# Welcome to:
# Mentoring Excellence and Diversity in Science

## Agenda

1. Lunch, Introductions, Meeting Goals
2. Challenges to career progression
   - Assessment & Bias
3. Aids to career progression
   - Education
   - Transparency
   - Mentorship

3. Discussion

4. Next steps

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# Mentoring Excellence and Diversity in Science

**Goals**

1. Informal mentorship
2. Assessment: How is UTSC/ Your department doing?
   - Identify issues that would benefit from discussion or action
   - Communicate these to the administration

# Perception of barriers to career progression

- June 2010
- 10,000 scientists with PhD invited to respond
- 1,301 qualified surveys completed
  - 57% women, 43% men
  - Women: 45 – 49 ; Men: 55 to 59
- Error: ±4.2% @ 95% confidence level

# Perception of barriers to career progression

- **Perception** of significant barriers:

| Challenge | Females | Males |
|---|---|---|
| Grants/funding | .....62% | 76% |
| Work-life Balance | .....61% | 48% |
| **Gender Bias** | ....52% | 2% |

# Just *perception?*

**TABLE B4-1 Speakers at 2004-2005 Scientific and Professional Society Meetings, by Sex**

| Conference (2004-2005) [d] | % of Invited Speakers Who Were Women | Total Number of Invited Speakers |
|---|---|---|
| American Association for Artificial Intelligence (AAAI) | 17 | 12 |
| American Chemical Society (ACS) | 18 | 174 |
| American Society for Cell Biology (ASCB) | 36 | 22 |
| American Society of Mechanical Engineers (ASME)[e] | 6 | 17 |
| International Conference on Computer Graphics and Interactive Techniques[f] | 17 | 78 |
| Oceanic Engineering Society Meeting[g] | 4 | 72 |
| Federation of Clinical Immunological Societies (FOCIS)[h] | 22 | 480 |
| Society for Neuroscience (SFN) | 9 | 11 |

SOURCES: www.aaai.org, www.acs.org, www.ascb.org, www.siggraph.org, www.ieee.org,www.focisnet.org, www.sfn.org.

Comparable data on gender differences in:

- nominations & elections to prestigious societies
- nominations & awards of prestigious prizes

Tower, 2008

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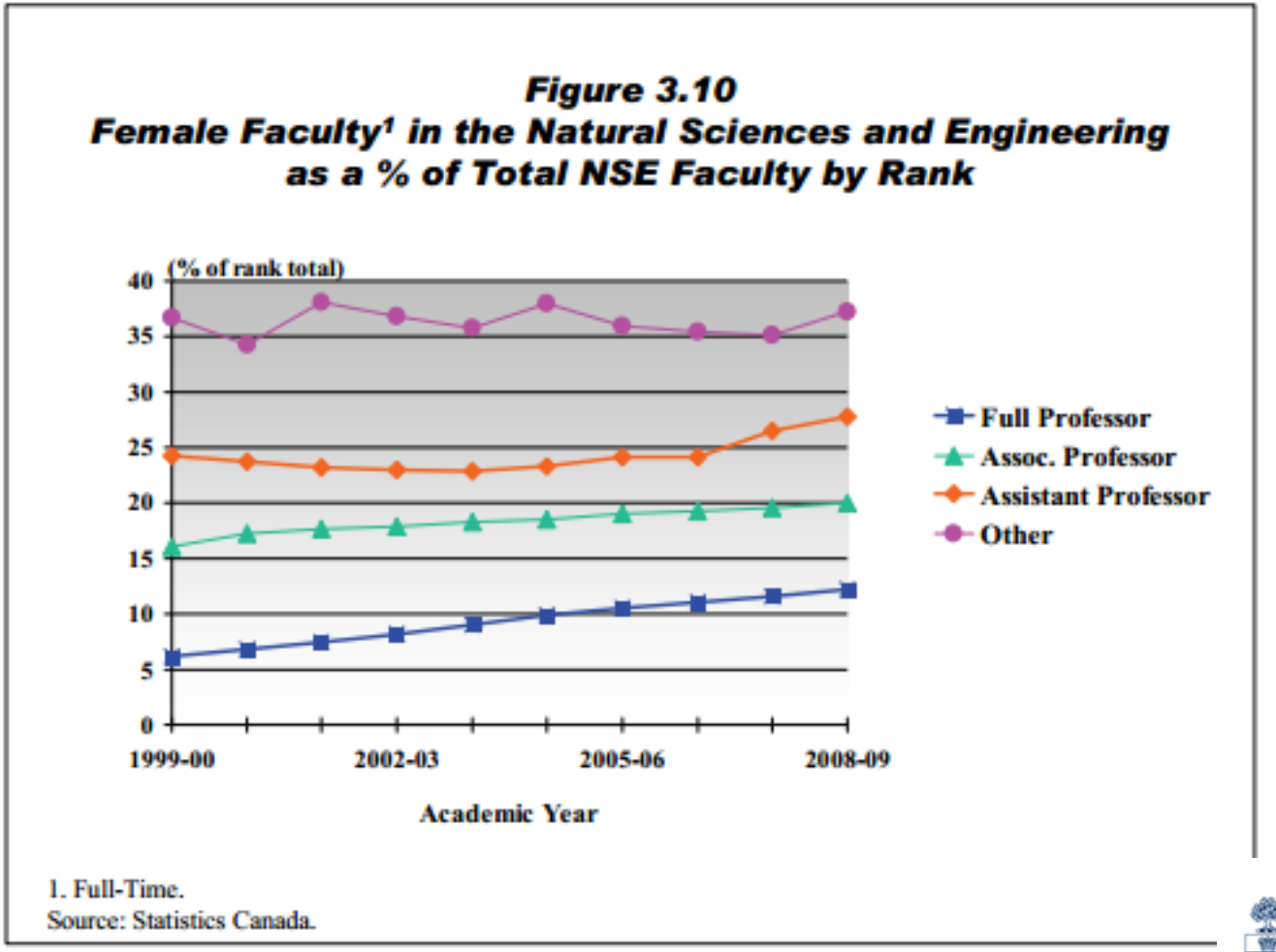
# Just *perception?*

