Engineering Diversity Update

Spring Advisory Committee Meeting
April 19 & 20, 2007

National Science Foundation
Directorate for Engineering

Program Director for Diversity & Outreach
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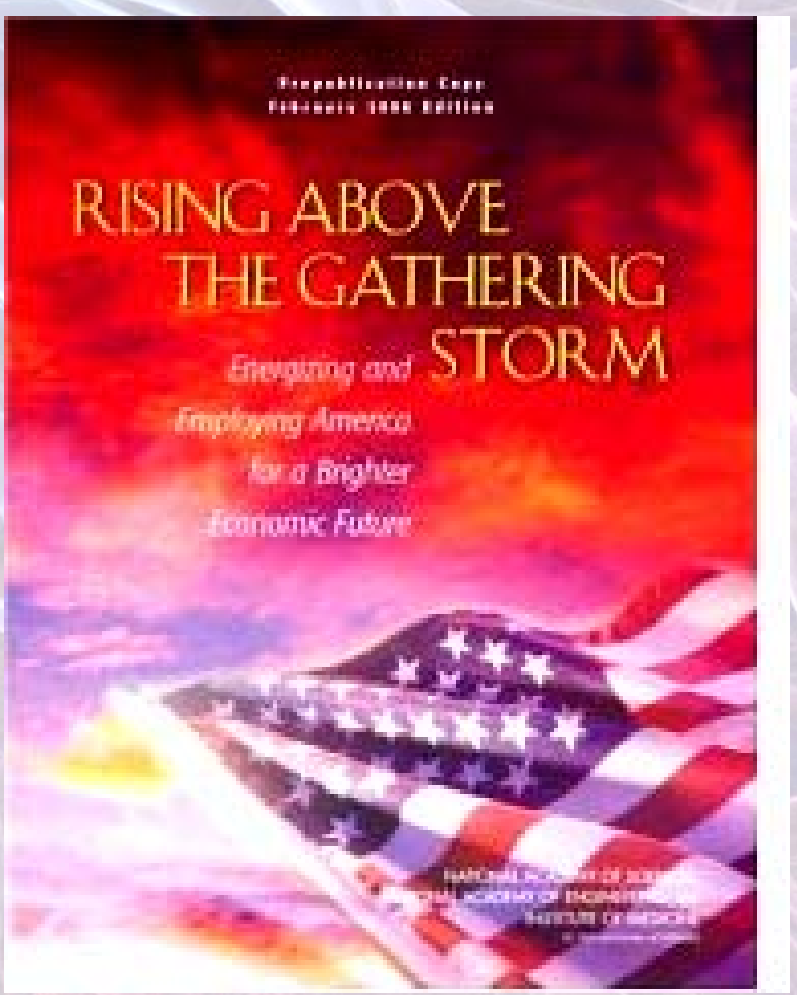
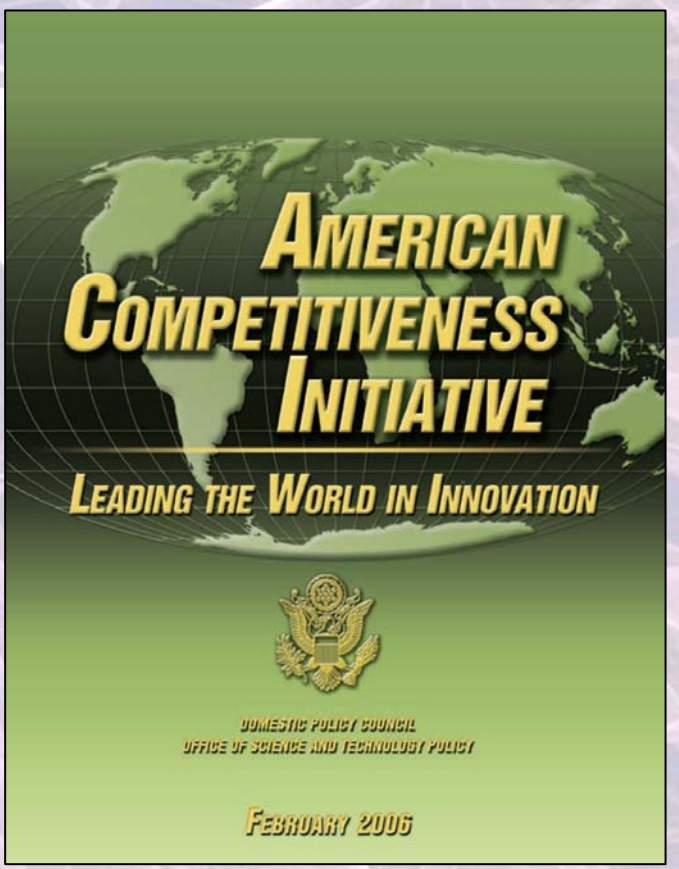
The Storm is Here



American Competitiveness Initiative – An Opportunity

- 300 grants for schools to implement research-based math curricula & interventions
- 10,000 more scientists, students, post-docs & technicians provided opportunities to contribute to the innovation enterprise
- 100,000 highly qualified math & science teachers by 2015
- 700,000 advanced placement tests passed by low-income students
- 800,000 workers getting skills they need for the jobs of the 21st century



