Women in the Workplace

2016

LEAN IN

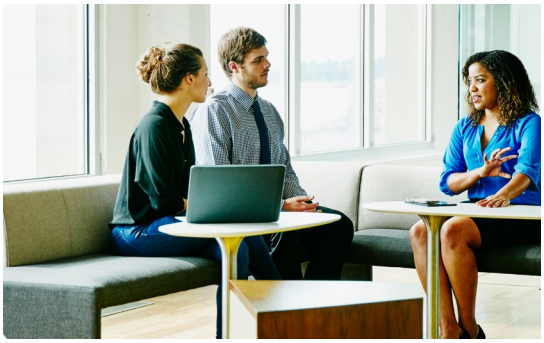
McKinsey&Company

About the study

Women in the Workplace 2016 is a comprehensive study of the state of women in corporate America. The study is part of a long-term partnership between LeanIn.Org and McKinsey & Company to give companies the information they need to promote female leadership and foster gender equality in the workplace.

One hundred thirty-two companies employing more than 4.6 million people shared their pipeline data and completed a survey of HR practices. In addition, more than 34,000 employees completed a survey designed to explore their experiences regarding gender, opportunity, career, and work-life issues.

This year's findings build on our *Women in the Workplace 2015* report, as well as similar research conducted by McKinsey & Company in 2012.



Contents

In corporate America, women fall behind early and continue to lose ground with every step

Women are less likely to receive the first critical promotion to manager—so far fewer end up on the path to leadership—and they are less likely to be hired into more senior positions. Women also get less access to the people, input, and opportunities that accelerate careers. As a result, the higher you look in companies, the fewer women you see. This disparity is especially pronounced for women of color, who face the most barriers to advancement and experience the steepest drop-offs with seniority.

Companies' commitment to gender diversity is at an all-time high, but they are struggling to put their commitment into practice, and many employees are not on board. To level the playing field, companies need to treat gender diversity like the business imperative it is, and that starts with better communication, more training, and a clearer focus on results.

This is hard work but work worth doing. Many studies link diversity to better business results,[1] and all employees benefit from a workplace that is inclusive and fair.

1 For a recent example, see "Why Diversity Matters," McKinsey & Company, February 2015, available at http://www.mckinsey.com/business-functions/organization/our-insights/why-diversity-matters.

A closer look at the corporate pipeline

Based on employee pipeline data from 132 companies, two broad themes emerge this year: (1) On average, women are promoted and hired at lower rates than men, so far fewer women become senior leaders. (2) At more senior levels, we see women shift from line to staff roles, so very few end up on the path to becoming CEO.

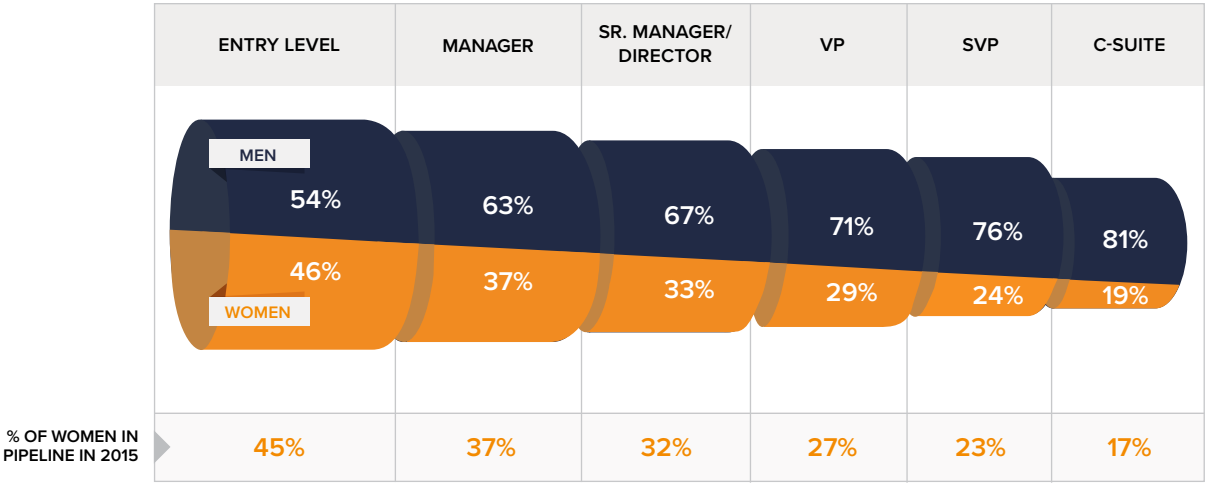
Women are still underrepresented at every level

Despite modest progress since 2015, women remain underrepresented in the corporate pipeline. At every step, the representation of women declines, and this does not appear to be the result of company-level attrition. On average, the women and men in this study are leaving their organizations at about the same rate.

GENDER REPRESENTATION IN THE CORPORATE PIPELINE IN 2016

WOMEN MEN

% OF EMPLOYEES BY LEVEL



Women are less likely to be promoted to manager, so fewer end up on the path to leadership

Promotion rates for women lag behind those of men, and the disparity is largest at the first step up to manager—for every 100 women promoted, 130 men are promoted. In addition, external hiring is not improving the representation of women. At every level, companies hire fewer women from the outside than men, and this is especially pronounced in senior management.

However, there is reason for optimism. The percentage of women being promoted into middle and senior management is higher than the percentage of women currently at those levels. If this pattern holds over time, the representation of mid- and senior-level women will slowly increase.

Compared to women, almost twice as many men are hired from the outside as directors—and more than three times as many are hired as SVPs.

GAP IN RATE OF FIRST PROMOTIONS

WOMEN MEN

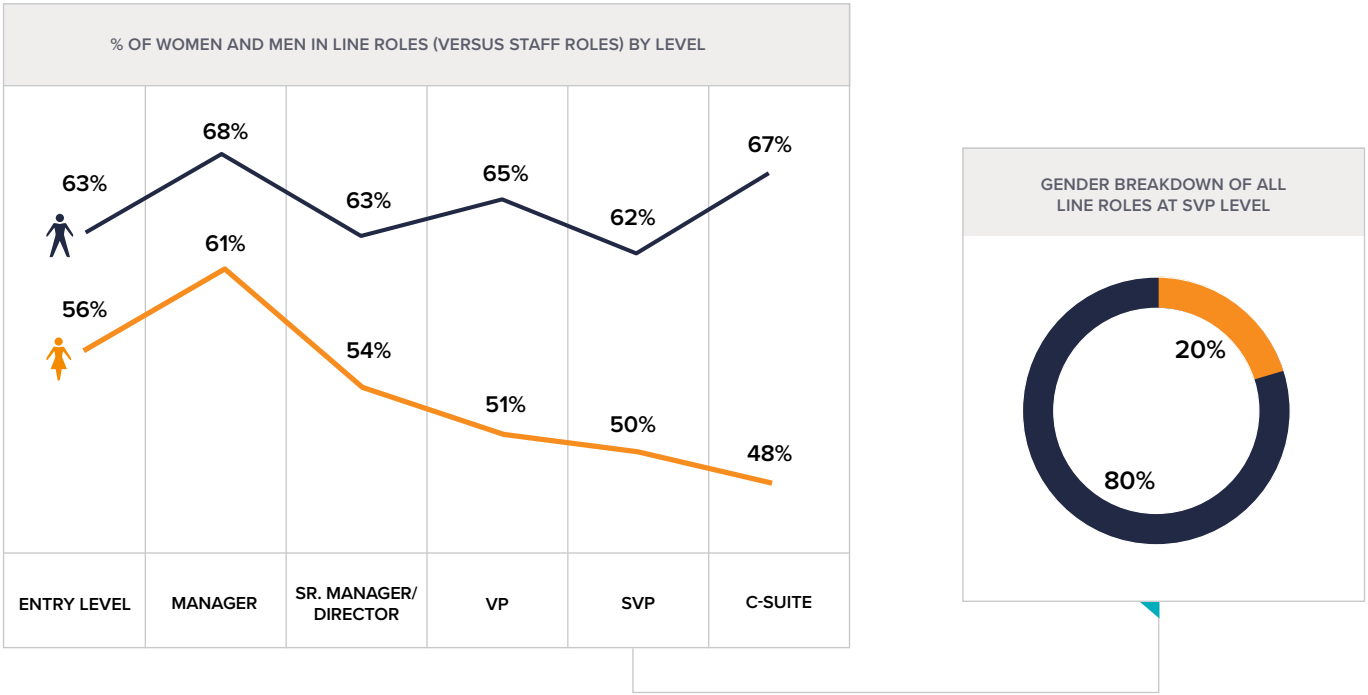
FOR EVERY 100 WOMEN PROMOTED TO MANAGER, 130 MEN ARE PROMOTED

Very few women end up in line to become CEO

At senior levels, we see women shift from line to staff roles,[2] while the percentage of men in line roles remains about the same. So by the time women reach the SVP level, they hold a mere 20 percent of line roles. This hurts their odds of getting the top job because the vast majority of CEOs come from line positions.

In 2015, 90% of new CEOs were promoted or hired from line roles, and 100% of them were men.[3]

WHAT HAPPENS TO THE DISTRIBUTION OF WOMEN AND MEN IN LINE ROLES



2 Line roles are positions with profit-and-loss responsibility and/or a focus on core operations. Staff roles are positions in functions that support the organization like legal, human resources, and IT. 3 "2015 CEO Transitions," Spencer Stuart, March 2016, available at https://www.spencerstuart.com/research-and-insight/2015-ceo-transitions.

Women of color face even more barriers

Women of color[4] are the most underrepresented group in the corporate pipeline, lagging behind white men, men of color, and white women. Even though they make up 20 percent of the U.S. population, women of color hold a mere 3 percent of C-suite positions, despite having higher aspirations for becoming a top executive than white women.

Compared to white women, women of color also report that they get less access to opportunities and see a workplace that is less fair and inclusive. They are 9 percent less likely to say they've received a challenging new assignment, 21 percent less likely to think the best opportunities go to the most deserving employees, and 10 percent less likely to feel comfortable being themselves as work. And in all cases, Black women appear to be the most disadvantaged.

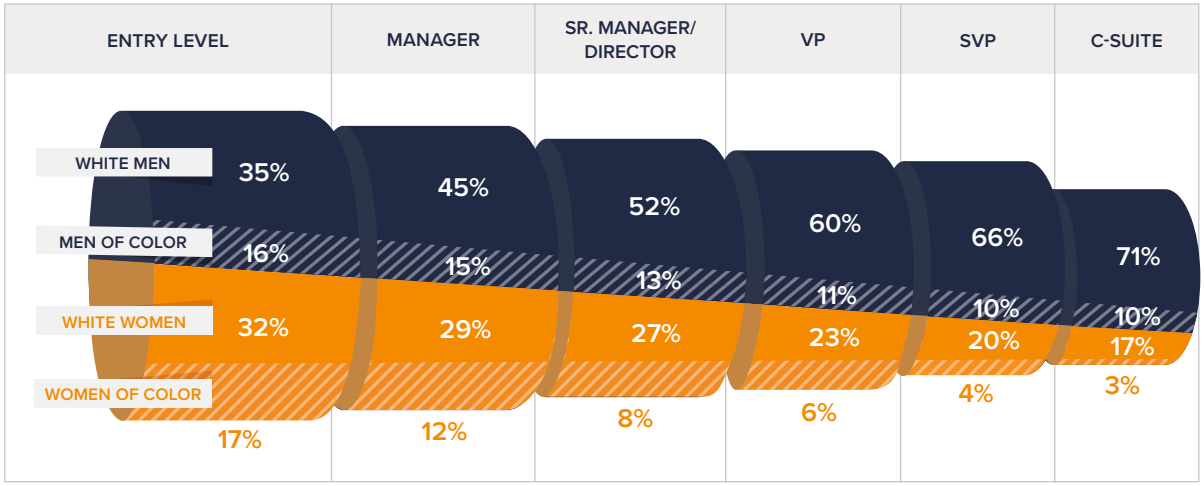
While 78 percent of companies report gender diversity is a top priority, only 55 percent report that racial diversity is.[5] Clearly there's important work to be done, and this starts with a greater awareness of the problem and a steadfast commitment to addressing it.

Only 29% of Black women think the best opportunities at their company go to the most deserving employees, compared to 47% of white women, 43% of Asian women, and 41% of Hispanic women.

RACE AND GENDER REPRESENTATION IN THE CORPORATE PIPELINE IN 2016[6]

WOMEN MEN

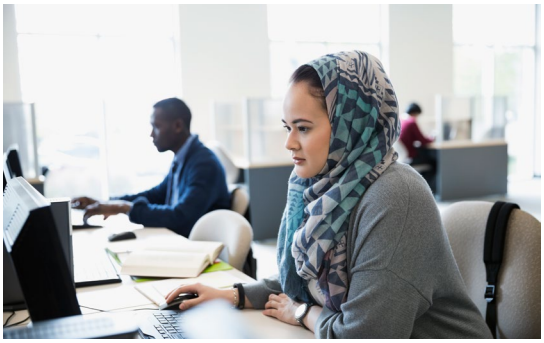
% OF EMPLOYEES BY LEVEL

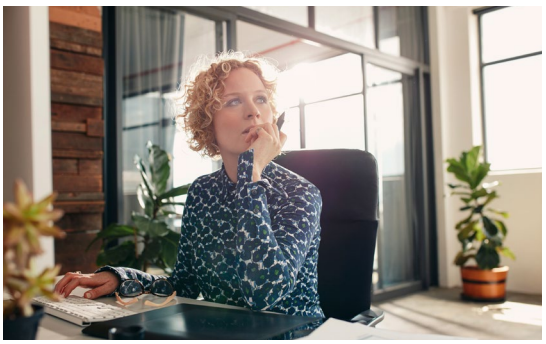


4 In this study, Black, Hispanic, Asian, American Indian or Alaskan Native, Native Hawaiian or Pacific Islander, and mixed-race women. 5 Seventy-eight percent of companies say that gender diversity is a top-ten priority for their CEO. Fifty-five percent of companies report that racial diversity is a top priority for their company. 6 Total percent of women and men per level in race and gender pipeline may not sum to overall corporate pipeline totals, as the race pipeline only includes companies that were able to supply race data.

A closer look at employee experiences

Based on the results of a survey of more than 34,000 employees from thirty-nine companies, women face a workplace skewed in favor of men and a steeper path to leadership.





Women experience an uneven playing field

Women and men are not having the same experiences at work. Women get less access to the people and opportunities that advance careers and are disadvantaged in many of their daily interactions. Women are also less than half as likely as men to say they see a lot of people like them in senior management, and they're right—only one in five senior executives is a woman.

These inequities appear to take a toll on women. Compared to men, they are less likely to think they have equal opportunities for growth and development—and more likely to think their gender will play a role in missing out on a raise, promotion, or chance to get ahead. Moreover, at every level, women are less interested in becoming a top executive, and those who do want a top spot are less confident they'll get there.

Women are less than half as likely as men to say they see a lot of people like them in senior management, and they're right—only one in five senior executives is a woman.

Entry-level women face more barriers to advancement than men at every level and senior-level women. They are the least likely to report they've gotten a challenging assignment and participated in an important development or training opportunity. In addition, women early in their careers are the least likely to believe they have equal opportunities for growth and development.

By the numbers: the uneven playing field

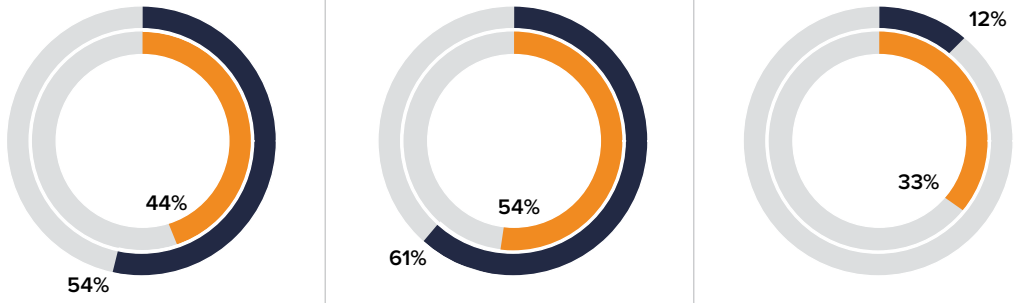
WOMEN ARE SUBTLY DISADVANTAGED IN MANY OF THEIR DAILY INTERACTIONS . . .

WOMEN MEN

67% 74% Are able to participate meaningfully in meetings[7]	62% 68% Have recently gotten a challenging assignment[8]
49% 54% Believe their contributions are appropriately valued[7]	56% 63% Are turned to for input on important decisions[7]

. . . AND ARE MORE LIKELY TO QUESTION THE FAIRNESS OF THE WORKPLACE

% OF WOMEN AND MEN WHO THINK . . .



The best opportunities go to the most deserving employees[9]	They have the same opportunity for growth as their peers[9]	Their gender will make it harder to get a raise, promotion, or chance to get ahead

7 Includes respondents who feel this "often" or "very often" applies to them. 8 Includes respondents who reported they have received this opportunity in the past two years. 9 Includes respondents who "agree" or "strongly agree" with this statement.

Women are negotiating as often as men—but face pushback when they do

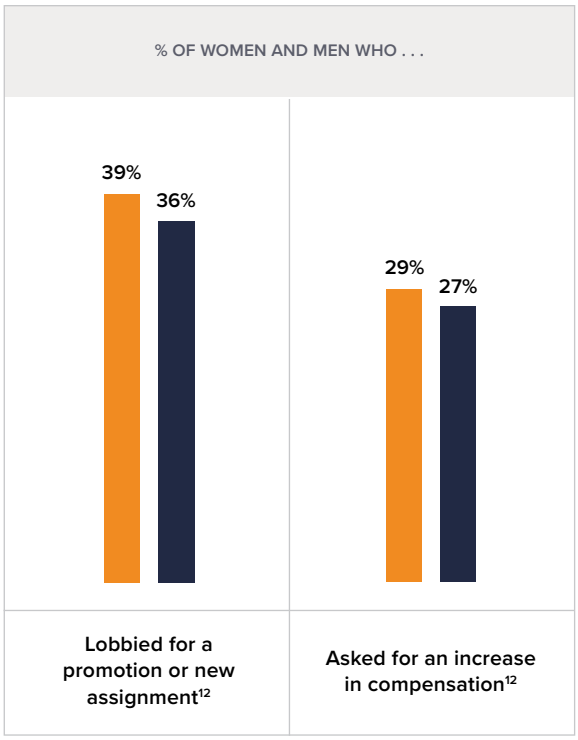
The good news is that women are negotiating for promotions and raises as often as men, and it appears to be paying off. For example, women who lobby for a promotion are 54 percent more likely to report getting one than women who don't.

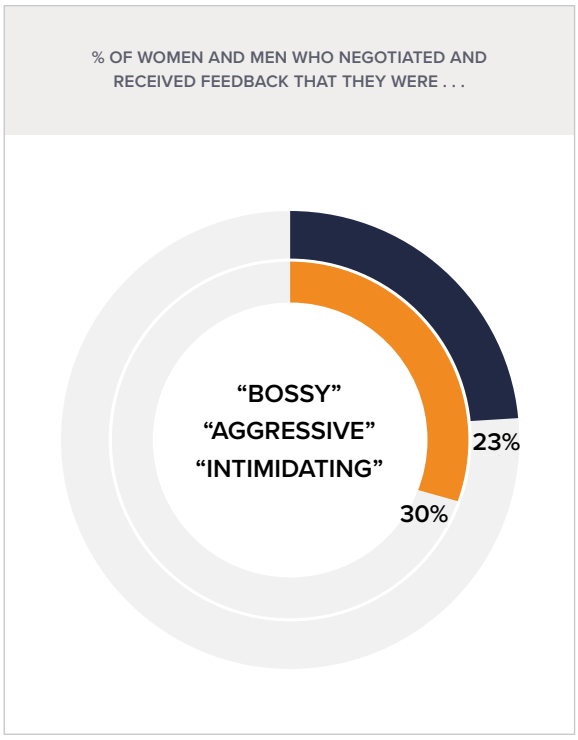
The bad news is that women who negotiate[10] are disproportionately penalized for it. They are 30 percent more likely than men who negotiate to receive feedback that they are "intimidating," "too aggressive," or "bossy" and 67 percent more likely than women who don't negotiate to receive the same negative feedback. Moreover, despite lobbying for promotions at similar rates, women are on average less likely to be promoted than men.

Despite lobbying for promotions as often as men, women on average are less likely to be promoted.

HOW OFTEN WOMEN AND MEN NEGOTIATE—AND THE RESULTING PUSHBACK[11]

WOMEN MEN





10 Women who say they lobbied for a promotion or an increase in their compensation in the last two years. 11 Based on employees' self-reported experiences.
12 In the past 2 years.

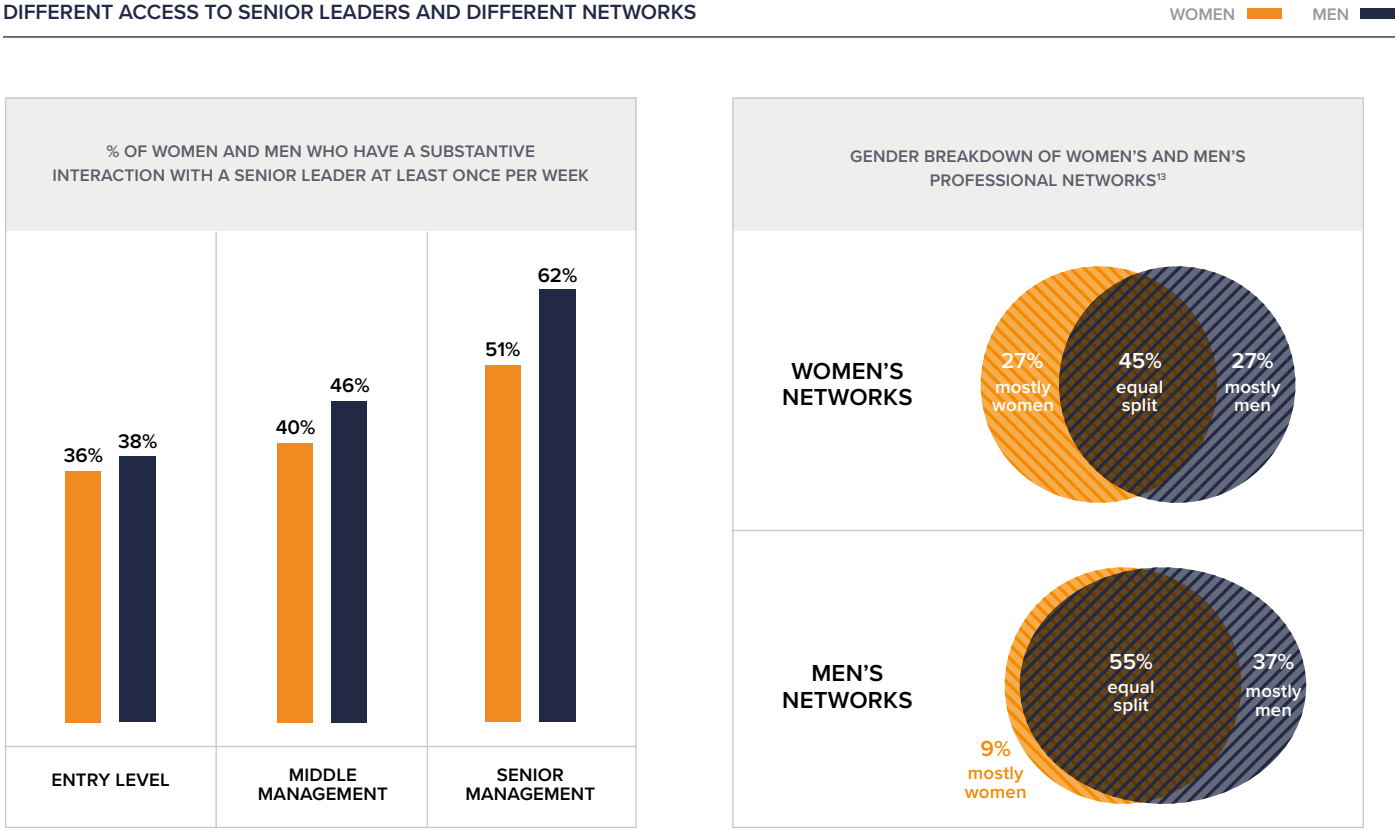
Women get less access to senior leaders

Women and men both view sponsorship by senior leaders as essential for success. Yet women report fewer substantive interactions with senior leaders than their male counterparts do—and this gap widens as women and men advance. In the same vein, women are less likely to say that a senior leader outside their direct management chain has helped them get a promotion or challenging new assignment.

This disparity may be caused—or even compounded—by differences in women's and men's professional networks. Women are three times more likely to rely on a network that is mostly female. Because men typically hold more senior-level positions, this means women are less likely to get access to people with the clout to open doors for them.

51% of women in senior management report they interact with a company leader at least once a week, compared to 62% of men.

DIFFERENT ACCESS TO SENIOR LEADERS AND DIFFERENT NETWORKS



13 Based on responses to the question: Thinking about people you can count on to be helpful in your career, are they mostly men, mostly women, or is it a roughly equal split?

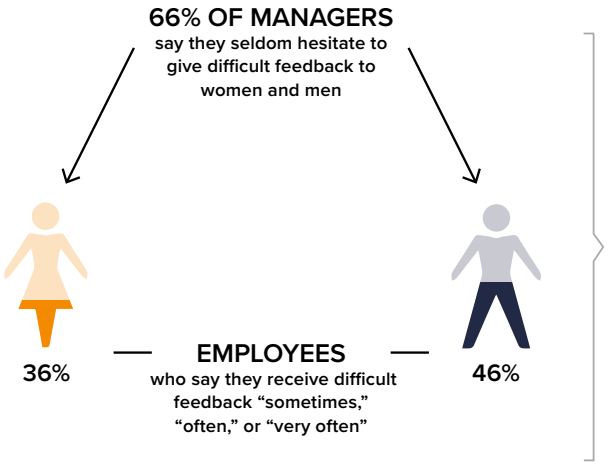
Women ask for feedback as often as men—but are less likely to receive it

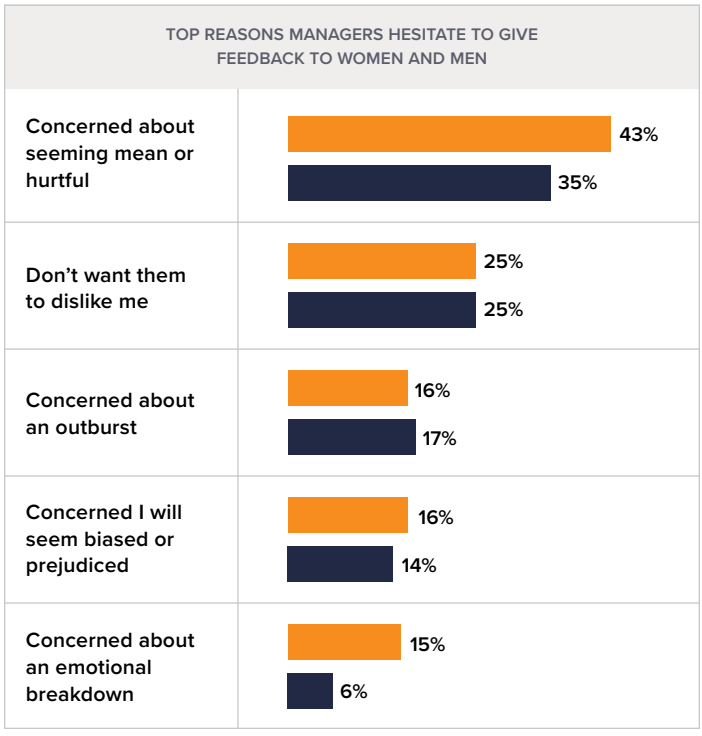
Feedback is critical for improving performance, but despite asking for informal feedback as often as men do, women report they receive it less frequently.

Moreover, there appears to be a disconnect in the way managers convey difficult feedback. Most managers say they rarely hesitate to give difficult feedback to both women and men, but women report they receive it less frequently. This may be driven by differences in how feedback is delivered: managers who hesitate to give difficult feedback are more concerned about triggering an emotional response from women. Direct feedback is critical because it helps employees take the steps they need to improve their performance and advance.

Women are more than 20% less likely than men to say their manager often gives them difficult feedback that improves their performance.

DIFFERENCES IN THE WAY DIFFICULT FEEDBACK IS GIVEN AND RECEIVED





Women are less interested in becoming top executives—and see the pros and cons of senior leadership differently from men

Most employees want to be promoted, but far fewer aspire to very senior leadership. This gap is particularly marked for women. Only 40 percent of women are interested in becoming top executives, compared to 56 percent of men.

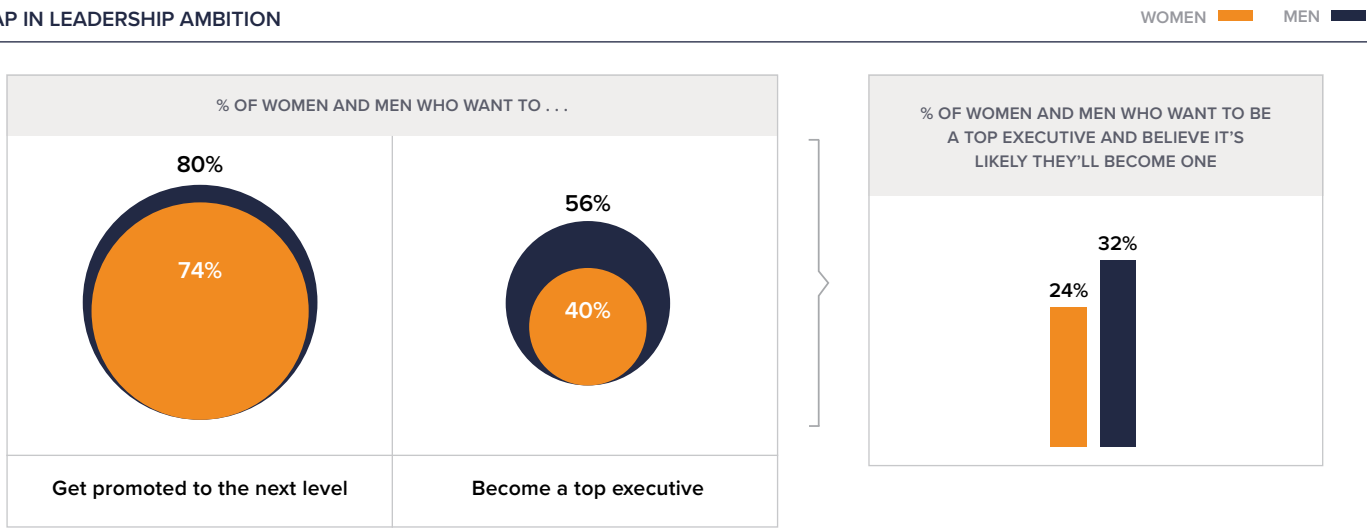
Women and men worry equally about balancing work and family—the issue of concern most cited by both groups—and about company politics. However, women *with and without children* are far more likely to say they don't want the pressure, suggesting they expect to face more challenges or are doing a different cost-benefit analysis.

Women anticipate a steeper path to the top. Women who aspire to become a top executive are less likely to think they'll get there than men with the same aspiration—and more likely to worry they won't be able to manage work and family commitments.

Women and men also see many of the same benefits of becoming a top executive, including higher compensation and more opportunities to mentor, with one important exception: men see greater potential to impact the business. This could be rooted in the different experiences women and men are having in the workplace. Women may not think their ideas and contributions carry the same weight as men's.

Only 43% of women think becoming a top executive will significantly improve their ability to impact the business, compared to 51% of men.

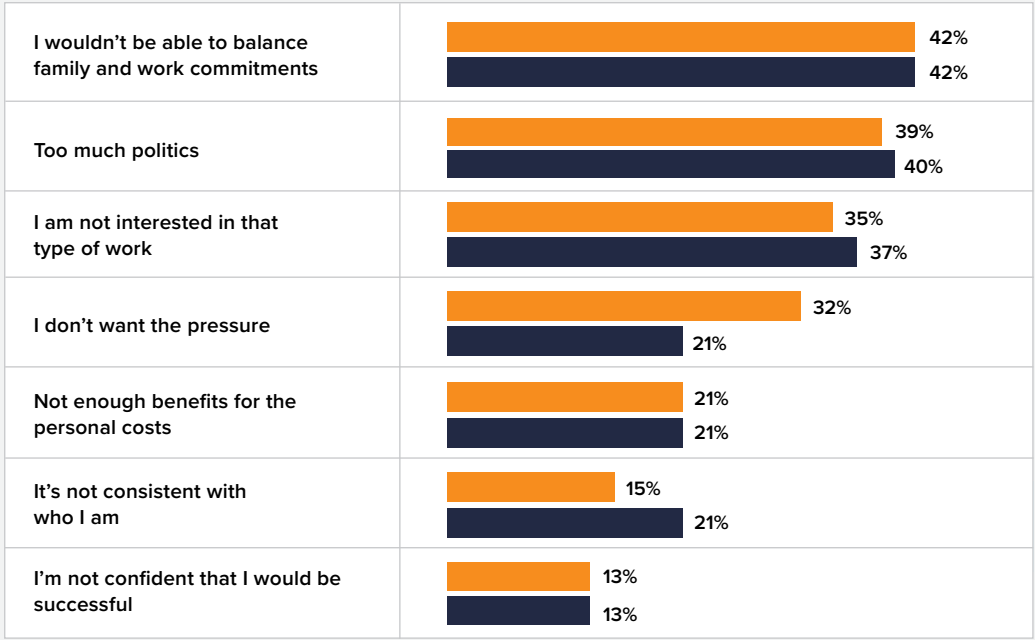
GAP IN LEADERSHIP AMBITION



Men will also benefit from a broader definition of leadership

Creating a more inclusive workplace is important for women and men. Only about half of men say their companies embrace diverse leadership styles, and the reasons men point to as barriers to advancement are telling. Twenty-one percent of men don't want to be a top executive because it's not consistent with who they are as a person, while almost a third of men who aspire to reach the top don't think they'll make it because they lack "the typical style of a top executive."

WHY WOMEN AND MEN DON'T WANT TO BE A TOP EXECUTIVE



People who do more work at home are less interested in becoming top executives

At every stage in their careers, women do more housework and child care than men—and there appears to be a link between the amount of work people do at home and their leadership ambition. While 43 percent of women who share responsibilities evenly with their partner aspire to become top executives, only 34 percent of women who do a majority of housework and child care have the same aspiration. This trend holds true for men: the more work they do at home, the less interested they are in very senior leadership.

Women in senior management are seven times more likely than men at the same level to say they do more than half of the housework.

A road map to gender equality

Although company commitment to gender diversity is at an all-time high, companies don't consistently put their commitment into practice, and many employees are not on board. We see four clear steps companies can take to advance their efforts: (1) Make a compelling case for gender diversity. (2) Ensure that hiring, promotions, and reviews are fair. (3) Invest in more employee training. (4) Focus on accountability and results.

Companies are struggling to put their commitment to gender diversity into practice—and many employees do not view it as a personal priority

Seventy-eight percent of companies report that commitment to gender diversity is a top priority for their CEO, up from 56 percent in 2012. But this commitment does not always translate into visible action. Fewer than half of employees think their company is doing what it takes to improve gender diversity. Moreover, fewer than a third of employees say senior leaders regularly communicate the importance of gender diversity and are held accountable for making progress.

So perhaps not surprisingly, many employees don't rank gender diversity as a top personal priority; this is particularly marked for entry- and manager-level employees, who make many decisions that affect women's early work experiences and career progression.

Employees who don't prioritize gender diversity point to concerns about favoritism and de-emphasizing individual performance, and men are more likely to point to both. Perhaps the case for gender diversity is not reaching employees, or they worry they'll be disadvantaged by diversity programs that aren't fair. However, it's worth noting that if the workplace was inclusive and fair now, the corporate pipeline would more closely mirror the general population.

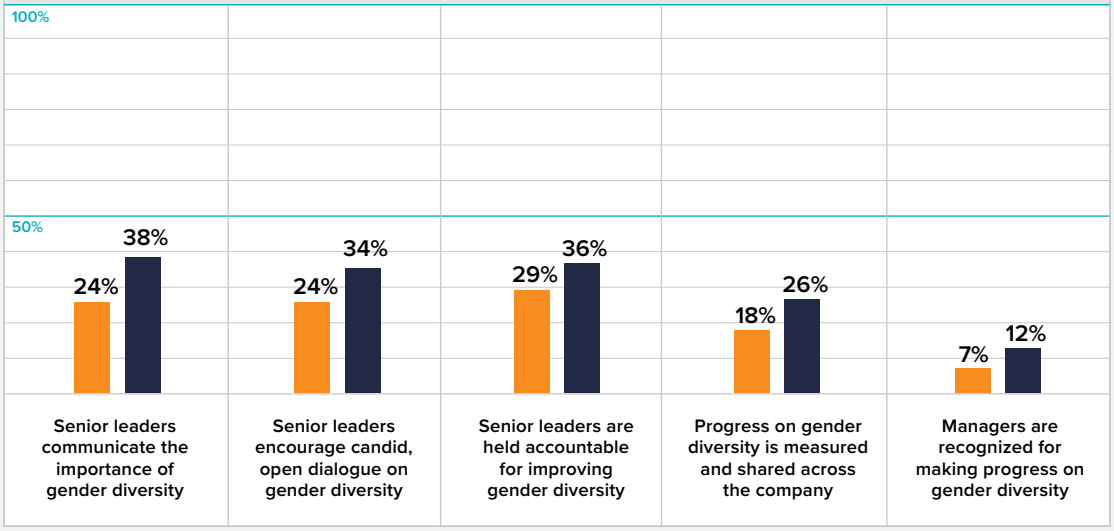
Women are less likely than men to see practices intended to promote gender diversity and less likely to think their company is doing what it takes.

By the numbers: the challenges companies face

COMPANIES ARE STRUGGLING TO PUT THEIR COMMITMENT INTO PRACTICE . . .

WOMEN MEN

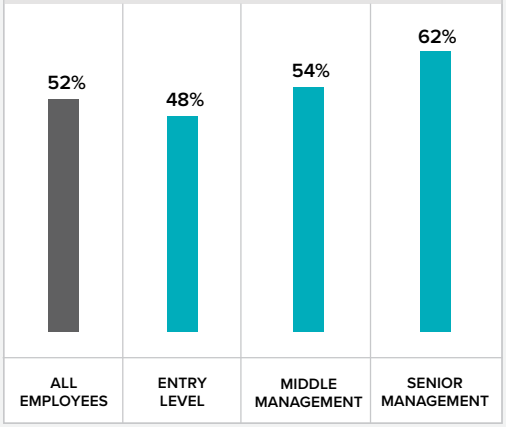
% OF EMPLOYEES WHO OFTEN OR ALMOST ALWAYS SEE PRACTICES INTENDED TO IMPROVE GENDER DIVERSITY



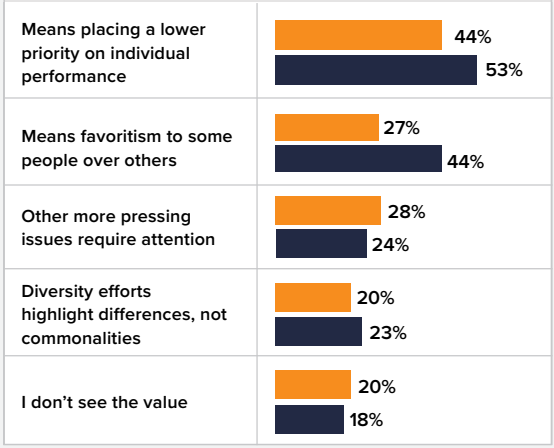
. . . AND MANY EMPLOYEES ARE NOT ON BOARD

WOMEN MEN

% OF EMPLOYEES WHO THINK GENDER DIVERSITY IS AN IMPORTANT PERSONAL PRIORITY



TOP 5 REASONS WHY EMPLOYEES DON'T PRIORITIZE GENDER DIVERSITY



Although there's no "one size fits all" solution, companies can take the following steps to advance their gender diversity efforts and create a fairer, more inclusive work environment.

1. Make a compelling case for gender diversity

Companies need to more fully communicate why gender diversity matters and how it benefits everyone. Using a combination of storytelling and data, companies should speak to the positive impact greater gender diversity has on individuals, on the company and its customers, and on society more broadly.

Senior leaders have an important role to play, from talking more often and openly about gender diversity to modeling their commitment in their everyday actions. Although 62 percent of senior leaders say that gender diversity is an important personal priority, only 28 percent of employees say senior leaders regularly encourage a candid, open dialogue on the topic.

Transparency is also critical, yet fewer than a third of companies disclose any gender metrics to employees, and a mere 4 percent share them all.[14] Giving employees more information will help them better understand the state of women in their companies and what's working—and what's not—in their efforts to reach gender equality.

Only 22% of employees say that progress on gender diversity is regularly measured and shared across the company.

Almost two-thirds of women say their company is an inclusive place to work and they feel like they can be themselves there—and this is an important factor in getting to equality. However, there is still room for improvement. Fewer than half of employees report that their company and managers regularly embrace diverse strengths and leadership styles, and women are far less likely than men to see these practices in action.

14 The quantitative metrics companies track could include recruiting pipeline by gender, gender representation at promotion rounds, and salary differences at comparable job positions by gender.

2. Ensure that hiring, promotions, and reviews are fair

Most companies report they have policies in place to support unbiased hiring, promotions, and performance reviews, but those policies are not always comprehensive or implemented effectively.

While 73 percent of companies actively recruit candidates from underrepresented groups, only 46 percent require a diverse slate of candidates for open positions. Even fewer companies require diverse slates for internal promotions. There are also signs of breakdowns in performance reviews: 93 percent of companies report they use clear and consistently applied criteria to evaluate performance, but only 57 percent of employees report managers do this in practice.

Companies should review their policies for hiring, promotions, and performance reviews to make sure there aren't any gaps in these end-to-end processes and look for opportunities to further reduce bias and foster diversity. For example, blind résumé reviews are a relatively simple way to minimize bias, yet only 4 percent of companies say they do this.

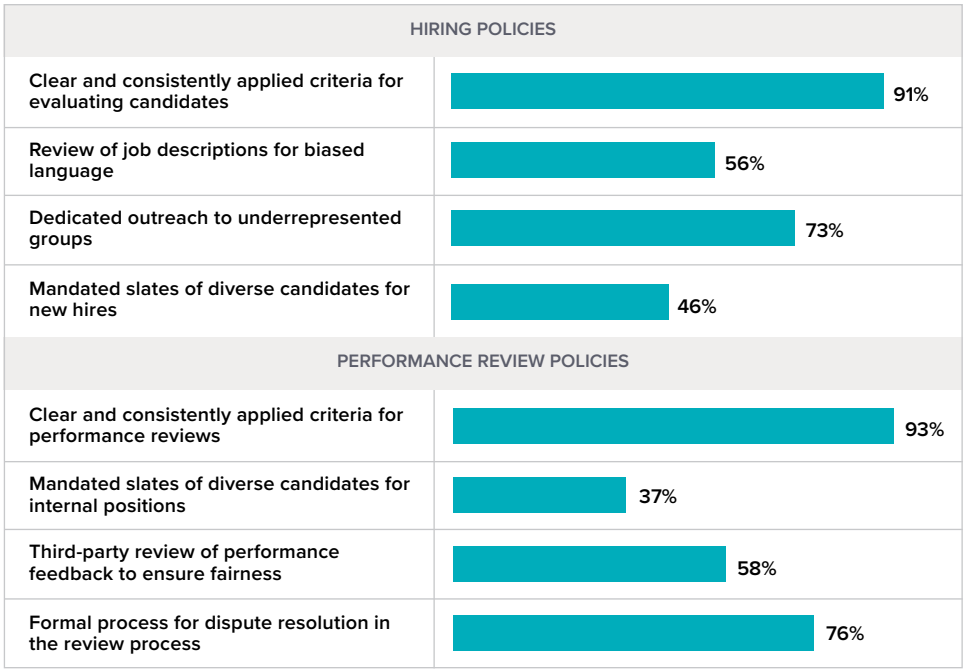
Companies also need better systems to ensure their policies are working. Currently, only 56 percent of companies review job descriptions for biased language, and fewer than 10 percent of employees say that personnel decisions are regularly evaluated for gender bias.

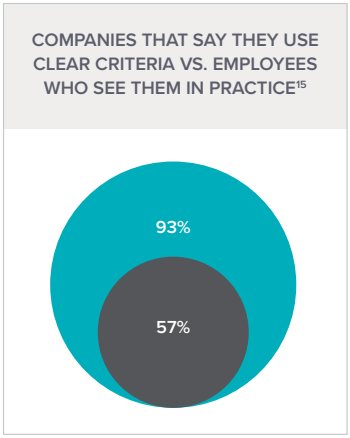
Sourcing the right people is a critical first step in both hiring and promotions, yet fewer than half of companies require diverse slates of candidates.

POLICIES THAT COMPANIES HAVE IN PLACE

COMPANIES EMPLOYEES

% OF COMPANIES WITH POLICIES IN PLACE





15 Includes companies that report they use clear and consistently applied criteria for performance reviews versus employees who report that managers often or almost always evaluate employee performance using standardized, clear, and objective metrics.

3. Invest in more employee training

Even if companies have all the right policies in place, it's only part of the solution. Employees need to understand what steps they can take to get to equality, yet they clearly need more guidance: only 28 percent of entry-level employees and 51 percent of middle managers to managers say they know what to do to improve gender diversity in their company.

Bias training is particularly important. Although almost 100 percent of companies offer anti-harassment/discrimination training, far fewer offer employees bias training for hiring (67 percent) and performance reviews (56 percent). When employees don't understand how bias works, they are less likely to make fair and accurate decisions and push back on bias when they see it. As evidence of this, only 24 percent of employees report that managers regularly challenge gender-biased language and behavior.

27% of employees say they rely on themselves for information on improving gender diversity.

A LACK OF KNOWLEDGE LEADS TO A LACK OF ACTION

MANAGERS EMPLOYEES

% OF MANAGERS WHO SAY THEY KNOW WHAT TO DO TO IMPROVE GENDER DIVERSITY

51%

% OF EMPLOYEES WHO SAY THEY SEE MANAGERS CHALLENGE GENDER-BIASED LANGUAGE OR BEHAVIOR[16]

24%

16 Based on employees who report that managers often or almost always challenge gender-biased language or behavior.

4. Focus on accountability and results

Companies need to place more emphasis on accountability. Only 40 percent of companies report that they hold their senior leaders accountable for performance against gender diversity metrics, and employees are even less likely to see this in practice: only 32 percent of employees report that senior leaders are regularly held accountable, and 9 percent report that managers are recognized for progress on gender diversity.

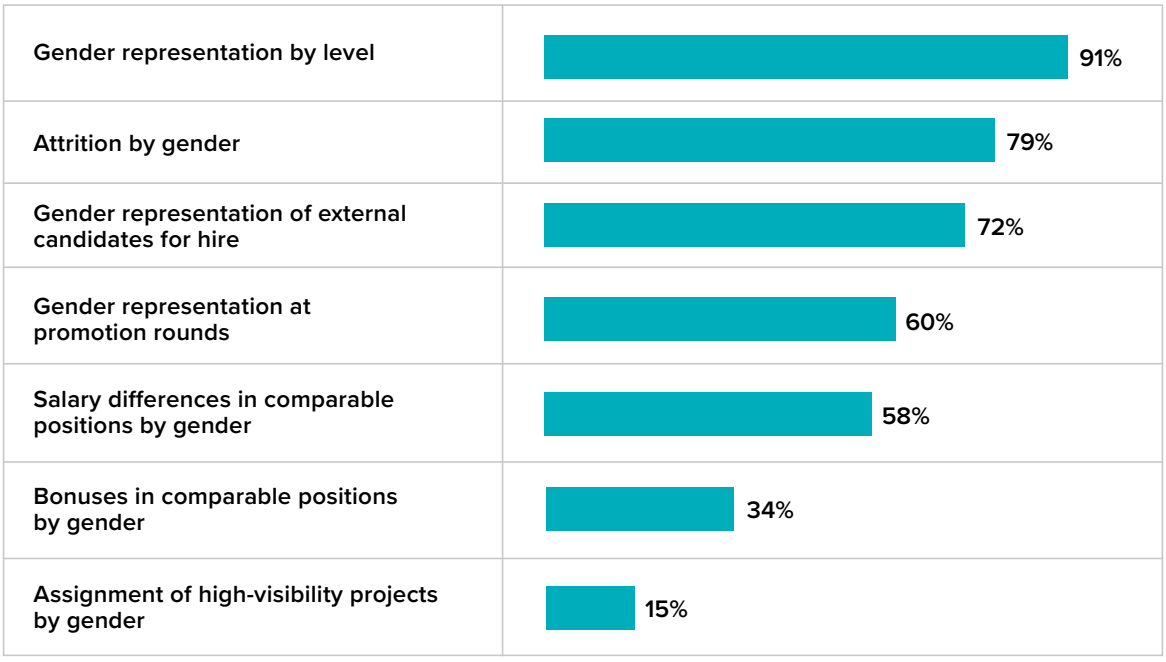
Although most companies track metrics on women's representation, targets are far less common. Only 44 percent of companies set pipeline targets, and even fewer set targets for external hiring and promotions. And targets matter—it is easier to track and make progress when a company has clear goals in place.

Although 91% of companies track gender representation by level, only 58% track salary differences by gender.

COMPANIES THAT TRACK GENDER METRICS

COMPANIES

% OF COMPANIES THAT TRACK . . .



Employees need the flexibility to fit work into their lives

More than two-thirds of companies offer programs to help employees balance work and life, including the option to work part-time and take leaves of absence. Fewer offer programs designed specifically for parents like extended leave and child-care subsidies.

The good news is that a majority of employees think these programs are effective. The bad news is that, with the exception of flexible work schedules, fewer than 25 percent of employees take advantage of them. In some cases, this is for fear of being penalized: 61 percent of employees worry that working part-time will hurt their career, and 42 percent believe taking a leave of absence or sabbatical will do the same. In other cases, employees may not be getting the right signals from higher-ups. Fewer than half of employees report that managers often support team members who take advantage of flexible work options, and even fewer say senior leaders frequently model work-life balance by taking time off.

Companies that report they offer programs to smooth transitions to and from extended leave, and guarantee employees a similar or better position upon their return, have a better representation of women in their ranks.

Getting gender diversity right matters

We see emerging evidence that certain diversity practices lead to important benefits: women and men are more likely to think their companies provide equal opportunities to learn and grow when leaders are held accountable for gender diversity, hiring and promotions are impartial, and companies embrace diverse work styles. Moreover, employees are more likely to report higher levels of engagement.

Looking ahead

Companies have an important role to play in reaching gender equality, and we will all benefit when they succeed. A fairer, more inclusive work environment will lead to more engaged employees. A more diverse workforce will lead to stronger organizations. And that's good for employees, good for companies, and good for all of us.

Appendix

Different talent pipelines call for different solutions

Although women are broadly underrepresented in corporate America, the talent pipeline varies by industry.[17] Some industries struggle to attract entry-level women (technology), while others fail to advance women into middle management (healthcare) or senior leadership (professional services).

