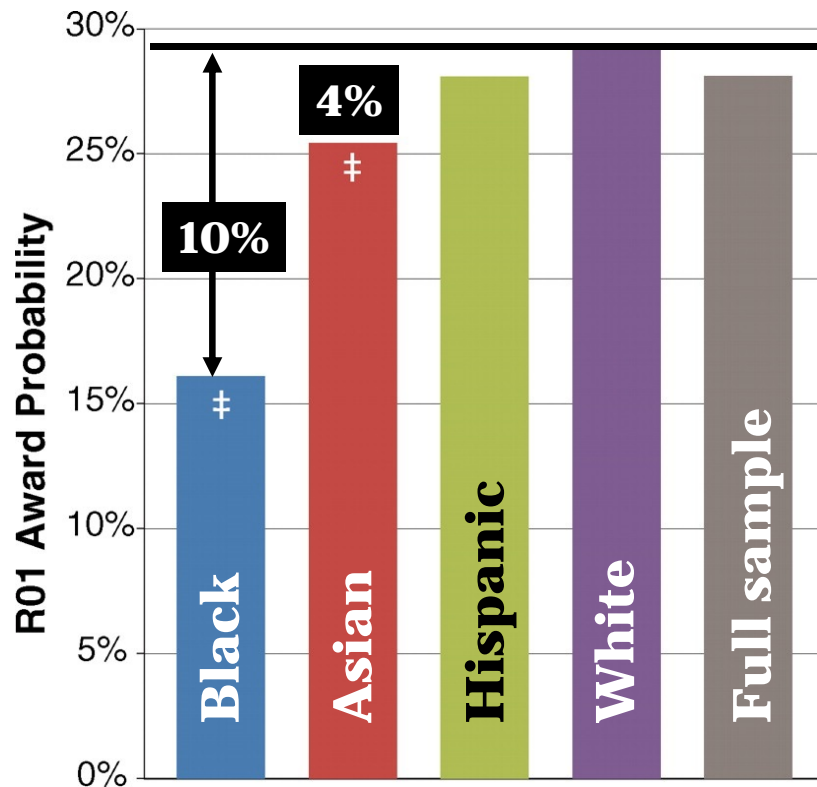
Ginther et al 2011. *Science*

- 2000 – 2006
- 83,188 grants; 40,069 unique investigators
- Self-reported race/ethnicity (+other databases)
- Race/ethnicity cues in application?
 - Name, biosketch, institutions attended in application

First-time Grant applications



Assessing excellence: racial & gender bias



Multi-variate analysis controls for:

- Research productivity
 - publications & citations
- Demographics
- Education & training
- Employer characteristics
- NIH experience

Negative effects most pronounced for women of colour

2000 – 2006

Unconscious bias: Experimental approaches



Standard scenarios / scripts or documents
Modify gender/ race of primaries

Evaluation of behaviour

- **Actors or confederates**
- **Scripts**
- **Recorded**

Evaluation of documentation

- **CV**
- **Narratives**
- **Case files**

Unconscious Bias & Assessment of Leadership



Modified from D Zweig

Beliefs about Males	Beliefs about Leaders	Beliefs about Females
Dedicated		Helpful
Determined		Caring
Assertive		Sympathetic
Competitive		Kind

'Agentic traits'

'Communal traits'

Unconscious Bias & Assessment of Leadership



Modified from D Zweig

Beliefs about Males	Beliefs about Leaders	Beliefs about Females
Dedicated	Dedicated	Helpful
Determined	Determined	Caring
Assertive	Competitive	Sympathetic
Competitive	Charismatic	Kind
	White	

'Agentic traits'

'Communal traits'

- Schema (stereotypes) affect our expectations & judgement

Schema & Assessment of Leadership



Modified from D Zweig

Beliefs about Males	Beliefs about Leaders	Beliefs about Females
Dedicated	Dedicated	Helpful
Determined	Determined	Caring
Assertive	Competitive	Sympathetic
Competitive	Charismatic	Kind
	White	

'Agentic traits'

'Communal traits'

Personality penalties: agentic traits seen as negatives when exhibited by women or 'visible minorities'

Payoff for excellence: gender bias



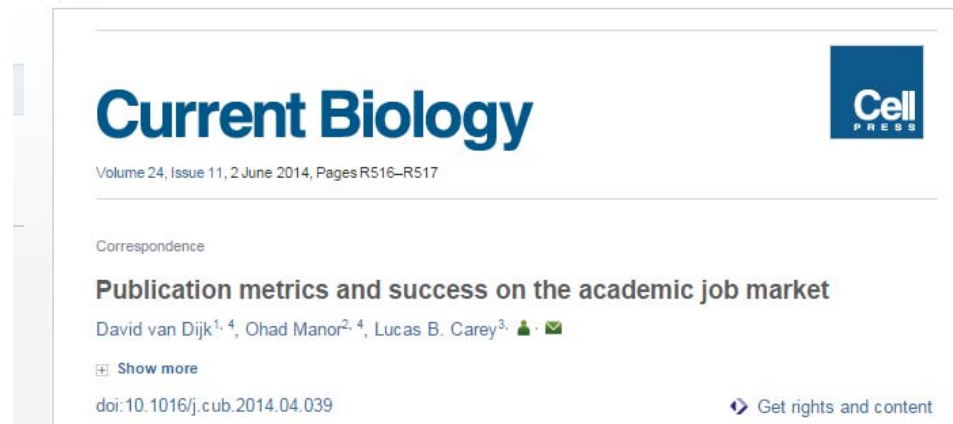
Who becomes a PI (Principal Investigator)?

25,604 published scientists
1583 (6.2%) became PI's

200 metrics of publication output



Model: Strongly predictive of who
becomes a PI



Payoff for excellence: gender bias



Who becomes a PI (Principal Investigator)?