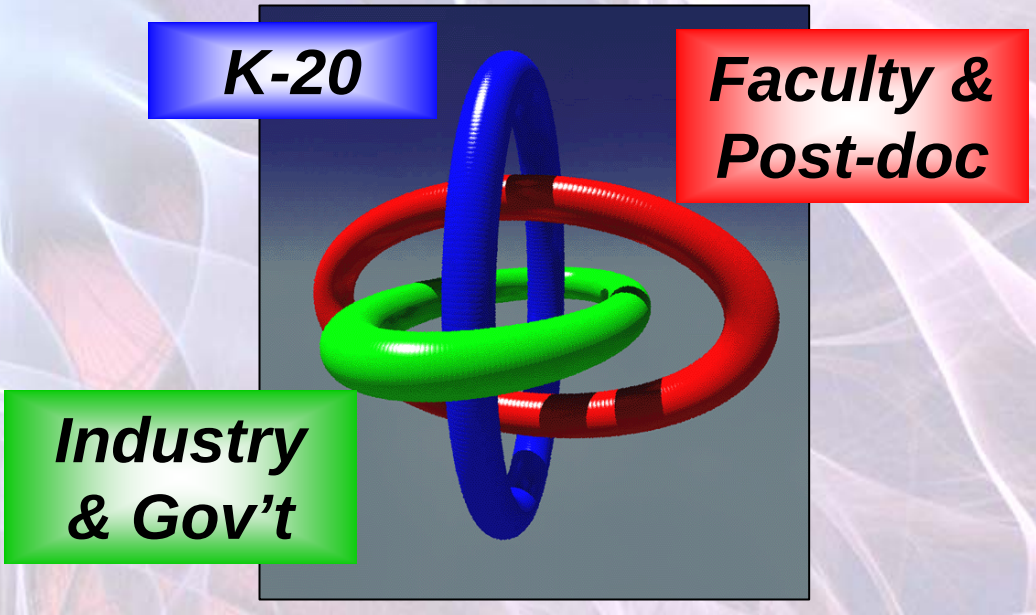
Outline

- Diversity and outreach goals for ENG
- Statistics for ENG
  - Observations of the demographics of proposal submissions and funding rates
  - Funding rates for CAREER proposals
  - Demographics of technical staff – current snapshot
- Current and potential diversity-related initiatives in ENG for FY07 & FY08

Diversity & Outreach Goals for Engineering at NSF

- Excellence and innovation *through* diversity
- To enable the integration and success of a diverse **engineering** workforce, both inside and outside NSF
- To make the demographics in **engineering disciplines** representative of the US census
  - The challenge is preparing for the demographics of the ***FUTURE***. **K-12** outreach simply cannot be separated from any ***research*** or ***diversity*** initiative.

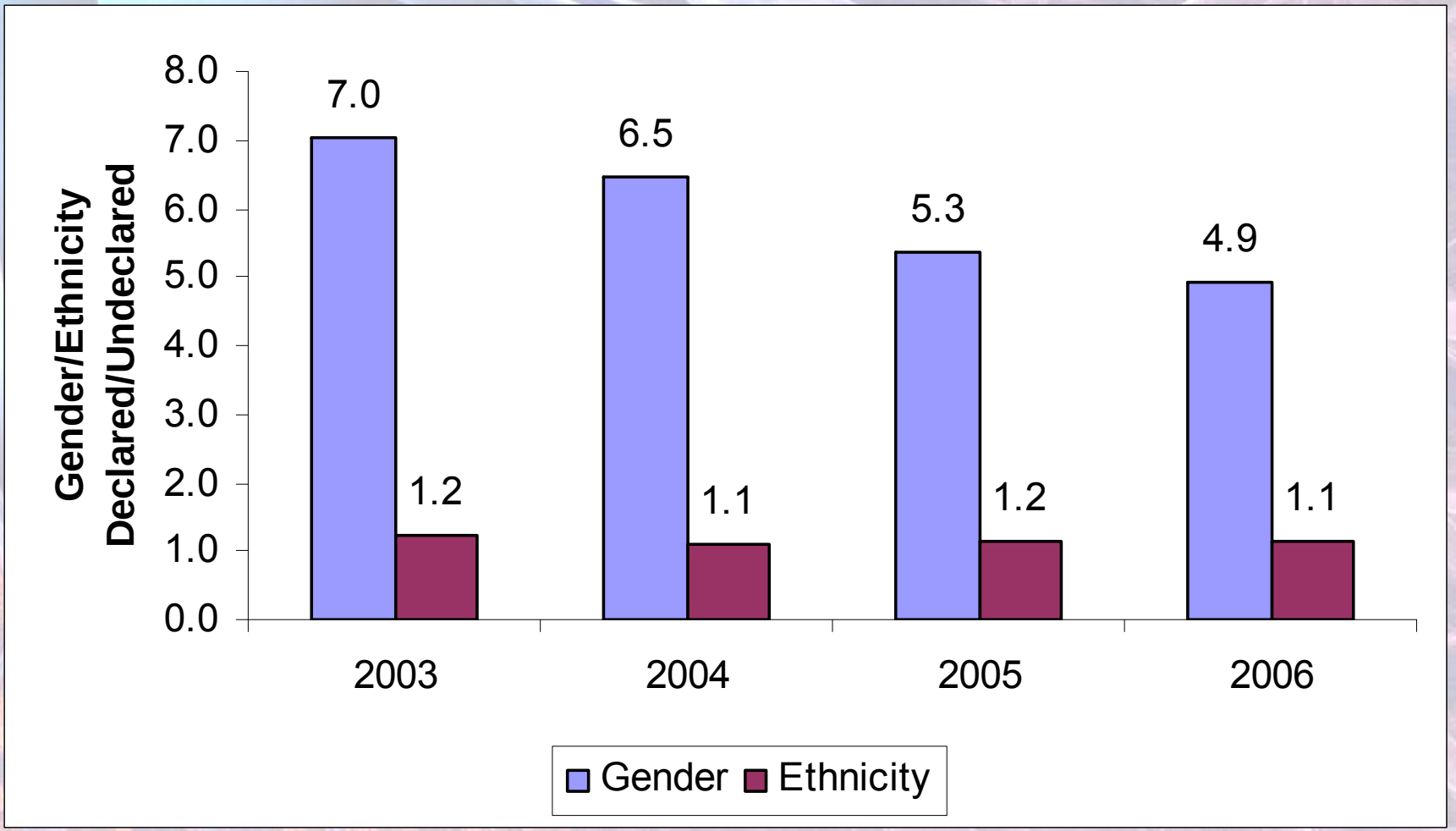
To achieve excellence *through* diversity and workforce development…



