MARISSA SUCHYTA

Why Motherhood Matters

in Academic Science

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N JANUARY OF 2005, HARVARD PRESIDENT LARRY SUMMERS GAVE a now-infamous talk on the underrepresentation of women in academic science. His remarks, in short, claimed there may be “different availability of aptitude” when it comes to men and women in science (“Remarks”). The meaning here was clear despite the clouded rhetoric: the president of Harvard University argued that the underrepresentation of women in the academic sciences was due to genetics. Women, he suggested, were simply not wired for the sciences. The firestorm that ensued eventually led to Summers stepping down and the Harvard Board of Overseers electing the university’s first female president, Drew Gilpin Faust.

Perhaps most surprising is that the remarks, though appearing to be a gaffe, seemed intended to produce debate: the venue was the National Bureau of Economic Research’s Conference on Diversifying the Science & Engineering Workforce, and Summers presented three theories on the low number of women professors and leaders in science. The first of these was choice: Summers stated some women decided not to work the necessary “eighty hour” weeks to maintain a prolific career in science (“Remarks”). The second of these was workplace discrimination against women scientists, but he framed discrimination as less problematic due to a theory of economic “unfavorability.” Summers explained that, according to this theory, a “pervasive pattern of discrimination” would “leave an extraordinary number of high-quality potential candidates behind,” which would be advantageous to institutions that would be willing to hire discriminated workers at a lower cost (“Remarks”). The third of these theories on the low number of women in the sciences was his most controversial: Summers argued that “in the special case of science and engineering, there are issues of intrinsic aptitude, and particularly of the variability of aptitude” between men and women (“Remarks”). The statement, though dense, should not be misunderstood: Summers implied that genetic differences between men and women affect their natural ability in science.

Five female scientists left the lecture hall during Summers' speech. Nancy Hopkins, a prominent MIT biologist, later stated that if she had not left “I would've either blacked out or thrown up” (Taylor 337). The feminist community questioned how female faculty at Harvard could be confident in themselves without the support of the university’s leader. Summers’ remarks sparked debate on “genetic difference,” and whether such differences between men and women would lead to differential aptitude – or even differential interest – in the sciences. Editorials from the likes of Charles Murray and Steve Chapman lauded Summers for approaching a politically controversial theory (Murray, Chapman). However, the argument that genetic aptitude accounts for women’s underrepresentation in science overlooks the increased number of women earning higher degrees in science. This changing demographic of degree recipients also demonstrates that socialization and stereotyping of science as a male profession is not the core issue deterring women from science professions. Scholars like Nancy Hopkins, Stephen Ceci, and Wendy Williams have questioned whether discrimination against women is responsible for the dearth of female faculty members in the sciences; indeed, Hopkins' monumental study at MIT found that institutions often unintentionally discriminate against women faculty members (Ceci, “Understanding” 3157, Loder 713).

But what might be the reasons behind such institutional discrimination against women? Neither Hopkins’ description of unintentional discrimination nor the theory of innate genetic differences fully addresses the problem of underrepresentation of women in science. When analyzed together, however, they may well reveal why women are so underrepresented. In other words, we need to recognize that women genetically differ from men by having children, and that the structure of academic science discriminates against pregnancy, childbirth, and motherhood. This might lead us to claim that, due to such a fundamental biological difference, women require differential treatment than men to obtain equal opportunities. But it might not be that clear. For one, motherhood can be viewed as a choice, and this raises an important question: is it the responsibility of an academic institution to accommodate childbearing and motherhood in its policies on tenure, publication rate, and research funding? Obviously, the firestorm Summers sparked in 2005 has raised more issues than he might have intended, and as we articulate the kinds of questions surrounding this topic, we realize there is more at stake. But these important questions should not detour us from the problem of underrepresentation when it comes to genetic differences and workplace discrimination: it is not that academic sciences necessarily discriminate against women, but that academic sciences discriminate against a woman’s right to have a family.

