Why So Slow?

The Effects of Unconscious Bias on the Inclusion of Women in STEM

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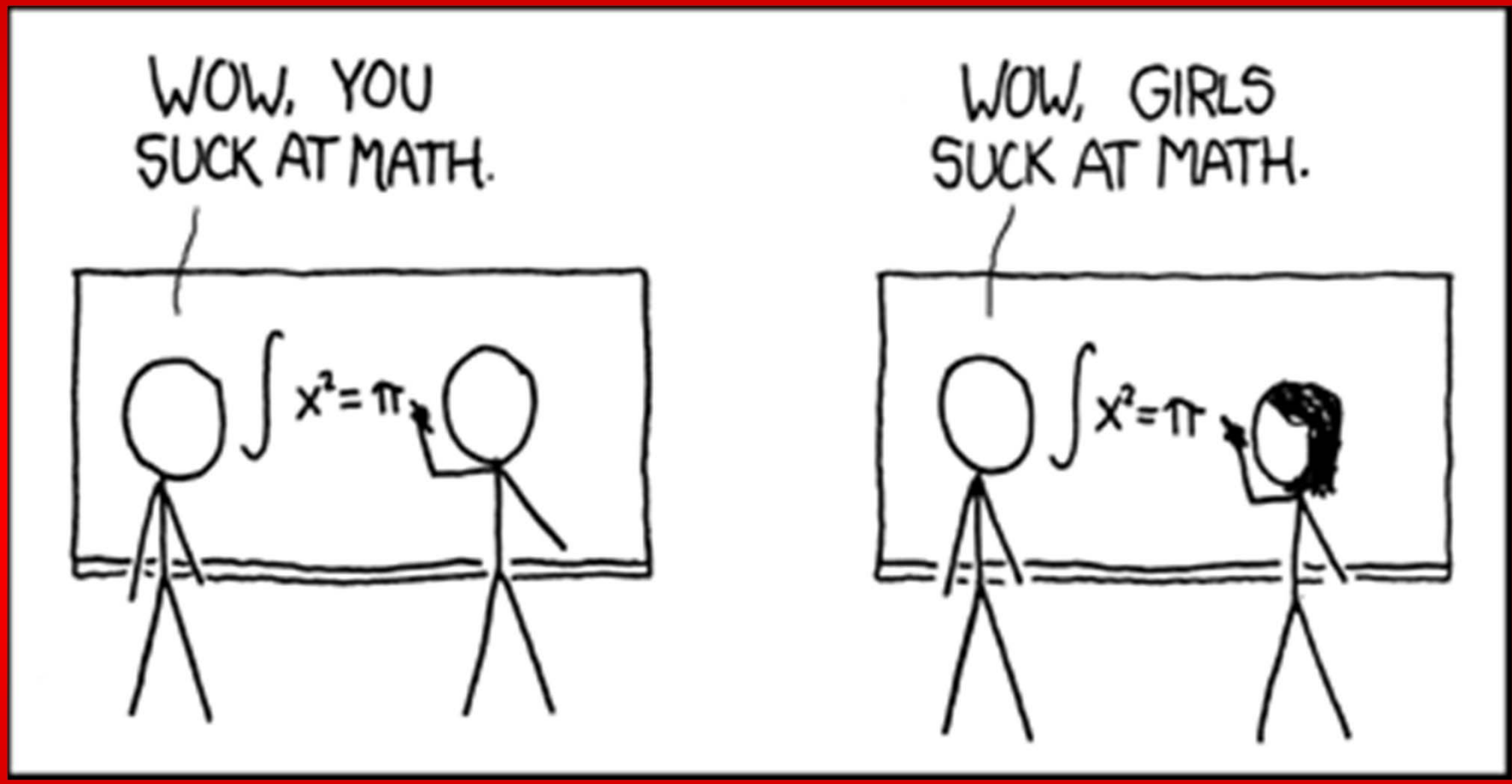
Why?

