

Perspectives from a Woman in Science

Kathryn V Johnston
Columbia University Astronomy

Starting Points

- Women and other minorities are equally capable as current faculty (see Spelke 2005 review in *American Psychologist*).
- Diversity strengthens innovation (e.g. Phillips in *Scientific American*, October 2014).
- Both men and women equally biased.
- Why not 50% women?
 - barriers in the system
 - leaky pipeline: women “choose” to leave

Starting Points

- Data: % women at each stage from survey of “top 100” US departments by Donna Nelson released in November 2007

Department	% BS (2005)	% PhD (96-05)	% assist profs	% all profs
Chemistry	51.7	32.4	21.2	13.7
Math	44.9	28.7	26.8	12.9
Physics	21.1	14.3	16.8	9.1
Astronomy	42.4	22.7	25.3	15.8

Why do I care?

- BA in math, Cambridge University
 - ~30% women in math at my college
- PhD in Astronomy and Astrophysics from UCSC
 - ~30% women in the program
- Postdoc at the Institute for Advanced Study
 - ~15% women members in astronomy

Stereotype Threat

Minorities are conscious of (and anxious about):

(i) their minority status;

(ii) stereotypes of that minority;

(iii) need to overcome that stereotype;

(iv) need to combat it as a member of the minority

- **Academic tests and African Americans** (Steele & Aaronson, 1995)
- **Math tests and women** (Shih, Pittinsky & Ambady, 1999)

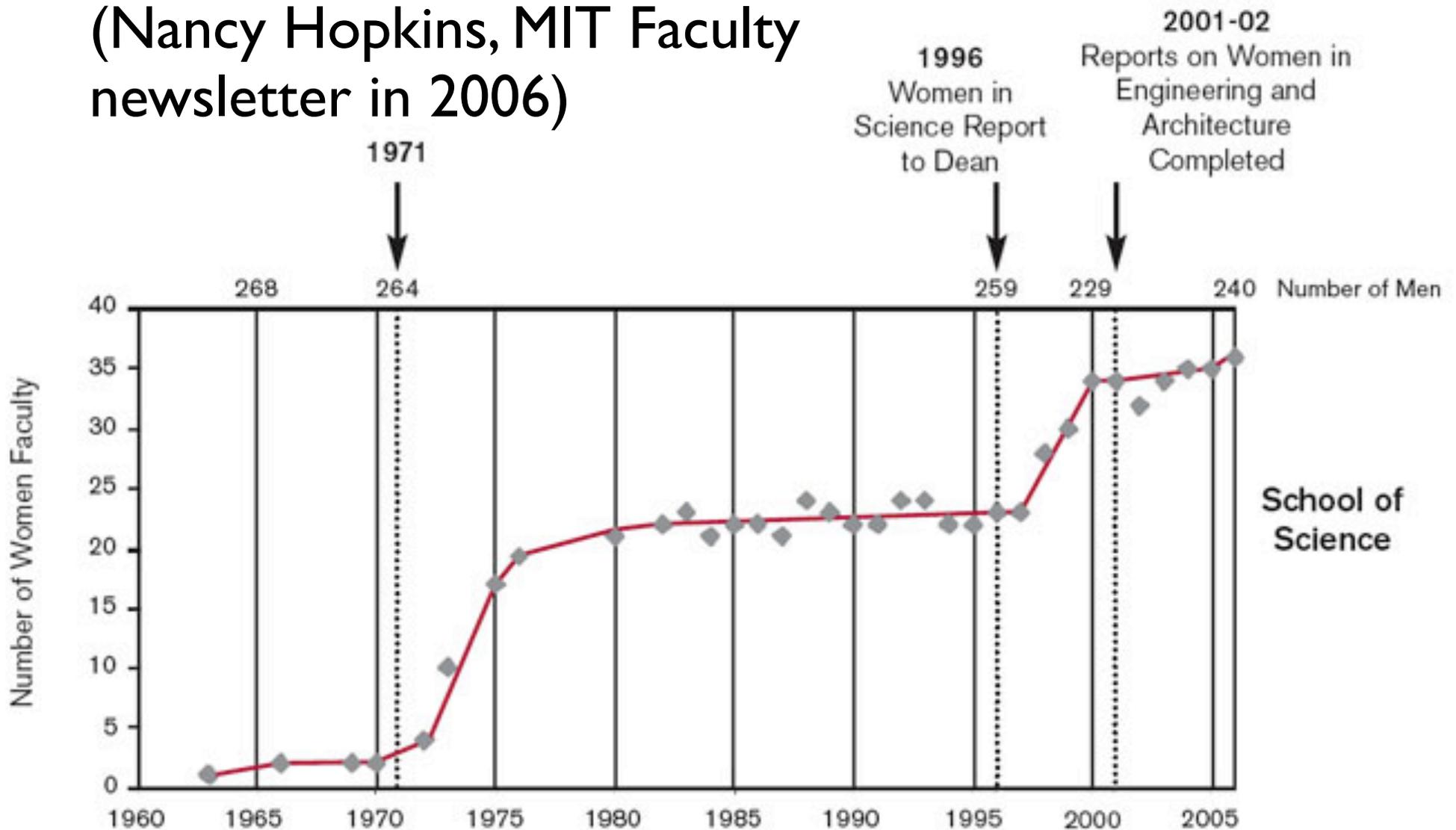
➡ **15% gap in women/men's Physics GRE scores?**