25,604 published scientists
1583 (6.2%) became PI's

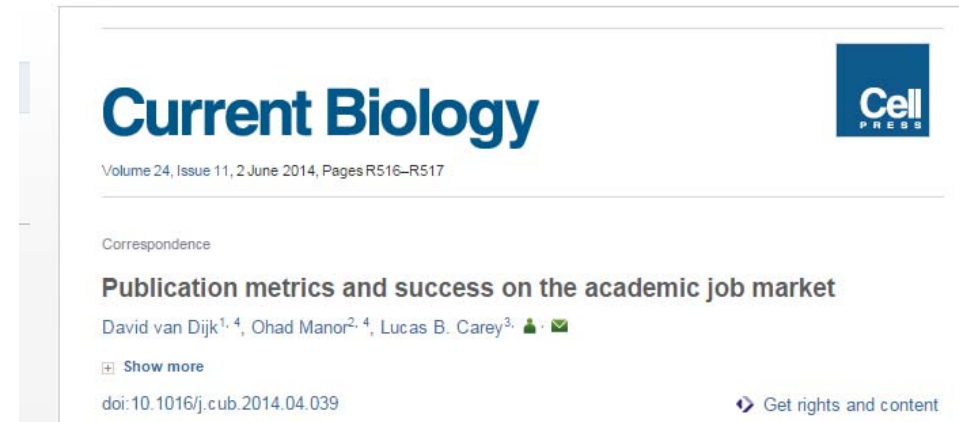
200 metrics of publication output



Model: Strongly predictive of who
becomes a PI

Factors (in order of relative importance):

1. Impact factors
2. Number of publications
- 3. Gender**
4. Citations/Impact Factor



Payoff for excellence: gender bias



Who becomes a PI (Principal Investigator)?

25,604 published scientists
1583 (6.2%) became PI's

200 metrics of publication output



Model: Strongly predictive of who
becomes a PI

Factors (in order of relative importance):

1. Impact factors
2. Number of publications
- 3. Gender**
4. Citations/Impact Factor



“...even after correcting for all other publication and non-publication-derived features, being male is positively predictive of becoming a PI....”

**Given the same publication record,
men are more
likely than women to become PI's.”**



Assessing excellence: racial & gender bias



ISTOCK.COM/VASELENA

Racial and gender biases plague postdoc hiring

Eaton et al 2019



Assessing excellence: racial & gender bias



Identical CV's

- Average record
- Conflicting indicators of quality

Professors from 8 major Universities:

Biology (n = 251)
Physics (n = 94)

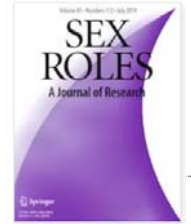
Task: Review CV of recent PhD as Post-doc applicant

- Sham: “how does CV formatting/style affect perception by faculty”
- Competence
- Hireability
- Likeability

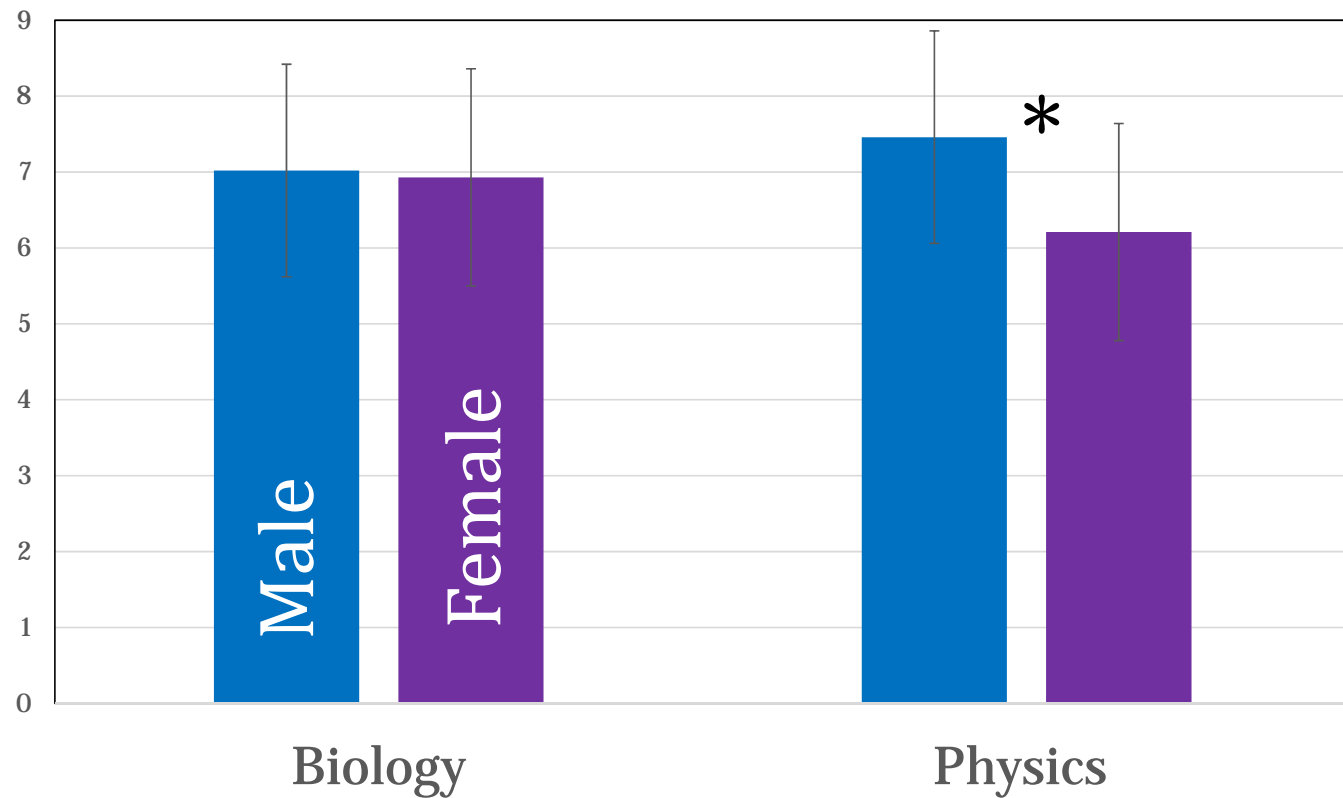
Race X Gender	White	Black	Hispanic	Chinese
Male	<i>Bradley Miller</i>	<i>Jamal Banks</i>	<i>Jose Rodriguez</i>	<i>Zhang Wei (David)</i>
Female	<i>Claire Miller</i>	<i>Shanice Banks</i>	<i>Maria Rodriguez</i>	<i>Wang Li (Lily)</i>



