Gender Equality in the Ivory Tower, and How Best to Achieve It

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ABSTRACT Both statistical and qualitative interview data confirm the on-going existence of gender inequality within American academia, with women both underrepresented and underpaid compared to their male counterparts. Surprisingly, what is needed to remedy this situation is not a secret. Most of the policies outlined in this article as good workable solutions are programs that have been tested and described in more than one study. Indeed, evidence suggests that when the nine strategies we identify here are fully implemented, as they have been at a few colleges and universities, the number of women on the faculty increases dramatically. The fact that we do not adopt these policies more widely in academia suggests not a lack of knowledge so much as apathy, prejudice, gender stereotypes, and cultural cues that end by depriving society of some of its best talent and energy.

Can we achieve gender equality in academia? This goal is a long-standing and a worthy one. Yet despite nearly 50 years of state and federal affirmative action policies and numerous initiatives by universities and professional societies to open opportunities and level the playing field, women remain underrepresented and underpaid compared to their male counterparts. Why? The pipeline solution—which held that once sufficient women entered graduate school they would move naturally to achieve equality at the top of the professoriate—no longer provides a viable explanation for on-going inequality since women reached parity with men in graduate school in many fields long ago. Some progress has been made, however, and policy makers now can draw on extensive studies of the problem, by both individual researchers and professional groups from the American Political Science Association (APSA) to the National Academy of Sciences. The experience gained by gender-equity programs sponsored by the National Science Foundation (NSF) Advance Grant program and individual universities, plus extensive surveys and interviews with faculty women and university administrators throughout the United States all provide further valuable information on workable solutions that do move us toward full gender equality. Beyond this, the remarkable gender equality among faculty at Seven Sisters Colleges—where more than 50% of the full professors and the presidents are women—demonstrates what strong, committed leadership can do to dramatically improve the situation for female faculty. The contrast between the few female-friendly schools and the rest of the academy suggests both that true equality can be achieved and that academia as a whole remains stuck, despite increasing gender balance in graduate school (50% over all fields, as of 2008).

Part I of this article analyzes statistical and interview data to document the existing situation in American academia. It finds women underrepresented and underpaid. Part II describes nine specific policies institutions can adopt, all proven to work well to expand and equalize the situation for women in academia. Seven of these policies affect *all* women; two others are specifically targeted at work/life balance for women with family obligations. Part III presents family-friendly policies that are controversial, and Part IV discusses the challenge of changing the professional culture,

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the role professional associations can play, and special issues related to STEM (science, technology, engineering, mathematics—medicine sometimes included) fields. Our conclusion finds it is neither the lack of knowledge about what policies work nor any intractable biological reason why women cannot succeed in academia but rather prejudice, gender stereotypes, and cultural cues that condemn all of us to conditions that deprive society of some of its best talent and energy.

I. THE PROBLEM: WOMEN REMAIN UNDERREPRESENTED AND UNDERPAID

Women are Underrepresented in Academia: Statistical Data

First, a few statistics describing the situation in American academia, and a caveat: Figures vary over time, particular study, discipline, rank, field, and university; nonetheless, all converge on the general conclusion that progress exists but remains excruciatingly slow. Nationally across all academic disciplines, women constitute 24% of full professors, 38% of associates, 46% of assistants, and 56% of lecturers/ instructors.[1] As specific illustrations, we use data from the two schools where the lead author conducted the bulk of her study. Harvard University (July 2013) has 22.87% female full professors, with parity only in the School of Education (50% female). At the University of California women fare only slightly better, constituting 25.28% of full professors, 29.7% of all tenured ranks,

the contrary is true. Women at this level outperform men academically, get more awards, demonstrate better attitudes to education, and have higher graduation rates than men. Interviews, case studies, and statistical research converge on two primary factors among the multiple forces pushing women to leave the STEM workforce: the need to balance career and family and a lack of professional networks (Long 2001).[6] The importance of institutional reforms is underlined by the fact that STEM fields remain far less welcoming to women in the United States than in the few countries where scientists have greater federal or institutional support for childbearing and rearing, from paid leave for both parents and onsite day care to the mandatory holding open of academic positions while faculty members take parental leave, something rarely found in the United States.[7] Attracting and keeping women in STEM overall requires changing the culture of science to make it more family-friendly, especially in the United States, where children are considered not a societal but an individual responsibility, usually the mother's (Mason and Goulden 2003, NSF 2007).[8]

Differential Pay: Statistical Data

Women are not only underrepresented in academia. They also are paid less for the same work, earning on average 80%–85% of comparable male faculty members across all ranks and all institutions (NCES 2013): a male professor earning $100,000 will have female

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and 41.5% of the nontenured ranks (July 2013).[2] As in corporate America, the percentage of women in academic positions drops the higher they climb, with only 26% of college or university presidents being female (American Council on Education 2007).

Disciplines vary and STEM fields are the worst in gender equality, where the percentage of women among full professors in science and engineering at elite research institutions has remained constant at 10% for the past five decades (National Science Foundation 2013).[3] The prize for the most depressing statistic goes to women of color in engineering faculties: 1.6%.[4] Fields matter. Within social science, political science is notoriously tougher for women than is sociology or psychology. Within humanities, philosophy is worse than English.[5] In biological sciences, chemistry is worse than biology. Indeed, most of the improvement in STEM fields comes from gains in the life sciences, with disciplines such as chemistry and physics showing little improvement. Even within departments, subfields vary. (For example, music departments have female representation at the national proportion overall but few female composers.)