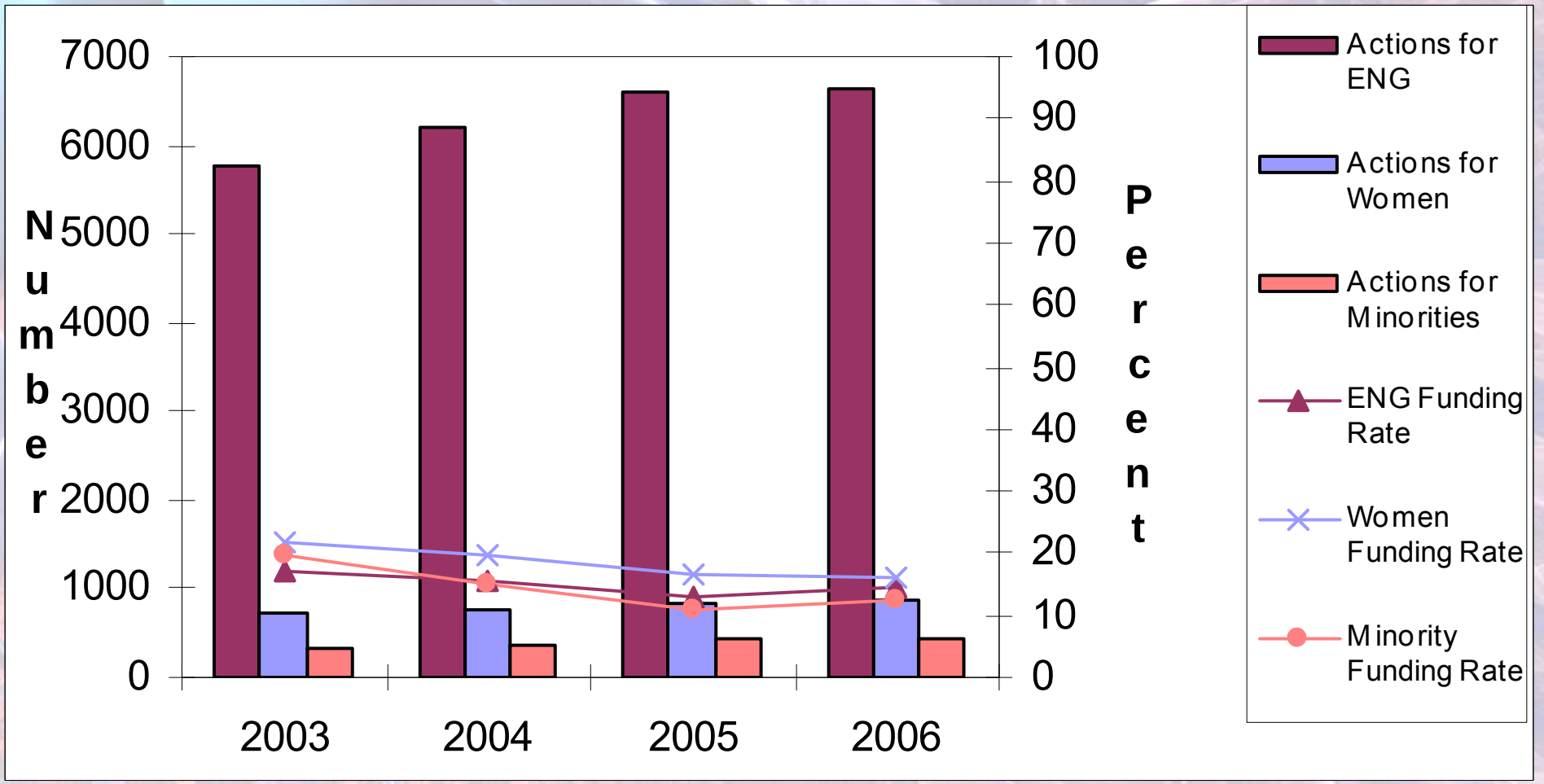
Observations of Recent Funding Rates for Women and Minorities in ENG

- There is a low number of proposals submitted by women and minorities for research awards.
- Women tend to declare their gender when submitting a research proposal.
- Minorities *may* not declare their ethnicity when submitting research proposals.

