

Women in Science: Interest, Culture, and Covert  
Discrimination

by

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## **Introduction**

Wesleyan University has committed to fostering a diverse student body. The institution's mission statement reads, "The university seeks to build a diverse, energetic community of students, faculty, and staff" (Wesleyan 2020, 2010). The university seeks to do so because it "believes that all students benefit from being part of a diverse learning community" (Wesleyan 2020, 2010). In *Wesleyan 2020*, a framework that was created to decide how to best allocate the institution's resources for the next 10 years, the university established specific objectives that it intends to fulfill. One of these stated goals is to create a "more international and diverse" student body (Wesleyan 2020, 2010). Wesleyan consistently expresses a desire to diversify and has specified furthered diversification of the student body as an objective within the next 10 years.

Wesleyan as an institution has expressed a commitment to diversity, yet an analysis of major and faculty distributions shows an underrepresentation of women in several STEM (Science, Technology, Engineering, Math) disciplines. While Wesleyan has noted the importance of "diversity as an academic asset...that support[s] learning in and outside the classroom", and has stated this objective since 1998, women continue to constitute a small minority in the physics and computer science majors, and are unrepresented in mathematics as well. What explains this gendered distribution?

While there are some majors, such as computer science, where Wesleyan particularly underperforms in regards to female participation, for the most part, Wesleyan's gender distributions are consistent with national trends. Despite their high

grades and achievements in STEM fields throughout high school, women are highly underrepresented at many levels of STEM attainment, particularly in the physical sciences. What factors cause these national gender disparities in STEM fields?

Scholars argue that different factors are responsible for the lack of women in STEM disciplines. One explanation put forth to understand the lack of women in STEM fields is an approach that focuses on the interests and aspirations of individuals. Other analyses focus on covert and institutional discrimination, arguing that the institutions of science systematically disadvantage women. I argue that while interest and motivation are extremely important, institutional changes are necessary for a shift in the gendered power dynamics found in the sciences.

## **Background**

The educational landscape has changed dramatically since the 1960s. In 1960, men earned 65% of the Bachelor degrees received in the United States (Jacobs, 1996). In 1982, women began earning more Bachelor degrees than men and they have since held on to this advantage (Jacobs, 1996). By 2007, women were earning 58% of all Bachelor degrees, widening this reversed gender gap (Buchmann et al, 2008).

Women enroll in college at higher rates than men, drop out at lower rates, complete their degrees faster, and receive higher grades (Buchmann et al, 2008).

Women have also made significant strides in the realm of graduate degrees. In 1970 women received 40% of the master's degrees in the United States, 14% of the PhDs, 8% of medical degrees, 5% of law degrees, and 1% of dentistry degrees (Buchmann et al, 2008). In 2007 they received 59% of the master's degrees, 49% of

the PhDs, 47% of the medical degrees, 49% of law degrees, and 44% of dentistry degrees (Buchmann et al, 2008).

While these accomplishments are monumental and should not be understated, it is important that they not mask the inequalities that still persist in higher education and beyond. Jerry Jacobs, writing in 1996, argued that different spheres of education need to be considered separately as they contain within them differing inequalities (1996). While women “fare relatively well in the area of access,” he observed, they experience more inequality “in terms of the college experience, and are particularly disadvantaged with respect to the outcomes of schooling” (1996, 154). Jacob’s words still hold true; while women have made huge strides in GPA attainment and college competition, these achievements are not translating fully into equality in major distribution or career attainment and salary.

Gender segregation across disciplines in college is stark. Women make up 58% of college graduates, yet they earn only 21% of computer science degrees and 19% of engineering degrees (Fox, 2011). While field segregation has decreased since the 60s, gender separation has decreased much less rapidly since the 90s (Fox et al., 2011). Importantly, the patterns of gendered field segregation present in the United States are not replicated globally. For instance, in 1995, women earned 62.7% of math and computer science degrees in Poland in contrast to 35.9% of those degrees in the USA (Jacobs, 1996). Similarly, in 1995, women in Kuwait, a country where women might be assumed to have fewer opportunities, made up 51.6% of engineering students in contrast to the US where women earned only 14% of engineering degrees in 1990 (Jacobs, 1996). Thus while patterns of gendered segregated study are very

real, they can exist differently based on “broader patterns in education and society” (Jacobs 1996, 169).

While women are already a minority in some STEM fields at the collegiate level, the distributions become more unbalanced at the graduate school level. For instance, in 2005, women made up 45% of math majors, however, five years later were only 30% of math PhD recipients (National Science Foundation, 2013). Professorial statistics shows a similar pattern; while women earned 30% of mathematics PhDs in 2005, women comprised only 19% of mathematics university faculty nationally (Hill, 2010).

In 1983, Sue Berryman introduced the concept of the leaky pipeline, putting forward an explanatory model for the lack of women in STEM fields. The educational pipeline, which begins in elementary school and is meant to funnel students and shape them into scientists, metaphorically leaks women at different points (Berryman, 1983). The farther up the academic pipeline, the more cumulative leaking, and thus the smaller percentages of women at each stage of scientific attainment (Berryman, 1983).

While many authors adopt the leaky pipeline model, they differ as to which factors contribute the most to the overall lack of women in STEM fields. At one end of the spectrum, authors like Yu Xie and Kimberlee Shauman emphasize individual motivations and interests, arguing that the limited pool of interested women is the most significant factor, and if addressed, would lead to more women in STEM (2003). At the other end, authors like Mary Fox emphasize structural and institutional factors, arguing that enlarging the pool of interested women who enter the pipeline

will not fix the leaks in the pipeline, that is, will not address the institutional problems that are blocking so many women from achieving at high levels (1999).

I argue that while the lack of interested women is a serious problem, without changing institutional and cultural structures, women can advance through the pipeline of science, only to be shifted towards the bottom of the science hierarchy (Fox, 1999). The valuation of women within STEM fields needs to be altered by changing the structures and norms of science (Fox, 1999). It is important that we not just create “biological female[s] who act as social [men]” who can then excel within an environment of male-norms (Acker 1990, 139). Instead, it is important to create sciences that appeal to a diversity of interests and are inclusive to minority norms, rather than perpetuating a science compatible with male norms. It is crucial that, in regards to interest and aspirations, women are taught to see sciences as a real option. However, I argue that interest alone does lead to the structural change that is needed in the sciences.

### **The Leaky Pipeline**

Today, women emerge from high school well prepared to enter STEM fields (Hill, 2010). While male high school students used to take more science and math classes, since the early 1990s, women have taken similar numbers of high-level math and science classes (Buchmann et al., 2008). Male high school students are slightly more likely to take AP physics, computer science, and calculus classes (Xie and Shauman, 2003). However, female students are as likely or more likely than their male peers to take all other science and math classes and tend to get higher grades in

those classes (Xie and Shauman, 2003, Buchmann et al., 2008). While the difference between men and women taking AP physics, computer science, and calculus classes is small at the high school level, it does indicate that leaks do occur at the high school level.

