Gender Issues in Academic Medicine, Science, and Engineering

University of Iowa
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Topics Covered Today

- Frame issue
- Illustrate how implicit assumptions about gender can undermine explicit egalitarian goals
- Highlight some interventions that reduce the cognitive distortion that results from implicit assumptions
- Case discussion

Tremendous gains in medicine

- In 2007-08, women comprised:
  - 49% of medical students
  - 45% residents & fellows
  - AMCs
    - 34% faculty
    - 12% chairs
    - 10% deans
  - 25% NIH R01 applicants and recipients

Gender issues remain in medicine

- Research = pathway to leadership in academic medicine
  - Women are more likely to be clinicians and educators Tesch et al., JAMA, 1995; Wright et al., Acad Med, 2003
  - Women more likely to be assigned "institutional housekeeping" Bird & Wang, NSWA, 2004
- Gender-based and frank sexual harassment remain prevalent Shiffman et al., JAMWA, 1995; Frank et al., Arch Intern Med, 1998; Witte et al., Acad Med, 2006
- Women physicians earn less with comparable productivity Wright et al, Acad Med, 2003; Ash et al., Acad Med, 2002
- "Climate" less supportive of women's careers Foster et al., Acad Med, 2000; Carr et al., JWH, 2003

Benefits of Reducing Gender Bias

- Aligns with personal views of self as good and just
- Employee satisfaction higher in gender mixed work groups (Fields and Blum, J Organ Behav, 1997)
- Women's career advancement in academic health sciences linked with advancements in women's health (Carnes et al., J Womens Health, 2008)
- Prevents waste of human capital
  - $\geq$ half clinical doctorates and PhDs in biomedical and behavioral sciences awarded to women (AAMC, 2008; NSF, 2007)

Why haven’t we solved this already?

- Title IX (the Education Amendment) in 1972
- Multiple calls for gender equity for > 20 years
- National Academies of Science concluded that major barriers were:
  - Not too few women enter most fields (pipeline argument)
  - Not that women scientists are less committed to their careers (women’s deficit argument)
  - Assumptions about gender – usually unconscious – lead to habitual responses that disadvantage women in academic career advancement

Consistent story in field and experimental studies over several decades –

- Women and the work performed by women receive lower evaluations than men and the work performed by men – even if the work is *identical* – multiple studies: e.g. Heilman, 2004; Wenneras and Wold, 1997; Steinpreis, 1999
- Sex of the evaluator makes no difference – i.e *both* men and women give women lower evaluations – nearly universal
- Women are particularly disadvantaged at evaluation points advancing to high authority positions, especially elite leadership positions – multiple studies; e.g. Sczesny et al., 2006
- Women, but not men, who self-promote receive lower evaluations – Several studies; e.g. Rudman, 1998
- Those who think they have no biases provide the most biased evaluations – Uhlmann and Cohen, 2005

We all have gender biases (conscious or unconscious) that would be predicted to subtly but significantly impede advancement of women in academic STEMM

Gender is a Social Category

- Sex is biological (xx = female; xy = male);
  - Gender is socially constructed
- Social categorization
  - People assigned to groups based on common attribute
  - Stereotyping can emerge if most members share certain characteristics

- Biology irrelevant to most professional roles occupied by men and women
  - Men and women continue to have different *social roles* outside the workplace
  - These social roles can influence gendered reactions and interactions in the workplace

Prescriptive Gender Norms

DESCRIPTIVE: How men and women actually behave

PRESCRIPTIVE: Assumptions about the way men and women in the abstract "ought" to behave:

- Women: Nurturing, nice, supportive, helpful, sympathetic, dependent = *Communal*
- Men: Decisive, inventive, strong, forceful, independent, willing to take risks = *Agentic*

RELEVANT POINTS:

- Leaders, scientists, professors: Decisive, inventive, strong, independent
- Social penalties for violating prescriptive gender assumptions
- Implicit gender biases are easily and automatically activated and once activated readily applied

Implicit biases conspire to prevent academic STEMM from achieving its explicit egalitarian goals

- Expectancy biases based on prescriptive gender norms
- Role congruity for men and implied communality deficit for women
- Reconstructing merit
- Shifting standards of reference
- Stereotype threat
- Gender priming

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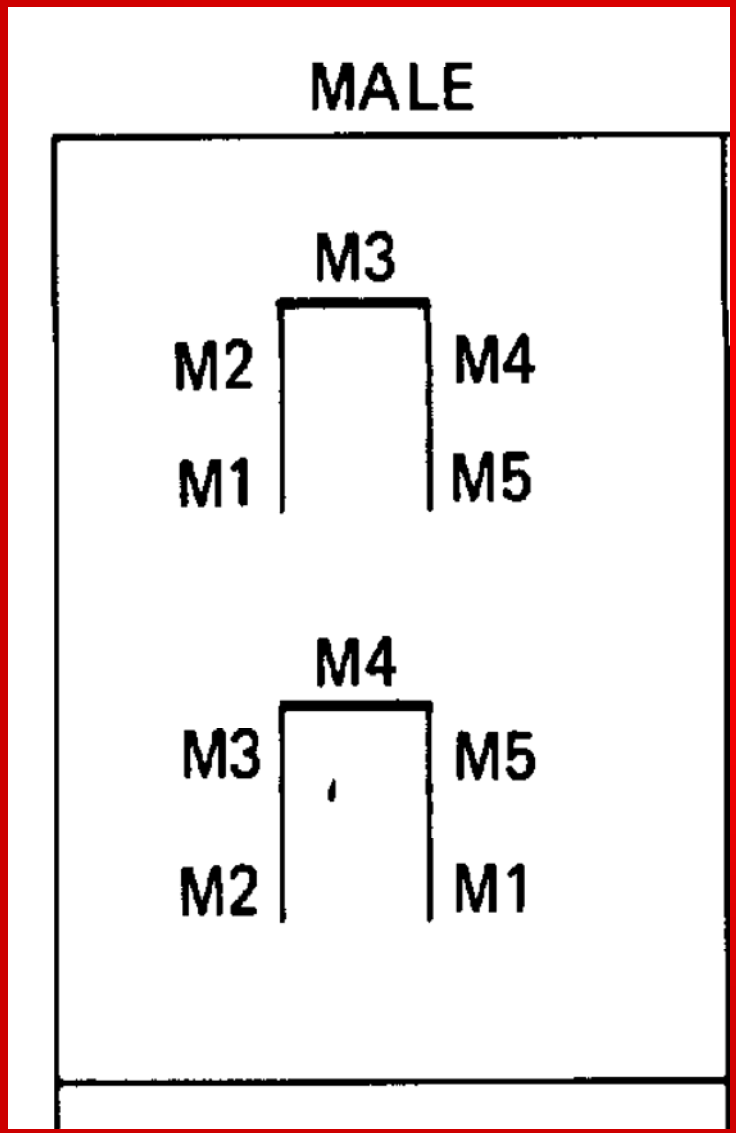
Evaluation of Leadership/Competence

- Students seated around a table – Who is the leader?