- Unconscious bias
- Tendency of our minds to evaluate individuals based on characteristics (real or imagined) of the group to which they belong
- Consequences for both the evaluator, and the person being evaluated


WOW, YOU SUCK AT MATH.
$\int x^2 = \pi$
WOW, GIRLS SUCK AT MATH.
$\int x^2 = \pi$

Three Central Ideas

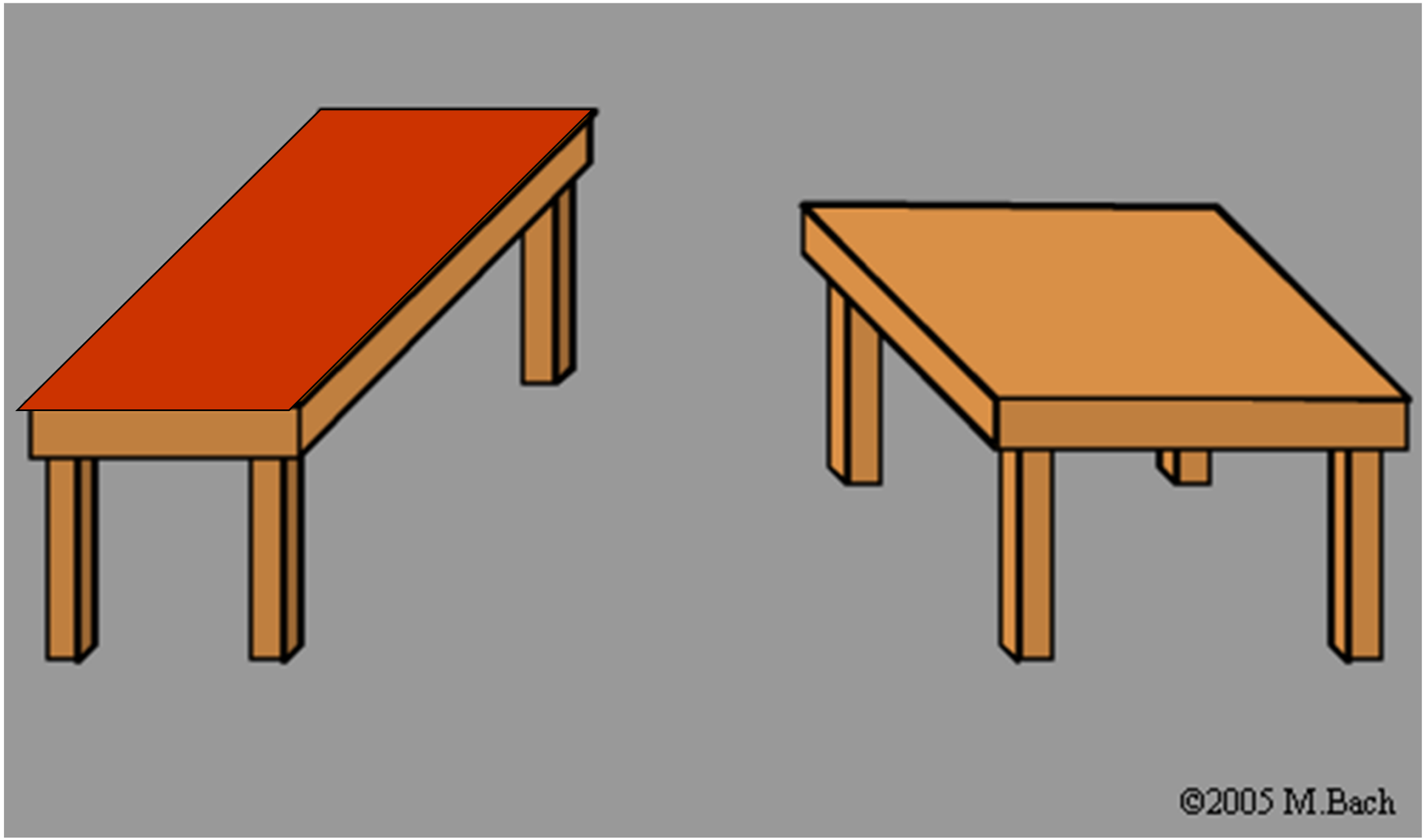
1. Our minds are more than the sum of the conscious parts
   - Implicit processes
2. Unintended thoughts can contradict beliefs
   - Prejudice as a habitual response
3. Acting consistently with beliefs can require more than good intentions
   - Breaking the prejudice habit