## **College**

Women and men enter college with similar levels of preparation and success in STEM classes. It is in college where the disparities become stark. Only 20% of female first years intend on majoring in a STEM field while 29% of male first years intend on majoring in a STEM subject (Hill et al., 2010). When biological sciences (biology, microbiology, environmental science, etc.), the majors where women most concentrate, are taken out of the picture, the portrait is much more drastic, with 20% of first year males intent on pursuing a major in computer science, engineering, or in the physical sciences, while only 5% of first year females state such an intention (Hill et al., 2010).

In 2010, women ultimately earned 57.8% of biological sciences and 43% of mathematics degrees, but only 19.5% of engineering degrees, and 18.4% of computer science degrees (National Science Foundation, 2013). In 2006 women earned 51.8% of chemistry degrees but only 20.7% of physics degrees (Hill, 2010). Women are the majority of biology and chemistry majors, and almost half of math majors, but a very clear minority in engineering, computer science, and physics (Hill, 2010).

Data collected at Wesleyan shows similar patterns. “We tend to do pretty well when it comes to the life sciences,” notes Professor Ishita Mukerji, Dean of Natural

Sciences and Mathematics at Wesleyan, “it’s in the physical sciences where we run in to trouble”. Consistent with national figures, in a five-year average taken from 2004-2012, women comprised more than half of biology and neuroscience majors, and were half of molecular biology and biochemistry majors. While women earned almost 40% of math degrees and did similarly in chemistry, the real drop off can be seen in physics and computer science. In the calculated five-year average, women at Wesleyan only earned 18% of physics degrees, very similar to the national average. The percent of female physics majors fluctuated significantly given the year; from no female physics majors in 2006 to 43% in 2008. Computer science, on the other hand, had particularly and consistently low female participation, with women earning only 6% of degrees in the five-year average and never earning more than 15% in a given year. While most Wesleyan science departments should be concerned with attracting and retaining women, the analyses in this essay are particularly relevant to the physics and computer science departments given the drastic gender segregation that occurs in these departments. Additionally, because the computer science department’s percentages of female degree earners are far below the national average, it is particularly pertinent that the department begins to question their current functioning.

**Fig. 1. Wesleyan University Major Female Gender Distribution**

	<b>Sociology</b>	<b>Psychology</b>	<b>Neuroscience and Behavior</b>	<b>Biology</b>	<b>Molecular Biology and Biochemistry</b>	<b>Chemistry</b>	<b>Computer Science</b>	<b>Physics</b>	<b>Mathematics</b>
	Female	Female	Female	Female	Female	Female	Female	Female	Female
<b>2012</b>	69%	69%	63%	69%	63%	44%	14%	6%	38%
<b>2010</b>	70%	72%	44%	61%	57%	29%	0%	13%	25%
<b>2008</b>	58%	75%	50%	49%	24%	43%	0%	43%	35%
<b>2006</b>	50%	68%	63%	73%	62%	43%	11%	0%	29%
<b>2004</b>	66%	77%	62%	65%	44%	57%	6%	30%	56%
<b>Average of Total Majors</b>	n=40	n=76	n=33	n=30	n=19	n=13	n=11	n=14	n=22
<b>Average Percentage of Female Majors</b>	63%	72%	56%	63%	50%	43%	6%	18%	37%

Fig. 1. Data collected from the National Center for Education Statistics for five different years.

## **Interests and Aspirations**

Xie and Shauman explain that the “the choice of a college major is... a process that begins before entry into college” (2003, 58). A 2009 study found that 74% of males between the ages of 13 and 17 identified computer science as a college major that would interest them, while only 32% of female students agreed (Hill et al., 2010). While expressed in college, these gender gaps are formed early on, and can be linked to different stated interests of males and females. Lubinski and Benbow found that regardless of mathematical skill, women ranked Social interests (people contact) as a top priority three times as often as men did, while men ranked Realistic values (things and gadgets) in their top two priorities four times as often as women did (2006). Lubinski and Benbow conclude that females express a stronger interest in “organic content”- they “tend to prefer to learn about and work with people”, while males express more interest in “inorganic content”- they “tend to prefer to learn about and work with things” (Lubinski and Benbow 2006, 327).

While Lubinski and Benbow focus on defining the differences between male and female interest, others who also argue an interest-based explanation emphasize the causes and affects of these different interests. Paula England, for example, explains that these gendered interests rely on societal notions of gender essentialism, which she defines as “the notion” pervasively engrained throughout our culture “that men and women are innately and fundamentally different in interests and skills” (2010). Implicit bias tests show that most men and women identify the humanities and arts with the female and science and math with the male (Hill et al., 2010). By the first grade, children already convey that math is more important for boys than girls

(Ambady et al., 2001). While students are encouraged to pursue majors and career choices that “express one’s ‘true self’”, that self is very much determined by gender essentialist beliefs which hold some realms to be inherently masculine and others to be feminine (England 2010, 150). Because gender has such an impact on an individual’s notion of self, England argues, pursuing a major in line with “their (tacitly gendered) notions of their interests” will push individuals to follow gendered pathways (2010, 161).

Building on England’s understanding, Catherine Riegle-Crumb suggests that female high school students may be taking so many math and science classes and achieving so highly because those classes are important for college acceptances (2012). In college, however, when women no longer need the STEM classes, they will choose a major that aligns with their “true selves” learned from “gender essentialist beliefs and the accompanying socialization and micro-level interactions” (Riegle-Crumb et al. 2012, 1067). Even if women are interested in STEM, they may be more interested in a non-STEM field because of these engrained “gendered patterns” (Riegle-Crumb et al. 2012, 1068).

Gendered socialization goes farther than instilling different interests, it also creates different ideas of what is possible, acceptable, and worth pursuing. Brian Nosek writes, “the idea that anything ought to be possible for anyone is the foundation of many proclamations of equality” (2008, 1). However institutions “[teach] people how to behave, what to hope for, and what it means to succeed or fail” in gendered ways (Tierney 1997, 5). Thus this idea of equal opportunity- or even

equality in “aspirations” is “undermined” because men and women are implicitly taught gender appropriate goals and career choices (Nosek 2008, 1).

Diverging slightly from the interest approach exists a more complicated middle ground, which argues that men and women gravitate towards success as it has been culturally defined for them. Shelley Correll found that when a sample group was told that males were better at a given task, the males in the group rated themselves as doing significantly better at that task than the female participants, while women undervalued their performance, even though all participants were given the same scores (2004). When a different sample was told there was no gender difference in task performance there were no significant differences in self-ratings based on gender (Correll, 2004). In the first scenario, men rated themselves as more likely than the women in the sample to pursue a career that involved the skills used in the task (Correll, 2004). However in the second sample, when participants were told there was no gender difference in performance, women rated themselves as more likely to pursue a career in a field that involved the skills used in the task (Correll, 2004).