## NSERC report: Women in Science & Engineering in Canada, 2010




http://www.nserc-crsng.gc.ca/_doc/Reports-Rapports/Women_Science_Engineering_e.pdf

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# Just *perception?*

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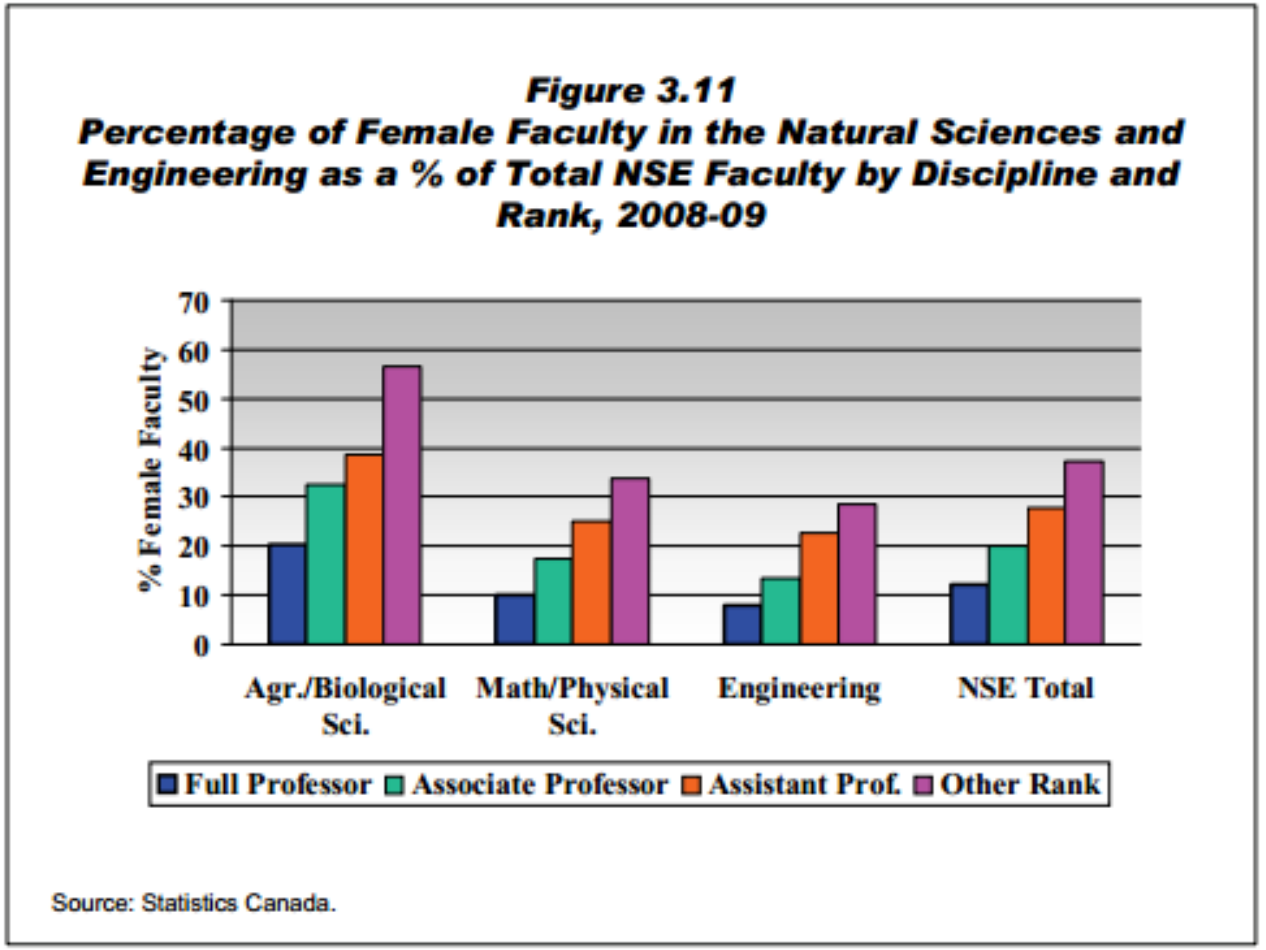


