AN ANNOTATED BIBLIOGRAPHY OF WORK RELATED TO GENDER IN SCIENCE

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The purpose of this manuscript is to gather together a large amount of source material pertaining to women in mathematics, from studies of girls in elementary school through data on females winning prizes for mathematical research. Along the way, we have also gathered a large amount of material from the psychology and sociology literature on implicit biases more generally, particularly pertaining to gender. This source material was then used to support the writing of the article [52]. We have tried to refer to primary research literature whenever possible, although we have also included well-written blog posts, organizational web sites, self-published articles by research organizations, and even a YouTube video.

Each bibliography entry is accompanied by some remarks summarizing its content (these will be cleaned up in the final version of this manuscript) and representative quotes from the articles themselves. We have followed standard practice when including these quotes, with the following exception: where the original quote has included citations to other work, or supporting statistics such as p-values, we have omitted these annotations to enhance the clarity of the quote. Nevertheless, much of the work in this bibliography contains a large number of further references to the relevant research literature.

The annotated bibliography is thus reasonable for browsing; but for those looking to find source material for particular aspects of this issue, we hope the following categories will be of some use:

- Hypotheses on biological science differences: [7], [23], [34], [46], [51], [80]
- Declining gender gap: [4], [23], [34], [40], [41], [46], [62]
- Overemphasis of/problems with standardized tests: [1], [23], [40], [60]
- Extremely high math achievement in children: [4], [34], [40], [41], [60]
- Role of culture's gender equity: [23], [34], [41], [46]
- Biases in primary school classrooms: [1], [8], [51], [60], [85]
- Fixed trait vs. malleable quality: [32], [57], [82]
- Explicit sexism: [7], [28], [39], [80], [87]
- Implicit biases: [6], [9], [12], [19], [20], [30], [31], [33], [38], [54], [55], [65], [70], [77], [79], [81], [87], [88]
- Incognizance of biases/illusion of meritocracy: [6], [30], [33], [49], [64], [68], [81], [83]
- Broader societal gender-based problems: [1], [4], [6], [7], [9], [16], [22], [35], [38], [39], [49], [51], [67]
- Gender-based personality expectations: [5], [10], [16], [19], [22], [24], [38], [59], [66], [74]
- Gender-based differential in self-concept: [60], [65], [73], [81]
- Effect of parenting, childcare, flexible schedule on career: [11], [18], [19], [25], [50], [56], [70], [71]
- Impostor phenomenon: [16], [47]
- Stereotype threat: [26], [32], [51], [60], [75]

- Leadership, persuasion, and negotation: [5], [10], [12], [13], [19], [22], [24], [37], [66]
- Female speakers at conferences: [2], [3], [15], [19], [25], [26], [27], [28], [30], [36], [43], [45], [61], [63], [68], [69], [76], [78], [83]
- Teaching evaluations: [48], [59], [73]
- Award winners, grants, promotion and tenure: [14], [17], [38], [49], [72], [77], [87]
- Biases in evaluation/selection processes: [11], [14], [21], [31], [36], [37], [43], [48], [49], [54], [55], [56], [65], [72], [73], [74], [79], [84], [86], [88]
- Action items and recommendations: [1], [4], [14], [15], [19], [25], [26], [28], [29], [42], [43], [45], [50], [58] [61], [69], [76], [83], [85], [87], [88]
- Further references: [1], [4], [19], [21], [23], [24], [26], [32], [34], [46], [49], [59], [64], [66], [85], [87]

The final version of this manuscript will include an appendix containing tables of data from the 2014 ICM and the 2014 Joint Meetings of the AMS and MAA, listing the various sessions and the numbers of female speakers and total speakers (and the same for organizers, where given). Some data from mathematics prizes will also be included.

We have made the conscious choice to include only initials and last names in the bibliography and in both manuscripts. We have observed a tendency to be curious about the gender of the authors of the research referred to herein, and perhaps to involuntarily wonder how the authors' gender should affect our evaluation of their conclusions. These reflexive speculations, we believe, tellingly illuminate the depth to which these implicit biases about gender are ingrained in us, even though we rationally know that possessing one gender or another does not affect a person's objectivity. Being socialized to have biases is not our fault; but preventing our biases from negatively affecting the world around us is nonetheless our responsibility.

ACKNOWLEDGMENTS

We thank W. Miao for gathering the data that will appear in the appendix, as well as for locating copies of several of the papers in this bibliography.

REFERENCES

[1] American Association of University Women, How schools shortchange girls: executive summary, The AAUW Report, 1992. http://www.aauw.org/files/2013/02/how-schools-shortchange-girls-executive-summary.pdf (accessed September 15, 2014)

"Girls receive significantly less attention from classroom teachers than do boys."

"African American girls have fewer interactions with teachers than do white girls, despite evidence that they attempt to initiate interactions more frequently."

"The contributions and experiences of girls and women are still marginalized or ignored in many of the textbooks used in our nation's schools."

"Incest, rape, and other physical violence severely compromise the lives of girls and women all across the country. These realities are rarely, if ever, discussed in schools."

"Test scores can provide an inaccurate picture of girls' and boys' abilities. Other factors such as grades, portfolios of student work, and out-of-school achievements must be considered in addition to test scores when making judgments about girls' and boys' skills and abilities."

40 Recommendations: Actions for Change

references to the AAUW Gender Equity Library

[2] American Mathematical Association, Annual survey of the mathematical sciences: full reports. http://www.ams.org/profession/data/annual-survey/survey-reports (accessed September 5, 2014)

data on math PhDs, broken down by gender (and ethnicity and employment and starting salary), from 1957–2010.

[3] Association for Women in Mathematics, Mathematics travel grants. http://sites.google.com/site/awmmath/programs/travel-grants/mathematics-travel-grants (accessed August 15, 2014)

"Enabling women mathematicians to attend conferences in their fields provides them a valuable opportunity to advance their research activities and their visibility in the research community. Having more women attend such meetings also increases the size of the pool from which speakers at subsequent meetings may be drawn and thus addresses the persistent problem of the absence of women speakers at some research conferences. The Mathematics Travel Grants provide full or partial support for travel and subsistence for a meeting or conference in the applicant's field of specialization."

[4] T. Andreescu, J. Gallian, J. M. Kane, and J. E. Mertz, Cross-cultural analysis of students with exceptional talent in mathematical problem solving, Notices of the AMS 55 (2008), 1248–1260.

"[T]he ratio of boys to girls identified in the [Study of Mathematically Precocious Youth] has dramatically declined during the past quarter century from the high of 13:1 originally reported in 1983 to 2.8:1 in a 2005 report. The fact that 29% of Ph.D.'s awarded to USA citizens in the mathematical sciences went to women in the 2006–2007 academic year supports the idea that this latter ratio is a more accurate reflection of current interest and ability in mathematics among USA females. This dramatic change likely reflects in part increased educational opportunities available to USA girls since enactment in 1972 of Title IX that banned sex discrimination in schools."

"While the USA has been producing many more women mathematicians in recent years, they remain poorly represented among tenured professors at the very top-ranked USA research universities and people identified as profoundly gifted in the field. This article presents for the first time a comprehensive compilation of data, including cross-cultural comparisons, regarding young people identified during the past twenty years as possessing profound aptitude for mathematics based upon their performances in extremely difficult examinations in mathematical problem solving. We show that many girls exist who possess such extremely high aptitude for mathematics. The frequency with which they are identified is due, at least in part, to a variety of socio-cultural, educational, or other environmental factors that differ significantly among countries and ethnic groups and can change over time. Girls were found to be 12%-24% of the children identified as having profound mathematical ability when raised under some conditions; under others, they were 30-fold or more underrepresented."

data on high achievement on Putnam, IMO, summer math programs, and US math degrees sorted by gender and also national/ethnic background

"it is deemed uncool within the social context of USA middle and high schools to do mathematics for fun; doing so can lead to social ostracism. Consequently, gifted girls, even more so than boys, usually camouflage their mathematical talent to fit in well with their peers. This peer group social problem has been noted in interviews with top Putnam students [29] and USA female Olympians [13], [28]. The overwhelming preponderance of foreign-born and Asian-American students in high school mathematics clubs is a nationwide phenomenon (for example, see [41]). Almost all of the girls who have achieved USAMO Award Winner or Honorable Mention (that is, top twenty-five) in this examination's thirty-five-year history were foreign-born, Asian-American, or home-schooled. Thus, we hypothesize that the extreme scarcity of USA-born non-Asian girls among the top scorers in the AIME, USAMO, and Putnam is not due to a lack of girls with profound intrinsic aptitude for mathematics; rather, it is due to their choosing to spend their free time on nonmathematical pursuits. The substantial overrepresentation of Asian-American and foreign-born boys indicates that USA-born non-Asian boys are also being adversely affected by the social stigma associated with doing mathematics, although not to the extreme extent it is affecting girls."

"1. First and foremost, the myth that females cannot excel in mathematics must be put to rest. Teachers, guidance counselors, parents, principals, university presidents, the lay public, and, most importantly, girls themselves need to be informed about the fact that females can excel in mathematics, even at the very highest level. When people

believe they cannot do something, it becomes a self-fulfilling prophecy. To quote Henry Ford, 'If you think you can or can't, you are right.'

"2. We need to improve greatly the lay public's perception of mathematicians via the news media, movies, and TV shows such as Numb3rs so preteens and teenagers of both genders will feel it is socially acceptable to study and to enjoy doing mathematics."

[5] L. Babcock, S. Laschever, M. Gelfand, and D. Small, Nice girls don't ask, Harvard Business Review 81 (2003), no. 10, 14–16.

"Woman are less likely than men to negotiate for themselves for several reasons. First, they often are socialized from an early age not to promote their own interests and to focus instead on the needs of others. ... Second, many companies' cultures penalize women when the do ask—further discouraging them from doing so. Women who assertively pursue their own ambitions and promote their own interests may be labeled as bitchy or pushy."

[6] L. Bacon, Once and for all: Tech is not a meritocracy, Quartz, March 27, 2013. http://qz.com/66866/once-and-for-all-tech-is-not-a-meritocracy (accessed July 27, 2014)

"Just about every time diversity comes up in tech-sector conversations, there is a chorus of protests that tech is a meritocracy where anyone who's talented and hardworking will advance smoothly and quickly. The problem with that belief system is that it assumes that there are no external or internal forces contributing to some groups being underrepresented in tech. I would argue that there are both. While it's a wonderful and important ideal, 'meritocratic' is a long way from being an accurate description of our current state of affairs, thanks to human foibles of various kinds. Those foibles can be broken down roughly into two types: biases (both conscious and unconscious) that limit people with qualifications from advancing, and barriers (personal, social, and systemic) that prevent people from attaining the qualifications, support, and mentorship necessary to succeed."

"Here's the thing: The defining feature of a blind spot is that we don't know it's there. And it's hard to notice it until we're challenged on it. We see this again and again with all-male speaker lineups at tech conferences. I certainly don't believe the organizers of those conferences are rabid misogynists; they just have a blind spot when it comes to gender, and frequently don't notice the lack of women until it's pointed out to them."