Why do I care?

- BA in math, Cambridge University
 - ~30% women in math at my college
- PhD in Astronomy and Astrophysics from UCSC
 - ~30% women in the program
- Postdoc at the Institute for Advanced Study
 - ~15% women members in astronomy
- Assistant professor at Wesleyan University
 - ~50% women scientists assist prof in 2001
 - **19 faculty hires in science 2002-2006, 0 women**

Why do I care?

- Similar pattern seen at MIT (Nancy Hopkins, MIT Faculty newsletter in 2006)



Unconscious Bias

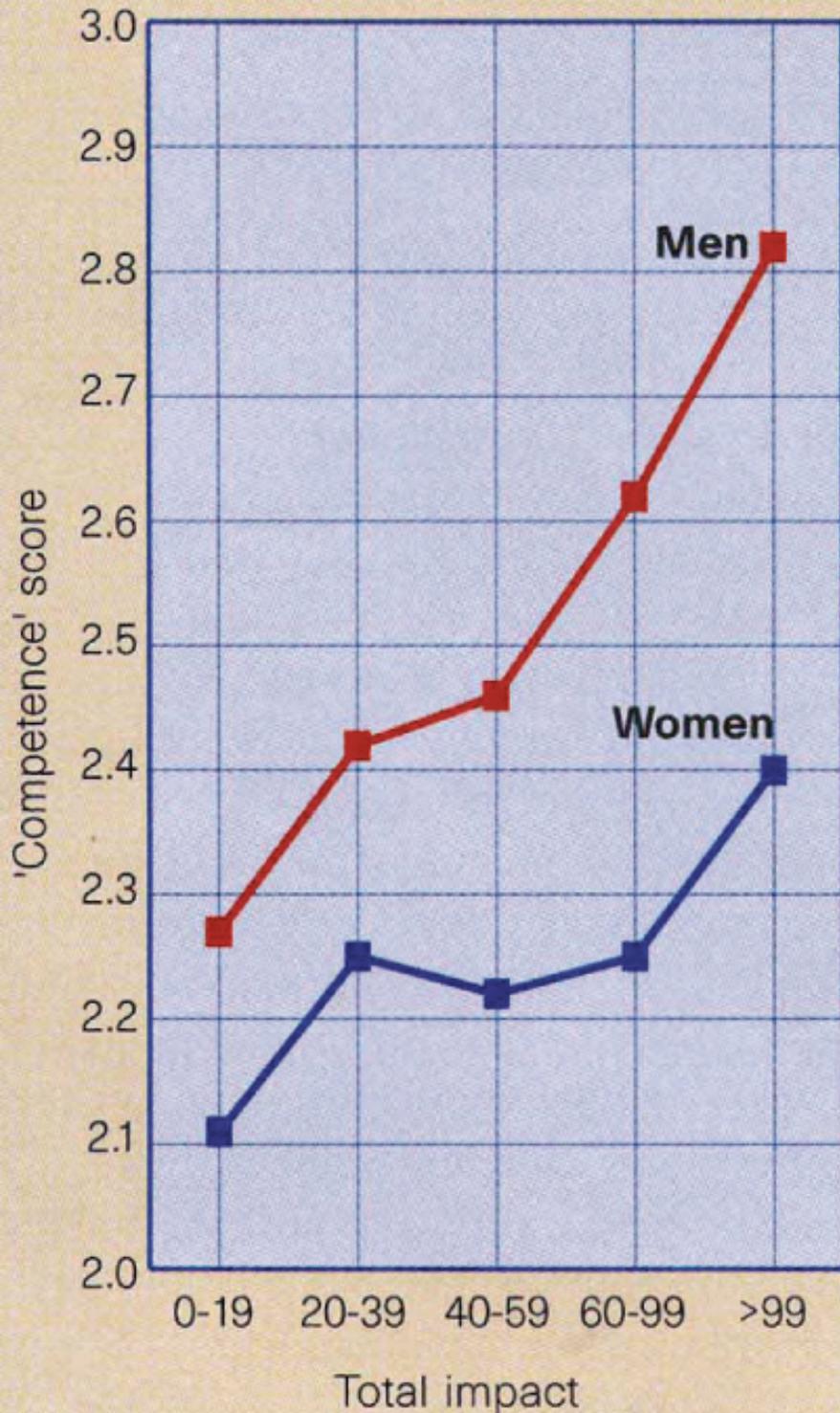
- Ben Barres, transgendered scientist, in 2006 Nature article “Does Gender Matter?”:

Shortly after I changed sex, a faculty member was heard to say "Ben Barres gave a great seminar today, but then his work is much better than his sister's."

Unconscious Bias

- Weneras & Wold (1997) commentary in Nature:
- prestigious postdocs awarded in 1995 by the Swedish Medical Research council
 - 52/62 female/male applicants - 4/16 female/male awards
 - applications peer-reviewed, score (0-4) in 3 categories
 - women score lower than men, particularly for “scientific competence”
- W&W objectively evaluated a scientist’s “impact”:
 - score: number of publication; number of 1st author publications; citations; prestige of journal

Unconscious Bias



- Only the group of women with impact scores greater than 100 were peer-reviewed to be as competent as any of the groups of men
- Note: no error bars on plot BUT differences must be significant otherwise you would have 50/50 success rate

➔ question your own and others evaluation of any scientist's "competence"

Unconscious Bias

e.g. Biases in....

- evaluation of performance (Deaux & Emswiller, 1974, Martell, 1991, Goldin & Rouse, 2000)
- recommendation letters (Trix & Psenka, 2003)
- peer review of journal papers (Budden et al 2008)
- assessment of resumes (Heilman, 1980; Steinpreis, Anders & Ritzke, 1999)

ALL STUDIES FIND THAT BOTH MEN AND WOMEN ARE EQUALLY BIASED

Why do I care?

- BA in math, Cambridge University
 - ~30% women in math at my college
- PhD in Astronomy and Astrophysics from UCSC
 - ~30% women in the program
- Postdoc at the Institute for Advanced Study
 - ~15% women members in astronomy
- Assistant professor at Wesleyan University
 - ~50% women scientists assist prof in 2001
 - 19 faculty hires in science 2002-2006, 0 women
 - motherhood

Why do I care?