Porter & Geis 1981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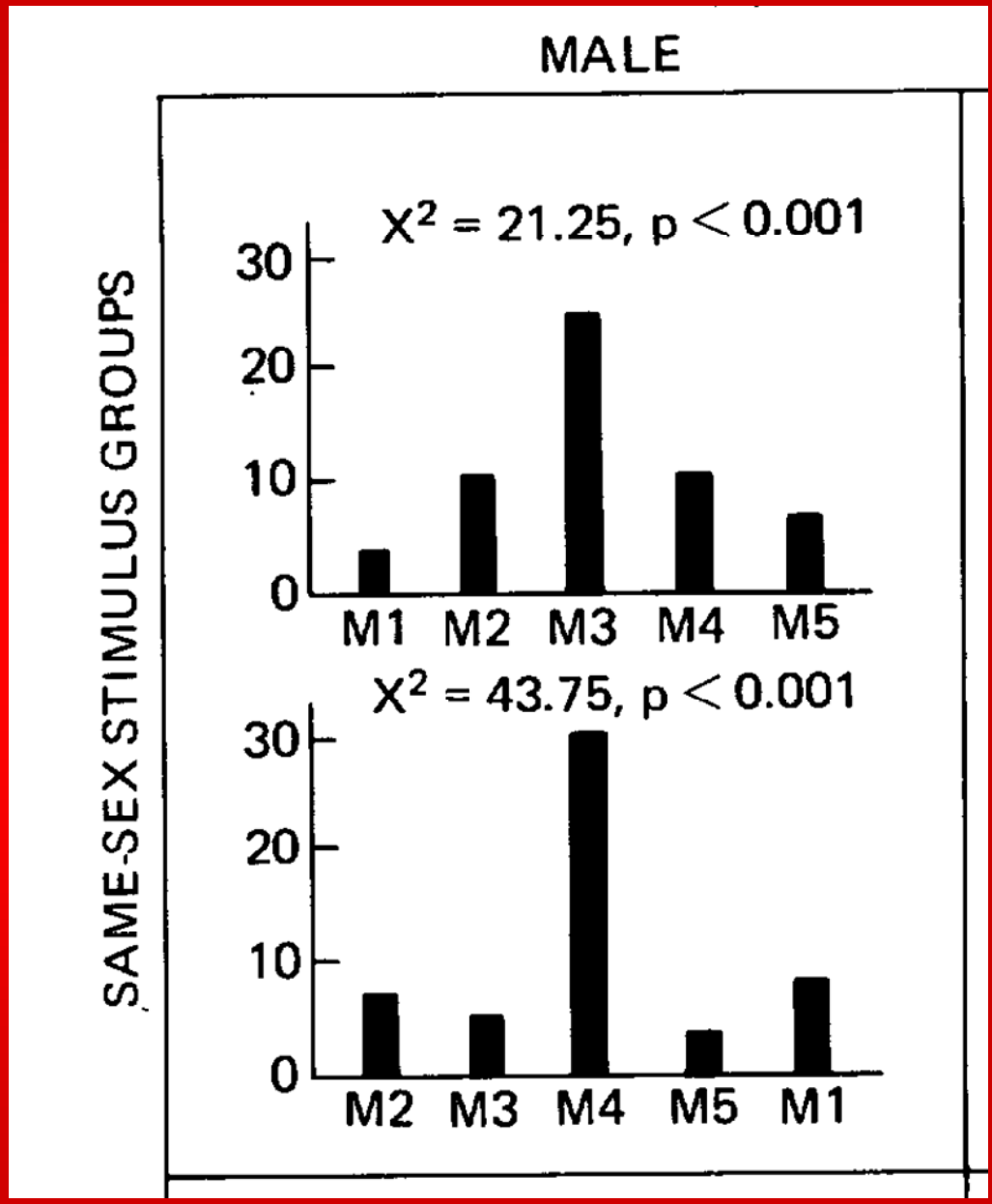
MALE
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$X^2 = 21.25, p < 0.001$
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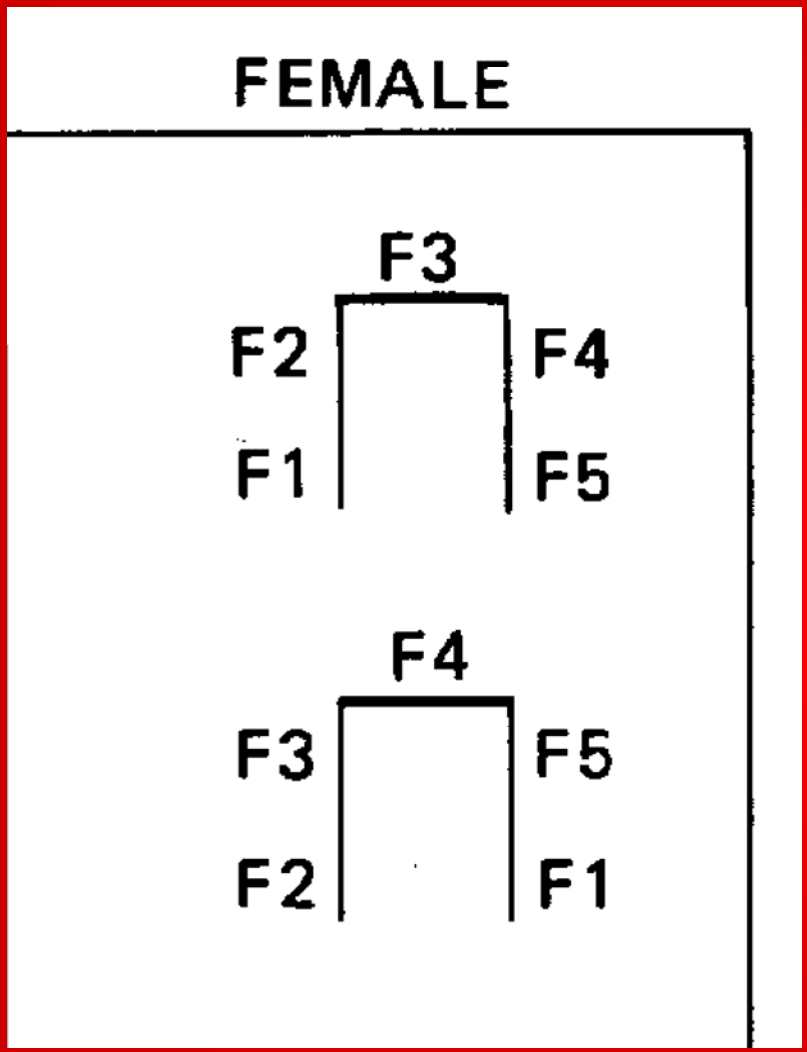
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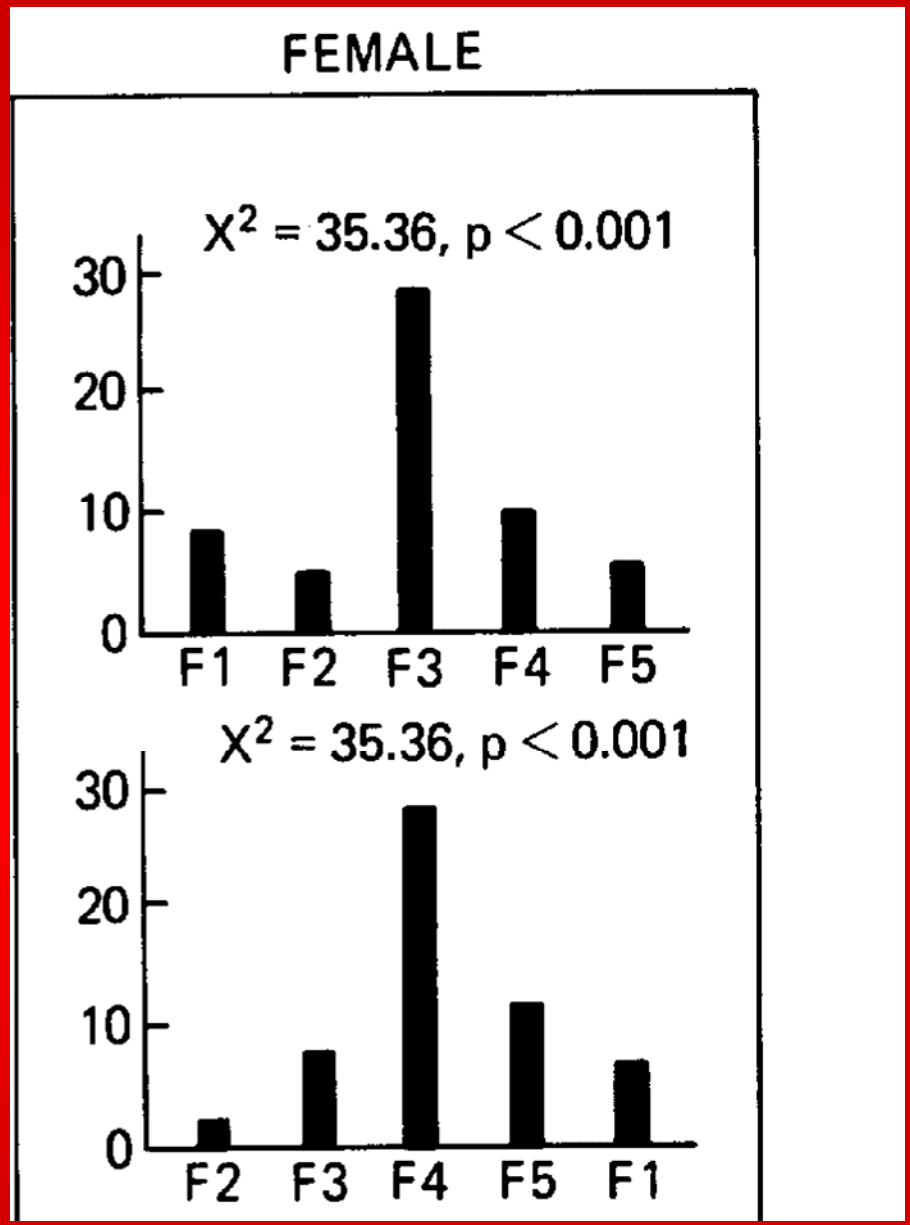
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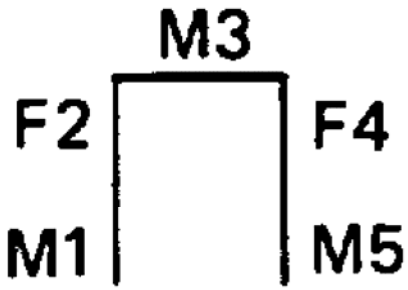