[7] B. A. Barres, Does gender matter? Nature 442 (2006), 133–136.

Larry Summers Hypothesis: "women are not advancing because of innate inability rather than because of bias or other factors"

Stephen Jay Gould Hypothesis: "woman are not advancing because of discrimination"

"As an undergrad at the Massachusetts Institute of Technology (MIT), I was the only person in a large class of nearly all men to solve a hard maths problem, only to be told by the professor that my boyfriend must have solved it for me. I was not given any credit. I am still disappointed about the prestigious fellowship competition I later lost to a male contemporary when I was a PhD student, even though the Harvard dean who had read both applications assured me that my application was much stronger (I had published six high-impact papers whereas my male competitor had published only one). Shortly after I changed sex, a faculty member was heard to say 'Ben Barres gave a great seminar today, but then his work is much better than his sister's.'"

"[P]eople who don't know I am transgendered treat me with much more respect: I can even complete a whole sentence without being interrupted by a man."

[8] S. L. Beilock, E. A. Gunderson, G. Ramirez, and S. C. Levine, Female teachers' math anxiety affects girls' math achievement, Proceedings of the National Academy of Sciences of the USA 107 (2010), no. 5, 1860–1863.

"There was no relation between a teacher's math anxiety and her students' math achievement at the beginning of the school year. By the school year's end, however, the more anxious teachers were about math, the more likely girls (but not boys) were to endorse the commonly held stereotype that 'boys are good at math, and girls are good at reading' and the lower these girls' math achievement. Indeed, by the end of the school year, girls who endorsed this stereotype had significantly worse math achievement than girls who did not and than boys overall. In early elementary school, where the teachers are almost all female, teachers' math anxiety carries consequences for girls' math achievement by influencing girls' beliefs about who is good at math."

[9] M. Biernat, M. Manis, and T. E. Nelson, Stereotypes and standards of judgment, Journal of Personality and Social Psychology 60 (1991), no. 4, 485–499.

"In 3 studies, subjects judged a series of targets with respect to a number of gender-relevant attributes (e.g., height, weight, and income), using either subjective (Likert-type) or objective response scales (e.g., inches, pounds, and dollars). Objective judgments were consistently influenced by sex stereotypes; subjective judgments were not. Results were also consistent with the expectation that when a judgment attribute is unrelated to gender, male and female targets evoke the same judgment standards."

There was also an intermediate result when respondents were explicitly asked to subjectively judge with respect to the "average person".

"The results we obtained when targets' financial success was evaluated present a particularly striking example of respondents' inadvertent use of different subjective standards for assessing women and men. ... [W]hereas the male targets were thought to earn more money per year than the female targets, these same men were regarded as being less successful than women when rated on a subjective scale."

[10] H. R. Bowles, L. Babcock, and L. Lai, Social incentives for gender differences in the propensity to initiate negotiations: sometimes it does hurt to ask, Organizational Behavior and Human Decision Processes 103 (2007), 84–103.

Abstract: "Four experiments show that gender differences in the propensity to initiate negotiations may be explained by differential treatment of men and women when they attempt to negotiate. In Experiments 1 and 2, participants evaluated written accounts of candidates who did or did not initiate negotiations for higher compensation. Evaluators penalized female candidates more than male candidates for initiating negotiations. In Experiment 3, participants evaluated videotapes of candidates who accepted compensation offers or initiated negotiations. Male evaluators penalized female candidates more than male candidates for initiating negotiations; female evaluators penalized all candidates for initiating negotiations. Perceptions of niceness and demandingness explained resistance to female negotiators. In Experiment 4, participants adopted the candidate's perspective and assessed whether to initiate negotiations in same scenario used in Experiment 3. With male evaluators, women were less inclined than men to negotiate, and nervousness explained this effect. There was no gender difference when evaluator was female."

[11] V. L. Brescoll, J. Glass, and A. Sedlovskaya, Ask and ye shall receive? the dynamics of employer-provided flexible work options and the need for public policy, Journal of Social Issues 69 (2013), no. 2, 367–388.

"[M]anagers were most likely to grant flextime to high-status men seeking flexible schedules in order to advance their careers. In contrast, flexible scheduling requests from women were unlikely to be granted irrespective of their job status or reason."

[12] A. W. Brooks, L. Huang, S. W. Kearney, and F. E. Murray, Investors prefer entrepreneurial ventures pitched by attractive men, Proceedings of the National Academy of Science of the USA 111 (2014), no. 12, 4427–4431.

Abstract: "We identify a profound and consistent gender gap in entrepreneurship, a central path to job creation, economic growth, and prosperity. Across a field setting (three entrepreneurial pitch competitions in the United States) and two controlled experiments, we find that investors prefer entrepreneurial pitches presented by male entrepreneurs compared with pitches presented by female entrepreneurs, even when the content of the pitch is the same. This effect is moderated by male physical attractiveness: attractive males are particularly persuasive, whereas physical attractiveness does not matter among female entrepreneurs...."

[13] L. L. Carli and A. H. Eagly, Gender, hierarchy, and leadership: an introduction, Journal of Social Issues 57 (2001), no. 4, 629–636.

"The articles included in the issue provide evidence of bias in the evaluation of women, discuss effects of gender stereotypes on women's influence and leadership behaviors, and evaluate strategies for change. This introductory article provides a brief summary of changes in women's status and power in employment and education and the absence of change at the upper echelons of power in organizations. Also included is an outline of the contributions of the other articles in the issue."

[14] M. Carnes, S. Geller, E. Fine, J. Sheridan, and J. Handelsman, NIH Director's Pioneer Awards: could the selection process be biased against women?, J. Womens Health 14 (2005), no. 8, 684–691.

None of the nine inaugural Director's Pioneer Awards were given to women.

"We present evidence to suggest that women scientists would be disadvantaged by the following components of the NIH Director's Pioneer Award initiative: (1) time pressure placed on evaluators, (2) absence of face-to-face discussion about applicants, (3) ambiguity of performance criteria, given the novelty of the award, combined with an emphasis on subjective assessment of leadership, potential achievements rather than actual accomplishments, and risk taking, (4) emphasis on self-promotion, (5) weight given to letters of recommendation, and (6) the need for finalists to make a formal, in-person presentation in which the individual and not his or her science was the focus of evaluation. We offer an analysis of this process to encourage the NIH to embark on self-study and to educate all reviewers regarding an evidence-based approach to gender and evaluation."

discusses in detail how each component disadvantages female applicants in our current society. For example, "Multiple studies, largely from cognitive and social psychology, find that whenever ambiguity or uncertainty exists in evaluating performance in a traditionally male gendered job, men are consistently evaluated as being more competent and possessing more achievement-related characteristics than women performing the same work."

[15] A. Casadevall and J. Handelsman, The presence of female conveners correlates with a higher proportion of female speakers at scientific symposia, mBio 5 (2014), no. 1, e00846-13.

"Analysis of 460 symposia involving 1,845 speakers in two large meetings sponsored by the American Society for Microbiology revealed that having at least one woman member of the convening team correlated with a significantly higher proportion of invited female speakers and reduced the likelihood of an all-male symposium roster."

"The proportion of women entering scientific careers has increased substantially, but women remain underrepresented in academic ranks. Participation in meetings as a speaker is a factor of great importance for academic advancement. We found that having a woman as a convener greatly increased women's participation in symposia, suggesting that one mechanism for achieving gender balance at scientific meetings is to involve more women as conveners."

[16] P. R. Clance and S. Imes, The imposter phenomenon in high achieving women: dynamics and therapeutic intervention, Psychotherapy: Theory, Research, and Practice 15 (1978), no. 3, 241–247.

"The term impostor phenomenon is used to designate an internal experience of intellectual phonies, which appears to be particularly prevalent and intense among a select sample of high achieving women. Certain early family dynamics and later introjection of societal sex-role stereotyping appear to contribute significantly to the development of the impostor phenomenon. Despite outstanding academic and professional accomplishments, women who experience the imposter phenomenon persists in believing that they are really not bright and have fooled anyone who thinks otherwise. Numerous achievements, which one might expect to provide ample object evidence of superior intellectual functioning, do not appear to affect the impostor belief. Four factors, which contribute to the maintenance of impostor feelings over time, are explored. Therapeutic approaches found to be effective in helping women change the impostor self-concept are described."

"The question has been raised as to whether or not men experience this phenomenon. In our clinical experience, we have found that the phenomenon occurs with much less frequency in men and that when it does occur, it is with much less intensity."

"The findings of the research citied by Deaux are consistent with the following principals: 1) An unexpected performance outcome will be attributed to a temporary cause. 2) An expected performance outcome will be attributed to a stable cause. In line with their lower expectancies, women tend to attribute their successes to temporary causes, such as luck or effort, in contrast to men who are much more likely to attribute their successes to the internal, stable factor of ability. Conversely, women tend to explain failure with lack of ability, whereas men more often attribute failure to luck or task difficulty. Given the lower expectancies women have for their own (and other women's) performances, they have apparently internalized into a self-stereotype the societal sex-role stereotype that they are not considered competent."

[17] R. Cleary, J. W. Maxwell, and C. Rose, Fall 2012 departmental profile report, Notices of the AMS 61 (2014), no. 2, 158–167.

Summary: the better the job, the lower the percentage of women.

Females account for 29–31% of full-time doctoral faculty—in all departmental groupings except "Doctoral Math", where they are only 18% of full-time doctoral faculty.

"Females account for 53% of full-time nondoctoral faculty in all mathematics groups combined (down from 54% last year), compared to females accounting for 24% of all doctoral full-time faculty and 29% of all full-time faculty."

"For the combined mathematics departments (Math Public, Math Private, Applied Math, Masters and Bachelors), women comprised 29% (6,482 with a standard error of 83) of the full-time faculty (22,219) in fall 2012. For the doctoral mathematics departments combined (Math Public, Math Private and Applied Math), women comprised 14% of the combined doctoral-holding tenured and tenure-track faculty and 27% of the doctoral-holding non-tenure-track (including postdocs) faculty in fall 2012. For Masters faculty these same percentages are 28 and 39, and for Bachelors faculty they are 29 and 33, respectively. Among the nondoctoral full-time faculty in all math departments combined, women comprise 53%. Females account for 41% of all part-time faculty in mathematics departments combined."

"Females hold 12% of full-time tenured and 24% of fulltime untenured/tenure-track positions in all doctoral mathematics departments combined."

"Masters departments reported the highest percentage of fulltime female faculty (35%), while Math Private Large reported the lowest (14%)."

[18] S. J. Correll, S. Benard, and I. Paik, Getting a job: is there a motherhood penalty?, American Journal of Sociology 112 (2007), no. 5, 1297–1339.

Abstract: "Survey research finds that mothers suffer a substantial wage penalty, although the causal mechanism producing it remains elusive. The authors employed a laboratory experiment to evaluate the hypothesis that status-based discrimination plays an important role and an audit study of actual employers to assess its real-world implications. In both studies, participants evaluated application materials for a pair of same-gender equally qualified job candidates who differed on parental status. The laboratory experiment found that mothers were penalized on a host of measures, including perceived competence and recommended starting salary. Men were not penalized for, and sometimes benefited from, being a parent. The audit study showed that actual employers discriminate against mothers, but not against fathers."

