The Impact of Implicit Bias on Women and Underrepresented Minorities in STEM

LEAD 2008

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Increasing emphasis on diversity…

Yet women and minorities are still underrepresented in many domains.
Number of Doctoral-Degreed Faculty (All Tenure Statuses) by Discipline and Ethnicity, 2003
(Source: Survey of Doctorate Recipients, 2003)

Number of Doctoral-Degreed Faculty (All Tenure Statuses) by Discipline and Ethnicity, 2003
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http://www.cpst.org Data provided by CPST and Lisa Frehill
A majority of faculty at R1 schools earned Ph.D.s at R1s. URM and Asian/Pacific Islanders at R1s are more likely to have come from non-R1 schools than non-minority faculty. (Source: National Study of Postsecondary Faculty, 2004)

<table>
<thead>
<tr>
<th>PhD Inst.</th>
<th>Current Institution</th>
<th>URM</th>
<th>Asian/Pacific Islander</th>
<th>Non-Minority</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R1</td>
<td>79.2%</td>
<td>63.7%</td>
<td>81.7%</td>
</tr>
<tr>
<td></td>
<td>&lt; R1</td>
<td>19.8%</td>
<td>34.7%</td>
<td>16.7%</td>
</tr>
<tr>
<td></td>
<td>Unk.</td>
<td>1.1%</td>
<td>1.6%</td>
<td>1.6%</td>
</tr>
</tbody>
</table>

http://www.cpst.org Data provided by CPST and Lisa Frehill
The URM pipeline to doctoral degrees is far from “full” . . . Not at “parity” with representation in the population.

(Degree awards, 2005)

Source: CPST analysis of IPEDS data using NSF's WebCASPAR system. Life Sciences includes biological and agricultural sciences; Physical sciences includes the earth, atmospheric and ocean sciences disciplines. URM = Under-represented minority and includes African American, American Indian and Hispanics.

Data provided by CPST and Lisa Frehill
Women in the Engineering "Pipeline"

Source: CPST analysis of NSF's WebCASPAR database (degree data), American Society for Engineering Education (faculty data), and Bureau of Labor Statistics (overall employment).
Women as a Percent of Ph.D.s Employed in Universities & 4-Year Colleges by STEM Field and Rank, 2003


http://www.cpst.org
Why we care

1) People are missing out on well-respected, influential, and flexible careers (Kalwarski, Mosher, Paskin, & Rosato, 2007)
2) STEM fields are missing out on potential talent (National Academy of the Sciences, 2003)
3) STEM fields are missing other perspectives (Margolis & Fisher, 2002)

4) Strength of diverse groups (Sommers, 2006)
Influence of racial composition on jury decision making (Sommers, 2006)

N = 29 juries (6 people each)
Influence of racial composition on jury decision making (Sommers, 2006)

Diverse juries:
• More information exchange
  • Took longer
  • Discussed more case facts
  • Discussed more missing evidence
• More accurate
  • Fewer inaccurate statements
  • Fewer uncorrected inaccuracies
• More openness to discussing race
  • Discussed more race-related topics
  • Fewer objections to considering race

Almost all driven by Whites!
Influence of racial composition on jury decision making (Sommers, 2006)

Whites’ in diverse groups less likely to vote guilty, even before deliberations began

In diverse juries, Whites are:

• Reminded to not be prejudiced
• Processing trial info more closely
• More receptive to discussing racism

Benefits of diversity
Why are we not there?

the role of bias
Bias is not what most people think it is

*Common understanding*: bias = conscious, intentional, to inflict harm

*But what the research shows*: bias = automatic, outside of our awareness, unintentional, conflicts with our conscious beliefs
TAE CAT
Unconscious bias:
The Implicit Association Test

A demo

https://implicit.harvard.edu/
Resume study (Neumark, 1996)

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OBJECTIVE: Resume including skills and experiences, including
work experience in the following areas:
- Management of the production, delivery, and use of comprehensive health care services, including the development of new programs and services.
- Experience in developing and implementing new programs and services, including the development of new electronic health care systems.
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PROFILE:
- Extensive knowledge of health care products and services.
- Skilled in developing and implementing new programs and services, including the development of new electronic health care systems.
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EDUCATION
Seattle General Hospital, Seattle, WA 2000

- Bachelor of Science in Nursing

EXPERIENCE
Seattle General Hospital, Seattle, WA 2000

- Registered nurse in the emergency department, responsible for the admission of patients, including evaluation, treatment, and discharge.
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Example of Gender Bias

• Study of Swedish Medical Research Council review

• Women needed to produce more than 99 “impact factors” to be perceived as competent as men with only 20 impact factors.

• Analysis of 300 letters of recommendation for medical faculty.
• Descriptions of women by letter writers emphasized teaching.
• Descriptors of men by letter writers emphasized their role as researchers and professionals.
• Fewer superlatives used to describe women.

"Exploring the color of Glass: Letters of Recommendation for Female and Male Medical Faculty"
Discourse & Society 14: 191-220.
Asking favors (Flynn, 2007)
Impact of stereotypes on career aspirations
(Cheryan, Plaut, Davies, & Steele, under review)

Computer science majors are…

“Nerdy, techie, stay up late coding and drinking energy drinks, no social life.”

“Pale, sometimes socially frustrated, inquisitive, skilled, focused.”

“They are usually guys, very intense, very intelligent, intuitive, and quick. They don't frequently take showers.”
Signaling belonging (Cheryan et al., under review)

Room in Gates CS building decorated with stereotypical or non-stereotypical objects
Interaction: $F(1, 35) = 10.22, p < .01$

Cheryan, Plaut, Davies & Steele (under review)
Signaling belonging (Cheryan et al., under review)

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Cheryan, Plaut, Davies & Steele (under review)
Stereotype threat (Steele, 1997)

*stereotype threat* - fear of confirming a negative stereotype about your group (Steele, 1997)

**Method** (Spencer, Steele, & Quinn, 1999)

- Male (N = 24) and female (N = 30) students with college math experience
- Administered a 30 minute GRE math subject test, divided:
  - “gender differences” vs. “no gender differences”
Results

Stereotype threat

Score corrected for guessing

"Gender difference"  "No gender difference"

Spencer, Steele, & Quinn (1999)
Gender difference   No gender difference

Score corrected for guessing

Men
Women

"Gender difference"  "No gender difference"

Spencer, Steele, & Quinn (1999)

$F(1, 50) = 5.66, p < .05$
Stereotype threat (Dar-Nimrod & Heine, Science, 2006)

Method
• Female students with college math experience
• Administered two math sections separated by a verbal comprehension section
  1. “No gender differences”
  2. Gender differences because of genes
  3. Gender differences because of experience

Gender diff vs. no gender diff manip remind you of anything
Takeaways

Bias can manifest in different ways
- deliberate
- unconscious
- “in the air”

Impact behaviors

Finding solutions (stay tuned)

Lessons from jury study
Indiv & structural & cultural
…linking it to the rest of the workshop
David’s fall email
A few solutions

• Acknowledge that diversity can be a competitive advantage
• Establish clear written procedures that minimize cognitive errors
• Promote diversity and ensure an equitable workplace at every level of the institution
• Construct welcoming environments
Thank you!
Influence of racial composition on jury decision making (Sommers, 2006)

Pre-deliberation opinions

Main effect of race
Main effect of prime
Whites in diverse groups had fewer guilty votes than Whites in all-White groups

Sommers (2006)