Assessing excellence: racial & gender bias

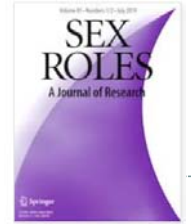


Competence
• Similar for
Hireability

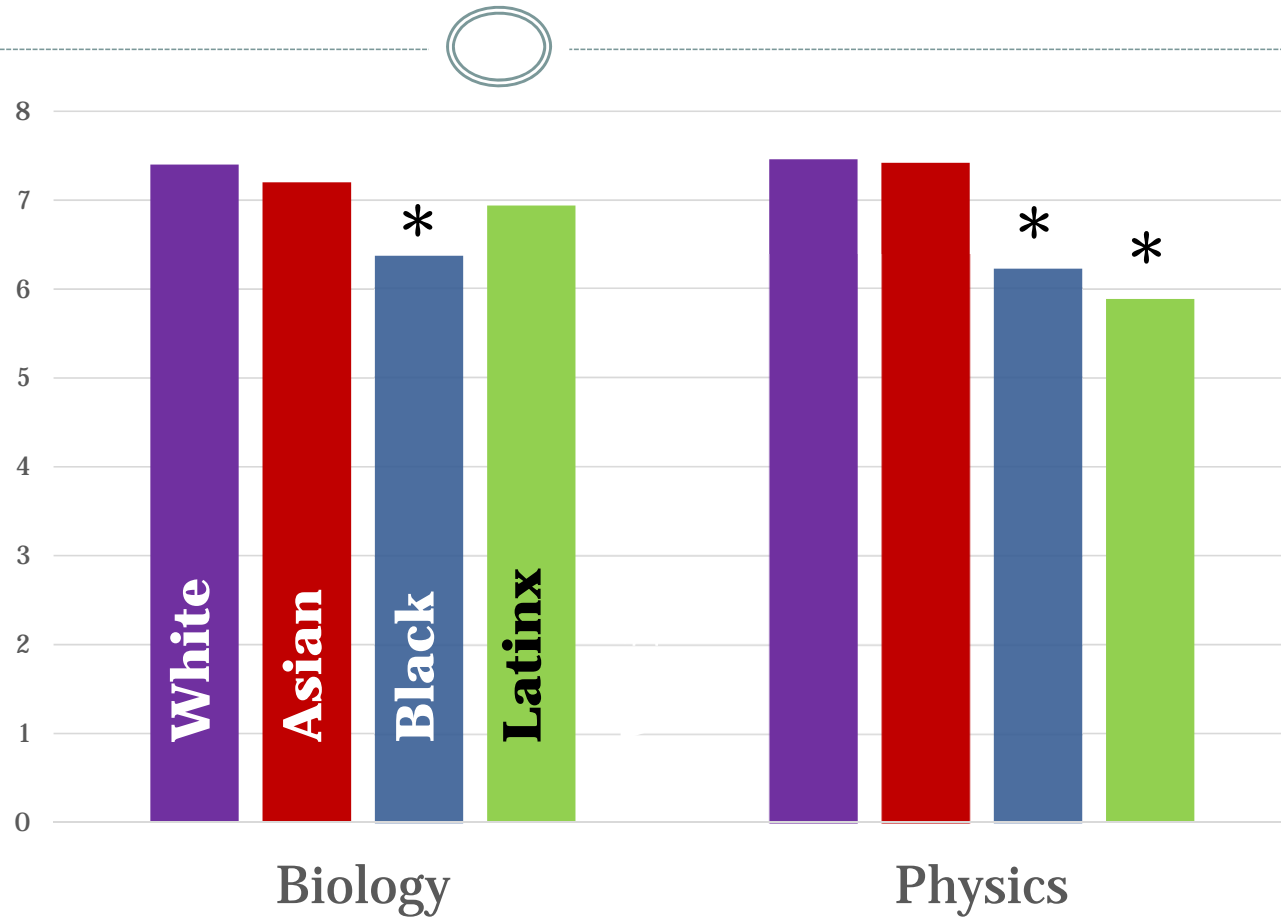




Assessing excellence: racial & gender bias



Competence



Assessing performance: racial bias



Subjects: Law partners (n = 60)

Given:

- **Identical** legal memos
- **22 deliberate errors**

Task:

- assess writing competence of young attorneys

Memo



Subsection 61(1) of the Act requires the Director to issue a receipt for a prospectus unless it appears to the Director that it is not in the public interest to do so. The Director has no choice with respect to the issue of a receipt pursuant to this subsection unless the Director comes to the determination that issuing the receipt would not be in the public interest. The issuer has the benefit of the doubt under where requirements of the not clear to the

Assessing performance: racial bias



Subjects: Law partners (n = 60)

Given:

- **Identical** legal memos
- **22 deliberate errors**

Task:

- assess writing competence of young attorneys

Name: Thomas Meyer

Seniority: 3rd Year Associate

Alma Mater: NYU Law School

Race/Ethnicity: African American

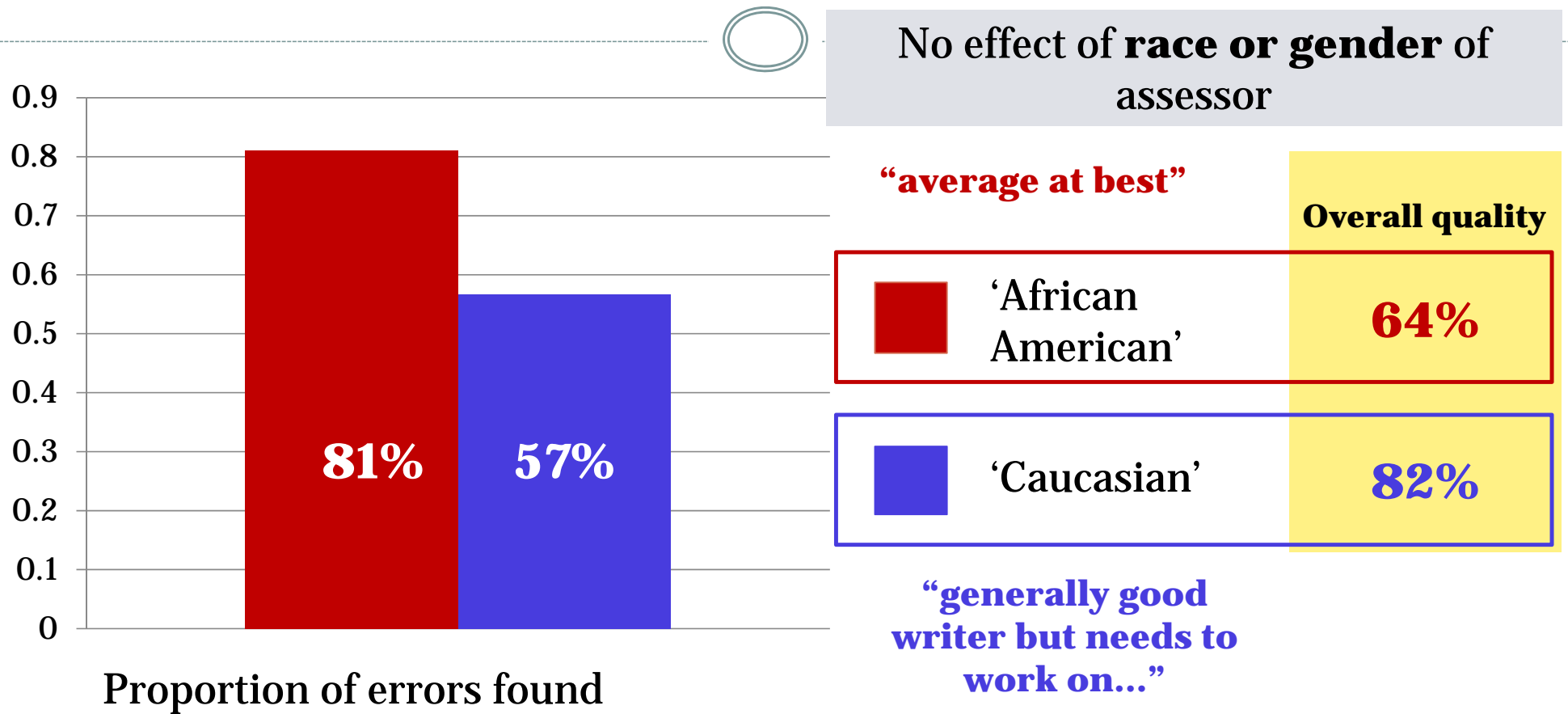
Name: Thomas Meyer

Seniority: 3rd Year Associate

Alma Mater: NYU Law School

Race/Ethnicity: Caucasian

Assessing performance: racial bias



Opportunities in academia: gender bias



1. Psychology professors

- Female reviewers: $n = 120$
- Male reviewers: $n = 118$

2. Male or female name, identical dossiers:

- Good record
- Exceptionally strong record



Evaluation Task:

- hire in tenure-track?
- grant tenure?

(Steinpreis et al 1999)

Opportunities in academia: gender bias

Good record:

	Craig	Karen
Offer tenure-track job	~45%	~29%

1999
Psychology, N = 338

No effect of gender
of reviewer

Exceptional record:

	Craig	Karen
Hire & Grant tenure?	~35%	~35%

BUT: 4x more likely to express reservations if the candidate was female

“I would need to see evidence that she had gotten these grants and publications on her own.”

Opportunities in academia: gender bias



Good record:

	Craig	Karen
Offer tenure-track job	~45%	~29%

1999
Psychology, N = 338

2015
Engineering, Biology
Psychology, Economics*
N = 363

Exceptional record:

	Craig	Karen
Hire & Grant tenure?	~35%	~35%

Hire?*

Opportunities in academia: gender bias



Good record:

	Craig	Karen
Offer tenure-track job	~45%	~29%

1999
Psychology, N = 338

2015
Engineering, Biology
Psychology, Economics*
N = 363

Exceptional record:

	Craig	Karen
Hire & Grant tenure?	~35%	~35%

Hire?*	32.7%	67.3%
--------	-------	-------

- BUT**
1. Exceptional records
 2. Excerpts from letters of recommendation
 - Career narratives
 3. Agentive/Communal vocabulary scrambled

Challenges to fair assessment: gender



Systematic biases in letters of recommendation & respectful forms of address

Descriptions of Men

- superlatives
- references to ability, outcomes, agentic traits
- references to meeting/exceeding performance objectives
- Longer letters
- Use their title

Descriptions of Women

- references to 'working hard'
- references to emotions, social effects, communal traits
- shorter/incomplete letters
- Use their first name
- negative language/ doubt-raisers: “..despite...”

Gender bias calculator: <https://www.tomforth.co.uk/genderbias/>

Trix & Psenka 2003; Dutt et al 2016; Schmader et al. (2008), Hebl et al 2018

Challenges to fair assessment: gender



Gendered/racialized use of doubt raisers

“...***although*** problems with permits resulted in ***relatively few*** publications, her results are ***high-impact***...”

-VS.-

“...he has ***overcome*** technical ***challenges*** to ***produce high-impact*** contributions...”

Trix & Psenka 2003; Dutt et al 2016; Schmader et al. (2008), Hebl et al 2018

Challenges to fair assessment: gender



Use of doubt raisers

- More common in recommendations written for women
- Even one doubt-raiser can decrease assessment of excellence in job candidates

Trix & Psenka 2003; Schmader et al. 2008, Dutt et al 2016; Hebl et al 2018

Opportunities in academia: racial & gender bias



Subject Line: Prospective Doctoral Student (On Campus Next Monday)

Dear Professor [surname of professor inserted here],

I am writing you because I am a prospective doctoral student with considerable interest in your research. My plan is to apply to doctoral programs this coming Fall, and I am eager to learn as much as I can about research opportunities in the meantime.

I will be on campus next Monday, and although I know it is short notice, I was wondering if you might have 10 minutes when you would be willing to meet with me to briefly talk about your work and any possible opportunities for me to get involved in your research.

Any time that would be convenient for you would be fine with me, as meeting with you is my first priority during this campus visit.

Thank you in advance for your consideration.

Sincerely



Opportunities in academia: racial & gender bias



Subject Line: Prospective Doctoral Student (On Campus Next Monday)

Dear Professor [surname of professor inserted here],

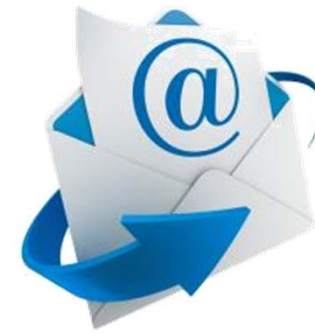
I am writing you because I am a prospective doctoral student with considerable interest in your research. My plan is to apply to doctoral programs this coming Fall, and I am eager to learn as much as I can about research opportunities in the meantime.