% of women in lecturer/instructor positions or not ranked:

Life Sciences:
**60%**

Physical & computer sciences, engineering, math:
**29.1%**

2008-2009

http://www.nserc-crsng.gc.ca/_doc/Reports-Rapports/Women_Science_Engineering_e.pdf

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# Just *perception?*

Strengthening Canada's Research Capacity: The Gender Dimension. Panel report 2012

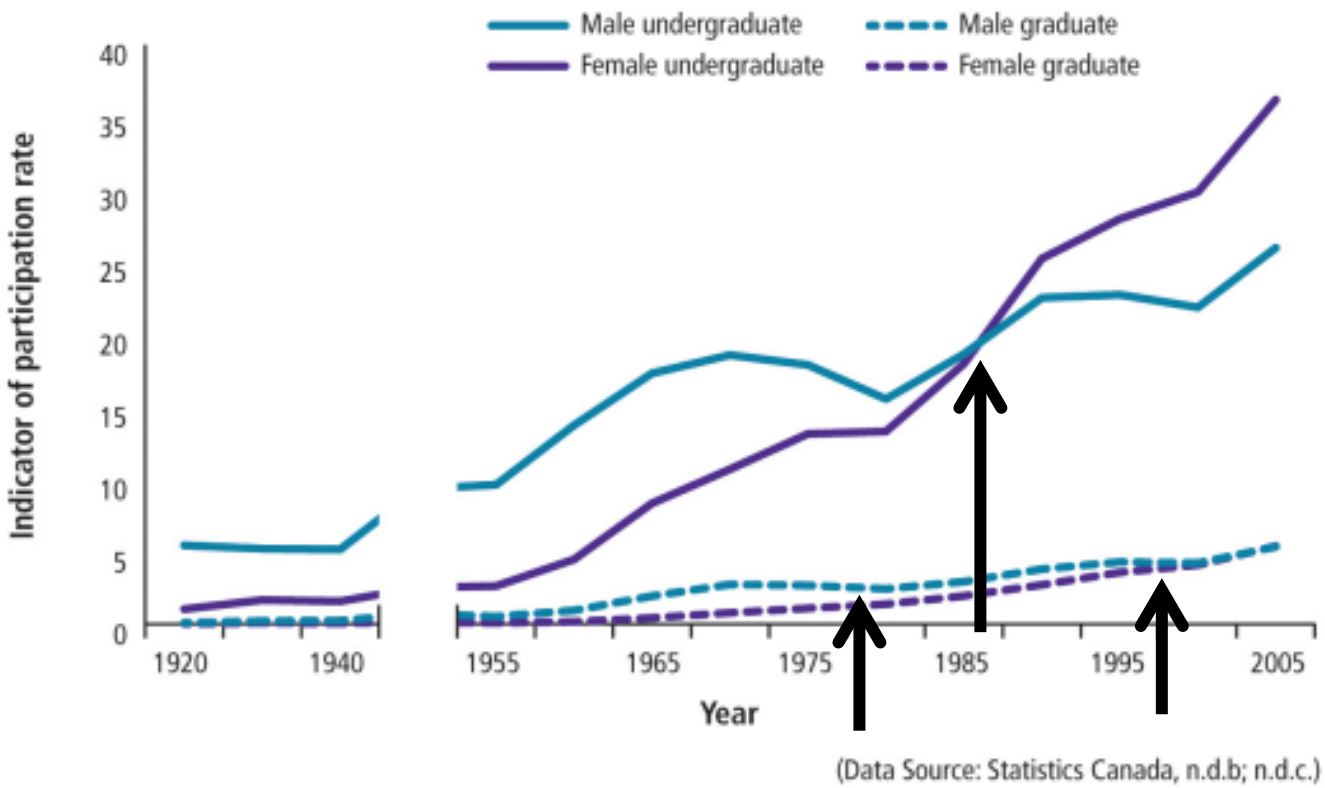


**Figure 1. Growth in University Enrolment since the 1920s**

*Expert panel on women in university research, Council of Canadian Academies*

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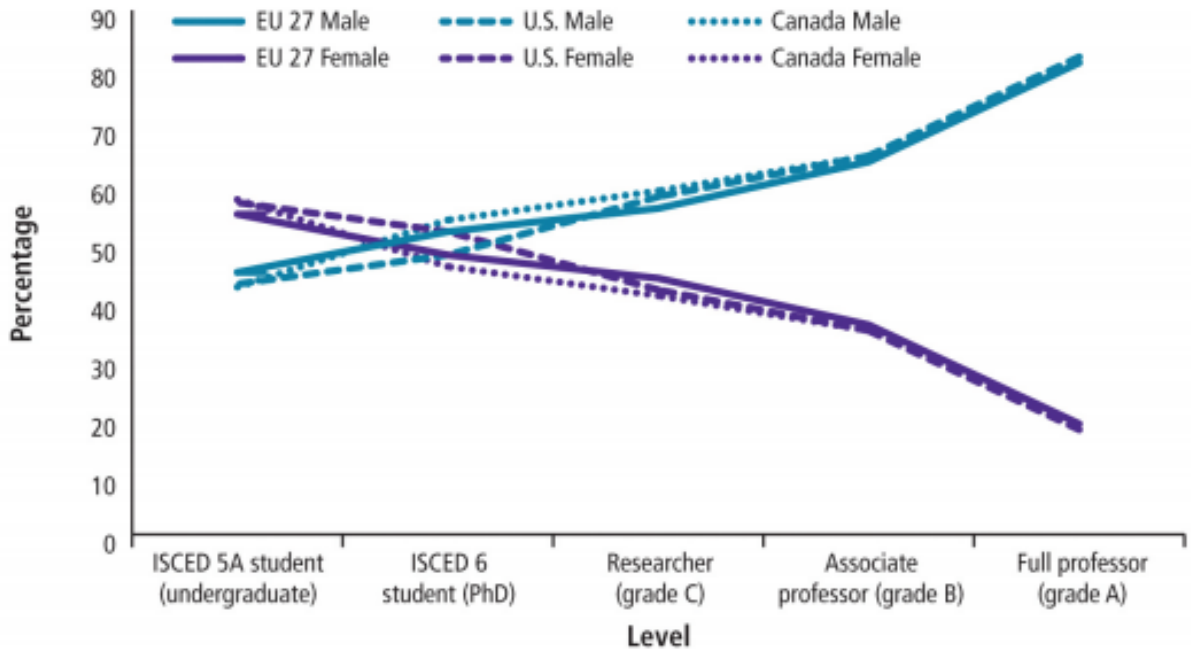
# Just *perception?*

## Strengthening Canada's Research Capacity: The Gender Dimension. Panel report 2012




(Data Source: European Commission, 2009; Statistics Canada n.d.b.; Cacace, 2009)