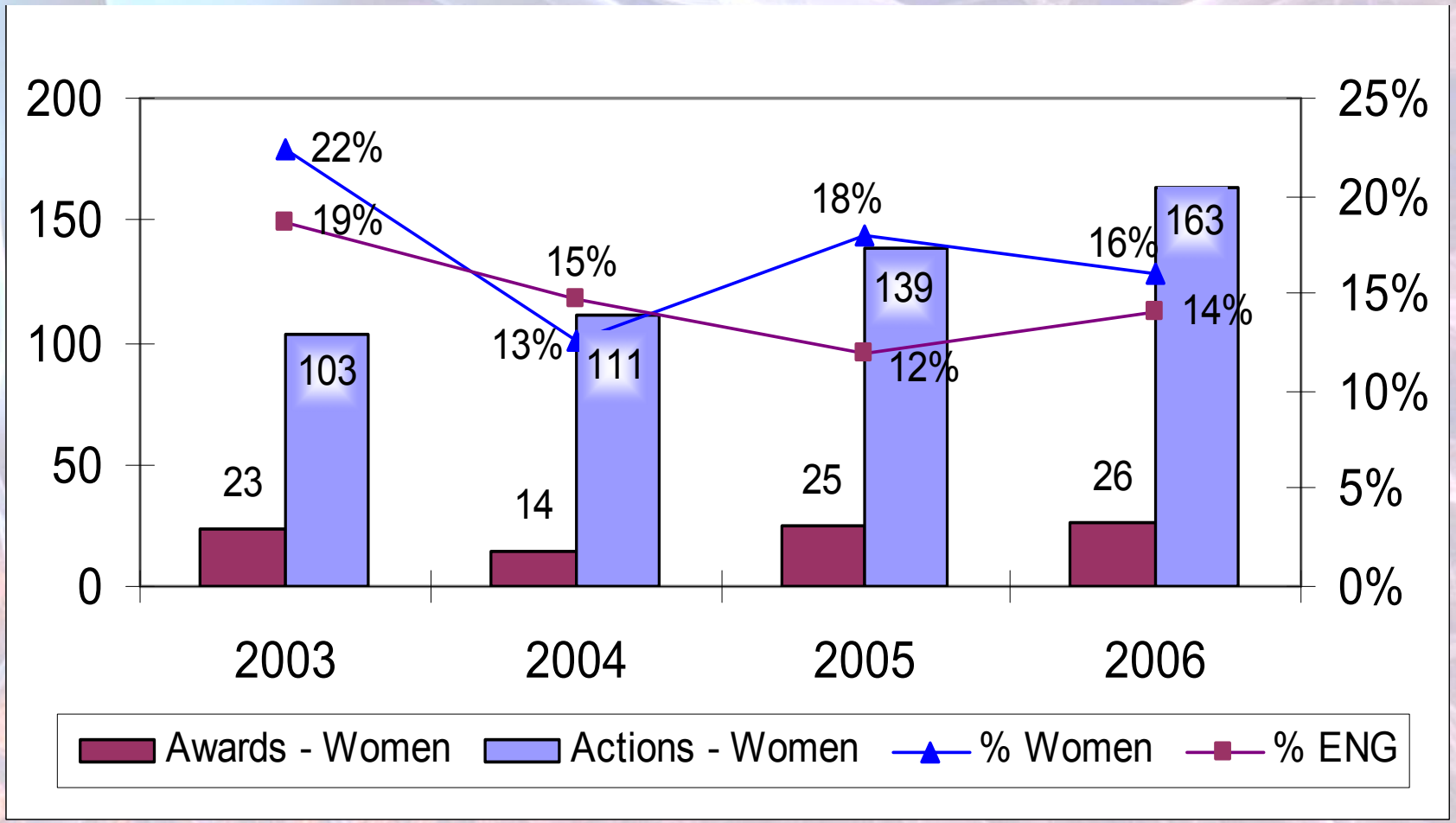
Ratio of Research Proposals with Gender or Ethnicity Declared to Undeclared



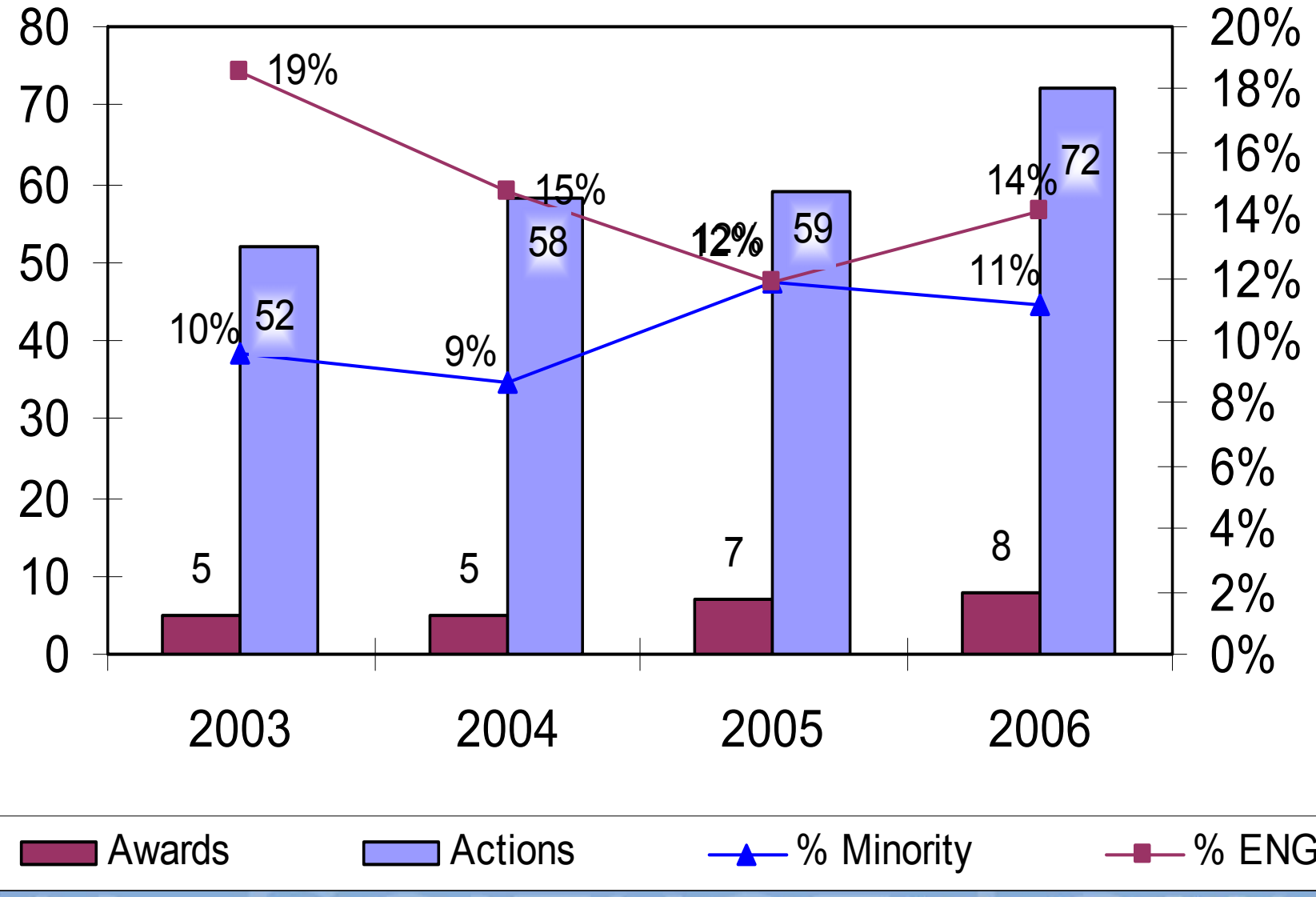
Comparison of Funding Rates for Research Proposals among All ENG, Women, and Minorities