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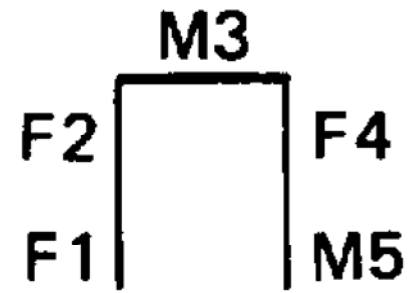
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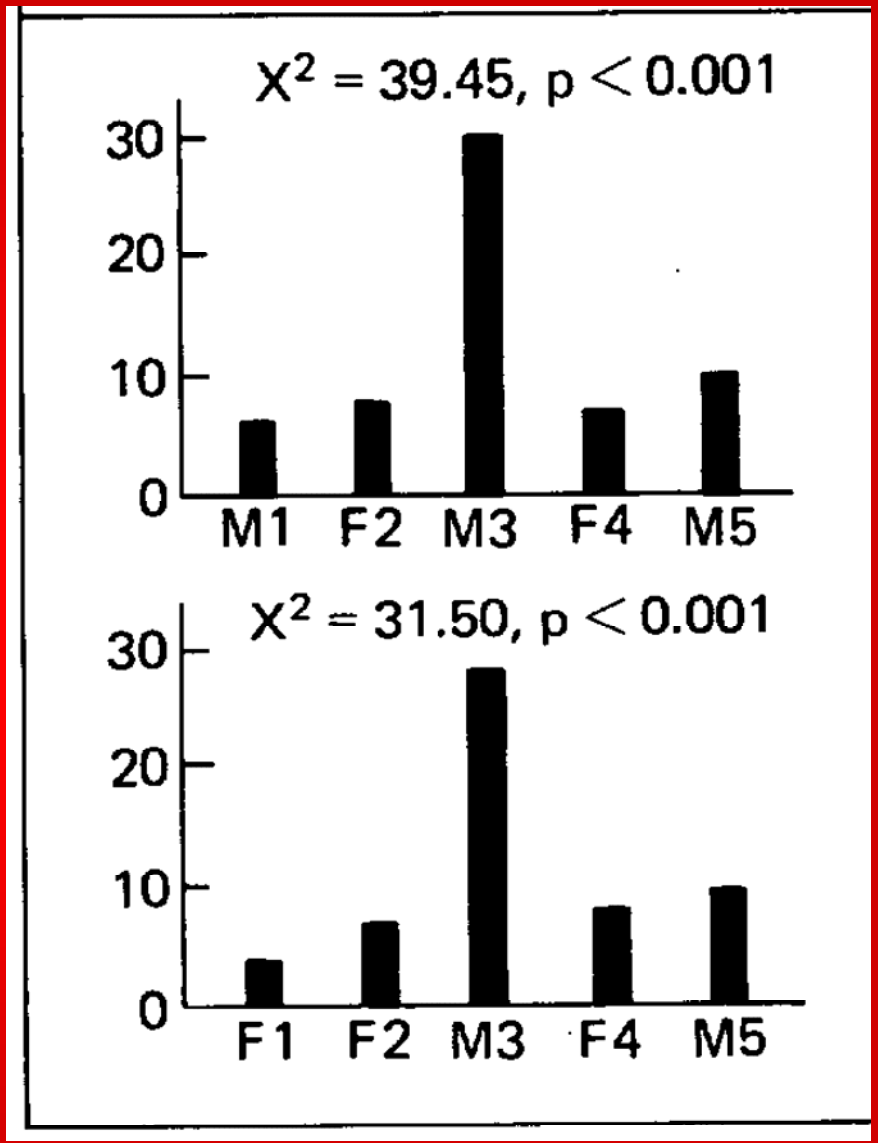
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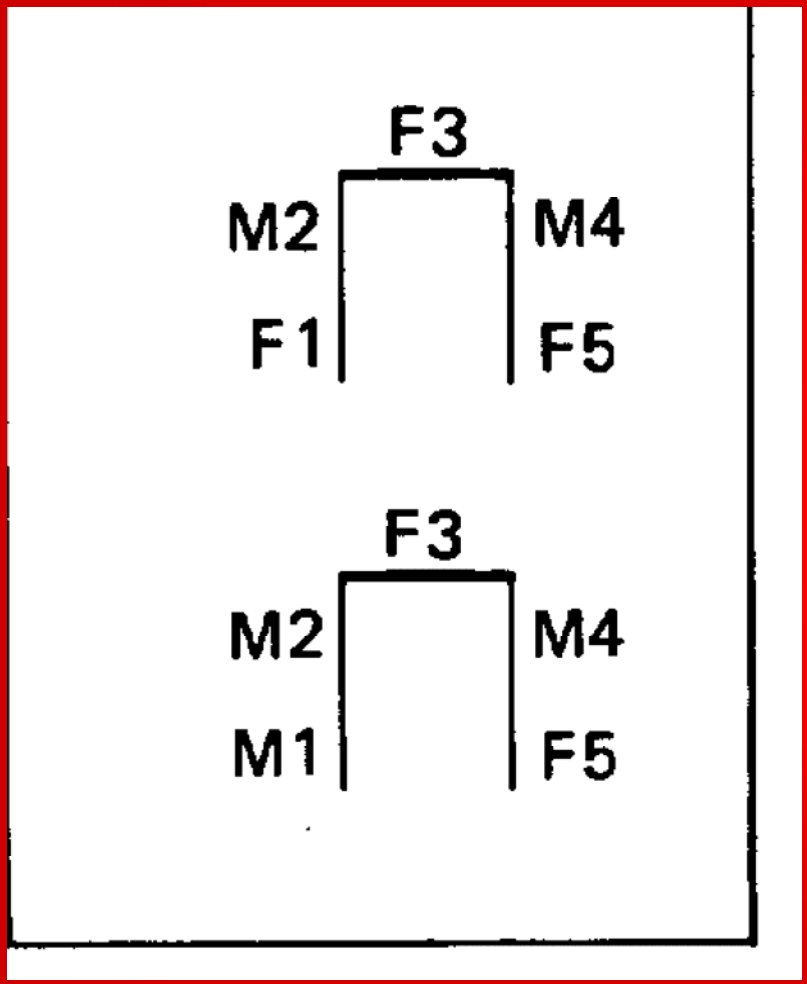
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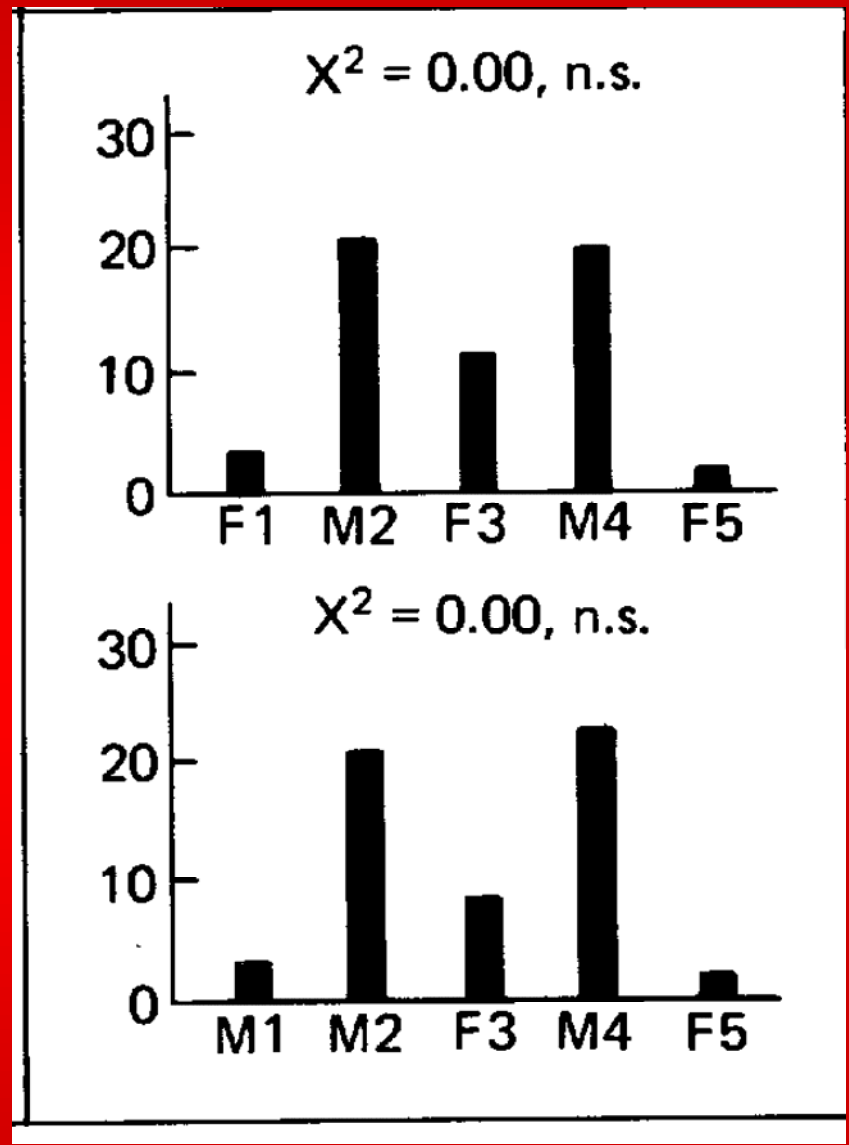
X2 = 0.00, n.s.
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X2 = 0.00, n.s.
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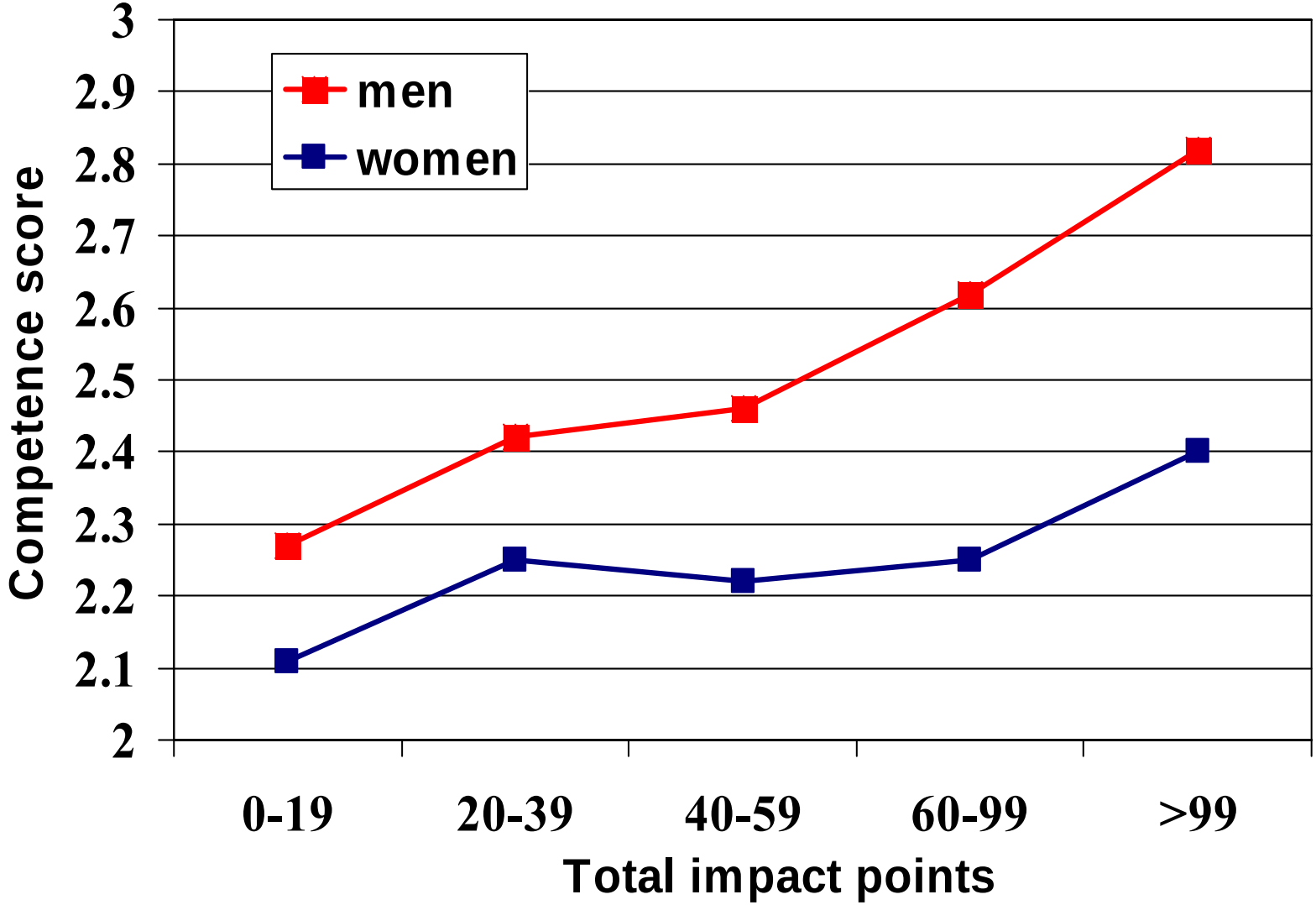
M4
F5