**Figure 3. Canada Compared to the EU and the U.S.: Similar Profiles**

This figure depicts the proportion of female and male students and academic staff in a typical academic career in Canada, the U.S., and the EU, 2007.

*Expert panel on women in university research, Council of Canadian Academies*

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# Just *perception?*

**Canada Research Chairs program**

CRC 2003 (first year).
**17% awarded to women**

- Settlement with Canadian Human Rights Commission over charge of discrimination

Canada Excellence Research Chairs 2008 (first year).
**0% (n=19) awarded to women**
**0% (n=36) of short-listed proposals**

- Strengthening Canada's Research Capacity: The Gender Dimension. Panel report 2012

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# Not just *perception*

## Who becomes a PI (principal investigator)?

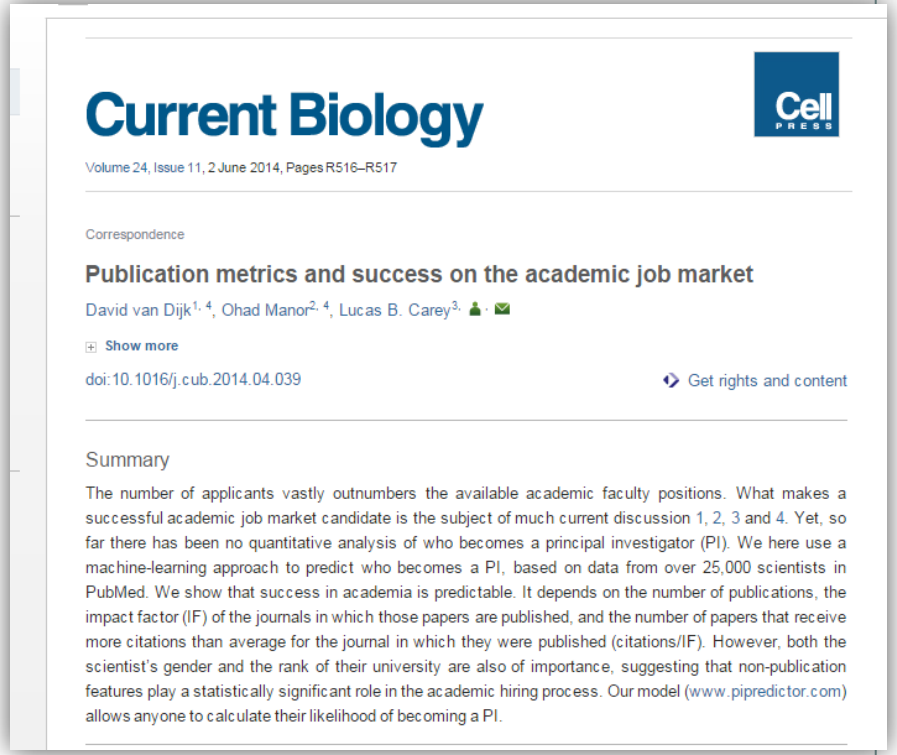
25,604 published scientists
1583 (6.2%) became PI's