[19] D. J. Dean and J. B. Koster, Equitable Solutions for Retaining a Robust STEM Workforce: Beyond best practices, Academic Press, 2014.

Chapters 5 and 6: case studies for child care at conferences, funding for family/caretaker travel

Chapter 8: implicit bias, success vs. likeability for women, shortage of female conference speakers

1. Envisioning the STEM workplace of the future: the need for work/life programs and family-friendly practices

2. Work/life integration challenges are worldwide

3. Addressing work/life issues

4. Dual careers and strategic decision making

5. Child care and dependent care in professional contexts

6. Promoting family-friendly policies

7. Mentoring and networking

8. Implicit bias and the workplace

9. Government policy implications for addressing family-related issues

[20] P. G. Devine, E. A. Plant, D. M. Amodio, E. Harmon-Jones, and S. L. Vance, The regulation of explicit and implicit race bias the role of motivations to respond without prejudice, Journal of Personality and Social Psychology 82 (2002), no. 5, 835–848.

"[E]xplicit race bias was moderated by internal motivation to respond without prejudice, whereas implicit race bias was moderated by the interaction of internal and external motivation to respond without prejudice. Specifically, high internal, low external participants exhibited lower levels of implicit race bias than did all other participants. Implications for the development of effective self-regulation of race bias are discussed."

IMS/EMS: Internal and External Motivation to Respond Without Prejudice Scales

"The IMS assesses personal motivation to respond without prejudice and includes items such as 'I attempt to act in nonprejudiced ways toward Black people because it is personally important to me' and 'Being nonprejudiced toward Black people is important to my self-concept.' The EMS focuses instead on external pressure to respond without prejudice and includes items such as 'If I acted prejudiced toward Black people, I would be concerned that others would be angry with me' and 'I attempt to appear nonprejudiced toward Black people in order to avoid disapproval from others.'"

"[W]hen responses are easy to control [EMS], those with high levels of personal motivation to respond without prejudice are able to do so. Also consistent with our previous findings, highly externally motivated individuals reported slightly higher levels of explicit race bias than did their low external counterparts."

"[W]e expected that participants who reported high levels of internal motivation and low levels of external motivation and, thus, were theoretically highly autonomous would be the most effective at regulating expressions of race bias, even on difficult-to-control responses [IMS]. Consistent with our expectations, these individuals responded with lower levels of implicit race bias than did all other participants."

[21] T. A. DiPrete and G. M. Eirich, Cumulative advantage as a mechanism for inequality: a review of theoretical and empirical developments, Annual Review of Sociology 32 (2006), 271–297.

"Merton started with three premises. The first was that resources in the scientific world were limited. The second was that scientific talent was difficult to observe directly. The third was that allocation of resources in science was governed by the norms of universalism (recognition should be granted based on the quality of scientific work) and communism (resources should be allocated in order to maximize the overall productivity of the scientific community). Scientific resources were therefore not simply a 'reward' for past productivity, but were given in order to stimulate future productivity. With limited ability to evaluate the great mass of ongoing scientific work, and with limited ability to measure future productivity ex ante, the scientific community favored those who had been most successful in the past with additional resources and attention. One consequence of this mechanism was that the gap in rewards between a more able and a less able scientist would grow over time. A second consequence was that chance events (e.g., unequal luck in the draw of reviewers upon submitting a grant proposal for funding (Cole, Cole, and Simon 1981) would produce a relative advantage for one of two individuals of identical talent, and this relative advantage could persist and increase over time. A third consequence (Merton's so-called Matthew effect) was that scientists with greater reputations would gain greater rewards from work of a given quantity and quality than would scientists with lesser reputations."

"[W]omen's disadvantage grows during the early career as a result of CA processes that magnify their early disadvantages, though Long and Fox evaluate this evidence as more tentative than conclusive." (several references to relevant literature)

[22] A. H. Eagly and S. J. Karau, Role congruity theory of prejudice toward female leaders, Psychological Review 109 (2002), no. 3, 573–598.

"[T]here is general agreement that such studies have demonstrated wage discrimination against women. Although Stanley and Jarrell's meta-analysis of the results of 41 studies estimating wage discrimination showed an unequivocal decrease over time, other detailed analyses confirm that some wage discrimination against women remains in the United States."

"A role congruity theory of prejudice toward female leaders proposes that perceived incongruity between the female gender role and leadership roles leads to 2 forms of prejudice: (a) perceiving women less favorably than men as potential occupants of leadership roles and (b) evaluating behavior that fulfills the prescriptions of a leader

role less favorably when it is enacted by a woman. One consequence is that attitudes are less positive toward female than male leaders and potential leaders. Other consequences are that it is more difficult for women to become leaders and to achieve success in leadership roles. Evidence from varied research paradigms substantiates that these consequences occur, especially in situations that heighten perceptions of incongruity between the female gender role and leadership roles."

"This method of examining potential bias against women has been labeled the Goldberg paradigm in honor of P. Goldberg's (1968) initial experiment, in which identical articles ostensibly written by a woman or a man were given to students for evaluation. ... The most extensive meta-analysis of the subset of Goldberg studies presenting job résumés or applications was based on information in 49 articles and dissertations. The results showed that men were preferred over women for jobs rated as male sex-typed and women over men for jobs rated as female sex-typed. Given that leadership roles are usually sex-typed as masculine, this research supports our theory's prediction of bias against female candidates for such positions."

[23] N. M. Else-Quest, J. S. Hyde, and M. C. Linn, Cross-national patterns of gender differences in mathematics: a meta-analysis, Psychological Bulletin 136 (2010), no. 1, 103–127.

lots of references for statements like "mounting evidence of gender similarities in math achievement", "Stereotypes about female inferiority in mathematics", "Girls earn better grades in mathematics courses through the end of high school", "girls tending to report higher anxiety and lower self-concept about their math abilities", "gender differences in mathematics performance are declining"

"Gender equity in school enrollment, women's share of research jobs, and women's parliamentary representation were the most powerful predictors of cross-national variability in gender gaps in math."

gender stratification hypothesis: "cross-national patterns of gender differences in math achievement reflect gender inequities in educational and economic opportunities available in a given culture"

greater male variability hypothesis: "greater variance in test scores is displayed by males than females, so that, even if there is no average gender difference, there will still be more males among the very top performers"

theoretical framework underlying the gender stratification hypothesis, and cognitive social learning theory, social structure theory

Composite and Domain-Specific Indicators of Societal Gender Equity table

[24] R. J. Ely, H. Ibarra, and D. M. Kolb, Taking gender into account: theory and design for women's leadership development programs, Academy of Management Learning & Education 10 (2011), no. 3, 474–493.

"Organizational research on the causes of women's persistent underrepresentation in leadership positions has thus shifted away from a focus on actors' intentional efforts to exclude women to consideration of so-called second-generation forms of gender bias, the powerful yet often invisible barriers to women's advancement that arise from cultural beliefs about gender, as well as workplace structures, practices, and patterns of interaction that inadvertently favor men. For example, organizational hierarchies in which men predominate, along with practices that equate leadership with behaviors believed to be more common or appropriate in men, powerfully if unwittingly communicate that women are ill-suited for leadership roles; people's tendency to gravitate to those who are like them on salient dimensions such as gender leads powerful men to sponsor and advocate for other men when leadership opportunities arise. Such biases accumulate and in the aggregate can interfere in women's ability to see themselves and be seen by others as leaders."

"The mismatch between qualities attributed to women and qualities thought necessary for leadership places women leaders in a double bind and subjects them to a double standard. Women in positions of authority are thought too aggressive or not aggressive enough, and what appears assertive, self-confident, or entrepreneurial in a man often looks abrasive, arrogant, or self-promoting in a woman. African American women are especially vulnerable to such stereotypes and risk being seen as overly aggressive and confrontational. In experiment after experiment, women who achieve in distinctly male arenas are seen as competent but are less well-liked than equally successful men. Merely being a successful woman in a male domain can be regarded as a violation of gender norms, warranting sanctions. By the same token, when women performing traditionally male roles are seen as conforming to feminine stereotypes, they tend to be liked but not respected: They are judged too soft,

emotional, and unassertive to make tough decisions and to come across as sufficiently authoritative. In short, women can face trade-offs between competence and likability in leadership roles."

"[T]he composition of one's informal network can open doors to leadership opportunities, determine who will see and grant (or not) one's leadership claims, and shape what one learns in the process. ... In settings where men predominate in positions of power, women have a smaller pool of high-status, same-gender contacts on which to draw and fewer ties to powerful, high-status men. Both white women and women of color cite lack of access to influential colleagues with whom to network as a major barrier to advancement."

tons of references to studies supporting these statements

[25] Feminist Philosophers, Childcare at conferences: how to do it, August 23, 2010; Childcare at conferences: how to do it (2), September 1, 2010. http://feministphilosophers.wordpress.com/2010/08/23/childcare-at-conferences-how-to-do-it and http://feministphilosophers.wordpress.com/2010/09/01/childcare-at-conferences-how-to-do-it-2 (accessed July 29, 2014)

[26] Feminist Philosophers, Gendered conference campaign, initial version December 9, 2009. http://feministphilosophers.wordpress.com/gendered-conference-campaign (accessed July 28, 2014)

"All-male events and volumes help to perpetuate the stereotyping of philosophy as male. This in turn to contributes to implicit bias against women in philosophy, which very likely leads even those genuinely committed to gender equality to evaluate women's contributions as less good than men's. (It may also in some cases be caused by implicit bias, which means that women's names will leap less easily to mind than men's, but that is not our topic here.) ... It also perpetuates stereotype threat, which very likely keeps women from performing as well in philosophy as they otherwise would. ... We would like these harms to stop, and we think that a significant step toward achieving that is drawing people's attention to some of their causes."

also a nice FAQ and how-to page

[27] Feministe, Female conference speaker bingo: a bingo card full of excuses for not having more female speakers at STEM conferences. http://www.feministe.us/blog/archives/2012/09/24/why-arent-there-more-women-at-stem-conferences-this-time-its-statistical/female-conference-speaker-bingo (accessed July 28, 2014)

[28] Geek Feminism, Conference anti-harassment/Policy. http://geekfeminism.wikia.com/wiki/Conference_anti-harassment/Policy (accessed July 29, 2014)

[29] Geek Feminism, Ten tips for getting more female speakers, August 11, 2009. http://geekfeminism.org/2009/08/11/ten-tips-for-getting-more-women-speaker (accessed July 29, 2014)

[30] A. Gheaus, Three cheers for the token woman, Social Science Research Network, March 5, 2013. http://ssrn.com/abstract=2228632 (accessed July 28, 2014)

a nuanced and extremely well-written essay that more deeply explores the question "was I invited to speak at this conference just because I'm a woman?"