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hy the dearth of women in the academic sciences in the first place? Current studies on the topic tend to question whether psychological differences between men and women are genetic or due to socialization. Steven Pinker, for instance, examines how scientific success in men may be due to increased spatial abilities and mathematic reasoning while Nancy Hopkins responds by questioning whether environmental conditions are, in fact, responsible for these specific differences. Pinker, a psychologist at Harvard, examined Summers’ statement that innate gender differences are responsible for the low number of women leaders in academic science by putting it in the context of current research. Pinker argues that men and women possess the same general intelligence, and so sidesteps Summers’ stance on innate difference. Instead, Pinker claims that psychological characteristics lead to differential success in the sciences (Pinker). He states that men are “by far the more reckless sex” and argues that studies show men are more willing than women to take intellectual risks; this, he says, leads to greater potential results in their careers (Pinker). Furthermore, he argues, men have greater spatial perception than women, an important ability among physicists and engineers. Pinker supports his theory by demonstrating that, of mathematically “precocious” youth taking the SAT, males are 2.8 times more likely to score over 700 (Pinker).

However, Pinker’s argument has several discrepancies that need more sustained analysis. First, equating mathematical talent with scientific aptitude assumes that math plays a preeminent role in all scientific fields. A cancer biologist or organic chemist, for example, is less likely to use advanced mathematics than a physicist or engineer. Second, Pinker does not distinguish the general population from high-achieving scientists when it comes to “reckless behavior” and “spatial perception.” That is, he assumes that the differences are based on gender rather than on intelligence. And finally, these gender differences may not be determined by genetic differences at all, but rather by environmental factors – factors that are especially important when we consider the ways in which they shape a younger girl’s perception of her role in society. Susan Barnett at Cambridge University speaks to just such a viewpoint. She argues that any potential genetic differences between men and women are too complex and difficult to determine, particularly as we try to ascertain how these differences might determine their aptitudes in the sciences (Barnett i). She concedes that there are clear differences in the brain structure and psychology of men and women, but she argues that there is no way to know whether these differences are innate or are a result of differing experiences. Referring to the fields of Science, Technology, Engineering and Mathematics, or STEM, she asks: “[A]re males more interested in STEM fields because they are better at them, or could they be better because they are more interested or are socialized to believe they are more competent?” (Barnett i). Men, she says, are conditioned to work in STEM fields.

Of course, the parallel suggestion Barnett makes here is that women are likewise socialized out of STEM fields. In the wake of Summer’s remarks, it would be wise to consider the role socialization plays when it comes to academic sciences. Robert Samuelson, responding to the Larry Summers firestorm in an editorial for the *Washington Post*, argued that socialization was a great factor leading to the low number of women in academic science: “Many women probably reject science and engineering for another reason: They simply don't find the work appealing, just as they generally don't like football” (Samuelson). We should not, however, misread Samuelson here: he is not implying that men and women have different interests because of their genetic differences. Affinities for the sciences and football in this context are more likely based on psychology, not biology. At the very least this means that, while women may be less attracted to STEM fields due to psychological differences, it is unclear if these differences are present at birth or if they are a product of environmental and social pressure.

In the past, such environmental and social pressures have inhibited women from entering scientific fields. Scientists have been historically viewed as male, which may affect women’s confidence and view of possible opportunities. This predominating social viewpoint of science was demonstrated in an eleven-year study, carried out by social scientist David Wade Chambers, which investigated the age at which children will draw the “standard” image of the stereotypical, male American scientist (Chambers 255). After asking children in kindergarten through fourth grade to “draw a scientist,” Chambers discovered a striking result: of the 4,807 drawings these children made, only twenty-eight depicted a female scientist (Chambers 261). The study, published in 1983, demonstrated that most students perceived science as a stereotypically male profession. Janice Law Trecker, examining the historical origins of this male-dominated perception of science, shows that the further back in time we go, the more outrageous the claims on women in the sciences (Trecker 90). She argues that, after the release of Darwin’s theory of evolution, we culturally perceived scientific learning as actually detrimental to women’s health and the future of society. According to the predominating “mind-brain linkage” theory of the time, a woman pursuing rigorous intellectual work would be redirecting blood from her reproductive organs (Trecker 90). Furthermore, Trecker notes, it was economically favorable for men to exclude women from scientific endeavors to reduce competition (Trecker 90). Clearly, social pressure shaped a woman’s role within the science and limited her ability to obtain a scientific education. The current literature on the subject of women in the sciences, therefore, tends to move away from the innate difference to lay responsibility on socialization.