To effectively improve women's representation, companies need to understand where they have the most significant pipeline challenges and focus their efforts accordingly.

REPRESENTATION OF WOMEN ACROSS INDUSTRIES

% OF WOMEN BY LEVEL

17 For more information, see "Breaking Down the Gender Challenge," McKinsey & Company, March 2016, available at http://www.mckinsey.com/business-functions/organization/our-insights/breaking-down-the-gender-challenge.

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Methodology

COMPANY PIPELINE AND PROGRAMS SURVEY

This study is based on research from 132 companies across North America, building on last year's study of 118 companies and a similar study conducted by McKinsey & Company in 2012. Each participating company submitted gender diversity talent pipeline, policies, and programs data to McKinsey. Pipeline data included the current representation of men and women (overall and by race/ethnicity), distribution of line and staff roles, and number of hires, promotions, and employees who left the company by gender. Data was as of December 31, 2015.

Promotion and attrition rates were determined independently for women and for men at each level. Promotion rates were calculated by dividing the number of promotions into a level by the start-of-year number of employees of that gender in the level below. Attrition rates were calculated by dividing the number of each gender who left the company at a given level by the number of employees of that gender in that level at start-of-year. Women's and men's start-of-year headcounts were each calculated by adjusting year-end headcount for attrition, promotions, and hires during the year.

We drew aggregate conclusions from this data using the following heuristics:

- **Averages across companies:** In calculating aggregate pipeline statistics, we took an average of averages. Each company received equal weighting to avoid overemphasizing the results of the largest employers.
- **Industries weighted to match Fortune 500:** Representation of women was calculated using industry weights to approximate the composition of the Fortune 500 as of May 20, 2016. This enabled us to avoid overemphasizing particular industries overrepresented in our sample. Other pipeline statistics were not adjusted. All reported trends hold with and without this weighting.

DEFINITION OF LEVELS

Companies categorized their employees into six levels based on standard definitions. Companies with more or fewer than six levels were encouraged to consider three elements when assigning employees: reporting structure, salary, and advancement. The levels and definitions are as follows:

- L1—C-level executives and presidents: CEO and his or her direct reports, or those responsible for company operations and profitability
- L2—Senior vice presidents: Senior leaders of the organization with significant business unit or functional oversight
- L3—Vice presidents: Leaders of the organization who report directly to senior vice presidents
- L4—Senior managers/directors: Seasoned managers with responsibility for multiple teams and discrete functions or operating units
- L5—Managers: Employees who have management responsibility over a store or team
- L6—Individual contributors: Employees who carry out discrete tasks and participate on teams, typically in an office or corporate setting

Field employees like cashiers or customer service representatives are not included in our primary analyses.

For many analyses we consolidated the six organizational levels into three larger groupings: senior management, middle management, and entry level. These larger groupings assured larger samples to maximize reliability and reduce the likelihood of chance findings in all groups. The mapping of levels to these groupings is:

- Senior management—L1, L2, and L3
- Middle management—L4 and L5
- Entry level—L6

EMPLOYEE EXPERIENCE SURVEY

Reporting on the employee experience is based on a survey from thirty-nine companies. More than 34,000 employees in North America completed the survey, representing an average response rate of 42 percent. The survey comprised eighty-three questions. No single company contributed more than 8 percent of the total responses. This research builds on our 2015 employee survey, which included thirty-four companies and nearly 30,000 employee respondents.

Group differences: Differences between groups are reported only when they are at least five percentage points and are statistically significant at a 95 percent confidence level using a two-tailed test, unless otherwise indicated. This maximizes the likelihood that differences are both reliable and of a meaningful magnitude.

REGRESSION ANALYSES

We used a multiple regression approach to identify company practices that best predicted employees' sense that the best opportunities go to the most deserving employees and/or that employee engagement is high at their company. Interaction terms were tested to identify any differences in predictive value of practices for men and women, and all models were adjusted for company-specific variation.

We also used multiple regression analysis to assess whether the degree of representation of women in each level of the organization could be predicted by the presence or absence of any HR/flexible work programs.

Findings reported are those in which practices significantly ($p < .05$) predicted representation, perceptions of equal opportunity, or employee engagement and the relationship was meaningfully large ($B > 0.05$).

COMPANIES INCLUDED

Participating companies opted in to the study in response to invitations from LeanIn.Org and McKinsey & Company or by indicating interest through a public website. Their participation in the Employee Experience Survey was encouraged but optional. The industry breakdown of participating companies is as follows:

- Technology (Electronics, Hardware, Software, and Information Technology Services)—21
- Banking, Insurance, and Financial Services—19
- Logistics, Travel, Infrastructure, and Industrial Manufacturing—17
- Asset Management and Institutional Investors—14
- Professional and Information Services—14
- Healthcare and Pharmaceuticals—13
- Consumer Packaged Goods—10
- Energy and Basic Materials—9
- Media, Entertainment, and Telecom—8
- Retailers and Restaurants—7

GEOGRAPHIC COVERAGE

This report covers only findings from North America (United States and Canada). We collected additional data for four other geographic regions: Europe, Asia Pacific, Latin America, and Middle East/Africa. We may publish further analysis on these regions at a later date.

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An Essay on Women and Intellectual Property Law: The Challenges Faced by Female Attorneys Pursuing Careers in Intellectual Property

Kara Hagen

AN ESSAY ON WOMEN AND INTELLECTUAL PROPERTY LAW: THE CHALLENGES FACED BY FEMALE ATTORNEYS PURSUING CAREERS IN INTELLECTUAL PROPERTY*

By Kara Hagen†

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I. INTRODUCTION

Intellectual property law is one of the most challenging, prestigious, and fast-growing practice areas in the law today, particularly in the Silicon Valley. This field of law allows very close, collaborative work with clients in conference rooms, and provides attorneys the chance to use their best adversarial skills in the courtroom. The subject matter varies from very technical, emerging issues to the time-tested symbols and products of everyday life. This essay highlights the special situation faced by female attorneys who pursue careers in the exciting and diverse field of intellectual property. This essay is not intended to further stereotypes or perpetuate gender differences. Rather, it relates the experiences of female intellectual property attorneys and necessarily reflects those perspectives through the societal, cultural, and historical framework upon which they are based.

As other writers note, all women have different experiences, and it is difficult to generalize those experiences into a specific perspective shared by every woman.[1] However, in order to discuss women as a group, some generalizations must be made, even though these generalizations do not apply to all women and may apply to some men. Therefore, the scope of this essay is limited to the issues facing female attorneys as perceived by the attorneys who were interviewed. This essay does not discuss the distinctions between the experiences of women of color and the experiences of other women.[2] Instead, this essay focuses only on those issues facing attorneys because they are women. It first looks at the current positions of women in the law. Next, this essay compares the challenges facing women in patent prosecution, intellectual property litigation, and trademark law. Finally, this essay concludes with an analysis of some possible solutions to the challenges facing women in intellectual property fields.

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1. *See* Susan P. Sturm, *From Gladiators to Problem-Solvers: Connecting Conversations about Women, the Academy, and the Legal Profession*, 4 DUKE J. GENDER L. & POL'Y 119, 124 (1997) ("It is difficult to justify theoretically an exclusive focus on women's experience as a critical lens . . . [when their] experiences do not necessarily characterize all women and may be shared by members of other groups.").

2. Women of color have to confront and overcome the bias of race, as well as the bias of gender. These issues are complex and often affect women of different races in diverse ways. *See generally* CRITICAL RACE THEORY: THE KEY WRITINGS THAT FORMED THE MOVEMENT 205-490 (Kimberlé Crenshaw et al. eds., 1995) (explaining the significant role played by race in the legal environment); Cynthia Fuchs Epstein et al., *Glass Ceilings and Open Doors: Women's Advancement in the Legal Profession*, 64 FORDHAM L. REV. 291, 324 (1995) (citing a study of New York law firms where 94% of male attorneys and 86% of female attorneys are white).

II. METHODOLOGY

This essay uses the perspectives of four women who were interviewed in depth to illustrate the positions of women in intellectual property law. Throughout the essay, many references are made to those interviews, and they are used to narrate the situations faced by women in intellectual property law fields. The interviewees provided views and perspectives on various components of life as intellectual property attorneys based on their own personal views and experiences as well as those of their friends and co-workers. All of the interviews were conducted in Silicon Valley, and the interviewees brought with them the perspectives of the Silicon Valley legal environment. All interviews were conducted with the understanding that the names of the interviewees and their employers would not be used. This enabled the interviewees to provide a very frank, honest, and revealing depiction of life as female attorneys. For clarity and to avoid confusion, the interviewees are referred to by pseudonyms. Sandra is a full-time intellectual property litigator who is single and has no children. Anne is a part-time trademark attorney and a mother of three. Laura is a full-time trademark counsel for a communications company as well as a new mother. Nancy, a part-time partner, works as an intellectual property litigator and is also a mother.[3]

III. FEMALE ATTORNEYS IN INTELLECTUAL PROPERTY LAW

In 1995 women lawyers represented 23% of all attorneys.[4] Although that figure signifies notably less than equal representation, the number of women in the legal profession has steadily grown over the years, and is expected to increase with each graduating class of law students. Since the 1987-1988 academic year, women have comprised over 40% of all first-year law students, and for years that numbers are available, have continued to make up roughly half of all graduating law students.[5] If this level of enrollment continues, by the year 2010 it is estimated that women will comprise 40% of the legal profession.[6]

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3. Sandra was interviewed in person at her office on October 3, 1997. The other attorneys were interviewed over the phone: Anne on January 12, 1998; Laura on January 21, 1998; and Nancy on January 22, 1998.

4. The statistics included in this essay are based on national surveys unless otherwise specified. *See* BARBARA A. CURRAN & CLARA N. CARSON, THE LAWYER STATISTICAL REPORT: THE U.S. LEGAL PROFESSION IN THE 1990s 4 (1994) (projecting figures for 1995).

5. *See* BARBARA A. CURRAN, AMERICAN BAR ASSOCIATION, WOMEN IN THE LAW: A LOOK AT THE NUMBERS 6 (1995) [hereinafter A LOOK AT THE NUMBERS].

6. *See id.*

As the number of women in the profession has increased, so has the number of women in private practice.[7] In 1980, more than half of female attorneys, 56%, were employed in private practice.[8] By 1991 that number had jumped to include over two-thirds of female attorneys, or 70%, working in private practice.[9] Even though many women head for private practice, the representation of female attorneys is not equally distributed throughout all levels of the profession.[10] In 1991, women accounted for only 10% of all partners.[11] By 1995, nearly one quarter of all attorneys were women.[12] However, in 1994 the percentage of women partners had only slightly increased from the 1991 figures, to 13% of law firm partners.[13] In addition, it is often only the largest firms that employ women or count women among their partners.[14] As of 1991, only 39% of law firms employed female lawyers and only 26% of law firms could boast at least one female partner.[15]

There may be fewer partners who are female because female attorneys as a group tend to be younger than their male counterparts. The average age of female attorneys in 1991 was thirty-six years old, in contrast to an average age of forty-three years old for men.[16] This age difference can be explained by the fact that approximately 80% of all women attorneys entered the profession after 1970.[17] Among states, California has been ranked as the state with the most lawyers,[18] and California is close to the national average both in terms of the percentage of female attorneys and in the average age of attorneys.[19]

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7. *See id.* at 18.

8. *See id.*

9. *See id.*

10. *See id.* at 26.

11. *See id.*

12. *See* COMMISSION ON WOMEN IN THE PROFESSION, AMERICAN BAR ASSOCIATION, BASIC FACTS FROM WOMEN IN THE LAW: A LOOK AT THE NUMBERS 1 (1995) [hereinafter BASIC FACTS].

13. *See id.* at 3.

14. *See* A LOOK AT THE NUMBERS, *supra* note 5, at 23 ("Over 95% of firms with more than fifty lawyers had at least one female partner in 1991. In contrast, less than one-fifth of two-lawyer and three-lawyer firms had female partners.").

15. *See* A LOOK AT THE NUMBERS, *supra* note 5, at 21.

16. *See* CURRAN & CARSON, *supra* note 4, at 23.

17. *See* BASIC FACTS, *supra* note 12.

18. *See* CURRAN & CARSON, *supra* note 4, at 45.

19. *See id* at 23, 46 (finding that in 1991, 23% of all attorneys in California were women. The national average for 1991 was 19.8%); CURRAN & CARSON, *supra* note 4, at 24, 46 (finding that the percentage of female attorneys in private practice in California in 1991 was 77.1% and the national average for that year was 69.6%).

Just as the number of women in law is increasing, so is the number of women in intellectual property fields, according to the interviewees. The experiences of those women attest that some areas of intellectual property, however, have many more female attorneys than do other areas of intellectual property.

This essay divides the legal world of intellectual property into three general categories: patent prosecution, intellectual property litigation, and trademark law. These categories do not represent the entire field of intellectual property law, but intellectual property law is divided into these three categories for the purpose of this essay to mirror the division of intellectual property into practice groups within law firms as well as the division between practices described by the attorneys who were interviewed.

There seem to be fewer female attorneys in patent prosecution and intellectual property litigation than in trademark law, based on the experiences of those interviewed. Two interviewees work in trademark departments where women are the majority. In contrast, the two attorneys practicing patent prosecution and intellectual property litigation stated that female attorneys are the minority in their law firm departments. The experiences related by the interviewees outline several reasons for the difference in women's representation within the intellectual property practice areas. These reasons include the requisite technical education and experience necessary for the practice, the proactive or reactive nature of the work, and the relationship between the attorney and the client. First, the situation facing women in patent law is analyzed. This is followed by a discussion of women in intellectual property litigation, and is concluded with an examination of women in trademark law.

A. The Limited Number of Women in Patent Prosecution

The women interviewed attest that men outnumber women in patent law practice. In Sandra's patent and intellectual property litigation firm, there are fifty-four men and nineteen women practicing law. Women comprise approximately one quarter of all attorneys as a result of a plan to specifically target women and bring them into the firm. This situation is not standard for patent firms. According to the interviewees, generally there are fewer female patent attorneys than trademark attorneys and women account for between zero and ten percent of all patent attorneys in their firms. One interviewee revealed that her friend, a patent attorney with at least nine years of experience, has never worked with another female patent attorney. The answer to the

puzzle of why there are so few female attorneys in patent law departments might lie in the requirements to practice in the field.

Patent law, when used in this essay, refers only to the prosecution of patents. The term encompasses only those attorneys who are certified to practice before the United States Patent and Trademark Office. The explanation for why there are so few women in patent law may lie the fact that there are strict requirements for entry and practice before the Patent and Trademark Office (the "PTO").[20] To practice before the PTO, attorneys must pass the Registration Examination, more commonly referred to as the Patent Bar.[21] However, to qualify to take the Patent Bar, the attorney must either have a Bachelor's degree in a recognized technical subject, or a Bachelor's degree and proof of scientific and technical training equivalent to that received for a Bachelor's degree in one of the recognized technical fields.[22]

Few women earn technical degrees that qualify for the patent bar, keeping the number of women eligible to be patent attorneys small. In 1989, 39% of all science and engineering degrees were awarded to women.[23] However, that figure includes fields with high percentages of women graduates, such as math, psychology, and the social sciences, which are not recognized by the PTO as technical subjects.[24] Accordingly, the percentage of women who earn Bachelor's degrees in technical fields recognized by the U.S. is much less than the above figure.[25] By far, the life sciences have attracted the greatest percentage of

20. *See* PATENT AND TRADEMARK OFFICE, U.S. DEPARTMENT OF COMMERCE, GENERAL REQUIREMENTS FOR ADMISSION TO THE EXAMINATION FOR REGISTRATION TO PRACTICE IN PATENT CASES BEFORE THE U.S. PATENT AND TRADEMARK OFFICE 1-4 (1997).

21. *See id.*

22. *See id.* at 2-3 (listing the included Engineering fields approved as areas for technical degrees: Aeronautical, Agricultural, Biomedical, Ceramic, Chemical, Civil, Computer, Electrical, Electrochemical, Engineering Physics, Geological, Industrial, Mechanical, Metallurgical, Mining, Nuclear, and Petroleum. The recognized technical fields include: Computer Science, Biology, Biochemistry, Botany, Electronics Technology, Food Technology, General Chemistry, Marine Technology, Microbiology, Molecular Biology, Organic Chemistry, Pharmacology, Physics, and Textile Technology).

23. *See* COMMITTEE ON WOMEN IN SCIENCE AND ENGINEERING, NATIONAL RESEARCH COUNCIL, WOMEN IN SCIENCE AND ENGINEERING: INCREASING THEIR NUMBERS IN THE 1990S, at 18 (1991) [hereinafter INCREASING THEIR NUMBERS].

24. *See* PATENT AND TRADEMARK OFFICE, *supra* note 20, at 2.

25. *See* INCREASING THEIR NUMBERS, *supra* note 23 (In 1989, women accounted for 29.7% of all physics degrees, 30.7% of all computer and information science degrees, and only 13.6% of all engineering and engineering technologies degrees.).

women.[26] Half of all life science degrees, which include many technical majors recognized by the PTO, were awarded to women.[27]

In addition to acquiring the required background and training, Patent attorneys must also pass the rigorous Patent Bar. The Patent Bar, administered by the U.S. Patent and Trademark Office is designed:

> to test . . . knowledge of patent law and U.S. Patent and Trademark Office rules, practice, and procedure; . . . [as well as the] ability to properly analyze factual situations and properly apply the patent laws and U.S. Patent and Trademark Office rules, practice, and procedure such as would be required to render valuable service to patent applicants in the preparation and prosecution of their patent applications.[28]

The Patent Bar is notorious for passing only a small percentage of those who take the test. Recent pass rates have hovered between 30 and 40%.[29] Overall, the prerequisite of a technical degree for the Patent Bar and the low pass rate contribute to keeping the number of female patent prosecutors very small.

B. The Limited Number of Women in Intellectual Property Litigation

Just as there are fewer women than men in patent practice, the women interviewed state that there are fewer women than men in intellectual property litigation. Nancy, an intellectual property litigator for ten years, says there are very few female litigators in intellectual property law. Only in the past year or so has Nancy actually appeared against female opposing counsel. Previously, she was consistently the only female attorney in front of the bench. Often the judge and the op-

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26. *See* INCREASING THEIR NUMBERS, *supra* note 23. Technical majors in the life sciences recognized by the U.S. PTO include Biology, Biochemistry, Botany, General Chemistry, Microbiology, Molecular Biology, and Organic Chemistry. *See* PATENT AND TRADEMARK OFFICE, *supra* note 20, at 2.

27. *See* INCREASING THEIR NUMBERS, *supra* note 23 (citing that women received 50.2% of all life science degrees conferred in 1989). Women are also clustered in the life sciences for graduate degrees in the same manner they are for Bachelor's degrees. *See* INCREASING THEIR NUMBERS, *supra* note 23. In addition, very few women hold Ph.D.s in the physical science or engineering fields. *See* PAULA RAYMAN & BELLE BRETT, PART I, PATHWAYS FOR WOMEN IN THE SCIENCES 9 (1993).

28. PATENT AND TRADEMARK OFFICE, *supra* note 20, at 4.

29. *See* U.S. Patent and Trademark Office, *August 1997 Exam Results* (visited Jan. 30, 1998) <http://www.uspto.gov/web/offices/dcom/olia/oed/aug97ex.htm> (providing the pass rate for the August 1996 Registration Examination at 35%). However, the pass rate for the reformulated August 1997 exam was extremely high with 58% of those taking the exam passing. *See id.*

posing party mistook Nancy for a paralegal. During those times, Nancy felt that male opposing counsel saw her as less qualified because of the low level of representation of women in intellectual property litigation. She does not get that same feeling now, because she has ten years of experience under her belt, and a low bar number which attests to that fact.[30]

Sandra, a five year intellectual property litigator, shares many of Nancy's views on the position of women in intellectual property litigation. Sandra left her previous law firm because a senior partner would not support her when a client refused to be represented by a woman. Sandra is now practicing at a litigation and patent firm with a relatively high percentage of women – approximately one-quarter of the attorneys are women. Her new firm seeks to hire and promote women, and Sandra plans to remain in this supportive environment. Although having more women around helps, Sandra has still noted times when she is treated differently. "There are times when you just get left out of things because you are a woman. For example, you will never be asked to take a client to a ball game, and aren't invited with the rest of the guys to go out after work and have a drink." Although things are changing, attorneys still feel they are left out of the total law firm experience because of their gender. There are still many obstacles for women who, as Sandra puts it, "dare to trespass" into the former boys' club of intellectual property litigation.

Unlike patent prosecution, however, the obstacles for women entering intellectual property litigation are not a result of special requirements. No specific technical or scientific training is necessary before an attorney may litigate. A litigator arguably only needs to be able to understand the subject matter of the lawsuit well enough to explain it to the court and to argue how the law applies to the relevant facts.

Intellectual property litigation, unlike patent prosecution and trademark law, is very reactive. As one interviewee explained, "Your clients call you up and say 'Oh my God, we have been sued.'" In this adversarial and reactive environment, some women may feel unwelcome or not as good simply because there are fewer women in this field. Until there are more female intellectual property litigators appearing before the court and for their clients, women will continue to

30. In California, bar numbers are issued sequentially. Therefore, those with smaller bar numbers are those attorneys who have been practicing the longest. Conversely, those with larger numbers are those attorneys who have most recently been admitted to the California Bar. In California, bar numbers are included on many court documents.

battle the existing stereotypes and attitudes that have kept women out of this field. In this reactive environment, Nancy tries to collaborate with her clients, but is very adversarial with the opposition. Nancy sees her job as that of a problem-solver. She is an avid advocator, and her clients expect her to get results. This necessitates differences in how intellectual property litigators deal with clients as opposed to how other attorneys in intellectual property fields deal with their clients.

C. The Large Number of Women in Trademark Law

The areas of law characterized under the heading 'trademark law' for the purposes of this essay include copyright law and advertising law. Copyright and advertising issues have many overlapping concerns with trademark law and are often addressed together. Further, from the client's perspective, trademark, copyright, and advertising law often work together to achieve the desired level of exploitation of the intellectual property.

All of the interviewees responded that even though there are fewer women than men overall in their workplaces, in the trademark department of their law firm or business, women outnumber men. One interviewee, Anne, works in a trademark practice group that is almost entirely comprised of women. In contrast to the low percentage of women partners in law firms overall, in this trademark practice the majority of senior partners are women. Laura, a part-time trademark attorney with a corporation, also works in a department where there are many women. Laura estimates that approximately fifty percent of all attorneys in her department are women.

Sandra's medium-sized patent and intellectual property litigation firm recently started a trademark practice area. A female junior partner was chosen to head the trademark practice, and another woman was selected to work with her. In this particular office, there are approximately fifty-four male attorneys and eleven female attorneys, with roughly nineteen male partners and four female partners. Even though there are many more men than women in the firm, the firm selected women to head and staff its trademark division. There are few statistics tracking the number of women in the different intellectual property fields, but the female attorneys who were interviewed feel that women outnumber men in the practice of trademark law. The distribution of women in trademark practice groups supports this sentiment.

The perspectives of the trademark attorneys who were interviewed illustrate that in the practice of trademark law, women do not feel as though men surround them. This perception reveals the level of secu-

rity and confidence felt by women trademark attorneys when working in their field. The interviewees responded that they feel more secure in their positions as a result of being among several women in their departments.

D. Intellectual Property Attorneys and Client Interaction

1. Participatory Model of Client Interaction

One of the reasons so many female attorneys choose trademark law may be the role played by the attorney when interacting with the client.[31] As explained by the attorneys who were interviewed, trademark law places a great deal of focus on the client, whereas intellectual property litigation focuses on the factual situation. Many aspects of trademark law involve close interaction with the client. Anne says that often the attorney must guide and counsel her client on the selection and best use of the mark. She may also need to help her client in the development and application of a marketing plan and a plan for challenging competing uses of the mark. As described by Nancy, in intellectual property litigation, the attorney is more involved with the application of legal analysis and unearthing facts than with actual client interaction. In litigation, often the opposing party and the court dictate the legal avenues and the client must accept those choices.

Taken as a whole, trademark law as described by the women who were interviewed is very proactive. This aspect of trademark law fosters an atmosphere in which the attorney and the client work together to achieve the same goal. In contrast, the attorneys who were interviewed see intellectual property litigation as very reactive and the attorney-client relationship as oriented away from the attorney-client interaction and toward the subject of the litigation.

Although there are more women in trademark law than in patent prosecution, the women interviewed explained that there is a similar lawyer-client relationship in both areas. Both areas are proactive and are geared toward avoiding litigation. However, patent prosecution revolves more around the patent application than around the client. These practical differences in the attorney-client relationship between trademark law and patent prosecution alone do not explain why there

31. The comparison of the type of attorney-client interaction found in the different intellectual property fields is not included to explain why there are more women in trademark law than in patent prosecution or in intellectual property litigation, but is instead included as a possible factor for the distribution.

are more women in the former than in the latter. For patent prosecution, it appears that the biggest factor excluding women from the area is the requirement of a technical degree.[32]

The type of lawyer-client relationship dominant in the practices of trademark law and patent prosecution is the participatory model of attorney-client interaction.[33] Douglas E. Rosenthal, in a discussion of the roles of lawyers and clients, proposes a model where the client is on equal status with the attorney and "participates actively in the professional relationship."[34] The participatory model benefits the relationship by furthering not only communication and interaction between the client and the attorney by virtue of shared control and decision making powers, but also by furthering the objectives of the client – getting better results.[35] This creates a more satisfied client.[36] When working with their clients, all of the interviewees described their interactions as fitting within the participatory model. This type of interaction is favored by the trademark attorneys who were interviewed, and may be an additional factor explaining why there are more female trademark attorneys and why there are fewer female intellectual property litigators.

2. Characteristic and Communication Differences between Men and Women

The proactive side of the law is described by Nancy as being concerned with avoiding litigation and protecting the client from risk of loss in the case where litigation is unavoidable. Some women may prefer this type of law because it draws on the skills which are perceived to be typically possessed by women.[37] Although many conclusions concerning the preference of attorney roles are based on stereotypes, they are not included to perpetuate generalities. They may provide some insight into the prevalence of women in trademark law, a participatory field of law, and the lower number of women in intellectual property litigation. The reasons why a woman may prefer a partici-

32. *See supra* Part III A.

33. *See* GEOFFREY C. HAZARD, JR. ET AL., THE LAW AND ETHICS OF LAWYERING 473-74 (2d ed. 1994) (citing DOUGLAS E. ROSENTHAL, LAWYER AND CLIENT: WHO'S IN CHARGE? 1-28 (1974)), (discussing a model of interaction between the attorney and the client that is similar to the type of interaction described by the attorneys who were interviewed).

34. *Id.* Traditionally the relationship between the lawyer and the client is not one of equality, but rather one of dependence on the attorney for her skill or knowledge. *See id.* at 473.

35. *See id.* at 473-74.

36. *See id.*

37. *See* Note, *Why Law Firms Cannot Afford to Maintain the Mommy Track,* 109 HARV. L. REV. 1375, 1383 (1996).

patory model of interaction with her clients may originate from some of the historically, culturally, and societally perceived differences between men and women. Cooperation, accommodation, nurturance, and a tendency to avoid confrontation rank as perceived characteristics of historical and cultural models of femininity.[38] In contrast, perceived historical and cultural masculine characteristics include competition, aggression, decisiveness, and hierarchical organization.[39] According to these traits, women may prefer, or be more comfortable with a participatory type of relationship.[40] Men, on the other hand, would seem to be more comfortable with the historical relationship of the client as dependent on the attorney.[41]

The finding that society has taught women to view things in terms of relationships and to understand events contextually supports the idea that women may prefer a legal environment which has a basis in shaping relationships and getting to know the client and the client's overall needs.[42] The women interviewed feel more comfortable in proactive types of fields. The combination of historical and cultural guidance, familiarity, and the reality of access to this area of law may work together to explain why there are more women in trademark law than other types of law.[43] The experiences of Anne and Laura support the idea that women may enjoy or feel more comfortable with trademark law because of the type of attorney-client interaction involved. This may be because of personal preference or may be based more on historical, societal, or cultural shaping.

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38. *See* CAROL L. PHILPOT ET AL., BRIDGING SEPARATE GENDER WORLDS 111-112 (1997).

39. *See id.*

40. "Typically, women use language to provide understanding and support... [and] use tag questions to encourage further discussion. . . .They tend to support the positions of others, listen attentively and empathically, wait to be invited to speak, and do not interrupt. In reaching a decision, women prefer consensus to the use of hierarchical power.... [T]hese communication patterns reflect women's desire to connect and their fear of offending others..." *Id.* at 115-116.

41. *See generally id.*

42. *See* DEBORAH M. KOLB, HER PLACE AT THE TABLE: GENDER AND NEGOTIATION 140 (Mary Roth Walsh ed. 1997).

43. "Women usually have had more relationship and communication skills because their position as the dependent and subservient gender has required that they develop these skills for survival." PHILPOT ET AL., *supra* note 38, at 114. The relationship and communication skills enjoyed by women may be a reason why there are more women in the proactive area of Trademark law, where there is a great deal of emphasis placed on communication between the attorney and the client.

3. Fewer Existing Male Power Structures

There are other explanations to support the high numbers of women in trademark law relative to the numbers of women in other areas of law. Other reasons may be the sudden and rapid growth of trademark law in many firms and the lack of an existing male power structure.

According to the interviewees, intellectual property law is a booming practice area.[44] Palo Alto and Menlo Park – located in California's Silicon Valley – are the most desirable new addresses for national and east coast law firms to include on their letterhead. Intellectual property practice is rapidly gaining interest and its own foothold in many firms.[45] As a result, women have the opportunity to grow along with these practice areas. In many situations, a trademark practice is new to the firm. As was the case with Sandra's firm,[46] the woman who heads the new trademark practice group did not have to directly compete with an existing male structure. The interviewees believe that expanding practices benefit women who are given the opportunity to grow along with their intellectual property practices. Two of the interviewees, one who has been practicing for five years, and the other for nine, grew into the practice of trademark law along with their firms. As more and more firms add intellectual property groups, women will have greater opportunities to move into higher positions within their firms.

IV. SOLUTIONS TO THE CHALLENGES FACED BY FEMALE INTELLECTUAL PROPERTY ATTORNEYS

[W]hat to do about the fact that women have an ability men still lack, gestating children in utero.[47]

A. *Changing Overall Policies*

One of the biggest challenges facing female attorneys comes not from specific acts of hostility or discrimination, but rather from the overall climate of the law firm. The firm climate can often be the deciding factor in determining whether women feel they are successful in

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44. *See also* Katharana L. Zanders, *Conspicuous Absences: Practice Area Reveals Paucity of Women Attorneys Among Group Heads*, 16 NO. 9 OF COUNSEL 1, 16-17 (1997).

45. *See id.*

46. *See supra* Part III C.

47. CATHARINE A. MACKINNON, TOWARD A FEMINIST THEORY OF THE STATE 222 (1989).

their careers. Certainly, all of the interviewees who identified themselves as successful credited their firms with being supportive and helpful. In fact, those women who left previous firms cited the basic climate of the firm as the primary reason they decided to leave. The women did not feel comfortable working for a firm which was not supportive of both their professional and personal goals. Several women mentioned feeling as though they were somehow less of a lawyer than their male counterparts as a result of the attitudes of their law firms. The atmosphere of the firm itself can thus be an important factor in developing the self esteem of women attorneys.

The general climate of the firm is also a big factor for women conducting their first job search. "The major concern for women considering private practice is what the climate of the firm is for women," says Roberta Kaskel, assistant dean for career services at the University of Maryland Law School. "They know that the decision they make at graduation about a job may affect any decision they might make five or ten years from now about having a family. The male students only want help comparing firms on the nature of the work and the salary potential."[48]

A solution to changing the overall climate of a firm can be found in a reflection on how the written policies pertaining to child leave, flexible work time, and evaluation processes actually function at the firm.[49] All of the interviewees responded that they felt their firms had good maternity leave policies, and that the application of these policies in practice was often more flexible than the policies appeared in writing. The written policies are important, but for women, it is how those policies are put into practice that really makes the difference.

Creating opportunities is not simply a matter of adopting gender neutral policies. Many employment procedures appear to be objective: evaluation processes, sexual harassment policies and equal employment opportunity policies all work on paper. In practice, these methods often fail because latent bias and stereotypes cannot be tackled through written directives alone.[50]

When writing policies, the drafters should take into consideration exactly why they are writing the policies. Looking specifically at the needs of women and how they will benefit from firm policies may re-

48. LORRAINE DUSKY, STILL UNEQUAL: THE SHAMEFUL TRUTH ABOUT WOMEN AND JUSTICE IN AMERICA 151 (1996).

49. *See* COMMISSION ON WOMEN IN THE PROFESSION, AMERICAN BAR ASSOCIATION, UNFINISHED BUSINESS: OVERCOMING THE SISYPHUS FACTOR 19 (1995).

50. *Id.*

sult in not only better policies for women, but also greater understanding of the reasons behind the policies, and more effective implementation of those policies. Careful drafting may also lead to a reapportionment of the burdens traditionally placed on women.

Recognizing social and biological differences between men and women may risk perpetuating stereotypes, but refusing to recognize them will unjustly ignore burdens disproportionately imposed on women to the advantage of men, will require women to "do it all," and thus will set up the average woman for failure. That is, ignoring differences benefits a few superwomen at the top but makes life more difficult for the average woman juggling an ordinary job and family, with fewer benefits and lower pay than the average man has.[51]

Well-written policies, then, are those which recognize the basic differences between men and women while providing benefits and support for all women. However, careful drafting and implementation alone are not enough. Firms must recognize that women and men are different, and that equality means presenting different people with the same opportunities. Thus for men and women to be equal, each must have the same opportunities. In the fields of patent prosecution and intellectual property litigation especially, opportunities which are available to men must be made available to women on the same scale and in the same scope through the recognition that men and women are different.

B. Flexibility and Support at Home and at the Office

Another challenge facing female attorneys is that of spending time with and taking care of their families while maximizing their career potential. This challenge is one faced by women in all types of careers. "The average woman . . . will experience pregnancy about twice in her working career."[52] Three of the interviewees gave birth to one or more children during their legal careers and expressed that it was very difficult for them to be both full-time mothers and full-time intellectual property lawyers. However, they found a solution to balancing their career and family interests. The solution involves a combination of support at the office from colleagues, support staff, and from a flexible work schedule and support at home from spouses, nannies, and cleaning services.

51. FEMINIST JURISPRUDENCE 22-23 (Patricia Smith ed., 1993).

52. *Id.* at 22.

Flexibility and support at work really help women achieve their professional and personal goals. Two of the interviewees work part-time. Anne, a trademark attorney and mother of three, works three days a week. She must make those days count and work efficiently in order to bill seven to eight hours per day.[53] Nancy is a part-time litigator and a mother of three who typically works four days a week. Nancy does not consider herself to be part-time, as she works much more than the traditional twenty hours per week. Rather, she considers herself to be eighty percent of full-time and bills approximately thirty hours each week. However, as a litigator, there are times when she works much more, for example, when a case goes to trial. She finds that as a less than full-time employee, she cannot handle as many cases and relies on the support of management to keep her case load down.

Although Anne and Nancy work harder as part-time attorneys than they did as full-time attorneys, their part-time status does create some negative perceptions. Neither Anne nor Nancy broadcasts to clients her part-time status. Although they both feel it is a personal matter and not a professional one, neither attorney wants her clients to think of her as less committed simply because she allots more time and preference to her family obligations than does the typical male attorney. Both women feel that even though female attorneys are generally accepted in the practice of intellectual property law, typically in the legal profession part-time female attorneys are not accorded the same level of respect as full-time female attorneys.

Law firms benefit from part-time employees, beyond gaining a satisfied, happy, and fulfilled worker. Firms can save money using part-time attorneys because they tend to incur fewer overhead expenses, freeing up both office space and support staff.[54] Two of the attorneys interviewed intimately understand this concept, as other attorneys use their offices on the days when they are not there.

In addition to receiving support through flexible working schedules, assistance and understanding from their law firms, coworkers, and support staff, the interviewees have also hired people to help with the cleaning and have used nannies to gain support at home. In our society, "the vast majority of housework is still relegated to the [woman] in the family,"[55] and now the woman is relegating the housework to someone else. The interviewees value their time too highly to spend so

53. At Anne's firm, full time attorneys bill an average of 2,000 hours per year.

54. *See* Amee McKim, Comment, *The Lawyer Track: The Case for Humanizing the Career Within a Large Law Firm*, 55 OHIO ST. L.J. 167, 182 (1994).

55. PHILPOT ET AL., *supra* note 38, at 137.

much of it cleaning, and would rather spend it either working or with their families. Although all of the women received some support and help from their husbands, in reality husbands take on household and family responsibilities much less frequently than women do.[56] However, men do face many obstacles imposed by society when it comes to undertaking familial obligations.

> [B]eing an involved father is not an easy task in our culture. Businesses may not look kindly on a man or a woman who puts the family first. Interruptions to the workday due to the illness of a child or attendance of a school conference are frowned on if the employee is a woman, but intolerable for a man. . . . [E]mployers and colleagues alike consider men who prefer to be involved in the daily activities of their children at the expense of their work schedules as "slackers" or otherwise ridicule them. . .[57]

Therefore, society seems to impose the greatest burden on couples who desire to share childrearing responsibilities equally. As Anne sees it, the delegation of childcare and household tasks to women is not going to change any time soon: "This is not going away. It is a societal thing." All of the other interviewees agree with this sentiment and wish that as a whole society could be changed. Until law firms decide to apply their policies in such a way as to allow men the opportunity to go part-time and take care of their children or to take paid leave for the birth of a child without the current stigma attached to such activities, women will still have to figure out how to handle a career and a family with only twenty-four hours in a day.

Law, a very strenuous career, demands a great deal of time from attorneys. Women bear the brunt of the responsibility for raising the children and taking care of the household.[58] This shouldering of responsibility marks the greatest difference between male and female lawyers. The real question lies in how women can be presented with the same opportunities to succeed and grow in the legal field as those typically presented to men, even though women are typically responsible for households and families. It is this question that law firms must answer in order to accord women equal opportunities to grow as attorneys.

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56. PHILPOT ET AL., *supra* note 38, at 137-140.

57. *Id* at 142-143.

58. *See generally id* at 137-41; Note, *supra* note 37, at 1375.

C. Support from Female Mentors

One of the challenges facing female attorneys is that of being left out of office support systems which encompass much of the learning and training which goes on from day-to-day.[59] A solution to this problem can be found in female mentors. Mentors support attorneys by providing the experience and knowledge a young attorney needs to grow and develop. A mentor may take many forms, from someone the mentee can consult about legal theories or troublesome clients, to a person who champions her legal career and actively searches out challenging new assignments and projects to develop her skills. Women seem to be less likely to develop a good relationship with a more senior attorney who can help train them in the ways of the law. By making more deep professional relationships within their department, women can show by example that women do belong in the fields of patent law and intellectual property litigation, thereby making the road easier for those who have just begun their careers.

Many of the interviewees stated that they did not have a mentor, yet when they discussed their relationships with people in their departments and around the firm, it became apparent that most of the women looked to other attorneys for professional guidance and support. During the interview, Anne did not mention having a specific female mentor, but does feel as though she receives support from her colleagues, all but one of whom are women. Laura identified her mentors as more akin to confidantes, people willing to give her the benefit of their experiences. One important aspect of 'mentoring' especially appreciated by Laura, is the availability of other women as resources. Laura says that women are finally "getting it" when it comes to networking. Other women often call Laura when they are trying to get background information about a client, a new trend in the law, or the latest news on who is hiring. In fact, during her last job search, Laura secured many interviews either directly or indirectly through her female contacts. Shortly before she moved to her new job, she received a few phone calls from women who wanted to make sure they kept her in their network and did not lose track of her.

Sandra, another intellectual property litigator, having been successfully mentored herself, makes sure that she is a mentor for at least one of her firm's summer associates each year. She was paired with a female associate last summer, and really enjoyed being able to answer

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59. *See* Amy Saltzman, *Woman Versus Woman: Why Aren't More Female Executives Mentoring Their Junior Counterparts?*, U.S. NEWS & WORLD REP., Mar. 25, 1996, at 50.

questions, give advice, and discuss the workings of the firm with a young associate. Sandra herself has had good mentoring relationships with both men and women, but she says that for her, a female mentor adds that little bit extra to the mentoring experience, no matter what stage she is at in her professional development.

Although women benefit from having a mentor relationship, it does not seem as though many women partners are actively engaged in mentoring other women.[60] One reason for this may be the relative powerlessness of women partners when compared to male partners.[61] In a study for the Committee on Women in the Profession for the Association of the Bar of the City of New York, female partners who were interviewed on the subject indicated that a lack of "political clout" limited their effectiveness as mentors.[62] Other reasons provided by women in the same study as to why they did not choose women as mentors were the political costs of being allied with female mentors as well as the unavailability of female mentors.[63] The women who were interviewed for this essay sometimes hesitate to approach older women for assistance and guidance, because they are uncertain as to whether the women would be helpful or would agree to be a mentor.

Women, one or two generations ago, were stereotyped as trying to have it all.[64] These "wonderwomen" wanted a career as well as a family, and were unwilling to make any concessions in their careers in order to have it all.[65] This "do everything" attitude results in some conflicts between older women attorneys and younger ones. "Older women brand as unrealistic their younger colleagues' belief that law firms should change to accommodate the reality of working caregivers. Young lawyers think older women were too willing to sacrifice either their careers or their personal goals. . . ."[66] The result of this debate is that tensions exist between women of different ages, resulting in misperceptions, missed opportunities, and fewer opportunities for women to be mentored by women. Laura, in discussing how many of her friends assist each other through networks, stated that "there are still

60. *See* Elizabeth K. Ziewacz, *Can the Glass Ceiling be Shattered?: The Decline of Women Partners in Large Law Firms*, 57 OHIO ST. L.J. 971, 983 (1996).

61. *See* Cynthia Fuchs Epstein et al., *Glass Ceilings and Open Doors: Women's Advancement in the Legal Profession*, 64 FORDHAM L. REV. 291, 353 (1995).

62. *See id.*

63. *See id.*

64. *See* Saltzman, *supra* note 59, at 50-52.

65. *See id.*

66. Epstein et al., *supra* note 61, at 299.

some unhelpful women out there." Laura looks to older women who are "those that see you are below them, extend a hand, and say let me help you."

In general, mentoring relationships help female attorneys advance within their careers and attain more satisfaction while doing so. These connections also provide support for women who need to ease their work load in order to try to balance their career and family. In the fields of patents and intellectual property litigation, mentors help female attorneys succeed and grow in their fields. Since there are fewer women in these fields, establishing such relationships will not only help women gain exposure within the firm, but will also pave the way for acceptance of more women in the future.

IV. CONCLUSION

Women in intellectual property fields of law do not have an easy solution for the attainment of success and equal opportunities. For the most part, our society is still biased toward thinking of women as wives and mothers, and not as patent prosecutors or intellectual property litigators. There are some changes which can be effected within the structure of the law firm to help women succeed in the fast-growing and exciting field of intellectual property law. Women can find mentors to teach and guide them throughout their careers. Law firms can rewrite their policies concerning issues which matter most to women to make certain that the policies themselves, as well as the way in which they are applied, present equal opportunities for success and achievement to both women and men. Law firms need to realize that female and male attorneys are different, and incorporate these differences into equal opportunities that are given to all attorneys. All of the interviewees agree that what they really want from their law firms is an equal opportunity to work hard, succeed, and achieve fulfillment not only as attorneys, but also as women. It is time for law firms to heed the call and provide the opportunities for all women to succeed as women and as attorneys.

Double Jeopardy?

Gender Bias Against Women of Color in Science

TOOLS FOR CHANGE

Boosting the Retention of **Women** in the **STEM** Pipeline

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TOOLS FOR CHANGE

I found growing up in India...there seemed to be less discrimination.... I found that it was far more here than back home, which may come as a surprise to you.

– Asian, Immunology

Executive Summary

THE PAUCITY OF WOMEN IN SCIENCE HAS BEEN documented over and over again. A 2012 Report from the President's Council of Advisors on Science and Technology reported that a deficit of one million engineers and scientists will result in the United States if current rates of training in science, technology, math, and engineering (STEM) persist (President's Council of Advisors on Science and Technology, 2012). It's not hard to see how this hurts the United States' competitive position—particularly if women in STEM meet more gender bias in the U.S. than do women elsewhere, notably in India and China.

The conventional wisdom is that women haven't progressed in careers in STEM due to the pull of children and early choices not to pursue math and science careers (Moss-Racusin, Dovidio, Brescoll, Graham, & Handelsman, 2012). Some studies conclude that the relatively low percentage of women stems from these factors and "is not caused by discrimination" in STEM (Ceci, Williams, & Banett, 2009; Ceci & Williams, 2011; Ceci et al., 2011).

Yet three recent studies found that gender bias also plays a role. One found that, even when math skills were identical, both men and women were twice as likely to hire a man for a job that required math (Reuben, Sapienza, & Zingales, 2014). "In some situations up to 90% of the time when a mistake was made, it was made in favor of the man," commented Dr. Ernesto Reuben, one of the study's co-authors (University of Cincinnati, 2014). A second study found that, in academic laboratories in elite universities, male (but not female) scientists employed fewer female than male graduate students and post docs (Sheltzer & Smith, 2014). A third double-blind randomized study gave science faculty at research-intensive universities application materials of a fictitious student randomly assigned a male or female name, and found that both male and female faculty rated the male applicant as significantly more competent and hirable than the female with identical application materials (Moss-Racusin, Dovidio, Brescoll, Graham & Handelsman, 2012).

These studies are part of a much larger literature on gender bias: experimental social psychologists have documented bias over and over again since the 1980s. The present study begins from an extensive review of this literature, which documents four distinct patterns:

1. **Prove-It-Again.** Women often have to provide more evidence of competence than men in order to be seen as equally competent (Eagly & Mladinic, 1994; Foschi, 1996; Foschi, 2000). This descriptive stereotyping (Heilman, 2001) reflects the perceived lack of fit (Heilman, 1983) between being a woman and being a scientist (Nosek, Banaji, & Greenwald, 2002; Moss-Racusin, Dovidio, Brescoll, Graham & Handelsman, 2012).

2. **The Tightrope.** Women often find themselves walking a tightrope between being seen as too feminine to be competent—or too masculine to be likable (Cuddy, Fiske, & Glick, 2004; Fiske, Xu, & Cuddy, 1999). The Tightrope reflects prescriptive stereotyping (Heilman, 2001), and stems from the fact that science is seen as requiring masculine qualities—but women are expected to be feminine. Thus women often find themselves pressured to take on dead-end roles, from acting as administrative assistants to being expected to mentor everyone else's students in addition to their own (Allen, 2006). Women also often face backlash for behaving in stereotypically masculine ways, such as being assertive (Prentice, & Carranza, 2002), angry (Brescoll & Uhlmann, 2008), or self-promoting (Rudman, 1998).

3. **The Maternal Wall.** By far the most damaging form of gender bias is triggered by motherhood. Maternal wall bias includes descriptive stereotyping that results in strong assumptions that women lose their work commitment and competence after they have children (Correll, Benard & Paik, 2007; Cuddy, Fiske, & Glick, 2004), as well as prescriptive stereotyping that penalizes mothers who remain indisputably committed (Benard & Correll, 2010).

4. **Tug of War.** Sometimes gender bias against women fuels conflict among women. This stems from the fact that women as well as men are biased against women in traditionally masculine domains (e.g. Moss-Racusin, Dovidio, Brescoll, Graham & Handelsman, 2012). In addition, studies show that women who experience discrimination early in their careers tend to distance themselves from other women (Derks, Ellemers, van Laar, & de Groot, 2011; Derks, van Laar de Groot, 2011). Commonly this is called the "queen

bee" syndrome and attributed to the personality problem of an individual woman, but this problem often signals gender bias in the environment.

Each of these patterns has been documented repeatedly.

STEM fields provide fertile ground for bias for at least two reasons. First, studies of tokenism document that bias tends to occur more often when women make up less than 15% – 20% of a given field, which is common in many fields of science (although no longer in biology) (Kanter, 1977a, 1977b). Second, an influential study by Emilio Castilla and Stephen Benard found that bias is more common in fields, like science, that see themselves as highly meritocratic (Castilla & Benard, 2010).

This report asks a long-standing question: do the patterns documented in experimental social psychologists' labs reflect what is actually occurring at work for women in the STEM fields? (Mitchell & Tetlock, 2006). The answer is yes. Gender bias exists, and it exists for women of color: **100% of the sixty scientists interviewed for this study reported encountering one or more of these patterns of gender bias**, based on interviews in which we simply described experimental findings and asked women scientists, "Does any of that sound familiar?" (An earlier study found that 97% of the Black women interviewed were aware of negative stereotypes of Black women, and 80 percent had been personally affected by them (Jones & Shorter-Gooden, 2003).

This research is unusual in that it bridges the gap between experimental social psychologists' labs and actual workplaces—and because it examines gender bias among women of color as well as White women. The current body of social psychological work on gender bias has focused almost exclusively on the experiences of White women, leaving the major question of whether these four distinct patterns of bias extend to women of color unanswered.

100% of the sixty scientists interviewed for this study reported encountering one or more of these patterns of gender bias.

This report adds to a small existing literature on women of color in STEM. The classic report, *The Double Bind: The Price of Being a Minority Woman in Science*, was written in 1976; it reports many of the same patterns of bias documented by this report (Malcolm, Hall, & Brown, 1976). Much of the subsequent research has focused on undergraduates or graduate students rather than science professors, who are the focus of this report. (For recent examples, see Ong, Wright, Espinosa, & Orfield, 2010; Espinosa, 2011; Reyes, 2011; Ong, Wright, Espinosa, & Orfield, 2011; O'Brien, Blodorn, Adams, Garcia, & Hammer, 2014.) One of the rare studies that compares White women scientists with women scientists of color found an important difference, namely that the White women reported higher levels of influence in their departments than did the women of color (Settles, Cortina, Malley, & Stewart, 2006). Another study of a major research university found that 43% of women of color academics felt under close scrutiny, as compared with 33% of White women and 18% of White men, and that women of color were also more likely (77%) to report that they felt they had to work harder to be perceived as legitimate than White women (58%) or White men (46%) (Hollenshead & Thomas, 2001).

We interviewed sixty scientists who were all women of color. Women of color face "double jeopardy" because they encounter race as well as gender bias (Epstein, 1973; Almquist, 1975). This study explores how the experience of gender bias differs by race. We

use the interviews of women of color in science and a survey that quantifies the experiences of White, Black, Asian-Americans, and Latina women in STEM fields to document the little-explored differences between the experiences of White women and women of color, and between different groups of women of color.

Respondents for both studies were recruited through the Association for Women in Science (AWIS) by sending emails to AWIS members. Sixty women participated in the interview study: twenty each of Latinas, Asian-Americans, and Black women. Erika Hall, then a graduate student at Northwestern University's Kellogg School of Business and now an Assistant Professor of Organization & Management at Emory University's Goizueta Business School, conducted the interviews. Five-hundred and fifty-seven scientists responded to the online survey.

