The Quality of Evidence Revealing Subtle Gender Biases in Science is in the Eye of the Beholder

Gender Bias in STEM

Much published research demonstrates a gender bias against women—or favoring men—in several STEM contexts, including hiring decisions for a lab-manager position, evaluations of conference abstracts, research citations, symposia-speaker invitations, postdoctoral employment, and tenure decisions.

Why do we care? Homogenous workforces (including the academic workplace) can deplete the creativity, discovery, and satisfaction of workers, faculty, and students; Yet, STEM fields are fairly homogeneously male (e.g., 71% at 4-year U.S. colleges).

But, **are people generally** (e.g., taxpayers, voters, government officials, etc.), ***and STEM practitioners in particular,*** **"buying" the mounting evidence of these gender biases within the STEM community?**

There are several reasons to **predict men would assess the quality of this evidence less favorably, and women more favorably, particularly within STEM areas.** Why?

- Men overall, especially those who identify with STEM, might perceive the research as threatening.
- The research might fit with women's expectations more than with men's expectations, therefore seeming more or less legitimate.

We conducted 3 experiments to test these ideas (Handley et al., 2015).

Science faculty's subtle gender biases favor male students

Despite efforts to recruit and retain more women, a stark gender disparity persists within academic science. Abundant research has demonstrated gender bias in many demographic groups, but has yet to experimentally investigate whether science faculty exhibit a bias against female students that could contribute to the gender disparity in academic science. In a randomized double-blind study (n = 127), science faculty from research-intensive universities rated the application materials of a student—who was randomly assigned either a male or female name—for a laboratory manager position. Faculty participants rated the male applicant as significantly more competent and hireable than the (identical) female applicant. These participants also selected a higher starting salary and offered more career mentoring to the male applicant. The gender of the faculty participants did not affect responses, such that female and male faculty were equally likely to exhibit bias against the female student. Mediation analyses indicated that the female student was less likely to be hired because she was viewed as less competent. We also assessed faculty participants' preexisting subtle bias against women using a standard instrument and found that preexisting subtle bias against women played a moderating role, such that subtle bias against women was associated with less support for the female student, but was unrelated to reactions to the male student. These results suggest that interventions addressing faculty gender bias might advance the goal of increasing the participation of women in science.

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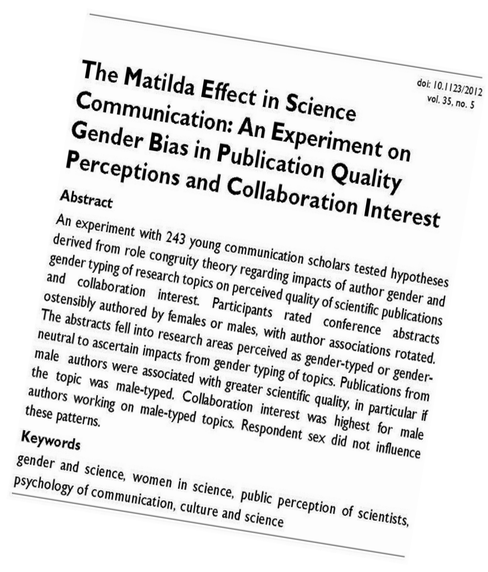

The Matilda Effect in Science Communication: An Experiment on Gender Bias in Publication Quality Perceptions and Collaboration Interest

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Abstract

An experiment with 243 young communication scholars tested hypotheses derived from role congruity theory regarding impacts of author gender and gender typing of research topics on perceived quality of scientific publications and collaboration interest. Participants rated conference abstracts ostensibly authored by females or males, with author associations rotated. The abstracts fell into research areas perceived as gender-typed or gender-neutral to ascertain impacts from gender typing of topics. Publications from male authors were associated with greater scientific quality, in particular if the topic was male-typed. Collaboration interest was highest for male authors working on male-typed topics. Respondent sex did not influence these patterns.

Keywords

gender and science, women in science, public perception of scientists, psychology of communication, culture and science

The Experiments

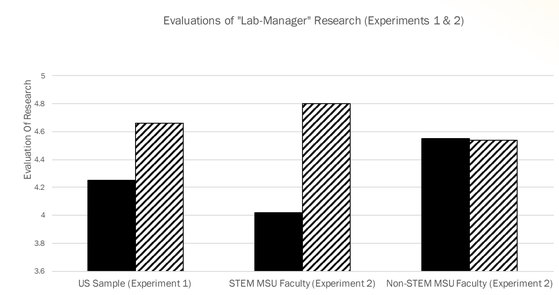
In each experiment, *male and female* participants read via an online survey instrument an *actual article abstract* from a peer-reviewed scientific journal, accompanied by the date and title of the article.

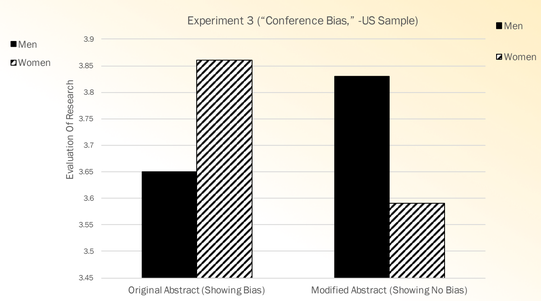
Participants then evaluated their agreement with the authors' interpretation of the results, the importance of the research, and how well-written and favorable they found the quality of the abstract.

Experiment 1: Participants came from a general sample of US adults recruited online through Amazon's Mechanical Turk (n = 205). They read and evaluated an abstract documenting gender bias in evaluations for a lab manager position (Moss-Racusin et al., 2012).

Experiment 2: Participants (n = 205) were STEM and Non-STEM faculty at **MSU**, who read and evaluated the same abstract.

Experiment 3: We randomly assigned new participants, recruited online through Amazon's Mechanical Turk (n = 303), to read either an original abstract reporting a gender bias against women's (relative to men's) scientific conference submissions (Knobloch-Westerwick et al., 2013), or a version slightly altered to report no gender bias.





Experiment 1: Significant effect of participant gender, $F(1, 197) = 9.85$, $p = .002$, $\eta^2_{partial} = .048$, (d = .45).

Experiment 2: Significant effect of participant gender, $F(1, 174) = 6.08$, $p = .015$, $\eta^2_{partial} = .034$, (d = .40).
Significant interaction between gender and STEM field, $F(1, 174) = 5.19$, $p = .024$, $\eta^2_{partial} = .03$

Experiment 3: Significant interaction between gender and abstract version, $F(1, 299) = 4.00$, $p = .046$, $\eta^2_{partial} = .013$

Conclusions

Sex biases individuals' evaluations of scientific evidence demonstrating gender biases in STEM fields.

- Men (Exp. 1), especially in STEM fields (Exp. 2), evaluated research demonstrating a bias against women lab-manager applicants in STEM less favorably than did women.
- Men (Exp. 3) evaluated research less favorably than did women if demonstrating a bias against women's STEM conference submissions, but women evaluated the research less favorably than men if the research conclusions were doctored to report no such gender bias.

There *are* gender biases in *many* STEM contexts, yet men seem less (and women more) favorable to that research.

Future efforts to combat gender bias in STEM will have to mitigate this bias if we are to optimize equity in the academy.

References

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