Prejudice and Habits of Mind

Ordinary mental operations that serve us quite well in most circumstances can fail our intentions

Essential Process…

- Translation of the world outside to a mental experience inside
  - Guided by our experience and expectations
  - Affects our perceptions, judgments, and behavior
- This translation process is not infallible
  - A variety of *habits of mind*, born out of experience, can separate our experience from reality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Stroop Color Naming Task

Compatible Trials	Incompatible (interference) Trials
RED	RED
BLACK	BLACK
BROWN	BROWN
GREEN	GREEN
YELLOW	YELLOW
BLUE	BLUE

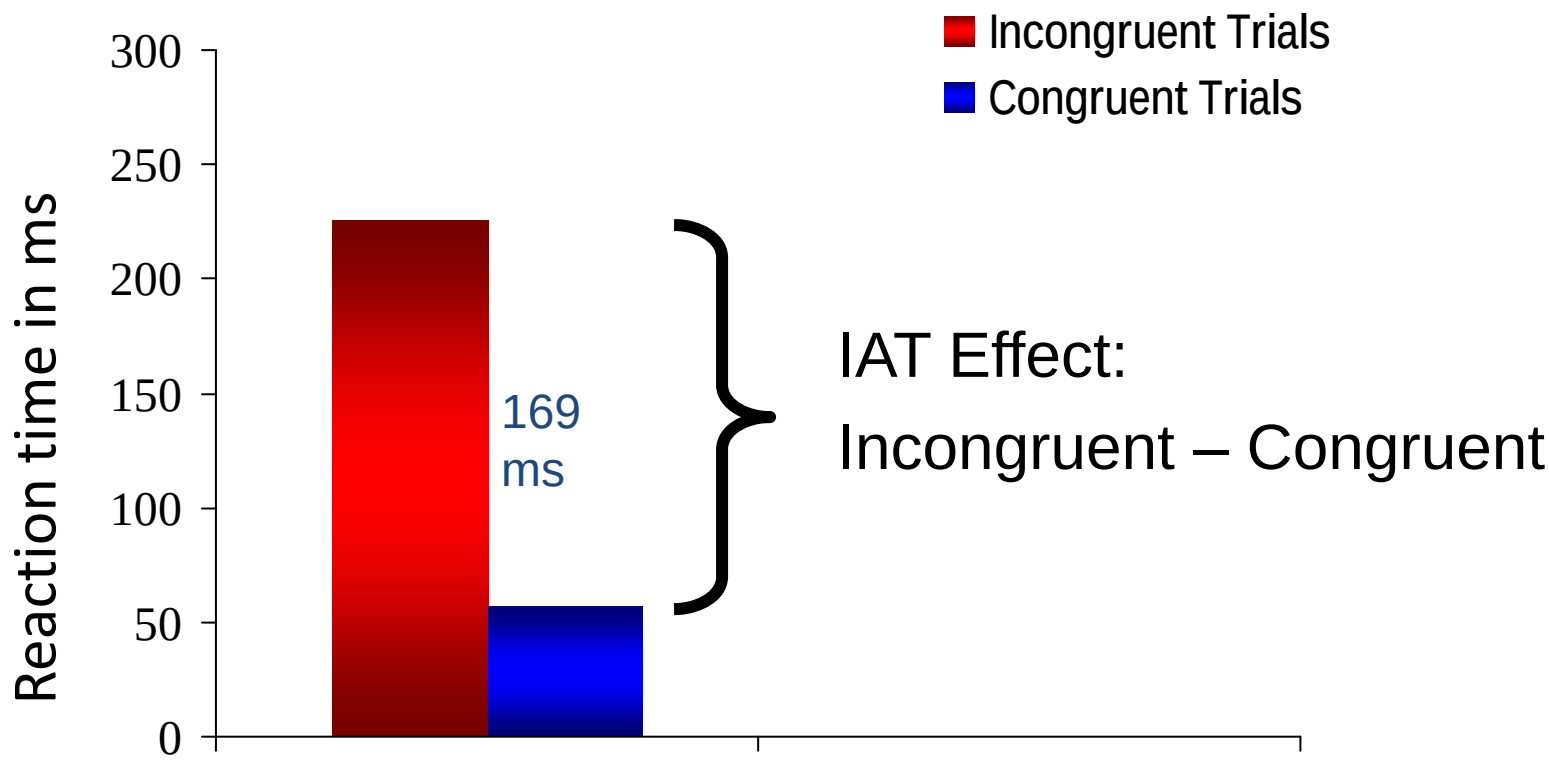
Construction Worker Experiment

Measuring Unconscious Bias: Gender-and-Science IAT

Logic of the IAT

- IAT provides a measure of the strength of associations between mental categories such as “male and female” and attributes such as “science and humanities” disciplines
- Strength of association between each category and attribute is reflected in the time it takes to respond to the stimuli while trying to respond rapidly
- Trial Types

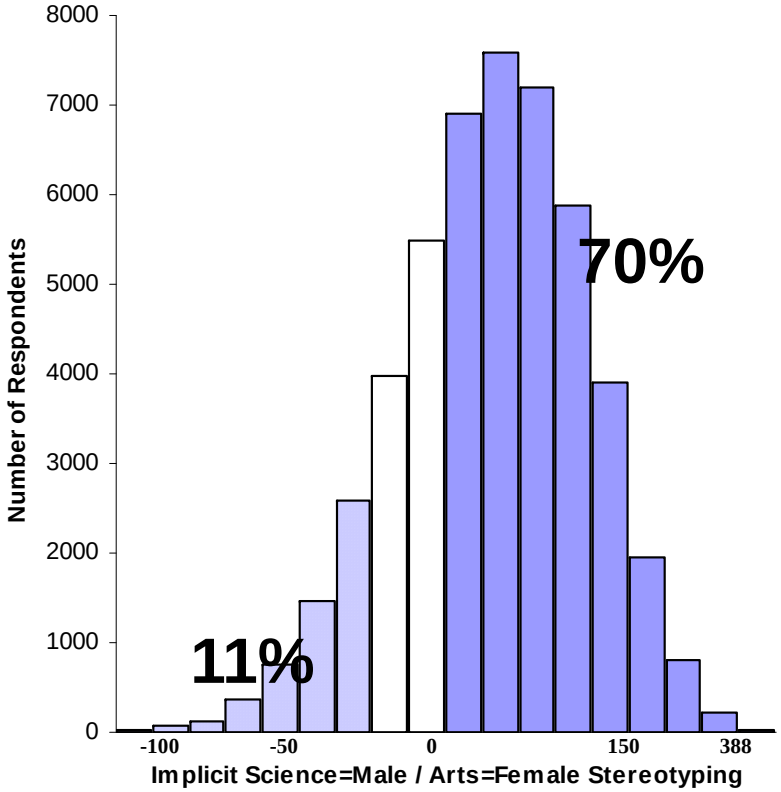
IAT Effect



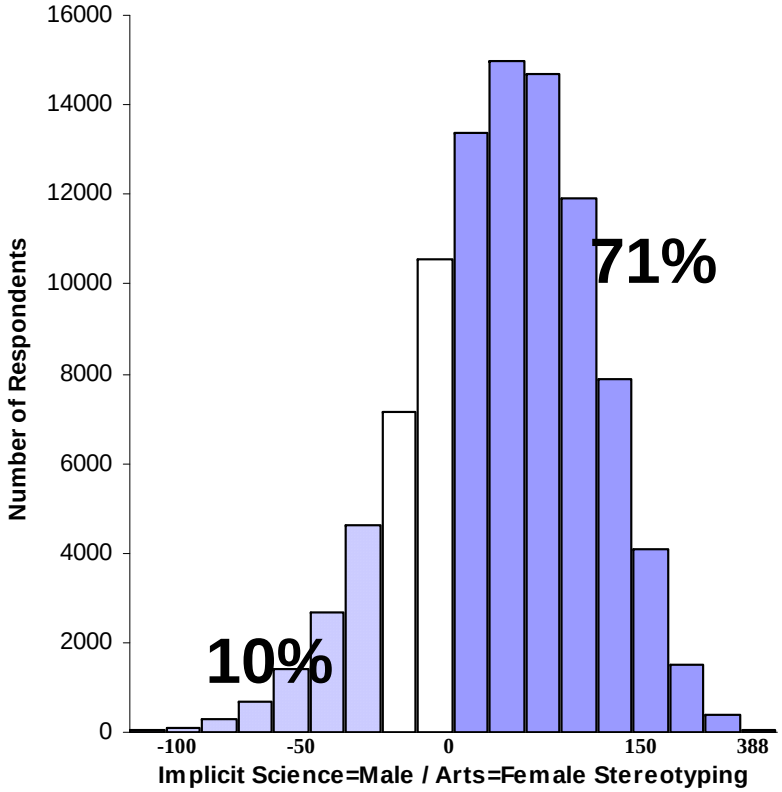
The larger the difference, the greater the bias in associating men with science and women with humanities