Our data suggest that gender bias is commonplace in science:

1. *Prove-It-Again*. Roughly **two-thirds** of both the women interviewed (66.7%) and those surveyed (63.9%) reported Prove-It-Again bias.
2. *Tightrope*. About **three-fourths** (76.3%) of the scientists interviewed reported Tightrope bias. The survey measured different types of Tightrope bias and found that:
    a. About **one-third** (34.1%) of the scientists reported pressures to take on dead-end traditionally feminine roles.
    b. About **one-half** reported backlash for stereotypically masculine behaviors such as assertiveness (53.0%) and expressing anger (52.3%). Over **one-third** (38.2%) reported backlash for self-promotion.
3. *Maternal wall*. In interviews, **nearly two-thirds** (64.0%) of scientists with children reported maternal wall bias, including the flexibility stigma (Williams, Blair-Loy, & Berdahl, 2013) when women took parental leave or stopped the tenure clock. Women scientists without children also report being disadvantaged in various ways, notably when they are expected to work longer hours to make up for the schedules of colleagues who do have children. Motherhood appears to be a no-win proposition for many women in STEM.
4. *Tug of War*. **Over one-half** (55.3%) of scientists interviewed reported Tug of War patterns. Although three-quarters (75.5%) of those surveyed reported that their female colleagues supported each other, several Tug of War patterns emerged. About **one-half** (51.4%) of the scientists surveyed felt that "some women [scientists] have 'just turned into men,'" while 41.7% agreed with the statement that "some women just don't understand the level of commitment it takes to be a scientist."
5. *Sexual harassment*. Over **one-third** (34.5%) of those surveyed reported sexual harassment.

In addition to these findings, our studies began to document how the experience of gender bias differs for women of different racial groups. Some major findings:

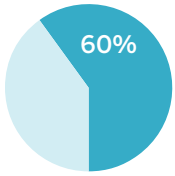
1. ***Prove-It-Again is more common for Black women than for the other three groups of women***: Black women (76.9%) were more likely than other women to report having to provide more evidence of competence than others to prove themselves to colleagues (Latinas: 64.5%; Asian-Americans: 63.6%; White women: 62.7%).
2. ***The stereotype that Asians are good at science appears to help Asian-American women with students—but not colleagues***. The stereotype of Asian-Americans as "good at science" did not appear to help the scientists surveyed establish their competence with colleagues: they reported *more* "Prove-It-Again" bias (63.6%) than White women did (62.7%) when it came to establishing their competence with colleagues. Interviews confirmed that Asian-American women's experiences were shaped far more by the negative stereotype that women are not good at science than the positive stereotype that Asians are. This finding raises the empirical question of whether the stereotype of Asians as technically competent (Fiske, Cuddy, Glick, & Xu, 2002) benefits Asian-American men more than Asian-American women. On the other hand, Asian-American women scientists reported *less* Prove-It-Again bias from students (31.7%), as compared with the other three groups of women (Black women: 56.5%; Latinas: 50.0%; White women: 43.3%).
3. ***Asian-American scientists were more likely than other women to report workplace pressures to***

fulfill traditionally feminine roles—and pushback if they didn't. Asian-American scientists surveyed were far more likely than other women to report backlash for stereotypically masculine behaviors such as being assertive (61.4%) and self-promoting (48.4%). They also were more likely than other women (40.9%) to report pressures to play traditionally feminine roles, such as office mother or dutiful daughter. Black women rarely reported pressures to play traditionally feminine roles (8.0%) and had the lowest levels of backlash for self-promotion (30.4%). White women and Latinas fell in between.

4. ***Latinas who behave assertively risk being seen as "angry" or "emotional"—and they shoulder large loads of office housework for both colleagues and students***. Interviews found that Latinas who behaved assertively risked criticism for being angry or "too emotional," even when the women themselves reported that they weren't angry—they just weren't deferential. Nearly 60% of Latinas surveyed noted backlash for expressing anger, as compared with 54.4% of Asian-Americans, 49.7% of Whites, and 47.8% of Blacks. In addition, in interviews, Latina scientists were far more likely than the other groups of women to report being expected—both by colleagues and by students—to do large loads of office housework, including literal housework (making coffee), administrative work typically performed by support personnel, and emotion work in helping students with their emotional problems.

5. ***Black women are allowed more leeway than other groups of women to behave in dominant ways—so long as they aren't seen as "angry Black women."*** The interviews confirm the finding of two experimental studies (Livingston, Rosette, & Washington, 2012; Richardson, Phillips, Rudman, & Glick, 2011) that found that Black women are allowed to behave in more dominant ways than White women—although interviews also noted pushback if one is seen as an "angry Black woman."

6. ***The Maternal Wall affects mothers of all races***. In interviews, 64.0% of the scientists who were mothers reported maternal wall bias. In the survey, 69.0% of both Latinas and Asian-Americans described pressure from their families to have children (as compared with 60.6% of Whites and 57.1% of Black women). Among those surveyed, Asian-Americans (26.7%) and White women (26.0%) were far more likely than Latinas (9.1%) or Black women (7.7%) to report that their colleagues had communicated that they should work fewer hours because they had children.



Nearly **60%** of Latinas surveyed noted backlash for expressing anger.

7. ***Tug of War***. When asked whether women support each other, most respondents (75.5%) said yes, but Black women were far less likely to agree: only 56.0% did so. Latinas (35.5%) were far more likely to report finding it difficult to get administrative support personnel to support them. In interviews, Black women also reported many instances of conflict with administrative staff. About one-third of both Black women and Asian-Americans reported tokenism—that women in their environments were forced to compete with each other for the one "woman's spot"—as compared with roughly one-fifth of Latinas and White women. Asian-Americans were far more likely (70.5%) than other groups to agree that "some women had just 'turned into men.'" Finally, roughly 40% of all groups of women agreed that "some women just don't understand the level of commitment it takes to be a scientist."

8. ***Attributions differ***. Black women tended to attribute Prove-It-Again bias to race rather than gender. All groups of women tended to attribute Tightrope and Maternal Wall bias to gender, although race remained more salient for Black women.

9. ***Sexual harassment***. White women (37.2%) are far more likely to report having been sexually harassed as compared with Asian-Americans (25.0%), Latinas (21.9%), and Black women (12.5%). Because the interviews did not ask about sexual harassment, this is the only data point available. A prior study that lumped social scientists with natural scientists found no difference between sexual harassment reported

among Whites and women of color (Settles, Cortina, Malley, & Stewart, 2006).

It has long been known that the experience of women of color differs from both that of men of color and from that of White women, a phenomenon known as "intersectionality" (Crenshaw, 1989). But this insight has rarely been explored empirically. (For a literature review of the exceptions, and a proposed theoretical framework, see Ridgeway & Kricheli-Katz, 2013.)

In addition to experiencing the forms of gender bias that fall into the Four Patterns rubric, women of color also reported racial bias. All three groups of women of color reported that they had to confront negative racial stereotypes. Black women were more likely than other women to report a sense of bleak isolation. Latinas and Black women also often reported being mistaken for janitors—something Williams has never heard in her interviews with White women (Williams & Dempsey, 2014). But men of color describe similar experiences (Bonilla, 2006).

Black women were more likely than other women to report a sense of bleak isolation.

An important point, sometimes overlooked, is that while bias is rampant, glimpses of hope also emerge from these interviews – situations where women of color experienced support and success despite the difficulties faced. Specifically, some of the scientists felt that their cultural and racial traditions armed them well to encounter the challenges they faced.

This report concludes by introducing a new approach to organizational change to interrupt gender bias, called Metrics-Based Bias Interrupters (Williams, 2014). In contrast to traditional one-off bias trainings, and traditional sensitivity based organizational change initiatives, Bias Interrupters uses a four-step iterative process: 1) identify how gender bias is playing out, if at all, in basic business systems (recruiting, assignments, evaluations, etc.), 2) develop objective metrics to measure bias, 3) implement a bias interrupter to interrupt the bias, 4) see whether the relevant metric improves and, if it doesn't, strengthen or modify the intervention. A compilation of Bias Interrupters is provided at the end of this report.

[Y]ou can try to ignore it just to keep your sanity and move on, but the biases that are there are prevalent. And closing your eyes to them will not make them disappear.

– Asian-American, Geology

Introduction

AN ASIAN WOMAN IN BIOPHYSICS RECALLED THAT, when she began her career in the late 1970s, gender bias was very open: "Research grants were very difficult to get. I got a grant, and my colleague said something about, 'Well, why don't you go back to the kitchen so that we have a chance to get the grant?'"

Gender bias today is typically more subtle. But it's pervasive.

Of the 60 women of color in STEM interviewed for this report, 100% reported having encountered one or more of the four basic patterns of gender bias. Some had been warned by male mentors: "He told me directly, 'Look, I know you want to go in to do research. And I think that if you are willing to fight, this will be a productive career for you. But this is a male-dominated area. So you're going to have to saddle up here,'" recalled a Latina professor of environmental biology.

Several women from India commented that gender bias for women in STEM was worse in the U.S. than at home. Women from Japan and Africa disagreed. Said a biologist originally from Japan, "There...women are supposed to be making tea for the guests [in addition to]...your regular work, [making it] three times harder than the male coworker to prove half as much." A biochemist originally from Africa agreed: "I'm comparing it to where I'm from, and I'm like pfft, this is nothing."

This report's focus on women of color is designed to address an oft-noted problem: that women's initiatives are seen as "White women's initiatives." Thus an Asian-American science professor said her colleague of color "felt that the committee on faculty women really should have been renamed the committee on White faculty women."

A common, and indisputable, point is that women of color often are affected by racial as well as gender bias. Much less discussed is that women of color often experience gender bias in ways that differ significantly by race. That is a major focus of this report.

The women we interviewed were divided on whether they had been more affected by gender, race, or another characteristic. Some women felt what mattered differed depending on the situation. Said a Black lesbian in biostatistics, "There's some times where I feel like being a woman is more problematic than being a person of color, and there are definitely times where it's the reverse. Then there are times where the combination is worse than being—it feels worse than being... a sexual minority.... [I]t's sort of situation dependent.... [I]n various situations, one is at play more than the other and vice versa."

Other Black women felt that race was more of an issue. Said another scientist, "I obviously stood out and I felt like I stood out first because of my race and then because I was a woman.... I'm the only African-American [in my department], but then in terms of my gender, there's a ton of women here. Maybe that's why." This was a common sentiment among Black women.

Asian-Americans and Latinas were more likely to attribute bias to gender than race: "I think it depends on the context. I sometimes have felt the ethnic bias versus the gender bias, but I think overall it's mostly...gender bias," said a Latina whose specialty is anatomy.

No matter what a woman's race, bias is draining and demoralizing. An Asian-American in astrophysics found the bias she encountered "tiring and exhausting because it's a constant." A Black woman in biostatistics described "this under-the-surface feeling of uneasiness that you can never quite identify as being overtly...

No matter what a woman's race, bias is draining and demoralizing.

racially discriminatory, but, man, it certainly feels that way." What's most draining, she noted, were "those little micro kinds of situations, I think that, in some ways, they're probably a little bit worse in that they linger the longest." These micro-aggressions (Sue, Capodilupo, Torino, Bucceri, Holder, Nadal, & Esquilin, 2007) are often hard to identify by those not affected. This report attempts to make them visible.

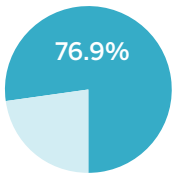
The vision of the scientist that is the White guy with the glasses and that vision that if you ask a kid to draw me a scientist, they would definitely draw a guy with glasses and White.

– Hispanic female, biomedical research

Prove-It-Again

BECAUSE WOMEN OF COLOR DON'T SEEM TO FIT quite as well with "the vision of a scientist," often they have to provide more evidence of competence than do White male scientists in order to be seen as equally competent. Prove-It-Again bias stems from the perceived mismatch between the typical woman and the brilliant scientist. This perceived mismatch drives several different tendencies:

- Women are presumed incompetent (Gutiérrez y Muhs, Flores Neimann, González, & Harris, 2012); men are presumed competent (double standards) (Foschi, 2000).
- Women's mistakes tend to be noticed more, and remembered longer, than men's (recall bias) (Heilman, 1995).
- Women's successes often are attributed to luck or other outside causes: he's skilled; she's lucky (attribution bias) (Swim & Sanna, 1996).
- Objective rules tend to be applied rigorously to women, leniently to men (leniency bias) (Brewer, 1996).
- Superstar women tend to receive even higher evaluations than superstar men, but women who are merely excellent tend to get much lower evaluations (shifting standards; polarized evaluations) (Biernet & Manis, 1994; Linville & Jones, 1980).
- If a job requires both experience and education, people tend to choose a man with more education and cite the importance of education to the position; but if the woman has more education, they tend to choose the man with more experience and cite the importance of experience (Uhlmann, Cohen, 2005).



76.9% of Black women reported having to prove themselves over and over again.

Nearly two-thirds of the women surveyed (63.9%) and those interviewed (66.7%) reported that they needed to provide more evidence of competence than others in order to prove themselves to their colleagues. Yet women's experiences varied substantially by race. Black women (76.9%) were more likely than the other three groups of women to report having to prove themselves over and over again (Latinas: 64.5%; Asian-Americans: 63.6%; Whites: 62.7%). Interestingly, in the interviews, Latinas discussed colleagues' negative competence assumptions about as much as did Black women, and far more than did Asian-Americans. This finding was not reflected in the surveys.

That Black women felt more Prove-It-Again bias makes sense, given that they trigger two distinct sets of negative competence assumptions, one based on gender, and the other on race (Fiske, 2010; Goff et al, 2008). Less easy to understand is that slightly *more* Asian-Americans reported Prove-It-Again bias from colleagues than White women reported: perhaps the "model minority" stereotype of Asians as equally competent as Whites (Fiske, Cuddy, Glick, & Xu, 2002), particularly in technical matters, chiefly benefits Asian-American *men*.

The scientists surveyed also reported having to provide additional evidence of competence to prove themselves to their students, although at lower rates. Black women

(56.5%) and Latinas (50.0%) reported this problem more frequently than did White women (43.3%) and Asian-Americans (31.7%). Interestingly, the "model minority" stereotype appears to help Asian-American women in STEM more with students than colleagues: while Asian-Americans were more likely than White women to report Prove-It-Again problems with their colleagues, they were less likely to report similar problems with their students.

Latinas

Colleagues' negative competence assumptions. A Latina in environmental engineering recalled Prove-It-Again bias from her earliest days in her field when, on her qualifying exams, one of her professors "told me that he was going to ask a question that I was not going to be able to answer and he was going to have me take an extra course." This woman's qualifying exams did indeed contain a question that was impossible to answer without making assumptions. So she made some assumptions, and reached the correct conclusion. Her professor was unimpressed: "even though [her] assumptions were correct and the answer of the question was correct" he still made her take the additional class. "[H]e went as far as knocking on my head and saying, 'Is there anybody there?'" Years later, her hands were shaking as she told the interviewer the story. "I was about 22 years old, so I went back to my office in tears." It took her years, she said, "just to be able to see myself again as somebody who actually did know what I was doing back then."

A Latina in geography thought that some people have "these kneejerk reactions that people of color or women of color aren't as competent." A Latina in biochemistry recounted being excluded when her (male) colleagues discussed her own project. When she suggested that it would have been appropriate to include her, they looked at her with surprise; "from that day on, I had to really fight and be very proactive about these things."

Sometimes negative competence assumptions play out as hyper-scrutiny. Said a biochemist, "they'll nitpick at the protocol, if that makes sense. Well, did you do something different? Did you change something on the protocol? Did you do it at a different time of day? Was the temperature exactly the same? You just have to address every one of their nitpicking questions, until you've answered them all. It's like, 'Okay, you're out of arguments.' Then they have to accept the fact that okay, yes, you were successful in that, not because you're a woman, but because you can do the experiment, or you can do that project well."

As a result, many Latinas felt intense performance pressure. For these women, working hard is a way to overcome the "Mexicans are lazy" stereotype. Some Latinas felt constantly under pressure to make sure everything they did was perfect, a pattern that has been documented in the lab for Black women (Rosette & Livingston, 2012).

"[S]tudents tend to basically just have a certain level of respect for a male faculty from day one that they don't necessarily have for a female faculty, or for me at least."

Students' negative competence assumptions. Women also mentioned challenges in getting students to take them seriously. A Latina engineer noted, "Students'...mental image of what their . . . respected engineering professor should look like is a White, balding male. I enter the classroom and I don't fit that image, so I start out with this, okay, I have to prove myself to them." A Latina chemical engineer noted that "students tend to basically just have a certain level of respect for a male faculty from day one that they don't necessarily have for a female faculty, or for me at least." Prior studies have made similar observations (Turner, Gonzáles, & Wong, 2011; Stanley, 2006 (citing studies)).

Successes discounted. Part of the problem was that Latinas' accomplishments were discounted or attributed to luck. "Even when I went up for promotion," said a Latina biologist, questions were raised about "whether or not I would continue to be doing the things that I was doing, once I got full professor....I had never heard that kind of a comment ever expressed in previous deliberations though. It was a double standard."

Mistakes magnified. Several women noted that women were penalized far more than men for mistakes. A Latina statistician recalled a female colleague whose mistake "many years back" was brought up again and again, noting that a male colleague "hasn't been able

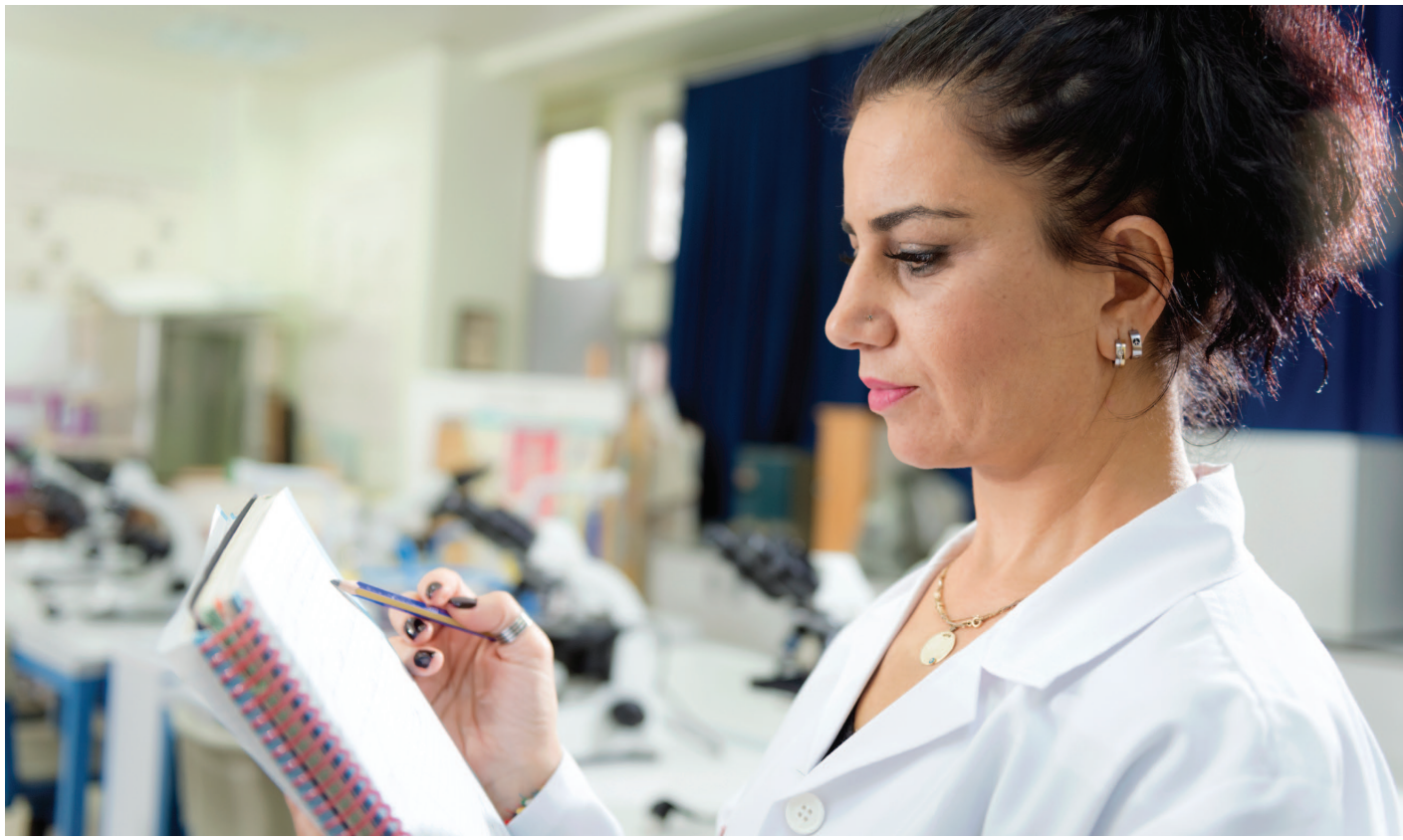
to let go of that and continues to pound this woman on every possible occasion." This same colleague, she noted "was extraordinarily lenient with a male colleague of ours who has done worse than this female colleague of ours and seems to enjoy—'Oh, he didn't mean that.'"

The stolen idea. Several women also reported situations where women suggest an idea only to have it overlooked, only to have the idea taken up when it is repeated by a man. Said a Latina environmental engineer, "I would say something in a meeting and it would go on deaf ears. And then somebody else would say the exact same thing and there would be the, 'Wow, that's such a great idea.'" A Latina statistician recalled, "[Y]ou say something in a meeting, you throw an idea out on the table, nobody picks up on it. Then, a little while [later] one of your male colleagues throws the exact same idea on the table and everybody goes, 'Oh, that's a fantastic idea.'"

The Latinas interviewed typically attributed their Prove-It-Again! challenges to gender rather than race. "[A]s a woman in engineering, very, very, very few women, right, mostly males, you are kind of wired into thinking that you have to try harder.... And you probably will have to work twice as much as your male colleagues," remarked one woman. Another Latina, a statistician, noted "You are young and you are male, you can do it. You are older and you are female, they don't want to waste time on you, until you prove the contrary."

Prove-It-Again problems were perceived to have concrete consequences. A Latina engineer commented, "I have seen some of my [female] colleagues get higher funding rates, higher number of publications, higher service achievements, have their promotions delayed because it was considered that they didn't have enough achievements."

A Latina in microbiology and biochemistry commented that the Prove-It-Again problems she encountered in the early years of her career stopped when she entered an environment that was gender balanced: "[D]uring my postdoctoral fellowship where I was the only female in a postdoctoral lab of six men, and the PI was also a man... I always felt like I had to do more to prove myself in that lab. Even in just simple lab meetings, we would each have to kind of say what we did that week and go



over our data. And I always felt like I was getting drilled... [W]hereas the other guys, they would just kind of say, 'Oh, yeah, and we sat around and did X,' and they were just believed immediately." Now that this woman is in a department that is half male and half female, she notes that this does not happen anymore.

Some Latinas felt that unfair treatment just rolled off their backs. A biology professor noted, "I was raised in a culture where women are sort of stronger in a lot of ways. Women have learned to take over responsibility for their families and be the ones in charge. Whether you have a man or not, you have to make things happen.... I feel that that has given me strength in science where I don't believe paying much attention about what other people might think or not think and just go for what I think I want to do and that I need to do. I just don't give up. I'm from Puerto Rico." A woman of Mexican descent agreed. "My mother is an extremely—she's a go-getter. My great-grandma grew up during the Mexican Revolution, and she was one of those ones that picked up guns and went fighting for the cause. It comes from generations of very assertive women."

A strong sense of right and wrong helped others: many Latinas in science adopted a "what does not kill you makes you stronger" attitude, viewing those who exhibited prejudice as weak and themselves strong because they worked hard and took pride in the results of their work.

Black Women

Colleagues' negative competence assumptions. The experimental finding that Black women have to provide more evidence of competence (Rosette & Livingston, 2012) definitely resonated with the women interviewed. Said a Black microbiologist, "[I]t's a huge barrier, how you're perceived as a capable scientist."

A Black biochemist noted, "You always have to prove yourself..., to show skill. I've never, ever had anything easy." She attributed the problem chiefly to gender, recalling a time when she and her advisor, a White woman, stood virtually alone watching the traffic go to the poster of a White male colleague, whose was on a closely related topic.

More commonly Black women attribute their Prove-It-Again problems to race. Said a Black woman in medical imaging, "that initial expectation of not being professional or whatever and—or not being taken seriously until they hear me, I think that's more because I'm Black than because I'm a woman." A statistician agreed, suggesting that when she presented to an audience, the audience assumed a lack of merit in her results. A prior study found that 63.6% of Black faculty report subtle racism as a source of stress—over 20 points higher than for any other group of faculty (Hurtado, 2011).

Other respondents expressed less certainty about whether race or gender was the issue. "It's challenging because you don't know if you're working twice as hard because you're a woman or if you're working twice as hard because I'm African American," said a mathematician. A Black microbiologist said, "Yes, we must prove it again and again. We have two strikes against us and each is addressed separately." The prevalence of this experience has been noted in other studies (Stanley, 2006).

"You don't know if you're working twice as hard because you're a woman or if you're working twice as hard because you're African American."

Still others felt gender and racial bias were additive. A Black biostatistician noted that she sometimes needed to put her foot down. "[When] it's moved to a place that's almost ugly, where I've had to remind people, 'Look, I have this degree from this very prestigious place. Yes, you have a different degree in a different area, which makes you knowledgeable in a very different area that's not Statistics, and if you're going to challenge me on this—well, I won't be challenged on this.'"

Black women are "presumed incompetent" (Gutiérrez y Muhs, Flores Neimann, González, & Harris, 2012) not only in research but also in teaching. A Black statistician recalled when an administrator asked her how her teaching was going. "'You're not having any problems? Everything's going okay?'" She said everything was fine; later she found out that "a student had called the office and complained about a professor. For some reason, naturally it was assumed that it was me, okay?" The student complained about another professor.

Successes discounted. A Black biochemist reported that an evaluation said, "she's bright, she's big, but she needs a lot of supervision." Note how her success was discounted.

Objective rules applied rigorously to women, leniently to men. A Black biologist noted an example of leniency bias—when objective requirements are applied rigidly to some but leniently to others. She prepared a document and "I didn't put it in an envelope. That was it. I just gave it to the staff member and didn't put it in an envelope. The faculty member came back to my office screaming and raging about anybody could have seen this paperwork, it's private and confidential. It was just a hiring form."

Some women were philosophical about their Prove-It-Again challenges. Many of these women grew up with the knowledge of an "uneven playing field." Said a Black statistician, "I turn it around as a motivator. Because I turn it around into a positive. It helps motivate me to push harder."

Asian-Americans

One woman used the model minority stereotype strategically. Asian-American women in STEM, at least in theory, are in a different situation than Latinas and Black women. First, Asian-Americans are not an underrepresented minority in STEM. Second, Asian-Americans are seen as equal in competence to Whites (Fiske, Cuddy, Glick, & Xu, 2002), particularly in technical matters. An Asian-American physicist very self-consciously played off the stereotype that "Asians are naturally talented in STEM fields" to counter the

negative stereotype that women aren't. Her strategy was to make sure she was seen as an Asian in STEM rather than a woman in STEM: "I'm more acceptable, if you will, as an Asian woman scientist rather than a woman scientist."

Colleagues' negative competence assumptions. Yet this sentiment was surprisingly rare. Most of the Asian-American women interviewed reported experiences similar to those reported by Latinas and Black women. "I have felt always under...extra scrutiny," noted an Asian-American woman in astrophysics. She had the sense that she needed to display her competence "in many more settings than they are required of men, of White women, whatever....—[Y]ou have to prove yourself all the time and that, yes, not a whole lot is taken on promise." An Asian-American in statistics described the attitude: "If you're perfect we might accept you, but if you're not perfect, forget it." She continued, "Your expertise constantly being questioned is probably the biggest thing—you know, people just assuming that you're not going to be able to cut it." Asian-Americans also reported disrespect: a geophysicist recalled when her colleagues told her students that she would not get tenure, and "it felt so wrong."

"If you're perfect we might accept you, but if you're not perfect, forget it."

Students' negative competence assumptions. An Asian-American biochemist reported her sense, when she starts a class of "an uphill kind of battle....I get the impression that students don't believe that I know what I'm supposed to know...?" Said an Asian-American statistics professor, "I think my worst experience was probably an almost all male engineering stats course where, if I pointed out a couple of different ways of doing a problem, the teaching evaluations came back saying 'She doesn't know what she's talking about.'" When her White male colleagues did the same thing, they were labeled "inventive" and "smart."

To enhance their authority, the Asian-American women interviewed tended to be much more formal than their male colleagues. "Because if I went into my class wearing cut-offs with holes in them and a t-shirt, I just would not get any respect at all—particularly when I was younger—whereas my male colleagues of the same age could get away with that," said an Asian-American in statistics. So she dressed more formally, and "tend[s] not to be jokey. My male colleagues can joke around a lot." People "have told me to loosen up and I honestly don't know what I've said in response, but I just had a feeling that if I started to loosen up I would lose respect."

Successes discounted. Other Asian-American women reported that their successes were discounted. One described her department chair saying that she got grants not due to merit but to politics. An Asian-American woman in statistics recalled that she was the only one who had a tenure track position when she finished her program. Despite the fact that she had three publications while her White male colleagues had none, she was told that she had gotten the job because she was a woman.

These assumptions have concrete consequences, noted an Asian-American immunologist: "I got my big R01 and then looked for the position." She was told she "needed to wait for a year to be associate professor in order to move your lab and also he gave me a lot of—I think it's excuses." She accepted the job at an assistant professor rank nonetheless because she wanted a shorter commute—only to have a less credentialed man hired as an associate professor. Even when she managed to get her rank changed to associate, her salary remained unchanged, despite the fact that she had brought in another prestigious grant. She said this kind of thing was common.

The stolen idea. An Asian-American biochemist recalled that often her idea was "just portrayed as somebody else's idea. And then they would discuss about it, basically not giving me any credit for what I was saying." She got so tired of this that she began to put her ideas in an email before a meeting, so everyone knew which ideas originated with her.

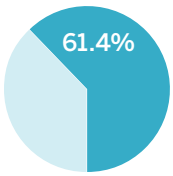
A geneticist noted that things had improved when more Asian-American women entered leadership positions. "[T]hat has helped changed the atmosphere."

The Tightrope

DUE TO PRESCRIPTIVE GENDER BIAS, WOMEN WALK a tightrope between being seen as too feminine, and so liked but not respected—or too masculine, and so respected but disliked (Fiske, S. T., Cuddy, A. J., & Xu, J., 1999). Studies have documented that Asians (men as well as women) are seen as more feminine than Whites, while Black people are seen as more masculine than White people (Goff, Thomas, & Jackson, 2008; Johnson, Freeman, & Paulker, 2012; Galinsky, Hall, & Cuddy, 2013). So it comes as no surprise that Asian-American women encounter more "too feminine" problems—and Black women encounter fewer—than do other women. White women and Latinas generally fall somewhere in between.

Asian-Americans surveyed were more likely (40.9%) than other women to report pressures to play traditionally feminine roles such as office mother or dutiful daughter, as compared with White women (35.9%) and Latinas (28.1%). Black women rarely identified this as a problem (8.0%).

Asian-Americans also more often reported backlash for stereotypically masculine behaviors. Most striking, fully 61.4% reported pushback for assertiveness. It seems that the stereotypes of Asians as passive mean that Asian-American women who aren't passive seem more transgressive. The other three groups of women also reported pushback for assertiveness, but at lower levels: 53.2% of White women, 50.0% of Blacks and 46.9% of Latinas.



61.4% Asian-Americans surveyed reported pushback for assertiveness.

The survey suggests that the racial stereotype of the "fiery Latin" may leave more room for Latinas to behave assertively, but the same stereotype disadvantages Latinas who show anger. Latinas were more likely than other groups of women to say they did not feel free to express anger at work: 59.4% reported this, as compared with 54.4% for Asian-Americans, 49.7% for Whites and 47.8% for Black women. Moreover, in the interviews, Latinas often reported that they were faulted for being angry or "too emotional" when they behaved assertively—something never reported by women from other groups.

Women walk a tightrope between being seen as too feminine, and so liked but not respected—or too masculine, and so respected but disliked.

Asian-American women are more likely than women from other groups to be policed into femininity, and penalized for stereotypically masculine behavior. The final evidence of this pattern concerns self-promotion. Nearly half (48.8%) of Asian-Americans surveyed reported backlash for self-promotion, as compared to roughly a third of women from other groups: 37.3% of Whites, 31.1% of Latinas, and 30.4% of Black women.

The survey contradicts an experimental study that found that Black women are allowed to behave in more dominant ways than White women without pushback (Livingston, Rossette, & Washington, 2012). In our survey, Blacks and Whites reported backlash for behaving assertively and showing anger at about the same rates.

In a counter-intuitive finding, White women (41.8%) were most likely to report they are asked to do more service work than others, a higher level than Black women (37.5%), Asian-Americans (32.5%), and Latinas (31.3%).

All four groups of women tended to attribute Tightrope issues to gender, although race remained more salient for Black women.

Asian-Americans

Asian-Americans often encountered pressures to play traditionally feminine roles—and pushback if they didn't. Asian-Americans surveyed reported that they had encountered pressures to play traditionally feminine roles such as office mother or dutiful daughter

at much higher rates than other women. Asian-American women were also much more likely to report backlash if they engaged in stereotypically masculine behaviors, such as self-assertion (61.4%) and self-promotion (48.8%), suggesting that the stereotype that Asian-American women *are* more feminine than Whites is also a stereotype that they *should* be more feminine.

The stereotype of Asians as passive plays a role. A geophysicist noted the expectation "that Asians are supposed to be very passive. And when you add women to that, they really don't expect Asian women to stand up for themselves, or they expect the dragon lady, the extreme opposite. You can't just be a normal person. There's no expectation for you to be normal." An Asian in viral immunology agreed, saying that, as an Asian, she was seen as someone who "should be like feminine, yeah. Shouldn't be aggressive."

Some refused to conform because they felt that doing so undercut their authority. "I just feel like it's kind of sad you have to portray yourself as a tough bitch in order to stand on your ground. It's hard," mused an immunologist. "I'm very candid and I do not hesitate to open my mouth and that was probably not the submissive female person," said an Asian-American biologist. "I think that being an oriental female immediately started, I guess, having a reputation of being a dragon lady." Colleagues in other departments told her to watch her back. "Early on when I started working here, a faculty colleague of mine said..., 'I can hear you way down the hall because your balls clang.'"

The Tightrope is very narrow for Asian-Americans: one soil microbiologist, who reported being penalized for her masculine style, also reported having been penalized earlier in her career for being too feminine. Now a professor, she talks with students about being assertive, and about the "difference between being assertive and being a bitch."

Sometimes colleagues' bias was very open: "I've gotten remarks like 'I didn't expect someone that was Indian... and female to be like this,'" said an Asian-American soil microbiologist. She found it a challenge to "fit some sort of stereotype of this, I don't know, quiet, subservient woman or something." Again, the Tightrope was narrow: "if a woman promotes herself, then she's too forward or too aggressive." Her solution was to signal masculinity through clothing, which is "my way of not really being masculine but kind of conforming to a dress code so that I am respected."

> "If you want to fit in, do you have to behave like the men?"

An Asian-American physicist perfectly articulated her dilemma, saying that the Tightrope sounded "very, very familiar. And I think it's a struggle that most women or even I go through is how do you portray yourself? I mean, where is the balance, right? I mean, you...are a woman...you don't have to be a man. But, at the same time, if you want to fit in, do you have to behave like the men? And I think I see that a lot. And I know of a lot of women who go through this struggle of how should you portray yourself and be respected for what you are.... I still find that a struggle."

Politically adept women riffed off stereotypes to keep colleagues off balance. "[I]f you're a young man you're a boy genius," said an astrophysicist. "But if you're a young woman, you are so threatening that, in order to be able to cope and to be liked and not intensely disliked by everybody else," things get difficult. "I have had to become as amiable as possible and a group player all the time, not looking out for myself, so damp down my ambition in some ways.... I rarely talk about the prizes I get, the media attention I get. I mean, I keep it all really

damped down. But, now in the age of the Internet, right, everybody knows everything." This is "gender judo": using feminine stereotypes that typically hold women back to, instead, propel them forward. While this strategy had proved successful in managing backlash, she believed she'd also paid a price for downplaying her accomplishments.

Self-promotion challenges. Women of all groups often struggle with self-promotion, which often is seen as appropriate in men ("he knows his own worth") but distasteful in women (Rudman, 1998), who are expected to be demure, modest, and helpful (Prentice & Carranza, 2002). Many Asian-Americans find self-promotion particularly difficult. "It's our upbringing that you're taught to be humble and not boast about your achievements and give credit to others and being boastful is just being rude....If people find and appreciate, that's good for you. If not, that's okay is what we are taught. And so, it's so inherent in us that in a society where it's more self-promoting...that it's really hard....Even those who do it eventually, it takes a very long time to learn that. And you pay a price for that," said a geophysicist.

Students' stereotypes. The "den mother" role is common for Asian-American women professors. Sometimes it's a self-conscious strategy—gender judo—to dodge pushback for being seen as too accomplished or too masculine by adopting a feminine persona. Often, though, the femininity feels mandated and uncomfortable, as students demand attention and emotional support from women that they rarely require of male professors. Said a physicist, "The weaker female grad students said 'Oh, I thought, as a woman, she would understand my problems.' They expected me to be sort of motherly towards them and spend time counseling them and so on, which is not my job." A statistician reported similar experiences, saying that students "expect me to be more helping—you know, always willing to help. Where a male faculty member could just refuse and not have that negatively affect him. Whereas if female faculty members just refuse, that can negatively affect them."

Again women reported that things got easier when they transitioned to environments with more women colleagues in professional roles. A statistician noted that in her current department, female administrators had been around for a long time, so "women can behave quite assertively and aggressively and be respected." She concluded, "so things are good."

Black Women

While Asians are seen by Whites as more feminine than Whites, Black women are seen by Whites as more masculine (Galinsky, Hall, & Cuddy, 2013). So it is not surprising that Black women reported both less pressure to play traditionally feminine roles and less backlash for behaving in masculine ways. Black women reported rarely feeling pressure to play traditionally feminine roles such as office mother or dutiful daughter: only 8.0% of Black women did. (Other women's agreement ranged from 28% to 41%.) A microbiologist described how she did not suffer fools lightly. When students come to her for tea, sympathy, and deferred deadlines, "I'm like, I do keep count of how many grandmothers people have. You can't do it three times."

Black women reported both less pressure to play traditionally feminine roles and less backlash for behaving in masculine ways.

Thus Black scientists surveyed reported the lowest level of pushback for self-promotion (30.4%, as compared to 31.3% for Latinas, 37.3% for White women, 48.8% for Asian-Americans). Black women also were less likely than other women to report that they did not feel free to express anger at work (47.8%, as compared to 49.7% of Whites, 54.5% of Asian-Americans, and 59.4% of Latinas).

Studies show that open expressions of anger tend to increase the perceived status of a man, but decrease that of a woman (Brescoll & Uhlmann, 2008), but the extent to which this is true may differ based on race. An experimental study found that Black women are less likely than White women to encounter backlash for behaving in dominant ways (Livingston, Rossette, & Washington, 2012), and the interviews contain

many examples of Black women saying that dominant behavior works for them. Said a Black woman in medical imaging, "I've never really dealt with being thought of as a bitch, but I have—I kind of aspire to that a little bit because I see, at this university at least, that—actually it's a very effective perception to have." She continued, "And when I am most successful is when I come out of my passive mode.... I am assertive, that's when I am most rewarded. I won't say that's when I'm most productive, but that's when I'm most rewarded." A Black statistician noted that she felt she could get respect for being like a prototypical man—aggressive or assertive. So did a mathematician, who embraced "the perception of the angry Black woman is that we're very, very strong-willed. We don't take any mess and we get the job done, right?"

Other women agreed. A Black statistician noted, "I certainly can't walk in the classroom and come off as being timid, right? Because then students will try and walk all over me. You go in there, you're assertive, you lay down the rules of the syllabus on the first day. At least if you come off on that first day as being stern—I'm not saying you have to be nasty, of course, but very set and this is what you want to do, this is the goal of the class, this is my role, this is your role. It lays down the groundwork." A prior study found that Black professors (both men and women) tend to be judged as significantly less competent and legitimate than White and Asian-American professors—and were seen as having fewer interpersonal skills than Whites (Bavishi, Madera & Hebl, 2010).

A doctor recalled sending an email when she was truly annoyed with a colleague: "When I finished the email and read it, you could tell that it had a bite to it. [*Laughter.*] This person was someone that I really didn't care if they got the bite because I wanted 'em to get the bite." Her partner noted that the email had an attitude and asked "'Now, why did you send that?' I said, 'Because I was ticked.' He goes, 'Well, that had an attitude to it.' I said, 'I know.' I said, 'I meant for it to have an attitude.'" She sent it to a colleague who "has this attitude of, well, I'm in charge and I know what's best and kind of push over people. I wanted him to know I wasn't just gonna go away or just back off just because this is the way he said it. I sent this email and, yeah, it had a bite to it. Within ten minutes—this is at 9:00 at night—within ten minutes I got a response from this guy and the response was, 'Oh, I am so sorry. I didn't realize.'" These findings echo an earlier study of physics graduate students that found that they strategically adopted a "loud Black girl" persona (Ong, 2005).

In sum, the interview evidence appears to confirm the experimental evidence that Black women can behave in more dominant ways than White women and Asian-Americans; the findings with respect to Latinas are murkier. Yet the picture is complex: the survey evidence appears to contradict that finding. In the survey, White women (52.3%) and Black women (54.2%) report pushback for being assertive with about the same frequency as each other; with Latinas not far behind (46.9%). More research is needed.

"[Y]ou have to avoid the stereotype of the 'angry Black female,'" which "diminishes your opinion and the weight of your argument."

Avoiding the "angry Black woman" stereotype and other backlash. There are limits. A statistician noted, that the Tightrope is "particularly sensitive" because "you have to avoid the stereotype of the 'angry Black female,'" which "diminishes your opinion and the weight of your argument." A microbiologist recalled getting testy with a colleague who wanted to correct a student's

technique in her research lab "—they were pretty much saying that what I was telling the student was wrong." She let them have it. "I pretty much bluntly invited them to leave my lab, and told them that if they had issue with things that go on in my lab, to address me first of all, and if I couldn't give them satisfaction, they were free to take it up with the administration, but unless they saw an imminent danger." She noted, "I'm calm. I don't raise my voice.... Because if I were as assertive as some Caucasian colleagues that are male, I would be called a mad Black woman.... For that reason, I choose to—and actually, it's just my personality to be soft-spoken."

A doctor also reported self-editing to avoid backlash, saying that she dressed more femininely because, if she "dressed like Hilary Clinton, wore pantsuits all the time or just kind of didn't care as much about her appearance," she felt she would be regarded as "aggressive as opposed to just neutral. I think a plain-dressing Black woman would be taken as aggressive or as—and then, especially with the hair." Whether to let one's hair grow natural, of course, has long been a delicate issue. One Black woman recounted, after becoming department chair, how a colleague had "spent 45 minutes telling me how I needed to dress more appropriately for the position that I was going to assume" and that she "should wear more skirts and apply make-up....I have been told that wearing my hair naturally was not a professional kind of hairstyle."

Other Black women describe backlash as a problem and gender judo as a solution. A biologist who noted that she tends to be "a very direct speaker" said that her Chair got "very angry and was like don't talk to me like that." She had heard male colleagues talking that way, without incident. But she felt she had to "put cotton candy in my mouth and, oh—I had to do very—a lot of deferring. 'I can't do this without your help, I really need you to do this,' if you—and I had to put him in that masculine 'I'll take care of it role,' and I had to take the feminine 'I need you to help me, I need to be saved' role. And a lot of times, that was how I had to deal with him in order to get what I needed to get things done." This interviewee felt that White women could get away with being direct, "whereas with me, it was seen as more threatening."

A cancer biologist exemplified "stereotype threat" (Steele, & Aronson, 1995)—when someone shapes their behavior in order to avoid a stereotype and, in doing so, becomes less effective. To avoid being seen as an "angry Black woman" she tried not to raise her voice or to be too animated, which, she acknowledged, contributed to her timidity in meetings.

The single most shocking story was told by a microbiologist who, earlier in her career, suffered a traumatic brain injury. When some White males who worked for her came to visit "I asked them the questions that a boss would ask, like 'Where are we with the project? Did you take care of this and that and that?.'" The hospital staff thought she was "unnecessarily brusque, undeferential" and that she "needed to stay in rehabilitation longer until I started acting like a woman." One of her colleagues suggested she act the "Southern belle" so "I dropped my IQ by several points and started looking for little things to decorate myself with." She raised the pitch of her voice and chose pink hospital gowns. "All the sudden, they let me out."

"I'm calm. I don't raise my voice.... Because if I were as assertive as some Caucasian colleagues that are male, I would be called a mad Black woman...."

This scientist proceeded to describe the Tightrope in classic terms. "[I]t's a fine line you have to walk, because sometimes I do find myself trying to not come off too aggressive, because I know it can be, I guess, viewed as she is bitchy or whatever. At the same time, I try not to let people walk over me...[or] come across as weak and helpless, you know [*laughter*]?"

Playing traditionally feminine roles and doing the office housework. The survey found that only 8.0% of Black women reported pressure to play traditionally feminine roles, yet the interviews surfaced a number of women who did so. One Black mathematician noted that she's "kind of seen as this motherly nurturing person in the department." Colleagues often sent students who were having problems to her. "I'm not a counselor, but I'm the only female in my department. And I work with a lot of foreign faculty members who have expectations of women. And the expectations that they have is that, you know, women are supposed to be caring and nurturing

and to take care of the kids." Another Black woman, a biologist, noted the expectation that women are a good fit for emotion work: "it's like, 'Yeah, you can tell me all your problems because that's my job sort of to help you solve your problems,' as opposed to coping with my own." She protested, "This is in the workplace."

The most poignant story was of a Black scientist whose mentors were "very adamant" that she didn't "need to sit on every blasted committee." So, in a meeting with the provost, she pointed out that Whites as well as people of color could be tapped to serve on diversity committees. The provost's response was to invite her to serve on another committee. "Of course I'm not going to say no to the provost. This is the man who basically has my tenure in his hands." Other studies have noted that women of color sometimes are more committed to "race-based service" (Baez, quoted in Stanley, 2006). Among our informants, the focus was more on how such service was extracted regardless of the wishes of the professor of color.

Latinas

Angry—or assertive? An important finding of the survey was that for Latinas, much more than for other groups of women, expressing anger is a danger zone: 59.4% said they did not feel free to express anger at work (as compared with 54.5% of Asian-Americans, 49.7% of White women, and 47.8% of Black women). The interviews also found that Latinas are often seen as angry when they're not: Latinas who behave assertively reported that they often were discredited as "angry" or "too emotional" even when they weren't angry; they just weren't deferential. In the survey, Latinas reported the lowest levels of pushback for behaving assertively (46.9%), although Black women (54.2%) and White women (52.3%) were close. Still, almost half of the Latina scientists surveyed reported pushback for assertiveness and the interviews provided many examples.

Said an environmental engineer, "Everybody is afraid that I'm just going to start crying or that I'm just going to get really mad." She noted "a lot of fear that, the Hispanics and the Black women, we'll just blow in a meeting because we are so much more emotional and we cannot handle ourselves in the way that everybody else can." She had protested when a job candidate kept being referred to as the "minority candidate," she was told to "'stop being so emotional about syntax.' And I

Latinas reported that they often were discredited as "angry" or "too emotional" even when they weren't angry.

was like I'm not crying. I'm not raising my voice. I'm not doing anything. Why am I being emotional when I'm telling you that this is just simply wrong...."

Again and again, Latinas reported being criticized as "angry" when they behave assertively. Said a Latina biochemist, "my department chair basically called me to his office afterwards and told me that I was giving the impression that I was an angry lady and basically encouraged me not to open my mouth and express my opinion during faculty meetings because people were going to think that I was just a hysterical woman." She noted that she had acted no differently than her male colleagues in expressing her views. Sometimes backlash came from students rather than colleagues. A neuroscientist recalled what happened when she asked a student to leave her lab because the student had been disrupting the smooth functioning of the lab. The student told her, "You're just too emotional. If you were just a little bit more cool-headed." The neuroscientist noted dryly that, "On the other hand there are some people that think that I'm just really too strict and too non-female-like."

Another theme was that Latinas were overly emotional or "crazy," a charge rarely reported by other groups of women. "I have found that it is much more accepted for a male to be aggressive," said a Latina engineer. "Many professors that will even kick the doors and everything, and nobody seems to care about that. I can guarantee if a female does it, they will feel that she's crazy." Said a statistician, "many times, when a woman has a dissonant voice, they are called, here and also back home, a crazy so and so."

Some of the scientists tightly controlled their emotional expression in order to avoid these stereotypes. "You have to be completely emotionless because that person's just going to say, 'Oh she's a woman'" and see you as weak, noted a Latina in anatomy. A Latina biochemist recalled getting angry when someone did

something she considered clearly inappropriate. "I was called to the principal's office to use a metaphor." She was "absolutely sure" that none of her male colleagues who got angry at faculty meetings got called on it.

Latinas walk a Tightrope, just as other women do. "You have to thread very finely," said an engineer. You have to "speak up your mind" without making your male colleagues feel "emasculated. So it's fine thread." An aggressive style works for men but not women, said a Latina in clinical science. "A similar behaving woman would not be received with respect, more likely be denigrated."

Some felt expectations that women would be "soft," understanding, and "accommodating." "[I] have to be very assertive to be heard and sometimes people take that as aggressive," said a Latina immunologist, but if you're too feminine, "then they think you're not smart enough." "You have to walk a very fine line," remarked an engineer, "You cannot let them walk over you. Otherwise, you're not going to get anything accomplished."

Large loads of office housework. In the survey, about a quarter of Latina scientists (28.1%) reported expectations that they play traditionally feminine roles such as office mother/dutiful daughter—considerably less than Asian-Americans (40.9%) and White women (35.9%) but much more than Black women (8.0%). Yet the interviews contained many reports of Latina scientists expected to play traditionally feminine roles, including literal housework as well as emotion work and work typically performed by administrative staff.

The Latina scientists interviewed reported that both students and colleagues expected them to do office housework. A Latina bioengineer remarked that students expect women professors "to be more motherly and more willing to make exceptions for them, if they want to." Male colleagues could tell students to leave the classroom if they were not paying attention. "They can say things quite frankly, rudely, and people love them. They think they're great. If I said that I'd be crucified. They would think I was the biggest, most horrible

witch there ever was." Both male and female students expected women to be supportive and nurturing. "They would never expect a male professor to respond well for example with them like breaking down crying in their office. I definitely feel that masculine/feminine gender roles, those expectations, I feel them on, yeah, a daily basis....I'm pretty aggressive. I find that both men and women... are going to immediately... call [you a] witch. I'd use another word but it would be rude. [*chuckles*.]"

The Latina scientists reported that both students and colleagues expected them to do office housework.

Latinas reported literal housework and admin roles never reported by other groups of women. A Latina bioengineer reported male faculty who "expected female faculty members to serve them tea or coffee or take notes." Noted a Latina in biomedical research, "They treat you like their mother, like they can get whatever you can from you, and there's no limit. Like, if you keep helping, they keep asking."