Inequality cannot be explained by reference to the pipeline or pathways problem, which argues that after we get enough women in graduate school they will advance naturally through the pipeline and into top administrative positions (Etzkowitz, Kemelgor, Uzzi 2000; Monroe and Chiu 2010). In STEM fields, 44% of the PhDs now are female, and yet women exit the STEM workforce in high numbers (Rosser and Taylor 2009). This fact cannot be explained away by a lack of interest or genetic predisposition because, if this were the case, we would expect to find female STEM students underperforming male counterparts in college and graduate school when in fact,

colleagues, in the same department at the same rank and seniority, who earn only $85,000. Over a 30–40 year career this disparity deprives women of $450,000–$600,000. For higher wage earners, say $200,000 a year—not an unusual faculty salary at top ranks—women thus lose as much as $900,000–$1.2 million over 30–40 years, enough to buy more expensive houses, educate children, pay for help to free time for research, and enjoy a far more comfortable retirement.

Interview Data Reveal More Subtle Forms of Gender Inequality

Statistical measures are not the only data documenting gender inequality in the academy. Four different sets of interview data fill in details in the general picture drawn by the statistical data. These include interviews with (1) five of the top female political scientists in the 1990s, (2) 100 faculty women at all ranks at University of California, Irvine from 2002 to 2006, (3) 100 written comments on a 2008 blog in response to an article in *Perspectives on Politics* (Monroe et al. 2008), and (4) ongoing interviews with women throughout American academia, from female students and faculty members to deans and presidents.[9] All these interviews supplement the dismal statistical picture and provide glimpses of what changes can work to counteract the forces that create subtle but continuing gender inequality.

Interview Data: Illustrations

We note just a few personal stories from these four different sets of interviews, conducted since the 1990s. (Actual names are used only when approval was granted.) Elinor Ostrom, APSA president, National Academy of Sciences and American Academy of Arts and

Sciences member, and the only female Nobelist in economics, told us that as a graduate student she was chased around the desk at the University of California, Los Angeles by the graduate director. As a faculty wife, Ostrom initially was denied a faculty position because of the nepotism convention. Female college presidents in the 1980s told of gender discrimination, such as not being allowed to enter the front doors of the private clubs where their boards met. All the women interviewed who came of age in the 1950s or 1960s spoke of hostile climates and gender discrimination, if not experienced

where young women told of an enduring and powerful culture of subtle social cues that discourages women. Several Harvard undergraduates used the same phrase—"I didn't know I was a girl until I came to Harvard"—to suggest their shock at the sense of limitations they encountered at one of the world's best colleges. Female faculty members of all ages spoke of similar cues and restraints imposed by "the rules of femininity." Why? Why does gender equality elude us or come in such dribs and drabs, with persistent backsliding? It is not for lack of qualified women.

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directly then by their friends. One might be cheered by thinking of these times as the "bad old days." But then we began interviewing younger women: female students currently (2012–2013) in college or graduate school, recent PhDs, and the newly tenured and new full professors. We found things had improved less than one might expect. A job candidate with twin babies—who did not accompany their graduate school mother on her job interview in 2002—was told the political science department at a top school would not schedule breaks in her interviews for her to express milk.[10] Women at APSA meetings—young assistant or associate professors attending a 2010 panel on gender equality—told of hiding their pregnancies and keeping their personal lives extremely private, for fear they would not be taken seriously as scholars if they openly revealed their identities as wives and mothers. Thus, while things *have* improved, well into the twenty-first century a shocking number of women still confront sexual harassment, passes made by fellow students and colleagues, demeaning remarks, chilly work climates, and other experiences not unlike those described here by senior psychologist Helen Haste at Harvard University, whose interview we quote because it so eloquently captures several critical aspects of the unaccommodating culture most women still confront.

> *I became aware, around eight or nine, that the generic human was male. Even when I was quite young, I felt a little irritated by this, and increasingly I began to feel excluded. I was always feeling a guest, a visitor on the outskirts of the real things that were happening. Whatever I did, even though I was a pretty successful kid, top of the class, there was still a sense that there was a male world out there which I was being permitted into. All the things I was being told I had to be as a woman were immediately excluding me from things I wanted to be. The obvious things, like rational vs. intuitive, and the sense that the qualities admired in women—and I would've thought should be admired in humans—were often seen as undesirable to men and to be avoided by men. By my teens, I further got all the messages that "Nice girls don't do this, and nice girls don't do that." We were supposed to be nice to boys, not show them up, not disagree with them. Ever! Otherwise, you wouldn't get a boyfriend. Boys didn't like intelligent girls. So if you showed yourself to be intelligent, you were on the road to spinsterhood and loneliness and isolation and ridicule. It's subtle, that discrimination. I don't recall much in the way of very explicit discrimination at that point. But it was so pervasive that it was like a fish in water. You don't even notice that the water is a distinctly murky color until you get out of it and say, "Hang on. That was a very muddy stream I was in."* (Helen Haste, full professor, Harvard University and Bath University).