Implicit Gender-Science Stereotypes

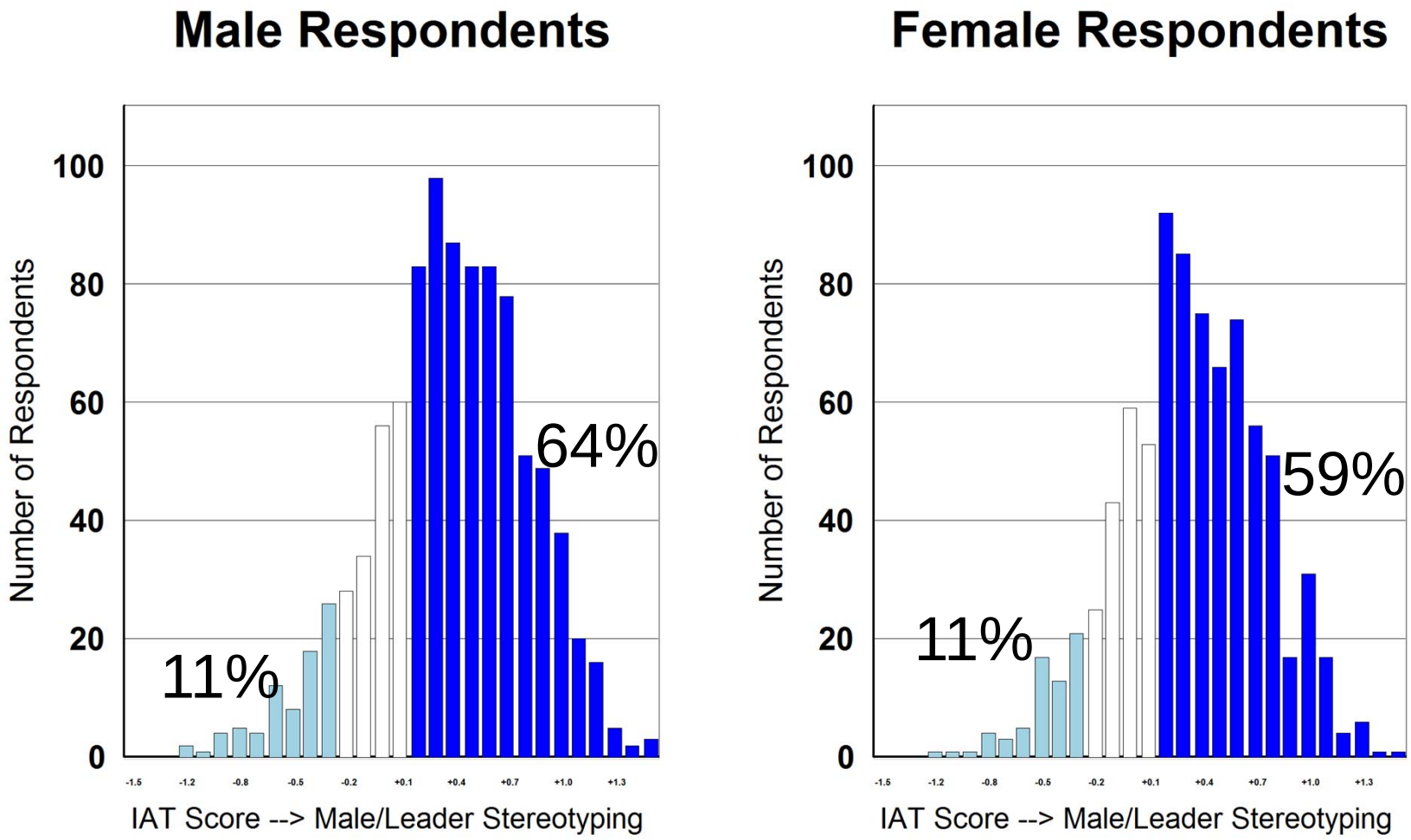
Male Respondents



Female Respondents



Implicit Gender-Leadership Stereotypes



Characteristics of Implicit Biases

1. Ordinary
   - Stem from our natural tendency to form associations to help organize our social worlds
2. Learned from culture
   - Reflect the "thumbprint of culture" on our minds
3. Pervasive
   - Prevalent among men and women, blacks and whites, young and old, etc.
4. Often conflict with consciously endorsed beliefs
   - Dissociation between implicit and explicit responses

Characteristics of Implicit Biases

5. Consequential
   - Predict behavior better than (and often at odds with) explicit measures
   - Constrain the opportunities of targets of implicit bias

Shift in Conceptualization of Prejudice

Old Framework = Prejudice is bad so if I think or act with bias, I am a bad person

New Framework = Prejudiced thoughts and actions are habits that we all have and breaking these habits requires more than good intentions

Unconscious bias in evaluation settings

- Most of us routinely rely on unconscious assumptions even though we intend to be fair and believe that we are fair.
- Human brain works by categorizing people, objects and events around us -- this allows us to quickly and efficiently organize and retrieve information. It is an essential cognitive function for managing a vast amount of sensory input.
- But – when evaluating people we can be led astray by our tendency to categorize people – and we tend to do so automatically on the following dimensions:
  - Race/Ethnicity, Sex, and Age.

Unconscious bias in evaluation processes

- Applications/CVs/Résumés
- Reference Letters
- Job Interviews
- Teaching Evaluations
- Tenure and promotion
- Honors and awards
- Leadership positions
- Student admissions

How is the research on bias and prejudice conducted?