The most shocking example was of a Latina in clinical science who was literally treated as an administrative assistant. "I think there are times when I am asked to be kind of the mother of the group," she said. This included tasks like making sure everyone filled out their paperwork or setting up a meeting. "I play many roles that...could be done by a competent administrative assistant if we happen to have had a competent administrative assistant, which we don't." She had tried to get rid of these "administrative duties [that]...eat into my time," but without success.

Men have higher salaries, noted an engineer, but women are expected to do more service. An environmental engineer reported that male colleagues try to delegate "managerial tasks, making copies, making sure that everybody's going to be on the meeting."

Dress is an important issue. Many Latinas sensed a tension between the way they believe a woman should look and the dress expected of scientists. Respondents widely acknowledged that scientists are "normally blue-jeans-and-sneakers people." Non-Latinas tended to notch that dress code up a bit and call it a day. But Latinas often felt caught. "You're expected as a scientist to look a little scruffy and not well taken care of," said an immunologist. Note the conflation of feminine dress and being "well taken care of." Lamented a biomedical researcher, "So if you dress well, you get less respect."

Just as Asian-Americans struggled to reconcile the pressures to self-promote with the cultural mandate to be modest, Latinas struggled to reconcile cultural mandates of feminine dress with dress norms in science. A biochemist nailed the dilemma: "You are kind of exotic." She had to "tone down" a lot so she is perceived as "culturally neutral" when she presents her science. "...I don't want them to be distracted by my earrings or by the loud print in my shirt or by my hair or whatever."

A neuroscientist said she tried not to wear too much makeup because "I don't want to be perceived as less than knowledgeable about what I do." An engineer recalled trying to look more masculine in the classroom in order to establish her authority, given that other signals (she felt) undercut it: that she was only 26, petite, and had an accent. "I would wear always pants, pantsuits just to try to assert a position out of fear that nobody would see me as a figure that they could respect."

Latinas who didn't eschew highly feminine dress often were counseled to do so. When she moved institutions, an engineer said, her dean took her aside and told her to dress more professionally. "So it's really difficult, because if you dress the way that you want to dress, you stand out."

Another engineer's advisor coached her for a job interview by telling her, "'You don't want to wear a pink... flowery dress ... wear a nice dark-colored pantsuit.'" Several other women had received similar advice.

Other women stood their ground and made their refusal to conform a point of pride. "I cannot make them stop thinking about, let's say, the color of my shoes," said a Latina in biomedical research, "because they're checking them out as they're talking to me, and that used to annoy me a lot. But, I just ignore it and I just keep talking about my science." "I will dress in the way that I feel comfortable, because if I'm dressed in a way that I'm not comfortable, my whole game is off," an environmental engineer remarked.

Even women who refused to compromise on clothing made allowances. The environmental engineer was

careful to wear "nothing revealing, nothing tight, because I'm very careful because, Hispanics especially, we like tight clothing. So I'm very careful to always look for clothing for work that's not overly tight, that is not revealing." A biochemist noted that, in Mexico "it would be pretty common that we wear tight clothes and... miniskirts, and I don't do that here because...I wouldn't be considered a serious scientist, or my message would be lost."

Some Latinas used feminine dress to create room for themselves to behave in highly valued masculine ways. "I happen to be a very girly girl," said another engineer. "I like high heels, I like cute dresses. Actually, that makes me stand out at conferences. I don't try to dress like a man with the pants and the pantsuits and that kind of stuff. I never do that. I don't own a single pantsuit." She felt that, for the most part, her style was received positively. She was very outspoken, she said, and "aggressive, using the word that men use; but what you see doesn't match." She'd been told she was a contradiction, and "I think that actually has been a positive thing in my career, because I surprise people. It's actually a good thing to surprise people, they remember you." This is gender judo: doing a masculine thing (being assertive) in a feminine way (in a stylish dress). It's a common strategy women use to defuse backlash against masculine behavior.

Gender judo. Latinas were much more explicit about gender judo than were women of other groups. An environmental engineer recalled her mentor warning her that "trying to be the man didn't work because people immediately—you immediately get called the bitch." Her mentor recommended gender judo: "she just started using her charm in the way that she talked to people, smiling a lot, and she became a lot more of herself. And I tried—and that really stuck with me."

An engineer reported being told, "'you're very assertive in a very sweet way.' I get what I want in a very sweet way.... Doesn't antagonize anybody." Note how she does a masculine thing (being assertive) in a feminine way (being sweet). Another Latina said that when she needed to be assertive, "I try to do it more in a calm, firm way. I actually think that's worked really well for me." A statistician agreed, telling her younger colleagues that they needed to "be pleasant but firm."

A bioengineer noted that, particularly with older men, one has to be careful "you're not so aggressive that you'll completely shut them down." Her solution was to downplay her ambition, and instead present herself as more communal—one of the team. A statistician agreed. "I try to do it sweet and polite, but I make my point and I say what I think.... When you are a woman, you have to do that. If not, they will walk over you with heavy boots." "There are smart ways of being assertive," concluded a biochemist, "and not-so-smart ways."

> "The way I present myself changes depending on who I'm meeting with."

One particularly astute woman in geography articulated the strategy Professor Deborah Gruenfeld calls "playing high" and "playing low" (Gruenfeld, 2013), using a stereotypically feminine demeanor when you are with people higher in status, and stereotypically masculine demeanor when you are with people lower in status: "I am really careful about the way that I present myself and my image," she said. "The way I present myself changes depending on who I'm meeting with." When she's meeting with high-level university officials, she barely talks and acts "shy and respectful. And I'm very clearly like the subordinate person in the room. But then in other meetings where I'm more familiar with people or I'm in more of a leadership role, then I would act a lot more direct and authoritative. But, at the same time, I'm still known for always being like really nice and someone who sort of comes up with little jokes, is fun at meetings."

In terms of its impact on the careers of women in STEM, motherhood is a no-win proposition.

Maternal Wall

EXPERIMENTAL STUDIES SHOW THAT THE MATERNAL wall, once triggered, is by far the most damaging form of gender bias. The most famous study gave people identical resumes, one but not the other a mother, and found that the mothers were 79% less likely to be hired, only half as likely to be promoted, offered an average of $11,000 less in salary, and held to higher performance and punctuality standards (Correll, Benard, & Paik, 2007). Other studies (Benard & Correll, 2008) have confirmed that motherhood not only triggers very strong negative competence and commitment assumptions; mothers also walk a tightrope: if they are seen as indisputably competent and committed, mothers tend to be disliked and held to higher performance standards by women (although not by men) (Benard & Correll, 2010). Evidently, women often see mothers who work long hours as bad mothers—and therefore as bad people.

The survey measured one form of maternal wall bias, and found that Black (7.7%) and Latina (9.1%) scientists who were mothers were far less likely than White (26.0%) and Asian-American mothers (26.7%) to report that their colleagues had communicated that they should work fewer hours after their children were born. For Black women, this finding may reflect the stereotype that Black mothers should work rather than stay home with their children (Cuddy & Wolf, 2013). All groups tended to attribute Maternal Wall problems to gender.

Maternal wall bias affects non-mothers too. One study found that women without children encounter the highest level of general workplace harassment of any group (Berdahl & Moon, 2013).

There's a stigma against scientists who have children and a different stigma against those who don't. Mothers are seen as uncommitted, while women without children are seen as somehow lacking as full human beings.

Whereas mothers may well be seen as good mothers but uncommitted scientists, women without children often are seen as somehow lacking as full human beings "without a life" (Cuddy & Wolf, 2013; DePaulo, 2006). This may explain why women without children work the longest hours of any group of workers (Trades Union Congress, 2008). Asian-Americans (34.5%) were far more likely than other women to say they felt they needed to spend more time working to compensate for the schedule of other colleagues who are mothers, followed by Latinas (23.8%). Black women (15.4%) and White women (13.6%) were far less likely to say this.

There's a stigma against scientists who have children and a different stigma against those who don't. In terms of its impact on the careers of women in STEM, motherhood is a no-win proposition.

Asian-Americans

Negative competence and commitment assumptions. "I feel like people think that Asian woman, they are caring and then they will give up their professions for their children," said an immunologist. Said another Asian-American, "I have to fight very hard to show that I am good scientist as well as a good mother." "People do judge women who have kids," said another Asian-American immunologist, and there's "this perception that if you're a mother, you can't be a high-achieving scientist," although she thought this was changing fast. Other women did not note progress. "You can either be perceived as the nurturer or extremely competent, but it's pretty hard to be perceived as both," noted a chemist. An Asian-American soil microbiologist put it slightly differently, saying you can either be "the superscientist" or the "supermom," but not both. An Asian-American physicist described the sentiment that "if you had a full blown career, that's inconsistent with being a mother."

Women in STEM often are competing against men with stay-at-home wives. An immunologist noted this, but also said that the full professors with daughters were "actually a little bit more sympathetic because they tended to have daughters who were going through the same thing." A soil immunologist found the most support from her administrative assistant, who was very supportive when she had to cancel class or a

meeting "because she's been through it and she is going through it."

Mary Ann Mason and her team have documented that the largest leak of women out of the STEM pipeline is when they start families (Mason, Goulden, & Frasch, 2010). Women in graduate school are anxious about how they can become both scientists and mothers, said an Asian-American statistician. Upon learning she has a child, students ask her questions like, "Is it possible to have a kid and be an academic? Is it better to have a kid while you're doing your Ph.D. or when you're doing your post doc?" This happens, typically, with students from other departments where all of the advisors are male. She mentioned a colleague in biology who said that, after the birth of her first child, "the floodgates opened and all sorts of female grad students and post docs would come talk to her about this, because this is something that nobody talks about very openly."

The irony, said a microbiologist, is that it's not true that mothers can't succeed in science. She felt that mothers "are actually more productive because they have a set schedule. They have to come in at a certain time because, at the end of the day, they have to leave and go pick up their kids. So they're a lot more organized. They're a lot more efficient.... They are very selective about the meetings that they go to and get the most out of that meeting." Many others mentioned that scientists who are mothers often are more focused and efficient than their colleagues.

When it comes to motherhood, the U.S. "mindset is kind of more backward than other country," said an immunologist originally from Taiwan, where, she noted children are in school until 5:30 in the evening. Because the educational system is not set up for working mothers, she said, a lot of highly educated women have to give up their jobs in order to educate their children.

Support from their families. Women from India and China discussed how their mothers supported their careers, and encouraged them to continue. When the immunologist was thinking of quitting, her mother urged her not to, reminding her that her children would grow up, and lauding her for "trying so hard to hold on to your dream and if you give it now, you might never get it back." She persevered. A geophysicist discussed having to live on a different continent than her husband when her child was a toddler. She felt judged by both by Europeans and by some "Asian mothers themselves saying that, you're an Asian woman, we give priority to our children and family, how can you just leave your husband and be here." It hurt, she said, "I didn't know what to say, and I didn't have the energy to fight these comments. I would come back, and it would make me cry." But her own mother reassured her: "That's why you're different. You go ahead in life. Don't bother about them. Not everyone has the smarts or has the sensitiveness, and you can't just teach everybody, just move on." She did.

Pink-collar ghetto. Most of the women professors interviewed were tenure-track, but a biologist who was not highlighted the perils of the "trailing spouse": "you got hired on the soft money, and they start forgetting the promises, and you find...you are stuck...." She felt cheated and angry.

Many mentioned that scientists who are mothers often are more focused and efficient than their colleagues.

Family care extends beyond children. A geophysicist highlighted that minorities are more likely than other Americans to have family care issues that extend beyond children. "I think a lot of professors don't realize that often the successful minority student is the most successful person in their entire family, and they have to take care of everybody else." Their caregiving responsibilities can extend to "aunts and their uncles and their grandparents and their parents and their brothers and sisters and their brothers' and sisters' children, because even as a grad student, they could be making more money than anybody else in the family."

A bright spot: one biochemist's experience shows that motherhood can fit well with science. Asked whether she had hit the maternal wall, she responded, "I've never experienced this." A single mother for over a decade, she has had a very positive experience: "everybody who meets me always congratulates me on how wonderful daughter I've raised and how well accomplished I am in my field and something that I've always got accolades on, both for my daughter and for my career... [N]one of

my faculty advisors have restricted me in bringing my daughter to the lab, you know, have a little office, and she could sit with me as long as I was working. I was allowed to work from home any time. So, yeah, I got it really lucky in the last seven years on that front." It's not impossible to combine science with children; one only wishes more environments recognized that.

Black Women

Negative competence and commitment assumptions. A Black microbiologist noted that she would never admit it if she had to be absent to care for a family member because to do so might be seen as her being "weak" or noncommitted. "[T]here is an assumption," said a Black microbiologist without children, "that your career is more of a hobby than a career, and you're only going to do it until you find a husband and/or have a family. It's not taken as something that's serious. You're taken as more of a passerby on your way home to be a wife and mother." A Black statistician recalled that a colleague came up to her and told her she should be at home with her child. A Black biochemist remarked that women "always want to get their job before anybody notices they're pregnant. I was like, why would they do that? Because it lowers my chances of getting the job." A Black microbiologist said that maternal wall bias played a role in her decision not to have children: "Yes. I was aware of it as early as high school, which is why I decided as an adolescent never to have children."

Some Black women encountered race-specific stereotypes. A microbiologist stated that, while "I don't have any data, being a Black woman with children gets complex because the assumption is once you start, you're never going to stop. You'll end up being a welfare queen. So I also didn't want to deal with that."

Hostile, and benevolent, disapproval of working mothers. A Black microbiologist reported that a colleague had been told that "she should go have little babies, she should go home." Similarly a Black mathematician recalled women students came to her disturbed when a male "professor told them that they shouldn't be in this class, that they should be at home having babies."

In addition to this "hostile prescriptive stereotyping," some also reported "benevolent prescriptive stereotyping," through comments that again send the message that good mothers belong with their children—but in a different tone of voice. One Black woman recalled a colleague saying, "Wow, why are you here so early? You should be home with the baby." She found herself "almost trying to explain to him, 'No, no, no, it's okay. The baby is with my mother-in-law. She's with family.'" She later learned that his wife had stayed home for the first year of his child's life.

When a supervisor believes that mothers "can't do it all," noted a Black doctor, that becomes a self-fulfilling prophecy. She recalled a colleague who ended up going part time because the chief in her department was "insensitive to that need of trying to be a parent and a full-time employee."

Maternal wall for women without children. While women with children definitely reported bias against mothers, women without children felt disadvantaged,

too. A Black woman in microbiology felt that, although she didn't want children, "it's something that individuals are dying to know, because it's almost, like you say, they're ready to hold it against me." She recalled a Black colleague asking her, when she described her job, "How can you do that? Doesn't your husband want babies? Your husband will never get babies with you doing all of that." "I just looked at him and said, 'Doesn't your wife want to do something other than have babies? She's pregnant every time I see her.'" She was told her salary was lower than her male colleagues' because they had families to support. "The biases are there," she concluded. (Note that this is illegal sex discrimination.)

Family-friendly policies and the flexibility stigma. Black mothers, unlike those of other groups, discussed the family friendly policies—and lack of them. One scientist noted that her institution's lack of clear policies for how to temporarily replace women on maternity leave left her "scrambling." Others highlighted the "flexibility stigma"—the stigma often encountered for use of stop-the-clock policies (Williams, Blair-Loy, & Berdahl, 2013). Said a Black statistician, "other people felt like they were doing me a favor and I'm like 'You're not doing me a favor!' [*Laughs*] 'This is just, this is the policy right now.'" You have a legal right to leave under the Family and Medical Leave Act, she observed, whereas "other people will try to make you feel like they're doing something special for you."

Several women felt pressured not to use their institution's family leave policies. A Black electrical engineer recalled a colleague who almost decided not to stop the tenure clock. "But it is something that is clearly stated in the rules, yet in practice, most of the female faculty that I've spoken to and some of the male faculty did advise me against doing it." Note that this kind of advice can easily be seen as illegal interference with Family and Medical Leave. (Family and Medical Leave Act of 1993, 2006.) A Black statistician noted that some of her colleagues did not use her institution's stop-the-clock policy. She believes they chose not to do so because they do not want to appear "weak" or as though they are receiving "special consideration." The same woman recalls she was admonished by her doctor for her reluctance to ask for maternity leave. Her doctor told her there was no explanation for her health issues "other than stress."

The tragedy is that it's so easy to get it right. A Black doctor recalled how worried she was when she had to tell her supervisor she was pregnant. He surprised her: "he's actually very sensitive to the female faculty and the fact that we have children." He thinks the tenure clock is "stupid," she noted, because it penalizes women when they want to have children. "I think he's an anomaly. [*Laughter*] but he actually gets it....Part of it, his wife is a physician, so I'm sure she's probably beat him over the head and grilled some of this stuff into him, which is probably a good thing."

Several women felt pressured not to use their institution's family leave policies.

In another hopeful story, a Black statistician who was "initially very fearful of sharing the news with my department" also found a supportive response when she finally got up the nerve to tell her department chair. He asked why she stopped by and "I'm literally stuttering through the statement saying that I just wanted to inform you that I won't be able to participate with the summer program this summer. In my mind I'm watching his face drop when I say this. Then I conclude, 'Because I'm expecting. Because I'm pregnant,' and he lit up. Mind you, this is male chair, right? He lights up, he gets—he's so excited. 'Oh, I'm so happy for you.' I was actually in shock that he responded like this because I had braced myself—ironically enough I was more prepared to face a backlash than a happy response, right? I'm just standing there a little stunned and taken aback and like oh, okay [*laughing*]... my son was basically the department baby."

STEM would lose far fewer women if more department chairs reacted in this way.

Latinas

Negative competence and commitment assumptions. Many Latinas reported maternal wall bias. "If you want to have a family," said an environmental engineer, "people do put in question how much you want your career." A Latina bioengineer's advisor told her, "Well, I don't want you to get your Ph.D.; you're just going to get married and have kids." She reported she was "basically told to

leave" when she had a child as a post-doc. Sometimes the comments may be subtler, "like, 'I called them, but they're never in their office,' or 'They won't be here after a certain time of day,'" said a woman in anatomy.

More subtly, a Latina who runs a lab recalled that, after she had a baby, colleagues related to her as a mother rather than a scientist, "they thought that there was nothing that they could talk to you other than, 'Oh, how's your son?'" She recognized that they meant well, "But, I have lots of other things to talk about."

Even some women without children reported maternal wall bias against colleagues with children. A biologist recalled "Some guy saying he was not going to hire a female research assistant because it's likely that she was going to get pregnant and then he'll just have to find for maternity leave and those things." One year, noted a Latina engineer, "a lot of men especially started taking me a lot more seriously because I was the single woman, gung-ho, very career focused. So I was taken very seriously by men." An engineer spoke of a colleague who returned to teaching three days after a Cesarean section because "'I don't want to be perceived as not doing my job because I have a kid.' I said, 'But you just had a C-section.'"

Assumptions that mothers were not committed were matched by judgments if they were.

Hostile disapproval of working mothers. Assumptions that mothers were not committed were matched by judgments if they were: A biomedical engineer reported, "many people say...I would never let somebody else...raise my children as if like our nanny is raising our children."

Some mentioned a double standard for mothers and fathers. A Latina biologist noted that when men said they had to leave to pick up their children, "people will stop and say, 'Oh, you are such a great dad. That is so wonderful that you spend time with your kids.'" The reaction when women did the same was very different.

Bias avoidance. The pattern of bias avoidance (Bardoel, Drago, Cooper, & Colbeck, 2011) documented by Robert Drago and his colleagues emerged in a comment by a Latina engineer who said she had decided, for now, not to have children because other women in her department did not, and the wives of the male faculty "are not working mothers, they are at home taking care of the kids." Of course, if young women feel that they will not be able to have children if they choose science, fewer will choose science—that's a price male scientists don't have to pay.

Family pressures to have children. In the survey, 69% of both Latinas and Asian-Americans described pressure from their families to have children (as contrasted with 60% of Whites and 31% of Blacks), but family pressure to have children emerged strongly only in the interviews of Latinas—especially Mexican-Americans. Said a Latina biochemist, "Every good Mexican woman has kids in their 20s. Like I told you, I'm not following the norm with my culture. I address that like anything else. It's like it's my life, I will have kids when and if I want them." The notion that traditional Chicano/Mexican culture "Places a higher premium on motherhood" has been noted in other studies of women of color in academia (Stanley, 2006).

Other women received the message not only that they should have children but that they should not have careers. Said a Latina bioengineer, "Family is extremely important. Achieving for something higher, at least in my case, it was seen as a waste of time. 'Why are you pursuing graduate school when you should be working?' or 'Why are you pursuing graduate school when you have a husband to take care of?'" Others faced expectations that they would shoulder all or most of the family work. "[B]eing a mother I think goes across all cultures," mused an immunologist, "and it's just a challenge for all. In terms of being a Hispanic mother...our culture expects women to definitely be the primary caregiver....99 percent of the work was my responsibility." A Latina doctor noted, "I feel like I have a very specific role in keeping my family running," a pressure she saw as self-imposed.

Once again there were happy stories. A Latina engineer who found out she was expecting shortly after she accepted her position found that her "colleagues are extremely supportive. I bring my child three times a week into my office. I take her up to the lab when I need

to, you know, set up stuff. Nobody—if I need an extra pair of hands, somebody will knock on my door, one of the guys, and said, 'Oh, let me hold the baby for a little bit.'" Because of the support from her colleagues, she felt no need to stop the tenure clock. She took six weeks of maternity leave, and was encouraged to come back slowly. "So, I really—I have had a very, very good experience so far."

A Latina biochemist had a similar experience. "[M]y employer is a fantastic employer.... as an institution, they get it that...women have a right to have babies...[and take] maternity leave." Noting that her department chair is a "family man," she said he set the tone for the rest of the department. When she had trouble with a nanny who did not arrive as planned, "...he basically said, 'Just do what you need to do to take care of your baby.'"

Several Latinas expressed concern about losing a lot of women scientists because they are pushed out after they have children. Said one, "you're just losing a lot of people that eventually will probably still even go back to putting in like even more time later on. I don't know if that makes any sense." Latinas, like women from other groups, pointed out that the mothers they knew had become more efficient scientists since they had children.

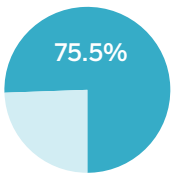
Again, a simple way to keep women in STEM is not to drive them out after they have children.

Tug of War

"FEMALE RIVALRY IN THE WORKPLACE MAY sometimes be as important as sexism in holding women back in their careers," opined an article in London's *Sunday Times* (Dobson & Iredale, 2006). But female rivalry is often the result of sexism. Two 2011 studies found that a common strategy for women experiencing gender discrimination in the course of their careers was to stereotype, distance themselves from, and criticize, other women (Derks, Ellemers, van Laar, & de Groot, 2011; Derks, van Laar & de Groot, 2011).

An important proviso: by discussing the gender dynamics that set women against each other, we are not saying that women never support each other. As has been noted, three-quarters (75.5%) of the scientists surveyed reported that the women in their environments supported each other. Nor are we saying that women *should* support each other every single millisecond: to say that would be to enforce the prescriptive stereotype that women ought to be endlessly selfless and communal. Men don't always support each other, and when they don't, the immediate assumption is not that they have personality problems.

Instead our contention is that women's workplace disputes over gender play a much larger role in complicating office politics for women than do men's disputes over gender with men. The reasons for this are complex, and it's the bottom line that's important—gender bias against women often fuels conflict among women.



75.5% reported that the women in their work environments supported each other.

The survey results highlight the complexity of this phenomenon. Although three-fourths of the scientists said that women support each other, Black women (56.0%) were far less likely than other groups of women to agree with this statement (70.5% of Asian-Americans, 76.9% of Whites, and 78.9% of Latinas did).

Gender bias *against* women often fuels conflict *among* women.

In addition, when asked more specific questions, patterned conflicts emerged. One is a pass-through of Tightrope bias. As women walk the tightrope between being seen as too masculine and too feminine, they may end up judging each other for failing to achieve the right balance. Roughly half of the scientists surveyed agreed that "some women have just 'turned into men.'" Once again answers differed markedly by race/ethnicity. Asian-American scientists were far more likely (70.5%) to agree than were other groups (50.0% of Latinas, 48.8% of Black women, 42.1% of Whites).

Maternal wall bias also can be passed through from woman to woman. Thus 41.7% of those surveyed agreed that "some women just don't understand the level of commitment it takes to be a scientist." This pattern differed less by race/ethnicity: 42.1% of Whites, 38.6% of Asian-Americans, 37.5% of Latinas, and 36.9% of Black women agreed.

Another Tug of War problem is when women professionals find it difficult to get administrative support personnel (who are typically women) to do their work. This may occur because support personnel feel more comfortable pushing back against women than men, or because support personnel perceive men as having more power to help their careers, or for other reasons. "I have heard administrative assistants say that they would not want to work with a woman boss—because they're harder to work with—which I thought was astounding," remarked one scientist. This was relatively rare overall: only 18.2% of women reported it as a problem. But Latinas were far more likely (35.5%) to report it than were other groups (20.5% of Asian-Americans, 16.9% of Whites, and 15.4% of Black women). The interviews suggest this combines racial and gender bias: One scientist was very aware of the racial dynamic involved, saying "conscious or unconscious," there is resistance based on the fact that "there is this Mexican woman telling them what to do."

A final pattern is tokenism, where women are forced to compete with each other for the one "woman's spot." About a fifth (20.6%) of scientists surveyed reported this, but the incidence varied a lot by race. About a third of Black women (32.0%) and Asian-American (29.9%) women reported this problem, as compared with lower levels among Latinas (21.9%) and Whites (17.3%).

Some women reported no Tug of War because there were too few women in their departments. Said one, "It's probably because, in engineering, there are very few women, and it happens that I most of the time was the only one." An engineer agreed. "So I don't think we have enough females in the department or the school for such patterns to happen," she said.

Women often support each other. First, the good news. Said a Latina biochemist, "the women in my department and especially the women doing science here in my institution, we are really—we bond together. We support each other a lot. If anything, I've gotten a lot of support." "I've been very impressed at my current workplace of this solidarity among women," said another Latina scientist. An Asian-American pathologist said, "[T]he women faculty I met that older than me [are] always very encouraging, very helpful and very kind to me." An Asian-American geophysicist agreed: "I've had senior women administrators been so supportive with me that I have just good feelings and good thoughts about that."

An Asian-American soil microbiologist spoke of how supportive other women were when her daughter got sick "for quite a long time and so I actually ended up getting behind in my research. Whenever I would sort of go into this panicky mode of 'Oh my God, will I ever go back to writing papers?'—I actually had a couple of senior colleagues elsewhere who [were]...incredibly supportive. One of them very clearly said 'You know, right now you take care of your kid because she's sick. Just remember that way back, you knew how to do a Ph.D. so you know exactly how to write papers. It'll happen.'"

Nonetheless, the interviews and survey also reported several classic Tugs of War.

Tokenism. A fifth of the scientists surveyed (20.6%) reported "I feel like I am competing with my female colleagues for the 'woman's spot.'" Tokenism often fuels conflict among women, as politically savvy and ambitious women vie for the woman's spot.

The three other types of gender bias also can fuel Tugs of War.

Prove-It-Again pass-through. Older women who have had to prove themselves over and over again may hold younger women to higher standards than men. An Asian-American in statistics described an experience told to her by a woman colleague: "I did not know the older senior female scientist personally, but as we talked it became evident to me that the older woman scientist probably had to go through hell to get to where she was—you know to get to her senior position. Since she had had to go through hell, she wanted to make sure that everybody else had to go through hell." As a result, she said, her "junior scientist was just having a horrible, horrible time of it."

Older women who had to prove themselves over and over again may hold younger women to higher standards than men.

Pass-through of Tightrope bias. If the Tightrope often requires women to balance the masculine and the feminine, women may be divided by different balances. An Asian-American described a colleague who "was very much the 'I will bake cookies for my students, I'll pick up everyone's plates after a lunch.'" Her colleague asked her, "'Well, how can you leave your baby at home?' It's like 'Well, I work. I don't think babies need to come to the Statistics Department.' [*Laughs*] I have colleagues, I mean, we all had kids about the same age, but they were never questioned about 'Was it okay for'—you know, so somehow I wasn't being feminine enough by actually just coming to work. [*Laughs*]." Note how the more stereotypically feminine woman judged her colleague for making the wrong balance between being too masculine and too feminine. Survey participants suggested this is common: 51.4% agreed that "I feel some women have just 'turned into men,' assimilating to the way men run their careers and their lives."

In addition, sometimes women expect other women to shoulder the kind of office housework that is rarely

extracted from men. Said an Asian-American, "I feel that female leaders can be as bad as a male leader in terms of gender bias." Her female boss expected her to edit her grant, a "secretarial job....And I'm sure that she will not ask men to do that." This may be driven by stereotyping—women are expected to be helpful—or it may simply reflect that the leader sensed the political reality that asking a man to do this kind of work might be politically more costly than asking a woman.

Mommy wars. Because mothers and women without children encounter quite different types of maternal wall bias, it's not surprising to find women judging each other around issues related to children. On the one hand, mothers may resent non-mothers on the grounds that they have it easy. On the other hand, non-mothers may resent mothers for getting "special treatment" or for reinforcing stereotypes that women need special treatment.

One scientist recalled conflict over a women's group when another professor said "'Well you just don't understand because you don't want kids, and that's not your plan.'...I was a little flabbergasted....I don't think a women's group is synonymous with a mother's group. I felt like perhaps she was angry at women like me." Mothers who feel judged for being mothers may sense that it's less risky to express anger at other women than at men. At a simpler level, the harsh fact that women of all races are often under hydraulic pressure to have children may make women who don't want children very emphatic. For all these reasons, gender bias against mothers turns into conflict among women.

Conflict between women scientists and their female bosses and students. "Immediately," said a doctor, "the male doctor gets more attention than the female. And it's sad that it comes from other female administrators and the non-professionals in the system...that does occur a lot." A grad student reported colleagues who said they did not want to work with a woman: "I've also heard females say things like 'I want a male boss.' I'm like, why do you want a male advisor? It makes no sense.... [T]hey have the feeling that well maybe [a female advisor is], I don't know, they call it PMS, or something? That if she's going to take it out on them, that they are always very moody and stuff like that. It's a female thing.... It's, I don't know, even within ourselves, I still see the bias." Years of studies document that it's not only men who stereotype women. Women do, too.

Asian-Americans

Tokenism. Many Asian-American women reported the tokenism effect. One Asian-American in biophysics pinpointed precisely how tokenism creates conflict among women, saying that when "each department wants to have a female faculty" a department with two women will find themselves pitted against each other: "one female will be the one to stay, the other one will not. And I have seen that kind of situation." An Asian-American doctor pointed out that, if there were only one "man's position," men would behave the same: "they'll fight to death among themselves to reach the top. So why shouldn't a woman do that?" Said an Asian-American scientist, "Oh yes, the notion of there's only room for one, I face it very, very actively. As I told you, when I was hired, I was hired along with this older woman at the same position. And yeah, she still hasn't given up. We both got tenure. She tried to block my tenure. And also, there's a premium for being the first X, right, woman, first woman blah, blah, blah. And the minute there's another woman

coming along the pike, you feel that you'll be displaced from this position of being like the first tenured woman or whatever, right, if you're a senior older woman. We try to take it for granted that women will help us, but they almost never do. Why is that?" If there's only room for one woman to succeed, undercutting the competition is a logical response.

"[T]he minute there's another woman coming along the pike, you feel that you'll be displaced from this position of being the first tenured woman."

Another Asian-American offered a slightly different theory, saying that she felt some of her female colleagues are "conflicted." On the one hand, they want to help younger women. "And yet, at the same time, they don't want to lose their... power positions." Her approach was to acknowledge that she wouldn't be there absent the efforts of the older women: I "remember to thank them and remind them that, without them, I wouldn't be here. I wouldn't have made it. So I'm continuously humble." She noted "it's the same in general when... you express respect and gratitude to your grandparents or even your great-grandparents if they are still alive. You have to recognize what they had to go through and appreciate what they had to go through in order for you to have what you have today." Here the Asian tradition of respect to elders clearly had served her well in defusing potential conflict.

Another Asian-American described a situation where she and another woman of color, somewhat older than she, joined their department at the same time: "Intensively competitive because of that, because she always felt she needed—she should have a higher salary because she has more experience." Studies show that women tend to compare their salaries with other women's rather than men's (Buchanan, 2005).

In addition, the tokenism effect can fuel conflict among women when White women attempt to deploy their racial privilege to cushion the effect of gender bias. One Asian-American described situations where "women would deprive me of information or resources that I'm entitled to....I'm a person of color, they felt it was easier for them to try and undermine me."

An Asian-American geophysicist clearly recognized that the tokenism effect disappears when women are no longer tokens, saying "you reach this tipping point where there can no longer just be one spot, that there's not a quota, we have to have our token woman, and then you want to be that token woman—where sort of having them around is just sort of more normal, it's not an oddity. And when you get to that point, then the competition goes down because you're not fighting for that one position."

Tightrope pass-through. A self-aware Asian-American physicist noted that "it does seem like there is a tightrope of not too feminine, not too masculine." She noticed herself "wincing when some [undergraduates] seem in my mind a little bit more feminine than I would feel professionally comfortable with. On the other hand, I'm happy that they feel comfortable being the way they are."

Prove-It-Again pass-through. "I know women can be very prejudiced against other women and if one woman is in a higher position and could be super critical of other women and wouldn't support them," said another Asian-American. "They're harsher to women in some cases. Well, I think there are several reasons behind that because the person at the top could be there because she struggled a lot and had to work extra hard and so expects other women to have done as much as she has." Another scientist agreed that sometimes happened. "I was very much encouraged because I had a woman mentor." In fact, she noted, that's why she went into her field. "But, I have seen how other—sometimes, it's other women harder on other women....'Well, I had to fight my way to the top. You need to do that, too, on your own,' attitude."

Mommy wars. A simple, straightforward reason that resentments arise between mothers and women without children is that the latter often feel they get work dumped on them by parents. Said one Asian-American scientist, "People immediately assume that because I don't have children that I should be the person who takes our colloquium guest every Thursday when we have a colloquium to dinner, that I should be there as the faculty member, because they all have their wives and their great husbands and their children to go back to, and someone who's single basically can be called upon to do this all the time...."

Other Asian-American scientists without children described resentment by mothers. Said an Asian-American, "[T]he older White women, for them they can't handle the fact that I am single, living it up." Said another, "I don't want to get married to some guy, some random guy, and have 2.2 children because that's what everybody does. And until I meet somebody I really want to be with, I don't. I'm not interested in buying a house and settling down. And so, I live in apartments and I just have a single lifestyle. And that annoys all these women no end." Do they make snarky comments, asked the interviewer? "Oh, totally."

"There's an enormous amount of resentment at women who are actually making a choice to be single."

Note how the mothers judge women without children. Another woman recalled when a female colleague "opined that the university 'is full of these super ambitious women like you who are so focused on their career that they don't have a concept of family. It has all passed them by and that's why we have not had childcare here, because the university is filled with powerful women like you,' a really backhanded way, 'Powerful women like you who just don't care.'" She continued, "Everybody came up to me afterwards and said, 'My God, you had so much poise when this woman attacked you.' This woman didn't even realize that she attacked me. She didn't even apologize." She continued, "There's an enormous amount of resentment at women who, like my generation now, are actually making a choice to be single. We are not left on the shelf because we wear thick glasses and we are unattractive and we can't find any man. We are making a choice that, 'You know what? I don't like this traditional marriage thing. I don't want to do it. I am not sure I want to have children, so I'm—my clock isn't ticking. And if it's ticking, I'm not listening.'" She continued, "I have had many senior women come up to me and say, "'You should have children. It's very selfish to not have children....' [S]he was trying to figure out if I was lesbian. It's just unbelievable."

This dynamic is further fueled when women have eldercare responsibilities that they don't feel are given the same deference as childcare. Said one woman, "Because women like me who don't have children, we have extra burdens. Like we have more responsibility on average. We're taking care of our elderly parents, right, because we are the single people in the family. Everybody—siblings are married and whatever, and those things—eldercare often comes on the plate of single people. I don't fit. It makes me feel acutely uncomfortable because I'm not interested in school districts. That's all they want to talk about. I have very little in common with most of these people."

Other women stressed generational divides. One senior Asian-American noted how tricky it is for women of her generation to give advice to younger women. Sometimes, she noted, "advice from us are not appropriate. Times has changed." For example, she noted that she had children later in life, but today you "can start a family almost any time. Just have to work out the problems and work out the situation. And—but, sometimes, I still tend to think, 'Don't have a family that soon,' but then I realize that may not be a good advice to the younger female faculty anymore."

Black Women

Tokenism. Black women were much less likely than other women to feel that women in their environments supported each other. In the interviews, there was less talk of tokenism, and what there was concerned conflicts based on race, not gender. One Black woman noted that sometimes there was a dynamic by which Blacks were forced to compete because there was only room for "one 'chosen' one." Another described a senior woman who, "when she's speaking, she pretty much focuses her attention on the men....So I'm thinking she might be one of those type of women where, okay, there's only room for one." She noted, "it's been a survival tactic on their part how to survive in a male dominated environment. And so they probably are not even conscious of what they're doing." Said another woman, "It was challenging to sit on that committee and have other women discredit what I had to contribute because I was a junior faculty member, because I was the only African American on this committee, and because I was coming from a historically Black institution. And so, they have stereotypes about that, too."

Tokenism also led to generational conflict. A Black microbiologist found more senior women discouraging

her from trying to excel "because it wasn't going to do any good. It's kind of like, 'You're a Black woman. You're only going to get so far, so don't worry yourself out trying to go further than that.'" This is another very pure example of how gender bias against women fuels conflict among women.

Prove-It-Again pass-through. A Black scientist noted that, when she initiated a conversation, a female colleague "told me that it wasn't fair that I was allowed to apply for a promotion" early, and that "I should go through exactly what she went through in order to earn promotion. And she had an awful experience." Another Black scientist described "a female colleague, and she is much more feminine than I am in terms of those stereotypical behaviors. When she fails to get something done or she repeatedly makes the same mistake over and over again, it's dismissed. Oh, that's just her, she needs somebody to take care of her....But, when I do something, I'm definitely held accountable for any minor things that are not absolutely correct. And people get really upset and angry." Notice one woman's strategy to immunize herself against Prove-It-Again bias by presenting herself as very feminine.

Tightrope pass-through. A Black biologist was very self-reflective about how her advice to a student to "man up" may have reflected the Tug of War. "I remember having a graduate student that we worked together on our PhD and that she more so had I guess those traditional female qualities that if would say, you know, kind of very passive or very soft spoken if you want to say. And then, she cried a lot. And I remember I would always tell her, you need to man up, you know, stop all that crying, because they are going to keep walking over you and keep criticizing you on your research and your papers and things like that if you don't stand up and take charge....Probably I could have told her in a different way."

A Black doctor interpreted White women's insistence on empathy through a racial lens, referring to the "mammy syndrome": White women, in her view, expect Black women "to be understanding and be kind of nurturing

Black women were much less likely than other women to report that women in their environments supported each other.

because I'm Black and because I understand what it's like to be oppressed."

Conflict between professionals and admins. Unlike Asian-Americans, Black women and Latinas reported a lot of conflict between women professionals and administrative support personnel. Said a microbiologist, "I've noticed that administrative staff sometimes they don't respect people. I don't even know if I would use the word 'respect,' but I think they respond differently to when they have a male boss than a female boss. I've seen it with my own eyes and it's unfortunate." She noted this issue can become more complicated for women of color.

A few women also felt that admins expected women professionals to do a specific kind of office housework: emotion work. Said a Black female doctor, "I do think that there's an expectation from female staff that the female supervisors will be more—will be easier, will be more nurturing, will be more understanding, for example, if they have to leave if—because of their families...." She continued: "staff are less tolerant of women who are not like that....I think that often causes problems between female staff and female supervisors."

She also felt there was a racial dimension that fueled conflict between herself and White administrative support staff. Black women support personnel, she noted, "do not expect me to want to know anything about their personal business. But yet, we are very respectful to each other....I feel that I know these women well and that we're good colleagues and work well together. And if I go and ask them for something, they try their best to help me. And the same with me." But there's "no expectation of knowing people's lives." In contrast, "White women share a lot of personal business, and it's a bonding with them. And I don't think that that expectation occurs among Black women."

Mommy wars. Black women also spoke less of mommy wars. An engineer noted that older colleagues sometimes advised younger colleagues "not to take advantage of their rights" to things such as maternity leave and stop-the-clock. Another Black woman discussed her advisor, who said, after she got pregnant, that after the grant finished, she'd have to leave. "So it was very upsetting. So I wrote a letter stating what I had done and how I had kept up even though I had to take some time off. But, essentially, she was saying, 'Having a family is more important for you. You should just stay home and do that. I don't think you can be—have an academic scientific career.'" She was remarkably understanding, saying "You have to deal with it and try to understand it and know that they were doing the best that they knew how....[You] could see in her face" that the senior woman had had lots of disappointments, "and I think lots of regret." In her view, the senior women "didn't mean any harm. They were I guess trying to protect me from grief."

Latinas

Tokenism. One Latina engineer observed that she has seen women very much taking care of their turf. "It's, 'If I let go of this turf, then who am I? I'm not going to let the younger women in,' even though I'm here telling them that I will let them in. And when you hear the words it's, 'Yes, yes, yes. Let's do this. I'll let you in. I want you to succeed.' But when you start getting close to succeed, the doors just start closing." Another Latina, a doctor, was very self-reflective about how Tugs of War stem from tokenism, specifically from the tendency to compare women with women. "I'm facing a difficult promotion right now," she said, "because I don't have good NIH funding. And one of my female colleagues who's a few years ahead of me, and she's doing really well right now, I'll admit, I'm jealous. And part of it is every success that she achieves makes me look worse...."

Prove-It-Again pass-through. A Latina engineer described generational conflict surrounding work-life balance. The older women, she said, "were just very, 'This is what we need to do. This is how we do it now.' They just don't care about anything else. They just want to work, work, work, and prove themselves all the time. I struggled with that a lot because I felt that you should have a little bit more balance."

Tightrope pass-through. One Latina reflected on women divided by the masculine-feminine balancing act: "There's so few females that if you are the type to sort of dress up and be very girly you'll be kind of on

your own because most of the females that are in the department are not the girly type."

Conflict between professionals and admins. Like Black women, Latinas reported a lot of conflict with admins. One scientist was very aware of the racial dynamic involved, saying "conscious or unconscious," there is resistance based on the fact that "there is this Mexican woman telling them what to do." "I have heard administrative assistants say that they would not want to work with a woman boss—because they're harder to work with—which I thought was astounding. This was an older White woman who said this, who had been working for a White male for a very long time and we hired a minority woman and she did not want to work for her. Her expression of that was, 'I don't want to work for a woman.' I don't know how much of it was truly gender or gender bias and how much of it was ethnic, race related...It was easier to say, 'I don't want to work for a woman,' than, 'I don't want to work for a Latina woman.'" Another Latina agreed that a racial dynamic is sometimes involved, saying "most of the times female bosses have a lot more resistance from other females in the group, not from everybody, but it happens especially if there's a difference in race." She described a White woman who had "a lot of resistance from African-American women working under her." Another Latina also felt that "African-American females are much more reluctant to work with a White female. It is a big, big, big issue." The interviewer asked whether they could work with Latinas. "No, no, no. They will work with other African-American women or with males."

Others framed the issue as one of gender. An engineer noted that admins expressed the view that their women bosses were "too demanding. I said, 'Well, but, the boss that you had before was equally demanding. The guy that you were working under was equally demanding.' 'Yeah, but, it's different.' I said, 'What is the difference?' 'Well, that she's a woman. And she should understand that we—sometimes we don't want to do this.' I said, 'Well, no, but the thing is, the work is one, and it has to be done.' In particular, for example, that they will be more lenient if they have to leave or if they don't feel like coming one day or there's a deadline that they have to allow them a little bit, slacking a little bit more the deadline, which they would never do with a male boss." Others felt that age also played a factor. Said one Latina, "I don't know if it was also age....I was younger than her....And she felt like, you know, 'How could this young person be my boss and make me wait. You know, I'm working 30 extra minutes here. This is completely unacceptable,' kind of thing."

Several other Latinas reported that support personnel undercut their authority by calling women by their first name but men by their titles. Said one Latina, "sometimes you go and talk to one secretary and there is a group of faculty in the room and she addresses you by your first name but addresses everybody else as doctors. You're like well I'm also a doctor what is the difference here?"

"[C]onscious or unconscious," there is resistance based on the fact that "there is this Mexican woman telling them what to do."

Mommy wars. The pass-through was clearest from the comments of a doctor, who said, "People are surprised—they're still, even at this age, that they're surprised that you can have children and still continue to do research and hopefully do good work. If you meet other women that are not in science and having decided to be primary caregivers to their children, those are the ones that precisely tell you, 'Well, I could never do that....'" Note how one group of mothers is judging another group as bad mothers. Another mother reflected, "If women don't have children, then a scientist—we tend to think, 'Well, of course they can do great work.'...Then sometimes we tend to ascribe their success to the fact that they don't have children...which is probably not fair to them either."

If mothers judge non-mothers, women without children judge right back. Said an engineer, "I think at first I was a little bit shocked and hurt because I had been working with her. It really made me say, 'Hey, I'm not just—I believe in family, and I believe in becoming a mom. I believe in doing that, but I also believe in having a career.' It just made me push harder to get my degree." Said a doctor, "There's that interesting internal gender bias with women who aren't supportive of my decision not to have a family, as if that undermines the whole women's cause. [*chuckles*.]"

Women without children have "no life." Latinas without children were far more likely than other women to report assumptions that they should work all the time because they had "no lives" outside of work, which of course fueled resentment by the women without children. One described the White male chair of her department, who would say, "'Oh, since you don't have children, can you please do this evening thing since you don't have a family to go home to?'...And so, one day I said, 'You know what? I have a family. It's composed of a husband, and I want to be home in the evening as well. So you're discriminating against me because I have no children.' And that put a pretty quick stop to that....And if you are reluctant to get the mothers or the fathers away from their children, then don't have these functions at night."

Latinas reported that pressures on women without children came from men as well as women. Said an engineer, "a lot of my female friends who had children started actually putting a lot on me as in, 'We have kids. Can you do this? Can you stay over this meeting? Can you do this committee for me? Can you do all of these extra things for me because I have kids?'" She continued, "they let me put the extra hours in for them and let me put these extra hours—let me do this extra thing and just one more....we're actually bringing up that kind of bias and trying to have a very open talk between the women who have children and women who don't." "Where it shows up most," said an engineer, is "when I'm writing proposals with women who do have children, I always get sent the proposal by 5:00 p.m. and be asked to have my revision back by morning because they cannot work at night and I can." "[T]hat happens a lot," she noted. Another Latina mused, "At the moment, I was probably mad at the women that had children, thinking 'Why should I, who do not have children, pick up the slack for the women that have children? It's a choice.' And then, of course you think about this for 10 minutes, and you realize it's not the women you need to be pissed off at. It's the men that make the assignments...." Note how, at first, her anger at gender bias was directed against other women. Then she made a self-conscious correcting, recognizing that gender bias was also putting other women in a difficult situation.

I was in a car accident and was hit by an 18-wheeler truck...So when I drive next to large trucks it took me a while to overcome that fear...I was always cautious in being around those types of trucks because it had an impact on my life. And so someone who has experienced some type of racism or stereotype, it's not going to be as easy for them to get over it as you think.

– Black, female biologist

Women of Color also Experience Bias that Does Not Fit the Four Patterns Template

ALTHOUGH WOMEN OF COLOR EXPERIENCE THE same bias patterns encountered by White women (often in somewhat different ways), they also experience patterns of bias that do not fit the Four Patterns template.

Most notably, nearly half of Black women (48.0%) and Latinas (46.9%) report having been mistaken for administrative or custodial staff, an experience far less common for White (32.4%) and Asian-American (23.3%) women scientists. Black women tend to attribute this to their race (44.12%) while White women (37.8%) and Asian-Americans (26.7%) tend to attribute this to gender, with Latinas about evenly split (29.2%: gender, 22.9%: race).

This reflected a general pattern. Black women generally were more likely than other groups to attribute bias to race as opposed to gender. For example, Black women (43.8%) tended to attribute prove-it-again problems with both their colleagues and students to their race, whereas the other three groups tended to attribute them to gender.

48% of Black women and **46.9%** of Latinas report having been mistaken for administrative or custodial staff.

All groups of women tend to attribute tightrope problems to gender. All groups of women tended to attribute pressures to play traditionally feminine roles to gender, although Black women and Latinas were less likely to do so than Whites and Asian Americans. All groups again attribute backlash for assertiveness and self-promotion to gender, although race still is more salient for Black women than for other women. Black women were more likely to attribute pushback for expressions of anger to race, whereas the other three groups of women tend to attribute them to gender.

In addition, each group of women of color reported experiences that differ substantially from those of White women—and each other.

Black Women

Isolation. The interviews with women of color reflected a sense of bleak isolation not evidenced by Williams' interviews of White women (using the same protocol) (Williams & Dempsey, 2014). A microbiologist reported "feelings of inadequacy" and "some depression," which she attributed to racial bias. "It just takes you longer," she said, "because you really don't have the support that you need."

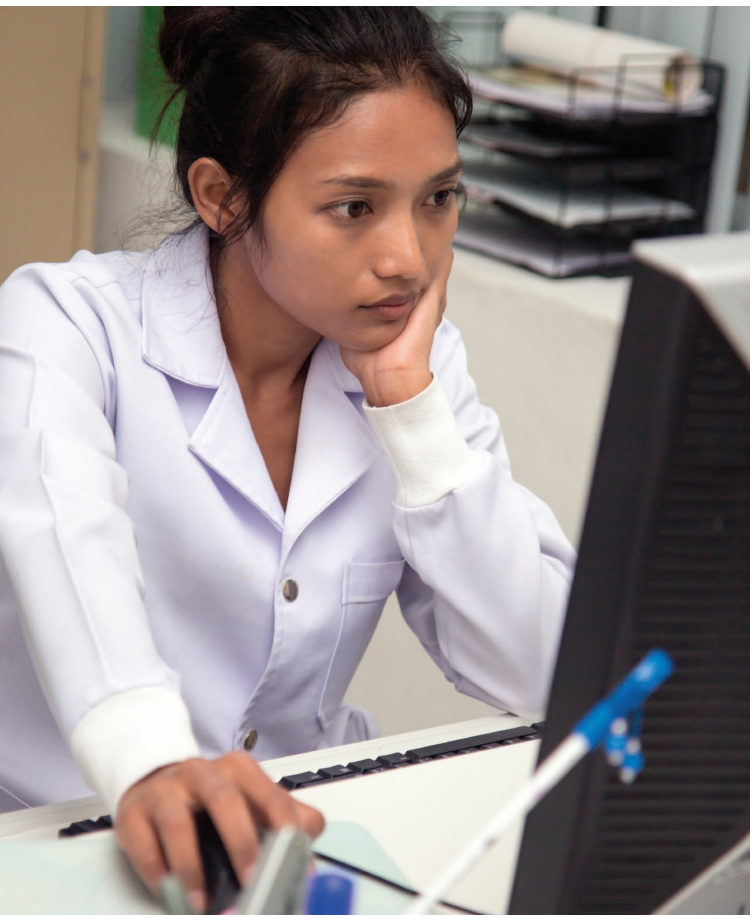
This isolation sometimes reflects exclusion. Said a biologist, "So a lot of times, there are things that people exclude me from because they say, 'oh, she would be uncomfortable....'[T]hey think for me... 'Oh, well, she's going to be the only Black person there... just don't invite her, she won't feel comfortable.'"