Much of Haste's childhood experiences in the 1950–60s surfaced in interviews conducted at Harvard College in 2012–2013,

Indeed, the Council of Graduate Schools data show women have been at parity for graduate degrees in many fields for years; in 2008–09, for the first time, women earned a majority of doctoral degrees awarded in the United States (Jaschik 2010). Yet gender discrimination remains entrenched in academia, supposedly a liberal and progressive environment.

Exceptions to the Rule Highlight the Importance of Leadership and Culture

We find stark evidence of the importance of dedicated leadership and political cultures when we examine the outlier colleges in the general statistical picture: the Seven Sisters Colleges, established in the nineteenth century to educate the sisters of Ivy League men.[11] In a world of excuses that "we can't change that fast" and there simply "aren't enough good women to be found," the Seven Sister Colleges demonstrate an astonishing parity, both in women administrators and on their prestigious, high-quality faculty. At the largest Seven Sister, Smith College, women comprise 54.8% of the faculty overall and 50.3% of the full, 57.6% associate, 62.7% assistants, and 83.6% of instructors. Bryn Mawr and Wellesley demonstrate similar proportions. Since their inception, Seven Sisters schools also have had many female presidents (62.5% Bryn Mawr, 50% Smith, 100% Wellesley). In contrast, at Swarthmore College—part of a tri-consortium with Bryn Mawr—61% of the tenured faculty members are male, and the first female president was inaugurated in 2009.[12] Vassar, a Seven Sisters College that went coed in 1969 and now admits 45% men, currently has 47.1% of its faculty members who are female, a statistic that is intriguing.[13]

What works? What can we learn from the Seven Sisters' experience, from our interviews with female faculty members, from scholarly research in the area, and from the numerous programs designed by governments and universities to improve conditions and increase the number of women in academia?

II. INSTITUTIONAL SOLUTIONS AFFECTING ALL WOMEN

Interviews with female faculty and administrators, and the numerous studies on the topic, reveal at least seven policies that virtually everyone agrees open opportunities for all women and two policies that dramatically affect women with children and families.

Policy #1. Hire and Appoint Qualified Women to Positions of Power

Interviews with four Seven Sister College presidents suggest the single most important factor in achieving their impressive gains

was simply the dedicated policy of appointing women to positions of power. Other female college presidents and faculty agreed, finding this change not tokenism but a critical way to provide talented women with experience and exposure to the networks necessary to recruit gifted female junior faculty and to alter a culture that can limit

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women by its assumptions about leadership and what is "appropriate" behavior for women going out into the world. The ripple effect of female faculty is noteworthy, with numerous studies finding the single most important factor in later success for women—as measured by self-concept and career commitment—is not the quality of the college but simply being taught by other women (Bettinger and Terry 2005; Ulkti-Steiner, Kurtz-Costes, and Kinlaw 2000). Further evidence suggests that, on the whole, women tend to care more about gender equality than do their male counterparts (Tamerius 1995 *inter alia*).

What to do to improve gender equality is no mystery. Nor is how to do it. Simply hire and appoint qualified women to positions with real power. One Big Ten provost and later a college president increased the number of female administrators (deans and department chairs) on her campus from 20% to 60% in *three* years simply by appointing to top positions women she knew were able and enthusiastically committed to advancing women below them. Defining the job search to attract female scholars also helps, as noted by Jane McAuliffe, former president of Bryn Mawr.

> On every tenure track search hav[e] one person, not a department member but someone from outside the department...who is there solely for diversity concerns, wanting to make sure that the review of the prospective applicant pool is attentive to any diversity candidates. A more critical step comes even before that, before this search committee has been struck. This means the crucial time is during the period in which the position is being defined. You know as well as I do that there are ways of defining positions that immediately narrow the prospective pool. So you have to make sure you don't eliminate, by virtue of the specificity of the definition of the position, hordes of possibilities in terms of getting a more diverse pool, in terms of race or gender or whatever. So in a way the critical thing to do is to make sure the job is defined broadly. We do this through our committee on academic priorities, which makes sure positions are defined broadly enough to attract as diverse a pool as possible. That is in my opinion the single most important thing one can do in structuring a search. (Jane McAuliffe, President Emeritae, Bryn Mawr)

Policy #2. Provide Mentoring Programs

The evidence is overwhelming on the value of two related types of mentoring: departmental/professional and university-wide/personal. Departmental/ professional mentoring pairs young faculty members with senior mentors—male or female—within their own department to counsel on disciplinary issues related to research and teaching within their own discipline, from grant-writing to publications. Such mentoring is most successful when coupled with more personal mentoring with a female mentor, preferably outside the department and hence someone who can be a sympathetic listener

not involved in tenure and promotion decisions. This personal, female mentor counsels on matters relating to work/life issues, possible experiences of discrimination, and interpersonal relations. The success of mentoring is evident in many metrics, from tenure and publications to the submission and awarding of grants and other professional prizes. The American Economic Association (AEA), for example, received a NSF Advance Grant to focus on mentoring. One year they had too few senior women to match with the many junior faculty women who applied for formal mentoring. The AEA used this opportunity to study the issue, by randomly selecting those who would be mentored. Then, they tracked the progress of both groups. Women who had applied for but not received professional mentoring by senior female economists produced fewer publication and awards, and submitted fewer grants during the three-year study than those who had mentors.[14] Further studies (Bettinger and Terry 2005) suggest critical mentoring takes place in faculty women's association and that the value of mentoring programs, of all varieties, also extends to postdoctoral, graduate, and even to undergraduate students.