Correll applied this framework to students’ perceptions of their math abilities (2004). Implicit bias tests have shown that parents, children, and teachers link math abilities with maleness (Correll, 2004). Similarly, Riegle-Crumb and Melissa Humphries showed that regardless of difficulty, teachers perceive math to be easier for males (2012). In the presence of these engrained beliefs, Correll found that when controlling for scores, male high school students evaluated their math skills, but not their verbal skills, more positively than female students (2004). Additionally, the greater students perceived their math skills to be, the more likely they were to major

in a STEM field (Correll, 2004). Thus, the belief that men are naturally more skilled at math encourages men to enter STEM disciplines and inhibits women from pursuing STEM fields regardless of ability as measured by performance. Unlike England's interest explanation, Correll does not discuss different socialized male and female interests and the way this results in different gendered paths, but argues that men and women both prefer activities that they have been culturally defined as good at, which leads to gendered paths. Namely, both men and women want to feel successful, and because women do not feel as successful as men do in the sciences, they do not pursue sciences at rates as high as men do.

Assistant Professor of Physics at Wesleyan, Christina Othon, touches on this phenomenon, remarking that it is one she and her husband often encounter in the sciences. "One of the most surprising things for me about young women in physics" Othon states, "is that they can be at the top of their class and not understand that". Othon explains that "there are a lot of males in there that really think they do know it and they will tell you they think they know it and they are very vocal about it". Othon theorizes that women may "think they are having more trouble than these other people who are more confident about their knowledge when in reality they have a much more firm grasp on it". Othon's analysis from her in class experience resonates with Correll's research. Men rate themselves as scoring higher on exams when there is a positive male bias present (Correll, 2004). Because the "math=male" norm exists, it is easier for males to associate themselves with math and harder for females, even those who have chosen pathways that are heavily involved with math (Nosek, 2002, 1). Because men have the benefit of an implicit culturally defined identification with

math, men in STEM may have an easier time vocalizing their success. This vocalization of success may be detrimental to women in STEM who do not benefit from the masculine association with math, and thus do not have elevated ratings of their scores.

These gendered expectations of success are held by society at large, and thus professors also hold these ingrained beliefs about gender appropriate career paths. Professors may not have it in their schema for a woman to become a physicist, despite her talent, and thus may unknowingly offer her different advice than a male student. Research done by Frances Trix and Carolyn Psenka on letters of recommendation written for medical school faculty illuminates how different gendered schemas that others hold affect individuals and their aspirations (2003). Letters written for women were twice as likely to focus on training and teaching, whereas letters written for men were twice as likely to focus on research, skills and ability, and their careers (Trix and Psenka, 2003). Because of these frameworks, professors, mentors, parents, and others who have influence may advise female students towards teaching, or other paths that fit within their understanding of female, while advising male students towards research or other acceptably male trajectories.

Assistant Professor of Astronomy at Wesleyan, Meredith Hughes, speaks about her experience as an undergraduate at Yale University, and the encouragement that she received from her advisor. “When I brought up grad school with my advisor, she –Meg Urry-who is known in the physics world for encouraging women in physics to go to grad school- said matter-of-factly, yeah, you should go to Cal Tech because the people there on a high enough level that they will push you because you need that

because you're really good". Hughes explains that while she "was just bringing up the thought" it was very encouraging that her advisor's "expectation was, yes, this is a very natural, next course for you, but not only that, but you should go to one of the top graduate schools". Hughes described this experience as making a "big difference" in her decision to pursue her graduate degree, and worried that women who did not receive this feedback were much more likely to pursue "literature and humanities" where they would receive that positive encouragement and feel successful.

### **The Culture and Organization of Science**

Women who express interest in STEM fields encounter barriers to their inclusion; the culture and organization of sciences deters women from pursuing STEM majors. Joan Acker writes that organizations are not "gender neutral" (1990, 146). Organizations contain within them gendered "divisions of labor, of allowed behaviors, of locations in physical space, of power" (Acker 1990, 146). Mary Fox adds that science is a particularly gendered hierarchical structure in that it is governed by norms of "rationality and control [that] have been more ascribed to men than to women" (1999, 452). Men who enter science majors "benefit [from] a culture and climate that reflects their understandings and interests" whereas women find themselves needing to adhere to a "male norm" to succeed (Fox 1999, 453-4).

Jane Margolis and Allan Fisher's work on the culture of computer science at Carnegie Mellon University demonstrates the specific difficulties women face in STEM majors. Computing is an activity generally associated with men, "claimed as 'guy stuff'" which alienates women and can make them feel they do not belong

(Margolis and Fisher 2000, 4). Margolis and Fisher explain that the computer science culture “mirror[s] and bestow[s] prestige on an orientation toward computing commonly identified with men, while devaluing and pushing to the margins the orientations associated with women” (2000, 1). Margolis and Fisher found that women tend to relate their interest in computing to a larger issue, such as education, medicine, or space exploration, while men tend to express an early passionate interest that is focused on computers (2000). Curriculums focus on and reward the technical and only discuss more holistic, applicable approaches to computer science towards the end of the major, when some women may have already lost interest (Margolis and Fisher, 2000). Additionally, many women reported struggling with the geek culture of computer science (Margolis and Fisher, 2000). Sixty percent of Carnegie Mellon’s female computer science majors said they did not fit the geek paradigm and 20% reported feeling that they did not belong in computer science because they did not fit the geek paradigm- namely, they lacked the “singular and obsessive interest in computing that is common among men [and] is assumed to be the road to success” (Margolis and Fisher 2000, 71).

The computer science major is a point of interest when examining the factors that lead to the lack of women in STEM fields, since the percentage of computer science Bachelor degrees awarded to women declined between the mid 80s and the mid 2000s (Hill, 2010). In the 80s, women earned 36% of computer science BAs, whereas in 2006, they only earned 20% (Hill, 2010). Can this drop in female majors be explained by shifting female interests and norms that are making it less acceptable

for women to be interested in and successful in computer science? Or is the culture and organization of computer science increasingly inhospitable to women?

Physics departments are similarly described as “‘masculine environments’ that may be unfamiliar- or even intimidating- to women” (Fox 2000, 53). One faculty member described their physics department as

...a locker room mentality. Everyone is on a sports team, slapping each other on the back. This works well among men...It is difficult for women to penetrate the locker room. Students work as a team to get through the problems. Men tend to band together in a rowdy, aggressive, friendly style...A woman who is very aggressive, tough as nails can project into the group” (Fox 2000, 53).

Physics has long been seen as the “old boys’ club” governed by masculine norms, and unwelcoming to women (Traweck 1988, 90).

Women in science face many challenges as outsiders in social spaces with norms they are unaccustomed to. Wesleyan professors touch on the social repercussions of stepping out of gendered paths and entering a culturally male sphere. Professor of Earth and Environmental Science, Suzanne O’Connell, remarked that in her 20 years at Wesleyan, she often found herself the only woman in the room. Othon shares that one of her biggest challenges in physics was the “isolation...just being around guys all the time can drive you a little crazy”. She recalls “inserting myself” into male study groups that otherwise would not have included her because “they didn’t know how to invite me without thinking they were crossing some kind of barrier, that they were hitting on me, or going to make me uncomfortable”.