I will be on campus next Monday, and although I know it is short notice, I was wondering if you might have 10 minutes when you

would be willing to meet with me to any possible opportunities for me to

Any time that would be convenient for meeting with you is my first priority.

Thank you in advance for your consi

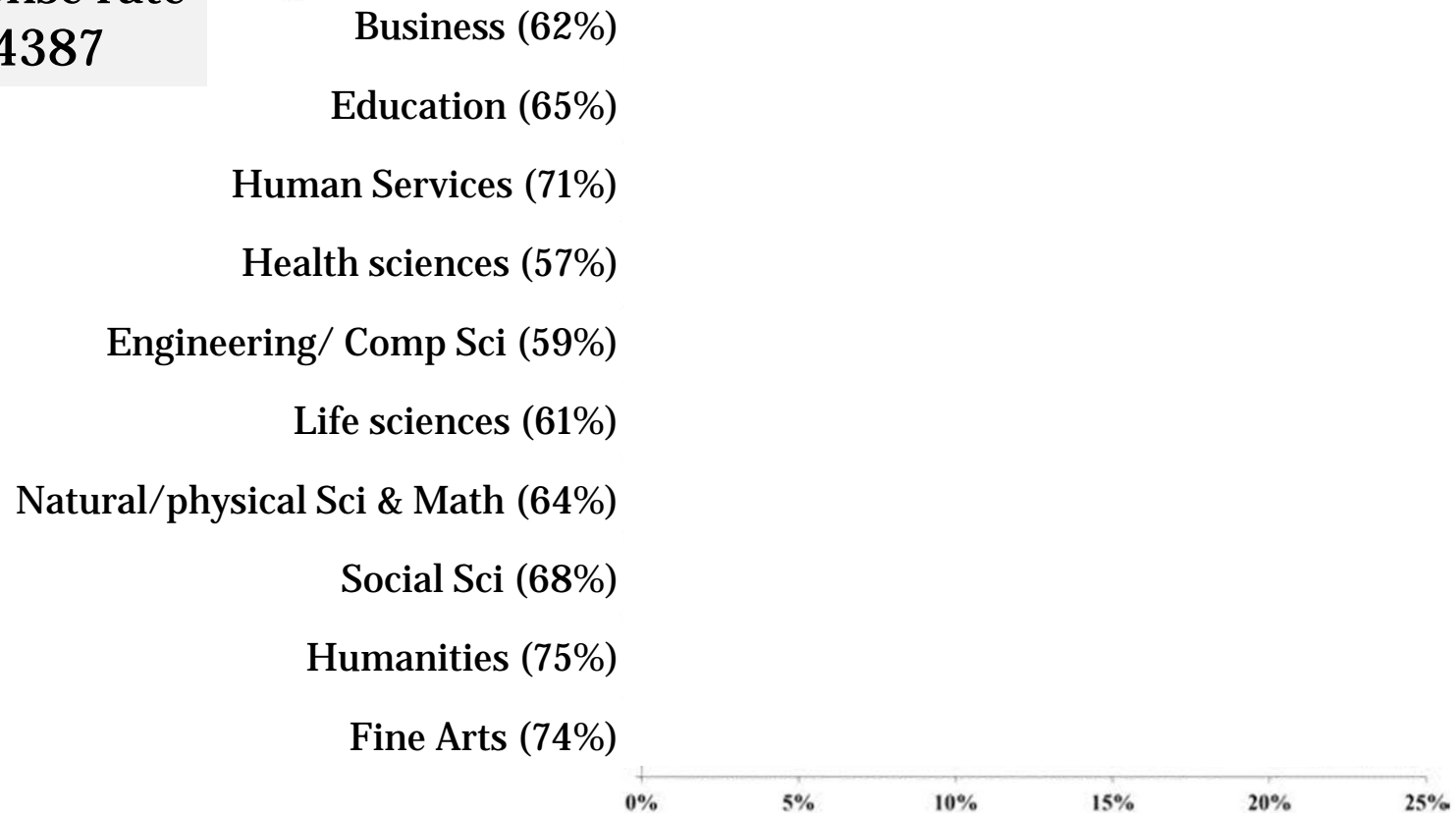


Race X Gender	White	Black	Hispanic	Chinese	South Asian
Male	<i>Brad</i>	<i>Lamar</i>	<i>Carlos</i>	<i>Dong</i>	<i>Deepak</i>
Female	<i>Claire</i>	<i>Keisha</i>	<i>Juanita</i>	<i>Mei</i>	<i>Indira</i>