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



Current Biology
Cell PRESS
Volume 24, Issue 11, 2 June 2014, Pages R516–R517

Correspondence

**Publication metrics and success on the academic job market**

David van Dijk[1, 4], Ohad Manor[2, 4], Lucas B. Carey[3]

Show more

doi:10.1016/j.cub.2014.04.039

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Summary

The number of applicants vastly outnumbers the available academic faculty positions. What makes a successful academic job market candidate is the subject of much current discussion 1, 2, 3 and 4. Yet, so far there has been no quantitative analysis of who becomes a principal investigator (PI). We here use a machine-learning approach to predict who becomes a PI, based on data from over 25,000 scientists in PubMed. We show that success in academia is predictable. It depends on the number of publications, the impact factor (IF) of the journals in which those papers are published, and the number of papers that receive more citations than average for the journal in which they were published (citations/IF). However, both the scientist's gender and the rank of their university are also of importance, suggesting that non-publication features play a statistically significant role in the academic hiring process. Our model (www.pipredictor.com) allows anyone to calculate their likelihood of becoming a PI.

Van Dijk et al 2014. Current Biology

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# Not just *perception*

## Who becomes a PI?

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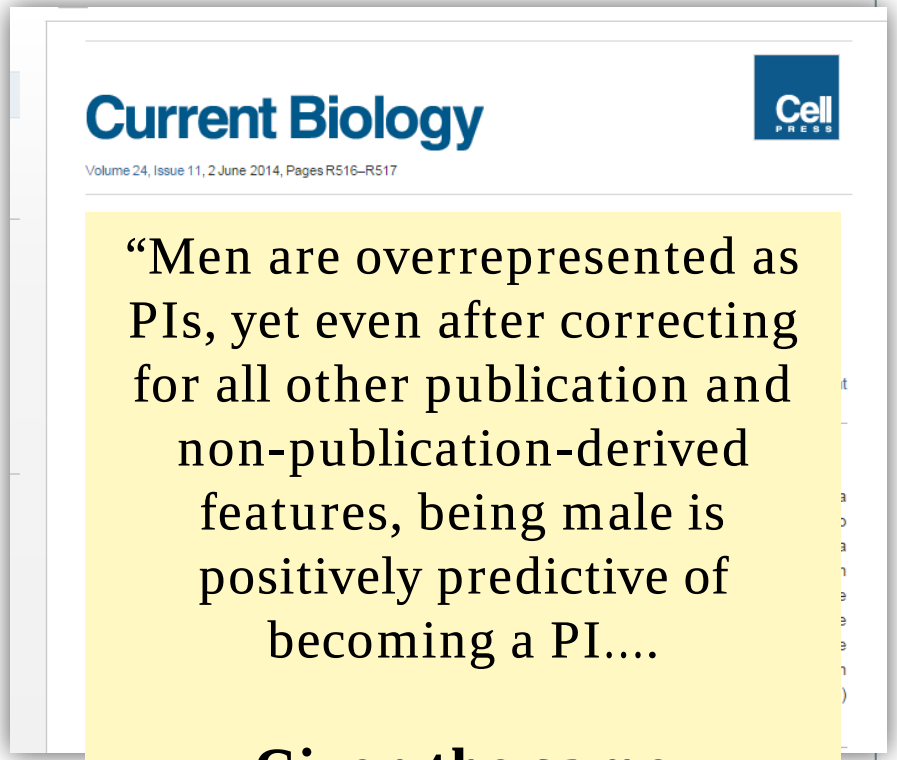