Othon also pointed out that interactions and perceptions changed once she entered a male field. “Guys were extremely intimidated when I told them that I was a physicist...that was pretty much a conversation stopper for like 80% of the men- they’d just be like woah, and walk away”. Othon explains that she “got the same thing” from women while she was in college- “I would be like- I’m studying physics, and they would be like- why would you do that?...I found fabulous friends, and I guess the ones that walked away weren’t worth it”. Othon feels she lost friends and interested men because of her deviation from the prescribed female pathway.

However the cultures and structures of science institutions do vary. The average physics department in the country graduates a 20% female class. Interestingly, there are 18 departments out of 767 undergraduate institutions that grant physics degrees that are graduating 40% or more female physics BAs yearly (Whitten, et al, 2007). Barbara Whittens argues that these departments have cultures that vary from the norm of physics departments, and that these localized cultures are more inclusive of women in science (2007). These departments are characterized by their “friendly and informal” culture, and their “atmospheres of cooperation” (Whitten, et al 2007, 56). Many of these departments also have a “comfortable and attractive” student lounge and host informal activities (Whitten, et al, 2007, 69). Introductory courses are engaging, inclusive of potential female majors, and taught by a charismatic teacher, rather than weed-out classes (Whitten, et al, 2007). A Wesleyan student at a Women in STEM Conference remarks of her own experience, “I wanted to be an engineering major, but [organic chemistry] was really intense and scary, so now I think I may be astronomy or environmental science”. Wesleyan’s science

introductory courses are impersonal and have unlimited enrollment. Changing the culture of weed-out introductory classes may allow for the retention of students that feel unwelcomed.

At the college level, women state intent of pursuing a STEM major half as frequently as men do (Xie and Shauman, 2003). Of the women intending to pursue a STEM major, a third less complete the major than males intending on majoring in STEM fields (Xie and Shauman, 2003). Using the pipeline analogy, STEM fields at the college level leak the most women at the interest point. However, colleges also lose a significant portion of interested women throughout the course of the major. This may be due to Correll's explanation that men tend to overrate their abilities in math and science, leading them to pursue STEM fields at higher rates than women because STEM fields fit their cultural ideas of success. Women may also be leaving STEM college majors at higher rates than men because of the cultural climates of STEM departments, which can be unwelcoming to women.

### **Graduate School**

An even smaller percentage of women emerge with PhDs in STEM fields than Bachelor degrees. In 2005, women made up 44.6% of math majors, however, five years later were only 30% of math PhD recipients (National Science Foundation, 2013). Similarly, in 2006, women made up 52% of chemistry BA students but that year women only earned 34% of the PhDs in chemistry (Hill, 2010). The higher up the educational ladder, the less percentages of women in most STEM fields.

Women may not continue on to graduate school in a STEM field for multiple reasons. Correll showed that beliefs that men are naturally better at math that are held by society at large encourage men to pursue fields that involve math at rates significantly higher than women (Correll, 2004). Women may not go on to the graduate level in STEM because they feel they have not gotten good enough grades, when in reality, they have gotten the same grades as men who are continuing in science (Correll, 2004). The men, however, benefit from the tacit belief that males are better at math, so they perceive themselves to have done better, and are thus more likely to continue in the study of the STEM field (Correll, 2004). This bias favoring men may account for some of the further gender inequalities between college and graduate level study.

Women may also not go on to graduate study because they feel sciences do not fit them. While they were interested in sciences, they may have struggled through their Bachelors in an inhospitable environment, and no longer want to be in such an isolated atmosphere. Women may be pushed towards other disciplines or fields where the culture is more inclusive.

Completion rates for graduate school students are low across all academic disciplines (Sowell, 2008). While completion rates are projected to be between 40% and 70% across different academic disciplines, they also vary by gender (Sowell, 2008). Within the humanities, completion is 52% for female PhD students, and 47% for male PhD students (Sowell, 2008). However math and the physical sciences retain 52% of female students while retaining 59% of male students (Sowell, 2008).

Similarly, 56% of women complete their engineering PhDs while 65% of men do the same (Sowell, 2008).

Once in graduate school, we can presume that women who were not interested in STEM fields were already filtered out of the pipeline. Additionally, the women who were unsuccessful at the STEM undergraduate level most likely did not move on to the graduate level. Thus, graduate school and paths taken onwards are particularly revealing in that departures from the STEM trajectory would not be attributed to lack of interest, commitment, or ability.

### **Covert Discrimination**

O'Connell explained that when she was in graduate school “a long time ago” for oceanography, “women were not allowed on research vessels...[or] in mines...the restrictions were unbelievable”. Today, women face less explicit barriers to participation in graduate school science. While women are not explicitly prohibited from entering certain spaces, male spaces still exist, like the lab, which pose barriers for women in STEM.

Once at graduate school, women face covert discrimination, and other institutional and social barriers to success. Scientific research is highly collaborative and social in comparison with other academic fields (Fox, 2001). Fox explains, “the sciences are more likely to be conducted as teamwork rather than solo; to be carried out with costly equipment; to require funding; in short, to be more interdependent enterprises” (2001, 658). This is important to take note of, because the heightened levels of “teamwork” in the sciences allows for interactional dynamics between men

and women to play out. Given the imbalance of men and women in most labs, interactional dynamics are extremely important to examine.

Women students surveyed in chemistry, computer science, electrical engineering, and physics cite lower frequencies of working with male professors and students than their male peers (Fox, 2001). Because women are the minority in most STEM fields (in student body and in faculty), having less interaction with the male majority of the department is a disadvantage. It is often harder for women than men to join majority male study groups, which can leave women studying alone (Fox, 2000). Women also reported feeling less comfortable speaking in research meetings than men, and reported that professors and other students took them less seriously at higher rates than men (Fox, 2001).

While earlier scholars saw this as a result of women's deferential speaking styles, Correll and Cecilia L. Ridgeway provide a different framework in which to understand these interactional dynamics (2003). They found that when a member of a group who participates often offers an idea, other group members are likely to perceive it as a good idea, however that same idea offered by a less vocal member will be less persuasive (Correll and Ridgeway, 2003). However, they also found that these status hierarchies form in groups in part because of expectations based on status characteristics, such as gender, race, and class, which group members assume influence competency (Correll and Ridgeway, 2003). Those with privileged status characteristics are expected by the group to make more significant and useful additions, so the group will "defer more to this individual and give her or him more opportunities to participate" (Correll and Ridgeway 2003, 31). Once these

performance expectation states are created amongst a group, they “shape behavior in a self-fulfilling fashion”- namely, once an individual is expected and given opportunities to influence the group, they have more chances than others to speak up, and when they do, they are more likely to receive positive feedback (Correll and Ridgeway 2003, 31). In a lab environment where many have the status characteristic of maleness, many would benefit from these performance expectations that are created. Correll and Ridgeway’s research sheds light on why female students feel they are not being taken as seriously as the male students, and why female students feel less comfortable participating in meetings.