Sincerely, **[Student's full name inserted here]**

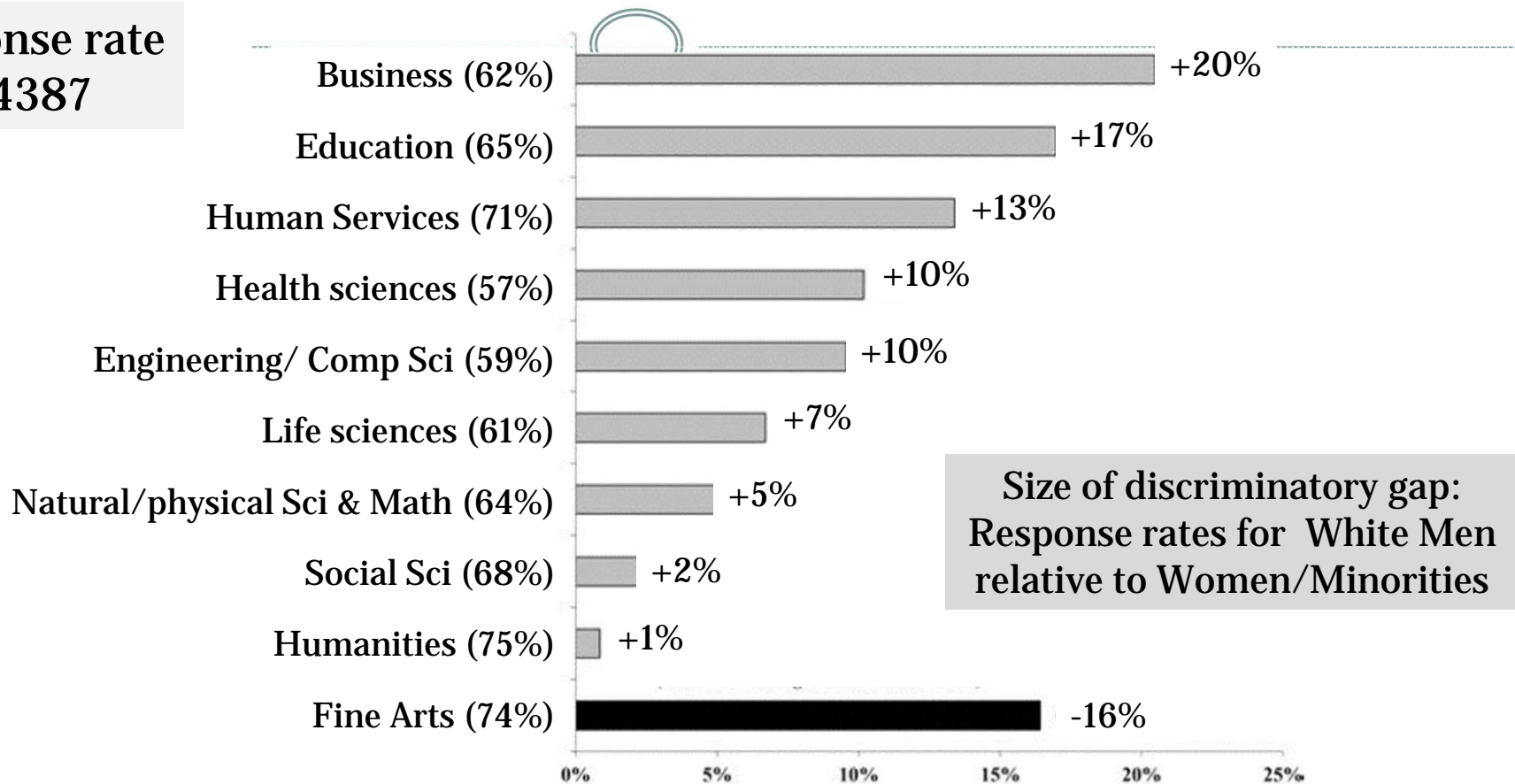


67% response rate
Total n = 4387



White males more likely to get a response in 9 of 10 disciplines

67% response rate
Total n = 4387



Milkman et al 2015

MCB Andrade 2016

Other studies: Bias & compromised assessment



- **Orchestra auditions & musical talent**
 - Golden & Rouse 2000
- **Assessment of leadership ability/qualities**
 - Geis et al 2006, Scott & Brown 2006, Rojahn & Willemsen, 1994
- **Reactions to leaders** Eagly et al 1995; Butler & Geis 1990
- **Paper acceptance rates** Tregenza 2002
- **Letters of recommendation** Trix & Psenka, 2003, Schmader et al 2008, Dutt et al 2016
- **Student evaluations of instructors** Basow 1998; McPherson et al 2009; Reid, 2010, MacNell et al 2014
- **Assessment of scientific competence**
 - Wenneras & Wold 1998; Steinpreis et al 1999, Moss-Racusin et al . 2012
- **Invitations to give plenary talks** Tower 2008
- **Nominations (& elections) to prestigious societies, (award) of prestigious prizes**
 - Lincoln et al , 2012; EOS editorial, Am.Geophysical Union, 2011
- **Assessment of leadership ability of black leaders (vs. whites)***
 - Rosette et al 2008; Knight et al 2003
- **Career mobility of black executives (vs. whites)**
 - Guest, 2016
- **Call-backs/job offers for black vs. white entry-level applicants**
 - Pager et al 2009, Oreopoulos & Dechief, 2012; Kang et al 2016
- **Assessment of pain, treatment & empathy for black patients (vs. whites)**
 - Berlinger et al 2016, Hoffman et al 2016, Chapman, Kaatz & Carnes, 2013
- **Attribution of success to talent/luck (black managers vs. whites)**
 - Greenhaus & Parasuraman 1993
- **Distinguishing armed or unarmed black civilians (vs. whites, hispanics, asians)***
 - Sadler, Correll, Park, & Judd, 2012

And many, many more...

Moving forward

- Kirwan Institute
- Google Re:Work
- Biasinterrupters.org
- Education Advisory Board
- Cook-Ross Diversity Best Practices
- Catalyst
- CRC Secretariat
- CIHR
- Proceedings of the Diversity and Inclusion Innovation Forum
- Can. J Physician Leadership, 2018, v.5 (2)
- The Lancet, 2019, v.393 (1071)



Moving forward: **The Leadership Challenge**



Many organizations have codified best-practice for minimizing effects of bias

Policy is only effective if:

Individuals understand underlying issues & value the goals

Everyone is responsible for equity

Leaders inspire & model a commitment to equity

Moving forward



- Diverse teams & review boards
- Equity targets & monitoring
- Clear Decision-making processes

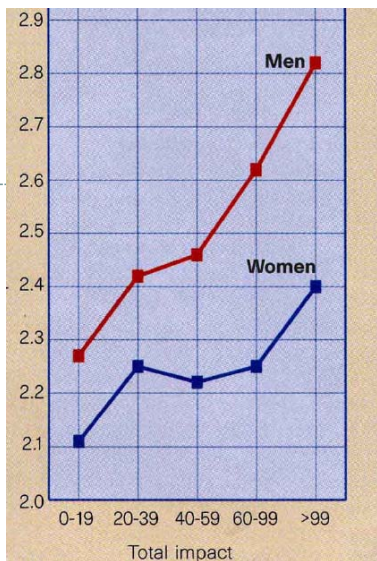
Structural

- Education about bias

- Source monitoring
- Recognize signs of bias
- Bias Interrupters:
 - Shift the conversation
 - Reflective decisions

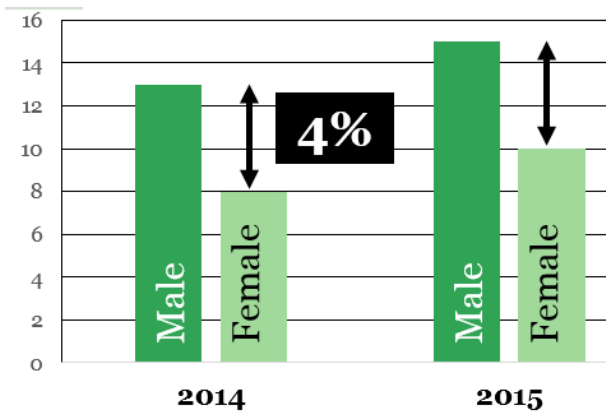
Personal

Moving forward: **Structural**



Institutional responses:

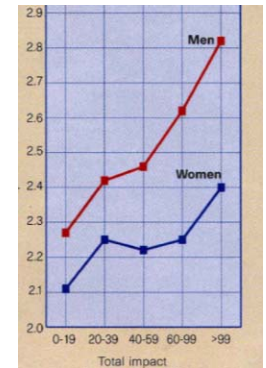
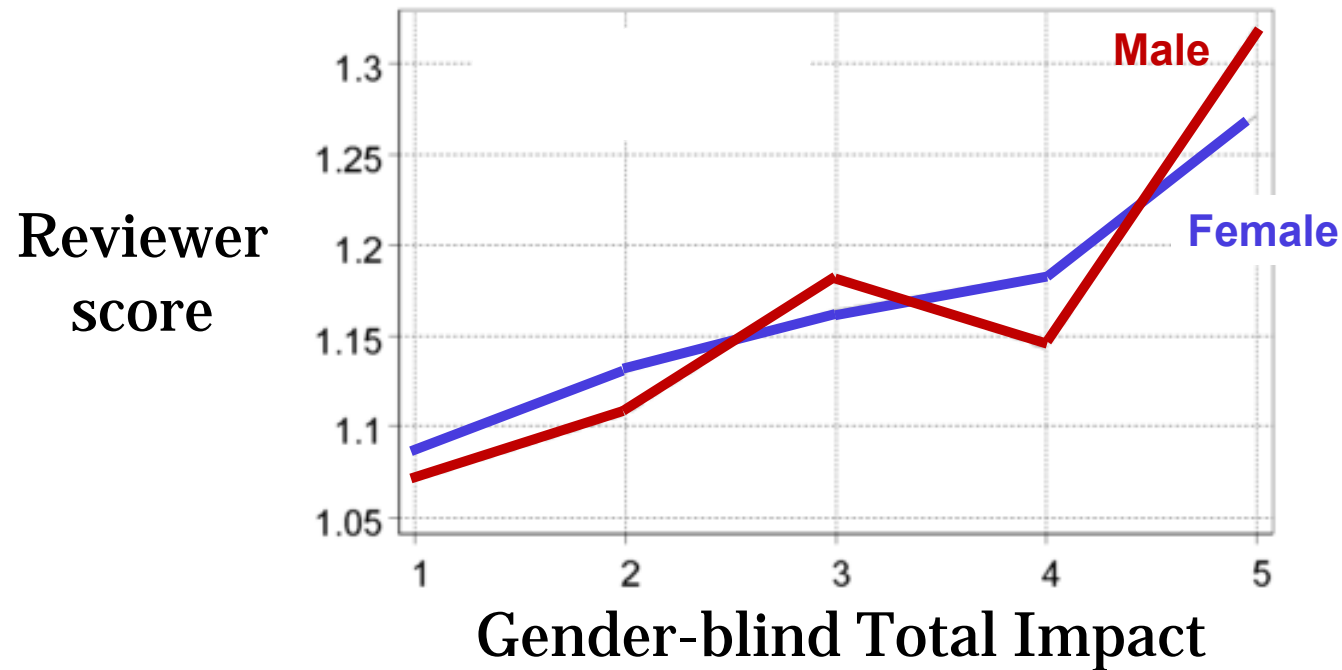
1. Equity of outcomes monitored
 - *Evaluated relative to **targets***
2. Diverse committees
3. Education about bias
4. Structured decision-making processes
- (5. Blind review)





Moving forward: **Structural**

Swedish Medical Research Council
Grant applications (**2004**)



11 years later

Is active attention necessary?

commentary

Nepotism and sexism in peer-review

In the first-ever analysis of peer-review scores for postdoctoral fellowship applications, the system is revealed as being riddled with prejudice. The policy of secrecy in evaluation must be abandoned.

Wenneras & Wold 1997

No Interventions



[Scientometrics](#)
February 2008, Volume 74, [Issue 2](#), pp 175–189

Persistent nepotism in peer-review

Authors [Authors and affiliations](#)

Ulf Sandström , Martin Hällsten

No Change

15% 'bonus'

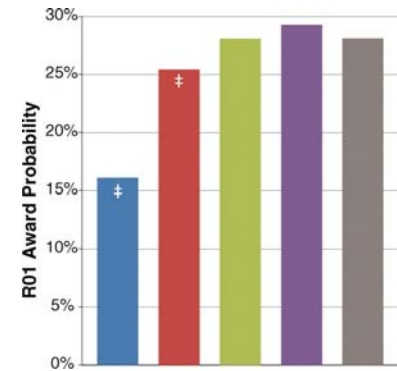
Sandstrom & Hallsten 2008



Is active attention necessary?