Another biologist described "Isolation... you don't know who you can trust....And alienating—this has been a very lonely life." Another scientist said she did not socialize with her colleagues because, "when you get to know people more socially, that's where the—to me, that lessens your authority." She worried that, as a junior person, if "it's too social, then I think there's a greater risk of you being put in that subservient position, or being looked at that way." She attributed this problem to gender, but it is a problem only Black women mentioned—and they mentioned it often.

"Do I socialize with any of my colleagues?," said a doctor. "Not really." Official office parties she attended but just, "'Oh, it's after work. Let's go get a drink and hang out.' I don't really do that and I guess part of that, particularly with the men in the division, I don't want to lose that edge, I guess. I don't want it perceived as, 'Well, you know, she comes out drinking with us. She's just one of us so we can treat her however.'"

Although Black women (41.7%) were the most likely to report on the survey that "I feel that socially engaging with my colleagues may negatively affect perceptions of my competence," many Latinas (37.5%), Asian-American women (36.4%), and White women (31.8%) reported the same thing—but this pattern showed up only in interviews with Black women. "I do not discuss personal things with people," said a microbiologist. "Judge me for me, not my personal life." She said she kept her personal life separate because "I don't want anything in my family life to be used against me."

Racial stereotypes. Black women also reported being openly confronted by negative racial stereotypes. The post-doctoral advisor of a biologist "turns to me and says, hey, do you have any family on drugs or in jail...." Another recalled when a professor made a comment about how she would understand about rats because she came from an urban area "and everyone laughed. I didn't think it was funny. And that no one—and that the other students, specifically my colleagues didn't—my female colleagues didn't understand why I was upset or more so offended. And so, when explaining the situation in class many of the White female students thought that they were being overly sensitive and that they just needed to get over it." Another biologist recalled starting a new job where she was the only Black person and a lot of people came in and started telling her negative stories about people of color. "I didn't think much about it," she said. "But I just thought it was strange that she just came out and told me that her parents just didn't like Africans Americans and that they still don't now and that when African Americans moved in their neighborhood during that time period that it was a lot of tension. And I was just like, oh, okay."



Latinas

Isolation. Isolation came up less often among Latinas. However, a Latina geographer had a different take on social isolation, saying that White people are "afraid of people of color in a way, like just worried about like they're going to say the wrong thing or do the wrong thing. So they avoid that entirely."

Disrespect. A distinctive flavor springs out from some of the interviews of Latinas in STEM: disrespect. A Latina in chemical and biomedical engineering learned from a student that one of her colleagues had "called me nauseatingly stupid in class to the other students." The comment still haunts her, she said. Every time she doesn't get a grant, "the first thing that comes to my mind is, 'Well, he did indeed tell me that I was nauseatingly stupid, and that's probably why I'm not getting this grant,' even though I have grants....[T]here's a lot of that internalizing. And after talking to a lot of women who are minorities, there's a lot of that."

Racial stereotypes. More commonly, Latinas encountered racial stereotypes. "Just comments here and there, assumptions people made, 'Oh, you're Hispanic so you love tacos and you love spicy foods.' That's not true. Just, 'Oh, you're very into drinking and music,' and just stereotyping, a lot of stereotyping," said a bio-engineer. A neuroscientist recalled a "joke": "'Oh, be careful. She's Puerto Rican and she may be carrying a knife in her purse.'"

A woman of Mexican heritage commented, "There seems to be a stereotype that, if you are from Mexico, you are lazy, and you only like to either sleep by a cactus or party. And I've really battled extremely hard all of

> "Yeah, in the moment you open your mouth and you have an accent, people dismiss what you are saying..."

these stereotypes. I work really hard at it." Note how she attributed her Prove-It-Again problems to race rather than gender, and felt the brunt of negative competence assumptions based on race. "I have actually heard people discuss Hispanic people as being lazy," said a Latina in anatomy. "I immediately tell them that my mother is Mexican-American, and that usually makes them very uncomfortable. At which point I've even had people say, 'Oh but you're just half.'" Another Latina noted that pervasive image "of the friendly Mexican or the passive Mexican or the disorganized Mexican, you know, I am much more organized than the average faculty member in my department. And the ethnic stereotype wouldn't tell you that. People would think that, you know, we Mexicans are always late, and we're disorganized." A woman originally from Brazil also encountered stereotypes, saying that Whites "tend to think Brazilians are very friendly and approachable. Even I don't know party animals maybe....Because the only image that they show about Brazil most of the time on TV internationally is Carnival, right, Mardi Gras. It is soccer time and World Cup time when everybody's on the street jumping around and laughing and having fun."

Assumed to be janitors. Latinas encountered persistent assumptions that they were janitorial staff, even if they had on white lab coats. A statistician said that she accepted that perhaps she is around the lab when other professors aren't "but they assume that I am the janitor, okay?... I always amuse my friends with my janitor stories, but it has happened, not only at weird hours." She calmly informed someone that she only had the key to the office, not the janitor's closet.

Assumed to be admins. Latinas also are assumed to be administrative support staff. "First thing, for a woman, they always assume I am the secretary of the faculty around, so if they see my door open, they come and ask me if doctor so and so, somebody that doesn't have a doctoral degree, but they assume, because he's a man, that it's a doctor. They come and they ask me if doctor so and so is going to come. I said, 'I don't know. You'll have to ask him.' First, they assume I am the secretary for all the faculty around, and second, sometimes they assume I am the janitor, even during office hours."

Accent discrimination. One Latina also encountered accent discrimination, noting that a colleague is "very open with me, and he says, 'Yeah, in the moment you open your mouth and you have an accent, people dismiss what you are saying,' so my greatest barrier is that people listen to what I say and not how I talk." She commented, "You develop a thick skin."

Asian-Americans

Racial stereotypes. Asians also reported stereotypes, notably the "forever foreign" assumption that they were foreigners. Said a physicist, "I've had a number of conversations where people ask me where am I from. And the answer I'm from Pittsburgh is really not what they want, right? And the fact of the matter is that I grew up in Pittsburgh, Pennsylvania, and I went to an expensive private school and then I went to Princeton and Cornell. So, I've had like sort of a really high end Ivy League education, right? And I speak English 'surprisingly well.' I should speak English surprisingly well," she noted dryly.

Isolation. Again, isolation came up less commonly among Asian-American women than among Black women. But for some, it was a factor. Said an astrophysicist, "I don't look like anybody else along any dimension. And that has been very, very isolating. Very, very isolating...."

Demeaning comments. A biologist recalled a diagram "to illustrate our department and the expertise and who interacts with who," drawn by the department head "with three circles overlapping. I am in one of those circles way out on the edge and I said, 'You know if I am a little bit more to the right, I would be outside the department.'" Again, these kind of demeaning comments did not emerge in interviews with White women.

Accent discrimination. An immunologist said that her colleagues made fun of her accent when she was a student. One told her, "oh, if you can speak English without accent and then you can come back and discuss with me....I was very angry. I reported to my mentor" who told her "don't ever write anything down if you cannot say anything nice." So she let it go.

Conclusion

OF THE 60 SCIENTISTS INTERVIEWED FOR THIS study, only one was Native American. While she is not necessarily representative, her viewpoint highlights how race can deeply color the ways women of color experience gender identity, and gender bias. While she said that each of the four patterns of bias sounded familiar, she felt that the challenges she had faced were attributable more to "cultural differences" between herself and members of the "dominant society" than to gender.

She repeatedly raised the difficulty she faces in relating to her colleagues, particularly White men. "I come from a totally different culture." She likened her experiences communicating with members of the dominant culture to "two aliens meet[ing]." "There's no common understanding ..." To be a scientist who is also a Native American, "You have to be okay with being totally ostracized in every way.... You have to be willing to continually confront that." Her lack of a support group meant that she had to advocate for herself.

In addition, her experience of the Tightrope was unique. She explained that the gender roles in her culture are the "reverse" of the roles in "dominant society." She described how in her culture, women are considered more confident and dominant and typically play the "provider" role, whereas men are considered "submissive." "In our culture, it's more common for women to do really well in sciences, and engineering, and things like that, than it is for men," she noted. "In my society, I'm the man. [Laughter.] I'm not the woman. The men in my society are your society's women," she observed. She believes her strong, dominant manner leads to clashes with male colleagues who expect her to behave in a more subservient way. She recounted that when she has a dispute with a White man, she often seeks advice from White women on how to act. "It's just I can't automatically receive that cultural information that a White woman would [have], but I don't."

> "You have to be okay with being totally ostracized in every way."

In sharp contrast, her concerns raised about the Maternal Wall were similar to those raised by other women. She observed that many women in her field "do not have children and delay childbirth for a very long time to pursue career interests.... I've thought about it myself, and I don't know what the solution is. I personally am planning to have children in my late 30s simply because of the career issue. If you would have asked me when I was 22, 'When are you gonna have your first child?' I was happy to think, 'Oh, 27.... I'll have my career going by then. Things'll be set.' No. Wasn't true. Twenty-seven came and went. Then, when I was 27, I did the readjustment. I was, 'Maybe 31, 32.' Nope. That didn't happen. Now, I'm, 'Maybe 38.' [*Laughter.*]"

This interview serves to highlight just how little we know about the experience of women of color, how little we know about how the experience of gender and gender bias differs by race, and how little we know about how racial bias is experienced in science. This report cannot fill that void—far from it. But our hope is to help the many well-intentioned people working to retain women in STEM to forge new, more inclusive conversations in which women's varied experiences feel honored, and in which a broad range of women feels included.

Bias Interrupters

Most of the research on interrupting subtle bias has focused on self-monitoring (e.g., Rudman, Ashmore, Gary, 2001). Williams has developed a different approach that focuses on redesigning basic business systems to interrupt subtle bias in real time (Williams, 2014), a model of organizational change called "Metrics-Driven Bias Interrupters."

The basic model has four steps:

1) ASSESS. Using interviews or focus groups, investigate whether, and how, subtle bias is playing out in your institution in hiring, Rank and Tenure processes, compensation, and elsewhere. Where bias is suspected, identify an objective metric that will measure whether bias exists.

2) IMPLEMENT A BIAS INTERRUPTER. Put in place a Bias Interrupter.

3) MEASURE. Measure to see if the intervention interrupted the bias effectively enough so that the metric improved.

4) RATCHET UP IF NECESSARY. If the metric did not show improvement, strengthen or modify the Interrupters until it does.

This report will allow STEM departments to jump over the first step of determining whether subtle bias exists, and move directly to developing objective metrics to assess how the bias is playing out in everyday ways.

Example: Start-up packages

1) ASSESS. Measure start-up packages of men and women in your department. Is there a patterned difference? While you are at it, compare the start-up packages of different racial groups.

2) IMPLEMENT A BIAS INTERRUPTER. Change procedures to interrupt bias. You might start with a gentle interrupter, say by assigning each professor a mentor as soon as a job offer is made, with a mandate to help the candidate successfully negotiate a fair start-up package.

3) MEASURE. Did the metric improve?

4) RATCHET UP IF NECESSARY. A stronger interrupter would be to have the department chair negotiate all start-up packages, described below.

Example: Office housework

1) ASSESS. Use interviews or focus groups to identify the kinds of "office housework" that exist in your department. Here are some common types:

   - Routine housework: Planning parties, scheduling meetings, ordering supplies, taking notes, doing other administrative tasks or (literal) housework.
   - Undervalued work: Mentoring other people's students, serving on low-power committees, putting on programs for students, etc.

   Once you have identified the office housework, develop objective metrics to measure who is doing it, e.g., by analyzing the membership of high-power versus low-power committees over a period of years; or a survey given to both male and female faculty members asking whether they have done various tasks (e.g. planned a party, mentored another professor's students, ordered equipment).

2) IMPLEMENT A BIAS INTERRUPTER. If women are planning the parties, assign an admin to plan the parties. If women are ordering equipment, establish a rule that each professor orders his or her own equipment, or that admins order all equipment. If women are mentoring other people's students, implement a system whereby professors notify the department chair each time they mentor another professor's students.

3) MEASURE. Follow up to see whether the "housework" is more evenly distributed among professors.

4) RATCHET UP IF NECESSARY. For example, if women are still mentoring far more students than men, it may be time to establish clear rules, e.g. that professors all make time to mentor their own students, or that professors who spend a lot of time mentoring the students of others are relieved of committee work (on the grounds that their service is mentoring).

Best Practices

Throughout recruiting, hiring, tenure and promotions processes

1. *Send a clear message that stereotypes exist, but that they can be overcome—and that the institution has a commitment to controlling them.* An experiment found that merely informing people of the existence of stereotypes risks increasing the penalties incident to stereotyping. This can be controlled by communicating that a "vast majority of people try to overcome their stereotypic preconceptions"—a simple statement that sharply reduced stereotyping, and the penalties to diverse candidates often associated with it. http://psycnet.apa.org/psycinfo/2014-43472-001.

Recruiting and hiring

Guide to best practice: http://sitemaker.umich.edu/advance/files/HandbookforFacultySearchesandHiring.pdf.

1. *Defining the parameters of the search.* Defining the parameters of the search in too narrow a way can bleach women out of the application pool in many fields, particularly those with few women. For excellent guidance on how to define a search, see http://advance.cornell.edu/documents/planning-the-search.pdf.

2. *Drafting the advertisement.* Ads that use masculine gendered words like "competitive," "assertive," and "ambitious" tend to decrease the number of women applicants (Gaucher, Friesen, & Kay, 2011). Because women in STEM are far more likely than men to have a professional spouse, it is important to signal openness to dual-career hiring. For a good example of language that signals openness to diversity and dual-career hiring, see http://advance.cornell.edu/documents/Sample-Lang-for-Ad.pdf.

3. *Reviewing resumes.* When women musicians began to audition behind a screen, the percentage of women hired by symphony orchestras increased by 46% (Goldin & Rouse, 2000). Initial resume screenings should be blinded for race and gender wherever possible. Establish criteria before screening begins to avoid "casuistry": an experiment found that, when a man had more education, subjects tended to choose the man and cite education as important, whereas when a woman had more education, they tended to hire the man and cite experience as important (Uhlmann &. Cohen, 2005).

4. *How to conduct a search process to control for bias.* For an excellent, evidence-based protocol for the search process that is designed to control for bias, see http://advance.cornell.edu/documents/Vet-School-Search-Process.pdf.

5. *Require an evidence-based bias training of each search committee.* For examples: http://search.committee.module.rutgers.edu/otherAAUs.shtml. A training available to all will soon be posted on toolsforchangeinstem.org. Best practice: the University of Florida requires that every search committee member participate in an online training module; a refresher course is required every three years.

6. *Manage the campus visit to control for bias.* For an excellent, evidence-based protocol for how to handle the campus visit to control for bias, see http://advance.cornell.edu/documents/Managing-the-Campus-Visits.pdf.

7. *Provide structured way to provide feedback on the candidates.* For an excellent form designed to control for bias, see http://advance.cornell.edu/documents/CandidateEvaluationTool.pdf.

8. *Legal and illegal questions.* For a good brief guide, see http://www.hr.umich.edu/empserv/department/empsel/legalchart.html. A fast-growing area of employment law involves lawsuits by mothers, and others, for discrimination based on family responsibilities. To avoid problems, see http://advance.cornell.edu/documents/October2010EmployerAlert.doc.

9. *Dual-career hiring and other family friendly policies.* Women scientists are far more likely than male scientists to be married to other scientists, so a dual-career hiring program is vital to successful recruitment of women. For a good model universities can use in preparing an FAQ for search committees, see http://www.advance.rackham.umich.edu/FAQDualCareer.pdf. For a good guide for university administrators on how to establish a best-practice program, see http://gender.stanford.edu/sites/default/files/DualCareerFinal_0.pdf.

11. *Start-up packages.* Women who negotiate hard tend to encounter backlash (Bowles, Babcock & Lei, 2007). Some department chairs at the University of Michigan negotiate for resources with a list of requested items from potential new hires. http://worklifelaw.org/wp-content/uploads/2013/01/Effective-Policies-and-

Programs-for-Retention-and-Advancement-of-Women-in-Academia.pdf#cb2.

Committee Assignments & Other Office Housework

Divide high-profile glamour work committees from low-profile "office housework" and keep track of how many committees and other service obligations male and female faculty have. If there's a significant imbalance, interrupt the bias by redistributing assignments (or at least limiting the number of low-power committees women serve on).

Promotion and Tenure

1. *Self-promotion.* Processes that require people to brag will push women onto the tightrope—disliked but respected if they do, and liked but not respected if they don't (Rudman, 1998). Self-promotion should be limited to formal contexts in which both men and women are sent the message that everyone is expected to share his or her accomplishments. Best practice: the department chair asks everyone for their accomplishments periodically and sends around a list. Best practice: establish a norm discouraging self-promotion in informal contexts.

2. *Language in P & T Letters.* Put language in all Rank and Tenure letters to ensure that people are not penalized for stopping-the-clock and/or using parental leave policies, following the example of the University of California, Davis. http://worklifelaw.org/wp-content/uploads/2013/01/Effective-Policies-and-Programs-for-Retention-and-Advancement-of-Women-in-Academia.pdf#cb2.

3. *Bias check.* Have someone trained in the Four Patterns of Gender Bias read through all P & T letters to check for common patterns of gender bias. Provide a feedback loop to faculty colleagues whose letters consistently reflect bias; obviously, this feedback loop has to be designed carefully in order not to trigger backlash. Trainings will soon be available at www.worklifelaw.org.

4. *Student evaluations.* Evaluations should be presented as distributions rather than averages, in order not to penalize women for polarized evaluations (Fleming, Petty, & White, 2005; Linville & Jones, 1980). When evaluations are polarized, analyze whether the dynamic has been affected by race and/or gender. Provide coaching for women and minorities who have polarized evaluations.

Climate

In addition to the many excellent climate surveys available on-line, two specific issues emerge from the bias literature.

1. *"Screamers" and Bullying.* A department climate that tolerates bullies and "screamers" will systematically disadvantage women and people of color. This is because prescriptive gender bias means that women often are punished for open displays of anger even in environments where men find that displays of anger actually increase their status (Brescoll & Uhlmann, 2008). Both Black men and Black women tend to encounter backlash if they are seen as "angry Blacks." In addition, in a social context where Latinos (probably of both sexes) are often written off as overly emotional ("fiery Latins") even if they don't show anger, open displays of anger may well also carry negative consequences for Latinos.

2. *Self-promotion.* A departmental climate that encourages open self-promotion also will systematically disadvantage women. This is because prescriptive gender bias means that women who self-promote often trigger dislike and other forms of backlash, even when men are doing precisely the same thing (Rudman, 1998). The Interrupter is to limit self-promotion to formal contexts or, if that's impossible, at least to establish formal ways in which women can publicize their accomplishments in a way that seems socially appropriate. Examples are a monthly email from the Chair publicizing publications, conference presentations, grants, prizes and other accomplishments of members of the department or—better yet—a section of departmental meetings that does so. This also will help modest men, who encounter pushback when they don't self-promote (Moss-Racusin, Phelan & Rudman, 2010), as well as Black men, who often encounter a backlash when they do (Hall & Livingston, 2012).

Trainings

An influential study found that trainings did not improve outcomes for women and diverse candidates (Kalev, Kelly, & Dobbin, 2006). This study did not control for the quality of the training provided. Its findings probably were influenced by the many unscientific, sensitivity-type trainings offered by diversity trainers.

Particularly in science, evidence-based trainings are required. The ideal is where information about subtle

biases is built into trainings that also cover other, "hard" topics. An example is a Training for Search Committees that discusses their duties and university procedures, and also discusses how biases can creep into hiring decisions. Bias training should be incorporated into annual workshops for Department Chairs and Search Committees.

For online trainings to address gender bias in STEM, see http://www.toolsforchangeinstem.org/workshop-catalog/ and http://www.hunter.cuny.edu/gendertutorial/tutorial1.html.

For an online training on bias designed for department chairs, see http://www.toolsforchangeinstem.org/workshop-catalog/ (Building a Department in an Era of Tight Budgets: It's Cheaper to Keep Her).

For an online training that focuses on how to avoid legal liability related to gender bias, see http://www.toolsforchangeinstem.org/workshop-catalog/ (Some Things Are Illegal).

An effective model for delivering bias training is the STRIDE program at the University of Michigan. STRIDE recruits full professors to participate in an ongoing committee that provides advice on how to recruit and retain a diverse faculty. Each STRIDE member attends three half-days of training and reads from a recommended reading list. They receive teaching relief for participating in the program. Colleagues then can request that a STRIDE member lead workshops for department chairs, search committees, and in other venues to educate their peers.

Parenthood and family caregiving

For trainings for department chairs and others on parenthood and science, see http://www.toolsforchangeinstem.org/workshop-catalog/ (Do Babies Matter?; The Competitive Edge: Best Practices for Family Friendly Policies).

For a comprehensive list of best family friendly practices, see http://www.worklifelaw.org/pubs/worklife_academia_FINAL.pdf.

Appendix

Survey respondents were recruited through the Association for Women in Science (AWIS), which sent emails to its membership recruiting participants. Interviewees also were recruited through AWIS. Interviewees, who are all scientists, were equally divided between Latinas, Asian-Americans, and Black women, with one interview of a Native American.

Breakdown of survey respondents:

Race of Respondent	N	%
White/Caucasian	398	72.4%
Black/African-American	26	4.7%
Hispanic/Latino	32	5.8%
Asian	45	8.2%
Native-American	2	.4%
Pacific Islander	0	0%
Mixed Race	39	7.1%
Other	8	1.5%
Total	**550**	**100%**

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TOOLS FOR CHANGE

Boosting the Retention of **Women** in the **STEM** Pipeline

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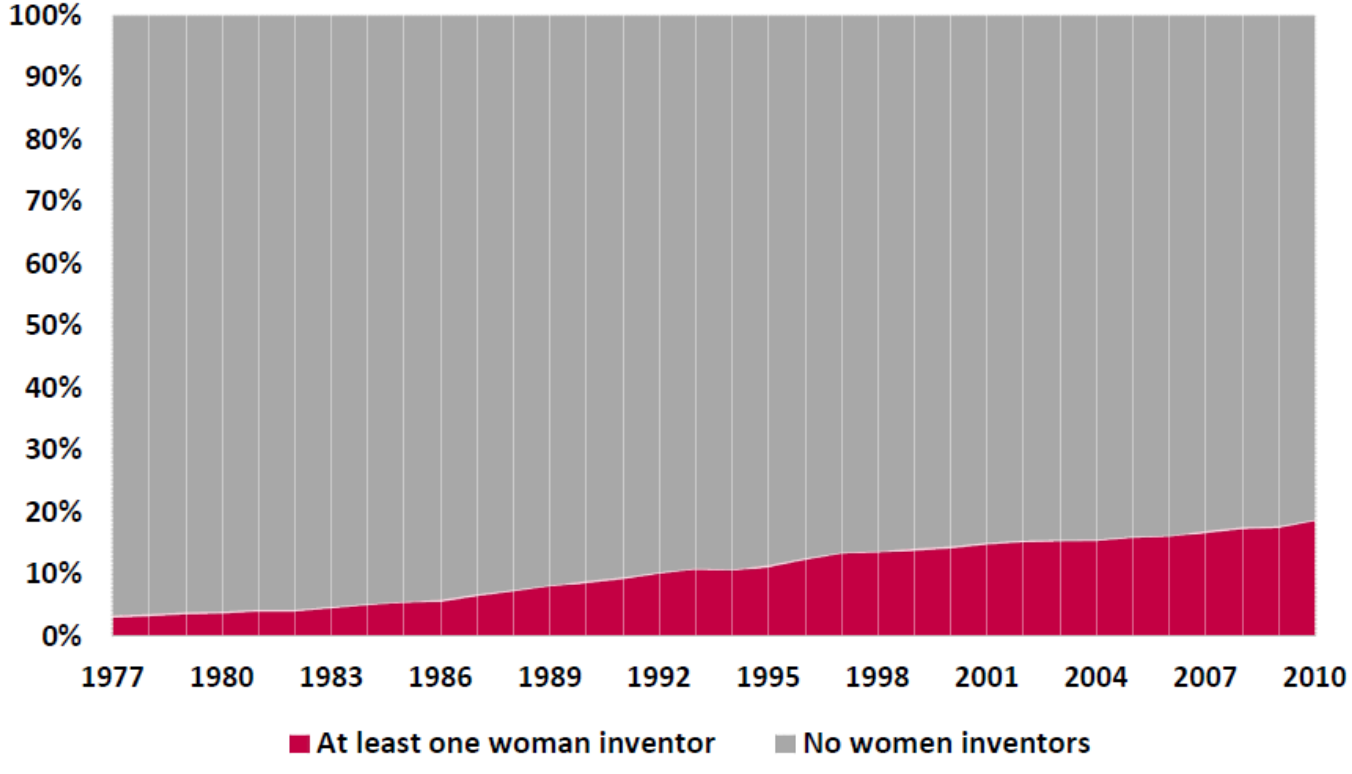
Figure 1. Share of Patents with Any Women Inventors, 1977-2010

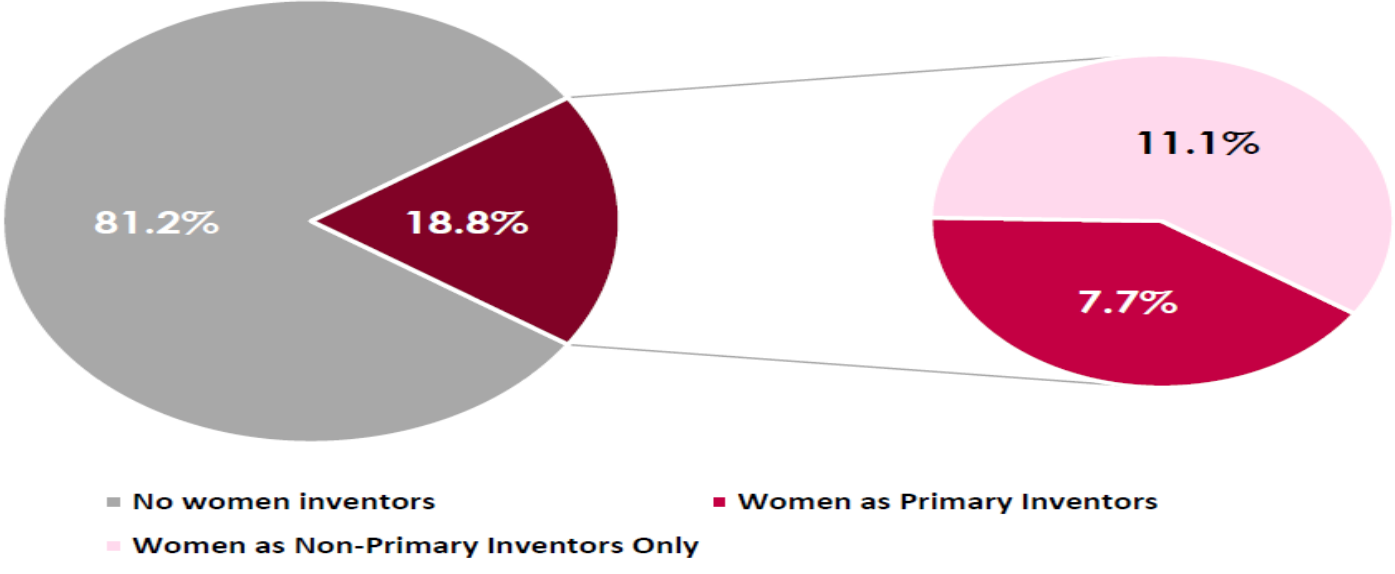


Source: IWPR analysis of Delixus, Inc. and National Women's Business Council (2012) and United States Patent and Trademark Office (USPTO) (2016a).

Women Underrepresented as Primary Inventors

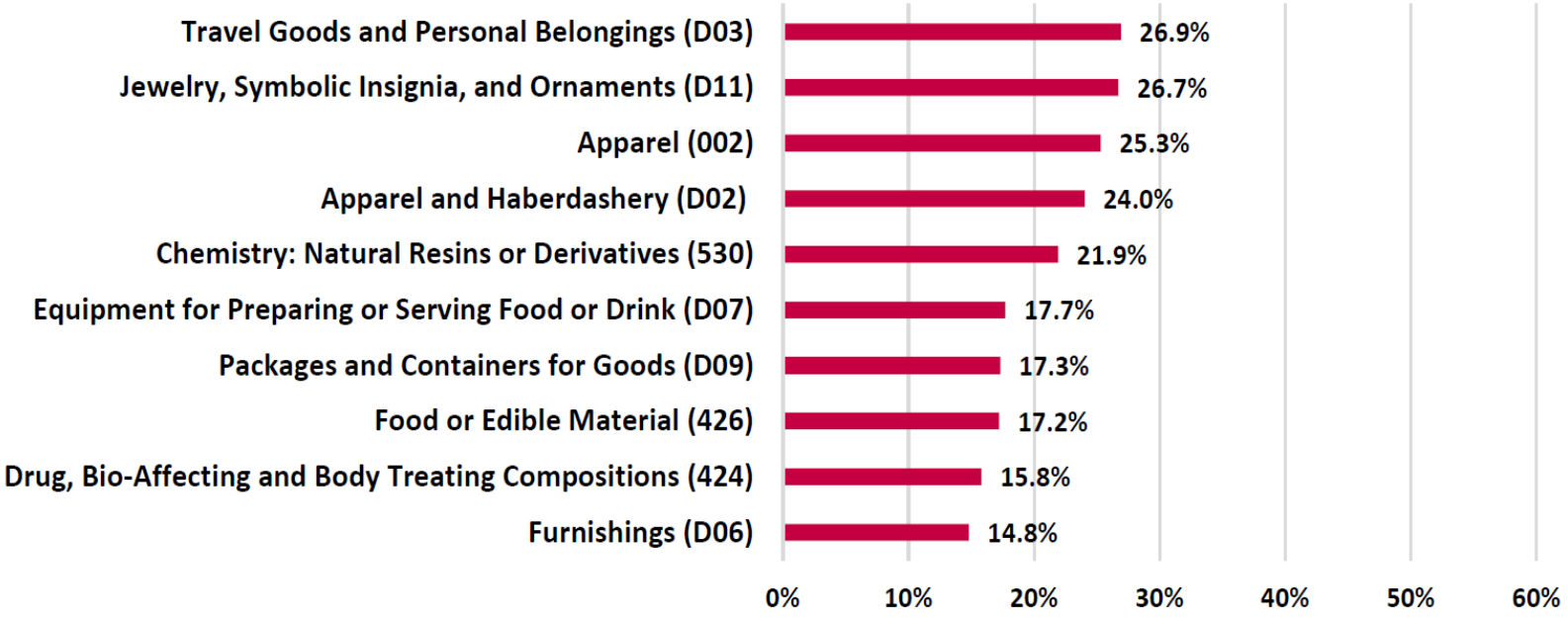
Of the 18.8 percent of patents that included at least one woman inventor in 2010, only 7.7 percent of the patents listed a woman as the ***primary*** *i*nventor (Figure 2).

Figure 2. Share of Women as Primary and Non-Primary Inventors on Patents, 2010



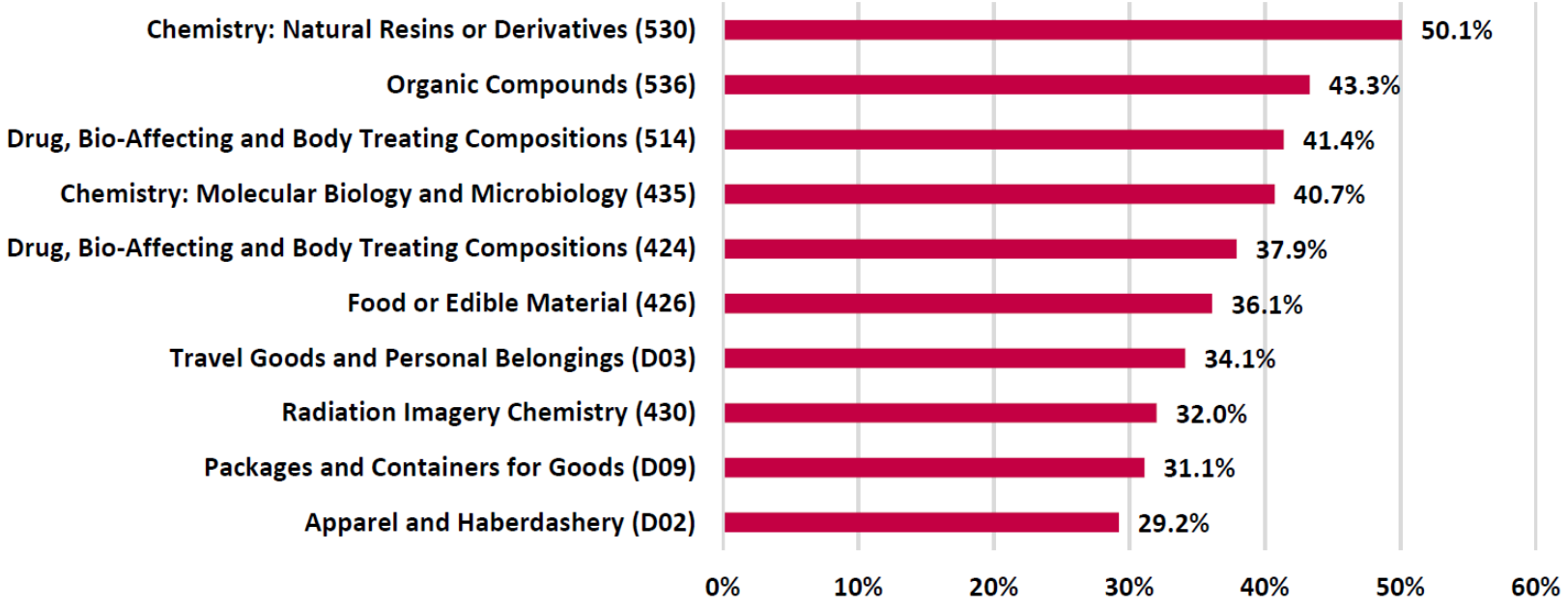
Source: IWPR analysis of Delixus, Inc. and National Women's Business Council (2012) and USPTO (2016a).

Figure 3a. Top 10 Patent Classes by Share with a Woman as the Primary Inventor, 2010



Note: Data represent total patent grants of U.S. origin only and do not include patent grants of foreign origin.
Source: Delixus, Inc. and National Women's Business Council (2012).

Figure 3b. Top 10 Patent Classes by Share with any Women Inventors, 2010



Note: Data represent total patent grants of U.S. origin only and do not include patent grants of foreign origin.
Source: Delixus, Inc. and National Women's Business Council (2012).

IT Patents

	ORIGINAL REPORT YEARS (1980-2005)	UPDATED YEARS (2006-2010)	TOTAL YEARS STUDIED (1980-2010)
% of patents with at least one female inventor *(e.g., any patent with at least one female inventor is counted)*	9%	16%	13%
% of patents invented by women, when accounting for multiple inventors *(e.g., a patent with 2 male and 1 female inventor = counted as 2/3 male and 1/3 female)*	4.7%	7.5%	6.1%

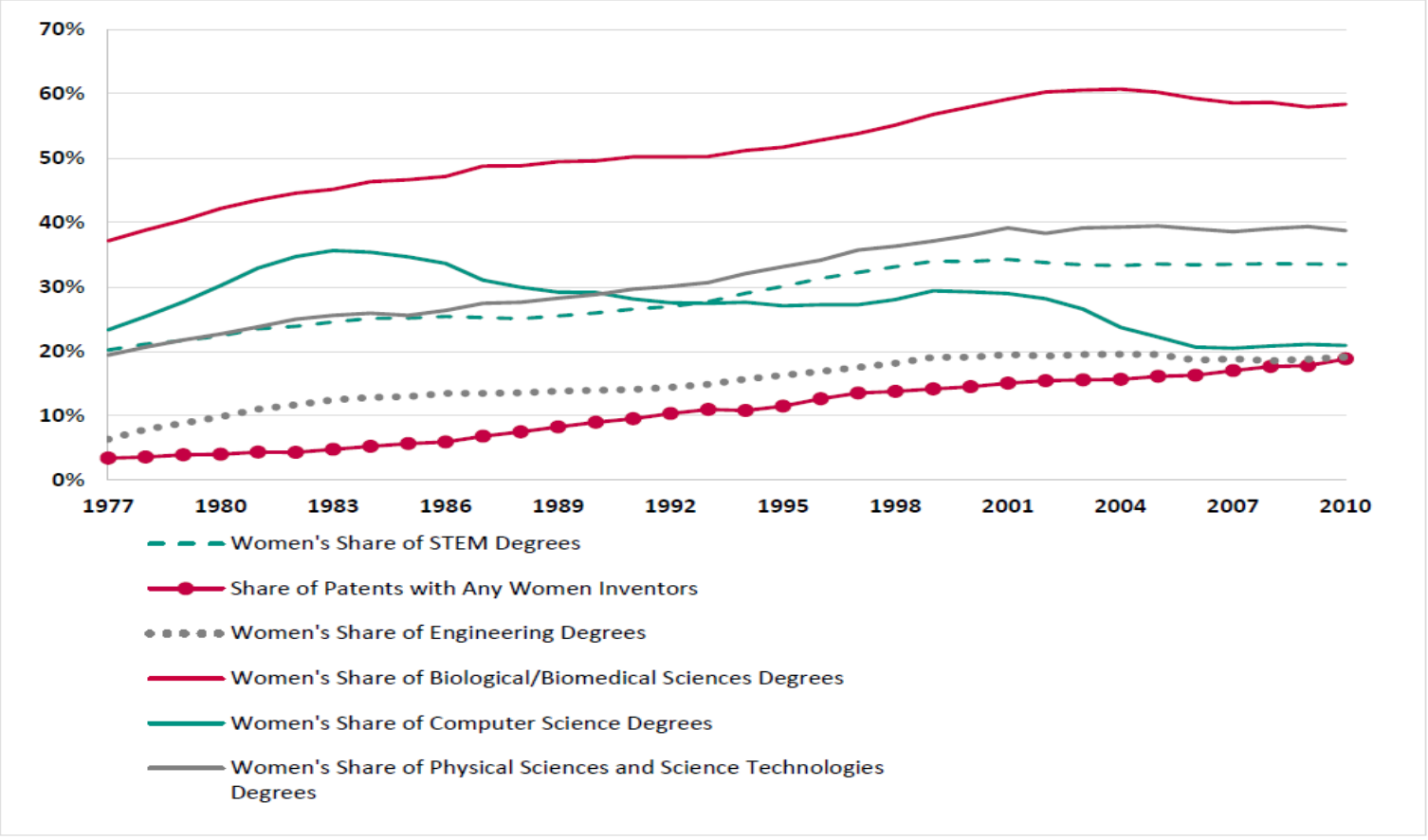
Who Invents IT? Women's Participation in Information Technology, 2012 Update www.ncwit.org

FIGURE 10

Percentage of Female U.S.-invented U.S. Information Technology Patents for Two Time Periods
(Fractional Counts 1980-84 and 2006-10)

CATEGORY	1980-84					2006-10				
	# PATENTS	# FEMALE PATENTS (FRACTIONAL)	FEMALE % OF TOTAL	# MALE PATENTS (FRACTIONAL)	MALE % OF TOTAL	# PATENTS	# FEMALE PATENTS (FRACTIONAL)	FEMALE % OF TOTAL	# MALE PATENTS (FRACTIONAL)	MALE % OF TOTAL
Communications	8491	172	2.03%	8319	97.97%	53438	3743	7.00%	49696	93.00%
Computer Hardware	4169	76	1.81%	4093	98.19%	49428	3090	6.25%	46338	93.75%
Computer Peripherals	3820	69	1.80%	3751	98.20%	9460	719	7.60%	8741	92.40%
Computer Software	1175	40	3.38%	1135	96.62%	50113	4677	9.33%	45436	90.67%
Semiconductors/ Solid-state Devices	9071	255	2.81%	8816	97.19%	41045	3064	7.46%	37981	92.54%
All Information Technology	26725	611	2.29%	26114	97.71%	203484	15292	7.52%	188192	92.48%

Figure 4. Proportion of Key STEM Degrees Received by Women, 1977-2010



Source: IWPR analysis of Delixus, Inc. National Women's Business Council (2012); USPTO (2016a); and Snyder, Brey, and Dillow (2016).

Women's Representation in STEM Degrees Awarded in the US, 2010[6]

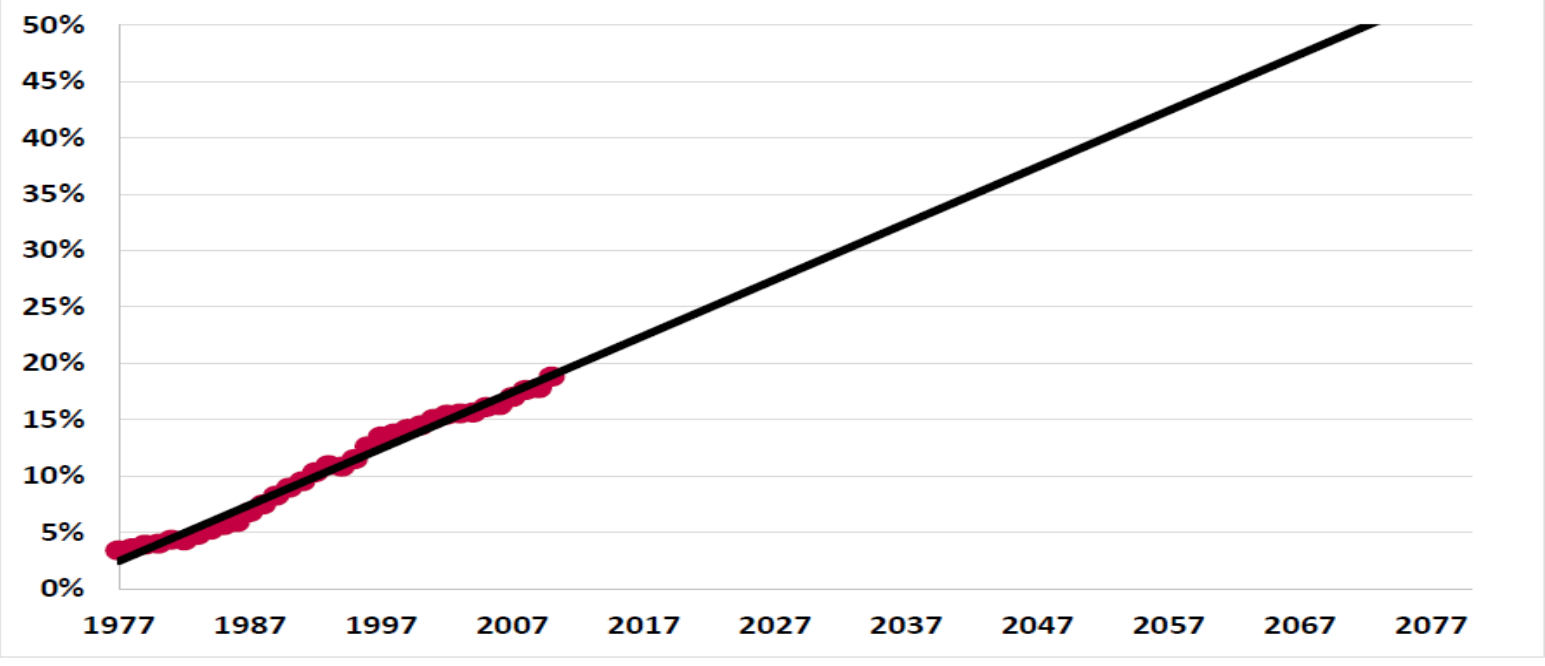
	Bachelor's		Master's		Doctoral	
Computer Science	7,306	18.2%	4,963	27.5%	336	21.5%
Electrical Engineering	1,740	10.7%	2,410	19.9%	382	17.6%
All Engineering	13,693	18.4%	8,402	22.3%	1,815	23.2%

Source: The Anita Borg Institute from National Science Foundation data (NSF, 2013)

How Far Do We Have to Go

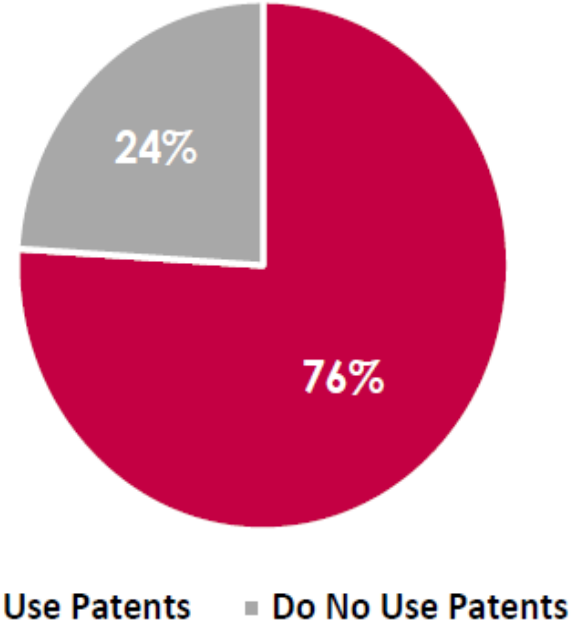
At the current rate of progress, women are not expected to reach parity in patenting until 2072 (Figure 5).

Figure 5. Share of Patents with any Women Inventors, 1977-2010, with Projection to Parity



Source: IWPR analysis and projection based on Delixus, Inc. National Women's Business Council (2012) and USPTO (2016a).

Figure 7. Percent of Venture Capital Investors that Use Patents in Funding Determinations, 2008



Source: Rai, Graham, and Doms (2010).

A Look at the USPTO Up to FY16Q3

Patents

First Action Pendency: 16.1 mo

Total Pendency: 25.6 mo

Backlog: 551,000

Filings by applicant type

- Large = 75%
- Small = 22%
- Micro = 3%

Pro Se applicants: 3%

Trademarks

First Action Pendency: 3.1 mo

Electronic TM Filings: 84.7%

Employees

Total Employees: 12,700

- Patent Examiners: 8300 (FY New = 237)
- TM Examiners = 507
- Minorities = 53%
- Under 35 = 25%
- Female = 36%
- Female Executive Leadership = 31%

Telework

- Full time = 5900 (46.5%)
- Part time = 3800 (30%)

Veterans

- Patent examiners = 21%
- Other = 18%


UNITED STATES PATENT AND TRADEMARK OFFICE
DEPARTMENT OF COMMERCE

The Paradox of Meritocracy in Organizations

The Paradox of Meritocracy in Organizations

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The Paradox of Meritocracy in Organizations

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In this article, we develop and empirically test the theoretical argument that when an organizational culture promotes meritocracy (compared with when it does not), managers in that organization may ironically show greater bias in favor of men over equally performing women in translating employee performance evaluations into rewards and other key career outcomes; we call this the "paradox of meritocracy." To assess this effect, we conducted three experiments with a total of 445 participants with managerial experience who were asked to make bonus, promotion, and termination recommendations for several employee profiles. We manipulated both the gender of the employees being evaluated and whether the company's core values emphasized meritocracy in evaluations and compensation. The main finding is consistent across the three studies: when an organization is explicitly presented as meritocratic, individuals in managerial positions favor a male employee over an equally qualified female employee by awarding him a larger monetary reward. This finding demonstrates that the pursuit of meritocracy at the workplace may be more difficult than it first appears and that there may be unrecognized risks behind certain organizational efforts used to reward merit. We discuss possible underlying mechanisms leading to the paradox of meritocracy effect as well as the scope conditions under which we expect the effect to occur.

0001-8392/10/5504-0543/$3.00.

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The idea of meritocracy as a social system in which "merit or talent is the basis for sorting people into positions and distributing rewards" (Scully, 1997: 413) has received great attention since the term was popularized in 1958 by Young (1994). Advocates of meritocracy stress that in true meritocratic systems everyone has an equal chance to advance and obtain rewards based on their individual merits and efforts, regardless of their gender, race, class, or other non-merit factors. In the United States, for example, survey research repeatedly reveals that Americans endorse the meritocratic ethos. Most believe that meritocracy is not only the way the system *should* work but also the way the system *does* work (Kluegel and Smith, 1986; Ladd, 1994; Ladd and Bowman, 1998). Because meritocracy has been culturally accepted as a fair and legitimate distributive principle in many advanced capitalist countries and organizations (Scully, 1997, 2000; McNamee and Miller, 2004), scholars have sought to assess the extent to which equal opportunity and meritocratic outcomes have been successfully achieved in society (e.g., Arrow, Bowles, and Durlauf, 2000; Dench, 2006).

Inside organizations, a significant strand of this research concerns how organizational practices and procedures affect employees' opportunities and careers, especially those practices designed to reduce disparities for women and ethnic minorities (e.g., Edelman, 1990; Baron, Mittman, and Newman, 1991; Dobbin et al., 1993; Edelman and Petterson, 1999). Recent empirical studies have found, however, that workplace inequality persists even with the adoption of merit-based pay programs (Castilla, 2008), affirmative action and diversity policies (Kalev, Dobbin, and Kelly, 2006), or certain popular team and cross-training arrangements (Kalev, 2009). These findings are not surprising to neo-institutional

theorists, who have long argued that organizational practices are adopted in part for symbolic reasons and consequently do not always accomplish their stated purposes (Edelman, 1992; Sutton et al., 1994; Kelly and Dobbin, 1998; Edelman, Uggen, and Erlanger, 1999; Stinchcombe, 2001).

What remains an open question, however, is whether gender and racial inequality persists in spite of management's efforts to promote meritocracy or even because of such meritocratic efforts. This is an important question given the fundamental shift to meritocratic employment strategies, such as pay-for-performance or merit-based reward practices, over the past two decades (Heneman and Werner, 2005; Miller, 2006; Noe et al., 2008). Although these merit-based efforts are intended to link employees' rewards directly to their performance, rather than to factors such as seniority or demographic characteristics, there is a growing concern that these efforts may not actually result in meritocratic outcomes (e.g., Roth, 2006; Castilla, 2008). A number of scholars have argued that organizational pay practices can increase gender and racial disparities because they introduce bias into employee compensation decisions (Reskin, 2000; Elvira and Graham, 2002). It may also be the case that not only merit-based practices but also meritocracy as a cultural value can serve as an "environmental trigger" (DiMaggio, 1997: 279) or be part of a "tool kit" of habits (Swidler, 1986: 273) that unleashes individual cognitive biases. Because employment decisions are made by managers embedded in organizational cultures, unintended adverse effects may result from employers' efforts to reward merit or other practices meant to increase fairness in the workplace.