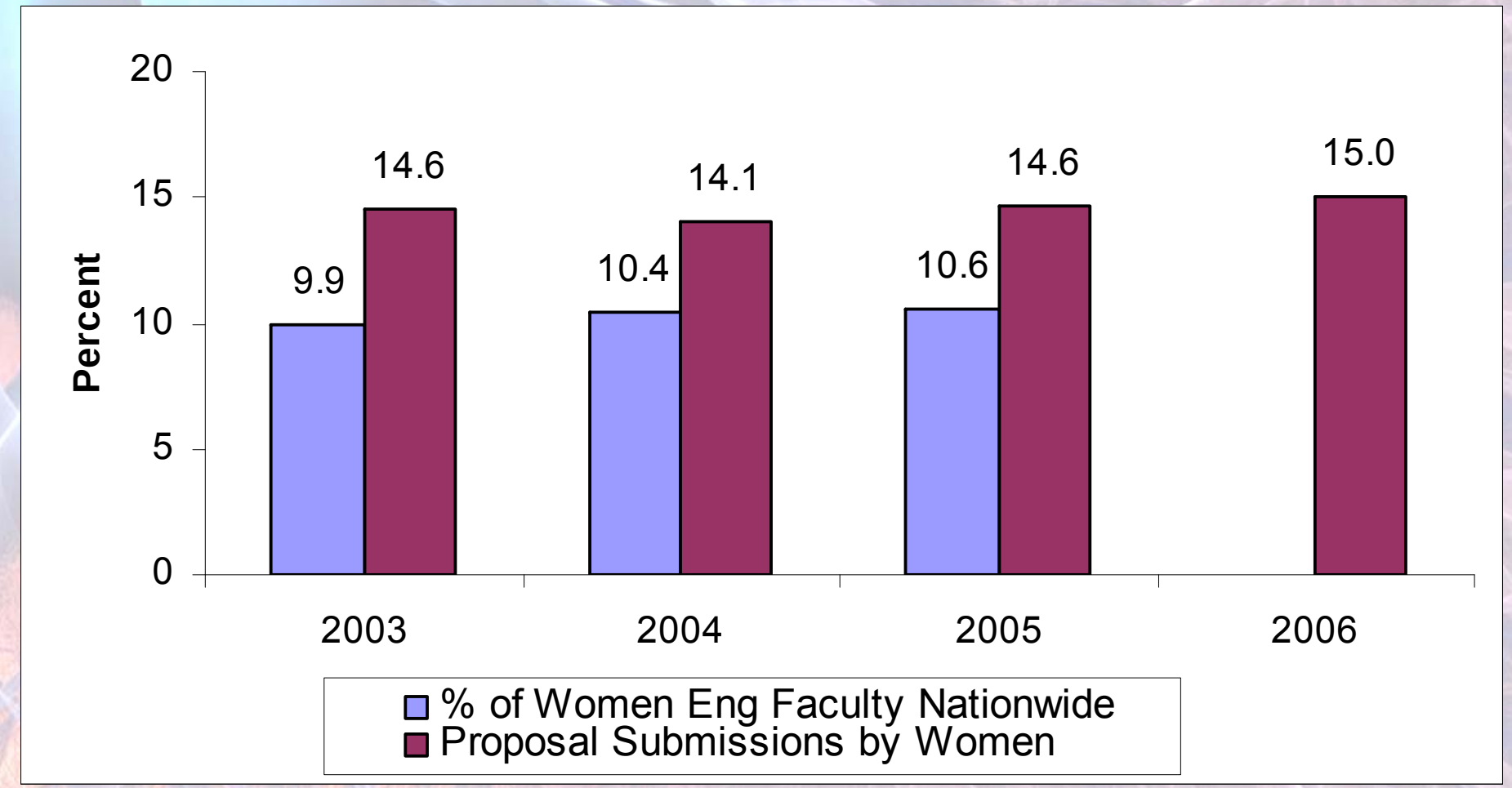
Comparison of CAREER Funding Rates between Women and All ENG