Policy #3. Promote Salary Equity Programs

Widely used throughout the University of California, which has an elaborate advancement system based on regular and open reviews of faculty members for promotion and raises at all ranks, an equity increase is a "permanent increase to the base salary that may be granted to an employee under certain circumstances, such as increased duties that do not warrant a reclassification or a significant salary lag to comparable internal positions or the local labor market. The intent of equity adjustments is to provide consideration to critical and/or unusual pay administration problems" (University of California, Riverside Human Resources Manual). Such equity increases involve complex bureaucratic procedures that vary from campus to campus but, on balance, prove a powerful mechanism to remedy salary inequities. Essentially, when a faculty member asks for an equity review, an independent review board analyzes all requests for consideration and recommends changes to the top academic officer. Because in practice women tend to be disproportionately underplaced and underpaid, salary equity programs work well with the posting of publicly available salary data (see Policy #4), thus allowing women to compare their pay status to others and request remedy when appropriate.

Policy #4. Collect and Post Metrics on Numbers of Female Faculty Members, Salary Differentials, and Other Details

Surprisingly few schools collect up-to-date statistics broken by gender, racial minority status, and so forth. Even fewer post these data publicly, making it difficult to find even the percent of the faculty that is female, let alone determine salary inequities or how different departments or schools fare in the gender breakdown. Collecting such data is time consuming but has proven to have a powerful impact on administrators (who may be ignorant that

there is a problem), faculty (who may be unaware of the extent to which female faculty members are underpaid), and prospective students (who may consider these facts relevant in choosing a graduate school). Simply collecting and making publicly available the extent to which a faculty member's salary is out-of-sync with comparable faculty at the same rank proves a powerful incentive for faculty to ask to have their base salary reexamined. Sometimes data have been collected via external grants, such as the NSF Advance Grants, but most analysts agree that the collecting and posting of metrics needs to be a responsibility of the individual university and must be ongoing to be most effective.

few schools require such training. Most female faculty found it useful if a bit bureaucratic and legalistic.

Policy #7. Encourage Networking

Many women report being marginalized in or even completely cut out of the professional networks they need to do scholarly work and succeed professionally. Lack of networking and mentoring can be especially devastating to women scientists who work in fields requiring extensive collaborative work. Women scientists often have fewer graduate and postdoctoral students to support their work than do men. Women enjoy less diverse networks, and

Professional network associations, such as on-campus female faculty associations or women's caucuses within professional societies, provide camaraderie and power as a group, in additional to networking.

Policy #5. Appoint Equity Advisors

Assigning one faculty member the duty of overseeing and coordinating efforts to increase equality has proven critical at many universities. The best policy seems to be to designate a high-profile, tenured faculty member to an administrative position with teeth, to act as a kind of gender equity czar. The equity officer writes job descriptions that ensure women will be in the pool of prospective job candidates, oversees hiring and promotions of faculty members, coordinates job searches throughout the campus, and hosts public events on the topic of equality. The equity czar works best[15] when joined by school-specific equity advisors, faculty members who rotate every few years. In the University of California system, school equity advisors' duties include checking and certifying that all job searches involve sufficient networking to bring into the pool qualified women candidates, checking to ensure family-friendly policies are followed and not abused, and disseminating information about critical gender issues throughout the school. The first equity advisor in School of Social Science at the University of California, Irvine, then a young associate professor, noted in her first weeks on the job that the search committee for dean had no faculty women on it; she told the male chancellor she would not sign off on the composition of the search committee until women were added. The chancellor complied, and the school ended up with a top female scholar who was elected to the National Academy of Sciences during her tenure as dean.

Policy #6. Require Sexual Harassment Prevention Training

Too often, what feels like sexual harassment to the victim is not recognized as such by the offender. A crucial institutional policy with teeth includes required training on what constitutes sexual harassment and where to report it.[16] These programs can be online or in-person, as is done in the University of California system, where California law requires faculty to undergo sexual harassment prevention training every two years.[17] Such programs are important in attacking what is often genuine cluelessness about what constitutes harassment. They provide critical information both to victims of sexual harassment and to faculty members who have to counsel students who report such abuse on topics such as (a) what constitutes sexual harassment, (b) where to report sexual harassment, and (c) where to go to get emotional support when they have encountered harassment. Surprisingly

thus receive fewer referrals from such networks to participate in the commercial marketplace, consult, serve on science advisory boards, and interact with industry (Murray and Graham 2006). Much of the network effect can be addressed by hiring women, especially for positions that provide women influence over future hiring, because much of the problem of networks is more natural than malevolent. (Women tend to have more heavily female networks than do their male counterparts.) Professional network associations, such as on-campus female faculty associations or women's caucuses within professional societies, provide camaraderie and power as a group, in additional to networking. These professional networks are especially valuable when schools follow a conscious policy of calling established women scholars, asking them for names of possible job candidates, and advertising jobs via special caucuses for women.