Gender characteristics play a large role in shaping implicit assumptions made about an individual’s competence. Correll and Ridgeway explain that “specific assumptions that men are better at some particular tasks” for instance, math and science, “while women are better at others (e.g., nurturing tasks)” are culturally engrained (2003, 32). Thus, the effects of gender on perception of competence are particularly important to study in the sciences because the sciences are assumed to be a male domain. A 2012 study showed that when given identical applications with either male or female names, both male and female science faculty rated the male applicants as more competent, offered them higher starting salaries, and more mentoring (Moss-Racusin et al., 2012). While faculty rated the female applicants as more likable than the male applicants, this likability did not lead faculty to rate female applicants as more hireable, competent, or deserving higher starting salaries (Moss-Racusin et al., 2012). These biases, often called implicit bias, clarify why men report receiving more mentoring from science advisors than women do (Fox, 2001).

Women in science “receive less faculty encouragement...than identical male counterparts,” which may influence women’s self-assessments and goals (Moss-Racusin et al. 2012, 4). Similarly, male students more frequently report having mentor-mentee relationships with faculty, while female students more often reporting having student-faculty relationship with their advisors (Fox, 2001).

Wesleyan professors discussed their encounters with covert discrimination, particularly as it involved assumptions about their competence. Mukerji explains that “I did have to encounter a lot of people who sorta treated you like what you don't know how to use this particular thing be it a saw or something else about building an instrument”. Othon similarly comments that in graduate school she was met with many assumptions that she could not “wire something or take a laser apart”.

While the female applicants were rated as more likable than the equivalent male applicants, when women are in positions of clear success and power in male spheres, they lose their likability (Heilman and Okimoto, 2007). Heilman and Okimoto found that “the mere knowledge that a women has been successful in a male domain produces inferences that she has engaged in stereotype-violating behavior, resulting in social penalties” (Heilman and Okimoto 2007, 81). These successful females are rated as less likable, hireable, and desirable as a boss than their male equivalents by both men and women (Heilman and Okimoto, 2007). Interestingly, women who are successful in female or neutral domains do not experience these negative character judgments (Heilman and Okimoto, 2007). It is not female success in general that warrants a negative personal response, but “the agenticism that it [success in male-domains] entails [that] apparently cause them to be seen as deficient

in the feminine attributes mandated by gender stereotypes” (Heilman and Okimoto 2007, 91). Women in male domains are caught in a bind- to be competent is to not be female, however to not act female or to clearly succeed brings about dislike and mistrust (Heilman and Okimoto, 2007). These biases pose barriers to female scientists who are attempting to participate in male dominated spaces.

### **Decentralization**

Another key factor to take into consideration is the decentralization of graduate departments (Fox, 2001). The sciences tend to be particularly decentralized because the costs of the laboratory equipment and personnel are provided by research grants that are obtained and controlled by the professors themselves instead of by the university (Fox, 2001). Additionally, these grants and programs are crucial in determining the national ranking of research universities (Fox, 2001). Because of their high self-sufficiency, control, and worth, individual laboratories run independently while administrators “take a ‘hands off’ approach” (Fox 2001, 661).

Because of the decentralization of graduate education, “departments tend to leave untouched the core of graduate education: the advisor-advisee relationship” (Fox 2001, 660). Since science department have strong interests in ensuring the continued success of funded labs, they have no incentive to interfere with the “privatized...training” conducted by faculty (Fox 2000, 57). This is problematic for women in STEM given the multitude of biases previously discussed that affect the student-advisor relationship.

The decentralization of the STEM graduate education additionally allows for faculty to use different “standards for performance” which can be “subjective and ambiguous” (Fox 2000, 54). The granting of PhDs is similarly in the hands of the faculty advisor (Fox, 2000). This “judgment” that individual faculty make for “sufficiency of work for doctoral degree[s]” is not standardized and subjective (Fox 2000, 55). Science departments that have higher percentages of female graduates tend to have written guidelines that faculty must refer to when evaluating students (Fox, 2000). The lack of explicit guidelines disadvantages women, because they are operating in a male sphere and are perceived as less competent (Fox, 2000).

While many departments identify the problems facing women as structural and systemic, the solutions they pose are often individualistic in nature, such as offering individuals tutoring (Fox et al., 2011). Departments define faculty and the lab as the major area that needs improvement, however, the decentralization of the lab hinders administrative efforts at intervention (Fox, 2011). Programs that aim to increase female participation at the graduate level must “maneuver within such conditions of comparatively high faculty control and low institutional surveillance of departments” (Fox et al. 2011, 608).

## **Career**

Women are a minority in college and university faculty in life sciences, physical sciences, and mathematics (Eccles, 2007). In 2005, women comprised 34% of the life science faculty, 19% of math faculty, and 18% of the physical sciences faculty (Hill, 2010). Faculty also funnel more narrowly into preexisting gendered

fields at this point. For instance, 64% of women science faculty are concentrated in the life sciences and psychology, whereas only 35.5% of male science faculty are found in these areas (Fox, 1999). Similarly, 50.2% of male science faculty are working in the physical sciences, computer science, or engineering, whereas only 17.5% of female science faculty are working in these fields (Fox, 1999).

Women also become scarcer as rank increases (Fox, 1999). In the 1990s, women made up 20.6% of the assistant professors in the physical sciences, but only 10.2% of the associate professors, and 3.5% of the full professors. Similarly, women filled 35.9% of the assistant professorship positions in the life sciences, 28.4% of the associate positions, but only 12.6% of the full professor positions (Fox, 1999).

There is a gap in the percentages of female PhD recipients in the sciences and the percentages of women receiving tenure (Hill, 2010). In 1996, women earned 12% of the PhDs in engineering; however, giving ten years for the tenure process, in 2006, only 7% of engineering tenured professors were women (Hill, 2010). Similarly, in 1996, 46% of PhD earners in biology were women; however, in 2006, women were less than 25% of tenured faculty in biology (Hill, 2010). Even allowing a span of 15 years between graduation and receiving tenure does not correct for this gap (Fox, 1999). Women tend to be clustered in the non-tenured, lower paying STEM academic positions (Hill, 2010). Fox writes that this gendered ranking in academia is the “area of greatest gender disparity in scientific career attainments” (1999, 449).

The data collected at Wesleyan tells a similar story. Mukerji recalls that “at one point in hiring, we took our eyes off the ball and we hired a lot of men. We had 19 positions and maybe 17 of them were filled by men”. Mukerji explains; “it was

sort of at this final level where it becomes a subjective decision...where the men were beating out the women”.