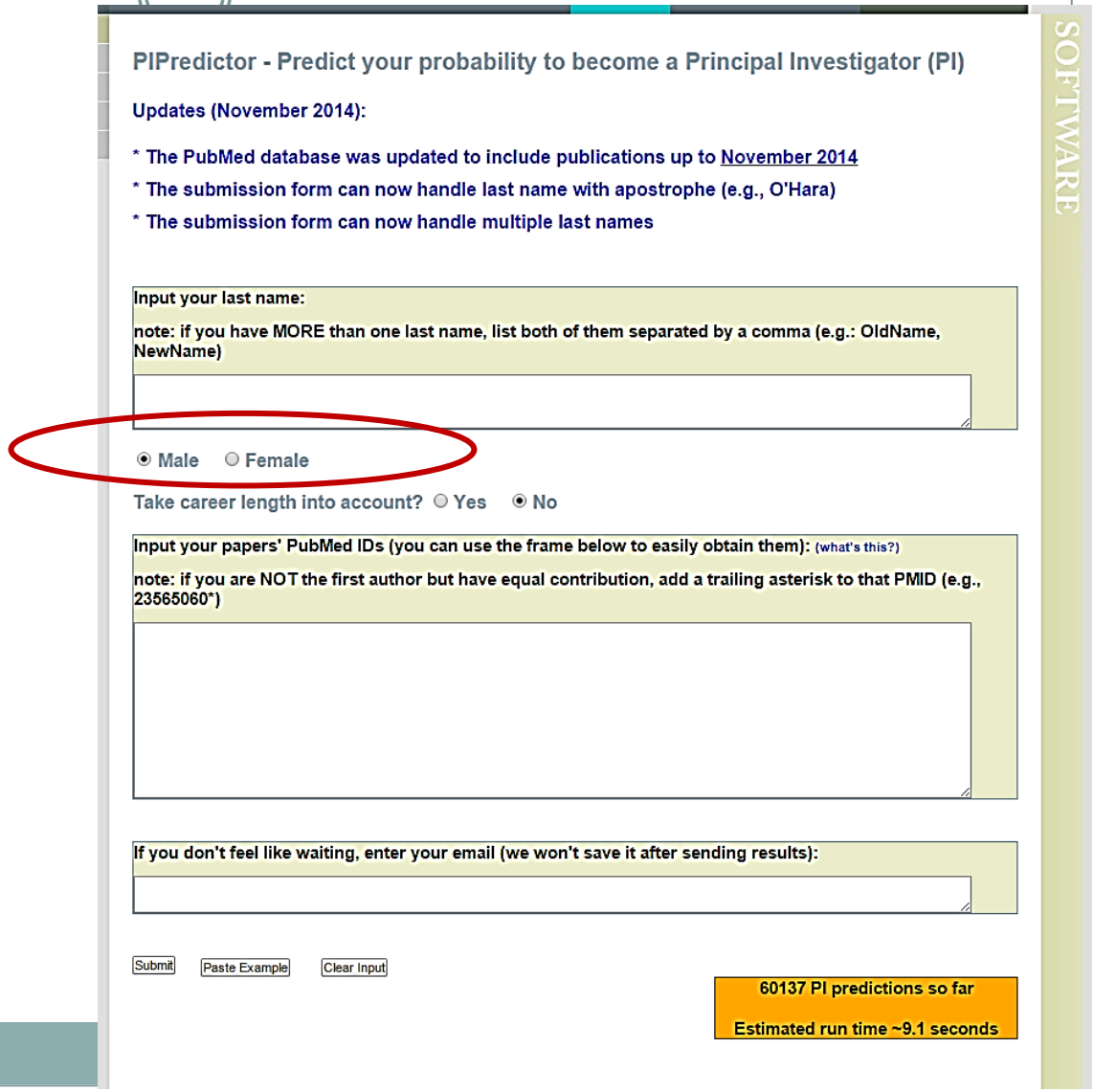

"Men are overrepresented as PIs, yet even after correcting for all other publication and non-publication-derived features, being male is positively predictive of becoming a PI....

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

Van Dijk et al 2014. Current Biology

# Not just *perception*

www.pipredictor.com




Van Dijk et al 2014. Current Biology

# Career challenges & schema

- **Schema:** categorical assessments of individuals and relationships between individuals
- **Shape *expectations* & *evaluations***
- **Can lead to unconscious or *implicit*, rather than overt bias**

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Gender, race, ethnicity, sexual orientation, age, rank....

# Unconscious bias

***BIAS** –evaluation of one group and its members relative to another

Expressed directly: "I like whites more than blacks."

Explicit/ Conscious = Person is aware of his/her evaluation

Expressed indirectly: Sitting further away from an black person than a white person

**Implicit/Unconscious** = Person doesn't perceive or endorse evaluation

*modified from T De Mello

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# Career challenges & Gender: Gender schema

## Assessment & Granting success

- Swedish Medical Research Council
- Post-doctoral fellowship competition (1995)
- Five reviewers (male & female) score each applicant on:
    - Scientific competence
    - Relevance of research
    - Quality of methodology

Wennerås & Wold. 1997. Nature

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# Career challenges & Gender: Gender schema