- Randomized, controlled studies ("Goldberg" design)
  - Give each group of evaluators pictures, words, or applications with a racial or gender indicator
  - Compare evaluations
- Real life studies
  - Evaluate actual resumés/curriculum vitae, job performance, letters of recommendations, call backs for interviews, etc.

Unconscious bias in evaluation settings

Evaluating Applications, CV's, Resumes –

- Moss-Racusin, C. et al. (2012). "Science faculty's subtle gender biases favor male students." PNAS 109: 16474-16479.
- Steinpreis, RE., Anders, KA, and Ritzke, D. (1999). "The Impact of Gender on the Review of the Curricula Vitae of Job Applicants and Tenure Candidates: A National Empirical Study." *Sex Roles* 41: 509 -528.
- Bertrand, M. and Mullainathan, S. (2004). "Are Emily and Greg More Employable than Lakisha and Jamal? A Field Experiment on Labor Market
- Derous, E., Hanh Nguyen, H., and Ryan, AM. (2009)."Hiring Discrimination Against Arab Minorities: Interactions between Prejudice and Job Characteristics." *Human Performance* 22: 297-320.
- Tilcsik, A. (2011). Pride and prejudice: Employment discrimination against openly gay men in the United States. *American Journal of Sociology,* 117: 586-626.

Women and members of minority groups rated as less competent or less likely to be hired or called back for interviews.

Gender bias and Science

Moss-Racusin, C. et al. (2012). “Science faculty’s subtle gender biases favor male students.” PNAS 109: 16474-16479.

- 127 Faculty from Biology, Chemistry and Physics departments participated
- Evaluated an application randomly assigned a male or female name for:
  - Competence
  - Hireability
  - Likeability
  - Starting Salary
  - Willingness to provide mentoring

Gender bias and Science

Moss-Racusin, C. et al. (2012). "Science faculty's subtle gender biases favor male students." PNAS 109: 16474-16479.