There are very few female professors in the physical sciences. There are no tenured female physics professors, while there are eight male tenured physics professors. There is now one tenured track female physics professor, Christina Othon, who was hired in 2010. The only other females in the physics department are two visiting professors; non-tenure track, low paying positions. The lack of female full professors in the chemistry department is problematic, especially because there are currently ten male full chemistry professors, and only one full female professor. While there is one more female assistant professor in the department, the disparities in the chemistry department are shocking given the percentages of female chemistry PhD earners. There are also no female computer science professors. The mathematics department has the highest percentage of tenured women faculty. Unfortunately, there are currently four male assistant professors and no female assistant professors, meaning this will eventually change unless the department makes a concerted effort to hire more tenured track female professors. The number of female tenured biology professors is also below 40%; even in STEM fields where women are the majority at the undergraduate level, they are still underrepresented at higher ranks. Besides psychology, biology does have the highest percentage of full female professors than any other discipline, showing that women tend to be particularly successful in the life sciences. Only in psychology do we see female full, associate, and assistant professors comprising more than 50% of the faculty.

Fig. 2.

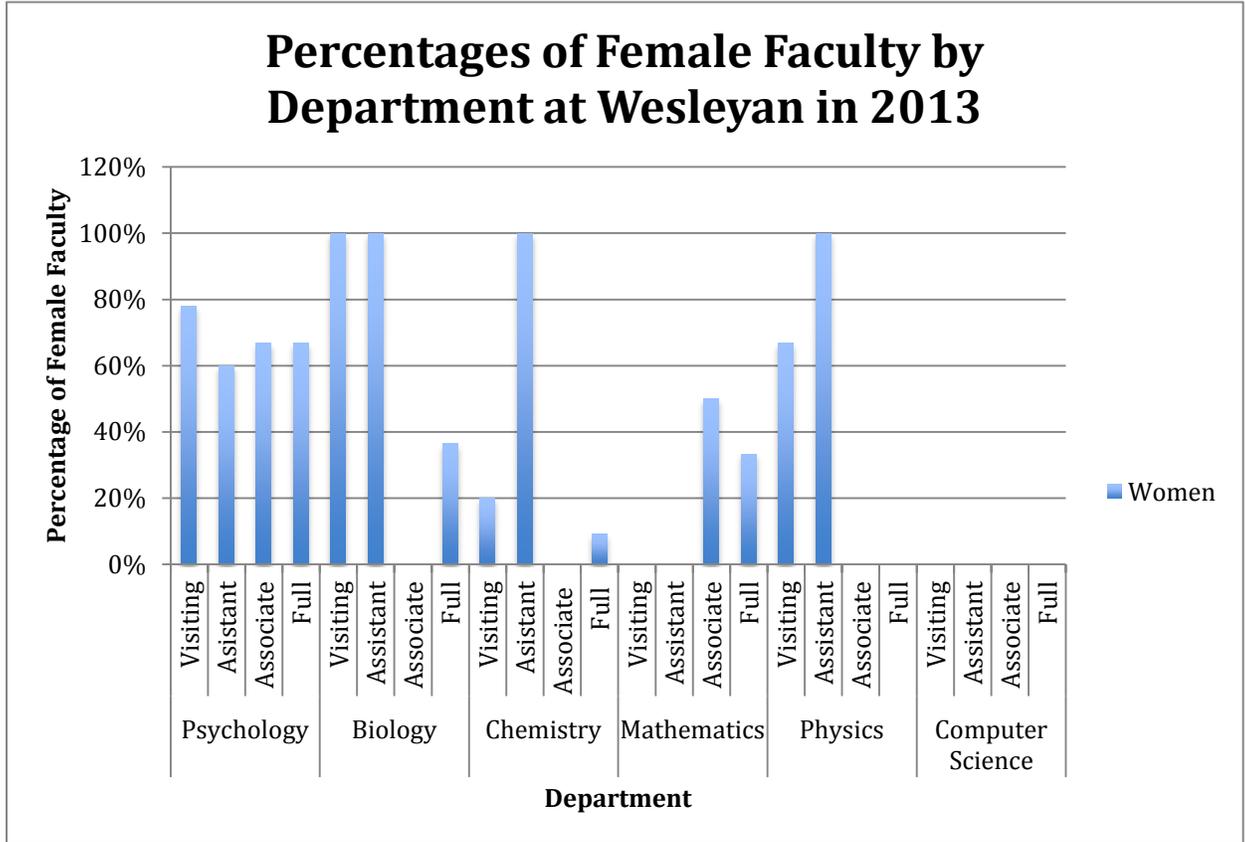


Fig. 2. Data collected from Wesleyan departmental websites

O’Connell points to the low numbers of female faculty at Wesleyan, highlighting the absence of women in the STEM workforce. “How many female professors are there at Wesleyan in physics?” she rhetorically asks. “One. And it’s 2013. How many in Chemistry? Two. You might say well maybe they’re all going to work for oil companies, they pay a lot more- they’re not there either! Government jobs? They’re not there either! Where are they?”. Women, as O’Connell alludes, only comprise 12% of the scientific and engineering industry work force (Mattis, 1999). In 2001, women only comprised 8.5% of employed engineers (Xia and Kleiner, 2001) though they earned 17% of engineering PhD that same year (National Science Foundation, 2013). Additionally, a survey done of the top 1,686 technology

companies showed that only 5.6% have a female in a top position (Xia and Kleiner, 2001). Another study recently showed that energy companies were the most likely industry to have no female representation on their board (Lamb and Gladman, 2012). Women in these science industry positions tend to earn less money than their male counterparts; male informational technology managers earn yearly starting salaries approximately \$7,000 higher than females with the equivalent job descriptions and titles (Xia and Kleiner., 2001).

While women are minorities in both industry job and academic positions, research shows that female scientists also obtain the jobs that are the least desirable within each sector (Fox and Stephan, 2001). For instance, male and female electrical engineers rate government and industry jobs as more desirable than academic research; the starting salaries for these positions tend to be particularly high (Fox and Stephan, 2001). Although men and women have higher preferences for government and industry jobs, women are more likely than men to be employed in academic research (Fox and Stephan, 2001). On the other hand, in physics, where both men and women rate academic positions as more desirable and prestigious, male physicists are significantly more likely than female physicists to be employed in academic research positions (Fox and Stephan, 2001).

### **“The Mommy Track”**

How can the career gaps between female and male scientists be understood? What explains these gaps between female and male academic scientists, particularly in rank? Two years after PhD completion, 50% of men in STEM have children under

the age of six, while only 30% of their female peers have young children (Mason, 2013). Although male scientists consistently have children at higher rates than their female counterparts at all ages, they do not suffer from what sociologists call the “motherhood penalty”.