"If women were invited on the sole ground of their sex, this would indeed pose the threat of humiliation and of undermining women's achievements. But nobody suggests including women on the sole ground of their sex; being a woman should be acknowledged as one of the legitimate reasons, alongside competence, for including women. Here I argue that in some contexts there are several legitimate grounds—independent from competence—for including people in positions of visibility and prestige and that sometimes sex can be such a legitimate reason. If this is true, there is nothing wrong with being a token woman—although a lot is wrong with what makes tokenism possible!—and it is important to overcome the ambivalence of those who may be, at some point, a token women."

"The gendered conference campaign (henceforth the GCC) is an initiative supported by growing number of philosophers who believe that the discipline of philosophy is overly dominated by men. Male domination is both expressed and perpetuated through the existence of too many male-only conference and edited volumes. This state of affairs is deemed to contribute to the (possibly unconscious) stereotype that philosophy is best done by men, a stereotype which the proponents of GCC think is detrimental to women in two ways. First, because it undermines the self-confidence of women who aspire to become professional philosophers, or to remain in this

exceptionally competitive profession. Second, the stereotype feeds the conscious or unconscious biases against women of the people who decide the fate of those who aspire to become or remain in the profession. The GCC supporters believe that conference organisers and volume editors should strive to include women philosophers amongst the invited speakers and authors in order to fight the stereotype of philosophy as a male subject. Because the existence and scope of implicit bias is disputed, this paper does not assume it. If implicit bias is as pervasive and uncontrollable as the proponents of the GCC believe it is, this lends additional force to the reasoning I propose here. But even without believing in implicit bias, it is reasonable to think that more gender-balance within professional philosophy will contribute to fairer chances for existing and would-be female philosophers, by making sex a less salient characteristic and so by sending the general message that people of both sexes can be professional philosophers."

"Anne Phillips—an advocate of female quotas in politics—encourages us to: 'query the startling presumption that existing incumbents were chosen on merit. One of the points raised in the wider literature is that, even in the most seemingly meritocratic of systems—the selection of students for academic courses or the appointment of academics to university jobs—there is normally a cluster of vaguer characteristics which can override the stricter numerical hierarchy of grades or publications or degrees, always moderated by additional criteria. These more qualitative criteria [(]'personality', 'character', whether the candidates will 'fit in') often favour those who are most like the people conducting the interview: more starkly, they often favour the men.'"

[31] C. Goldin and C. Rouse, Orchestrating impartiality: the impact of "blind" auditions on female musicians, The American Economic Review 90 (2000), no. 4, 715–741.

"We find, using our audition sample in an individual fixed-effects framework, that the screen increases the probability a woman will be advanced out of a preliminary round when there is no semifinal round. The screen also greatly enhances the likelihood a female contestant will be the winner in a final round. Using both the roster and auditions samples, and reasonable assumptions, the switch to blind auditions can explain about one-third of the increase in the proportion [of] female[s] among new hires (whereas another one-third is the result of the increased pool of female candidates)."

[32] C. Good, A. Rattan, and C. S. Dweck, Why do women opt out? Sense of belonging and women's representation of mathematics, Journal of Personality and Social Psychology 102 (2012), no. 4, 700–717.

created a "sense of belonging in math" tool, which predicted "college students' intent to pursue math in the future".

"[S]tudents' perceptions of 2 factors in their math environment—the message that math ability is a fixed trait and the stereotype that women have less of this ability than men—worked together to erode women's, but not men's, sense of belonging in math. ... [T]he message that math ability could be acquired protected women from negative stereotypes...."

references for stereotype threat: "ability-impugning stereotypes such as these can trigger psychological processes that can undermine the performance of stereotyped individuals, including females in math"

references for implicit theories of intelligence: believing math to be a "fixed trait" can "turn students away from challenges that might undermine their belief that they have high ability", while believing math to be a "malleable quality" can make students "seek challenges that can result in better learning" and "remain highly strategic and effective in the face of setbacks, even showing enhanced motivation and performance"

[33] T. Greenwald, M. Banaji, and B. Nosek, Take a test: preliminary information, Project Implicit. https://implicit.harvard.edu/implicit/takeatest.html (accessed August 23, 2014)

you can take your very own implicit biases tests

[34] L. Guiso, F. Monte, P. Sapienza, and L. Zingales, Culture, gender, and math, Science 320 (2008), 1164–1165.

"(i) The World Economic Forum's Gender Gap Index (GGI) reflects economic and political opportunities, education, and well-being for women (see chart). (ii) From the World Values Surveys (WVSs), we constructed an index of cultural attitudes toward women based on the average level of disagreement to such statements as: "When jobs are scarce, men should have more right to a job than women." (iii) The rate of female economic activity reflects the percentage of women age 15 and older who supply, or are available to supply, labor for the production of

goods and services. (iv) The political empowerment index computed by the World Economic Forum measures women's political participation, which is less dependent on math skills than labor force participation. These four measures are highly correlated."

"We find a positive correlation between gender equality and gender gap in mathematics. ... These results are true not only at the mean level, but also in the tail of the distribution."

"This interaction between gender gap and GGI remains significant even when we insert an interaction between gender and log of GDP per capita, which suggests that the improvement in math scores is not just related to economic development, but to the improvement of the role of women in society."

Reading scores are similarly affected by GGI.

Not an effect of biological factors (replicates in groups with small genetic difference).

"This evidence suggests that intra-gender performance differences in reading versus mathematics and in arithmetic versus geometry are not eliminated in a more gender-equal culture. By contrast, girls' underperformance in math relative to boys is eliminated in more gender-equal cultures. In more gender-equal societies, girls perform as well as boys in mathematics and much better than them in reading. These findings shed some light on recent trends in girls' educational achievements in the United States, where the math gender gap has been closing over time."

[35] A. Hegewisch, C. Williams, H. Hartmann, and S. K. Hudiburg, The gender wage gap: 2013, Institute for Women's Policy Research Fact Sheet #C423, September 2014. http://www.iwpr.org/publications/pubs/the-gender-wage-gap-2013 (accessed September 16, 2014)

"The ratio of women's and men's median annual earnings was 78.3 percent for full-time/year-round workers in 2013. This means the gender wage gap for full-time/year-round workers is 21.7 percent."

"An alternative measure of the wage gap, the ratio of women's to men's median weekly earnings for full-time workers—was 82.1 percent in 2013."

These numbers have been basically static for the past decade.

[36] M. E. Heilman, The impact of situational factors on personnel decisions concerning women: varying the sex composition of the applicant pool, Organizational Behavior and Human Performance 26 (1980), 386–395.

"One hundred male and female MBA students evaluated a woman applicant for a managerial position when the proportion of women in the applicant pool was varied. Results indicated that personnel decisions of both males and females were significantly more unfavorable when women represented 25% or less of the total pool. Additional findings suggest that this effect was mediated by the degree to which sex stereotypes predominated in forming impressions of applicants. The results were interpreted as supportive of the thesis that situational factors can function to reduce the adverse effects of sex stereotypes in employment settings."

[37] M. E. Heilman, M. C. Simon, and D. P. Repper, Intentionally favored, unintentionally harmed? impact of sex-based preferential selection on self-perceptions and self-evaluations, Journal of Applied Psychology 72 (1987), no. 1, 62–68.

"It had been proposed that sex-based preferential selection procedures would have negative consequences only for women because they, as a group, are unlikely to be confident about their ability to succeed in a leadership position, whereas men, as a group, are confident about their ability in this regard. Women's performance apprehensions were therefore expected to be exacerbated by the ambiguity of [sex-based] preferential selection and alleviated by the reaffirmation of competence inherent in merit-based selection, giving rise to differential evaluations of self and performance. Our results are consistent with this idea and, indeed, lend support to it."

"As predicted, the method of leader selection had effects only on women, not on men."

"When selected on the basis of sex, women devalued their leadership performance, took less credit for successful outcomes, and reported less interest in persisting as leader; they also characterized themselves as more deficient in general leadership skills."

[38] M. E. Heilman, A. S. Wallen, D. Fuchs, and M. M. Tamkins, Penalties for success: reactions to women who succeed at male gender-typed tasks, Journal of Applied Psychology 89 (2004), no. 3, 416–427.

"(a) [W]hen women are acknowledged to have been successful, they are less liked and more personally derogated than equivalently successful men; (b) these negative reactions occur only when the success is in an arena that is distinctly male in character; and (c) being disliked can have career-affecting outcomes, both for overall evaluation and for recommendations concerning organizational reward allocation. These results were taken to support the idea that gender stereotypes can prompt bias in evaluative judgments of women even when these women have proved themselves to be successful and demonstrated their competence. The distinction between prescriptive and descriptive aspects of gender stereotypes is considered, as well as the implications of prescriptive gender norms for women in work settings."

[39] A. Hess, Why women aren't welcome on the internet, Pacific Standard 11 (Jan/Feb 2014), 36–47. http://www.psmag.com/navigation/health-and-behavior/women-arent-welcome-internet-72170 (accessed September 8, 2014)

A thoroughly horrifying account of how women are treated online.

"Accounts with feminine usernames incurred an average of 100 sexually explicit or threatening messages a day. Masculine names received 3.7."

Trigger warning for rape threats, torture threats, and death threats.

[40] J. S. Hyde, S. M. Lindberg, M. C. Linn, A. Ellis, and C. Williams, Gender similarities characterize math performance, Science 321 (2008), 494–495.

scores on standardized tests are essentially equal now between boys and girls

"For whites, the ratios of boys:girls scoring above the 95th percentile and 99th percentile are 1.45 and 2.06, respectively, and are similar to predictions from theoretical models. For Asian Americans, ratios are 1.09 and 0.91, respectively. Even at the 99th percentile, the gender ratio favoring males is small for whites and is reversed for Asian Americans. If a particular specialty required mathematical skills at the 99th percentile, and the gender ratio is 2.0, we would expect 67% men in the occupation and 33% women. Yet today, for example, Ph.D. prorgams in engineering average only about 15% women."

they examined test problems on a knowledge framework: Level 1 (recall), Level 2 (skill/concept), Level 3 (strategic thinking), Level 4 (extended thinking). they lamented the fact that tests associated with No Child Left Behind included essentially no Level 3/4 problems at all. They found some Level 3 problems associated to National Assessment of Educational Progress data; gender differences on these problems were quite small.

"Conclusion. Our analysis shows that, for grades 2 to 11, the general population no longer shows a gender difference in math skills, consistent with the gender similarities hypothesis. There is evidence of slightly greater male variability in scores, although the causes remain unexplained. Gender differences in math performance, even among high scorers, are insufficient to explain lopsided gender patterns in participation in some STEM fields. An unexpected finding was that state assessments designed to meet NCLB requirements fail to test complex problem-solving of the kind needed for success in STEM careers, a lacuna that should be fixed."

[41] J. S. Hyde and J. E. Mertz, Gender, culture, and mathematics performance, Proc. Nat. Acad. Sci. USA 106 (2009), 8801–8807.