Expectancy Bias = Scientists are men so male scientists must be doing better science

- 114 applications for prestigious research postdocs to Swedish MRC (52 women)
- Reviewers' scores vs standardized metric from publication record = impact points
- Women consistently reviewed lower, especially in "competence"
- Women had to be 2.5x as productive as men to get the same score
- To even the score, women needed equivalent of 3 extra papers in a prestigious journal like Science or Nature

Wenneras and Wold, Nature, 1997

Wenneras and Wold, Nature, 1997



Expectancy Bias = Faculty are men

- Curriculum vitae sent to 238 academic psychologists (118 male, 120 female)
- Randomly assigned male or female name to cv
- Academic psychologists gave cv's with male names attached higher evaluations for
  - Teaching
  - Research
  - Service Experience
- More comments on cvs with female name
- Evaluators were more likely to hire the male than the female applicant

Steinpreis et al., Sex Roles 41: 509 1999

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- Gender priming

Penalties for success: Reactions to women who succeed at male gender-typed tasks

Heilman et al., J Applied Psychol 89:416-27, 2004

- 48 participants (20 men)
- Job description; Assist VP; products made suggested male (e.g. engine parts, fuel tanks). Male and female rated in two conditions:
  - Performance ambiguous
  - Performance clear

Competence Score:

Competent - incompetent
Productive - unproductive
Effective - ineffective

Achievement-related Characteristics:

Unambitious - ambitious
Passive - active
Indecisive - decisive
Weak - strong
Gentle - tough
Timid - bold
Unassertive - assertive

Likeability:

Likeable - not likeable

How much do you think you would like to work with this person?