Results

- Evaluated female applicants as more likeable but less competent
- Were more likely to hire male applicants
- Were more likely to give male applicants substantially higher starting salaries
- Were more likely to offer mentoring to male students

Moss-Racusin et al. 2012. Data

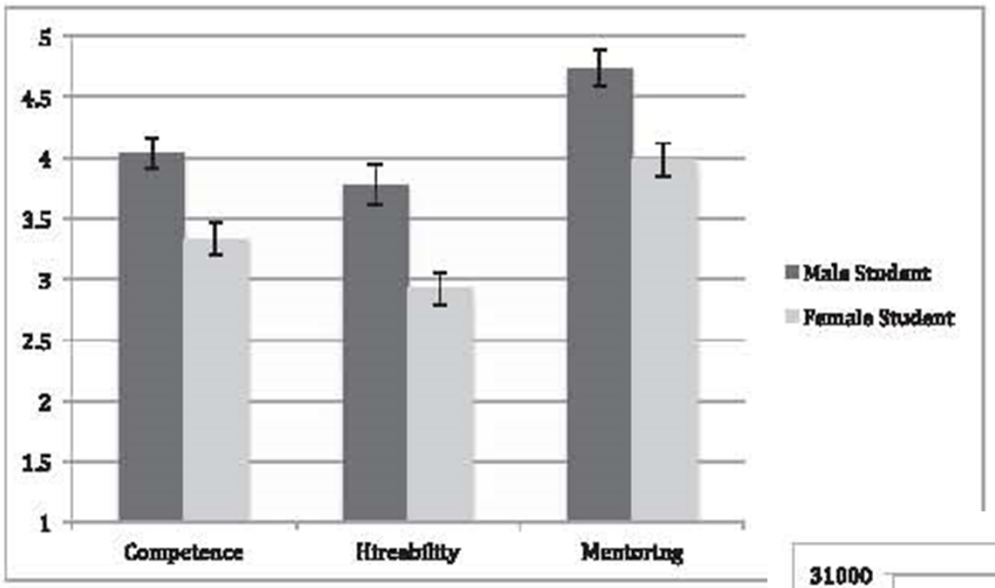


Fig. 1. Competence, hireability, and mentoring by student
(collapsed across faculty gender). All student gender differen
($P < 0.001$). Scales range from 1 to 7, with higher numbers re
extent of each variable. Error bars represent SEs. $n_{\text{male stu}}$
$n_{\text{female student condition}} = 64$.

Fig. 2. Salary conferral by student gender condition (collapsed across faculty gender). The student gender difference is significant ($P < 0.01$). The scale ranges from $15,000 to $50,000. Error bars represent SEs. $n_{\text{male student condition}} = 63$, $n_{\text{female student condition}} = 64$.

Selected forms of bias

- Expectancy Bias

  Expecting certain behaviors or characteristics in individuals based on stereotypes or assumptions about the social category to which they belong.

- Presumed competence/incompetence

  Making judgments about the competence or incompetence of individuals on the basis of stereotypes about the group to which they belong.

- Role Congruity/Incongruity

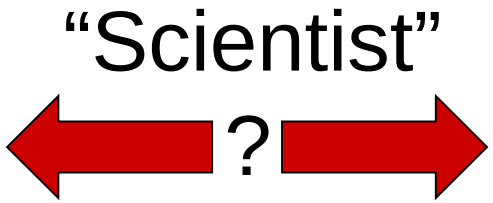
  The fit (or lack of fit) between group stereotypes and occupations or occupational roles.

Selected forms of bias

Role Congruity/Incongruity

Men

- Strong
- Decisive
- Intelligent
- Logical
- Unemotional
- Good at math



Women

- Nurturing
- Nice
- Supportive
- Sympathetic
- Emotional
- Verbal

Selected forms of bias (Cont.)

- In-group preferences

  Being more comfortable interacting with people who share your group identity/identities.

- Microaggressions

  "… brief and commonplace daily verbal, behavioral, or environmental indignities, whether intentional or unintentional,
  that communicate hostile, derogatory, or negative … slights and insults toward [members of underrepresented groups]."

  Derald Wing Sue, *Racial Microaggressions in Everyday Life (2010)*

- Stereotype Threat

  Members of negatively stereotyped groups may underperform when reminded of their group membership

Selected forms of bias

Stereotype Threat

- NPR Audioclip: How stereotypes can drive women to quit science
- Good, J. (2010). "The Effects of Gender Stereotypic and Counter-stereotypic Textbook Images on Science Performance." *J. of Social Psychology* 150(2):132-147.
  - Stereotype-consistent images (male scientists) – male students score significantly higher than female students.
  - Counter-stereotype images (female scientists) – female students scored significantly higher than they did when images were stereotype consistent; male student scored lower – though not statistically significant.
  - Mixed gender images – no difference between male and female students scores.