"Contemporary data indicate that girls in the U.S. have reached parity with boys in mathematics performance, a pattern that is found in some other nations as well. ... [S]tudies find more males than females scoring above the 95th or 99th percentile, but this gender gap has significantly narrowed over time in the U.S. and is not found among some ethnic groups and in some nations. Furthermore, data from several studies indicate that greater male variability with respect to mathematics is not ubiquitous. Rather, its presence correlates with several measures of gender inequality. Thus, it is largely an artifact of changeable sociocultural factors, not immutable, innate biological differences between the sexes. ... [W]e document the existence of females who possess profound mathematical talent. Finally, we review mounting evidence that both the magnitude of mean math gender differences and the frequency of identification of gifted and profoundly gifted females significantly correlate with sociocultural factors, including measures of gender equality across nations."

[42] Institute for Mathematics and its Applications, Diversity at IMA. https://www.ima.umn.edu/diversity (accessed August 23, 2014)

[43] L. A. Isbell, T. P. Young, and A. H. Harcourt, Stag parties linger: continued gender bias in a female-rich scientific discipline, PLOS ONE 7 (2012), no. 11, e49682.

"Discussions about the underrepresentation of women in science are challenged by uncertainty over the relative effects of the lack of assertiveness by women and the lack of recognition of them by male colleagues because the two are often indistinguishable. They can be distinguished at professional meetings, however, by comparing symposia, which are largely by invitation, and posters and other talks, which are largely participant-initiated. Analysis of 21 annual meetings of the American Association of Physical Anthropologists reveals that within the subfield of primatology, women give more posters than talks, whereas men give more talks than posters. But most strikingly, among symposia the proportion of female participants differs dramatically by the gender of the organizer. Male-organized symposia have half the number of female first authors (29%) that symposia organized by women (64%) or by both men and women (58%) have, and half that of female participation in talks and posters (65%). We found a similar gender bias from men in symposia from the past 12 annual meetings of the American Society of Primatologists. The bias is surprising given that women are the numerical majority in primatology and have achieved substantial peer recognition in this discipline."

need women on organizing committees

[44] Joint Mathematics Meetings, Child care grants, 2015 Joint Mathematics Meetings (San Antonio, TX). http://jointmathematicsmeetings.org/meetings/national/jmm2015/2168_childcare (accessed September 16, 2014)

"The AMS and the MAA will provide approximately 40 reimbursement grants of US$250 per family to help with the cost of child care for a number of registered participants at 2015 JMM. The funds may be used for child care that frees a parent to participate more fully in the JMM."

[45] JSConf EU 2012, Beating the odds—how we got 25% women speakers for JSConf EU 2012. http://2012.jsconf.eu/2012/09/17/beating-the-odds-how-we-got-25-percent-women-speakers.html (accessed July 29, 2014)

"When I'd talk to men about the conference and ask if they felt like they had an idea to submit for a talk, they'd always start brainstorming on the spot. I'm not generalizing—every guy I talked to about speaking was able to come up with an idea, or multiple ideas, right away … and yet, overwhelmingly the women I talked to with the same pitch deferred with a, 'well, but I'm not an expert on anything', or 'I wouldn't know what to submit, or yes but I'm not a lead [title], so you should talk to my boss and see if he'd want to present."'

what a disparity between the percentage of males submitting, and the number of female submissions ranked above the vast majority of them.

[46] J. M. Kane and J. E. Mertz, Debunking myths about gender and mathematics performance, Notices of the AMS 59 (2012), no. 1, 10–21.

gender-stratified hypothesis: "boys and girls may be born similar in their innate intellectual potential but end up displaying differences due to a variety of sociocultural factors present in their environment"

gap due to inequity hypothesis: "the gap between boys' and girls' mathematics performance is due to differences in opportunities available to males versus females"

greater male variability hypothesis: "variability in intellectual abilities is intrinsically greater among males"

"The Gender Gap Index (GGI) is a composite, weighted measure of the gap between men and women with respect to economic participation, educational attainment, political empowerment, and health."

difference between GGI and the Social Watch Group's GEI: the GEI reflects overall wealth less, and "typically yielded slightly higher correlations with mathematics performance"

"In support of the gender-stratified hypothesis, we show here that greater male variability and gender gap in mathematics performance, when present, are both largely artifacts of a complex variety of sociocultural factors rather than intrinsic differences, co-educational schooling, or specific religious following per se. Importantly, we document that mathematics performance for both boys and girls exhibits a strong positive correlation with some

measures of gender equity, especially participation rates and salaries of women in the paid labor force relative to men."

"equity indexes and gender gap in mean mathematics performance do not reproducibly correlate; that is, while girls' scores increase as equity indexes increase, boys' scores do likewise."

[47] K. Kaplan, Unmasking the impostor, Nature 459 (2009), 468–469.

a succinct but thorough description of what it's like to experience the "impostor phenomenon", how it affects people's careers, and steps that may help in "purging that inner critic". examples of, and quotes from, women who experience it

[48] E. Kaschak, Sex bias in student evaluations of college professors, Psychology of Women Quarterly 2 (1978), no. 3, 235–242.

"Sex, which would be an entirely irrelevant variable, seemed to be the crucial one on which faculty members were evaluated by male students. ... The women students in this study rated female professors equally with male professors.... [M]ales, to a greater extent than females, are clearly biased by supposedly irrelevant information—the sex of the professor."

[49] S. Knobloch-Westerwick, C. J. Glynn, and M. Huge, The Matilda effect in science communication: an experiment on gender bias in publication quality perceptions and collaboration interest, Science Communication 35 (2013), no. 5, 603–625.

From the abstract: "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."

"Although ideally scientists would communicate with each other in unbiased fashion, living up to an ideal marketplace of ideas, patterns of stereotyping may still apply." (cf. Tech is not a meritocracy)

"Rossiter (1993) introduced the term Matilda effect for a systematic underrecognition of female scientists. The term has been coined with reference to the well-known "Matthew effect" (Merton, 1968)—overrecognition of those at the top of the scientific profession, even credit misallocation to scientists who are already well known."

"Compared with their male counterparts, they receive grants less often and receive smaller grant allocations, fewer citations, and fewer scientific awards—for example, 'men were more than eight times more likely than women to win a scholarly award and almost three times more likely to win a young investigator award'. Furthermore, among recipients of career development grants, women are significantly less likely than men to obtain subsequent academic success for a number of criteria, such as receiving major grants, getting promoted, and holding academic leadership positions. Evaluation biases against women may play a role in this context. In fact, faculty recommendation letters have been found to differ in language use and praise by sex of the evaluated individual, favoring males. Yet women likely benefit from a blind peer review process, as it reduces gender biases through author anonymity. Taken together, the data suggest a 'pervasive culture of negative bias—whether conscious or unconscious—against women in academia'." This paragraph alone had nine citations to supporting research.

"A bias against female scholars extended further to young scholars' interest in exchange and collaboration. Overall, male authors were perceived as more attractive for such interpersonal connections if they worked on male-typed topics compared to gender-neutral or female-typed topics. On the other hand, female authors fostered greater Collaboration Interest if they were associated with work on female-typed topics compared to gender-neutral topics." The very fact that some fields are male-typed or female-typed [49, Table 1 on page 612] is thus a huge part of the problem. Note this extends to leadership, which is male-typed.

[50] M. Lalin, Attending conferences with small children, *What's new*, August 20, 2014. http://terrytao.wordpress.com/2014/08/20/matilde-lalin-attending-conferences-with-small-children (accessed August 20, 2014)

"The mother of a nursing infant that wishes to attend a conference has three options:

(a) Bring the infant and a relative/friend to help caring for the infant. ...
(b) Bring the infant and hire someone local (a nanny) to help caring for the infant. ...
(c) Travel without the infant and pump milk regularly. ...

"It is important to keep in mind that each option has its own set of challenges (even when expenses and facilities are all covered) and that different families may be restricted in their choice of options for a variety of reasons. It is therefore important that all these three options be facilitated."

"[H]aving to make choices about what to miss in the conference is very hard. While talks are important, so are the opportunities to meet people and discuss mathematics that happen during breaks and social events."

includes a "Hall of Fame for those organizations that are already supporting nursing mothers' travels in mathematics", and ends with action items for conference organizers

[51] S. M. Lindberg, J. S. Hyde, J. L. Petersen, and M. C. Linn, New trends in gender and mathematics performance: A meta-analysis, Psychol. Bull. 136 (2010), 1123–1135.

"Mathematics and science are stereotyped as male domains. Stereotypes about female inferiority in mathematics are prominent among children and adolescents, parents, and teachers. Although children may view boys and girls as being equal in mathematical ability, they nonetheless view adult men as being better at mathematics than adult women. Implicit attitudes that link men and mathematics have been demonstrated repeatedly in studies of college students.

"Parents believe that their sons' mathematical ability is higher than their daughters'. In one study, fathers estimated their sons' mathematical IQ at 110 on average, and their daughters' at 98; mothers estimated 110 for sons and 104 for daughters. Teachers, too, tend to stereotype mathematics as a male domain. In particular, they overrate boys' ability relative to girls'." Those two paragraphs alone cite ten studies.

"Stereotype threat effects (C. M. Steele, 1997; C. M. Steele & Aronson, 1995) have been found for women in mathematics. In the standard paradigm, half the participants (talented college students) are told that the math test they are about to take typically shows gender differences (threat condition), and the other half are told that the math test is gender fair and does not show gender differences (control). Studies have found that college women underperform compared with men in the threat condition but perform equal to men in the control condition, indicating that priming for gender differences in mathematics indeed impairs girls' math performance. Stereotype threat effects have been found in children as early as kindergarten. Other research, measuring implicit stereotypes about gender and math, has found that these implicit stereotypes predict performance in a calculus course."

Averaged over all studies, gender difference was negligible: mean of 0.05, histogram bell-curve-shaped, standard deviation around 0.5.

One of the few effects that is still present: "Overall, we conclude that a small gender difference favoring boys in complex problem solving is still present in high school. Multiple factors may account for this gender gap. As noted earlier, girls are less likely to take physics than boys are, and complex problem solving is taught in physics classes, perhaps even more than in math classes. Gender differences in patterns of interest may play a role, although these patterns, too, are shaped by culture. Moreover, even in very recent studies, parents and teachers give higher ability estimates to boys than to girls, and the effects of parents' and teachers' expectations on children's estimates of their own ability and their course choices are well documented."

[52] G. Martin, Addressing the underrepresentation of women in mathematics conferences, in preparation.

[53] H. A. Medina, Doctorate degrees in mathematics earned by blacks, Hispanics/Latinos, and Native Americans: a look at the numbers, Notices of the AMS 51 (2004), no. 7, 772–775.

[54] K. L. Milkman, M. Akinola, and D. Chugh, What happens before? a field experiment exploring how pay and representation differentially shape bias on the pathway into organizations, preprint.

"In our experiment, professors were contacted by fictional prospective students seeking to discuss research opportunities before applying to a doctoral program. Students' names were randomly assigned to signal gender and

race, but messages were otherwise identical. Faculty ignored requests from women and minorities at a higher rate than requests from Caucasian males, particularly in higher-paying disciplines and private institutions."