Very much - not at all

Interpersonal Hostility:

Abrasive - not abrasive
Conniving - not conniving
Manipulative - not manipulative
Not trustworthy - trustworthy
Selfish - not selfish
Pushy - accommodating

Comparative Judgment::

Who is more likeable?
Who is more competent?

Results

Performance ambiguous

- Likeability and hostility comparable
- Men more competent
- Men more achievement-related characteristics

} Congruity of roles for men and *in*congruity for women

Performance clear

- Competence comparable
- Achievement-related characteristics comparable
- Women less liked
- Women more hostile

} Penalty for gender role violation

Why Are Women Penalized for Success at Male Tasks?: The Implied Communality Deficit

Heilman & Okimoto J Apppl Psychol 92:81-92, 2007

- Similar design – evaluating VP's in male-gendered position
- Memo from CEO introducing each VP; sentence varied in last paragraph:
  - Communal ("caring and sensitive" to employees; encourages "cooperation and helpful behavior")
  - Positive non-communal ("worked hard to maximize employees' contributions")

Results

- No effect of participant sex
- Positive non-communal or no information:
  - Women vs men
    - Less likable
    - More hostile
    - Less desirable as boss
- Communal information
  - Men - no effect
  - Women vs men
    - More likable
    - Comparable hostility and boss desirability

Heilman & Okimoto J Apppl Psychol 92:81-92, 2007

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Constructed Criteria:
Redefining Merit to Justify Discrimination
Uhlmann and Cohen, Psychol Sci, 16: 474-480, 2005

- Mock hiring situation – 3 studies
- Male and female applicants with identical credentials
- Police Chief – criteria constructed to favor male applicant
- Women's Studies Professor – criteria constructed to favor female applicant
- Self-perceived objectivity predicted gender bias

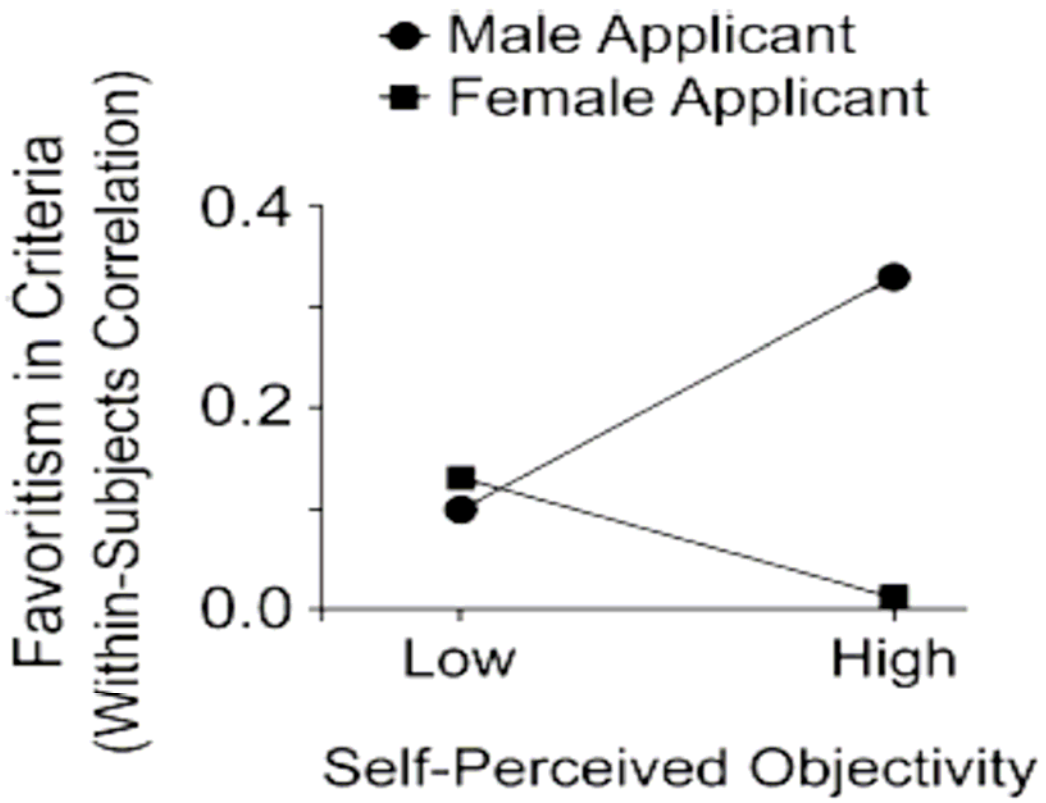

Fig. 2. Results from Experiment 1: the interaction of applicant's gender and self-perceived objectivity in predicting biased criteria. Low self-perceived objectivity is defined as one standard deviation below the mean; high self-perceived objectivity is defined as one standard deviation above the mean. Higher numbers indicate greater favoritism toward the applicant.

Study 3 -

- Half of the evaluators rated importance of criteria *before* seeing applications (commitment vs no-commitment)
- No-commitment: Criteria constructed to favor male applicant
- Commitment: Male and female applicants – similar hiring evaluations

Uhlmann and Cohen, Psychol Sci, 16: 474-480, 2005

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Shifting Standards of Reference:

Occurs when reliance on a group trait or stereotype leads to evaluation using a different referent standard (e.g.,strong, for a woman; sensitive, for a man)

Shifting Standards of Reference cause cognitive distortions in judgment

- Height of men overestimated and women underestimated despite standard reference
  Nelson, Biernat, Manis, J Pers Soc Psychol 25: 356-71, 1990
- Woman judged *lower* than men on actual wages but *higher* in financial success Biernat, et al.,J Pers Soc Psych 60:485, 1991
- Women applicants as likely to be shortlisted but less likely to be hired for male gender-typed job
  Biernat & Fuegen, J Soc Issues 57:707-724, 2001