Comparison of CAREER Funding Rates between Minorities and All ENG

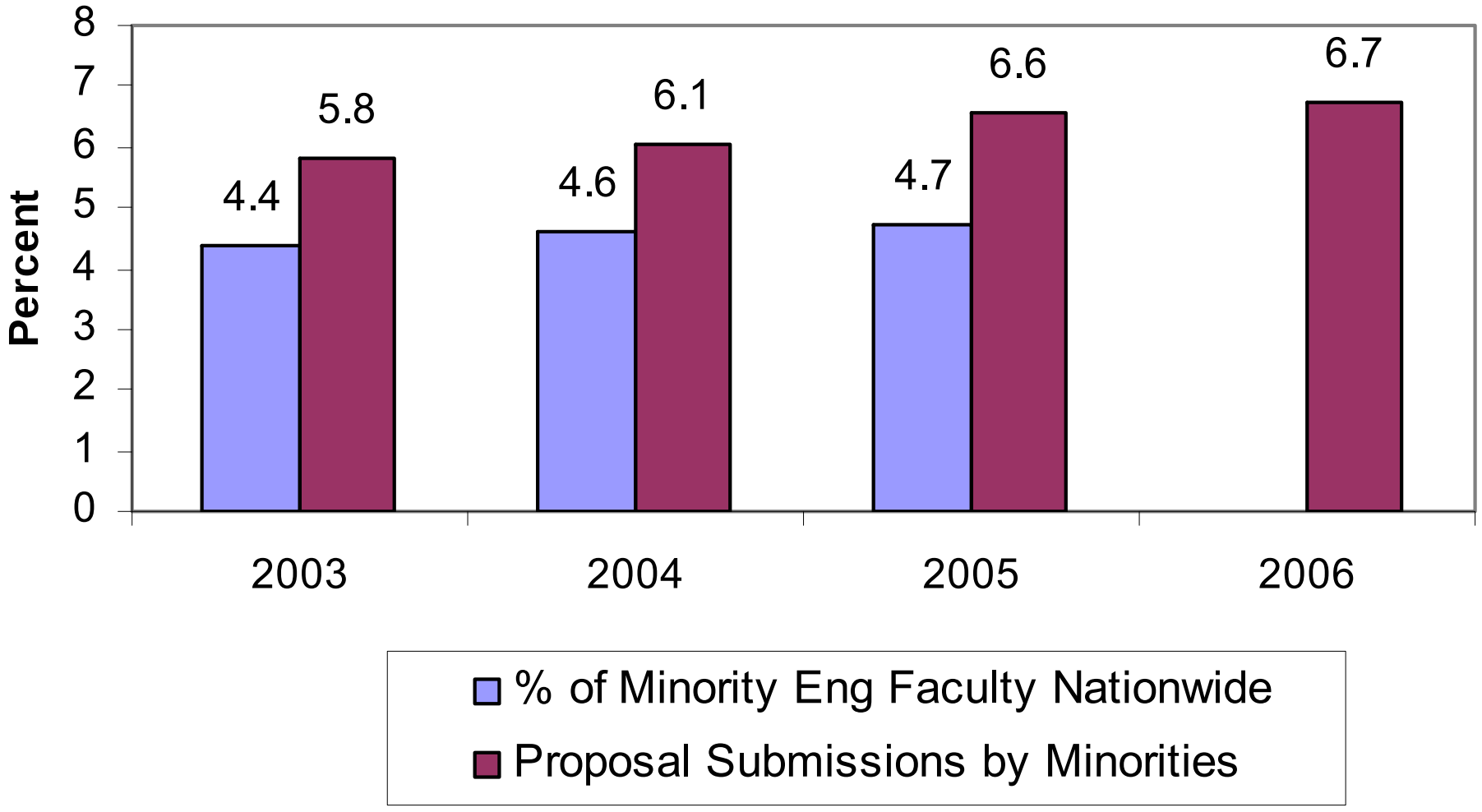


Comparison between the % of Women Eng Faculty Nationwide* and Research Proposal Submissions by Women in ENG



** Source: ASEE, "The Year in Numbers 2005"*

Comparison between the % of Minority Eng Faculty Nationwide* and Research Proposal Submissions by Minorities in ENG



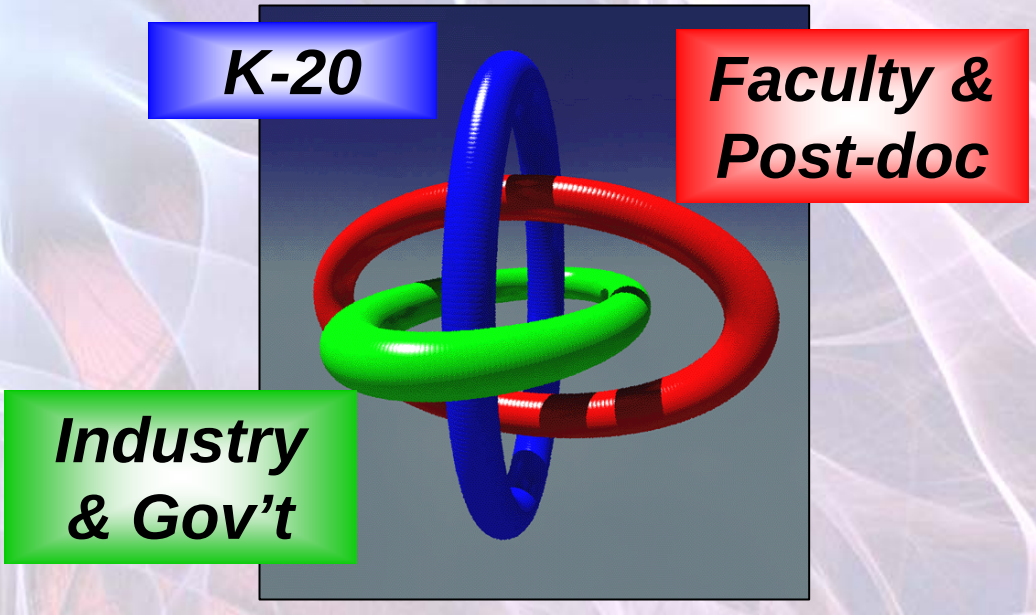
** Source: ASEE, "The Year in Numbers 2005"*

Current Demographics of Technical Staff in ENG

	CBET	CMMI	ECCS	EEC	IIP
Male	14	15	8	4	14
Female	6.5	3	3	9	2
Black/AA	1	0	1	3	1
Hispanic	0	1	1	0	1
Native American	0	0	0	0	0

Diversity-related Initiatives in ENG

To achieve excellence *through* diversity and workforce development…



New Membership in the Engineering Diversity Working Group (EDWG)

1. Stephanie Adams, EEC
2. Juan Figueroa, IIP
3. Garie Fordyce, ENG
4. Rick Fragaszy, CMMI
5. Deborah Jackson, EEC
6. Bob Jaeger, CBET
7. Mary Juhas, OAD, *Chair*
8. Olufemi Olowolafe, ECCS
9. John Regalbuto, CBET
10. Mike Reischman, OAD
11. Judy Vance, CMMI
12. Usha Varshney, ECCS

Current & Potential Diversity Initiatives in ENG

- Unintended bias training for panels – more later
- Diversity included as part of new & existing program director/program officer training
- Gender Equity Workshop for department chairs
  - Chem Eng & MSE coming soon!
- K-12 workshop for advisors/counselors
  - Project Lead the Way
  - Mathematics Engineering Science Achievement (MESA)
  - Junior Engineering Technical Society
  - Detroit Area Pre-College Engineering Program