WORK/LIFE BALANCE SOLUTIONS

Gender discrimination affects all women. Women with children and family responsibilities require further targeted assistance. The following workable policies have been found effective in addressing this significant group of female faculty.

Policy #8. Provide Childcare

Over and over we heard that "the single most important policy that helps advance women with families is childcare, onsite and reasonably priced" (Beatrice, history, full professor). University and college presidents echoed this thought, noting that female faculty are happier and more productive if their families are well cared for. Many universities offer onsite childcare, but many faculty members complained that the existing onsite day care is too expensive and has too long a waiting list to make it helpful. "You have to sign up for childcare after the first date!" a young economist told us.

Policy #9. Hire Partners

Another widely advocated family-friendly policy is partner-hiring. Suppose the art history department wants to hire a male faculty member who has a partner in sociology. Under most family-friendly partner hires, the cost of this partner hire is shared by the central administration, the two relevant schools in which the faculty will reside, and the department hiring the partner. Sociology still has to assess the partner and decide on the quality of that scholar's teaching and research but in the best case the faculty budget line itself

resembles a free-good, and hence presumably easier to allocate. Partner-hiring is especially helpful for women scientists, 83% of whom have academic partners, compared to only 54% of male scientists (Schiebinger, Henderson, and Gilmartin 2008). One concern with partner-hiring is the stigma of "less good" that often attaches to a second hire. Therefore, it is important to disseminate the results of research showing that among full-time faculty members, partner hires actually prove *more* productive than comparable peers in their departments (Schiebinger, Henderson, and Gilmartin 2008). One reason for this greater productivity may be the effect of shared professional networks, even when partners are in different academic fields.

Furthermore, having fathers more fully involved in childcare is necessary to shift discussion of children from "a woman's problem." As one feminist said, "Women can't run the board room until men can run a washing machine."

Sharing professional networks stands out as perhaps the greatest career gain for academic couples compared with other couple types. Fifty-eight percent of academic couples share contacts, mentors, colleagues, and friends compared with one-quarter or less of faculty with stay-at-home or employed partners. This greatly enhances each partner's reach into the other's circle of mentors, friends, and patrons. In academia, where power and privilege still often divide along gendered and racial/ethnic lines, access to multiple circles of knowledge and influence can potentially boost career (Schiebinger, Henderson, and Gilmartin 2008: 37–39.)

Partly for this reason, and partly for reasons related to the informal discussion of their work with their spouses, 44% of faculty in academic couples report that they benefit in research productivity as a result of their partnerships, compared with 35% of faculty members with stay-at-home or employed but nonacademic partners.

When the partner is not a fellow academic, in the best case a university will have a dedicated full-time staff specialist who masters the local professional landscape and maintains links to law firms, architecture firms, other businesses, and other universities in the local area that might hire the partner.

III. CONTROVERSIAL FAMILY-FRIENDLY POLICIES

While affordable, onsite childcare is a frequently recommended policy advocated by many faculty women, including most university presidents, it nonetheless can prove controversial because of cost. Other family-friendly policies are perhaps even more contentious, with strong advocates and opponents.

Policy #1. Provide Childcare While at Conferences

Providing funds for childcare while at conferences is relatively inexpensive and is advocated by many women in faculty positions. In the interviews for this article, however, few of the college presidents supported this measure, arguing that such costs should be paid via individual faculty grants. This ignores the fact that in many fields, granting agencies—such as NSF—will not include such funding; the Henry Luce Foundation grants in science are a notable exception.

Policy #2. Offer Parental Leave

A similarly hotly contested policy is the parental leave for faculty with children. Should it be mandatory? Required or available for all parents, male and female? Opt-in or opt-out? And how do you deal with "cheating" when faculty members take parental leave but devote the time to research and not to their children? Male faculty with traditional wives or nannies have done this, thus advancing further than those who use the leave solely for childcare. Indeed, some female faculty with extensive childcare help at home also fall into this category. The university presidents we interviewed insisted this sort of "abuse" is minimal; many female faculty disagree. (One Harvard faculty member reported that her department chair publicly encouraged male faculty to use this policy to get more time to produce publishable work.) The best policy on parental leave remains unclear.[18] Overall, we find the most powerful argument for requiring men to take parental leave is that doing so will provide men more time with their children, and that this is a value to all. Furthermore, having fathers more fully involved in childcare is necessary to shift discussion of children from "a woman's problem." As one feminist said, "Women can't run the board room until men can run a washing machine."[19]

Policy #3. Promote a Flexible Tenure Clock

The only other family-friendly policy as divisive as parental leave, with passionate advocates on each side, concerns flexibility in the tenure-clock policy for childbearing. Overall, most agree that in the best case parents should get a year on their tenure clock for each child. Some want, in addition, an "alternative tenure clock," in which women can work part-time or hop on or off the clock for a few years without penalty. Others argue that offering such possibilities would tempt women to take so many leaves that they would begin to lose touch with the field and colleagues. Although individuals' choices would be maximized, they argue that overall the policy would harm women. From an administrative perspective, few college presidents favored such a policy, arguing that being a faculty member means you need to cover your courses and keep current in the field as a departmental citizen. Views were mixed on the value of a more flexible program for graduate students or postdocs, who are not responsible for covering courses and presumably can more easily catch up on any loss of knowledge in their field.