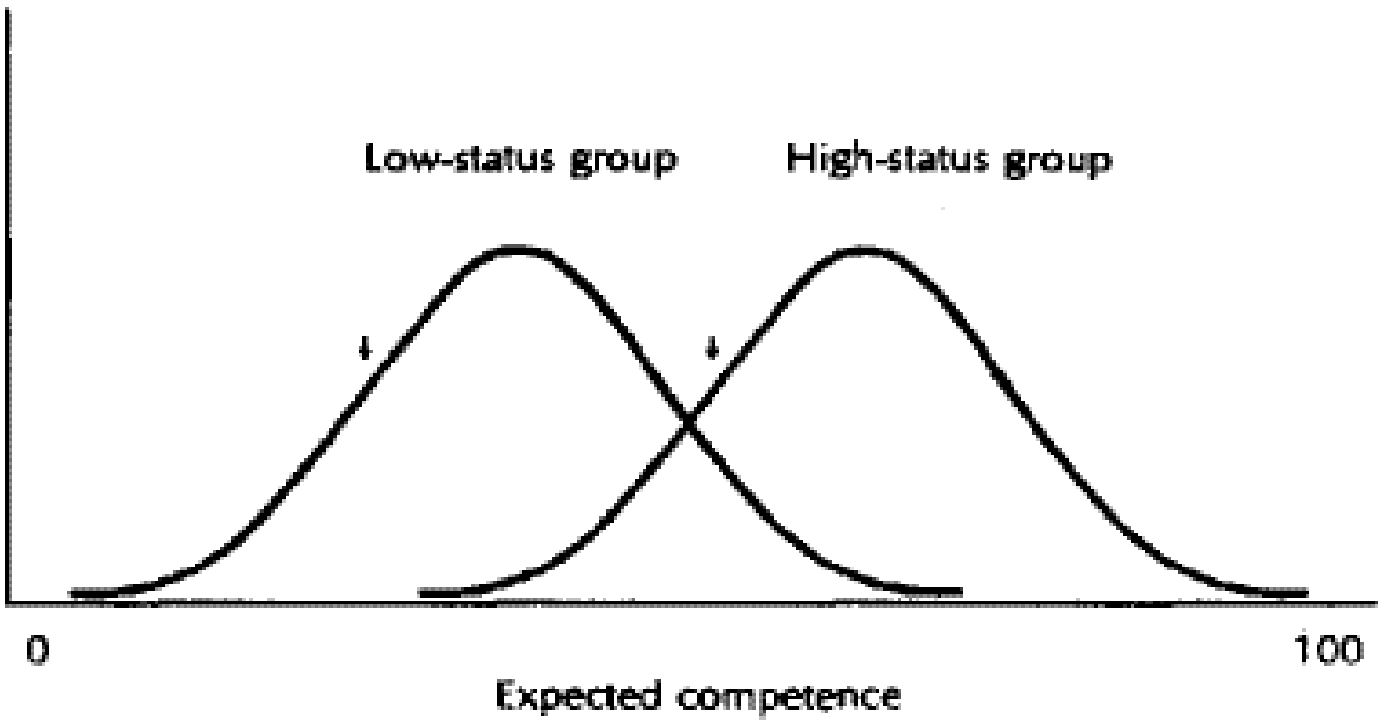

Figure 1. Schematic depiction of stereotyped representation of competence and minimum-standard levels for low- and high-status groups.

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Clearing the Air: Identity Safety Moderates the Effects of Stereotype Threat on women's Leadership Aspirations

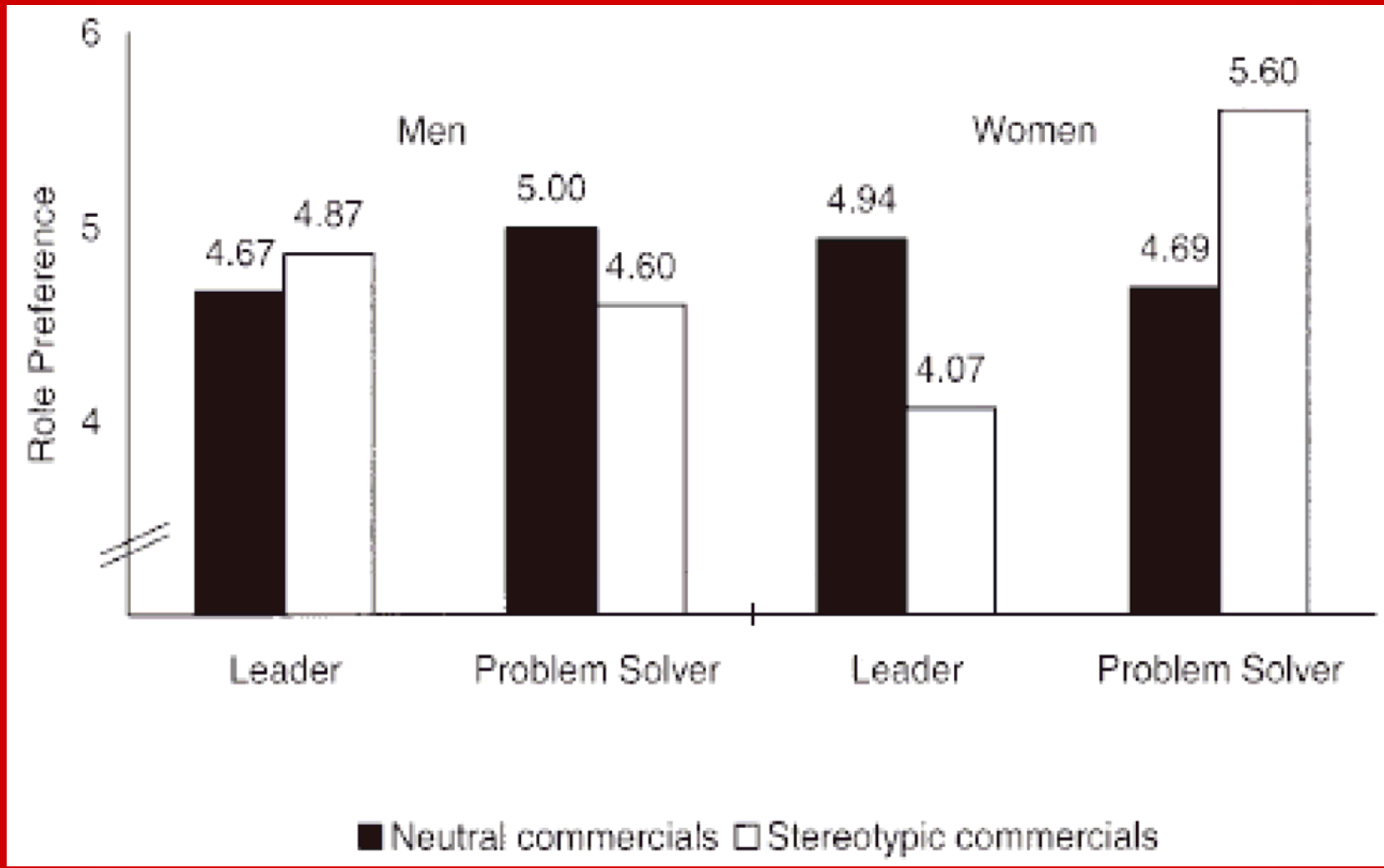
Davies, Spencer &Steele, J Pers Soc Psych 88:276-287, 2005

- 61 Ss (30 M, 31 F)
- Gender Priming = viewed commercials that reinforced female gender stereotypes or neutral
- Stereotype Threat = women are less able to lead
- Asked to select role as "leader" or "problem-solver" in a subsequent group task

Results

- Men in all conditions and women after neutral commercials
  - No clear role preference
- Women after gender priming
  - Strong preference for problem-solver rather than leader

Davies, Spencer &Steele, J Pers Soc Psych 88:276-287, 2005

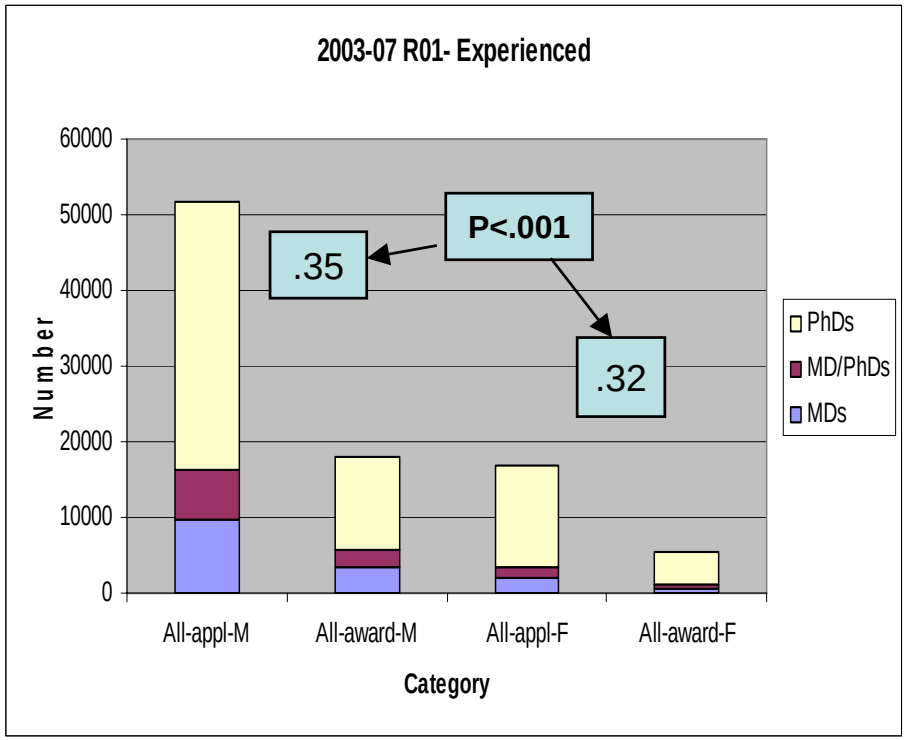

6
5
4
Role Preference
Men
Women
4.67
4.87
5.00
4.60
4.94
4.07
4.69
5.60
Leader
Problem Solver
Leader
Problem Solver
Neutral commercials
Stereotypic commercials