[55] C. A. Moss-Racusin, J. F. Dovidio, V. L. Brescoll, M. J. Graham, and J. Handelsman, Science faculty's subtle gender biases favor male students, Proceedings of the National Academy of Science of the USA 109 (2012), no. 41, 16474–16479.

"[S]cience 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 [14% on average] and offered more career mentoring to the male applicant. The gender of the faculty participants did not affect responses...."

"[T]he female student was less likely to be hired than the identical male because she was viewed as less competent overall."

"The fact that faculty members' bias was independent of their gender, scientific discipline, age, and tenure status suggests that it is likely unintentional, generated from widespread cultural stereotypes rather than a conscious intention to harm women."

[56] C. Munsch, Flexible work, flexible penalties: the effect of gender, childcare, and type of request on the flexibility bias, preprint.

from ASA press release: "Among those who read the scenario in which a man requested to work from home for childcare related reasons, 69.7 percent said they would be 'likely' or 'very likely' to approve the request, compared to 56.7 percent of those who read the scenario in which a woman made the request. Almost a quarter—24.3 percent—found the man to be 'extremely likeable', compared to only 3 percent who found the woman to be 'extremely likeable'. And, only 2.7 percent found the man 'not at all' or 'not very' committed, yet 15.5 percent found the woman 'not at all' or 'not very' committed."

[57] M. C. Murphy and C. S. Dweck, A culture of genius: How an organization's lay theories shape people's cognition, affect, and behavior, Personality and Social Psychology Bulletin 36 (2010), 283–296.

"In five studies, the authors examine how an organization's fixed (entity) or malleable (incremental) theory of intelligence affects people's inferences about what is valued, their selfand social judgments, and their behavioral decisions. In Studies 1 and 2, the authors find that people systematically shift their self-presentations when motivated to join an entity or incremental organization. People present their 'smarts' to the entity environment and their 'motivation' to the incremental environment. In Studies 3a and 4, they show downstream consequences of these inferences for participants' self-concepts and their hiring decisions. In Study 3b, they demonstrate that the effects are not due to simple priming."

"People who hold an entity theory of intelligence view it as a fixed quantity that cannot be changed very much by effort and learning, whereas people who hold an incremental theory believe intelligence is malleable and expandable."

"[P]articipants judged the club endorsing a fixed view to be less appealing than the one endorsing a malleable view of intelligence."

"[P]articipants expected to be more comfortable, to feel that they belonged more, and to believe that they would be more accepted and less likely to stick out in the organization that endorsed a malleable (vs. fixed) view of intelligence."

"Participants who interviewed with a club that endorsed a fixed view of intelligence not only displayed their smarts during the interview but also enacted the fixed-view philosophy when choosing a candidate in an unrelated hiring task. In fact, participants chose the candidate who featured her smarts 78% of the time when they themselves had previously applied to the entity club. Similarly, participants who interviewed for membership to a club that espoused a malleable theory of intelligence showed a strong trend toward displaying more motivational characteristics and went on to hire the motivated candidate 92% of the time."

Despite what we want our students to believe, our discipline has a strong view of mathematical research "power" as a fixed aspect of intelligence.

[58] NSF Mathematical Sciences Institutes, Joint math institutes expertise database. http://www.mathinstitutes.org/diversity_database (accessed September 15, 2014)

a database of women and underrepresented minority mathematicians, for use by NSF-sponsored math institutes (currently AIM, IAS, ICERM, IMA, IPAM, MBI, MSRI, SAMSI). Website seems to be maintained by the IMA.

[59] I. Neath, How to improve your teaching evaluations without improving your teaching, Psychological Reports 78 (1996), 1363–1372.

"Tip 1: Be Male"

"The effects of instructors' gender on evaluation ratings are complex and interact with a variety of other variables. Nonetheless, a preliminary conclusion appears to be that it is better to be male than female. Changing your gender, if female, can boost your effectiveness ratings. Students often expect more support from female faculty than from male faculty, and, when this extra effort is not forthcoming, students often downgrade their ratings of teaching effectiveness. If you are female, do not be very demanding of your students; students tend to be more critical, particularly on items measuring faculty's availability and course stimulation when the instructor is female. This effect is compounded if you teach a technical course, particularly to liberal arts majors. If you do happen to be female and, for whatever reason, do not wish to become male, all is not lost. The Bem Sex-role Inventory is a scale that measures the preponderance of masculine and feminine traits in an indvidual. Study the scale and learn how to be less feminine and more androgynous; your ratings will improve." That paragraph alone cites seven studies.

[60] M. Niederle and L. Vesterlund, Explaining the gender gap in math test scores: the role of competition, Journal of Economic Perspectives 24 (2010), no. 2, 129–144.

Males' greater (over)confidence leads them to select more difficult and more math-intensive paths than females.

"Over the past 20 years, the fraction of males to females who score in the top five percent in high school math has remained constant at two to one (Xie and Shauman, 2003). Examining students who scored 800 on the math SAT in 2007, Ellison and Swanson (in this issue) also find a two to one male–female ratio. Furthermore, they find that the gender gap widens dramatically when examining the right tail of the performance distributions for students who participate in the American Mathematics Competitions."

"We will present results that suggest that the abundant and disturbing evidence of a large gender gap in mathematics performance at high percentiles in part may be explained by the differential manner in which men and women respond to competitive test-taking environments."

"Our results show that women shy away from competition while men embrace it and this difference is explained by gender differences in confidence and in attitudes toward competition. A consequence is that from a payoff-maximizing perspective, too few high-performing women and too many low-performing men enter the tournament." [note: performance gap for mixed-sex tournaments far larger than for single-sex tournaments]

"Girls and boys with the same math test scores have very different assessments of their relative ability (for example, Eccles, 1998). Conditional on math performance, boys are more overconfident than girls, and this gender gap is greatest among gifted children (Preckel, Goetz, Pekrun, and Kleine, 2008). The strong gender stereotype that boys are better at math may help to explain this gender gap in confidence."

"Dee (2007) and Carrell, Page, and West (2009) study the effect of a teacher's gender on performance. Having a female math or science teacher improves the math and science performances by females, and the effect is particularly large for the gifted female students. Using the 1999–2000 Schools and Staffing Survey (SASS), Dee (2007) estimates that in 12th grade 44 percent of science teachers and 52 percent of math teachers are female, compared to 71 percent in reading. See Bettinger and Long (2005) for evidence on college instruction."

"Stereotypes may not only influence a child's confidence directly and the manner in which the child responds to competition, it may also influence the likelihood by which the child 'chokes' in any performance setting. Stereotype threat theory (Steele, 1997) argues that a strong stereotype may harm the stereotyped individual's performance on a task because they fear confirming it. Spencer, Steele, and Quinn (1999) show that the effect of stereotype threat may be removed if in describing a test it is stated that the 'math test had revealed no gender difference in the past.'"

"The findings by Pope and Sydnor (in this issue) are very much in line with stereotypes influencing test performance at the tail. Looking at U.S. data, they find large variation in the gender ratios of 8th graders scoring in the top 75th and 95th percentiles of the National Assessment of Educational Progress (NAEP). The test is taken by a sample of children in public schools. Consistent with beliefs inflfluencing behavior, they show that in regions where men and women are viewed as more equal there are smaller gender disparities in stereotypically male-dominated tests of math and science and in stereotypically female-dominated tests of reading."

"Our study shows that when women are guaranteed equal representation among winners [via an affirmative-action tournament], more women and fewer men enter competitions and the change exceeds that predicted by the changes in the probability of winning that result from the introduction of affirmative action. The response causes the fraction of entrants who are women to increase from 29 to 64 percent. ... men are less overconfident and women less reluctant to compete in groups where their own gender is better represented."

[61] O'Reilly Media, Conference diversity. http://cdn.oreillystatic.com/en/assets/1/eventprovider/1/ConfDiversity.pdf (accessed July 29, 2014)

Template conference diversity statement (Creative Commons license)

[62] Organisation for Economic Co-operation and Development, How do girls compare to boys in mathematics skills?, PISA 2009 at a Glance, OECD Publishing, 2011.

data on boys' and girls' math scores on the 2009 Programme for International Student Assessment test, by the Organisation for Economic Co-operation and Development

[63] A. Prasad, Conference diversity distribution calculator. http://aanandprasad.com/diversity-calculator

"I sometimes encounter the argument that speaker line-ups that fail to adequately represent women are not the product of systemic discrimination, but rather an inevitably frequent occurrence in an industry as male-dominated as ours. ... [I]n an unbiased selection, you're significantly more likely to see more than the expected number of women than none at all."

[64] E. Pronin, T. Gilovich, and L. Ross, Objectivity in the eye of the beholder: perceptions of bias in self versus others, Psychological Review 111 (2004), 781–799.

"In the present article, we argue that people readily detect or infer a wide variety of biases in others while denying such biases in themselves."

"Studies calling for individuals to assess possible biasing influences on their own judgments and decisions have generally documented a failure to recognize such influence."

tables on pages 786–787, with lots of studies of biases and principal findings

"[P]articipants overwhelmingly reported that they personally were less susceptible to each of these biases than the average American."

"This asymmetry in attributions of bias, we have suggested, arises in part from the simple fact that people inhabit a world in which others hold opinions, make judgments, and undertake decisions that differ from their own. The attempt to account for this difference, and to do so while holding the conviction that one's own responses to the world reflect the realities of that world, we have further suggested, is a proximate cause of the perceived asymmetry between self and others."

"Our analysis further suggests that blindness to bias in the self is also produced and maintained by people's willingness to take their introspections about the sources of their judgments and decisions at face value—that is, to treat the lack of introspective awareness of having been biased as evidence that one is innocent of such bias."

[65] E. Reuben, P. Sapienza, and L. Zingales, How stereotypes impair women's careers in science, Proceedings of the National Academy of Science of the USA 111 (2014), no. 12, 4403–4408.

Abstract: "Does discrimination contribute to the low percentage of women in mathematics and science careers? We designed an experiment to isolate discrimination's potential effect. Without provision of information about candidates other than their appearance, men are twice more likely to be hired for a mathematical task than women. If ability is self-reported, women still are discriminated against, because employers do not fully account

for men's tendency to boast about performance. Providing full information about candidates' past performance reduces discrimination but does not eliminate it. We show that implicit stereotypes (as measured by the Implicit Association Test) predict not only the initial bias in beliefs but also the suboptimal updating of gender-related expectations when performance-related information comes from the subjects themselves."

[66] C. L. Ridgeway, Gender, status, and leadership, Journal of Social Issues 57 (2001), no. 4, 637–655.