IV. CHANGING THE CULTURE, THE ROLE OF PROFESSIONAL ASSOCIATIONS AND THE SPECIAL ISSUES IN STEM

Change #1. Shift in Types of Knowledge

Finally, we approach the subtle changes that might have to occur in the general culture, such as changes in the respect and reward for different styles and types of work. Many female faculty members and administrators told us they find women tend to work more on interdisciplinary topics, do more problem-driven research, and hence perhaps are less mainstream but more creative than

are their male counterparts (Rhonda, computer science, tenured, Caltech). Some female scientists argued that women are penalized by a "linear male model, which is strongly organized around existing modes of teaching and doing research. Such a model privileges the strongly delineated existing model for disciplinary departments" (Tabatha, neuroscientist, full professor). It leads to narrow work and spurious findings, as witness the significant shift in our understanding of moral reasoning when Carol Gilligan (1982) reanalyzed Lawrence Kohlberg's (1981) data and methodology using female subjects. Most of the university presidents interviewed for this article seemed cognizant of these subtleties. Indeed, they note that the knowledge base in many fields has changed as knowledge producers moved from exclusively white and male to include minorities and women. To break out of such gender-biased modes of organization, one dean and provost crafted a plan to increase gender equity in the economics department by offering the department positions in the fields of labor and development economics, which are more heavily populated by women in that discipline. Many presidents noted that defining job searches to tap into such fine points is critical for enacting change and that this issue relates to a diverse range of groups, not just to women.

Change #2. The Role of Professional Associations

Universities are not the only players that can effect structural changes. Professional associations (e.g., APSA) also play key roles. First, they can develop guidelines and best practices that faculty members can use in pressuring their own universities for change.[20] Second, they can establish effective mentoring programs. (The AEA established such a program and demonstrated its effectiveness with the help of an NSF Advance Grant. APSA's Mentoring Program has not been evaluated in a randomized field trial study but anecdotal evidence finds it of value.) Third, professional societies can adopt policies to require introducing gender into the selection of key decision makers, especially the presidents, officers, journal editors, and award committees. Fourth, such associations now work with caucuses (e.g., APSA's Women's Caucus for

by time from PhD, a policy that helps women who are returning to the professional world after having their children.)

Change 3. Special Needs of STEM

Women now earn more than half the undergraduate degrees and 44% of the PhDs in STEM.[22] Yet cultural and institutional biases continue to chill the climate for women scientists, resulting in unequal distribution of resources between men and women in terms of laboratory space, salary supplements, start-up packages, university funding, citation counts, and even prize nominations. Several organizational changes have proven to have profound impact on STEM and are predicated on the recognition that women who want families cannot wait to have children until their careers are established. We note here the five policies that female faculty and administrators found most successful. (1) Appoint women to science advisory boards, science journal editorial boards, and science policy positions that provide both exposure and experience. (2) Take legal action to require the government to strictly enforce existing antidiscrimination laws, such as the sixth, seventh, and ninth titles of the Civil Rights Act. (3) Monitor and equalize research and laboratory resources. (Men once banned women from academic laboratories or withheld research funding to women. Madame Curie was banned from the laboratory until she won her *second* Nobel Prize.) In the twenty-first century women scientists routinely still report being given less lab space, smaller budgets, and fewer assistants, all of which puts them at a serious disadvantage in their research. (4) Mentor appropriately. Some STEM departments now incorporate business training into graduate education since high-tech employers want STEM workers who understand project management and have appropriate business skills, such as the ability to write proposals and read financial statements. Women seldom get this mentoring in graduate school, nor do they get adequate mentoring in grant writing. Mentors should actively help introduce female graduate students into male-only networks. In contexts where it would not be counterproductive, mentors may need

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Political Science)[21] or establish special committees on the status of women in the profession to track the situation for women, lobby for nondiscriminatory and family-friendly policies, increase access to professional positions of power/status (such as association officers and membership in the National Academy of Sciences), ensure and financially support adequate childcare facilities at meetings, encourage flexible timetables for graduate students, and establish websites with easily accessible information and advice that addresses professional issues relevant for women. These goods are especially helpful to young women, particularly women of color, LGBTQ women, and women with children, who are vulnerable to "feeling a chill" at meetings. Such policies are critically important for graduate and postdoctoral students, especially in STEM fields. (Some associations, such as the International Society for Political Psychology, give young career awards, defining a young scholar not by age but

to find sensitive ways of encouraging female graduate students to assert themselves. (5) Build support for childcare into a range of institutions. For example, the Clare Booth Luce Professorships, funded by the Henry Luce Foundation and designed to advance the careers of women in science, engineering, and mathematics, allow all applicants to allocate grant money toward family care, including child and elder care. Few funding organizations take this tack.