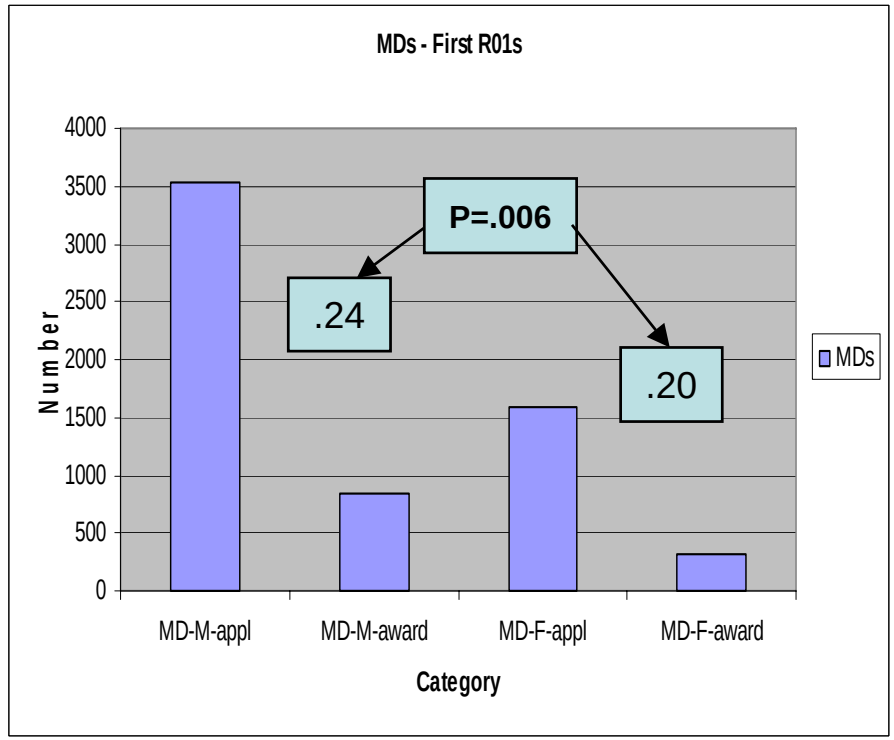
Affirmation of gender competence removed impact of stereotype threat

- Study repeated with:
  - Confirmation of gender priming
  - Randomized, controlled inclusion of statement affirming competence of men and women in both tasks
- Results:
  - Priming did activate stereotype
  - Affirming statement completely eliminated impact on role selection

Davies, Spencer &Steele, J Pers Soc Psych 88:276-287, 2005

Gender difference in NIH Award rates, 2003-07





Ley & Hamilton Science, 2008

MALE

NIH R01

- High prestige
- Scientific leadership
- Keen competition for scarce resources with high status

Agentic

NIH K23

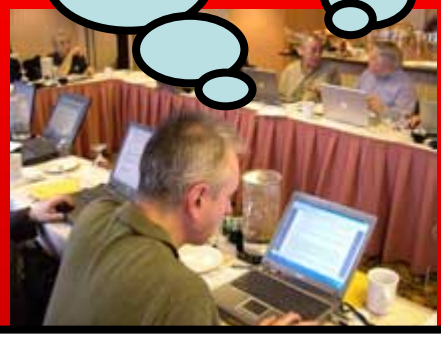
- Mentored (usually by senior male)
- Lower status than reviewers
- Lower budget
- Less competitive

Communal

FEMALE

- Role congruity for men
- Implied communality deficit for clearly competent agentic women

- Status differential replicates societal gender roles



Study Section

Letters of Recommendation

- 312 letters of rec for medical faculty hired at large U.S. medical school
- Letters for women vs men:
  - Shorter
  - 15% vs 6% of *minimal assurance*
  - 10% vs 5% with *gender terms* (e.g. “intelligent young lady”; “insightful woman”)
  - 24% vs 12% *doubt raisers*
  - *Stereotypic adjectives*: “Compassionate”, “related well…” vs “successful”, “accomplished”
  - 34% vs 23% *grindstone adjectives*
  - Fewer *standout adjectives* (“outstanding” “excellent”)

Trix and Psenka, Discourse & Soc 14:191 2003

NIH Director's Pioneer Awards

- All 9 went to men in the first round (2004)
- In subsequent rounds, women received:
  - 2005 = 43%
  - 2006 = 31%
  - 2007 = 33%
  - 2008 = 25%

Were women doing better science after 2004?

2004	≥ 2005
Characteristics of target scientist and research	
Risk-taking emphasized: • "exceptional minds willing and able to explore ideas that were considered risky" • "take…risks" • "aggressive risk-taking" • "high risk/high impact research" • "take intellectual risks" • URL includes "highrisk"	Emphasis on risk removed: • "pioneering approaches" • "potential to produce an unusually high impact" • "ideas that have the potential for high impact" • "highly innovative" • URL no longer includes "risk"
Description of recommendations from outside consultants	
Technological advances highlighted as desirable: • "support the people and projects that will produce tomorrow's conceptual and technological breakthroughs"	Mention of technological breakthroughs removed; human health added: • "encourage highly innovative biomedical research with great potential to lead to significant advances in human health."

Semantic priming and tenure criteria?

- 25 top research academic medical centers
- Tenure criteria from websites
- Scanned for “Leader”
- Also scanned for other Bem Sex Role Inventory male, female, neutral words
- Slopes of regressions for annual % faculty tenured women x 7 years
- “Leader” = OR 6.0 (1.02, 35.37) for slope below median compared to those without

Marchant, Bhattacharya, Carnes. J Woman’s Health, 2007

Stereotypically male traits valued for tenure = role congruity for men?

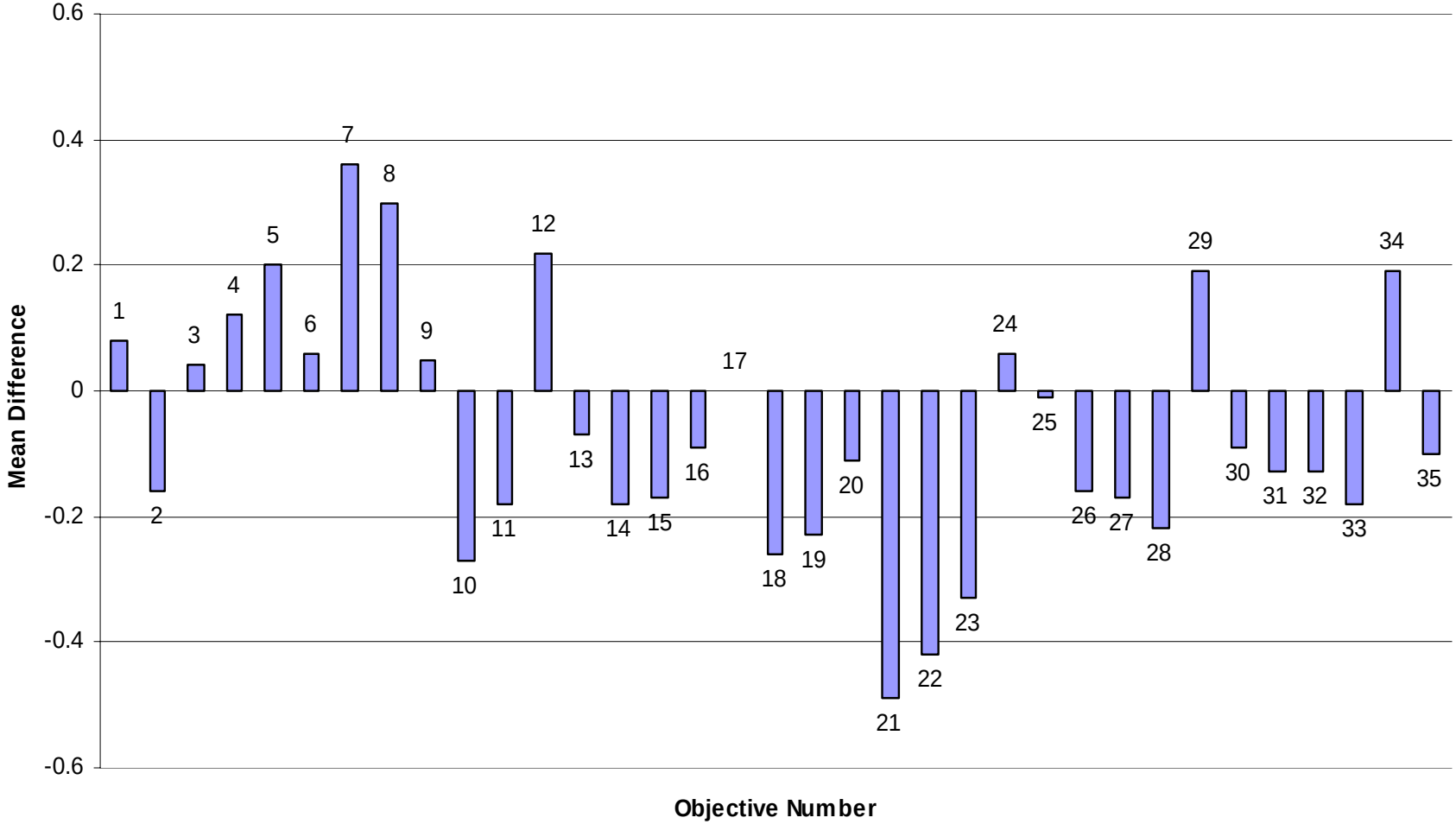
Male	Neutral	Female
• Analytical • Competitive • Defends • Independent • Individualistic • Leadership • Risk	Friendly Helpful Inefficient Truthful	Sensitive Understanding Yielding
Median 5.5/school; 2-50 Total 183	4 schools Total 5	3 schools Total 3