Good, J. et al., 2010
Performance Data

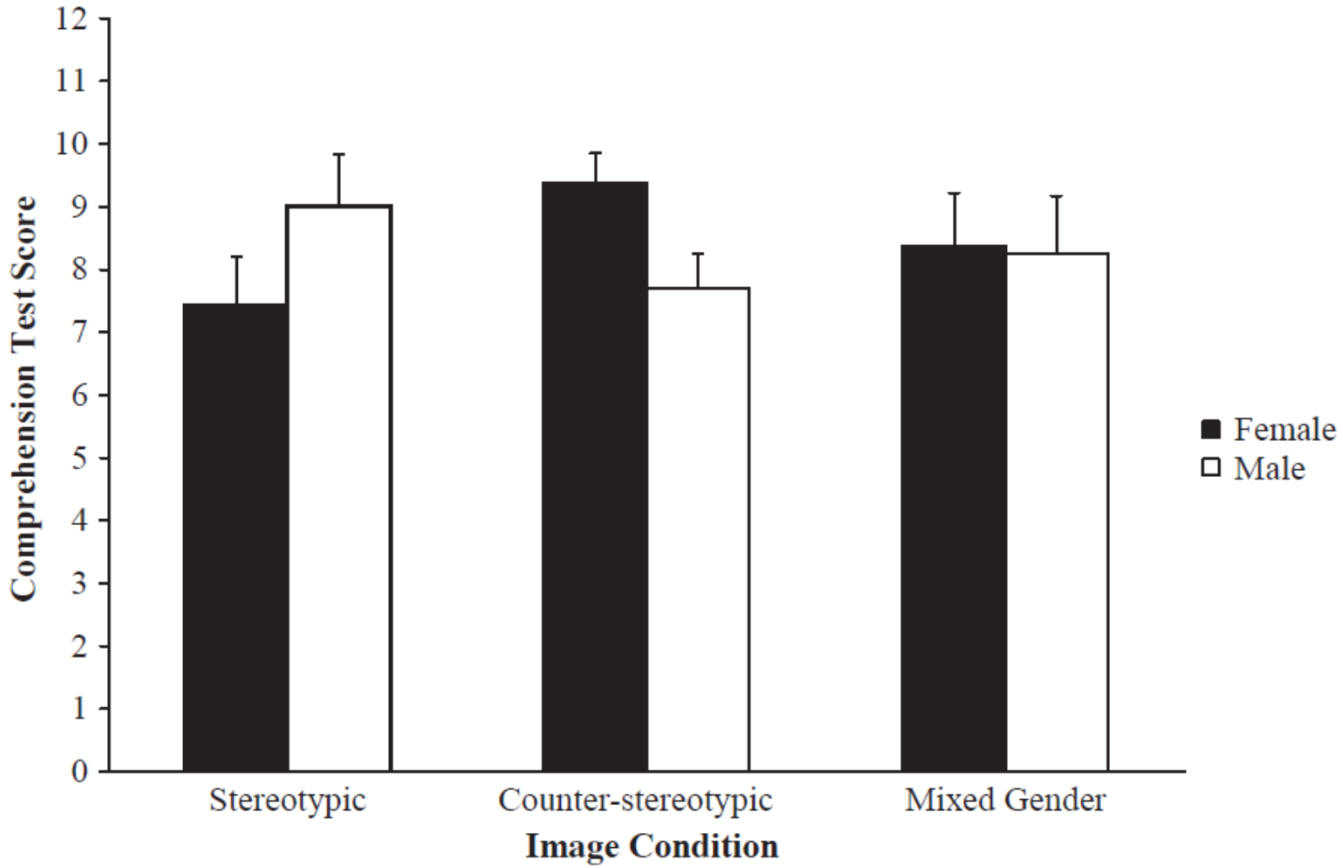


FIGURE 1. Significant interaction of sex and image condition on comprehension score.

Next Session

- Minimizing the influence of unconscious bias
- Other strategies for advancing and promoting women in science