CONCLUSION

Both statistical and qualitative interview data confirm the ongoing existence of gender inequality within American academia, with women both underrepresented and underpaid compared with their male counterparts. What we need to do to "fix" this situation is not a secret. Most of the policies we have outlined here as good workable solutions are policies that have been tested and described in more than

one study. The preponderance of evidence suggests that when implemented fully, as they have been at a few colleges and universities, there are at least nine policies that everyone agrees dramatically increase the numbers of women on the faculty, and three policies whose effect exists but may be more controversial. That we do not adopt these policies more widely in academia—where we hear well-worn excuses that "this wouldn't fly here" or "we can't move that fast"—suggests not a lack of knowledge so much as a lack of political will.

Prejudice, not biology, perpetuates gender discrimination in academia. Certain institutional, organizational, and structural factors—such as a linear professional pattern to tenure that conflicts with women's biological clocks—unquestionably make it harder for women to succeed in academia. But the intractability of the biological clock is belied by the numbers of female faculty members in positions of power at the few universities or colleges—such as Bryn Mawr, Smith, and Wellesley—that have pursued long-term committed efforts to implement policies that increase opportunities for women. Equality comes when universities and colleges become aware of explicit and implicit discrimination and commit themselves to hiring more qualified women. This is easily done via instituting programs such as mentoring, parental leave, and partner hiring. Women also advance when universities establish institutional structures that collect and regularly post metrics on hiring and salary differentials. They advance when there are compulsory sexual harassment sensitivity training programs and salary equity programs that include "equity czars" and school/departmental advisors with power to squelch job searches that do not recruit from a diverse pool, not just for a few highly visible positions but all the way down to beginning-level jobs. Having a pool of money to recruit especially qualified women—at both the senior and junior level—by providing them additional research funding, travel to conferences, onsite day care and day care at conferences, and so on, even if only for five years can aid greatly in recruitment and retention of productive female faculty.[23] These policies *do* work.

Yet gender inequality endures in academia. It remains just one of many forms of discrimination in the world. It violates our deepest ideals. One can argue against it on all the reasons of social justice, equity, and fairness that we quite properly muster to combat other forms of discrimination. We close by making another argument, however, one of waste. To do so, we pose a thought experiment.[24] Close your eyes a moment and think about the person you love most in this world. Then ponder the unimaginable, that in 20 years this person will contract a rare, painful and eventually fatal disease. Now imagine further that the one person alive today with the raw intelligence, drive and ambition to find a cure for this disease in 19 years is a high-school senior, applying to college this fall. Would you really want to deny that person the best resources of our educational system, just because she is a girl?

NOTES

1. Aggregate data (National Academy of Sciences).

2. Precise figures vary, according to source and date. These figures come from the official University of California websites as of July 2013.

3. Using a slightly different metric, the 2012 University of California Accountability Report lists women as 29.96% of ladder and equivalent rank faculty. Aggregate estimates are "17.6% full professors of science and engineering at four-year colleges and universities in 2004, 31.1% associate professors, and 41.0% assistant professors. At the top 50 PhD-granting institutions, women accounted for 21% assistant professors, 22% associates, and 10% full professors in chemistry."

4. Women of color constitute 36.3% of the female population and 18% of the entire US population. Kerby 2012.

5. See for example, www.salon.com2013/08/15/philosophy_has_a_sexual_harassment_problem/ http://opinionator.blogs. nytimes.com/2013/09/02/women-in-philosophy-do-the-math.

6. Single men and single women participate about equally in the STEM workforce. But a married female PhD is 13% less likely to be employed than is a married male STEM PhD. If the married woman has young children, she is 30% less likely than a single man to find work (Long 2001).

7. Mary Ann Mason and Marc Goulden (2013), using data from the 1979–95 National Science Foundation Surveys on Doctoral Recipients, reported that male faculty members who start families within five years of receiving their PhDs are 38% more likely to receive tenure than are their female counterparts. Among women who take a fast-track (elite or research) university job before having a child, only one in three ever becomes a mother. In contrast, "second-tier" women PhDs—those who are not working or who are adjunct, part-time, or "gypsy" scholars and teachers—have children and experience marital stability in patterns that resemble those of men who become professors.