Current and Potential ENG/OAD Diversity Initiatives, cont'd

- Broadening Participation in Engineering
  - PD for Diversity & Outreach serving on Foundation-wide Broadening Participation Working Group (BPWG)
- Frontiers of Engineering event at a minority serving institution
  - Visit to NCA&T in May
- Tribal College initiative
  - SGER at Oglala Lakota College, South Dakota

Example of Unintended Bias Training (1 of 6)

Minimizing Bias in Evaluation

- Implicit bias toward a group: "schemas"
  - Unconscious hypotheses/stereotypes, often about competence
- Lack of critical mass ⇨ greater reliance on schemas
  - Few women and minorities in engineering
- Accumulation of disadvantage
  - Small bias in same direction has large effect over time
  - Very small differences in treatment can have major consequences in $alary, promotion and ***prestige*** *Valian (1998)*

Schemas are...

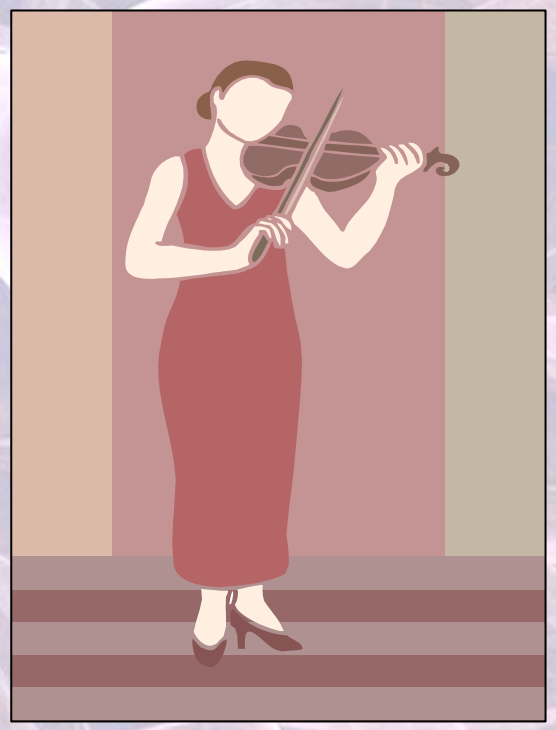
- **Widely culturally shared**
  - All people, even members of underrepresented groups, hold schemas about these groups
  - People are often unaware of them

- **Applied more** under circumstances of:
  - Lack of information
  - Stress from competing tasks
  - Time pressure
  - Lack of critical mass

Fiske (2002). *Current Directions in Psychological Science, 11*, 123-128.

Impact of Orchestra Blind Auditions: Gender Bias

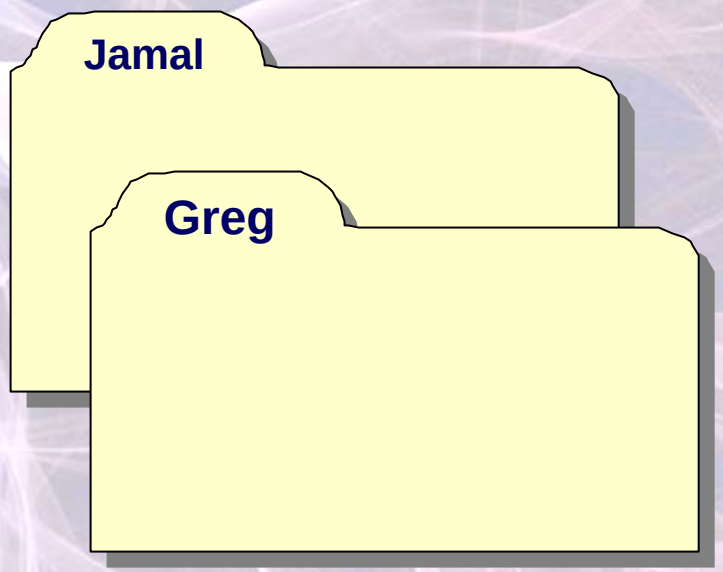
When orchestra auditioners were behind a screen, the percentage of female new hires for orchestral jobs *increased 25 – 46%.*



Goldin & Rouse (2000) *The American Economic Review*, 90, 4, 715-741. (14,133 auditioners over 25 years)

Evaluation of Identical CVs: Race Bias

- "Jamal" had to send 15 resumes to get a callback, compared to 10 needed by "Greg."
- "Greg" yielded as many more callbacks as an additional eight years of experience for "Jamal."
- The higher the resume quality, the higher the gap between callbacks for "Greg" and "Jamal."



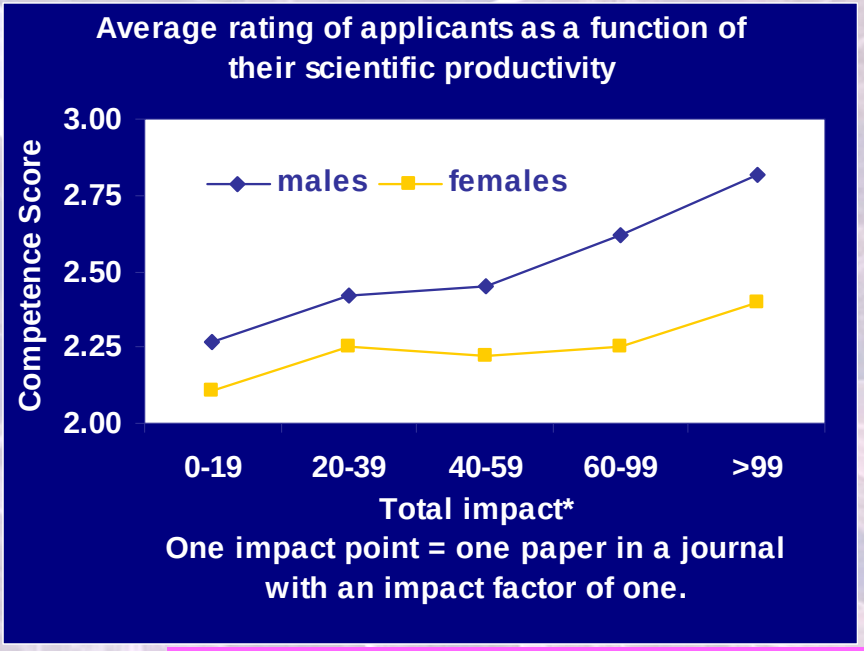
Bertrand & Mullainathan (2004) *Poverty Action Lab*, 3, 1-27.