2015



Ginther et al 2011

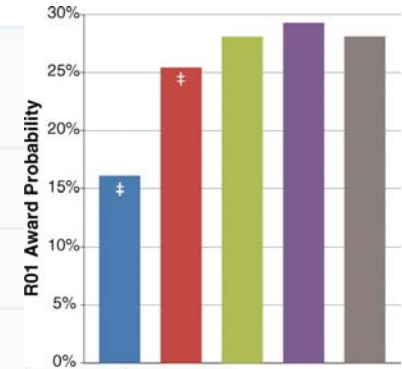
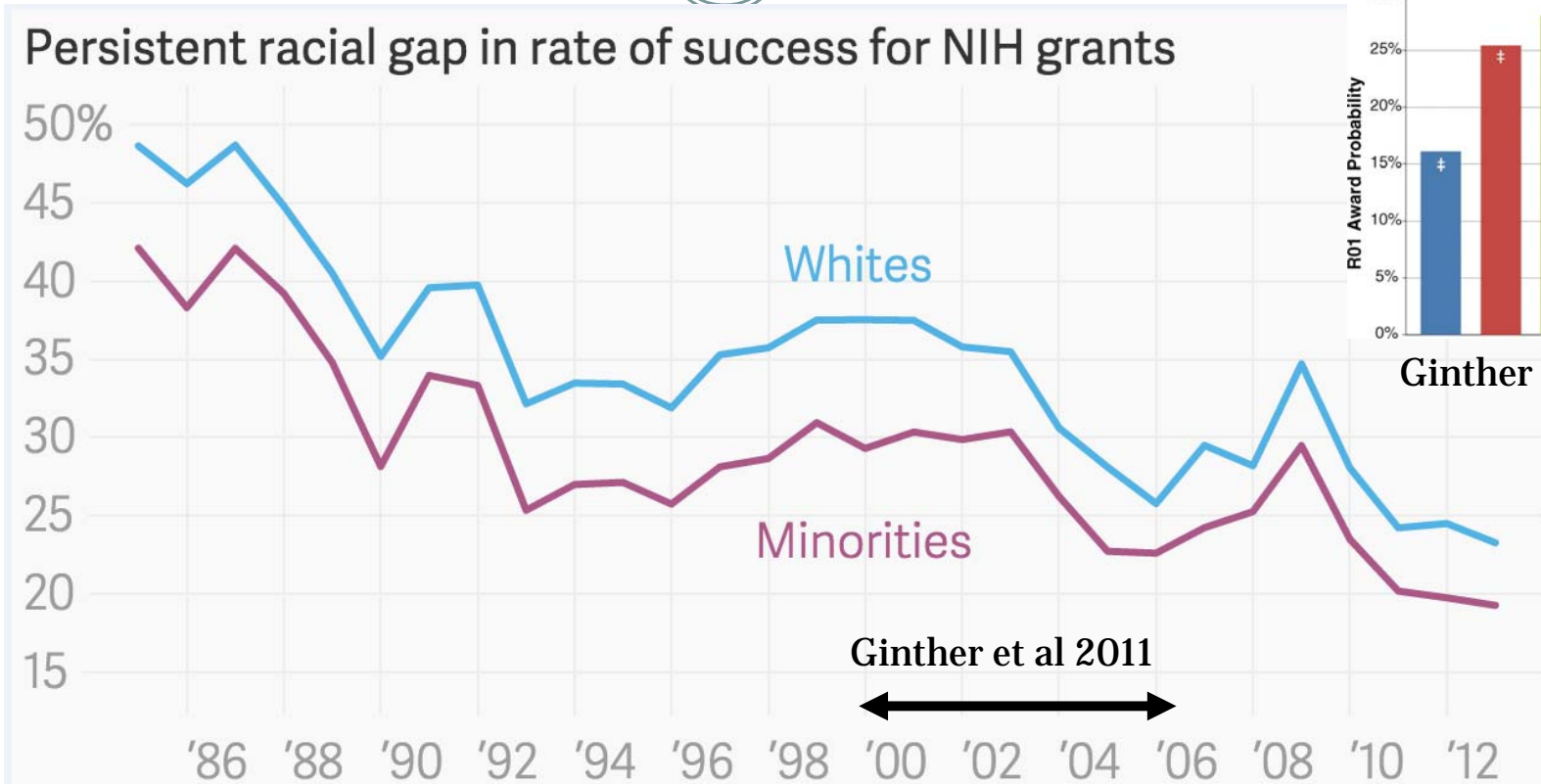


Is active attention necessary?



2015

nature



Ginther et al 2011

Ginther et al 2011
←→



Assessing excellence: gender bias



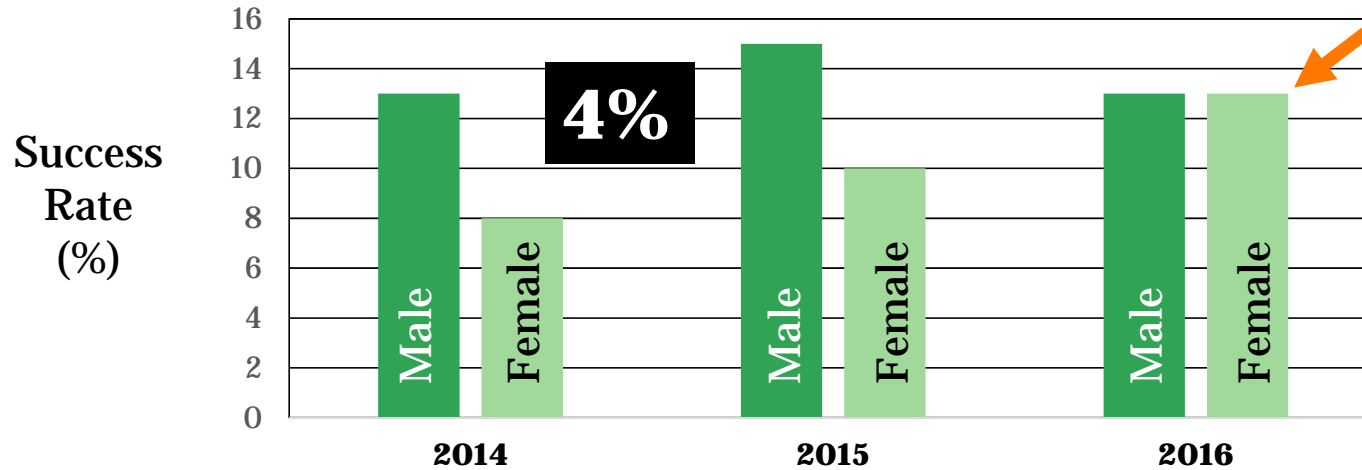
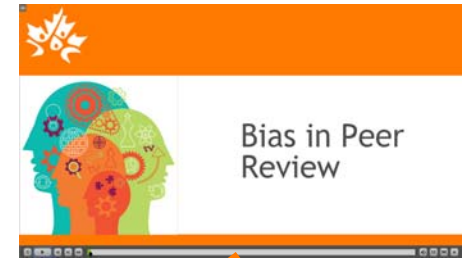
2014 - 2015

**Excellence of
Researcher**



2016

- 1. Targets
- 2. Unconscious bias Training Module



Moving forward



- Diverse teams & review boards
- Equity targets & monitoring
- Clear Decision-making processes

Structural

- Education about bias

- Recognize signs of bias
- Monitor Sources
- Bias Interrupters:
 - Shift the conversation
 - Reflective decisions

Personal

Structural & Personal: Education



Implicit association tests



implicit.harvard.edu/implicit



www.toronto-tide.ca



<https://academics.skidmore.edu/blogs/vids/>