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oday, though, we have a very different landscape when it comes to women in the sciences. However much social barriers were a hindrance to women in academic science in the past, such obstacles are no longer the real issue at hand. These social barriers, in other words, do not adequately explain why so few women go into the academic sciences. This is especially true given an important trend over the past 45 years: since 1966, the proportion of women receiving bachelor’s degrees has increased exponentially (Ceci, *Why Aren’t More Women in Science?* 13). And beginning in 2001, that trend has become even more striking: over the past decade, more women have earned degrees than men in certain scientific fields, including biology; female high school students have shown to do better in math courses than their male classmates; and women are now equally represented in the most difficult levels of high school math (Ceci, *Why Aren’t More Women in Science?* 14). In addition, science graduate school admissions have become more equal. In 1966, for instance, only 8% of PhDs in science were given to women; by 2001, that number had jumped to more than 37% (Fisher 21). Mary Ann Mason, Dean of the Graduate School of University of California, Berkeley, recalls her excitement when realizing women comprised 51% of the school’s graduate class of 2001 (Mason ix). She states, “I realized that this was a moment anticipated by the women of my generation who had struggled to open the gates to high-status, male-dominated occupations. Achieving graduate degrees, we believed, would lead to professional and economic equality” (ix). Mason articulates the widespread belief that increasing a woman’s ability to gain a scientific education will lead to a greater number of women in both scientific leadership and in science faculty positions.

This increase in the educational level of women in the last four decades, however, has not been met with a parallel increase in female representation among university science faculty. Despite the increase in female students graduating from PhD programs, the rates of female faculty members still remain very low. At the top fifty research institutions in the United States, for instance, it is estimated that only 3-15% of full professors in science are women (Ceci, *Why Aren’t More Women in Science?* 15). Even Mason herself contrasts her excitement over the growing population of female graduate students with the realization that there is a continuing gap in representation at the faculty level. Recalling an experience in a faculty senate meeting, Mason writes: “Looking around the chamber, I saw only a few female faces. As a longtime faculty member, I was accustomed to this dynamic; at Berkeley, only 23 percent of the tenure-track faculty are women, a number that has been stagnant for about a decade” (ix). In fact, one of the reasons that Summers’ speech was so inflammatory was that the percentage of female science faculty members at Harvard had actually decreased during his presidency, despite an increase in female science PhD graduates across the nation (Loder 713).

What accounts for such discrepancies? We cannot account for this dearth of women in academic sciences by looking solely at education hindrances. This is not to argue that social and educational hindrances haven’t prevented the entrance of women into scientific fields, as shown by Chamber’s monumental “Draw a Scientist” study and Trecker’s argument that Darwin’s theory of evolution negatively impacted women in science. But, women currently earn more science bachelor degrees than men, and graduate school admissions have equalized between the genders. Despite these gains in education, women are still dramatically underrepresented among academic science faculty. The statistics are so dramatic they stand to be repeated: among the top 50 research institutions in the United States, only 3-15% of full professors in the sciences are women, and even a campus as politically active as Berkeley’s cannot boast that one out of four of their tenure-track faculty are women. Clearly, women are facing issues beyond their educational experiences.

A strong possibility here is that university institutions systematically discriminate against women, but up for debate is whether that discrimination is intentional. Such are questions offered by Nancy Hopkins, the MIT biologist who walked out of President Summer’s controversial speech. Hopkins led an influential study between 1995-1999 with the purpose of investigating discriminatory practices against women in science at MIT. The study, as summarized by Natasha Loder in *Nature*, was carried out to investigate why, “despite increasing numbers of women scientists, there had been no change in faculty ratios for 10–20 years” (713). Hopkins showed differential allocation of resources, salaries, awards, and laboratory space between men and women faculty members. She concluded, as Stephen Ceci points out in his review of the study, that female science faculty members at MIT suffered from “pervasive, if unintentional discrimination” (Ceci *Why Aren’t More Women in Science?* 17).