One explanation for the career gaps between female and male scientists focuses on the discriminatory preconceptions of motherhood that affect women’s careers. Being seen as a mother leads to lower ratings of competence, commitment, and performance (Correll et al., 2007). In an experimental study of evaluations of mothers, fathers, and non-parents prospective employees, mothers are significantly less likely to be hired, promoted, and are offered significantly lower salaries than identically qualified non-mothers (Correll et al., 2007). Correll explains that this occurs because “cultural understandings of the motherhood role exist in tension with the cultural understandings of the ‘ideal worker’ role” (2007, 1298). The role of mother includes the “expectation that mothers will and should engage in ‘intensive’ mothering that prioritizes meeting the needs of dependent children above all other activities” (Correll et al. 2007, 1306). The ideal worker, on the other hand, is understood to prioritize and sacrifice for their work (Correll et al., 2007). Academic science not only warrants sacrifice and prioritization, but “demands exclusive attention to research” and women who are mothers “cannot be serious scientists” as they are on “the mommy track” (Mason 2013, 51).

However, male scientists are never believed to be “on the daddy track” (2013, 51). Correll explains that being an ideal worker and a father are not seen to be incompatible; they reinforce each other (2007). Unlike women, male workers tend to

make more money once they are fathers, and are rated as more competent and committed once they become fathers (Correll et al., 2007).

Another explanation emphasizes the impact of internal family dynamics on women's careers. Pamela Stone explains in her work, *Opting out?* that the traditional household division of labor and deference to husbands' preferences is still alive and well (2008). Women surveyed often desecrated their husbands as absent (Stone, 2008). While women also often described their husbands as "good fathers" their contributions were not substantial enough, leading women to "pick up the pieces and the slack" (Stone 2008, 68). The "exemption of husbands from domestic responsibilities and the privileging of husbands careers" creates an unbalanced roles where once children enter the picture, women are tacitly expected to take on more of the childcare for the benefit of the husband's career, even in the cases of the highly successful professional women Stone studied (Stone 2008, 62)

While mothers often give up jobs, hours, or stay home all together, husbands are much less willing to "step off the career track to allow women to continue on theirs" (Stone, 2008, 70). Hughes remarked, "too often what I see is that because of societal expectations...women put themselves in second place". She explained that her "solution was to find a really great feminist husband" who "took a step back from his career...working from home" to allow her to pursue her "dream job" in Middletown, Connecticut. Hughes explains that in her relationship, they attempt to be "equitable about these decisions", and so perhaps in the future, she will be the one to "sacrifice". Ultimately, being the spouse who repeatedly takes one for the team leads to "significant and cumulative disadvantages to...careers" for women (Stone 2008,

77). This is especially true for upper class and upper-middle class families, who can afford to have one parent stay at home or work reduced hours (Stone, 2008).

Wives often reported their husbands' expressing some form of the sentiment "I'll support whatever you do" when it came to the choice between work and childcare (Stone 2008, 76). However, in this passivity; "its your choice;" husbands are asserting themselves as "bystanders, not participants in the nexus of work and family" (Stone 2008, 77). While husbands seem to be "deferring" to their wives in this decision, in reality, by offering no real support or "behavioral changes" husbands show they "quietly expected their careers would be primary" (Stone 2008, 78). While many mothers speak "of their decision to leave their career track as a choice," there are many influencing factors that make these decisions "not...their own" (Mason 2013, 22).

These two explanations interact in complex ways to create the reality mothers face. Mothers face discrimination in the workplace, which leads to lower pay and fewer promotions. Because men tend to make more money than women due to these discriminatory practices, women give up jobs to stay home with children even if they are making six figures, because their husbands are making seven (Stone, 2008). In Provost Ruth Weissman's opening remarks at the Women in STEM Conference, she remarked, "not only are we losing half the population, women, but the women who go on to have children are primarily responsible for educating our children, and a mother who is not well educated in the sciences is not optimally equipped to help support her children's education". Weissman's assumption can be understood using Correll's explanation- women's primary job is motherhood, which is incompatible

with the ideal worker, therefore they will ultimately not succeed as scientists.

Additionally, Weissman captures Stone's argument as well; mothers are responsible for the domestic sphere, thus it is important that we educate women because they are the spouse responsible for the children's education.

The postdoctoral years are a good example of the impact of these cultural expectations and power dynamics on women's decision to continue pursuing their career goals. Women with no children, who do not plan on having children, are just as likely as men who do not plan on having children to say they will pursue professorship with a strong emphasis on research (Mason, 2013). However, women who plan on having children are 10% more likely to abandon the goal of professorship and research than men who plan on having children (Mason, 2013). Women who had a child during their postdoc are twice as likely to give up the goal of professorship and research as men who have had children during their postdoc (Mason, 2013).

Having a child six years old or younger significantly reduces women's chances of achieving tenure in the sciences, while having children does not affect women's chances of achieving tenure in other academic fields (Mason, 2013). A female with a young child is 26% less likely than a male with a young child to be tenured in the sciences, while women who do not have young children are 11% less likely than men to be tenured in the sciences (Mason, 2013). Ultimately, 73% of tenured male science professors are married with children, while only 51% of tenured female science professors are married with children (Goulden, et al., 2011).

Tenure-track married women with young children are 21% less likely to receive national grants than tenure-track married men with young children (Mason, 2013). Grants are extremely important for the functioning of a lab and the process of tenure (Mason, 2013). The grant writing process is time consuming and tedious, and many female scientists who are taking on an unequal amount of the childrearing will find they do not have time for the process (Mason, 2013). Married tenure-track women with young children are 26% less likely to receive grant funding than married tenure-track women without young children (Mason, 2013). Access to this resource is key to success in the sciences.

Female scientists with young children are 26% more likely than female scientists without young children to be contingent faculty (Mason, 2013). On the other hand, a male scientist with children is 36% more likely to be on a tenure-track than a male scientist without children (Mason, 2013). Clearly parenthood affects the science careers of male and female parents differently.

Female scientists in industry face the same motherhood discrimination and issues of unequal domestic labor division. Female executives in science industries marry and have children less often than the average population (Mattis, 1999). In a study done of women in industry, half poled reported “that having a supportive husband was critical to their ability to balance work and family responsibilities” (Mattis, 1999). Those who remain in industry also cite husbands who were willing to relocate so they could take a job (Mattis, 1999).

## Discussion

While departments can often name the systemic problems, the solutions offered are often individualistic in nature (Fox et al., 2011). While the professors quoted were quick to point out systemic factors that blocked women's entry into STEM fields, many ultimately offered individualistic words of advice. Hughes, for example, spoke about the need for affirmative action because of the "systematic disadvantages" women have had in sciences, and the importance of equal valuation of husbands' and wives' careers. Similarly, O'Connell speaks about implicit bias, explaining: "basically, you get two equal resumes, one from Joyce and one from John, the exact same resume, which one is best? John. These biases are built into our society, and if you're aware of them and know you have them you can at least try to fight against them so you will not be some of those people putting other women down". Mukerji also advocated that all people fight against their internal biases. Mukerji spoke about assumptions regarding her incompetence that she encountered in the sciences, and how these biases affected hiring at Wesleyan.