Evaluation of Fellowship Applications: Gender Bias

"…the success rate of female scientists applying for postdoctoral fellowships at the [Swedish Medical Research Council] during the 1990s has been less than half that of male applicants."

Wenneras & Wold (1997) *Nature*, 387, p. 341

Women had to be 2.5 times more productive to receive the same competence score.



**Cited by Richard Zare, Stanford chemistry professor and former NSB chair, editorial in 5/15/06 Chemistry and Engineering News*

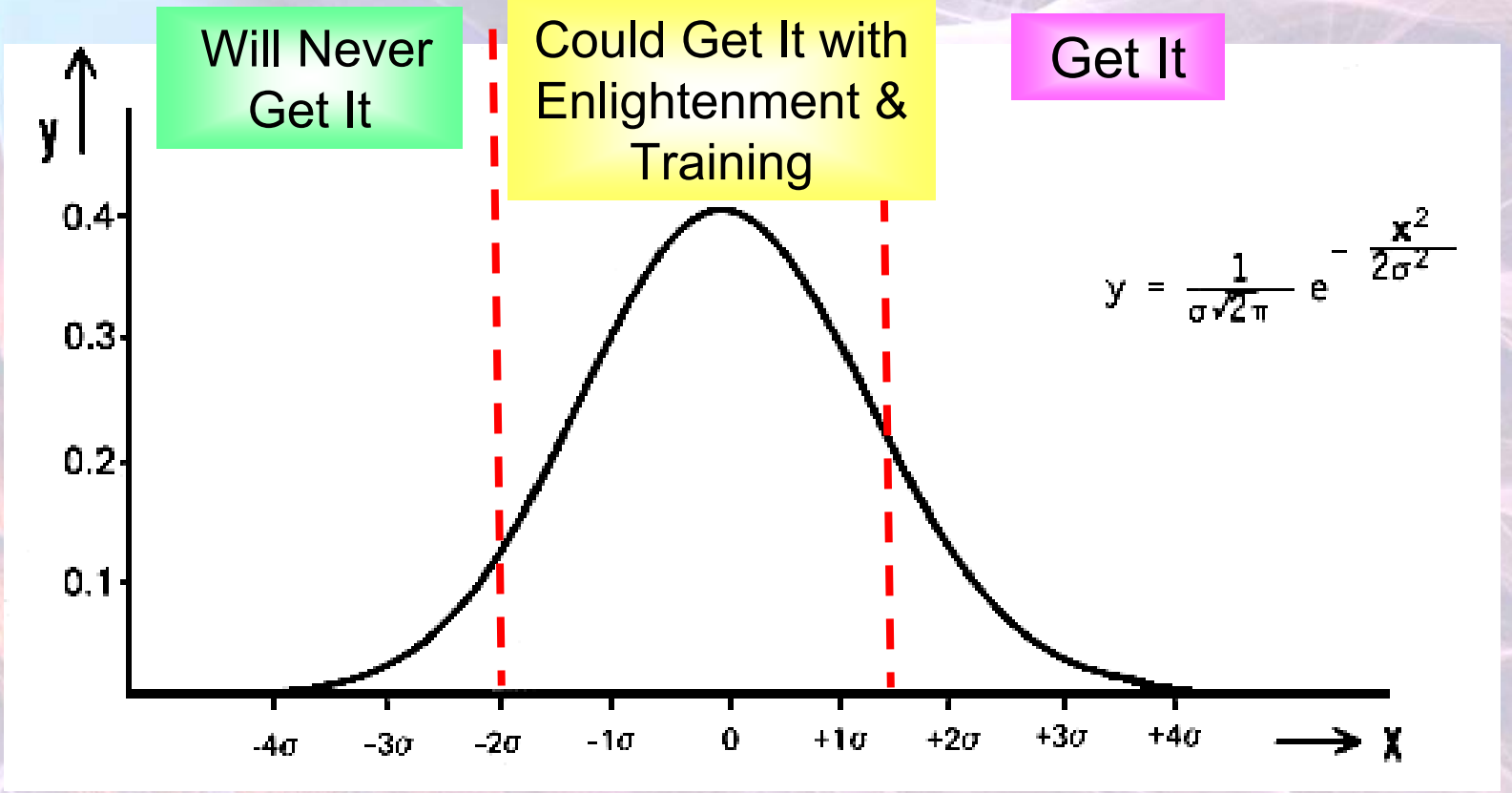
Similar findings:
GAO report on *Peer Review in Federal* Agency Grant Selection (1994); and *European Molecular Biology Organization Reports* (2001)

Ways to Mitigate Evaluation Bias

1. Increase awareness of how schemas might bias evaluation
2. Decrease time pressure and distractions in evaluation process
3. Rate on explicit criteria rather than global judgments
4. Point to specific evidence supporting judgments

Bauer & Baltes, 2002, *Sex Roles, 47* (9/10), 465-476

Diversity & the Normal Distribution



Number of People

The Diversity "Get It" Index

Diversity is Everybody's Job

Thank you!

¡Muchas Gracias!

感謝!

Merci Bien!

СПАСИВО!

Vielen Dank!

Grazie!

谢谢!

Tak!

Obrigado!