Consistent with these research insights, recent scholarship has demonstrated that merit-based pay practices in particular may fail to achieve race or gender neutral outcomes, with results showing that women and minorities (in the same job and work unit, with the same supervisor, and the same human capital) received lower salary increases than white men, even after they are given the same performance evaluation score (Castilla, 2008). Because previous empirical studies have evaluated workplace inequality *after* the introduction of these practices (e.g., Castilla, 2008; Manning and Swaffield, 2008), however, research has not been able to successfully answer the question of whether the introduction of organizational cultures and practices aimed at promoting meritocracy can cause bias in organizations.

The goal of this article is to investigate the causal link between merit-based organizational efforts and their employment outcomes at the level of individuals involved in making these decisions. We develop and test our key hypothesis that managers making decisions on behalf of organizations that emphasize meritocracy will ironically show greater bias in favor of men over equally performing women in the translation of performance into bonuses than managers in organizations that do not emphasize meritocracy. Drawing on the culture and cognition tradition, we suggest that organizations promoting meritocracy as a cultural value can lead to unintended behaviors, in part by triggering managers' stereotypes and other schematas (Swidler, 1986; DiMaggio, 1997) when

making their employment decisions. This is what we call the "paradox of meritocracy," in which emphasizing meritocracy as an organizational value to reward employees fairly may result in the opposite outcome. We test our paradox of meritocracy hypothesis directly with three different experiments (with a total of 445 participants across all three studies) in which individuals with managerial experience are asked to play the role of managers in a hypothetical organization and to evaluate and compensate employees based on their performance reviews. In our study, we experimentally manipulate both the gender of the employees being evaluated and whether the company's core values emphasize meritocracy in the organization.

THE PARADOX OF MERITOCRACY

The concept of meritocracy as a distributive mechanism resting on equal opportunity and merit has broad cultural appeal (Scully, 1997, 2000; McNamee and Miller, 2004). As a result, many scholars have been interested in understanding to what extent equal opportunity and meritocratic outcomes have been achieved.

Inside organizations, employment strategies aimed at linking merit to employees' careers, such as pay-for-skill and pay-for-performance reward systems, are often portrayed as variations on meritocracy (Scully, 1997: 413). Merit pay is seen as an important symbol of an organization's culture, emphasizing that work is to be rewarded on the basis of performance alone, rather than other considerations, such as equality, need, or seniority (Heneman and Werner, 2005: 9). But results of empirical studies that control for employee performance have recently called into question whether the introduction of meritocratic (or merit-based) reward practices and routines in organizations helps to remedy gender and racial disparities in wages in the workplace (e.g., Elvira and Graham, 2002; Castilla, 2008).

The persistence of gender and racial inequality in wages is especially puzzling given the claims that some type of merit-based or incentive pay practices are widespread among employers (Heneman and Werner, 2005; Miller, 2006; Noe et al., 2008). According to a comprehensive survey of personnel procedures used in 826 firms in the United States, there has been a sharp rise in the percentage of companies using performance evaluations at the workplace, from approximately 45 percent in 1971 to more than 95 percent in 2002 (Dobbin, Schrage, and Kalev, 2008). According to the Hewitt Associates salary survey in 2002, 90 percent of the large organizations surveyed already had a merit pay plan in place (Hewitt Associates, 2002, cited in Heneman and Werner, 2005).

These organizational strategies aimed at promoting merit-based reward systems in companies have also received great support in both scholarly and practice-oriented communities. Some practitioners encourage employers to use performance-reward systems (Scharinger, 2002) and highlight the idea that strengthening the tie between rewards and performance evaluations increases job satisfaction and motivates employees to work hard (Lazear, 1998; Martocchio, 2004;

Milkovich and Newman, 2004). These programs can also attract more able workers by paying them a wage that better reflects their performance (Lazear, 2000). Many workers find that these practices give them greater opportunities for advancement (Osterman, 1999) or at least create an "illusion of opportunity" that can also be motivational at the workplace (Ospina, 1996).

Less well understood is whether these merit-based reward practices successfully link employees' compensation directly to their performance evaluations and productivity, thereby reducing the influence of stereotypes and other work-irrelevant factors. In particular, we know little about the impact of promoting meritocratic cultures and practices on inequality in employee wages and attainment. The suspicion that adopting these merit-based pay practices in organizations, especially those that promote meritocracy, may not solve inequality in the workplace is not new (e.g., Kalev, Dobbin, and Kelly, 2006; Castilla, 2008; Kalev, 2009). Broadly, the claim that organizational bureaucracies and routines may even serve to exacerbate or institutionalize gender and racial inequality in the workplace has long been established (e.g., Kanter, 1977; Edwards, 1979; Acker, 1989, 1990). Scholars interested in studying the transformation of the employment relationship and new "market-driven" employment arrangements have also raised equity and fairness concerns about these practices (e.g., Jacoby, 1985; Kochan, Katz, and McKersie, 1986; Cappelli et al., 1997; Cappelli, 1999; Osterman et al., 2001; Dencker, 2009). However, past work has not tested the *causal* effect promoting meritocracy might have on biases in reward decisions.

Under certain circumstances, organizations that emphasize meritocratic values and beliefs may unintentionally introduce bias and create inequity in the distribution of employee rewards. In a recent examination of pay practices, Castilla (2008) showed that the implementation of an ostensibly meritocratic performance-reward system, designed to give workers extra compensation based on their performance, did not eliminate gender and racial bias in earnings. The large service organization studied had recently introduced a two-stage performance-reward process. In the first stage, supervisors meet employees annually and evaluate their performance. In the second stage, based on those performance evaluations, the employee may be recommended for a bonus by a manager superior to the rater. Castilla (2008: 1479) found what he called "performance-reward" bias: even though performance evaluations were the most important predictors of employees' salary increases and bonuses every year (in stage 2), significant effects for demographics were found on salary growth. Overall, salary increases were significantly lower for women, ethnic minorities, and non-U.S.-born employees when compared with white men with the same performance evaluation scores, in the same job and work unit, with the same supervisor, and the same human capital. Notably, this penalty occurred even after the organization signaled that it strongly valued and supported meritocracy at the workplace by implementing a performance-reward program that linked employees' performance with the size of pay increases. Similarly,

using data from a financial corporation, Elvira and Graham (2002) reported a 25 percent difference in performance-based bonuses, also distributed at managers' discretion, between women and men in the same jobs.

Because these field studies focused exclusively on organizations *after* the introduction of the merit-based bonus system, however, these findings cannot determine whether ascriptive inequality in the distribution of bonuses persisted in spite of management's efforts to introduce a merit-based reward system or because of these efforts. It could also be that the race or gender effects found in real settings reflect some unobserved heterogeneity, either for the employees or for the features of the organization. Our goal in this article was to experimentally test whether emphasizing meritocratic values at the organizational level may actually introduce bias in favor of men over equally performing women in translating performance into bonus amounts. In our study, we focused specifically on how organizations may attempt to promote particular meritocratic values among their managers and employees, which is consistent with one dimension of the broad definition of culture in DiMaggio (1997).

Although our prediction of greater bias in monetary rewards under meritocratic cultures may seem counterintuitive, it is consistent with broader scholarship in this area. For example, the important "myth and ceremony" argument made by Meyer and Rowan (1977) highlighted that organizational procedures and structures are often designed to be "rituals." They are adopted symbolically to gain legitimacy but can be inefficient or ineffective, not necessarily accomplishing their stated purpose (e.g., Edelman, 1992; Sutton et al., 1994; Kelly and Dobbin, 1998, 1999; Stinchcombe, 2001). Consistent with these neo-institutional predictions, studies have shown that organizational practices aimed at reducing ascriptive inequality do not always work (e.g., Edelman, 1990; Baron, Mittman, and Newman, 1991; Dobbin et al., 1993; Edelman and Petterson, 1999). Recent empirical work has shown that workplace inequality remains even after the adoption of affirmative action and diversity policies (Kalev, Dobbin, and Kelly, 2006). Although institutional accounts suggest that practices may fail to accomplish their stated purpose, they generally do not go so far as to predict that these practices may accomplish the opposite.

The prediction that emphasizing meritocracy may actually have a paradoxical effect is in accordance with research on the link between culture and cognition. The insight is that cultures play a key role in shaping cognitive processes (e.g., Swidler, 1986; DiMaggio, 1997), with studies showing that specific elements of local cultures can trigger individual cognitive and interactional biases against low-status groups (Ridgeway, 1997; Correll and Ridgeway, 2003; Turco, 2010). Relevant to this prediction, recent studies on cognitive bias and stereotyping have found that in contexts in which people are led to feel that they are unbiased, fair, or objective, they are more likely to then behave in biased ways (Monin and Miller, 2001; Crandall and Eshleman, 2003; Uhlmann and Cohen, 2005, 2007; Effron, Cameron, and Monin, 2009; Kaiser et al., 2009). For example, people given a chance to

disagree with a set of sexist statements (Monin and Miller, 2001) or primed to feel objective (Uhlmann and Cohen, 2007) have been found to be more likely to recommend a male over a female candidate in experimental hiring scenarios.

Drawing on the culture and cognition tradition, we suggest that employers' efforts to promote meritocratic beliefs or cultures in organizations may ironically yield unintended negative consequences, perhaps by leading individuals to feel unbiased, fair, or objective, and as a result become more likely to express individual bias toward low-status groups of employees. In the case of gender, we thus predict that managers making decisions on behalf of an organization that emphasizes meritocracy will show greater bias in favor of male employees than managers making decisions on behalf of an organization that does not emphasize meritocracy. In particular, we identify and test this "paradox of meritocracy" effect, whereby emphasizing meritocracy has the causal effect of increasing ascriptive bias in the distribution of monetary rewards. Our main hypothesis is as follows:

Hypothesis: Participants in an organization that emphasizes meritocracy as a core organizational value will show greater levels of ascriptive bias in translating employee performance evaluations into monetary bonuses than participants in an organization that does not emphasize meritocracy.

We conducted three experimental studies designed to test our hypothesis, the first focusing specifically on whether there is a paradox of meritocracy. The next two studies further assess the paradox of meritocracy finding. Because an empirical examination of the potential underlying mechanisms leading to the paradox of meritocracy effect is beyond the scope of our study, we consider them theoretically in the discussion section.

STUDY 1: THE PARADOX OF MERITOCRACY

We first tested our hypothesis with an experimental study in which participants, who played the role of employee managers in a fictitious large service organization in the United States, read a set of employee performance reviews and evaluated the employees on a number of career dimensions. The study employed a 2×2 mixed factorial design that manipulated (1) the apparent extent to which a performance evaluation system was meritocratic (meritocratic or non-meritocratic, between subjects) and (2) the gender of the person being evaluated (male or female, within subjects). Participants were asked to make compensation decisions based on yearly employee performance reviews. Participants were randomly assigned to receive one of two different sets of organizational core values, one set that emphasized meritocracy (the "meritocratic" condition) versus another (neutral) set that did not emphasize meritocracy (the "non-meritocratic" condition).

Participants then examined three employee profiles. Two of the profiles were "test profiles" and included one male employee and one female employee with similar performance evaluations. These test profiles formed the basis of our analysis. We also included one "filler" profile, a male

employee with a lower performance evaluation score. The filler profile was included to reduce suspicion that the study was about gender bias. Participants decided the size of the bonus, if any, each employee should receive. Participants also evaluated the profiles on other measures, including recommendations about promotion and retention. This design allowed us to test whether believing that the organization is meritocratic increases the level of gender bias in the managerial decision-making process.

Method

Participants. The data for this study were collected in three sessions at a business school in a private university in the northeastern United States. Session 1 was conducted as an optional in-class exercise for masters of business administration (MBA) students and included 95 participants (67 male and 26 female; two did not answer the question on gender). Sessions 2 and 3 were conducted as an optional pre-presentation exercise for a group of students and managers attending either an MBA program or a similar business degree program. Attendees were interested in learning about performance-reward systems in the workplace. Sessions 2 and 3 were conducted at the same university but, by design, did not include any of the participants in session 1. Session 2 included 68 participants (48 male and 20 female). Session 3 included 66 participants (48 male and 18 female). The final sample in our first study thus included 229 individuals (163 male and 64 female).

Unlike many social science experiments, which rely on undergraduate participants, this study employed MBA students with substantial work and managerial experience. Although these participants are in limited supply, thus not permitting the extensive experimental permutations possible in some research using undergraduate samples, this approach potentially offers more realism in its assessment of the ways managers with different professional backgrounds evaluate and compensate their workers. Additionally, one of the many goals of these MBA programs is to prepare MBA students to fill positions with supervisory and managerial responsibilities and to play an active role in employee performance evaluations.

The average age of participants was 29.71 (with a standard deviation of 3.89 years); they had an average of 5.80 years of work experience (with a standard deviation of 3.36 years). Approximately 4 percent of the respondents had already earned an MBA degree; the remainder were currently enrolled in an MBA program. Additionally, 80.4 percent of participants had previously worked as a manager, and the average participant had 2.4 years of management experience (with a standard deviation of 2.6 years). About 78.3 percent of respondents reported liking jobs with supervisory responsibilities (with 5.3 percent not liking them, and 16 percent not knowing yet whether they would like jobs with supervisory duties).

Procedure. The procedure across sessions was identical. Participants were invited to participate in a "Management Personnel Decision-Making Exercise" as part of an educational unit on a similar topic. Participants who volunteered to

participate received a packet that included the study materials. The experimenter gave a verbal overview of the study and then participants read and completed the packet. The instructions asked participants to play the role of a manager at "ServiceOne," a large service-sector employer, and to make personnel decisions similar to those made at actual firms. Following the instructions, participants read a company description for ServiceOne. They were informed, accurately, that the description was based on a real firm that one of the authors had worked with (with many details changed in order to protect the firm's identity). In this section, participants also read a description of how performance evaluations and compensation decisions are made at ServiceOne, described in more detail below.

Following the company description was the experimental manipulation of meritocracy. We manipulated the apparent level of meritocracy by providing participants with a list of "Core Company Values" that either did or did not emphasize meritocracy in the performance-reward system (see below). Participants then examined three employee profiles, including two equivalent "test profiles" that varied in gender, as well as the filler profile, which was always male. After participants examined the three profiles, they first evaluated each employee on a range of measures, including our key dependent variable (the bonus amount decision), and then they filled out a set of "final reflections" that included our manipulation checks. Participants were informed from the outset that the profiles were fictional. After the experiment was conducted, the exercise was integrated into a class discussion and was immediately followed by a cautionary lesson for participants to learn about the unintended consequences of using performance-reward systems.

Company description. The company description for ServiceOne included both general details about the firm and specific details about the performance evaluation process. ServiceOne was described as a large private service-sector organization in an urban area in North America, focusing on research and information technology. The description included information about the types of jobs available at ServiceOne and age and tenure demographics for employees. Participants were asked to play the role of a manager in charge of a small work group of consultants.

The company description also included information about the evaluation procedure that participants would use when considering the employee profiles. We focused on two-stage evaluation processes such as those described by Castilla (2008) in which (1) one manager or immediate superior evaluates an employee's performance, and then (2) a second, different manager uses this evaluation to determine whether the employee receives a raise and, if so, how much. Participants played the role of the second manager. This meant that participants received the performance evaluations of three employees in their work unit and used them to make managerial decisions about the bonuses, promotion, and termination for these employees at the end of the fiscal year.

We used this company setting for several reasons. First, laboratory research has generally focused either on

performance evaluations alone or on simultaneous performance-reward evaluations. Examining the two-stage evaluations allowed us to study a frequently used organizational procedure about which relatively little is known in the inequality literature. More importantly, the two-stage procedure replicated in our study is widely advocated by employers and human resource specialists for making pay decisions (e.g., Campbell, Campbell, and Chia, 1998; Mathis and Jackson, 2003; Burke, 2005; for a review, see Bretz, Milkovich, and Read, 1992; Heneman and Werner, 2005).

Second, practitioners increasingly view the two-stage evaluation system as more desirable than single-stage evaluation systems. Many have defended separating performance appraisals and salary discussions into two separate stages mainly because decoupling these two processes and strengthening the tie between the performance evaluations of employees and their career outcomes are generally seen as more meritocratic. Work has suggested that this decoupling encourages employees' perception of merit, increases job satisfaction, and is motivational (Gerhart and Rynes, 2003; Martocchio, 2004; Milkovich and Newman, 2004). Finally, findings of bias in the experimental study would dovetail with recent case studies showing that real-world organizations that use these two-stage performance-reward procedures exhibit pay gaps based on workers' race, gender, and national origin (e.g., Castilla, 2008, in the United States; Manning and Swaffield, 2008, in the United Kingdom).

Meritocracy manipulation. To manipulate whether the organization was presented as meritocratic, we varied the information that participants received about ServiceOne's company values. For each condition, participants read a form describing five "Core Company Values at ServiceOne." To be as realistic as possible, we drew on information from a real organization's core values introduced to emphasize meritocracy at the workplace as one of the most basic aspects of an organizational move toward achieving meritocracy and also as a cultural symbol signaling that work was to be rewarded on the sole basis of performance. This approach also allowed us to test directly the potential causal effect of promoting a merit-based culture on employee bonuses. In the *meritocratic* condition, the core values emphasized fairness and compensation based on performance. These meritocratic core values statements were as follows: (1) "All employees are to be rewarded fairly"; (2) "whether employees deserve a raise is determined by their performance"; (3) "raises and bonuses are based entirely on the performance of the employee"; (4) "promotions are given to employees when their performance shows that they deserve it"; and (5) "ServiceOne's goal is to reward all employees equitably every year."

In the *non-meritocratic* condition, the core values did not indicate meritocratic values; instead, they emphasized the regularity of evaluation and managerial autonomy. We refer to this condition as the *non-meritocratic* condition simply because this condition does not emphasize fairness or compensation based on employee performance as the meritocratic condition did. To be conservative, the non-meritocratic

condition was designed to be neutral but not explicitly anti-meritocratic; thus the possibility of bias or discrimination in evaluations was not raised. The non-meritocratic core values statements were the following: (1) "All employees are to be evaluated regularly"; (2) "whether an employee deserves a raise is determined by their manager"; (3) "raises and bonuses are to be given based on the discretion of the manager"; (4) "promotions are to be given to employees when their manager decides that they deserve it"; and (5) "ServiceOne's goal is to evaluate all employees every year."

To make sure participants read and considered each of the core values statements carefully, we asked them to indicate whether they agreed with each value by placing a check mark on a line next to each statement. Participants were asked to indicate whether they agreed with the values statements so that they would feel as if their goals were the same as those of the company and thus would behave like an actual manager at that firm. Requesting that participants indicate agreement makes the manipulation similar to the "moral credentials" manipulation introduced by Monin and Miller (2001). One distinction between the latter study and ours is that our participants agreed with statements about the general values of the company rather than about their specific beliefs about gender or other bases of moral credentials. Following the meritocracy manipulation, participants examined the three employee profiles.

Employee profiles. Participants examined three profiles, including two equivalent test profiles that varied in gender and one filler profile that was always a low-performing male employee. Each profile was presented using a "Performance and Staff Development Evaluation Form," which included a quantitative assessment of each employee on a 1–5 scale as well as qualitative comments from the employee's immediate supervisor. All employees had the same title, "Consultant," worked in the same unit, "Product Development," and had the same supervisor.

We manipulated the employee's gender by using male- and female-typical names on the profiles. We chose gender-typical names from a list tabulating the most common names for men and women in the United States and then paired them with common last names (from the genealogy of names in the census.gov Web site). The names of our test profiles were Patricia Anderson and Michael Taylor, and the name of our filler profile was Robert Miller. To test our hypothesis, it was key that the test profiles were of equivalent merit, but not so similar as to raise participants' suspicion that studying gender bias was a goal of the research. To accomplish this, we gave each test profile equal quantitative performance scores, similar but not identical qualitative comments, and counterbalanced the qualitative comments across profiles. The 5-point quantitative assessment scale was labeled "Summary of Performance," and each of the 5 levels was labeled with a descriptive phrase. The two test profiles received a score of 4 on the 5-point scale. This score included the descriptive label "Staff member's performance consistently meets and frequently exceeds all established goals/expectations for the position."

The profiles also included two types of qualitative feedback: areas in which the employee performed well (praise) and areas in which the employee's work needed improvement (criticism). The test profiles each included three sentences of praise and two sentences of criticism. For one test profile, the praise read, "Michael/Patricia is hardworking and quick to find ways to solve clients' problems. He/She is also generally popular with the clients. Michael/Patricia reliably completes projects on time." For the other test profile, the praise read, "Michael's/Patricia's proposals are always well thought-out and highly detailed. He/She always does an excellent job of communicating technical aspects of the proposals to clients. Clients respect and enjoy working with Michael/Patricia." The criticism for one of the test profiles read, "While the quality of Michael's/Patricia's work is excellent, several projects this year have gone over budget. In the next appraisal cycle, he/she needs to work on keeping costs down." The criticism for the other test profile read, "Michael/Patricia is a valuable team member, but sometimes tries to take on too many projects at once. In the next year, he/she needs to work on staying focused." The qualitative comments were counterbalanced across the two test profiles: each set of comments was randomly assigned to the male test profile for half of the sample and to the female test profile for the other half. This ensured that any differences in the evaluations of the qualitative comments did not bias the results because the employee's gender was uncorrelated with which comments he or she received.

We included a third filler profile, named "Robert Miller," to further reduce suspicion that gender bias was a focus of the study. With three profiles, gender may less obviously differentiate the profiles than if participants rated two very similar profiles that only differed by gender. The third profile was designed to be clearly less qualified than the two test profiles so as not to compete with the test profiles on the ranking variables. The test profile was always rated a 3 out of 5 on the quantitative evaluation. The "3" rating was labeled "Staff member's performance consistently meets established goals/expectations for the position." The praise for the filler profile was similarly lukewarm, reading, "Robert does a good job of listening to the clients and meeting their expectations. His work has been consistently solid, but not spectacular." The criticism for the filler profile always read, "Robert has a tendency to miss minor deadlines when things get busy. He needs to do a better job of staying on top of his projects."

Dependent measures. Our hypothesis predicted that people will be more likely to engage in gender bias in the translation of performance evaluations into rewards when the organization presents itself as meritocratic. To test this argument, we asked participants to assign a yearly bonus to each employee. They were told that they had a limited pool of resources ($1,000) from which to assign the bonus, to be divided among the three employees. To determine whether other employee outcomes are also affected by perceptions of meritocracy, we asked participants to rate each employee on four additional items, using a set of 7-point Likert-type scales. The first of these questions read, "Do you think hiring this employee was the right decision?" and was anchored at "definitely wrong

decision" and "definitely right decision." Similar questions asked to what extent the employee should be considered for promotion or termination and whether the employee would be successful in the future. We also collected variants of these questions, which asked participants to choose only one employee profile as most deserving of a bonus, promotion, or retention, and as having the greatest potential for success.

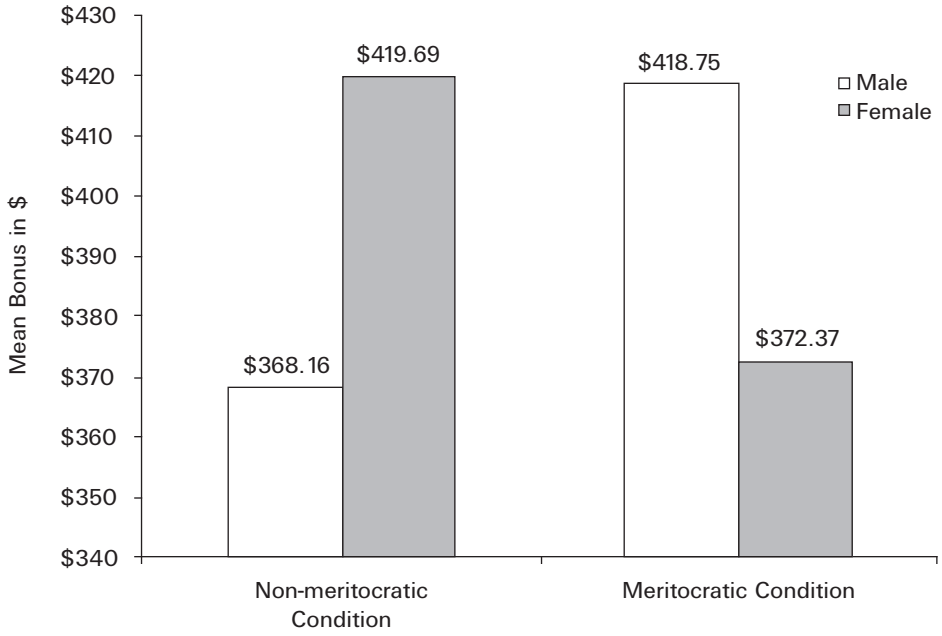
After completing and submitting the rating part of the experiment, participants were asked to fill out a "final reflections" questionnaire. They were asked to indicate their beliefs about the performance evaluation process and about ServiceOne as a company. This included our key manipulation check questions, the extent to which ServiceOne as a company was *meritocratic* and *fair* (again using 7-point scales). We expected participants to rate the company as more meritocratic and fair in the meritocratic condition than in the non-meritocratic condition. To determine whether this belief was limited to the company, we also asked participants to evaluate (1) the extent to which the particular supervisor's evaluations were accurate, competent, and fair, and reflected knowledge of the employees and effort, (2) whether the performance evaluation process itself was viewed as accurate and fair, and (3) whether, as an employee, they would like to be evaluated using a similar process.

Results

Manipulation check. We first checked whether our manipulation successfully convinced participants that ServiceOne was more meritocratic and fair in the meritocratic condition compared with the non-meritocratic condition and found that participants did rate ServiceOne as more meritocratic under the meritocratic condition than under the non-meritocratic one (meritocratic condition mean = 4.05 vs. non-meritocratic condition mean = 3.57, t-value = 2.609, significant at the .01 level). Participants also rated the company as more fair in the meritocratic condition (meritocratic condition mean = 3.67 vs. the non-meritocratic condition mean = 3.25, t-value = 2.565, significant at the .01 level). This indicates that our manipulation of meritocracy was successful. Further checks determined that impressions of the company did not generalize to the performance appraisal process or to the supervisor. Thus we did not find any significant differences in the supervisor's accuracy, competency, knowledge of employee, or fairness across conditions, nor did we find any differences in ratings of the accuracy and fairness of the company's evaluation process or willingness to be evaluated using this process. This indicates that the manipulation successfully shaped beliefs about the organization, not beliefs about the supervisor or the evaluation process itself.

The paradox of meritocracy effect. We assessed our main hypothesis by examining the bonus-amount decision for each of the test profiles by apparent meritocracy condition. We expected to find greater levels of gender bias in the meritocratic condition than in the non-meritocratic condition in the form of a lower bonus for women. To test this claim, we began by comparing the bonus amounts for the equally performing male and female test profiles within each

Figure 1. The paradox of meritocracy in the distribution of rewards by employee gender, study 1 (N = 229).



2 × 2 factorial design: ANOVA F-test (Gender × Meritocracy interaction) = 18.79 (p = .000).

condition. We also calculated a paired t-test to determine whether the difference varied within each condition. Given the known problems of using difference scores as dependent variables (Edwards, 2001), we interpreted the ANOVA results using bonus amount as the dependent variable: we hypothesized that the meritocracy manipulation would interact with the gender of the employees who were being evaluated to influence the bonus. Such interaction is properly tested by an ANOVA using bonus amount as the dependent variable.

The results of our analyses are presented in figure 1. In the non-meritocratic condition, we found that women, on average, earned a bonus $51 higher than equally performing men, significant at the .01 level. By contrast, we found the opposite pattern in the meritocratic condition: men earned, on average, a bonus $46 higher than equally performing women, significant at the .01 level.[1] Because the t-tests evaluate differences within each condition only, to test for differences across condition, we also performed a 2 × 2 factorial ANOVA (repeated measures for the male and female test profiles) to test our main hypothesis regarding the bonus. Consistent with our hypothesis, this analysis yielded an interaction effect for gender and meritocracy such that women were paid less than men in the meritocratic condition, but not in the non-meritocratic condition (F = 18.792, p = .000). Consequently, participants in a performance-reward system that emphasizes meritocracy significantly favored men over women in the translation of employee performance into bonus amounts. There was neither a significant gender main effect (F = .052, p = .82) nor a meritocracy main effect (F = .027, p = .87) on the bonus. We therefore find strong support for our main hypothesis.

1
We found no significant difference in the bonus amount assigned to the filler profile between the two meritocracy conditions. The average bonus for the filler profile was $159.23 in the meritocratic condition and $150.07 in the non-meritocratic condition. The t-test for the bonus difference of $9.16 was not significant (t-value = –.739, p = .46), suggesting that the meritocracy condition did not significantly affect the bonus rating of the filler profile across conditions.

We did not predict a tendency for participants to give women a higher bonus than men in the non-meritocratic condition. Though this result does not contradict our main prediction, we considered reasons for this pattern in detail below, in our third study.

Robustness checks. We conducted several additional analyses to ensure that the results were robust as well as to further investigate our findings. First, we estimated the analyses separately for each of the three experimental sessions. We found results substantially similar to those reported. Additionally, we analyzed the data separately by the gender of the participants. Regardless of participants' gender, we found strong support for our main hypothesis. The interaction effect for gender and meritocracy on the bonus was significant for male participants (N = 163; F = 11.121, p = .001) and female participants (N = 64; F = 7.273, p = .01).[2]

To further evaluate the robustness of our findings, we estimated a series of multivariate regression models that included participants' characteristics as control variables. For each participant, regardless of meritocratic condition, we computed the difference in the amount of the bonus between the male and the female test profiles and then used that difference as the dependent variable for the regression analyses. This difference provides an absolute measure of "rating" bias in favor of men. In addition to examining the main effect of meritocracy, we included a number of control variables, including participants' gender, age, and years of management experience, as well as their ratings of the sources of employees' success. Consistent with our main hypothesis, the meritocracy manipulation was always statistically significant and in the predicted direction for the bonus amount.[3]

Although the results of study 1 support our hypothesis, one alternative explanation for our findings is that participants might have made certain gender attributions and interpreted the language in the organizational values statement differently in the meritocracy condition. In particular, participants may have interpreted the emphasis on "equity" and "fairness" in the meritocratic condition as a rhetorical device actually signaling a preference for women. Along these lines, experimental research has found that, under certain conditions, preferential selection methods can produce a backlash toward the beneficiaries (Heilman, Block, and Lucas, 1992; Heilman, McCullough, and Gilbert, 1996). If so, participants in the meritocratic condition might have assumed that the female test profile was held to more lenient standards and was more likely to have achieved her performance rating through help from others or some source other than her own productivity, ability, or effort. For example, research suggests that men's performance tends to be attributed to skill, while women's tends to be attributed to luck (Deaux and Emswiller, 1974).

To address this alternative explanation, we collected additional measures right after the administration of the employee reward questionnaires. Following Pazy (1986), we asked participants to evaluate, using 7-point Likert type scales, why each employee was successful, along five dimensions: (1) ability and talent, (2) effort and hard work, (3) luck or

2
We ran ANOVA (repeated measures for the male and female test profiles) to test for the three-way interaction of gender of the employee × gender of the participant × meritocracy condition. This interaction was not significant, providing further support for the finding that the interaction effect for gender and meritocracy on the bonus does not depend on the gender of the participant (p = .98). We also ran our ANOVA analysis controlling for the bonus amount that participants gave to the filler profile. Though the effect of this variable was negative and significant at the .05 level—signaling that the higher the amount of money given to the control profile, the lower the amount of money participants gave to our two test profiles, which is not surprising, given the $1,000 budget constraint—including such control variables in the models did not change our main results at all. This model's interaction effect for gender and meritocracy on the bonus was still significant (F = 17.725, p = .001).

3
Because the regression results were largely redundant with the findings presented in prior ANOVA analyses, they are omitted but are available upon request.

chance, (4) easiness of their job, and (5) help they have received. Participants were also asked to indicate which factor was most responsible for each employee's success. If the meritocratic condition did lead participants to believe women were evaluated according to more lenient standards, women in the meritocratic condition should be evaluated as more likely to have been successful due to factors other than ability and talent or effort and hard work. The results of our analyses of these employee attributions did not support this alternative explanation. We found no significant gender differences in the perceptions of sources of employees' success between respondents in the meritocratic and non-meritocratic conditions. Consistent with earlier work (Pazy, 1986), we only found significant that women's success was more likely than men's to be attributed to hard work and effort, but this pattern did not differ by meritocratic condition. These results suggest that participants did not perceive women to be evaluated more leniently in the meritocratic condition.

Other employee outcomes. Our hypothesis focused on the effect of meritocratic values or beliefs on bias in the distribution of bonuses. One important question is the extent to which this effect may be found for employees' other career outcomes. In general, past research suggests that gender bias may affect decisions on a wide range of outcomes, such as hiring, promotion, and salary (e.g., Steinpreis, Anders, and Ritzke, 1999; Foschi, 2000; Biernat and Fuegen, 2001; Eagly and Karau, 2002). This is because gender stereotypes draw on broad-based beliefs about women's and men's differential competence, assertiveness, and other traits generally thought to be needed for high status or traditionally male occupations (Eagly and Karau, 2002; Biernat, 2003; Correll and Ridgeway, 2003). As a result, these stereotypes should apply to other employment outcomes that are related to an individual's competence and productivity. Consequently, to the extent that emphasizing meritocracy at the organizational level increases the expression of gender stereotypes, we would also expect to find greater levels of bias in favor of male employees in a variety of career outcomes.

Recent fieldwork suggests that the effects of emphasizing meritocracy may be greatest for salary and bonus increases. Empirically, in studying a company that emphasized the meritocratic aspect of its performance-reward system, Castilla (2008) found significant penalties for women, minorities, and non-U.S. citizens in bonus amounts but not in promotions, terminations, or the binary decision of whether an employee deserves a bonus. Theoretically, Castilla argued that this difference arises at least in part because employee hiring, promotion, and termination are more visible employment outcomes (consistent with Petersen and Saporta, 2004). Employees may not know how much their salaries changed relative to other members of their unit, but information about who was hired, promoted, or terminated is more easily available and observable. Because bias in these career outcomes is more manifest and therefore easier to detect, Castilla predicted that it should be less likely to occur in the workplace. This is also consistent with Kalev, Dobbin, and Kelly's (2006) finding that managerial accountability is associated with higher female and minority representation in

managerial jobs. Since the development of employers' compliance with Title VII and the human resource profession in the late 1960s (see Reskin and McBrier, 2000; Stinchcombe, 2001; Kalev, Dobbin, and Kelly, 2006; Dobbin, 2009), we would expect managers to feel more accountable for their decisions on hiring, base salaries, promotions, and terminations than for decisions regarding bonuses (Castilla, 2008). This is also in accordance with considerable work in social psychology indicating that bias is more likely when decision makers feel that their judgment is unlikely to be closely scrutinized (Tetlock, 1983a, 1983b; Lerner and Tetlock, 1999).

The transparency argument made in these previous studies aligns closely with the moral credentials argument (Monin and Miller, 2001), according to which people do not wish to appear prejudiced to others, or even to themselves (i.e., privately acknowledge that bias might shape their evaluations of others). Thus they should be less likely to express bias when that bias could more obviously call their moral credentials into question. For example, recommending a somewhat smaller salary increase for a woman over a similarly qualified man may be more easily rationalized, and thus pose a smaller threat to one's view of oneself as unbiased, than choosing to hire, promote, or terminate a man over a similarly qualified woman. Though emphasizing meritocracy should increase bias, the manifestation of such bias should be stronger for outcomes in which disparities would be subtler or less noticeable to others.

There are also practical reasons to expect that emphasizing meritocracy in organizations when implementing pay-for-performance programs will have the greatest effect for salary and bonus increases. Such programs typically rely on performance evaluations for making pay decisions (Institute of Management and Administration, 2000; Burke, 2005), but they explicitly require additional supply- and demand-related factors, such as job openings and/or employees' tenure in the company, and skills, when making promotion or termination decisions at the firm level (Miller, 2006).

Based on these reasons presented in prior work, our ancillary prediction is therefore that participants in an organization that emphasizes meritocracy as a core organizational value will show lower levels of bias in the translation of employee performance evaluations into other more observable career decisions than monetary bonuses. To test this prediction, we collected and examined four other employee ratings of the test profiles by meritocracy condition. Because these other career outcome variables are measured using a different metric than the bonus, we computed a standardized measure of the paradox of meritocracy effect for each rating variable (i.e., beta coefficients).

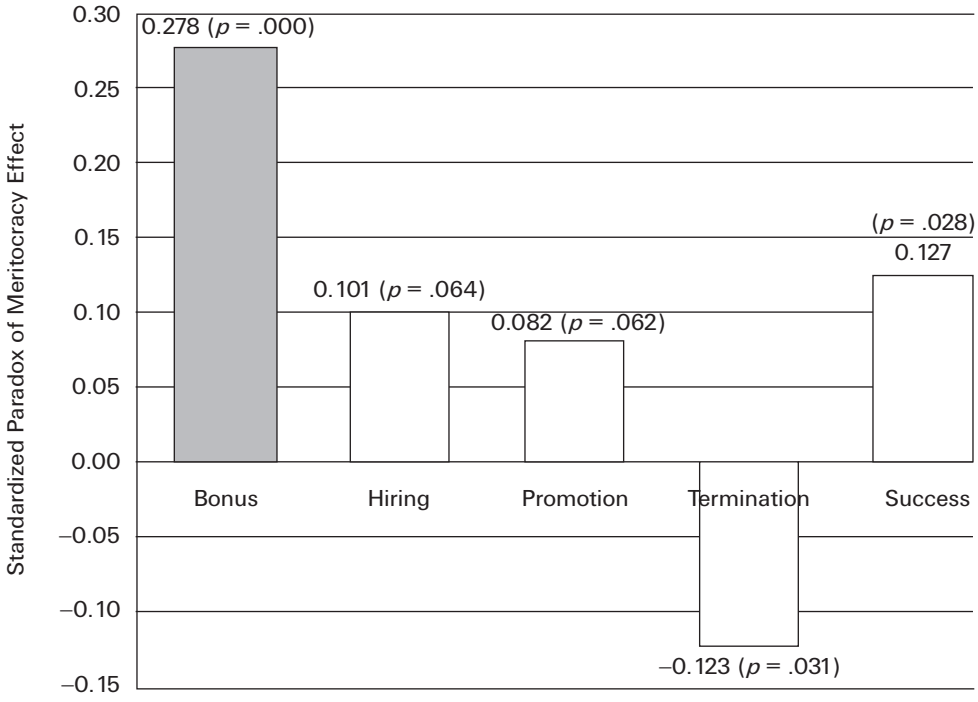
This approach allowed us to directly compare the effect of our meritocracy manipulation on employee bonus versus the other career variables. For each participant, regardless of meritocratic condition, we computed the difference in ratings between the equally performing male and female test profiles and then used the standardized values of these differences as the main dependent variables. These differences provide a standardized measure of the level of bias in favor of men in the translation of performance evaluations into each

employee rating score. Similar results were obtained when estimating Cohen's D (Cohen, 1988). Regardless of the method used to compare the paradox of meritocracy effect across the different variables of different scales and magnitudes collected (including ANOVA coefficients and marginal effects), we consistently found that the levels of bias (in favor of men) were larger for the bonus amount than for the other four career outcome variables.

Results are presented in figure 2. Supporting our ancillary prediction, we found that the tendency for participants to express bias in favor of men in the meritocratic condition was large and highly significant for the bonus measure (B = .278, p = .000). But we found smaller levels (in absolute magnitude) of gender bias in the meritocratic condition for hiring (B = .101, p = .064), promotion (B = .082, p = .062), termination (B = –.123, p = .031), and success in the future (B = .127, p = .028; all one-sided tests).

Table 1 reports differences in ratings and the relevant paired t-tests comparing the unstandardized employee career ratings for the male and female test profiles in each experimental condition; for convenience, we also include the analysis of the bonus amount in the table. Once again, we also ran 2 × 2 factorial ANOVAs (repeated measures for the male and female profiles) and report the interaction term

Figure 2. The paradox of meritocracy: Standardized coefficients by employment career outcome.



Note: For the purpose of comparing across career outcomes of different scales and magnitudes, the standardized measure of the paradox of meritocracy effect is reported for each rating variable (i.e., beta coefficients). Consistent with our prediction, the penalty for the bonus amount is larger than for hiring, promotion, termination, or success. P-values (in parentheses) reflect statistical differences from zero and are calculated for each career outcome variable.

Table 1

Mean Employee Ratings in Meritocratic and Non-meritocratic Conditions by Employee Gender*

	Non-meritocratic Condition (N = 116)			Meritocratic Condition (N = 113)			ANOVA F-test (Gender x Meritocracy Interaction Term)†
	Male test profile (Michael)	Female test profile (Patricia)	Difference (t-value)	Male test profile (Michael)	Female test profile (Patricia)	Difference (t-value)	
Bonus amount	$368.16	$419.69	$51.53•••	$418.75	$372.37	$46.38•••	18.79•••
(Total of $1,000 to distribute)	(116.03)	(122.30)	(–2.948)	(111.38)	(102.75)	(3.267)	
Hiring decision	5.84	6.03	–0.19•	6.04	5.99	0.05	2.34
(1 = Definitely wrong decision; 7 = Definitely right decision)	(1.06)	(0.91)	(–1.545)	(0.68)	(0.85)	(0.501)	
Promotion decision	4.86	5.02	–0.16	5.18	5.06	0.12	1.52
(1 = Definitely do NOT promote; 7 = Definitely promote)	(1.31)	(1.41)	(–0.923)	(1.07)	(1.23)	(0.826)	
Termination decision	2.12	1.85	0.27••	2.01	2.06	–0.05	3.51•
(1 = Definitely do NOT terminate; 7 = Definitely terminate)	(1.21)	(1.01)	(2.028)	(1.19)	(1.26)	(–0.495)	
Success in the future	5.58	5.75	–0.17•	5.84	5.70	0.14•	3.70•
(1 = Will NOT be successful at all; 7 = Will be highly successful)	(0.97)	(0.98)	(–1.406)	(0.76)	(0.92)	(1.319)	

• $p < .10$; •• $p < .05$; ••• $p < .01$; one-sided t-tests.
* Standard deviations are in parentheses. We calculated paired sample t-tests for the difference in the rating variables between the male and the female test profiles in each meritocracy condition separately, reported under the Difference (t-value) columns.
† F-values are reported in this column. Based on our ancillary prediction, we expected participants in the meritocratic condition to show lesser levels of bias in the translation of employee performance evaluations into other key employee career outcomes (when compared with the translation of performance evaluations into bonus amounts) than participants in the non-meritocratic condition.

between the meritocracy manipulation and the gender of the employees in column 7 of table 1. The only significant interaction effects for gender and meritocracy were found for the termination ($F = 3.51$, $p = .062$) and success ratings ($F = 3.70$, $p = .056$).

In addition, we examined whether participants were more likely to rank the male test profile first across all outcome variables, by meritocracy condition and gender. We also expected that the effect of the meritocracy manipulation on gender bias would be smaller than on the bonus for the more visible measures. Across all variables, men were always preferred more under the meritocratic condition than under the non-meritocratic condition. The preferences for men over equally performing women, while substantively large, were not significant.

STUDY 2: GENDER COMPOSITION OF THE EMPLOYEE PROFILES

Study 2, designed to test whether the gender composition of the employee profiles matters, was nearly identical to study 1,

with the exception that we used a female name (Linda instead of Robert) for the filler profile. We conducted this second experiment to rule out one important alternative explanation for our findings in study 1: the fact that our filler profile was male in study 1 may have shaped the comparisons made by the participants, leading to a preference for the male employee in the meritocratic condition.

Individuals often use gender to determine salient referents for comparison when making evaluations regarding pay and other career outcomes (Kulik and Ambrose, 1992), comparing males with other males and females with other females (for a review of work showing how one's numerical representation in a group affects individual judgment and influence, also see, e.g., Reagans, 2005; Loyd and Phillips, 2006; Duguid, Loyd, and Tolbert, 2010). In study 1, participants may have rewarded our male test profile more highly in the meritocracy condition because they implicitly compared him with Robert, our low-performing filler profile. When making such a comparison, it could have seemed more fair or meritocratic to give the male test profile a larger bonus. In contrast, our female test profile could not have benefited from comparison with a low-performing female test profile and instead may have been compared with the male test profile, which was virtually identical in terms of apparent quality. If this alternative argument is true, then changing the gender of the filler profile from male to female should reverse the results, producing a greater bonus for women in the meritocracy condition.

Method

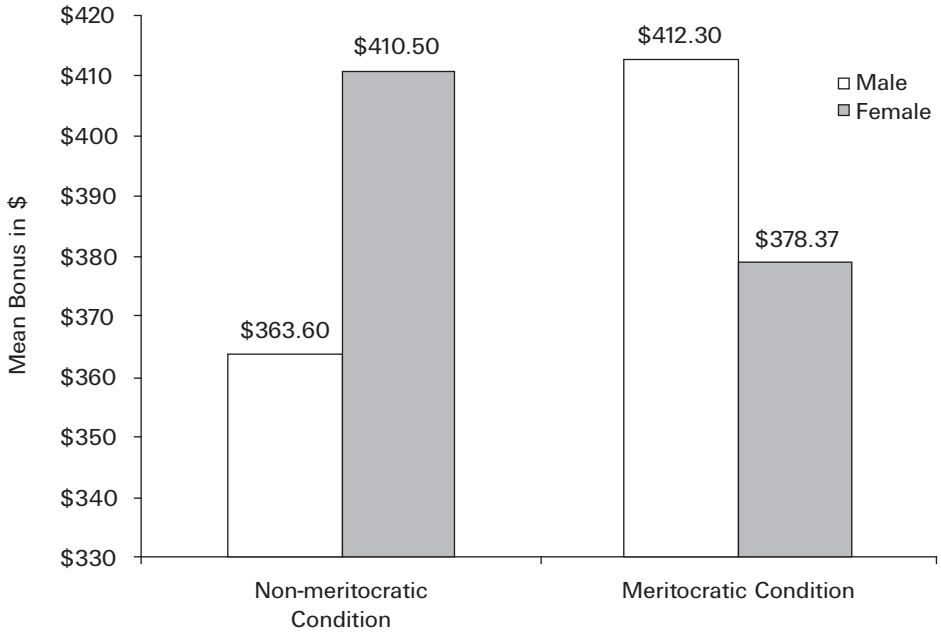
Participants. In study 2, the participants were again recruited at a business school in the northeastern United States. The study included 115 participants (70 male and 45 female). Age and managerial experience were similar to those in the previous study. Participants were on average 29.29 years old (with a standard deviation of 4.20 years) and had an average of 6.07 years of work experience (with a standard deviation of 3.76 years). Approximately 8 percent of the respondents had already earned an MBA. As in study 1, most respondents (almost 75 percent) reported liking jobs with supervisory responsibilities, with 4.3 percent reporting not liking them.

Procedure. With the exception of substituting the low-performing female filler profile for the low-performing male filler profile, the procedure was identical to that used in the prior study.

Results

Manipulation check. Similar to study 1, our manipulation led participants to perceive ServiceOne as more meritocratic and fair in the meritocratic condition than in the non-meritocratic condition (both significant at the .01 level). Participants rated ServiceOne as more meritocratic (the mean difference between the two conditions is .738, t-value = 2.641, $p < .01$) and more fair (the mean difference was .708, t-value = 2.980, $p < .01$) under the meritocratic condition than under the non-meritocratic one.

Figure 3. The paradox of meritocracy in the distribution of rewards by employee gender, study 2 (N = 115).



2 × 2 factorial design: ANOVA F-test (Gender × Meritocracy interaction) = 10.125 (p = .001).

The paradox of meritocracy effect. The results for the bonus measure are summarized in figure 3. Consistent with study 1, in the non-meritocratic condition we found that women earn on average a bonus $47 higher than equally performing men ($p < .01$). By contrast, in the meritocratic condition, men earn, on average, a bonus $34 higher than equally performing women ($p < .01$). Also consistent with the analyses of study 1, this yielded an interaction effect for gender and meritocracy such that women were paid less than men in the meritocratic condition but not in the non-meritocratic condition (F = 10.125, p = .001). The findings thus strongly support our main hypothesis, demonstrating that the effect does not depend on the gender of the filler profile.[4]

As in study 1, the analyses of the ratings variables in study 2 on hiring, promotion, termination, and success in the future also supported our ancillary prediction of less ascriptive bias in the translation of performance evaluations into these other employee career outcomes. The standardized coefficients were similar to those reported in table 1: consistent with our prediction, participants also tended to rate women more favorably than men in the non-meritocratic condition and to rate men more favorably than women in the meritocratic condition on hiring, promotion, termination, and success decisions, although the effect sizes were lower than for bonuses. For hiring, promotion, and termination, the interaction effects of gender and meritocracy were non-significant (for hiring, F = .762, p = .385; promotion, F = .237, p = .628; and termination, F = 1.668, p = .199). The only significant interaction effect found was for employee success rating (F = 4.389, p = .038).

Comparing high- and low-performing employee profiles. Our hypothesis, and by extension our study design, focused

4
Once again, we found no significant difference in the bonus amount assigned to the female filler profile between the two conditions (the mean bonus difference was $21.57, t-value = –.775, p = .44). The average bonus for the filler profile was $150.42 in the meritocratic condition and $128.85 in the non-meritocratic condition.

on comparing equally performing male and female employees, but another possible way of ascertaining the effect of a culture of meritocracy on merit-compensation decisions is to compare the same-gender high and low performers in the meritocratic and non-meritocratic conditions. For simplicity, "low performer" refers to the filler profile of the employee who received a 3 rating versus "high performer," which refers to the test profiles of employees who received a 4 rating. This approach allowed us to assess to what extent performance differentials are less effective at generating rewards for women than men in the meritocratic condition, compared with the non-meritocratic condition. In other words, we could also examine whether greater performance translates into greater rewards in the meritocratic condition, regardless of the gender of the employees.

To explore this possibility, we ran some additional analyses. For study 1 (low-performing male filler profile), we ran an ANOVA analysis with only the two male profiles, estimating (a) the main effect of meritocracy, (b) the main effect of being the test or filler profile ("performance"), and (c) the interaction of these two. The latter interaction effect tells us whether the performance effect is significantly greater in the meritocratic condition than in the non-meritocratic condition for male profiles. This interaction effect was positive and significant ($F = 4.015$, $p = .046$, two-sided). Both the "performance" direct effect and the effect of meritocracy were significant for men ($p < .001$). We took a similar approach for study 2 (low-performing female), with only the two female profiles. The interaction effect was not significant for female profiles ($F = 1.422$, $p = .236$). Although the "performance" direct effect was significant ($p < .001$), the effect of meritocracy was not significant for female profiles ($F = .041$, $p = .84$).

Overall, these findings are consistent with our paradox of meritocracy hypothesis and indicate that the effect of meritocracy on monetary rewards is significant for men but not women. In addition, the effect of performance on rewards is significantly greater in the meritocratic condition than in the non-meritocratic condition for men, but there is no evidence of a similar boost for women in the meritocratic condition.[5]

STUDY 3: THE FEMALE ADVANTAGE IN THE NON-MERITOCRATIC CONDITION

The results of studies 1 and 2 supported our prediction that women would receive smaller average bonuses than men in the meritocratic condition. One unpredicted finding in both studies, however, was that women received greater average bonuses in the non-meritocratic condition. Although this finding does not contradict our hypothesis, it is surprising and warrants additional attention in a third study.