However, ultimately, despite their acknowledgment of systematic disadvantages, professors also expressed individualistic understandings of success. Hughes explained that she made it through the science pipeline unlike her friends who were also physics majors because of "personality...I just knew I loved science and I wanted to keep doing it and I was able to push through those minor setbacks". Hughes explains, "if you want it badly enough...it's all just work and if you're willing to put in the work and you want what's at the end of it you can get there". Similarly, O'Connell advocates that students "can do things you want to and believe

in, and some exploitive to them!” she chides, dismissing those who pose barriers. More seriously she adds, “whatever obstacles or hurdles you face you can look upon them in a really interesting almost spiritual...sense”. Mukerji also expressed that “I really do believe that if you truly are interested in something and love something, and I love science, that you will succeed. And if the interest is there and the passion is there, that you can be successful and of course here I am, so I guess it worked!”.

This ambivalence highlighted by the professors’ advice points back to the two different literatures. Is it interest that drives or inhibits the individual’s journey towards the sciences? Or are there cultural and systemic structures that benefit some and disadvantage others? Ultimately, what changes needs to occur to retain women in the sciences?

Some authors argue that this change is given. Mason reiterates a common belief that because women are outpacing men at the BA and Masters level it is “reasonable to assume that further gains will occur” in scientific educational attainment (2013, 9). Very similarly, Marc Goulden “conclude[s] that” given current trajectories, “further gains will occur” in female science attainment at the BA, MA, and PhD level (2011, 144). It is important to challenge these assumptions. The percentage of computer science Bachelor degrees earned by women declined significantly between the mid 80s and the mid 2000s (Hill, 2010). Given this decline in female participation, increased female presence in the sciences cannot be assumed.

If progress towards a science in which equal attainment between genders is not an inevitable occurrence, what must happen in order to achieve this reality? Some scholars see that women’s lack of interest as the key explanatory factor. Xie and

Shauman, for example argue that the “inadequate supply of interested and qualified women has been ...more of a hindrance to the feminization of science” than any other one factor (2003, 2). They explain that while “much of the blame...has been attributed to the practice of science” (2) the locus instead lies at the level of interest, “commitment” (135), and “persistence” (Xie and Shauman 2003, 2). Xie and Shauman maintain that “among those who pursue science, however, a significant portion of women achieve a level of success on par with their male colleagues” (2003, 2).

Xie and Shauman are correct in a sense; the science pipeline loses many women at the college level due to lack of interest. STEM fields become dramatically gendered at the college level despite very similar levels of high school preparation, due to different gendered interest and gendered perceptions of suitable major choices. The transition from high school to college sees a very dramatic narrowing of the potential future pool of female scientists, particularly in physics, computer science, and engineering. Increase interest and thus qualified women, flood the pipeline with women, and the discipline will eventually feminize. Women will see more female scientists, which will “induce more girls to aspire...[to] once male-dominated...professions” (Xie and Shauman 2003, 216).

However, there is an issue with the premise of this argument. Xie and Shauman assert that a significant percentage of women scientists, that is- women who are interested in science and persevere, ultimately do gain ranks equally high as male scientists (2003). This claim is challenged by the finding that female scientists are much more likely than male scientists to be untenured, or on a non-tenure track

(Mason, 2013). The data regarding salaries and expressed preferences shows that women in sciences “obtain employment ‘left-overs’” (Fox 2001, 119). Thus Fox explains that while the “attention upon ‘increasing numbers of women in science’ [is] understandable,” the attention should be elsewhere (Fox, 454, 1999).

In STEM fields, women scientists are held up to a norm of rationality that is equated with maleness (Fox, 1999). Fox explains that women “have long been present in science” the problem is rather that they are not “valued...rewarded, [or] visible” (1999, 453). Increasing the number of women in sciences can occur without changing the valuation of female scientists or the existing power distribution (Fox, 1999). Rather what is needed is a reimagining and recreation of the culture and institution of science with the “possibility of a more diverse-including a feminist-science” (Fox 1999, 452).

Women can increase their numbers in STEM fields without challenging the tacit male dominance in these fields, “and, in turn, a hidden “male norm [is] likely to prevail” (Fox 1999, 453). If a male norm persists, males will benefit from covert assumptions, and the courses that will be taught, “the ways in which questions are framed, [and] approaches [that] are taken” will continue to be geared towards male interest (Fox 1999, 453). Margolis and Fisher showed that women in computer science majors were frequently interested in connecting the science they were learning to larger issues, like space travel, or education, while men were focused narrowly and intently on the science (2000). It is important that we not just tailor women to excel within an environment of male-norms (Acker 1990, 139). Instead, it is important to cater to a diverse set of interests and needs- not fit women into the

sciences, rather change the structure and hierarchies of science. As Fox writes, “just as organizations are structured, so they can be restructured” (Fox 2001, 663).

This should not obscure Xie and Shauman’s importance of interest. It is true that unequal socialized interests, aspirations, and beliefs about the acceptability of certain sectors are leading to different gendered career pathways. It is very important that women learn that they can and should pursue sciences, particularly physics and engineering. However, this is to say that education, or interest alone is not enough to ensure equal participation in the sciences (Fox, 1999).

## **Conclusion**

At different levels of STEM attainment, there are different factors that cause the narrowing of the pool of female participants. Despite high female achievement in the sciences at the high school level, disparities between male and female participation become stark at the collegiate level, particularly in physics, computer science, and engineering. I argue that the lack of women in these fields is caused mainly by different gendered understandings of acceptable aspirations and interests. However, a significant percentage of interested women are also lost at this point in the trajectory because of cultural norms entrenched in the sciences that leave women feeling isolated, unwelcomed, or as if they do not belong.

Once at graduate school, women face systematic disadvantages that are particularly aggravated by the male dominated lab space. Female scientists are seen as less competent, receive less face time with professors than their male peers, and feel less comfortable speaking in lab spaces. The decentralized nature of the lab gives

individual faculty power to run their labs as they wish, meaning that there is a lack of standardization. This allows for greater subjectivity, which disadvantages women, who are already implicitly seen as less competent than their male counterparts.

Women experience additional biases as they start families, which often coincides with entering the work place. Mothers are seen as less competent and less worthy of hire than single women and men. Additionally, the traditional and often expected household division of labor is split in ways that disadvantage female careers and privilege male careers.

Ultimately, these different factors compound, creating a shrinkage of women in the sciences at the different stages of attainment. Creating interested women, and perhaps more importantly, making it acceptable and desirable for women to be physicists and engineers is extremely important, particularly in high school and college.

It is time to imagine what can be done at Wesleyan. Instead of graduating 18% of women in physics, how can Wesleyan strive to be like the 18 departments across the nation that graduate 40% or more female majors. Wesleyan graduated a physics major that was 43% female in 2008. How can the department strive to make this a permanent circumstance, without placing the entire burden on the one tenure-track female professor who is working to achieve tenure? Additionally, how can the computer science department rethink its image and culture, and attempt to retain more women? And how can science departments at Wesleyan across the board work on hiring more women faculty? It is time to examine these institutions, and make systematic changes, so Wesleyan's sciences can become more inclusive and diverse.



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