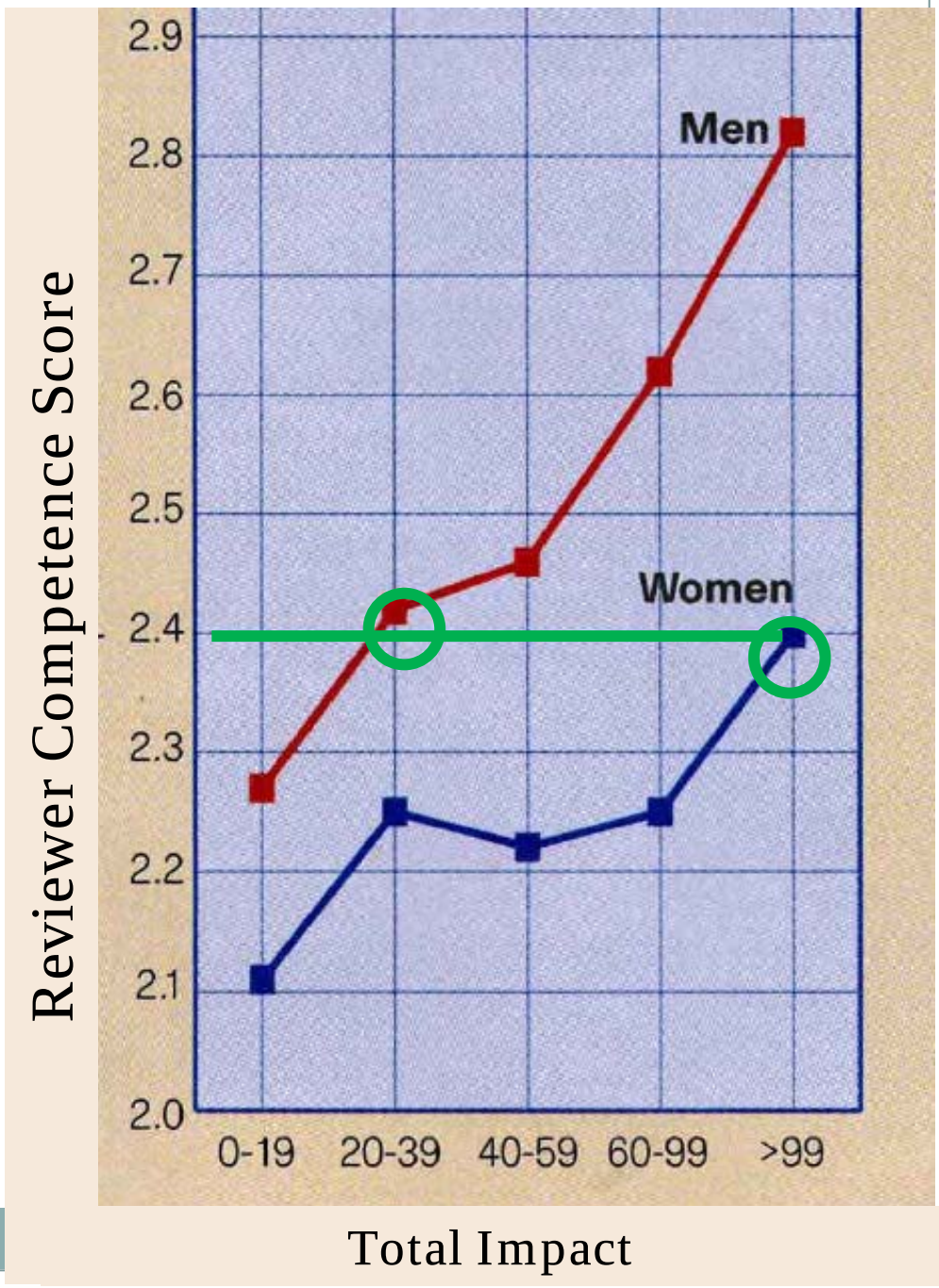
## Assessment & Granting success

- Women = lower ratings across all categories
- Fellowships granted:
  - 8% of female applicants
  - 24% of male applicants

- Largest gender differential on ‘scientific competence’
  - Did women publish fewer, or lower impact papers?

Wennerås & Wold. 1997. Nature

“ ...a female applicant had to be **2.5 times more productive** than the average male applicant to receive the same competence score ...”




Wennerås & Wold. 1997. Nature

# Unconscious bias

Comparable data on gender bias (by both male & female assessors):

- Assessment of competence & salary (Moss-Racusin et al . 2012)
- Assessment of leadership ability (Geis et al 2006)
- Letters of recommendation (Trix & Psenka, 2003)

# Unconscious bias

**‘Damning with faint praise’**

e.g., letters of recommendation, performance evaluations (from men and from women)

- Men are more often described with:
  - superlatives
  - references to ability
  - references to meeting/exceeding performance objectives

- Women are more often described:
  - as ‘working hard’
  - with negative language: “..despite...”

  - *Schmader et al.* (2008), *Trix & Psenka* (2003)

*modified from T De Mello

# Unconscious bias

## Examples of Gendered Evaluations

1. Using first names for women or minority faculty and titles for men
    - "Joan was an asset to our department."
    - –vs.- "Dr. Smith was an asset to our department."