One possible explanation is that the language about discretion used in the non-meritocratic condition may have signaled the possibility of bias on the part of the evaluating supervisors. If the participants believed that managerial bias in the evaluation system disadvantaged women, they may have felt they needed to compensate or correct for this bias by favoring women (consistent with Petty and Wegener, 1993;

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Although a direct comparison cannot be made between studies 1 and 2 because participants were not randomly assigned across studies, we can still approximate this comparison by merging both datasets in studies 1 and 2 and running an ANOVA comparing the same-gender high and low performers in the meritocratic and non-meritocratic conditions. We examined (a) the main effect of meritocracy; (b) the main effect of being the test or filler profile ("performance"); (c) the main effect of whether the compared profiles are male (study 1 data) or female (study 2 data); (d) all two-way interactions; and in particular, (e) the three-way interaction of (a), (b), and (c). The estimated three-way interaction coefficient (d) indicates that the "performance" effect is significantly greater in the meritocratic condition for men than for women ($F = 4.818$, $p = .029$). Though the "performance" direct effect (term b) was significant at the .001 level, the effect of meritocracy and the two-way interactions were not significant. Participants in the meritocratic condition thus showed greater levels of bias in favor of men in translating employee performance differentials into bonuses (in comparison with participants in the non-meritocratic condition). We thank an anonymous *ASQ* reviewer for suggesting this analysis.

Wegener and Petty, 1995).[6] In particular, the participants in studies 1 and 2 may have been responding to the language emphasizing managerial discretion in the "Core Values" statement of the non-meritocratic condition (e.g., "raises and bonuses are to be given based on the discretion of the manager"). If participants perceived more managerial discretion in the non-meritocratic condition, they may have suspected that the performance evaluations they received were biased in favor of male employees and compensated for this bias by awarding a larger bonus to the female test profile. If this explanation is correct, then removing the emphasis on managerial discretion in the non-meritocratic condition should result in equal bonuses for the male and female test profiles.

Method

Updated non-meritocratic condition. To test the effect of an emphasis on discretion, we first constructed a new non-meritocratic condition designed to be less discretionary than the non-meritocratic control condition used in studies 1 and 2. In the new condition, the statements on the "Core Company Values" form read as follows: (1) "All employees are to be evaluated regularly"; (2) "performance evaluation forms include a quantitative as well as qualitative component about the employee's performance"; (3) "performance evaluations are part of the employee's official personnel file"; (4) "performance evaluations are discussed with each employee every year"; and (5) "ServiceOne's goal is to evaluate all employees every year." We refer to this as the "updated non-meritocratic condition."

We next conducted a pretest of all three "core values" statements to evaluate two key assumptions: first, that the original non-meritocratic condition was perceived as more discretionary than the meritocratic condition; and second, that the updated non-meritocratic condition and the meritocratic condition would be perceived as equally discretionary. We asked 21 participants (undergraduate students at a public university in the Midwest) to read and rate the three "Core Company Values" statements. They were asked to assess the level of discretion that managers working for an organization with each set of values would possess. The values statements were rated on a scale of 1 ("Very little discretion") to 7 ("A great deal of discretion"). As expected, participants rated managers in the original non-meritocratic condition as having significantly greater discretion than managers in the meritocratic condition (mean = 6.24 vs. mean = 3.67, $p < .01$, paired t-test, two-tailed). Our updated non-meritocratic condition successfully reduced the perceived level of managerial discretion, being rated as significantly less discretionary than the original non-meritocratic condition (updated non-meritocratic condition mean = 3.95, $p < .01$, paired t-test, two-tailed). Importantly, the updated non-meritocratic condition and the meritocratic condition were rated as equally discretionary ($p = .52$, paired t-test, two-tailed). The results of the pretest thus confirmed both our assumptions.

Participants. Study 3 included 101 participants (62 men and 39 women), again recruited at a business school in the northeastern United States. Similar to the previous studies,

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Another possibility is suggested by work on "aversive racism" (Gaertner and Dovidio, 1977; Gaertner et al., 2005), which has found that individuals favor stigmatized groups when concerned about appearing prejudiced. Because gender discrimination is frowned upon in organizations, especially among managers (see, e.g., Dobbin, 2009), participants in the non-meritocratic condition may have awarded the female employee a larger bonus to avoid the perception that they were biased. Given the language of discretion used in the non-meritocratic condition, however, we decided to first test the overcorrection explanation described above in study 3.

participants were 30 years old on average (with a standard deviation of 3.5 years); they had an average of 5.73 years of work experience (with a standard deviation of 3.56 years); and most of them (71.6 percent) reported liking jobs with supervisory responsibilities (with 3.9 percent not liking them, and 24.5 percent not knowing yet whether they would like jobs with supervisory duties).

Procedure. The procedure in study 3 was identical to that used for study 1, with the exception that the updated non-meritocratic condition was used in place of the original non-meritocratic condition with the five non-discretionary core values statements, as described above.

Results

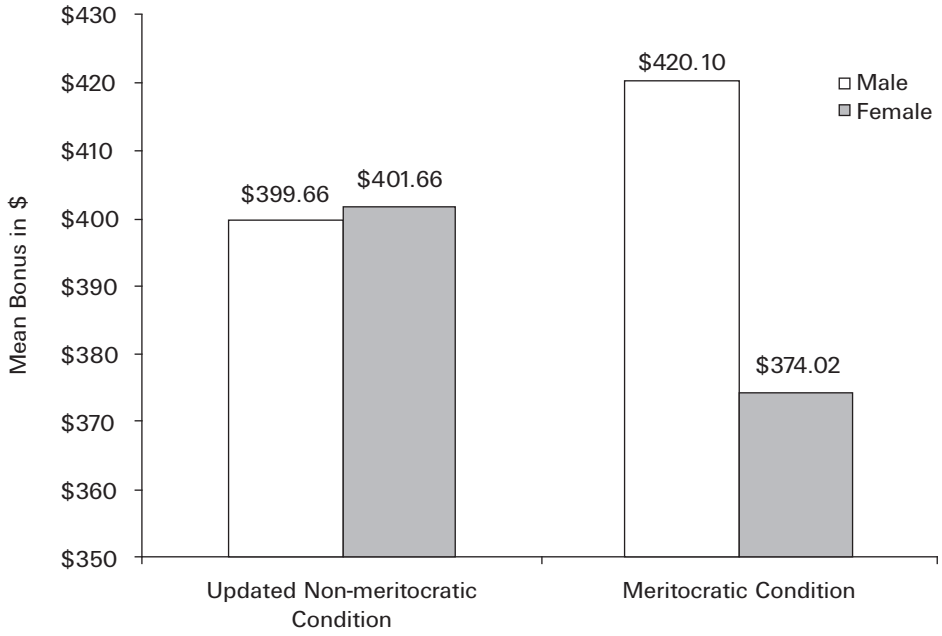
Manipulation check. Our meritocracy manipulation was successful. As in the previous two studies, we found that participants rated ServiceOne as more meritocratic (the mean difference between the two conditions was .674, t-value = 2.376, $p < .01$) and more fair (the mean difference was .635, t-value = 2.552, $p < .01$) under the meritocratic condition than under the non-meritocratic one.

As an additional check on our pretest results, in study 3, we also asked participants to assess the level of discretion that managers working for an organization with each set of values would possess. The values statements were rated on a scale of 1 ("Very little discretion") to 7 ("A great deal of discretion"). In study 3 (and similar to our pretest findings), participants rated the updated non-meritocratic condition and the meritocratic condition as equally discretionary; hence, we had successfully removed any difference in perceptions of discretion across the two conditions (the difference of .275 points was not significant, $p = .39$, two-tailed).

The paradox of meritocracy effect. Figure 4 reports the results for the bonus measure in the meritocratic and non-meritocratic conditions. As in studies 1 and 2, we found support for our hypothesis that women would be disadvantaged in the meritocratic condition. On average, men in the meritocratic condition earned a bonus $46 dollars higher than equally performing women (t-value = –2.153, $p = .018$).

Most importantly for the purposes of study 3, we found no significant differences in the bonuses assigned to men and women in the updated non-meritocratic condition: the bias in favor of women found in the original non-meritocratic condition in studies 1 and 2 disappears under the updated non-meritocratic condition in study 3. In the updated non-meritocratic condition, women were paid $2 more than men on average, a non-significant difference (t-value = –.075, $p = .94$, one-tailed). The interaction effect of gender and meritocracy only approached significance, which is not surprising given the lack of significance for the gender difference in the non-meritocratic condition (F = 1.997, $p = .161$). Thus the results of study 3 replicate the finding of a penalty for women in the meritocracy condition and also demonstrate that the advantage for women in the non-meritocratic condition disappears when we remove the discretionary wording in this condition.

Figure 4. The paradox of meritocracy with updated non-meritocratic condition, study 3 (N = 101).



2 × 2 factorial design: ANOVA F-test (Gender × Meritocracy interaction) = 1.997 (p = .161).
Updated non-meritocratic condition: $2.00 Bonus difference (not sig.) (t-test = –.075, p = .94, one-tailed).
Meritocratic condition: $46.07 Bonus difference (t-test = –2.153, p = .018, one-tailed).

As in the previous studies, the analyses of the ratings on hiring, promotion, termination, and success in the future also supported our ancillary prediction of less gender bias in the translation of performance evaluations into these other key employee outcomes (for simplification purposes, the results are not presented here but are available upon request).

GENERAL DISCUSSION

Inside organizations, the use of meritocratic organizational policies and procedures, particularly pay-for-performance or merit-based reward practices, has gained great support among employers over past decades (e.g., Heneman and Werner, 2005; Noe et al., 2008). Although these efforts by employers are aimed at improving equal opportunity and linking merit to employees' careers, recent empirical studies have found that workplace disparities persist even with the adoption of certain employer practices such as affirmative action and diversity policies (e.g., Kalev, Dobbin, and Kelly, 2006) or merit-based pay programs (e.g., Castilla, 2008; Manning and Swaffield, 2008). What remains an open question, however, is whether gender and racial disparities in the distribution of rewards remain in today's organizations in spite of management's efforts to introduce merit-based reward systems or because of such efforts. This article advanced research on this question by empirically testing, for the first time in the literature, whether certain management efforts to promote meritocracy in the workplace may have the causal effect of increasing ascriptive bias in the translation of employee performance into rewards and other career outcomes.

Using three experimental studies with a total of 445 individuals with managerial experience, we found strong support for the novel theoretical argument that we call the paradox of meritocracy effect in managerial decisions. Participants in the meritocratic condition showed greater preference for the male employee over an equally qualified female employee (in the same job, with the same supervisor, and the same performance evaluations) when making bonus decisions. By contrast, participants in the non-meritocratic condition did not favor the male employee. This effect was significant and did not depend on the gender of the participant or the gender of the filler profile. The effects of emphasizing meritocracy on other (more visible) employee career decisions such as hiring, promotion, and termination were also in the predicted direction, but as expected, the effect sizes were smaller. This provides support to our ancillary prediction that less gender bias would be found in the translation of performance scores into more visible employment outcomes when comparing managers embedded in meritocratic versus non-meritocratic organizational contexts, consistent with studies of real organizations (e.g., Petersen and Saporta, 2004; Kalev, Dobbin, and Kelly, 2006; Castilla, 2008).

In addition, study 3 showed that removing the language emphasizing managerial discretion from the non-meritocratic condition eliminated the bias in favor of women found in that condition in studies 1 and 2. The finding that the language about discretion in the non-meritocratic condition may have triggered the need to compensate for possible bias against women stresses the key role organizational cultures play in shaping ascriptive inequality at work. Although previous empirical research has shown that personnel practices that allow managerial discretion have the potential to increase bias toward women and minority groups (e.g., Reskin and McBrier, 2000; Elvira and Graham, 2002), study 3 indirectly suggested that organizational values that emphasize managerial discretion alone may create the perception of the existence of bias and may therefore motivate individual attempts to correct it.[7]

Underlying Mechanisms and Scope Conditions of the Paradox of Meritocracy

Though an empirical examination of the possible underlying mechanisms is beyond the goal of our study, there are at least two mechanisms by which the paradox of meritocracy may work. One mechanism is the role of moral credentials: individuals are more prone to express prejudiced attitudes when they feel that they have established their moral credentials as a non-prejudiced person (Monin and Miller, 2001). The moral credentials argument is consistent with our prediction that managers making decisions about employees on behalf of an organization will be more likely to discriminate against women when that organization explicitly promotes itself as meritocratic. When the culture of an organization includes the strong belief that the organization is meritocratic, and particularly when managers themselves explicitly endorse this belief, this serves as a form of meritocratic moral credentialing that makes future bias more likely. An organizational culture that prides itself on meritocracy may encourage bias by convincing

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We stress "indirectly" here because study 3 did not directly compare discretionary and non-discretionary conditions. We thank an anonymous *ASQ* reviewer for making this point.

managers that they themselves are unbiased, which in turn may discourage them from closely examining their own behaviors for signs of prejudice. In addition, if a culture that emphasizes meritocracy leads managers to feel that members of the organization consider one another to be unbiased and fair, they may feel that their motivations are not in question and that there is little risk that their actions will be interpreted as prejudiced. As a result, they may feel less constrained by social norms and be more likely to allow stereotypes to influence their decisions.

Uhlmann and Cohen's (2007) argument that a sense of personal objectivity moderates the extent to which individuals act on their beliefs, including stereotypical beliefs, would also predict the paradox of meritocracy in employment settings. They showed that when people feel objective, they become more confident that their beliefs are valid, and thus more likely to act on them. As a result, people who hold work-relevant negative stereotypes about women become more likely to express those stereotypes in their employment decisions. In our study, the meritocratic condition gave participants the opportunity to agree that fairness and equity are important criteria for the extra compensation of employees. Emphasizing these criteria as organizational values may make participants feel that they are fair and objective and, as a result, make them more likely to act on beliefs that they hold. If participants do hold gender stereotypes—and past work suggests that such stereotypes are common and automatic (Greenwald and Banaji, 1995)—then increasing participants' tendency to act on their beliefs could produce the patterns we found in the meritocracy condition.

Although a full review of the stereotyping literature is beyond the scope of our current study, we believe that both mechanisms are also consistent with previous research in social psychology. Much of the work broadly classified under the "justification-suppression model" of prejudice (Crandall and Eshleman, 2003) converges on the idea that individual prejudice will be suppressed unless it can be justified on grounds other than prejudice. To the extent that moral credentials and self-perceived objectivity provide two justifications, they both may facilitate the expression of prejudice in meritocratic settings. Along similar lines, a number of studies have proven that people are more likely to use stereotypes when they lack motivation to avoid applying stereotypes (e.g., Plant and Devine, 1998; Tetlock, 1983a, 1983b; Kunda and Spencer, 2003) or when they expend less effort to monitor their own decisions for the influence of stereotyping (e.g., Moskowitz et al., 1999; Fein et al., 2003). In our particular case, managers embedded in meritocratic contexts may experience higher confidence that their decisions are impartial, leading them to be less motivated or invest less effort in avoiding the application of stereotypes.

Before assessing the broader implications of our study below, it is important to qualify the generality of our argument and consider the scope conditions that may delimit the paradox of meritocracy effect in organizations. Doing so may contribute to our understanding of how employers can mitigate the paradox of meritocracy effect by taking steps to reduce the extent to

which these conditions exist. One scope condition is the level of preexisting biases held by individuals in organizations. We would not expect to find the paradox of meritocracy effect in organizational settings in which evaluators harbor no gender bias. A key insight in the study of stereotyping, however, is that individuals are subject to both conscious and unconscious biases. Widespread cultural beliefs about the association between demographic characteristics and particular traits (e.g., women and productivity) often shape evaluations and behavior unconsciously, even among those who disagree with the stereotype on a conscious level (e.g., Devine, 1989; see Greenwald and Krieger, 2006, for a review).

A second scope condition has to do with how meritocratic organizational procedures and values are framed and articulated to the organizational members. In our study, participants were simply asked to indicate whether they agreed with the organizational core values presented, as a way of endorsing certain meritocratic values, before evaluating the employees. This subtle manipulation increased the relative advantage of equally performing men in the meritocratic condition. In settings in which the articulation of core values is aligned with other organizational cultural elements and practices that limit the extent to which managers feel (and act on their feelings) that they are non-biased, fair, or objective (Monin and Miller, 2001; Uhlmann and Cohen, 2005), the paradox of meritocracy effect may presumably be weakened. For example, Uhlmann and Cohen (2007) suggested that the self-objectivity effect on hiring bias will be weaker when there is high accountability.

A third possible scope condition is how the presence of additional organizational procedures and routines is likely to moderate the paradox of meritocracy effect. Because our focus was on the effects on employee rewards of promoting a meritocratic culture, we did not build into our study design other organizational factors shown to affect bias in the literature. For example, organizational policies aimed at increasing transparency and accountability in the workplace have been shown to reduce the expression of individual bias both experimentally (e.g., Lerner and Tetlock, 1999) and in field studies (e.g., Castilla, 2008). Additionally, employers' policies designed to limit discretion for managers to exert strong influence in determining bonuses may also decrease workplace inequality (e.g., Reskin and McBrier, 2000; Elvira and Graham, 2002). Consequently, the negative effects of emphasizing meritocratic values in the workplace may be less likely to occur when organizational conditions promote less managerial discretion, more accountability, and more transparency in the workplace.

Theoretical Implications

Beyond the implications for research about the role organizations play in creating and maintaining inequality in the workplace (e.g., in the tradition of Baron and Bielby, 1980; Baron, 1984; Ferguson, 1984; Bielby and Baron, 1986; Beckman and Phillips, 2005; Phillips, 2005), our research makes a number of important theoretical contributions to our understanding of broader organizational processes in management and sociology. First, our finding about the unintended effects of certain organizational efforts to promote meritocracy in the workplace

provides a novel theoretical explanation for why ascriptive inequality remains despite the proliferation of merit-based policies inside organizations. Previous studies have shown that organizational policies aimed at reducing disparities for women and ethnic minorities do not necessarily work (e.g., Edelman, 1990; Baron, Mittman, and Newman, 1991; Dobbin et al., 1993; Edelman and Petterson, 1999). In contrast to recent field studies demonstrating that workplace inequality persists in spite of meritocratic employer practices (e.g., Kalev, Dobbin, and Kelly, 2006; Castilla, 2008), our study empirically shows that ascriptive inequality, particularly in the distribution of rewards, is potentially introduced because of such meritocratic efforts. Additionally, our study demonstrates that ascriptive bias occurs even after holding the employees' performance evaluations constant and equivalent. In real settings, the performance evaluations themselves may also be affected by gender bias (Eagly and Karau, 2002; Biernat, 2003; Correll and Ridgeway, 2003). Thus our study suggests a new source of bias, although not the only one.

A second contribution is to the body of research that links cultural context to individual cognition and behavior. Our study specifically demonstrates that an emphasis on meritocracy as an organizational cultural value can serve as an "environmental trigger" (DiMaggio, 1997: 279) that unleashes ascriptive biases. Thus our finding is consistent with past work showing that local cultures can trigger individual cognitive and interactional biases against low-status groups and that the processes of evaluation themselves are influenced by the cultural context in which individuals interact (Ridgeway, 1997; Correll and Ridgeway, 2003; Lamont, 2009; Turco, 2010). Along similar lines, our study joins broader research efforts investigating the impact of organizational cultures on labor market processes and workplace inequality, in the tradition of Barley (1991) and Martin (1992). Ely and Thomas (2001), for example, examined how different diversity cultures affect not only work group processes and outcomes but also employees' experiences inside three different firms. Consistent with these studies, we found that the cultural context of meritocracy has the potential to increase bias in employment decisions. In contrast, our research stresses the potential unintended (opposite) effects of certain managerial efforts aimed at promoting meritocratic cultural values in the workplace.

Third, our study contributes to important psychological work on evaluation biases. Past work in moral credentialing (Monin and Miller, 2001; Effron, Cameron, and Monin, 2009; Kaiser et al., 2009), for example, tends to focus on the consequences of an individual's decision or cognition (i.e., presenting or thinking of oneself as unbiased) for subsequent bias in his or her own decisions. The same applies to research on self-perceived objectivity (Uhlmann and Cohen, 2005, 2007). Our research extends these perspectives by demonstrating that bias can be shaped not only by an individual's previous decisions or beliefs but also by organizational cultures that emphasize meritocracy. Furthermore, the subtle nature of our manipulation highlights how little is sometimes needed to trigger individuals' biases in managerial decisions.

Further Research

Our research could be productively extended in several ways. First, we focused on employee gender in this study because we employed several manipulations, and our MBA participants were in limited supply. For the same reason, all employees had the same title, worked in the same unit, and had the same supervisor. Future experiments should test whether the results generalize to other employee demographics such as race, ethnicity, and country of origin, as well as other supervisor and job characteristics. We also asked participants to reward three employees, with the low-performing employee as a filler profile. Future research could further examine our paradox of meritocracy finding by changing the characteristics of the pool of employees being evaluated, including the number of employees and the levels of employee performance. We also think that there is great promise in undertaking additional studies examining the translation of more objective productivity measures, such as sales or revenues, into rewards. These studies could help us further explore the paradox of meritocracy.

The second extension involves additional testing of the relationship between different aspects of meritocracy and compensation. In our study, we manipulated the presentation of a meritocratic culture, as we believe this is one of the most basic aspects of meritocracy at the organizational level. This provided a conservative test of whether emphasizing meritocracy as a core organizational value can produce bias in employee evaluations. Of course, work cultures are complex and contextual (Barley, 1983, 1991), and additional experimental research should manipulate other elements of organizational culture when continuing the investigation of the paradox of meritocracy effect. We also encourage further theorizing and testing to extend our finding to other key aspects of meritocracy, including specific merit-based employment processes and routines as they are currently implemented in the workplace (see Cappelli, 1999; Dobbin, 2009). Here we suggest paying particular attention to the effect of bundles of organizational practices and cultural elements on ascriptive inequality (à la Kalev, Dobbin, and Kelly, 2006, in the case of practices; Ely and Thomas, 2001, in the case of organizational cultures). Similarly, further research should examine whether the paradox of meritocracy applies to other types of evaluation procedures (such as ranking, forced distribution, the management by objectives approach, and 360-degree performance systems), merit-based reward systems (such as sales commissions, special recognitions, profit-sharing plans, employee stock options, and deferred compensation), and to other sets of company goals and guidelines behind the performance-reward process (see Lawler and McDermott, 2003; Hale, 2004; Heneman and Werner, 2005; Rynes, Gerhart, and Parks, 2005).

Along these lines, a productive research direction consists of examining whether the paradox of meritocracy effect interacts with organizational policies aimed at increasing transparency or accountability in the workplace, which have been shown to reduce the expression of bias both experimentally (e.g., Lerner and Tetlock, 1999) and in field studies (e.g., Castilla, 2008). Research should also continue exploring

what real companies may be doing to achieve meritocracy and diversity in the workplace beyond hiring and promotion (e.g., Kalev, Dobbin, and Kelly, 2006; Dobbin, Schrage, and Kalev, 2008; Kalev, 2009). Such research can help us understand under which conditions meritocratic processes foster fairness and equity in organizations.

Finally, to continue building on our efforts to study the nexus of organizational cultures and cognition, we hope future work will investigate the extent to which cultures of meritocracy may directly shape other important organizational behaviors outside the domain of employee rewards and other career outcomes. One interesting research possibility is to study whether endorsing a meritocratic culture can be viewed as a more broadly "moral" behavior, ultimately influencing the ethics of managerial decisions. We also see promise in examining the extent to which the underlying mechanisms we propose in this study account for our paradox of meritocracy, with emphases on the moral credentialing and the self-perceived objectivity explanations. Altogether, we believe that these potential studies offer interesting future strategies for expanding our research, both theoretically and empirically, while providing greater interdisciplinary engagement in this area.

The Risks of Rewarding Merit

Inside organizations, employers have often emphasized various elements of meritocracy and merit-based approaches in the workplace. Perhaps implicit in the adoption of these merit-based practices is the presumption that they increase workplace opportunities as well as fairness and equity. Because these practices are ultimately implemented by decision makers embedded in different organizational cultures and structures, however, there are hidden risks behind the adoption of ostensibly meritocratic practices. Our work reveals that bias can be triggered by attempts to reduce it, particularly in organizational contexts that emphasize meritocratic values. This paradox of meritocracy is of theoretical relevance because it provides an insight into why gender and racial disparities persist within job titles and work establishments, especially given the recent shift to employer procedures emphasizing merit and pay for performance.

Finally, our study has important implications for managerial practice and policy making. It serves as a cautionary lesson about the potential unintended negative consequences of organizational efforts to reward merit. If not implemented carefully, such efforts may prove unhelpful or even harmful. We do not mean to suggest that the pursuit of meritocracy is futile, only that it may be more difficult than it first appears. The central contribution of this study is to demonstrate that the causal effect of introducing meritocratic cultures and merit-based practices cannot be taken for granted. Instead, and paradoxically, the implementation of such organizational routines and efforts may have hidden risks and should therefore be undertaken with care.

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Where Have All the Patent Lawyers Gone? Long Time Passing . . .[1]

Ken Port,[2] Lucas Hjelle,[3] and Molly Littman[4]

I. Introduction

This article pursues two distinct, but related hypotheses. First, as total LSAT takers decline, we expect to see a decline in the number of new attorneys admitted to the patent bar. Second, as the number of new patent attorneys shrinks and the number of women pursuing engineering degrees increases, we expect that the patent bar will become more female.

In order to test these hypotheses, we gathered and collated data from the Law School Admission Counsel (LSAC) regarding students taking the Law School Admissions Test (LSAT), the United States Patent and Trademark Office (USPTO), the Society of Women Engineers (SWE), and the American Bar Association (ABA). The data establishes that the first hypothesis is true, but that the second one is false. That is, the number of new entrants to the patent bar will drop precipitously. By 2018, new entrants will number one half of what they were in 2008. However, the number of female patent attorneys compared to the number of male patent attorneys will not change in this same time period. That is, even though the patent bar will shrink, the patent bar will not become more female.

II. Context

In 2012, Congress passed the America Invents Act (AIA). It passed with astounding bipartisan[5] support.[6] Such bipartisan support for legislation has not been seen in years. It was perceived as a jobs

[1] Article title meant as a reference to "Where Have All the Flowers Gone?" written by Pete Seeger in 1955. Dubbed as one of America's top political songs ever, it also is a contemplation of death. Ian K. Smith, *Top 20 Political Songs: Where Have All the Flowers Gone*, New Statesman, March 25, 2010. As this article does not predict a healthy or robust future for the patent bar, it seems apropos.

[2] Professor of Law, William Mitchell College of Law. We are deeply indebted to Ms. Julie Ekkers, Assistant Dean of Admissions, William Mitchell College of Law, for her and her staff's valuable assistance in the collection of data for this piece.

[3] Patent Attorney, Schwegman, Lundberg and Woessner. We are especially indebted to Professor Saurabh Vishnubhakat from the Center for Innovation Policy at Duke Law School for his valuable research and scholarship on female patent attorneys and his willingness to cooperate in this study.

[4] William Mitchell College of Law '16. Ms. Littman will be a summer associate at Gray Plant Mooty in 2015. The views expressed in this article are those of the authors.

[5] *H.R. 1249 (112th): Leahy-Smith America Invents Act*, GOVTRACK, https://www.govtrack.us/congress/votes/112-2011/h491 (last visited Feb. 3, 2015) (71% of all Congressional representatives voted in favor of the AIA).

[6] House Vote #491 on June 23, 2011 passed with 304 Representatives voting yes, 117 voting no, and 10 not voting *See Final Vote Results for Roll Call 491*, CLERK H.R., http://clerk.house.gov/evs/2006/roll491.xml (last visited Feb. 3, 2015) . Senate Vote #129 on September 8, 2011 passed with 89 Senators voting yes, 9 voting no, and 1 not voting. *U.S. Senate Roll Call Votes 112th Congress- 1st Session*, U.S. SENATE, http://www.senate.gov/legislative/LIS/roll_call_lists/roll_call_vote_cfm.cfm?&congress=112&session=1&vote=00129 (last visited Feb. 3, 2015). The total number voting yes was 393, the total number voting was 519, and the

bill. Even President Obama claimed that it would result in the creation of jobs.[7] In the lead up to its passage, many claims were made that it would generate jobs in America, thus the bipartisan support. Many irrational claims were made that it would produce 200,000 or more jobs. It appears that these "jobs" would come in the form of patent attorneys who would be needed to prosecute the increased number of patent applications that would need to be filed because the AIA was to spur innovation.

In fact, there is no actual data on how many, if any, jobs the AIA will create. All such claims appear to be mere political hyperbole.

If the AIA were to produce 200,000 patent attorney jobs as some claimed,[8] at current rates, it would take 200 years to recognize this goal. Today, approximately 1,000 people a year enter the patent bar. Even if the claim of 200,000 new jobs were broadly applicable to any new employment, there is no evidence or data that suggests the AIA will be directly responsible for 200,000 new jobs in the foreseeable future. For example, one study that focused on startup companies was relied upon to suggest that every new patent would create between three and ten new jobs.[9] With the expected increase in the number of patent applicants due exclusively to the AIA, this implies that the AIA is to be responsible for generating between 20,000 and 66,667 new patents.[10] However, even the authors of this principle study expressly cautioned against using their study for determining the number of jobs the AIA is expected to produce. Therefore, this claim of the number of jobs that would be allegedly created by the AIA seems disingenuous. As will be demonstrated below, there will be an overwhelming amount of patents to file and prosecute, but that there appears to be no data to support the suggestion that the AIA is itself responsible for creating patent attorney jobs.

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percentage voting yes was 75.7% 71% of members of the House voted in favor of the AIA, as well as 89% of members of the Senate. See *House Vote #491*, GOVTRACK (Jun. 23, 2011), https://www.govtrack.us/congress/votes/112-2011/h491; *Senate Vote # 129*, GOVTRACK (Sept. 8, 2011). https://www.govtrack.us/congress/votes/112-2011/s129.

[7] See http://www.whitehouse.gov/the-press-office/2011/09/16/remarks-president-signing-america-invents-act

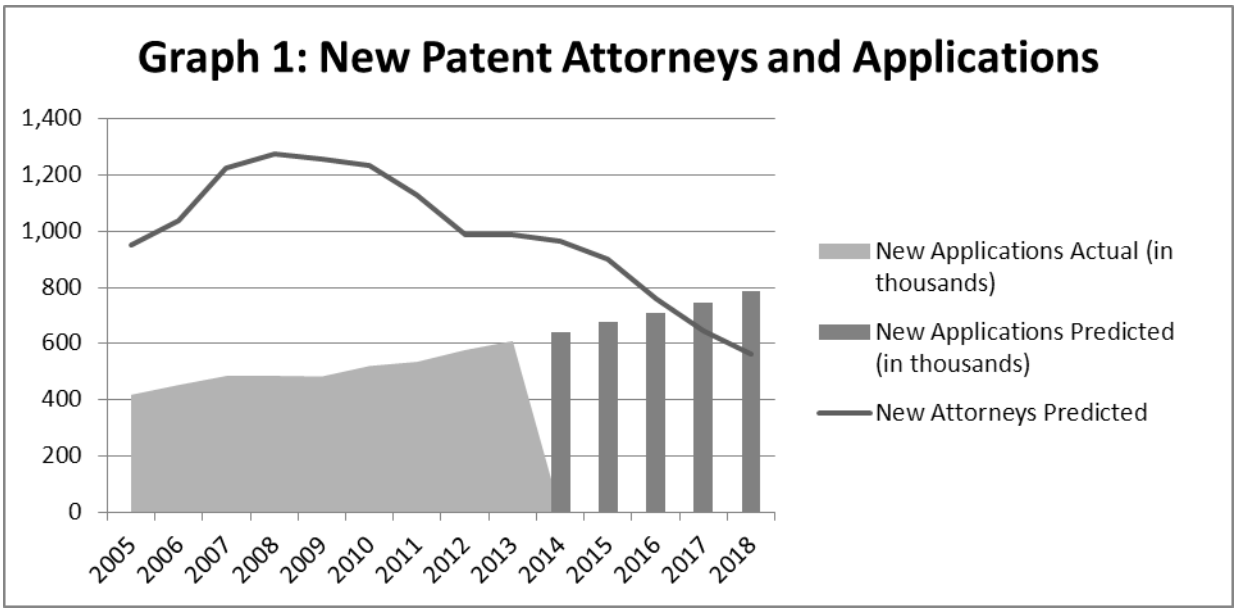
[8] *See* H.R. Rep. 112-98, at 73 (Jun. 1, 2011), *available at* http://www.uspto.gov/aia_implementation/crpt-112hrpt98-pt1.pdf. "H.R. 1249 modernizes US patent law to improve the operations of the US Patent and Trademark Office, inhibit frivolous patent lawsuits, protect the rights of all inventors, and spur innovation as a means to create American jobs and raise standards of living." Robert I. Reis, Smoke and Mirrors: America Invents Act 2011: A Chill in the Air, 6 AKRON INTELL. PROP. J. 301, 334, n. 104 (2012); David Goldman, Will Patent Reform Really Create 200,000 Jobs?, CNN MONEY (Sept. 16, 2011), http://money.cnn.com/2011/09/08/technology/patent_reform_jobs/. *But see* Brad Plumer, *Everything You Need to Know About Patent Reform in One Post*, WASH. POST (Sept. 6, 2011), http://www.washingtonpost.com/blogs/wonkblog/post/everything-you-need-to-know-about-patent-reform-in-one-post/2011/09/06/gIQAOD4V7J_blog.html.

[9] *See* Robert Merges, et al., *Guest Post: What We Said (and Didn't Say) in the Berkeley Patent Study*, PATENTLYO, http://patentlyo.com/patent/2011/08/guest-post-what-we-said-and-didnt-say-in-the-berkeley-patent-study.html (Aug. 5, 2011). For the original study, *see* Stuart J.H. Graham, et al., *High Technology Entrepreneurs and the Patent System: Results of the 2008 Patent Survey*, BERK. TECH. L.J. 24, 255 (2009), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1429049.

[10] The authors of the original study, Robert Merges, Pam Samuelson, and Ted Sichelman, later cautioned against any such calculation, stating "it is impossible solely from our data to draw conclusions about the general role of patents on innovation or jobs," and that "there is no principled way to determine from our data whether or not additional patents lead to additional jobs, much less the number of jobs created by each patent." Merges, *supra* note 9.

Also, even if the AIA is to produce any jobs for patent attorneys in America, it appears that in the lead up to its passage and the subsequent implementation, no one talked to law schools or did anything to encourage potential law students to attend law school and become a patent attorney.

Inventors seem to have gotten the message. New filings for patent applications continue to rise, as shown in Graph 1 below.[11] Once again, there is no statistical correlation between the AIA and an increase in patent application filings. As Graph 1 makes clear, the filings are increasing, but at a rate consistent with the constant rate prior to 2012, the effective date of the AIA. There is no substantial increase in patent application filing as a result of the AIA. There is, and remains, a constant year-on-year steady increase of new patent applications.



That is, the number of patent applications has increased and will continue to increase,[12] AIA or not. Inventors and patent attorneys seem to all have been made are aware of the AIA.[13] However, the number of new patent attorneys entering the patent bar is about to fall precipitously, and no one is taking notice. Women are not making inroads in the proportion of patent attorneys in the United States

[11] *See* USPTO, *U.S. Patent Statistics Chart Calendar Years 1963–2013*, USPTO.GOV, http://www.uspto.gov/web/offices/ac/ido/oeip/taf/us_stat.htm (last modified July 24, 2014). In 1963, 66,715 utility patent applications of US origin were filed. In 2013, there were 287,831. The total number of patents filed in 2013 was 609,052.

[12] The number of applications is projected to grow by 5% each year. *See* USPTO, FISCAL YEAR 2015 PRESIDENT'S BUDGET: THE USPTO CONGRESSIONAL BUDGET JUSTIFICATION 14 (Mar. 13, 2014), *available at* http://www.uspto.gov/about/stratplan/budget/fy15pbr.pdf.

[13] Richard Maulsby, *President Obama Signs America Invents Act*, INVENTORS EYE (OCT. 2011), http://www.uspto.gov/inventors/independent/eye/201110/americainventsact.jsp.

and it remains a distinctively male endeavor. Approximately 30% of patent attorneys are female and that will remain unchanged.[14] That is, women patent attorneys are not making up for the dramatic decrease in new patent attorneys.

Furthermore, we are often told that the number of jobs requiring a JD degree are shrinking drastically and that potential law students have gotten that message and have stopped coming to law school.[15] Accepting for the sake of argument that this is true, if normal market forces are in play, one would expect to see a flood of patent bar eligible students attending law school, as there are many jobs for qualified patent bar eligible people.[16] If the AIA is to create all these jobs and encourage patenting, there should be more patent jobs to be had in America. In fact, hiring in patent firms is robust.[17] However, this has not translated into more patent bar eligible students attending law school. In fact, the decrease of patent bar eligible students far exceeds the decrease of non-patent bar eligible law students.[18]

Not only is misrepresenting the AIA as a jobs bill disingenuous at best, there will soon be a shortage of new patent attorneys to do the very work the AIA encourages. New patent applications are projected to increase at 5% a year for the next 4 years and the number of new patent attorneys will fall by 50% in the next 4 years (compared to 2008).[19] This is a crisis and policymakers and educators need to take action now.

III. Hypothesis One: As LSAT takers Shrink, the Number of New Patent Attorneys will Shrink

Our first hypothesis was that as the number of total LSAT takers decreased, the number of new admissions to the patent bar would correspondingly decrease. The data supports this conclusion, but also shows that the number of new admissions to the patent bar will actually decrease at a rate far faster than the decrease in all LSAT takers. Over the last 5 years, approximately 1,200 new patent attorneys passed the patent bar each year and were admitted to the patent bar. Within 5 years, the number of new entrants to the patent bar will decrease substantially. By 2018, the number of new entrants to the patent bar is expected to shrink to less than half of what it is today, or approximately 600 new patent attorneys per year. The 1,200 people who entered the patent bar in 2008 are actual numbers. The 600 that will enter by 2018 is, obviously a projection; however, the projection is overinflated. That is, there are predicted to be 600 people *eligible* to take the patent bar in 2018. We

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[14] *See* Graph 5, *infra* at 9.

[15] *See* Elizabeth Olson & David Segal, *A Steep Slide in Law School Enrollment Accelerates*, NY TIMES, Dec. 17, 2014, http://dealbook.nytimes.com/2014/12/17/law-school-enrollment-falls-to-lowest-level-since-1987/?_r=0NY Times article; Ethan Bronner, *Law Schools' Applications Fall as Costs Rise and Jobs Are Cut*, NY TIMES, Jan. 30, 2013, http://www.nytimes.com/2013/01/31/education/law-schools-applications-fall-as-costs-rise-and-jobs-are-cut.html.

[16] Courtney Rubin, *Spark Your Legal Career With These In-Demand Law Jobs*, U.S. NEWS & WORLD REPORT EDUCATION, http://www.usnews.com/education/best-graduate-schools/top-law-schools/articles/2014/03/12/spark-your-legal-career-with-these-in-demand-law-jobs (Mar. 12, 2014) ("Intellectual property law is an area where firms are always hiring associates."). *See also* Rich Steeves, *Intellectual Property Law Jobs on the Rise*, INSIDE COUNSEL, http://www.insidecounsel.com/2013/11/12/intellectual-property-law-jobs-on-the-rise (Nov. 12, 2013).

[17] *See* Rubin, *supra* note 16.

[18] *See ABA All Majors* (document on file with author).

[19] *See* Graph 1, *supra* at 3.

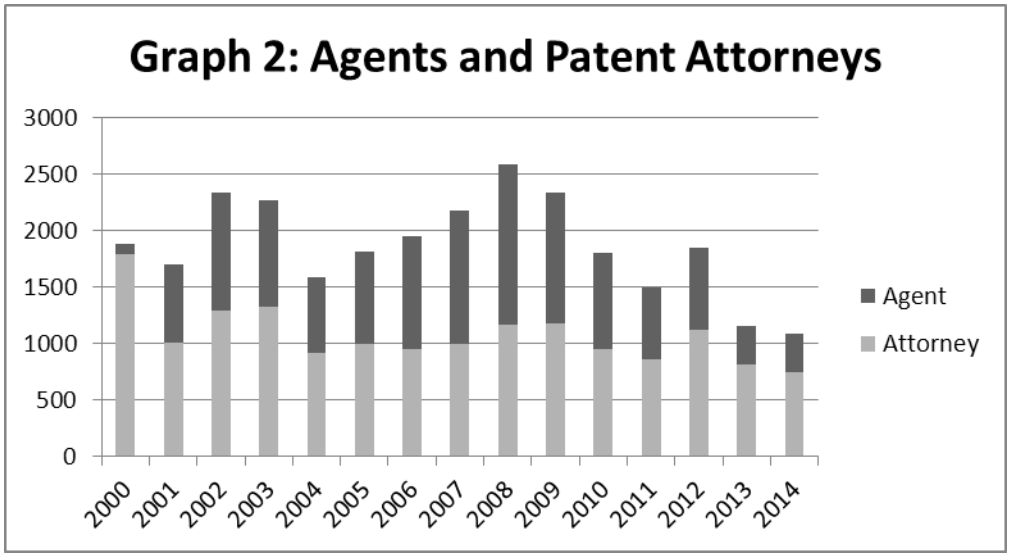
know that not every patent bar eligible student becomes a patent attorney. Although the percentage of patent bar eligible people who enter the patent bar has increased in the last decade, today, approximately 20% of patent bar eligible people will choose not to become patent attorneys. That is, the 600 predicted patent attorneys needs to be discounted by the likelihood that anyone will become a patent attorney. This is impossible to measure but, anecdotally, appears to be roughly 20%.

We know the number of new patent attorneys will shrink by looking at indicators. First, LSAT takers who are patent bar eligible are dropping precipitously. In 2008–09, 5,408 people who possessed patent bar presumptive eligible degrees took the LSAT.[20] By 2012–13, that number became 2,474 LSAT takers or a drop of 46%.[21] Within the patent bar-eligible range of LSAT takers, the most employable people as patent attorneys are Mechanical Engineers, Electrical Engineers, Computer Engineers, and Chemical Engineers. The data supports this by showing that most patent attorneys fit within one of these four fields.[22] The number of law students with these degrees has declined even more steeply than the general population of all LSAT takers with patent bar presumptive eligible degrees over this same time period.[23]

In 2008–09, the total number of people who took the LSAT (patent-eligible and not patent-eligible) was 84,119. Similarly, by 2012–13, that number had become 59,354, or a drop of 29%. This decline is not remarkable to anyone. Every law professor alive knows that the number of students has been in decline. What is remarkable is that patent bar eligible student numbers are in a complete freefall and that the patent bar eligible student freefall far exceeds the decline of all LSAT takers.

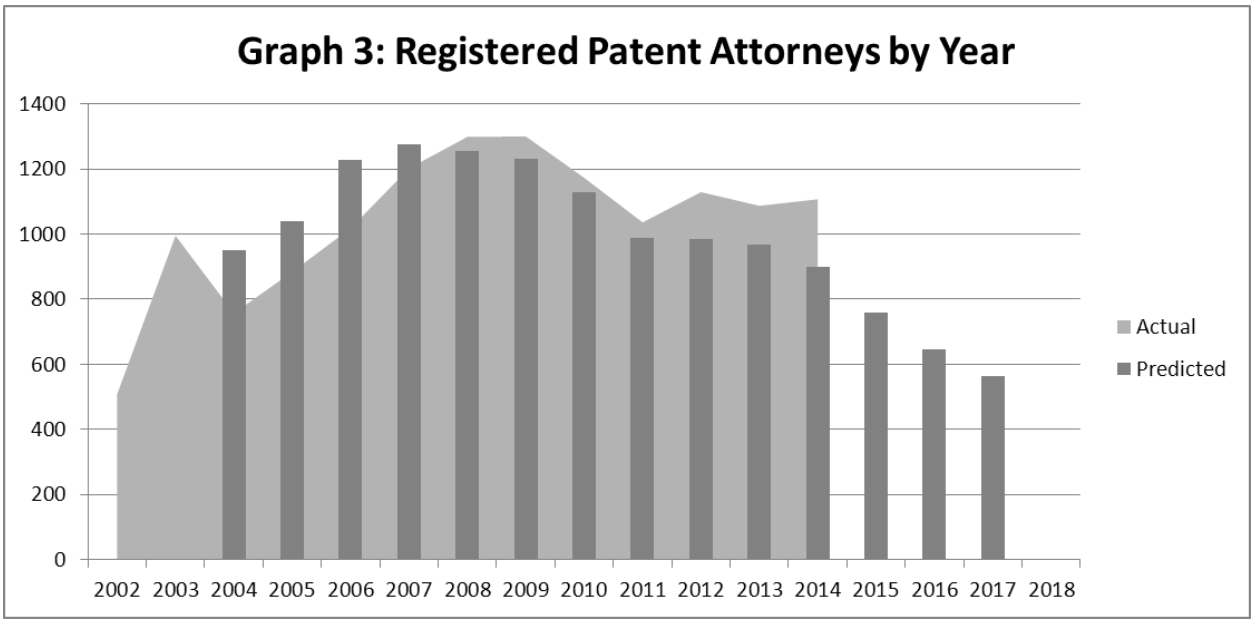
To be sure, in the last decade, the number of new patent agents has increased somewhat. However, as shown in Graph 2 below, this amount is not nearly enough to alleviate the burden that patent attorneys are about to realize.[24]

[20] *Patent Bar Eligible Majors* (document on file with author).
[21] *Id.*
[22] *See id. But see* Bloomberg News, *New Law Creates a Demand for Patent Specialists*, NY TIMES (Oct. 9, 2011), http://www.nytimes.com/2011/10/10/business/new-law-creates-demand-for-patent-specialists.html ("The most highly sought degrees held by patent lawyers are in electrical engineering, computer science and computer engineering.").
[23] Mechanical Engineers (ME): 378/181/52%; Electrical Engineers (EE): 452/184/59%; Computer Engineers (Comp. E): 130/49/62%; Chemical Engineers (Chem E): 199/115/62%. Key: LSAT takers possessing this degree in 2010/LSAT takers possessing this degree in 2014/percent decline in four years.
[24] *See* Graph 2, *infra* at 6.

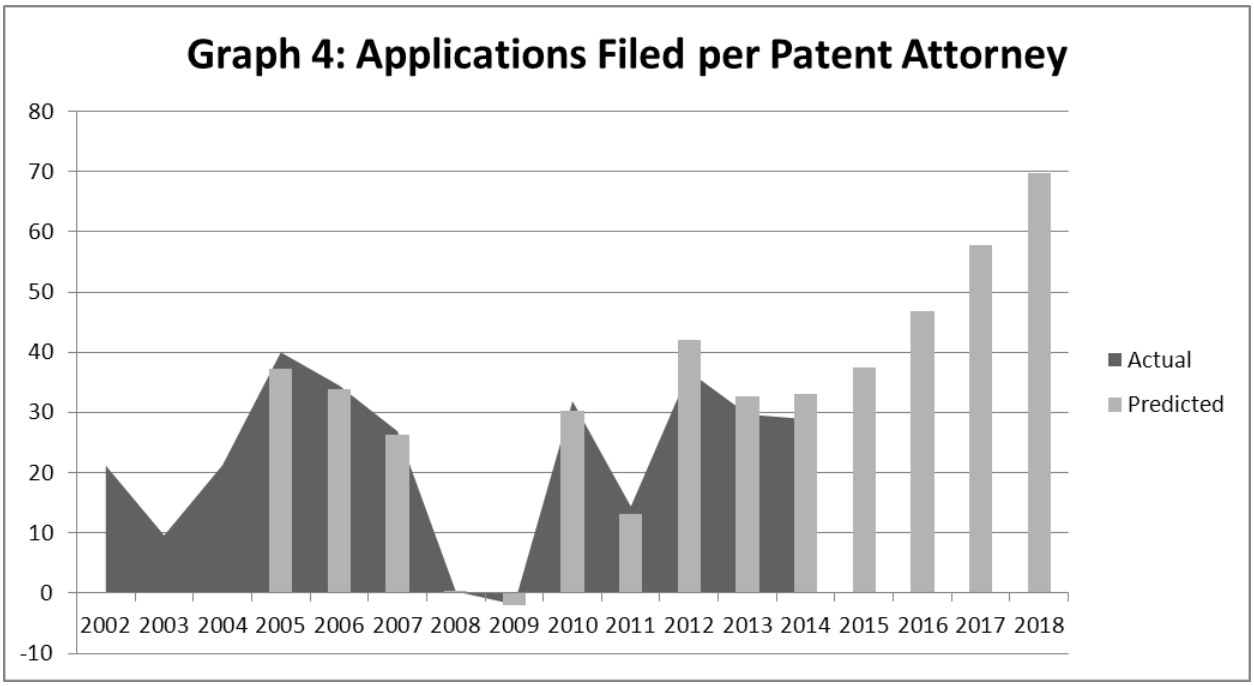


The ratio of registered patent attorneys to number of patent bar eligible students entering ABA accredited law schools has remained fairly consistent at about 31.5% over the years.[25] Graph 3 below shows the predictive ability of this 31.5% assumption for the decade spanning 2004–2013, the predicted totals for 2014, and the predicted number of new registered patent attorneys in 2015–2017:

[25] *See* ABA to Patent Attorney Spreadsheet, *infra* at 19.



It is also interesting to examine how this assumption predicts the increased workload per patent attorney. Using the 31.5% prediction, Graph 4 was generated to show predicted ratio of new applications filed per new patent attorney. As with Graph 3 above, actual data matches well with predicted data. As can be seen in the graph, the predictive ability of the 31.5% is fairly consistent for years 2005–2014, and the trend shows the ratio of new applications filed per new patent attorney to double between 2014 and 2018.



IV. Hypothesis Two: the Patent Bar will become more Female

As the total number of LSAT takers decreased and the number of female engineers increased,[26] we expected the patent bar to become more female. Our data supports the contrary notion. The ratio of male to female patent attorneys has not changed significantly in the last 25 years. As such, we have no data to support the idea that it is about to be anything different.

In addition, the hyperbole of increased women in engineering appears to be just that: an exaggeration. 19.1% of engineering degrees granted in 2013 were to women.[27] Comparatively, women make up a disproportionately large percentage of patent attorneys, as the patent bar today is nearly 30% female.[28]

Contrary to the precipitous fall in the total number of patent attorneys, the percentage of female patent attorneys will remain unchanged, as shown in Graph 5 below. The overall law school population at some law schools now exceeds 60% female.[29] This is an increasing trend since 1950, but the increase in the last 40 years is significantly greater, as shown in Graph 6 below.[30] However, while female patent bar eligible students have similarly increased, it is not enough to change the ratio of female to male patent attorneys.