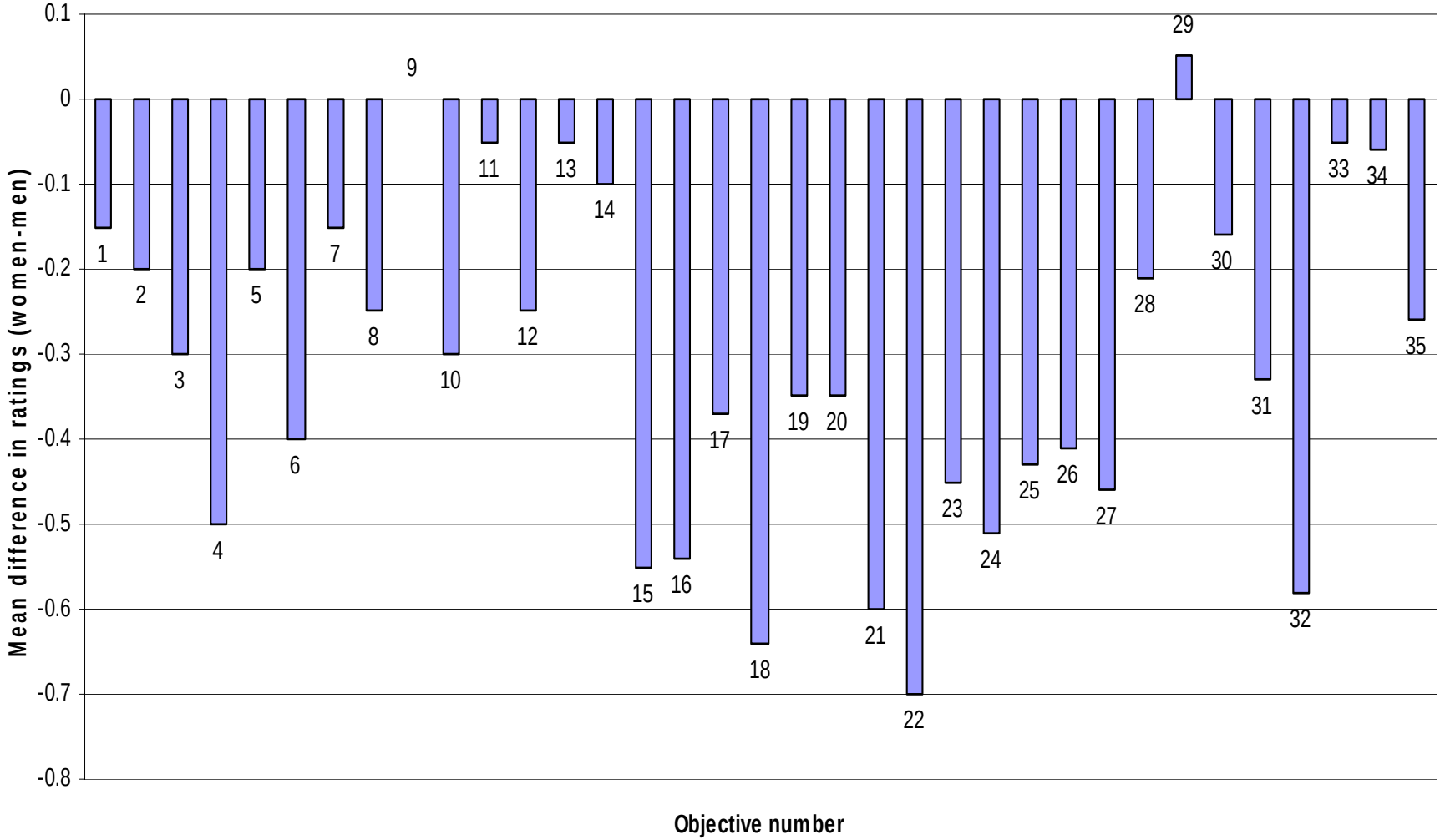
Gender Differences in Self-Assessed Abilities to Perform Clinical Research = Stereotype Threat?

- Women (n=28) entering a program to train clinical investigators scored lower than men (n=29) on 22/35 competencies
  - significantly lower on “spend sufficient time developing and advancing one’s own area of scientific research.”
- Following 3 d workshop, gender difference increased; women lower on 34/35, sign. for 7

Bakken et al., Acad Med, 2003

Pre-training difference in mean ratings of men and women for each objective on the self-assessment (n=57).

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Mean difference in ratings (women-men)
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Objective number

Evidence-Based Strategies –
For women in male sex-typed roles

- Avoid triggering female stereotype of less competence *and* implied communality deficit = narrow range of behavior
  - Too stereotypically feminine = triggers assumptions of incompetence, dependence
  - Too stereotypically masculine = penalties for gender role violation
- Agentic but communal = powerful combination
- Individuate whenever possible = prevents filling in gaps with stereotyped assumptions

Evidence-Based Strategies –
For institutions committed to gender equity

- Reaffirm that *"research shows there is no gender difference in the performance of…"*
- Structure evaluation processes to allow individuation
- Remove sources of information that lead to stereotype threat (e.g. picture gallery of white men)
- Examine wording of internal awards for gender priming favoring male applicants
- Establish value of credentials before reviewing applicants

In spite of our egalitarian goals, gender bias recurs

2004

NIH Director's Pioneer Award

Conditions that lead to application of gender bias:
Male semantic priming – "high risk research", "technological breakthroughs"
Rapid, unfamiliar review
Ambiguous performance criteria

Round 1 = 9/9 men

Conscious efforts to reduce application of implicit bias

Round 2+ = ≥25% women

2006

CTSA Awards

Conditions that lead to application of gender bias:
High prestige
Leader of leaders
Big budget
Lots of institutional power
Ambiguous performance criteria

Round 1 = 35 male PIs

Conscious efforts to reduce application of implicit bias

Round 2+ = ≥16% women

Carnes et al., 2005, 2006, 2007

Conclusion/Summary

- Women physicians & scientists have made tremendous advances but gender bias causes cognitive distortions at both the individual and institutional level that conspire to reduce women's full participation in the academic STEMM enterprise
- The subtlety of these distortions enables bias against women to enter decision-making processes without being overt (both of individual women and those rating women's work)
- Academic medicine would be well served if we diagnose and treat gender bias with the same reverence for evidence-based decision-making that we demand in our clinical practice and teaching

Case of Dr. Leroy