"In mixed-sex or gender-relevant contexts, gender status beliefs shape men's and women's assertiveness, the attention and evaluation their performances receive, ability attributed to them on the basis of performance, the influence they achieve, and the likelihood that they emerge as leaders. Gender status beliefs also create legitimacy reactions that penalize assertive women leaders for violating the expected status order and reduce their ability to gain complaince with directives."

lots of references embedded within the following quotes

"Several studies show that, other things being equal, men in mixed-sex groups talk more, make more task suggestions, display more visual dominance and assertive gestures, use less tentative speech, and are more influential than women. ... [M]en's tendency to speak more and engage in more active task-related behaviors was mediated by status-based assumptions that men were more competent. When performance expectations for men and women in the situation were equalized, gender differences in task-related behavior disappeared."

these effects depend upon the perception of the task as male, female, or gender-neutral

"As a result, the theory predicts that when a woman becomes a manager, the task-relevant implications of that role will significantly strengthen performance expectations for her, compared to other women. Because of the lingering, background effects of gender status, however, she will still be seen as less competent than a similar male manager.... The persisting effects of gender status mean that a woman manager's efforts to assert authority over others is subtly undercut by continuing, implicit assumptions that she is not quite as competent in the role as a man would be."

"[W]hen women in mixed-sex groups present their ideas in an assertive or self-directed style, they are disliked or perceived as untrustworthy and achieve less influence over men compared to similarly acting men or less assertive women. Similarly, studies have shown that self-promoting behavior that highlights competence produces positive outcomes for men but makes women appear less likeable and less hireable."

[67] C. L. Ridgeway and S. J. Correll, Unpacking the gender system: a theoretical perspective on gender beliefs and social relations, Gender and Society 18 (2004), no. 4, 510–531.

"[C]ultural beliefs about gender function as part of the rules of the game, biasing the behaviors, performances, and evaluations of otherwise similar men and women in systematic ways that the authors specify. While the biasing impact of gender beliefs may be small in any one instance, the consequences cumulate over individuals' lives and result in substantially different outcomes for men and women."

"When hegemonic gender beliefs are effectively salient in a situation, hierarchical presumptions about men's greater status and competence become salient for participants, along with assumptions about men's and women's different traits and skills. ... The trouble with these status-shaped expectations for competence is that they affect people's behaviors and evaluations in self-fulfilling ways."

"What is interesting about the age old gender system in Western society is not that it never changes but that it sustains itself by continually redefining who man and women are and what they do while preserving the fundamental assumption that whatever the differences are, on balance, they imply that men are rightly more powerful. The essential form of gender hierarchy—that is, the cultural assumption that men have more status and authority than do women—has persisted during major economic transformations such as industrialization, the movement of women into the paid labor force, and more recently, the movement of women into male-dominated occupations such as law or medicine."

[68] E. Ries, Why diversity matters (the meritocracy business), Startup Lessons Learned, February 22, 2010. http://www.startuplessonslearned.com/2010/02/why-diversity-matter-meritocracy.html (accessed August 16, 2014)

"So when a team lacks diversity, that's a bad sign. What are the odds that the decisions that were made to create that team were really meritocratic? That's why I care a lot about diversity: not for its own sake, but because it is a source of strength for teams that have it, and a symptom of dysfunction for those that don't."

"[S]tartups led by women are actually more successful, on average, than those led by men. This doesn't surprise me at all, and you don't have to support a biological determinism theory to see why. If women face structural barriers to becoming entrepreneurs, then those few who are able to overcome those barriers are probably exceptional to begin with."

"Diversity benefits men, too. One of the most pernicious effects of groupthink is the sense of entitlement it breeds. Teams that are complacent are less likely to challenge their own assumptions, less likely to listen to feedback and, therefore, less likely to learn. ... Outsiders are afraid to enter, let alone make a suggestion. The safety of the group becomes an impediment to dealing with reality."

"Demographic diversity is an indicator. It's a reasonable inference that a group that is homogeneous in appearance was probably chosen by a biased selector."

"Even the fact that a startup is all-male can make it less likely that a women would want to join. Even worse, it might even affect her performance in an interview. And just solving the gender imbalance might not be helpful, if the solution involves yet more negative stereotypes. ... But priming cuts both ways: when we go out of our way to affirm meritocracy, it actually improves everyone's performance. In fact, explicitly making meritocracy a value is actually better than rejecting stereotypes—by calling attention to the stereotype, you're still engaging in priming. Instead of focusing on programs designed to specifically benefit any one group, I think our focus should be on making our companies as meritocratic as possible."

[69] E. Ries and S. Milstein, Seeking speakers, Startup Lessons Learned, August 8, 2012. http://www.startuplessonslearned.com/2012/08/seeking-speakers.html (accessed July 29, 2014)

lovely personal story about how changing the way speakers were sought greatly improved diversity.

[70] S. A. Rogier and M. Y. Padgett, The impact of utilizing a flexible work schedule on the perceived career advancement potential of women, Human Resource Development Quarterly 15 (2004), no. 1, 89–106.

from the abstract: "This study examined whether a woman working a flexible schedule would be perceived as having less career advancement potential than a woman on a regular schedule. Participants reviewed a packet of materials simulating the personnel file of a female employee in an accounting firm who was seeking promotion from manager to senior manager. Results indicated that participants perceived the female employee on the flexible schedule as having less job-career dedication and less advancement motivation; there was no difference in perceived capability."

"This finding is consistent with prior research by Cohen and Single, who found that CPAs working flexible schedules were perceived as less desirable for an engagement, less likely to be promoted, and more likely to leave the firm."

[71] E. Sander, AWM childcare statement, Association for Women in Mathematics, November 2010. http://sites.google.com/site/awmmath/awm-resources/policy-and-advocacy/awm-childcare-statement (accessed July 29, 2014)

official statement on what conference policy should be

[72] J. M. Sheltzer and J. C. Smith, Elite male faculty in the life sciences employ fewer women, Proceedings of the National Academy of Science of the USA 111 (2014), no. 28, 10107–10112.

"[M]ale faculty members tended to employ fewer female graduate students and postdoctoral researchers (postdocs) than female faculty members did. Furthermore, elite male faculty—those whose research was funded by the Howard Hughes Medical Institute, who had been elected to the National Academy of Sciences, or who had won a major career award—trained significantly fewer women than other male faculty members. In contrast, elite female faculty did not exhibit a gender bias in employment patterns. New assistant professors at the institutions that we surveyed were largely comprised of postdoctoral researchers from these prominent laboratories, and correspondingly, the laboratories that produced assistant professors had an overabundance of male postdocs. Thus,

one cause of the leaky pipeline in biomedical research may be the exclusion of women, or their self-selected absence, from certain high-achieving laboratories."

"[M]ale professors run laboratories that have about 22% fewer female postdocs and 11% fewer female graduate students than their female colleagues do."

"For instance, male HHMI investigators ran laboratories that had, on average, 31% female postdocs, whereas men who were not HHMI investigators employed, on average, 38% female postdocs. This difference translates to a 19% deficit in the employment of female postdocs relative to their representation across all laboratories [led by males]."

[73] L. Sinclair and Z. Kunda, Motivated stereotyping of women: she's fine if she praised me but incompetent if she criticized me, Personality and Social Psychology Bulletin 25 (2000), no. 11, 1329–1342.

Abstract: "Motivation may provoke stereotype use. In a field study of students' evaluations of university instructors and in a controlled experiment, participants viewed women as less competent than men after receiving negative evaluations from them but not after receiving positive evaluations. As a result, the evaluation of women depended more on the favorability of the feedback they provided than was the case for men. Most likely, this occurred because the motivation of criticized participants to salvage their self-views by disparaging their evaluator led them to use a stereotype that they would otherwise not have used. The stereotype was not used by participants praised by a woman or by participants who observed someone else receive praise or criticism from a woman; all these participants rated the woman just as highly as participants rated a man delivering comparable feedback."

[74] K. Snyder, The abrasiveness trap: high-achieving men and women are described differently in reviews, Fortune.com, August 26, 2014. http://fortune.com/2014/08/26/performance-review-gender-bias (accessed August 28, 2014)

"When breaking the reviews down by gender of the person evaluated, 58.9% of the reviews received by men contained critical feedback. 87.9% of the reviews received by women did. Men are given constructive suggestions. Women are given constructive suggestions—and told to pipe down."

"This kind of negative personality criticism—watch your tone! step back! stop being so judgmental!—shows up twice in the 83 critical reviews received by men. It shows up in 71 of the 94 critical reviews received by women."

"Words like bossy, abrasive, strident, and aggressive are used to describe women's behaviors when they lead; words like emotional and irrational describe their behaviors when they object. All of these words show up at least twice in the women's review text I reviewed, some much more often. Abrasive alone is used 17 times to describe 13 different women. Among these words, only aggressive shows up in men's reviews at all. It shows up three times, twice with an exhortation to be more of it."

[75] S. J. Spencer, C. M. Steele, and D. M. Quinn, Stereotype threat and women's math performance, Journal of Experimental Social Psychology 35 (1999), 4–28.

From the abstract: "When women perform math, unlike men, they risk being judged by the negative stereotype that women have weaker math ability. We call this predicament stereotype threat and hypothesize that the apprehension it causes may disrupt women's math performance. In Study 1 we demonstrated that the pattern observed in the literature that women underperform on difficult (but not easy) math tests was observed among a highly selected sample of men and women. In Study 2 we demonstrated that this difference in performance could be eliminated when we lowered stereotype threat by describing the test as not producing gender differences. However, when the test was described as producing gender differences and stereotype threat was high, women performed substantially worse than equally qualified men did. A third experiment replicated this finding with a less highly selected population and explored the mediation of the effect."

[76] C. Stanton, How I got 50% women speakers at my tech conference, Geek Feminism, May 21, 2012. http://geekfeminism.org/2012/05/21/how-i-got-50-women-speakers-at-my-tech-conference (accessed July 29, 2014)

women don't submit proposed talks as much as men do; organizer made a huge effort to get them to submit

[77] R. E. Steinpreis, K. A. Anders, and D. Ritzke, The impact of gender on the review of the curricula vitae of job applicants and tenure candidates: a national empirical study, Sex Roles 41 (1999), no. 7/8, 509–528.

"Both men and women were more likely to vote to hire a male job applicant than a female job applicant with an identical record. Similarly, both sexes reported that the male job applicant had done adequate teaching, research, and service experience compared to the female job applicantwith an identical record. In contrast, when men and women examined the highly competitive curriculum vitae of the real-life scientist who had gotten early tenure, they were equally likely to tenure the male and female tenure candidates and there was no difference in their ratings of their teaching, research, and service experience."

"The present findings did not indicate that potential female tenure candidates are evaluated more negatively than potential male tenure candidates, although participants were four times as likely to write cautionary comments in the margins of their questionnaire if they had reviewed a female tenure candidate than if they had reviewed the male tenure candidate. These cautionary comments include such comments as, 'We would have to see her job talk,' 'It is impossible to make such a judgement without teaching evaluations,' 'I would need to see evidence that she had gotten these grants and publications on her own.' Such cautionary comments on the male tenure candidate's vitae were quite rare."

[78] J. Surowiecki, The difference difference makes: waggle dances, the Bay of Pigs, and the value of diversity, in The Wisdom of Crowds, Doubleday, 2004, 23–39.