The picture drawn by Hopkins in these two reviews seems clear enough: the underlying structural practices in a university’s decision-making processes and in its evaluation of faculty members might explain their discriminatory processes as a function of bureaucracy rather than outright prejudice. This doesn’t excuse the problem of partiality when it comes to promoting women in the sciences, but it does indicate a more pervasive problem we need to deal with. For example, it was shown that MIT determined tenure, laboratory space and award allocations based on publication record (Ceci *Why Aren’t More Women in Science?* 18). The interesting wrinkle here was this: male scientists published more frequently than did female faculty members while female faculty members’ works were, on average, cited more frequently (Ceci *Why Aren’t More Women in Science?* 18). However, according to MIT’s system of evaluation, a professor’s frequency of publication counted more than her citation record; to be more blunt about it, MIT favored quantity over quality. This is not, however, an argument that MIT intentionally favored men, but an argument that the school’s existing structural practices implicitly do. So, even as Hopkins’ study elucidates valid issues in male and female achievement in academic science, we should keep in mind that these differences are more likely due to “unintentional” discrimination against women. We could argue, in other words, that when it comes to the academic sciences, women lose by default.

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et us recap here: there are two main arguments about the underrepresentation of women in the academic sciences. On the one hand, we have the argument made by the likes of Summers that genetic differences between men and women lead to greater scientific aptitude. On the other hand, we have the argument made by the likes of Hopkins that universities discriminate against women scientists. Viewed separately, these two views do not adequately account for the dramatic underrepresentation of women in the sciences. This paper argues that, when viewed together, the two arguments elucidate the most compelling and prominent reasons why women do not become full science faculty members. Men and women do have well-known genetic differences; that much is true. However, the most important genetic difference in this context is not an unfounded, innate difference in scientific mental aptitude but rather one that is much more apparent: women have the capability to bear children. This profound biological difference, along with structural though unintentional discrimination policies against new mothers in universities, greatly accounts for the underrepresentation of women in academic science.

This is not an altogether new argument. Mary Ann Mason, the Dean of the graduate school of University of California who was shocked by the low numbers of women in a faculty senate meeting, investigated along with Marc Goulden the effect of motherhood on women in academic sciences. In their extensive research project entitled “Do Babies Matter?” (Mason and Goulden 10), they succinctly answered their own question. Their team studied the careers of 160,000 male and female scientists, and found interesting results. Mason and Goulden found that “Men with children were 38 percent more likely than married women with children to achieve tenure” (14). Furthermore, they demonstrated that women who do not have children are more successful in academic science. The “Do Babies Matter?” project revealed that women who achieved tenured faculty positions in science were two times more likely than men to be single and childless­­ (Mason and Goulden 12). This striking difference demonstrates that babies do indeed matter.

However, to determine exactly how children affect women in the academic sciences, we must also examine motherhood in light of Hopkins’ assertion that universities unintentionally discriminate against women in the sciences. The structural rigor of the tenure track that leads to full faculty positions in turn often leads women to choose “second tier” positions in either scientific industries or in non-tenured adjunct positions (Mason 37). But another contributing factor here is what academic scientists need to do between earning a PhD and finding a tenure-track job. Emily Monosson, an environmental toxicologist and author of *Motherhood: The Elephant in the Laboratory*, writes, “What may set science and academics apart from other professions when it comes to having children is the requirement for many PhD graduates to complete at least one postdoctoral position before moving into a more permanent job” (Monosson 15). The problem here, Monosson reminds us, is that scientists achieve tenure later than other professionals obtain stable jobs. This means that many women in the sciences feel they must choose between having a career and having a family.

Monosson’s book, a collection of female scientists detailing their personal stories, addresses the difficulty of raising children and having careers. One contributor to this project, the environmental scientist Rebecca Efroymson, describes the challenges of her “split life between motherhood and science” as she tried to secure a grant proposal to cover her salary (102). Efrymson recalls having to bring her feverish toddler to a conference because her grant could not cover child support. She details a sleepless night, an inadequate presentation, and ultimately a loss of funding. Monosson’s collection therefore argues from personal experiences that a woman’s career opportunities in academic science often conflict with her opportunities to raise a family. Monosson argues, “When a woman is striving for tenure or career stability (typically in her early to mid-thirties), the biological clock is winding down” (15). The personal anecdotes of these women scientists coupled with Mason and Goulden’s statistics demonstrate that motherhood is a hindrance to academic scientists, but this still might not give us the full picture when it comes to motherhood and tenure.