8. The National Science Foundation (NSF) reported in 2007 in *Women, Minorities, and Persons with Disabilities in Science in Engineering* that in 2004, women earned 57.6% of the bachelor's degrees in all fields and 59.1% of all master's degrees. This trend began in 2000, when women also earned more of the bachelor's degrees in science and engineering, although they earned only 43.6% of the master's degrees in those fields. In 2004, women earned 60% of the PhDs in fields other than science and engineering, but only 44% of the PhDs in science and engineering received by US citizens and permanent residents. The aggregated data also hide the wide variance in women's participation in STEM fields. The NSF reports that, overall, women earn most of the bachelor's degrees in fields other than science and engineering, such as humanities, education, and fine arts, and in the science and engineering fields of psychology, social sciences, and biological sciences. Men earn most of the degrees in computer sciences; earth, atmospheric, and ocean sciences; mathematics and statistics; physical sciences; and engineering. At the master's level, women earned the majority of degrees in 2004 in fields including the biological sciences, psychology, and the social sciences. Women earned fewer than half of the master's degrees in computer sciences; earth, atmospheric, and ocean sciences; mathematics and statistics; physical sciences; and engineering. At the doctoral level, women earned fewer than half of the science and engineering degrees in 2004 in all fields except psychology and a few social sciences, such as anthropology, history of science, and sociology. Women earned 46.3% of the PhDs in the biological sciences. The number of tenure-track positions available in the social and life sciences is constant or decreasing, and federal funding is relatively tight, leading to intense competition. According to the NSF's 2007 report, women earned less than a third of the PhDs in computer sciences; earth, atmospheric, and ocean sciences; mathematics and statistics; physical sciences; and engineering. In short, in many of the social and the life sciences, women have reached parity in the percentages of degrees received. In other areas, such as the geosciences, mathematics, and physical sciences, the percentages of women continue to increase but have not approached parity. In engineering and computer sciences—the fastest-growing STEM fields with the greatest workforce demand—the percentages of women have reached a plateau or dropped over the past decade. Aggregated data mask the attrition of women at every phase of the educational and career STEM pipeline. Despite grades and other academic attainments equal to or surpassing those of the men who remain in STEM fields, more women than men leave science and engineering. As a result, few women are in senior or leadership positions in the STEM workforce (see table 2). In "Women Faculty Gain Little Ground,"

published in 2006 in *Chemical and Engineering News*, senior journal editor Corinne A. Marasco reports that women made up 41.0% of assistant professors of science and engineering at four-year colleges and universities in 2004, 31.1% of associate professors, and 17.6% of full professors. At the top 50 PhD-granting institutions, women accounted for 21% of assistant professors, 22% of associate professors, and only 10% of full professors in chemistry.

9. Anyone willing to be interviewed should contact the lead author at KRMonroe@UCI.Edu.

10. This incident was reported to us by a past APSA president and advisor for the student.

11. Known as the "Seven Sisters," to the Ivy League and related high-quality male colleges, Barnard, Bryn Mawr, Mount Holyoke, Radcliffe, Smith, Vassar, and Wellesley Colleges were founded between 1837 and 1889 to educate women. Radcliffe has since merged with Harvard and Vassar is now coeducational.

12. Institutional statistical data were gathered from the US Department of Education, Institute of Education Sciences, National Center for Education Statistics in 2010.

13. One obvious question occurs, and might be answered by examining Vassar's statistical data over time: Did the move to coeducation lessen—or reflect—Vassar's commitment to women's education? Such data were requested but have not yet been obtained.

14. Information from two anonymous sources, both top academic economists.

15. Having only one individual designated to supervise equity and advancement of all underrepresented groups overwhelms that person and is less effective than when joined by specialized equity advisors within each school. This recommendation is for larger universities; at smaller colleges, one equity czar might suffice.

16. Some criticize this law as ineffective, a mere bureaucratic hassle that annoys rather than instructs. Others find it extremely useful in providing concrete illustrations of what constitutes sexual harassment.

17. An online Sexual Harassment Prevention training course is mandated by California Law AB 1825 (Gov. Code Section 12950.1). This 2004 law requires two hours of sexual harassment prevention training every two years for supervisors and other specifically identified employee groups, such as faculty.

18. See http://www.nyt.com/2013/02/17/opinion/Sunday/why-gender-equality-stalled.html for a discussion of this complex issue.

19. We believe that this quotation comes from a feminist in the women's movement, probably Gloria Steinem, but cannot find the reference.

20. This article reflects information gained by the lead author when she chaired APSA Task Forces on Workable Solutions, set up by Carole Pateman and extended by Jane Mansbridge.

21. Caucuses for women in the discipline provide social networking, access to other successful women in specific fields, as well as camaraderie, and "a place to go" at the professional meetings.

22. One must speak of women in STEM with caution since statistics vary dramatically, depending on the data source and the field. The problem comes from socialization, not innate abilities or interest in STEM, which tends to lessen somewhere between high school and graduate school for women, with the highest drop-out rates occurring around the postdoctoral stages when women face work/life choices that work against full-time employment in STEM fields. Having given the above caveat, we nonetheless convey some general figures. In 1966 women earned roughly 12% of the doctorates in biological and agricultural sciences; by 2006 this figures had increased to 50%. In 1966, women earned 3% of the doctorates in atmospheric, engineering, physics, computing, and ocean and earth science. By 2006, women earned 33% of the PhDs in earth, atmospheric and ocean sciences, chemistry, and math. They earned 20% of the degrees in computer science, engineering and physics. Most studies find that as of 2011–2013 50% the STEM women in graduate school in the US are non-US citizens, with percentages again varying widely from field to field. To speak of overall estimates of women in STEM then can mislead, but as of 2013 most analysts find women constitute from 25% to 48% of the graduate students in STEM overall, with most of the improvement in the biological and agricultural sciences. US Census data suggest the high mark from women employed in STEM fields (not just academia) was 1990 at 34%, with 2011 figures dropping to 27%.

23. The Radcliffe Institute does this for Harvard.

24. One could pose other thought experiments more directly relevant for political science. Who would you want to have as negotiator during a political hostage crisis, or as president with her hand on the nuclear launch codes during a potential war?

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