"Diversity helps because it actually adds perspectives that would otherwise be absent and because it takes away, or at least weakens, some of the destructive characteristics of group decision making."

"Ultimately, diversity contributed not just by adding different perspectives to the group but also by making it easier for individuals to say what they really think."

[79] F. Trix and C. Psenka, Exploring the color of glass: letters of recommendation for female and male medical faculty, Discourse & Society 14 (2003), no. 2, 191–220.

"Letters written for female applicants were found to differ systematically from those written for male applicants in the extremes of length, in the percentages lacking in basic features, in the percentages with doubt raisers (an extended category of negative language, often associated with apparent commendation), and in frequency of mention of status terms. Further, the most common semantically grouped possessive phrases referring to female and male applicants ('her teaching,' 'his research') reinforce gender schema that tend to portray women as teachers and students, and men as researchers and professionals."

[80] N. D. Tyson, response to question during panel discussion, The Secular Society and its Enemies, Center for Inquiry, New York, 2007. response http://www.youtube.com/watch?v=z7ihNLEDiuM ; conference web site http://www.centerforinquiry.net/secularsociety (both accessed August 16, 2014)

transcription of his response, by M. Goodwin at http://economixcomix.com/2014/04/20/neil-degrasse-tyson-on-gender-and-race-in-science-transcribed : "I have never been female. But I have been black my whole life. And so, let me perhaps offer some insight from that perspective. Because there are many similar social issues related to access to equal opportunity that we find in the black community, as well as the community of women, in a male-dominated—a white-male-dominated—society.

"When I look at, throughout my life—I've known that I wanted to do astrophysics since I was nine years old, my first visit to the Hayden planetarium. So I got to see how the world around me reacted to my expression of these ambitions. And all I can say is, the fact that I wanted to be a scientist and astrophysicist was, hands down, the path of *most* resistance through the forces of society.

"Any time I expressed this interest teachers would say, 'Don't you want to be an athlete?' I looked to become something that was outside the paradigms of expectation of the people in power. Fortunately, my depth of interest was so deep, and so fuel-enriched, that every one of these curveballs I was thrown, and fences built in front of me, and hills that I had to climb, I just reached for more fuel and I kept going.

"Now here I am, one—I think—one of the most visible scientists in the land, and I look behind me and say, 'Where are the others who might have been this?' And they're not there. And I wonder how—who—what is the blood on the tracks that I happened to survive that others did not? Simply because of the forces of society

that prevented, at every turn, at every turn, to the point that I have security guards following me as I go through department stores, presuming that I am a thief. I walked out of a store one time and the alarm went off, so they came running to me. I walked through the gate at the same time a white male walked through the gate. And that guy just walked off with the stolen goods, knowing that they would stop me and not him. That's an interesting sort of exploitation of this; what a scam that was. I think people should do that more often. [laughter]

"So, my life experience tells me that when you don't find blacks in the sciences, when you don't find women in the sciences, I know that these forces are real, and I had to survive them in order to get where I am today.

"So before we start talking about genetic differences, you gotta come up with a system where there's equal opportunity. *Then* we can have that conversation."

[81] E. L. Uhlmann and G. L. Cohen, "'I think it, therefore it's true': effects of self-perceived objectivity on hiring discrimination", Organizational Behavior and Human Decision Processes 104 (2007), 207–223.

"This suggests that the conviction that one is objective (and by extension, that one's beliefs and thoughts are as well) should increase the likelihood that an individual will act on his or her stereotypic beliefs and thoughts. Additionally, people confident in their own objectivity may overestimate their invulnerability to bias, and thus fail to correct for the influence of stereotypic biases that they might have otherwise been careful to monitor."

"[A] sense of personal objectivity led people to act on group-based biases they might have otherwise suppressed or held with greater tentativeness."

"[T]he rational actor ideal can exacerbate bias when it is applied descriptively. When people believe that they are objective, rational actors, they may be more likely to do what they think is correct, and at the same time less likely to take into account alternative viewpoints. However, as Study 3 indicates, what people think is correct can arise not simply from stereotypic beliefs, but from incidental, environmentally primed concepts like 'pink' and 'Barbie'."

"When people feel that they are objective, rational actors, they act on their group-based biases more rather than less. ... Indeed, from the actor's perspective, it may seem rational to act on stereotypic thoughts that, though they may arise from incidental environmental cues, subjectively feel like objective reflections of reality."

[82] D. H. Uttal, Beliefs about genetic influences on mathematics achievement: A cross-cultural comparison, Genetica 99 (1997), 165–172.

From the abstract: "Contrary to the beliefs of many Americans, the East Asian advantage in mathematics is probably not due to a genetically-based advantage in mathematics. Instead, differences in beliefs about the role of genetics may be partly responsible. Asians strongly believe that effort plays a key role in determining a child's level of achievement, whereas Americans believe that innate ability is most important. In addition, despite the relatively poor performance of their children, American parents are substantially more satisfied with their children's performance than Asian parents. The American emphasis on the role of innate ability may have several consequences for children's achievement. For example, it may lead children to fear making errors and to expend less effort on mathematics than their Asian counterparts."

[83] V. Valian, D. Sperber, et al., For gender equality at academic conferences, http://forgenderequityatconferences.blogspot.fr ; http://www.gopetition.com/petitions/commitment-to-gender-equity-at-scholarly-conferences.html (accessed July 28, 2014)

Q&A, online petition

"Q. To the best of my knowledge, I am unbiased. I resent the idea that bias against women is at work in the invitations I make.
"A. The word 'bias' here is not meant to imply deliberate bias. Although there may be deliberate cases, those are not the ones we are concerned about. Rather, we are concerned about the subtle, unintentional examples. Men's names come to mind more readily than women's, leading to more invitations to men, leading to greater visibility for men, leading to yet easier availability of men's names. Both men and women, to the same extent, tend to evaluate women more negatively than men in professional contexts."

"An analogy with geographical distribution may be helpful. Organizers of international conferences often make an attempt to have geographical diversity, even if it takes more time and effort."

"Q. To invite women, I would have to go slightly off-topic.
"A. In our experience, not everyone fits neatly into a program, even when they are all men or all women. Themes are sometimes loosely adhered to. Make sure you are not using different criteria for men and women; you don't want to require that women adhere more closely to the theme than men do. Also, in the very choice and description of topics, you may have been influenced by the competencies and interests of the people you initially had in mind to invite. If you had thought of more women to invite, you might have ended up formulating a somewhat different but no less interesting and relevant topic. The choice of topics itself may not always be gender-neutral."

[84] D. van Dijk, O. Manor, and L. B. Carey, Publication metrics and success on the academic job market, Current Biology 24 (2014), no. 11, R516–R517.

"Men are overrepresented as PIs, yet even after correcting for all other publication and non-publication derived features, being male is positively predictive of becoming a PI.... Given the same publication record, men are more likely than women to become PIs." (I believe the amount quoted was 7% more likely.)

[85] K. Wellhousen, Do's and don'ts for eliminating hidden bias, Childhood Education 73 (1996), no. 1, 36–39.

"Boys quickly raise their hands to respond or contribute to discussions, wave their hand around and up and down, change the arm they have raised when it gets tired, jump out of their seat and make noise or plead with the teacher to call on them. Girls, however, raise their hand but will soon put it down if they are not acknowledged. As a result, teachers call on boys and interact with them most of the time, while girls' passive, compliant behavior often means they are ignored."

"In addition to allowing boys more time to respond, teachers often extend boy's answers by asking a follow-up question or by asking them to support their previous response. Girls are more likely to receive an 'accepted' response from teachers such as 'Okay' or 'Uh-huh.' ... These behaviors send a very negative message about the importance of girls' contributions to class discussions."

"Boys call out answers (when the teacher does not call on them) eight times more often than girls do.... Teachers often respond to boys' calling out, thus reinforcing the behavior. When girls call out, however, teachers are more likely to remind them that they are not following the class rules."

many references to M. Sadker and D. Sadker, Failing At Fairness: How Our Schools Cheat Girls (Scribner, 1995)

[86] C. Wennerås and A. Wold, Nepotism and sexism in peer-review, Nature 387 (1997), 341–343.

"Our study strongly suggests that peer reviewers cannot judge scientific merit independent of gender. The peer reviewers overestimated male achievements and/or underestimated female performance...."

"Did men and women with equal scientific productivity receive the same competence rating by the MRC reviewers? No! As shown in Fig. 1 for the productivity variable 'total impact', the peer reviewers gave female applicants lower scores than male applicants who displayed the same level of scientific productivity. In fact, the most productive group of female applicants, containing those with 100 total impact points or more, was the only group of women judged to be as competent as men, although only as competent as the least productive group of men (the one whose members had fewer than 20 total impact points)."

"[F]or a female scientist to be awarded the same competence score as a male colleague, she needed to exceed his scientific productivity by 64 impact points.

"This represents approximately three extra papers in Nature or Science ... or 20 extra papers in a journal with an impact factor of around 3, which would be an excellent specialist journal.... Considering that the mean total impact of this cohort of applicants was 40 points, a female applicant had to be 2.5 times more productive than the average male applicant to receive the same competence score as he...."

[87] WISELI, online brochures and booklets, Women in Science & Engineering Leadership Institute (Madison). Advancing women in science and engineering: advice to the top, http://wiseli.engr.wisc.edu/docs/AdviceTopBrochure.pdf ; Benefits and challenges of diversity in academic settings, http://wiseli.engr.wisc.edu/docs/Benefits_Challenges.pdf ; Fostering success for women in science and

engineering, http://wiseli.engr.wisc.edu/docs/FosteringSuccessBrochure.pdf ; Reviewing applicants: research on bias and assumptions, http://wiseli.engr.wisc.edu/docs/BiasBrochure_3rdEd.pdf . Accessed July 28, 2014.

first one: "Top 10 Tips for Academic Leaders to Accelerate the Advancement of Women in Science and Engineering"

second and and fourth ones: great pamphlets where I got so many sources from

third one: "Four main factors are responsible for the relatively low representation of women in leadership positions in academic science and engineering: Subtle bias; Discrimination and harassment; Lack of role models and encouragement; Work-life balance"

[88] WISELI, Searching for Excellence & Diversity: A guide for search committees, Women in Science & Engineering Leadership Institute (Madison), 2012.

"Element III, 'Raise Awareness of Unconscious Assumptions and their Influence on Evaluation of Applicants', presents research findings from a variety of disciplines (including cognitive psychology, social psychology, economics, and organizational behavior) that demonstrate how unconscious assumptions can influence the evaluation of applicants."

"Element IV, 'Ensure a Fair and Thorough Review of Applicants', relies on research findings to suggest methods for overcoming the influence of unconscious bias and assumptions on the evaluation of applicants. It also provides suggestions and instruments for conducting equitable evaluations."

APPENDIX: GENDER DATA ON ICM AND JM

The final version of this manuscript will include tables of data from the 2014 ICM and the 2014 Joint Meetings of the AMS and MAA, listing the various sessions and the numbers of female speakers and total speakers (and the same for organizers, where given). Some data from mathematics prizes will also be included.