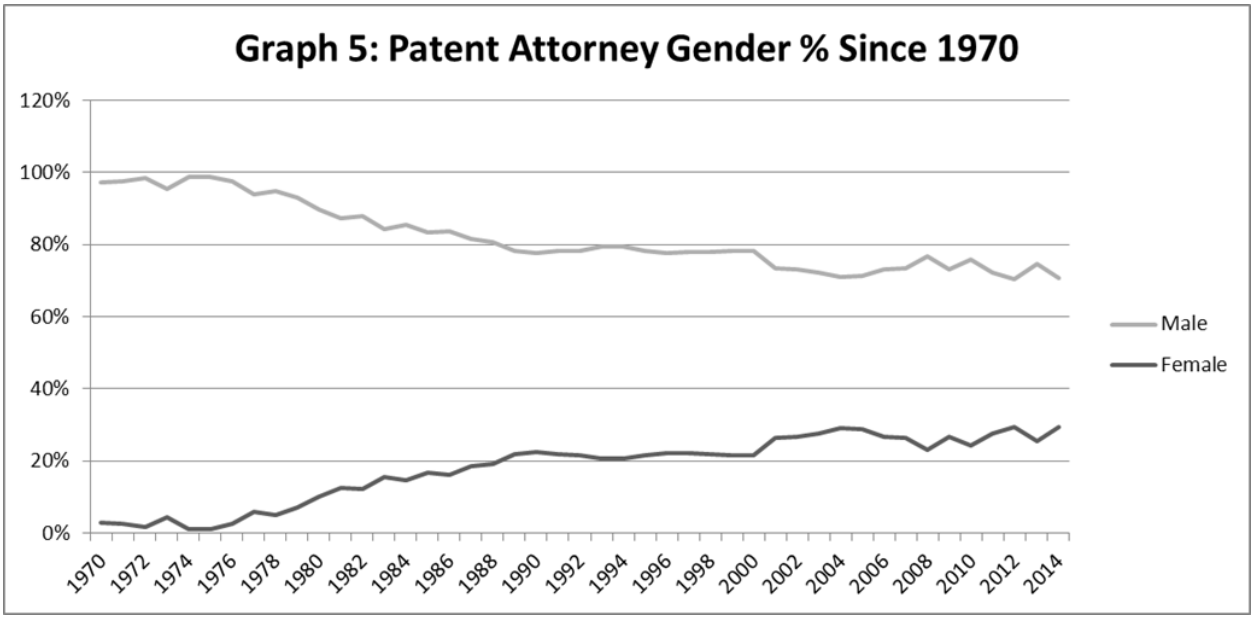
[26] In 2009, women obtained 17.8% of engineering bachelor's degrees. In 2013, that number rose to 19.1%. *See* MICHAEL T. GIBBONS, ENGINEERING BY THE NUMBERS 12 (2009), *available at* http://www.asee.org/papers-and-publications/publications/college-profiles/2009-profile-engineering-statistics.pdf; BRIAN L. YODER, ENGINEERING BY THE NUMBERS 12 (2013), *available at* http://www.asee.org/papers-and-publications/publications/14_11-47.pdf [hereinafter YODER 2013].

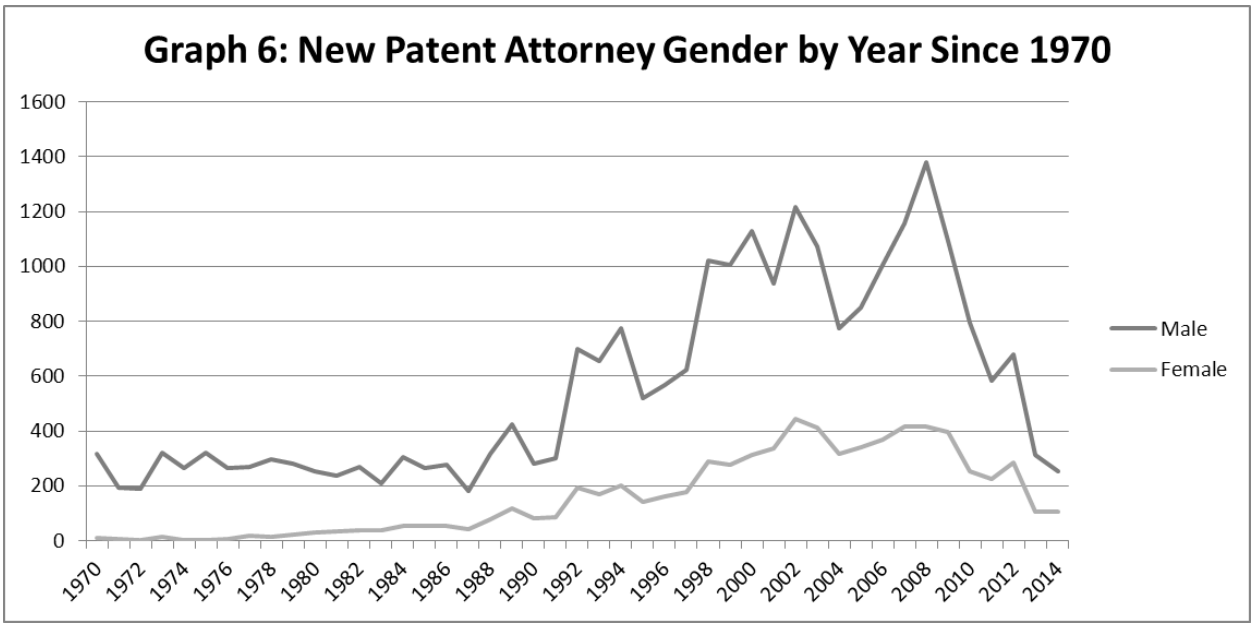
[27] *See* YODER 2013, *supra* note 26.

[28] *See* Graph 5, *supra* at 9.

[29] WMCL is 61% female. While WMCL may have a higher percentage of women enrolled in the J.D. program, it is not much higher than the rest of the country. In general, women make up 47% of J.D. students. *See* A.B.A. COMM'N ON WOMEN IN THE PROFESSION, A CURRENT GLANCE AT WOMEN IN THE LAW (2014), *available at* http://www.americanbar.org/content/dam/aba/marketing/women/current_glance_statistics_july2014.authcheckdam.pdf.

[30] In 1970, only 8.6% of J.D. candidates were women. In 1993, 50.4% of students enrolled in a J.D. program were women. In 1994, that percentage dropped to 43.1%. Since then, we have seen a steady increase in the number of women enrolled in J.D. programs. Currently, 47% of students enrolled in a J.D. program are women. *See* FIRST YEAR AND TOTAL J.D. ENROLLMENT BY GENDER, A.B.A. (2011), *available at* http://www.americanbar.org/content/dam/aba/administrative/legal_education_and_admissions_to_the_bar/statistics/jd_enrollment_1yr_total_gender.authcheckdam.pdf.





Female patent bar eligible students and patent attorneys newly admitted to the patent bar do not possess those most attractive degrees to the patent industry: mechanical, electrical, computer, and chemical engineering. In fact, the most popular engineering degrees for females to possess are environmental engineering (45.8%), biomedical (38.9%), and chemical engineering (32.3%).[31] The least

[31] YODER 2013, *supra* note 26, at 12. Since 2009, the percentage of women pursuing environmental engineering degrees has increased from 43.7% to 45.8%, while biomedical saw a spike in 2012 at 39.2%, and chemical engineering has seen a slow decline since 2009. In 2009, 35.9% of women in engineering received chemical

popular among women are computer engineering (10.7%), mining engineering (12.1%), and electrical engineering (12.3%).[32]

Interestingly, women have made significant inroads in the number of professors of patent bar eligible subject matters. For women, the most popular subjects to teach, in fact, match very well with areas where there is high growth predicted for patent attorneys (MM, EE, Comp E, and Chem E).[33] However, this fact has not demonstratively translated into more women pursuing those subjects and more women subsequently entering the patent bar. Clearly, more study is needed to determine why having female professors of the most important (by employment statistics) patent bar-eligible subjects does not translate into more women entering those fields. Theories that support affirmative action would suggest the opposite.[34] That is, we are told that our teachers need to look more like the students in order to encourage and support those students. Professors of color are more likely to encourage, support, and attract students of color.[35] This small snippet of data in this study indicates that female

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engineering degrees, while today that number is 32.3%. However, chemical engineering is still one of the top three engineering majors for women today. *See* GIBBONS, *supra* note 23, at 12; BRIAN L. YODER, ENGINEERING BY THE NUMBERS 12 (2012), *available at* http://www.asee.org/papers-and-publications/publications/11-47.pdf [hereinafter YODER 2012]; YODER 2013*, supra* note 26, at 12.

[32] *See* YODER 2013, *supra* note 26, at 12. While computer engineering is still among the lowest sought engineering degrees for women, there has been an increase in percentage of women seeking computer engineering degrees. In 2009, only 7.9% of women in engineering sought computer engineering degrees, while today that number is 10.7%. Two degrees often sought after by patent law firms, electrical and mechanical engineering, are also on the low end of the scale for women seeking engineering degrees. In 2013, only 12.5% of women in engineering sought mechanical engineering degrees and only 12.3% of women in engineering sought electrical engineering degrees. *See* GIBBONS, *supra* note 26, at 12; YODER 2013, *supra* note 26, at 12.

[33] While the percentage of women teaching in these disciplines has increased, the number of tenure-track professors teaching in the fields of mechanical, computer, chemical, and electrical engineering remains predominately male. Female tenure-track professors are more likely to teach in the areas of environmental and biomedical engineering, as well as engineering management. *See Data on Women and Engineering Majors* (document on file with author).

[34] Sapna Cheryan, et al., *Do Female and Male Role Models Who Embody STEM Stereotypes Hinder Women's Anticipated Success in STEM?*, SOCIAL PSYCHOLOGY & PERSONALITY SCIENCE (2011), *available at* http://depts.washington.edu/sibl/Publications/Cheryan%20Siy%20et%20al.%20Role%20Models%20SPPS%20in%20press.pdf (suggesting that women entering STEM fields may be less concerned with gender than whether their role models embody STEM stereotypes). Comparatively, studies show that women role models play a role in introducing women to STEM fields. *See e.g.*, Penelope Lockwood, *"Someone Like Me Can Be Successful": Do College Students Need Same-Gender Role Models?*, 30 PSYCHOLOGY OF WOMEN QUARTERLY 36, 44 (2006) ("In sum, female role models may be especially beneficial for women for a variety of reasons," including: "inspirational examples of success . . .; possibil[ity of] overcoming traditional gender barriers . . .; serv[ing] as . . . guides to the potential accomplishments for which other woman can strive . . .; [and] demonstrating competence in traditionally male occupations . . . .").

[35] *E.g.*, Ana Maria Villegas, et al., *Closing the Racial/Ethnic Gap Between Students of Color and Their Teachers: An Elusive Goal*, EQUITY & EXCELLENCE IN EDUCATION 283, 285–88 (2012), *available at* http://www.montclair.edu/profilepages/media/439/user/Villegas-Strom-Lucas--2012--EEE.pdf (explaining that this role model theory "emphasizes the role that teachers of color can play in bolstering the sense of worth of students of color, motivating them to strive for academic success, and encouraging them to envision professional careers for themselves."). It may be that the lack of minority professors in the STEM fields is not limited to gender. One source argues that racial minorities also lack role models in the STEM fields. *See* Kelsey Sheehy, *Minorities Need*

electrical engineering professors, for example, are not attracting female students to electrical engineering.

V. Significance

The number of patent attorneys will fall and, despite efforts to the contrary, will remain a distinctively male endeavor. Policy makers may want to respond to these findings. The drop in new patent attorneys following the AIA, may create an ideal environment for women to enter an otherwise predominantly male field. Policy makers may take early advantage of this opportunity, such as by encouraging more females to, not only go to science and engineering schools, but to also become specific types of engineers and then be more employable as patent attorneys.

The AIA policy planning is deficient in that it encourages patenting on one hand, yet does nothing to reverse the trend of declining patent bar entrants on the other. There will have to be a national, concerted effort to change this trend if the AIA's lofty goals of creating any jobs is to be realized. Otherwise, there simply will not be enough people to do the job.

There are many possible ways to either incentivize ME, EE, Chem E, and Comp E people to become patent attorneys; however, it may be time to change the nature of the patent bar. As is discussed below, America is alone in the world in making a "patent attorney" such a reified class of people. It may be time to end the requirement that patent attorneys possess specific undergraduate degrees to be patent bar eligible. Perhaps, the patent bar should be opened up to any person possessing a Juris Doctorate degree or, even more radically, to anyone who can pass the patent bar, regardless of their undergraduate educational background[36]

VI. Education of Would-be Patent Lawyers

In the United States, the PTO has authority to regulate all patent attorneys.[37] As such, it has determined that all patent attorneys must possess one of several technical degrees in science or engineering, or otherwise prove their competency to a sufficient extent to be allowed by the PTO to enter the coveted "patent bar."[38] America is anomalous in this regard. Other industrialized nations, like Japan, allow anyone to sit for that country's patent bar.[39] In the United States, only people who possess a science or engineering undergraduate degree or the equivalent are allowed to work as a patent

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STEM Role Models Too, U.S. NEWS & WORLD REPORT, June 28, 2012, *available at* http://www.usnews.com/news/blogs/stem-education/2012/06/28/minorities-need-stem-role-models-too.

[36] For a discussion of whether a technical degree requirement is needed and/or valid, see Nicholas Matich, *Patent Office Practice After the America Invents Act*, 23 FED. CIR. B.J. 225, 241–44 (2013).

[37] 35 U.S.C. § 2(b)(2)(D) (2014) ("The Office . . . may govern the recognition and conduct of . . . attorneys . . . .").

[38] For a list of patent bar eligible majors and requirements, see *Do I Qualify to Sit for the Patent Bar Exam?*, PATBAR, http://patbar.com/uspto-patent-bar-exam-requirements.shtml (last visited Nov. 13, 2014).

[39] In Japan, any person who has passed the patent attorney examination, is qualified to be an attorney, or has been an examiner at the Japan Patent Office for seven years or more, and has completed the practical training can become a patent attorney. *See* Patent Attorney Act, Act No. 49 of 2000, ch. 1 art. 7 (Japan) [hereinafter Japan Patent Attorney Act], *available at* http://www.jpaa.or.jp/english/aboutus/pdf/PatentAttorneyAct.pdf.

attorney. In the United States, only patent attorneys (or agents) who are registered to practice through the patent bar can file patent applications on behalf of a third party client.[40]

In addition, all people who are admitted to the patent bar and wish to do the job of a patent attorney must also graduate from an accredited American law school and pass a State Bar Exam.[41] Only when a person passes both a State Bar Examination and the Patent Bar Examination may they represent themselves as a "patent attorney."[42]

In many other countries the title of "patent attorney" is not such a reified entity. Many countries are much more liberal in deciding who can file patent applications and who cannot. In Japan, for example, a person with the title of "patent attorney" (*benrishi* 弁理士) is not necessarily also a regular attorney with a legal education or admitted to practice law in Japan.[43] In most countries of the world, "patent attorney" is not the reified class of individuals that it has become in the United States. As in Japan, a person becomes a patent attorney by taking and passing the respective patent bar exam.[44] "Patent attorneys" and "lawyers" are two, separate classifications of law providers. Therefore, it is common in Japan to have people admitted to the patent bar who would be ineligible to be patent attorneys in the United States (because they do not possess a JD or its equivalent). In the United States,

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[40] 37 C.F.R. § 1.31 ("An applicant for patent may file and prosecute the applicant's own case, or the applicant may give power of attorney so as to be represented by one or more patent practitioners or joint inventors, except that a juristic entity (e.g., organizational assignee) must be represented by a patent practitioner even if the juristic entity is the applicant."). 37 C.F.R. § 11.10 ("Restrictions on practice in patent matters. (a) Only practitioners who are registered under § 11.6 or individuals given limited recognition under § 11.9(a) or (b) are permitted to prosecute patent applications of others before the Office; or represent others in any proceedings before the Office."). 37 C.F.R. § 11.6 allows for the following:

> (a) Attorneys. Any citizen of the United States who is an attorney and who fulfills the requirements of this part may be registered as a patent attorney to practice before the Office. . . . (b) Agents. Any citizen of the United States who is not an attorney, and who fulfills the requirements of this part may be registered as a patent agent to practice before the Office. . . . (c) Foreigners. Any foreigner not a resident of the United States who shall file proof to the satisfaction of the OED Director that he or she is registered and in good standing before the patent office of the country in which he or she resides and practices . . .

Similarly, 37 C.F.R. § 11.9 allows prosecution by "(a) [a]ny individual not registered under § 11.6 may, upon a showing of circumstances which render it necessary or justifiable, and that the individual is of good moral character and reputation" or by "(b) [a] nonimmigrant alien . . . authorized by the United States Government to be employed or trained in the United States in the capacity of representing a patent applicant by presenting or prosecuting a patent application."

[41] 37 C.F.R. § 11.8 ("An individual seeking registration as an attorney under § 11.6(a) must provide a certificate of good standing of the bar of the highest court of a State that is no more than six months old.").

[42] Am. B. Assoc. R. 7.4 "Communication of Fields of Practice & Specialization" allows an individual to designate themselves as a "patent attorney" only if the individual is a "lawyer admitted to engage in patent practice before the United States Patent and Trademark Office . . . ." *Id.*

[43] *See* Japan Patent Attorney Act, *supra* note 39; *Training at the German and Patent and Trade Mark Office: Opportunities for School Leavers and University Graduates*, DEUTSCHES PATENT-UND MARKENAMT, http://www.dpma.de/english/the_office/training/index.html (last visited Nov. 13, 2014) [hereinafter *Training at German PTO*] (requiring only "a university degree in a science, engineering or technical subject and a subsequent almost three-year training under supervision of a patent attorney and at the patent authorities. After the training the candidates must pass a written and oral qualifying examination.").

[44] *See* Japan Patent Attorney Act, *supra* note 39, ch. 2; *Training at German PTO*, *supra* note 43.

we have created a reified class of law professionals that must possess one of a limited number of science or engineering degrees and be admitted to a State Bar before being called a patent attorney.

In 1836, the United States patent system changed from a registration-based system to one of examination,[45] making it more difficult for inventors to obtain patents.[46] Where inventors previously filed their own patent applications, inventors began to hire experts in the minutia of drafting applications and convincing the newly created Patent Office that it should recognize the invention as novel.[47] Historically, attorneys did not practice patent prosecution as inventors favored those with a background in science over those with formal legal training.[48]

It was not until the end of the nineteenth century that attorneys began prosecuting patents.[49] While attorneys were entering the patent field, there was no official requirement that an attorney must be the one to file a patent application. Therefore, "patent agents"—those with a technical background, but no legal training—were able to file patent applications on behalf of inventors.[50] These agents were not subject to any professional code of conduct and took the opportunity to swindle inventors.[51] In 1899, regulations were placed on those who could practice patent prosecution.[52] However, because the bar could not convince Congress nor the Patent Office to rid the practice of non-lawyers,[53] anyone with the requisite scientific background or experience may sit for the patent bar, legally trained or not.[54]

The result is that the United States has created a reified classification of special attorneys to do patent work.[55] It is only these special attorneys that can communicate with the USPTO on behalf of a third party client. Patent agents and patent attorneys can handle any matter that comes up before the USPTO in the prosecution of a patent. However, patent agents are strictly prohibited from the practice

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[45] *See* Patent Act of 1836, ch. 347, 5 Stat. 117, *available at* http://patentlyo.com/media/docs/2008/03/Patent_Act_of_1836.pdf; William I. Wyman, *The Patent Act of 1836*, 1 J. PAT. OFF. SOC'Y 203, 207 (1919) ("The law restored the examination method of granting patents, established the Patent Office as a distinct and separate bureau, placed it in charge of a chief to be called the Commissioner of Patents, and provided a complete organization to make effective the American plan of predetermining the validity of the invention before the grant.").

[46] *See* Patent Act of 1836, *supra* note 45 (requiring that the patent application for a *new* invention or discovery include a written description of the invention in such a manner as to educate another person skilled in the particular art on how to make and use the invention). These new requirements were more strenuous than under the Patent Act of 1793, in which practically anyone who accurately filed a patent application was issued a patent. In the first years under the Patent Act of 1836, the rejection rate was 75%. *See also* Kara W. Swanson, *The Emergence of the Professional Patent Practitioner*, IRIS 519, 524, 526 (2009), *available at* http://ipbio.org/pdfs/papers/fulltext%20(1).pdf.

[47] Christ J. Guerrini, *The Decline of the Patent Registration Exam*, 91 NEB. L. REV. 325, 332 (2012).

[48] Id.

[49] JAMES WILLARD HURT, THE GROWTH OF THE AMERICAN LAW: THE LAW MAKERS 297–98 (1950).

[50] Naomi R. Lamoreaux & Kenneth L. Sokoloff, *Intermediaries in the U.S. Market for Technology*, *in* FINANCE, INTERMEDIARIES, AND ECONOMIC DEVELOPMENT 209, 211 (Stanley L. Engerman et al. eds., 2003).

[51] *See* Sperry v. Fla., 373 U.S. 379, 390 (1963).

[52] *Id.*

[53] Guerrini, *supra* note 47 at 334.

[54] *See* 37 C.F.R. § 11.7 (2012); *see also Do I Qualify to Sit for the Patent Bar Exam?*, *supra* note 38.

[55] For the argument that the technical background requirement of patent attorneys no longer makes sense and the scope of subject matters accepted should be greatly expanded, see Corey B. Blake, Note*: Ghost of the Past: Does the USPTO's Scientific and Technical Background Requirement Still Make Sense?*, 82 TEX. L. REV. 735, 757–63 (2004).

of law, even regarding other matters relating to the patents. Only a patent attorney may draft documents dealing with Interferences, draft Opinion Letters regarding whether one patent is likely to infringe another, or draft any other document not directly related to the prosecution of a patent.[56]

Historically, people who desired to become patent attorneys graduated from law school and then sat for the patent bar as well as a State bar examination. In the mid-1990s, law schools began educating students to become patent attorneys or "intellectual property" experts of some varying degree. Ranking organizations began scoring law schools on the reputation of their "IP Programs." In the early 1990s, it was unusual for a law school to have one person who primarily taught patent law.

There is some reliable longitudinal data on the topic of patent law offerings at American Law Schools. In 2004, Port commenced the Mitchell Study on IP Curricula.[57] In that year, there were 139 schools that offered a patent law course. By 2011, on average, the 212 ABA accredited law schools offer eight IP courses at each school. It is now not unusual to have many full-time professors who now teach IP courses. In fact, of the 212 law schools in the United States, 155 offered at least one three credit, stand-alone patent course in 2011. Thirty-one of these schools offered patent law as a multi-semester, sequenced class and awarded 6-8 credits for this sequence.[58]

In 2014–15, the number of schools offering a stand-alone patent law course dropped to 144.

That is, in under 20 years, IP generally and patent law specifically has gone from a course of study that was rarely offered to a subject matter that is present, to one extent or another, in nearly every law school in America. In 2011, only five American law schools did not list any IP courses in their course catalogues.[59] Some law schools legitimately offer 20 or more IP courses every year with some law schools claiming that they offer upwards of 40 courses a year.[60] Regardless of whether this is a legitimate claim or marketing puffery, IP has become so hot that some law schools claim that every

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[56] Patent agents may provide patentability opinions, but only for opinions that do not involve the practice of law. The example given for an allowable opinion: "In contrast, a validity opinion issued in contemplation of filing a request for reexamination would be in contemplation of a proceeding before the Office involving a patent. Due to registration to practice before the Office in patent cases, a practitioner may issue a validity opinion in contemplation of filing a request for reexamination." Federal Register (Rules and Regulations), Vol. 73, No. 158 (2008); *see Sperry v. Florida,* 373 U.S. 379 (1963).

[57] *Mitchell Study on IP Curriculum 2007*, WILLIAM MITCHELL, http://web.wmitchell.edu/intellectual-property/mitchell-report-on-intellectual-property-curricula-2007/ (last visited Feb. 4, 2015) [hereinafter *Curriculum Study 2007*]. *See* Kenneth L. Port, *Essay: Intellectual Property Curricula in the United States*, 46 IDEA 165 (2005).

[58] *See Curriculum Study 2007*, *supra* note 57.

[59] *See Mitchell Study on IP Curriculum 2011*, WILLIAM MITCHELL, http://web.wmitchell.edu/intellectual-property/mitchell-report-on-intellectual-property-curricula/%20 (last visited Feb. 4, 2015) [hereinafter *Curriculum Study 2011*].

[60] DePaul University Law School's Center for Intellectual Property law and Information Technology claims that they offer "more than 40" IP classes. *See Curriculum*, DEPAUL COLLEGE OF LAW, http://law.depaul.edu/about/centers-and-institutes/center-for-intellectual-property-law-and-information-technology/Pages/curriculum.aspx (last visited Feb. 4, 2015).

course that touches on IP, be it first-year Property Law or Anti-trust Law, Sports Law, Entertainment Law or Cyberlaw, etc., are claimed as being IP courses.[61]

Truly, in 20 years' time, patent law has gone from an extreme outlier in law school curricula to a mainstay and focal point. This much is self-evident.

There have been scholars who have pointed out that the trend of always expanding patent rights was not sustainable[62] but their focus has always been on the appropriate scope of IP rights, not on whether there would be enough professionals to do the job. Most American law schools rushed to create IP courses focused on training an entire new generation of patent lawyers. When people graduate from law school today, it is not unusual for them to have taken six or eight courses (and upward) which focused on various aspects of patent law and to have already sat for and passed the patent bar exam.

Law schools built it and they came.

VII. Patent Law Faculty

By some estimates,[63] in 1999, there were only 56 law schools in the United States that offered a course titled "patent law." Unfortunately, this conclusion was based on a survey of IP professors in America at that time.[64] As there is a danger that IP professors may over-report or under-report the number of courses their law school offers and there is no way to check the veracity of these claims, this conclusion is not very reliable as an accurate statement of data. However, it is helpful as a starting point. Since it is impossible to roll back the clock 20 years to study what patent law education looked like at that point in time, it is all we have.

For the general point that IP generally, and patent law specifically, has increased in significance in the law school setting in the last 20 years, Professor Kwall's study seems applicable and relevant.

As stated above, in 2011, there were 155 law schools that offered a three-credit, standalone course on patent law.[65] In the academic year of 2014–15, 144 schools offered a standalone patent course. Of

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[61] For the list of 31 "Patent Law Certificate" courses that DePaul University Law School offers, see http://www.depaul.edu/university-catalog/degree-requirements/law/law-jd/certificate-requirements/Pages/intellectual-property-patent-law-certificate.aspx.

[62] *See, e.g.*, Martin J. Adelman & Sonia Baldia, *Prospects and Limits of the Patent Provision in the TRIPS Agreement: The Case of India*, 29 VAND J. TRANSNAT'L L. 507 (1996).

[63] Roberta Rosenthal Kwall, *The Intellectual Property Curriculum: Findings of Professor and Practitioner Surveys*, 49 J. LEGAL EDUC. 203, 203 (1999). Starting in 2005, I have kept a longitudinal record of course offerings in United States law schools. *See*, Kenneth L. Port, *Intellectual Property Curricula in the United States*, 46 IDEA 165 (2005); *Curriculum Study 2011*, *supra* note 59.

[64] Kwall conducted a nationwide survey of law professors. She received responses from 69 schools (sometimes from more than one professor at a school). *See* Kwall, *supra* note 63, at 203–04.

[65] *See Curriculum Study 2011*, *supra* note 59.

those 144 schools, 95 were taught by full-time, tenured or tenure-track faculty ,and 46 were taught by adjunct faculty.[66]

Patent law specifically has become the apparent focus of all IP programs. Twenty years ago, it was rare for a patent attorney to become a full-time law professor. Today, if a law school does not employ at least one patent attorney, its IP program is somehow considered "less" or deficient in some regard. In fact, today, many law schools take the most pride in the writings of professors who teach patent law and who happen to be admitted to the patent bar or are patent bar eligible. Until the decline in general law school enrollment commenced, there was keen competition for the best talent among patent attorney professors. It has become commonly accepted in the field that the "best talent" is defined as those writing the most conceptual scholarship regarding patent law and those who were admitted to the patent bar or who were patent bar eligible.[67]

There are 49[68] schools who claimed in their online literature in 2014 to have the equivalent of an "institute" for IP within their law school. Of these 49, 35 schools employ at least one professor who is admitted or eligible to be admitted to the patent bar and taught patent law in the 2014–15 school year.

In addition, Expresso lists 63 journals as publishing exclusively or primarily intellectual property related articles.[69] Twenty years ago there were 21 such journals.[70]

The teachers of patent law courses used to be adjunct professors and full-time patent attorneys. It was very rare for a full-time professor to teach a patent law course because they simply did not exist.[71] Today, some of the most theoretical publications are written by patent professors who have joined the ranks of academia in the last 20 years and are also admitted to the patent bar or who are patent bar eligible.

Twenty years ago, the career trajectory of some current patent professors was unthinkable. People like Dan Burk,[72] Mark Lemley,[73] and Scott Kieff[74] largely were absent from the list of professors in the

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[66] Some courses are co-taught by a professor and adjunct. We counted both the professor and adjunct when the course is co-taught. Of the full-time faculty, 66 were admitted to the patent bar or eligible to be admitted to the patent bar. Of the adjunct faculty, 45 were admitted to the patent bar or eligible to be admitted to the patent bar. *See Curriculum Study 2014* (document on file with author).

[67] For example, George Washington School of Law lists three co-directors of their program and 14 faculty members. *See Faculty,* GW LAW, http://www.law.gwu.edu/Academics/FocusAreas/IP/Pages/Faculty.aspx (last visited Feb. 4, 2015). At least four of these 17 people who seem to be involved with GW's IP program are admitted to or are eligible to be admitted to the patent bar. *Id.*

[68] *Curriculum Study 2014* (document on file with author).

[69] *Select Law Reviews*, BEPRESS, http://law.bepress.com/do/expresso/submit/select (last visited Jan. 23, 2014).

[70] *See Law Journals 20 Years* (document on file with author). Of the 63 existing IP law reviews, 21 are on volume 20 or higher. Presumably, each law review can be counted by the number of volumes it publishes and this directly corresponds to the number of years of its existence. For example, a law review working on Volume 4 would mean that the law review has been in existence for 4 years.

[71] For example, the AALS Directory of Law Teachers from 1998-99 lists only 222 professors of intellectual property in the United States. By 2011-12, that same publication lists over 870.

[72] For a biography, see Univ. of Cal. Irvine School of Law, *Dan L. Burk*, PROFILE, http://www.law.uci.edu/faculty/full-time/burk/ (last visited Jan. 27, 2015). Professor Burk started his professorial career at Seton Hall. He moved from Seton Hall to the University of Minnesota. From Minnesota, he moved to the University of California—Irvine to become an associate dean in the formation of a new law school. He is now the Chancellor's Professor of Law.

United States. Many, like these, patent law professors have gone from entry level assistant professorships without tenure to tenured full professors and even to decanal roles and appointments.[75] Although there are some senior faculty who are patent attorneys, such as Martin Adelman,[76] this was an extremely rare situation only 20 years ago. In fact, Don Chisum, the author or Chisum on Patents,[77] the leading treatise in this field since 1978,[78] is not admitted to the patent bar.[79] Edmund Kitch[80] and Harvey Perlman,[81] the authors of one of the first textbooks on intellectual property law in America,[82] are not admitted to the patent bar, nor are they patent bar eligible.

In 2011-12, the American Association of Law Schools reported that there are now some 870 professors of intellectual property in the United States.[83] The 1998-99 version of the same directory lists 222 intellectual property law professors.[84] A basic count of the number of full-time faculty teaching an introduction to patent law course has now reached 95.[85] All of these full-time faculty are either tenured

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[73] For a biography, see Stanford Law School, *Mark A. Lemley*, DIRECTORY, https://www.law.stanford.edu/profile/mark-a-lemley (last visited Jan. 27, 2015). Professor Lemley started his professorial career at the University of Texas Law School. From Texas, he moved to Boalt Hall School of Law at the University of California at Berkeley. He is currently the director of the Stanford University program in Law, Science & Technology and the William H. Neukom Professor of Law.

[74] For a biography, see George Washington Univ. Law, *F. Scott Kieff*, FACULTY DIRECTORY, http://www.law.gwu.edu/Faculty/profile.aspx?id=16061 (last visited Jan 27, 2015) which states in relevant part as follows: "Professor Kieff joined the faculty at the George Washington University Law School in the summer of 2009, after serving on the faculty at Washington University in Saint Louis, where he was a Professor in the School of Law with a secondary appointment in the School of Medicine's Department of Neurological Surgery. He was named Fred C. Stevenson Research Professor at the George Washington University Law School in the fall of 2012. He took a leave of absence from George Washington University effective October 18, 2013, to swear in as a Commissioner of the U.S. International Trade Commission, having been nominated to that post by President Barack H. Obama, recommended unanimously by the U.S. Senate's Committee on Finance, and confirmed by unanimous consent of the Senate on August 1, 2013, for the term expiring on June 16, 2020."

[75] *See e.g., Dan L. Burk*, *supra* note 72.

[76] For biography, see George Washington Univ. Law, *Martin J. Adelman,* FACULTY DIRECTORY, http://www.law.gwu.edu/faculty/profile.aspx?id=1701 (last visited Jan. 27, 2015).

[77] For curriculum vitae [hereinafter Chisum CV], see http://www.chisum-patent-academy.com/wp-content/uploads/Chisumcv-March-2014.pdf.

[78] *See Chisum on Patents*, LEXISNEXIS STORE, ww.lexisnexis.com/store/catalog/booktemplate/productdetail.jsp?pageName=relatedProducts&prodId=10111 (last visited Jan. 27, 2015) ("*Chisum on Patents* is also the most cited treatise in patent law today- cited more than 800 times by the U.S. federal courts and twice as much as the nearest competitor since it was released in October 1978.").

[79] *See* Chisum CV, *supra* note 77.

[80] For biography, see Univ. of Virginia School of Law, *Edmund W. Kitch*, FACULTY, http://www.law.virginia.edu/lawweb/faculty.nsf/FHPbI/1180712 (last visited Jan. 27, 2015)

[81] For biography, see Univ. of Nebraska-Lincoln, *Harvey Perlman*, OFFICE OF THE CHANCELLOR, http://www.unl.edu/chancellor/bio.shtml (last visited Jan. 27, 2015).

[82] Edmund W. Kitch and Harvey S. Perlman, Legal regulation of the competitive process : cases, materials, and notes on unfair business practices, trademarks, copyrights, and patents (1972).

[83] The AALS Directory of Law Teachers 2011-2012. To be clear, these are professors that self-report that they teach a course on intellectual property. There is no indication of frequency of that course and no verification that they actually do teach a course in intellectual property.

[84] The AALS Directory of Law Teachers 1998-99.

[85] *Curriculum Study 2014* (document on file with author)

or tenure-track professors. Therefore, they are incentivized to write and place their articles in as high a ranked law review as is possible. Twenty years ago, law reviews shied away from publishing IP articles. Today, not only have IP law reviews proliferated, law reviews regularly publish IP topics.

That is, by hiring and employing 95 faculty to teach patent law, we have given them a great incentive to write academic literature. This is all a very good development and we are all better for it. However, it does not answer the question if demand for the education patent professors can provide preceded or succeeded their employment. If student demand is the driver of all such engines and if student demand is dropping, it seems that the demand curve for patent professors should also be dropping.

VIII. Methodology

Various data sets and analyses have been used throughout this article. Below is a brief description of the data gathering and analysis methodology for the count of currently registered patent attorneys, a predictive estimation of patent attorneys as predicted by ABA-admitted student data, an estimation of attorney gender, and a count and predictive estimate of new patent applications.

Patent Bar registration number data has been collected primarily from the USPTO website, which offers a freely downloadable current list of active registration numbers for patent attorneys and patent agents. However, the date of registration corresponding to each registered patent attorney or agent is only available by accessing a person-specific webpage, so a script was generated to download each of these person-specific pages and aggregate the data.[86] Additional data for registration numbers of patent attorneys and agents no longer practicing have been collected from various sources, including PatenBuddy.com.

Most of the dates corresponding to each registration number are provided by the USPTO data. Registrants that have a date for both attorney and agent often represent individuals who have passed the patent bar before passing the state bar, and upon passing the state bar, updated their status from patent agent to patent attorneys. Because all patent attorneys have passed their respective state bar, these individuals are counted as patent attorneys and not counted as patent agents.

The predictive estimation of patent attorneys has been generated by extrapolating ABA-admitted student data. The ABA provided data for students admitted to ABA-approved schools, where the admitted students were separated by undergraduate major. As a prerequisite for taking the Patent Bar, the PTO provides a General Requirements Bulletin for Admission to the Examination, which includes a

[86] The entire list of registered attorneys and agents is available in CSV format at https://oedci.uspto.gov/OEDCI/index.jsp. The web page for each registered attorney or agent is available by using their registration number within a generalized URL, such as the author's page at https://oedci.uspto.gov/OEDCI/details.do?regisNum=72945. Some registration numbers do not have an associated attorney or agent, so a list of all available URLs was generated using the registration numbers downloaded from the PTO CSV file. This list of URLs was then used as the input of a call to the program "wget" to download each page; for example, as "wget --no-check-certificate -i ./reg_numbers_temp.txt -w 0.5 -O ./reg_dates_temp.txt." (Here, the "-w" wait flag was used to slow the process to reduce the likelihood that this download would be erroneously flagged as a "denial of service" cyber attack.)

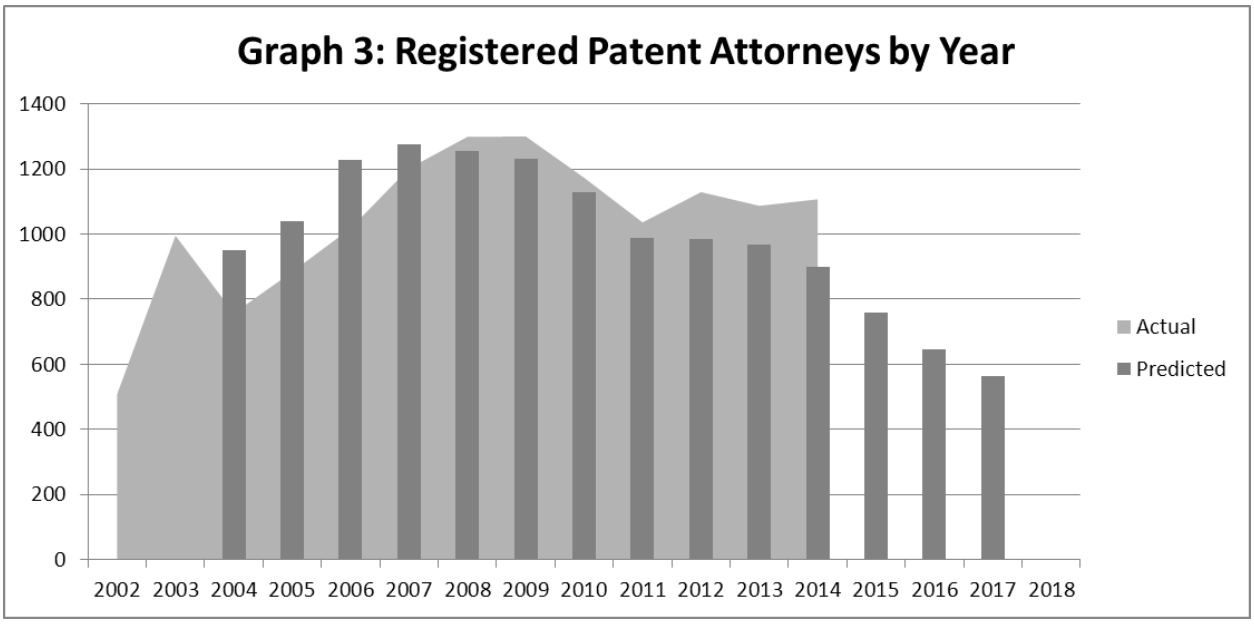
list of eligible undergraduate majors.[87] These majors were used to filter the ABA-approved students, and a number of patent bar eligible students was determined for each of the years 2000-2011. Because the time between admission, graduation, and taking the patent bar may vary for each individual, the number of new ABA-admitted students was compared against the number of new patent attorneys for each year. Because most law schools require three years of coursework, a ratio of ABA-admitted students to new patent attorneys for each year were calculated for delays ranging from 3 years to 5 years, as can be seen in Table 1:

Table 1: ABA to Patent Attorney Spreadsheet				
	3 Years	4 Years	5 Years	Average
2000				
2001				
2002				
2003	33.0%			33.0%
2004	23.0%	25.1%		24.0%
2005	22.7%	26.8%	29.3%	26.3%
2006	25.1%	26.1%	30.9%	27.4%
2007	30.2%	29.7%	30.9%	30.2%
2008	33.2%	32.6%	32.1%	32.6%
2009	36.3%	33.2%	32.6%	34.1%
2010	37.4%	32.8%	30.0%	33.4%
2011	33.1%	33.0%	29.0%	31.7%
2012	36.8%	36.1%	36.0%	36.3%
2013	38.1%	35.5%	34.7%	36.1%
Mean	31.7%	31.1%	31.7%	**31.5%**
Std. Dev.	5.7%	3.9%	2.4%	4.0%

Averaging these delays resulted in an estimate that, for patent bar test delays from ABA admission ranging from 3 years to 5 years, that 31.5% of students admitted to ABA-approved law schools with patent bar eligible majors eventually become registered patent attorneys.

The 31.5% estimate matches actual numbers quite well. The graph below shows the predictive ability of this 31.5% assumption for the decade spanning 2004-2013, the predicted totals for 2014, and the predicted number of new registered patent attorneys in 2015-2017 as shown in Graph 3, reprinted below:

[87] Office of Enrollment and Discipline, *General Requirements Bulletin for Admission to the Examination for Registration to Practice in Patent Cases before the United States Patent and Trademark Office*, USPTO, *available at* http://www.uspto.gov/ip/boards/oed/exam/OED_GRB.pdf (last visited Feb. 4, 2015). The authors acknowledge that other "Bachelor's Degrees In Other Subjects" enables students with majors not listed to "establish to the satisfaction of the OED Director that he or she possesses the necessary scientific and technical training under either Category B or Category C below" (*id.* pp. 4-5), where Category B is also "Bachelor's Degree in Another Subject," and Category C includes "Practical Engineering or Scientific Experience."



Data for patent attorney gender were not available through the PTO, so the estimation of patent attorney gender is primarily name-based. A spreadsheet was generated using the names of all of the registered patent attorneys, and duplicate names were removed. Similar to the systematic downloading of registration numbers, the de-duplicated list of all names was used to generate a URL, and the URL download was used to generate a spreadsheet of name, gender, and gender probability. This data set was generated using the website Genederize.io which states the website "utilizes big datasets of information, from user profiles across major social networks and exposes this data through its API"[88] Invocation of the API results in a text string, which includes an estimated gender, a probability of that gender, and a count of the number of names used to generate the probability.[89] This textual gender information was transferred to a spreadsheet, and a lookup function was used to crosscheck the list of registered patent attorneys against names, generating an estimated gender for registered patent attorneys and agents. This data was used to produce gender-based graphs, such as the "Patent Attorney Gender % Since 1970" graph in Section IV. This also provides interesting comparisons of new agents and new patent attorneys by gender, as shown in Graph 6, reprinted below:

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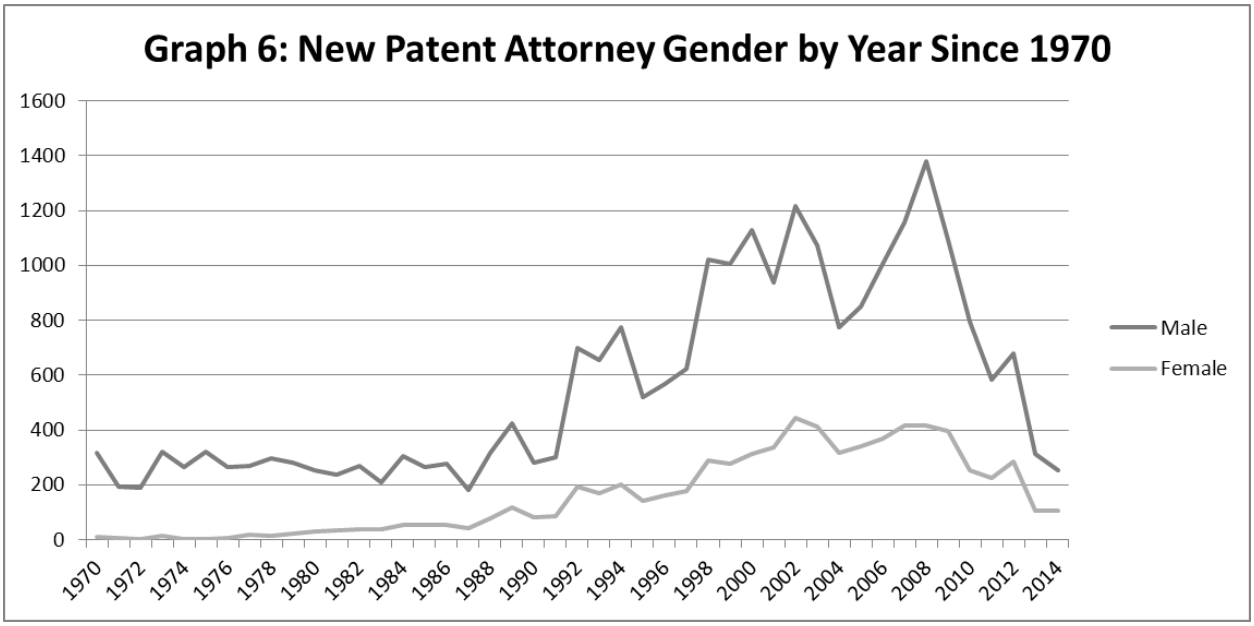
[88] *Determine Gender of a First Name*, GENDERIZE.IO, http://genderize.io/ (last visited on Feb. 4, 2015).

[89] For example, the URL "http://api.genderize.io?name[0]=Aakash&name[1]=Aakash&name[2]=Aamer&name[3]=Aaron&name[4]=Aarti&name[5]=Aasheesh&name[6]=Aashish" results in an output that includes the following string:

- {"name":"Aakash","gender":"male","probability":"1.00","count":16},
- {"name":"Aakash","gender":"male","probability":"1.00","count":16},
- {"name":"Aamer","gender":"male","probability":"1.00","count":5},
- {"name":"Aaron","gender":"male","probability":"0.99","count":1248},
- {"name":"Aarti","gender":"female","probability":"1.00","count":25},
- {"name":"Aasheesh","gender":null},

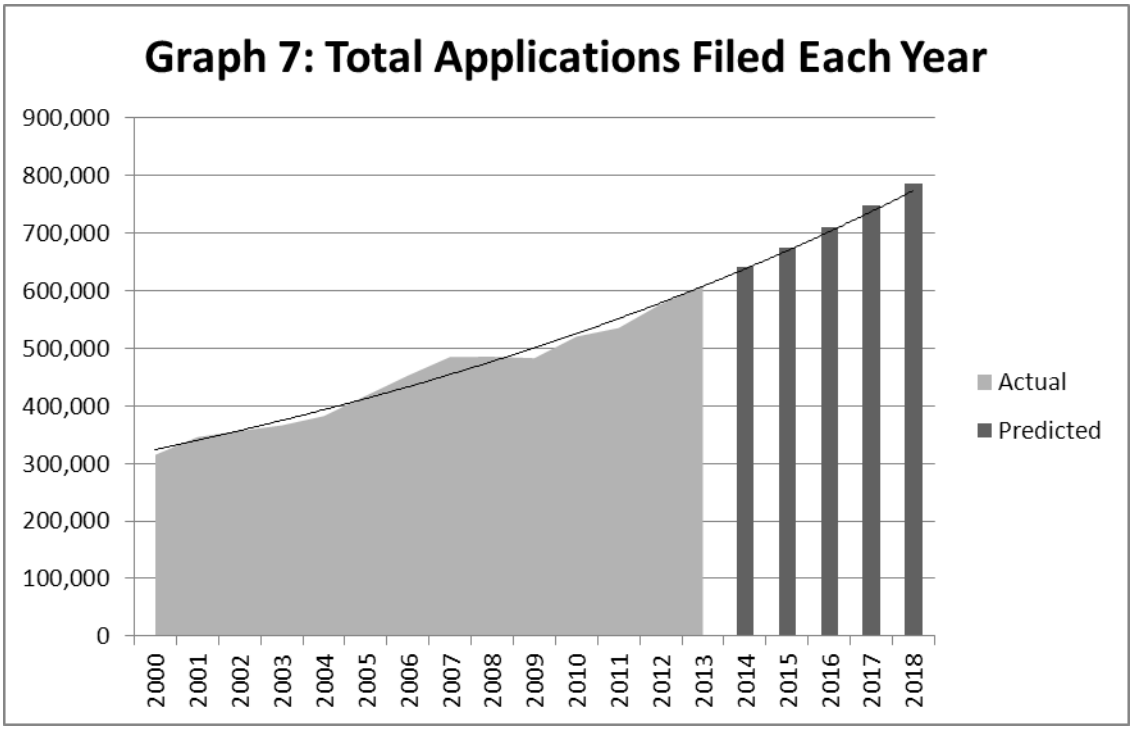
(The string has been separated into bullets for purposes of this discussion.) As can be seen in the last bullet, there are names for which no gender estimate was provided; these names or genders were not used in the graphs or conclusions discussed herein.



The above graph shows a precipitous drop in the number of new patent attorneys in both genders from 2008. While this appears to be caused predominantly by a shortfall of patent eligible law students, this may be due in part to the possibility that some data for 2014 has not yet been made available. That is, the PTO publishes names of newly registered Patent Attorneys and Patent Agents every few weeks, and because the graph above is based only on an analysis of published names, part of the names in 2014 may not yet be available for inclusion in this figure. However, assuming there is no gender bias at the PTO, the ratio of male newly registered patent attorneys to female newly registered patent attorneys would not change, and the percentage of male to female in Section IV would not be expected to change significantly.

The count and predictive estimate of new patent applications is based on data conveniently compiled and provided by the USTPO.[90] The data show that patent filings since 2000 have increased an average of 5.3%. Using this average increase, a predicted number of new patent filings was predicted for the years 2014 to 2018, as can be seen in Graph 7:

[90] *Calendar Year Patent Statistics*, PTMT, http://www.uspto.gov/web/offices/ac/ido/oeip/taf/reports.htm (last visited January 28, 2015).



This data was used to generate the graphs showing the predicted number of Applications Filed per Patent attorney and New Attorneys and Applications in Section II, above.

IX. Conclusions

The number of new patent attorneys is dropping faster than the total law school population. In fact, the number of new patent bar members will shrink to half of what it was in 2008 by 2018.

Even though far more women are now becoming engineers than ever before, they are not entering the patent bar. The ratio of women to men patent attorneys has remained unchanged for 25 years and it will remain unchanged in the near future securing patent law as primarily a male endeavor.

As the number of patent attorneys shrinks and the female ratio remains unchanged, policymakers and managers of patent firms need to take note. Productivity will have to increase significantly to keep up with demand. This increase in productivity will likely affect patent attorney retention. That is, as the number of patent attorneys drops, the billable hours for existing patent attorneys will assuredly increase. As billable hours increase, more individuals will elect to exit, thereby exacerbating the problem. Coupled with the AIA's incentives to patent, patent law is about to face a crisis.

Another likely result of this finding is that as the number of patent attorneys shrinks, the fees that existing patent attorneys can charge for their services will increase. If this results, the precise converse of the intentions of the AIA will be realized. The AIS's incentives to patent will not be recognized and the PTO's hyperbole regarding encouraging inventing will not be realized.