2. Gendered adjectives
    - "Dr. Sarah Gray is a caring, compassionate physician"
    - –vs.– Dr. Joel Gray has been very successful with his patients"

3. Doubt raisers or negative language
    - "…although her publications are not numerous"
    - or "while not the best student I have had, she…"

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# Unconscious bias

Comparable data on gender bias (by both male & female assessors):

- Assessment of competence & salary (Moss-Racusin et al . 2012)
- Assessment of leadership ability (Geis et al 2006)
- Letters of recommendation (Trix & Psenka, 2003)
- Who becomes a PI (van Dijk et al 2014)
- Differences in paper acceptance rates by gender of first author (Tregenza 2002)
- Tenure review* (Spelke & Grace 2007) *70 vs 45%*
- Student evaluations of instructors (Basow 1998; McPherson et al 2009; Reid, 2010)

# Unconscious bias & student evaluations

Wright et al 2012

Data: 7 consecutive semesters
11 major departments in Engineering
3938 courses, 137,431 students

- Male instructors received higher student evaluations on average
- ($p = 0.01$)

- Gender differential was significant in lower level, but not upper-level courses.

- Student evaluations higher in smaller classes (not analyzed by gender)

*Texas A & M*

Johnson et al. 2013. J.Engineering Education

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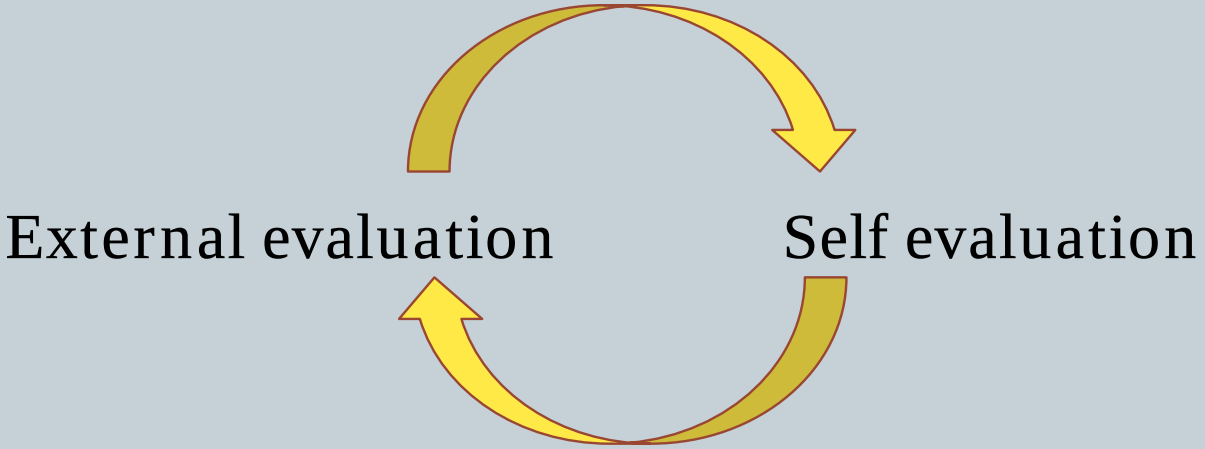
# Career challenges & schema: Imposter syndrome/phenomenon

- **Success is attributed to luck, not ability**
- **Convinced of own incompetence**




Clance & Imes, 1978. Psychotherapy; Clance & O'Toole, 1998. Women & Therapy

# Moving forward?

Policy & Behaviour

**CREDIT WHERE IT IS DUE**

**EDUCATION ABOUT BIAS**

**TRANSPARENCY**

Tools

**MENTORSHIP**

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# Moving forward: **Credit where it is due**

Endorsement of competence & talent can shift biased evaluations by an audience

•Brown & Geis 1984. J. Pers. Social Psych.
•Geis et al 2006. J. Appl. Social Psych

- Best practice for introducing job candidates?
- Departmental acknowledgement of significant contributions? (internal & external)
- Acknowledgement of origin of departmental initiatives (verbal & in final documents)

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# Moving forward: **(self) education**

- Does the imposter phenomenon affect you?
  - http://paulineroseclance.com/impostor_phenomenon.html

# Moving forward: **education**

Recognition of an unconscious bias can lead to behavioural compensation.

Green et al 2007. J GIM

## Recognize unconscious biases: Implicit Association Tests ?


https://implicit.harvard.edu/implicit/

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# Moving forward: **transparency**

**Consider Departmental policies:**

- Clear, systematic processes for evaluation & feedback
- Clear guidelines on discipline-specific standards for promotion
- Written guidance following formal promotion committee meetings
- Published service/committee membership
- Rotating membership on PTR committees

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# Moving forward: **mentorship**

## If in doubt: ask

- Update your understanding
- You are *entitled* to information
- Collegial norms
- Pathways to resource / space acquisition

## Be strategic (e.g., service)

- Consider your own goals
- Consider fair workloads

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