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hat might be a solution to the “question” of motherhood? Perhaps another way to ask this question is this: whose responsibility is it to accommodate motherhood? The real issue on the table when it comes to the dramatic underrepresentation of women in the sciences is not their capability to have children but how we reconcile motherhood with the tenure process. The counter-argument, of course, is that a university is not responsible for a woman’s choices when it comes to having a career and having a family, but such an argument doesn’t address the problem Hopkins documents in her study. This is especially true when we consider, as Hopkins demonstrates, that institutions structurally discriminate against female faculty members. It is this same sense of indirect discrimination that affects women in the academic sciences who also wish to pursue motherhood. But a less nuanced understanding of gender equality within academic institutions will not change the representation of women in science. Women and men are biologically different, and true equality can only be obtained if institutions consider their differing biological roles when writing policy, particularly when it comes to policies related to promotion. It is unquestionable that women should have the same opportunities as men; less clear is whose role it is to ensure equal opportunity.

We may want to turn to other fields as models for a way forward. In medicine, for instance, accommodations have been made to allow women to pursue their career goals in tandem with motherhood. Interestingly, during medical residency, the equivalent of the tenure-track years, half of all female doctors who will have children give birth to their first child. In addition, as Mason demonstrates, women in medicine are more likely to have children than any other “fast track professionals,” including scientific academics, lawyers, and journalists (45). Mason attributes this difference to the fact that all doctors who complete residency generally obtain jobs, unlike academics (46). However, in a broader sense, Mason argues that in medicine “there is a culture of cooperation surrounding childbirth and children. Rather than an ethos of independent competition, as exists in law, the academic world, and the corporate world, teamwork is essential throughout medicine, as it is during the residency” (46). Mason is certainly on to something here, though we should also acknowledge the teamwork necessary within a laboratory. Forging collaborations, in fact, is equal to, or may even exceed, those needed in medicine.

But there’s a simpler explanation here for the apparent discrepancy between the medical and academic sciences when it comes to women: pregnancy leave is institutionalized for medical residency programs. Although programs individually decide upon their policy regarding pregnant residents, all programs give at least six weeks off and have a written, clear policy regarding childbirth (van Dis). This structure is not in place within all graduate science programs, and since graduate students are not viewed as employees, many federal policies regarding mandatory pregnancy leave do not apply to these women. Furthermore, during postdoctoral work, the phase in academic science immediately following graduate school, pregnancy leave heavily depends on the availability of grants and funding sources (Klotz). For example, as *Science Career Magazine* informs us, the National Institute of Health’s guidelines when it comes to its research awards are particularly burdensome: per the NIH’s guidelines, women are granted only 12 days per year for maternity – and this taken in the form of sick leave (Klotz). The lack of broad guidelines for pregnancy in academic science clearly affects a women scientist’s ability to succeed and have children during the more flexible periods of her academic career. Standardized policies pertaining to pregnancy and maternity leave are necessary for graduate schools and postdoctoral positions to increase the number of women in science who refuse to sacrifice family for career. Postdoctoral research and medical residency programs are not completely identical in structure, but adopting similar policies towards motherhood in the field of academic science would alleviate the most pressing issue hindering women in science.

Despite the flood of controversy surrounding Larry Summer’s 2005 remarks, he at least reinvigorated a debate over the underrepresentation of women in academic science. Summers seemed intent on provoking the audience by questioning whether innate differences between the sexes could account for differing success in science. However, Summers was missing the clearest difference between male and female scientists: women’s ability to have children. We should also beware of a less nuanced reading here as well: we cannot argue that men and women are identical despite clear genetic differences. Nancy Hopkins, who stormed out of the seminar, proposed the theory of unintentional discrimination, yet did not clarify exactly why academic institutions discriminate against women. Together, however, these two viewpoints of innate genetic differences and unintentional discrimination may better explain the low number of female academic scientists. Many questions remain, including whether it is a university’s responsibility to diminish the unintentional discrimination against female scientists who decide to have a child. Medicine has demonstrated that simply having a standardized policy towards maternity leave can greatly foster a woman’s performance within a profession. However, science academia seems to view motherhood as a woman’s privilege, rather than a right. Combining this viewpoint with the intense, competitive track towards tenure as a university science professor results in a field hostile towards pursuing motherhood. It gives us the clearest answer yet why women are underrepresented in academic science.

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