- Goldin & Katz (2008) surveyed
 - all Harvard/Radcliffe grads 1969-1972, 1979-1982, 1989-1992
 - ~7000 responded, ~20% PhD's
- % women full-time employed 15 years on?

women	no children	1 child	2+ children
1970	83.5	54.2	46.4
1980	80.6	62.4	47.3
1990	78.8	62.7	41.4
PhDs	91.5	64.9	57.5

Social Pressure

FIGURE 8

Percent of University of California postdoctoral scholars who shifted away from professor with research emphasis as a career goal, broken down by gender and family status/future plans

The issue of children is a dramatic influence on women's decisions to abandon professorial career goals with a research emphasis

No children, no future plans

19%

20%

■ Men ■ Women

No children, future plans to have children

17%

28%

Children previous to postdoc

19%

32%

New children since postdoc

20%

41%

Source: Goulden, Marc, Karie Frasch, and Mary Ann Mason. 2008. "UC Postdoctoral Scholar Career and Life Survey." (<http://ucfamilyedge.berkeley.edu/UC%20Postdoctoral%20Survey.html>).

My personal plan

Combat biases:

- Make the case for diversity
- Maintain awareness - give this talk!
- On any admissions/search committee
 - question letter-writers' assessment
 - watch my own reactions

Patch the pipeline:

- support development programs (e.g. Columbia's "postbac" program in sciences)
- more realistic work/life plans within academic careers

Useful References

- Committee on the Status of Women in Physics, "Best Practices for Recruiting and Retaining Women in Physics" Report of the CSWP of the American Physical Society (2004); <http://www.aps.org/educ/cswp/loader.cfm?url=/commonspot/security/getfile.cfm&PageID=55144>
- Budden et al [*Trends Ecol. Evol.* 23, 4-6; 2008](#)
- Deaux, K. & Emswiler, T., "Explanations of successful performance on sex-linked tasks: What is skill for the male is luck for the female", *Journal of Personality and Social Psychology* 29(1974): 80-85.
- Goldin & Katz American Economic Review - proceedings (2008), 98, 2 p 363
- Heilman, M. E., "The impact of situational factors on personnel decisions concerning women: varying the sex composition of the applicant pool", *Organizational Behavior and Human Performance* 26(1980): 386-395.
- Hopkins, N., "Diversity of a University Faculty: Observations on Hiring Women Faculty in the Schools of Science and Engineering at MIT" *MIT Faculty Newsletter* Vol XVIII, no. 4 (2006); http://web.mit.edu/fnl/volume/184/hopkins_fnl184.pdf
- Goldin, C. & Rouse, C., "Orchestrating Impartiality", *American Economic Review* (September 2000).
- Martell, R.F., "Sex bias at work: The effects of attentional and memory demands on performance ratings for men and women", *Journal of Applied Social Psychology* 21(1991): 1939-60.
- Mason, M.A., & Goulden, M., "[Do Babies Matter: The Effect of Family Formation on the Lifelong Careers of Academic Men and Women](#)", *Academe*, November—December 2002 olume 88, Number 6.
- Mason, M.A. & M. Goulden (2004), "[Do Babies Matter \(Part II\)? Closing the Baby Gap](#)".
- Nelson, D.J. and Rogers D. C., "A National Analysis of Diversity in Science and Engineering Faculties at Research Universities," January 2005); http://www.now.org/issues/diverse/diversity_report.pdf
- Shih, Pittensky & Ambady, 1999, *Psychological Science*, Vol 10, No 1, p 80
- Steele CM, Aronson J (November 1995). "[Stereotype threat and the intellectual test performance of African Americans](#)". *J Pers Soc Psychol* 69 (5): 797–811. [doi:10.1037/0022-3514.69.5.797](https://doi.org/10.1037/0022-3514.69.5.797)
- Steinpreis, R., Anders, K.A., & Ritzke, D., "The impact of gender on the review of the curricula vitae of job applicants and tenure candidates: A national empirical study", *Sex Roles* 41(1999): 509-528.
- Trix, F. & Psenka, C., "Exploring the color of glass: Letters of recommendation for female and male medical faculty", *Discourse & Society* 14(2003): 191-220.
- Wenneras, C. & Wold, A., "Nepotism and sexism in peer-review", *Nature*. 387(1997): 341-43.