VE RI TAS and Responsibility

When Harvard President Lawrence H. Summers made his remarks last January citing the possible lack of intrinsic scientific aptitude in women as the main reason behind the continuing lack of gender diversity in science academia, he also said he would like that notion to be proved wrong. In fact, Dr. Summers[1] said "I will have served my purpose if I have provoked thought on this question and provoked the marshalling of evidence to contradict what I have said."

I am not a scientist. I am a Harvard student who has listened to and contemplated thought provoking rhetoric on Dr. Summer's provocation. I am also a mother whose daughter is currently studying to be a scientist at a major research university. I imagine Dr. Summers would agree that parental love is one of the purist forms of motivation. It is in this spirit that I embark on this journey for the real answers.

It certainly seems ironic that in a year when science giant MIT has appointed its first woman president and there is mainstream debate[2] about the role Einstein's first wife physicist Mileva Maric may have had in helping develop the theory of relativity, that the innate scientific ability of women in general would fall into question. I mistakenly thought this battle had been fought and won. If I were a scientist I would have known better. An exploration of the history, work, and culture of women in the sciences holds real answers to the dilemma of sexism in this field. First, I will expand on the background issue of historically assumed inferiority of women and their brains. Next, I will discuss past sexism in the scientific and academic setting. Present day issues surrounding

1 Dr. Summers initially refused to release a transcript of his remarks. It can be found at www.president.harvard.edu/speeches.

2 Jan Eliot *Stone Soup* (Boston Globe, Nov. 20, 2005) Sunday Funnies

pervasive, institutionalized discrimination and sexism in the sciences is the final topic of this exploration. Subtle and overt gender discrimination has been and remains a major detriment to women's participation and advancement in this field. Its relevance to the state of present day science is crucial to addressing and ameliorating the lack of gender diversity in the sciences.

For centuries, scientists have tried to prove women and their brains inferior. Such are the cases made by 19th century Craniometry (skull measurement) specialist Paul Broca and uber misogynist Gustave Le Bon. Through their combined, elaborate, and convoluted attempts at scientifically proving feminine inferiority, they succeeded only in resting on the premise of inferiority – not testing it. On this topic, Dr. Stephen Jay Gould of Harvard finds in his essay "Women's Brains", that "one may affirm the validity of biological distinctions but argue that the data have been misinterpreted by prejudiced men with a stake in the outcome."(pg. 691) MIT neuroscience professor Nancy Kanwisher asserts, "It is cognition that counts, not the physical matter that does the cognition." Harvard psychology professor Dr. Elizabeth Spelke writes, "We adults may think very different things about boys and girls and treat them accordingly, but when we measure their capacities, they're remarkably alike." In terms of standardized testing, Dr. Summer's speech refers to, "different availability of aptitude at the high end." Boys consistently occupy greater high as well as greater low numbers on the SAT's. This is most markedly seen at both the high and low end of the math bell curve, or the "tails." While boys are likelier than girls to figure nearly all of the answers right on the math SAT's, they are also more likely to figure nearly all of the answers wrong. *A New York Times* article by Natalie Angier and Kenneth Chang suggested that "Such results taken together with

assorted neuro-curiosities like the comparatively greater number of boys with learning disorders, autism and attention deficit disorder, suggest to them that the male brain is a delicate object, inherently prone to extremes, both of incompetence and genius." They also point out that "evidence suggests that female brains are relatively more endowed with gray matter – the prized neurons thought to do the bulk of the brain's thinking – while men's brains are packed with more white matter, the tissue between neurons." These men and women of modern day science are all in agreement about the different but essentially equal nature of both gender's brains. Throughout history, scientists and others have repeatedly cited male-female brain discrepancies to account for inferiority in women. These overarching hypotheses have inevitably been found to merely reflect the cultural prejudices of the time. It does seem that, for at least as long as men have controlled the pen, they have been able to define and control women.

When not engaged in brain size analysis, many male scientists through the ages have focused on keeping female scientists out of their labs and out of their scientific fields altogether. Opportunities to engage in lab work only came about for women when there were not enough interested male scientists to carry out experiments. Not satisfied with leftovers, women scientists such as Lillian Gilbreth, Alice Hamilton, Ellen Swallow Richards, and Rachel Carson all successfully founded new fields of scientific study. Historically, when women scientists have, against all odds, succeeded in innovation and invention, their work has often been purposely overlooked, claimed by male scientists or subsumed altogether as was the case of Lillian Gilbreth. Popularly known as the mother in the "Cheaper by the Dozen" story, Ms. Gilbreth's pioneering work in the psychology of management was, for many years, attributed to her late husband Frank. This practice

was fairly common, especially when husband and wife were both scientists. To date, a total of 12 women scientists out of more than 300 male scientists have garnered the Nobel Prize. Isaac Asimov's Biographical *Encyclopedia of Science and Technology*[3] lists only 10 women out of more than 1100 scientists whose work is included and detailed. The history text, "*Women of Science: Righting the Record*, lists over 500 women scientists and their contributions. These are just the scientists the editors were able to find and re-discover. It is astounding to read in this text of the apparently "now-infamous" DNA discovery case where Rosalind Franklin's work was allegedly stolen from her desk by James Watson, Francis Crick, and Maurice Wilkins (pg. 236). All three men were subsequently awarded the Nobel Prize in 1962 for their DNA discoveries. DNA is widely considered to be the most important scientific discovery of the 20th century. This case clearly illustrates a gigantic problem in the way women's contributions have been historically (under) reported and rewarded in the world of science. With so much information about the work of women scientists unknown, it is almost no wonder the marginalized status they have achieved throughout history.

The cultural climate of science academia remains quite chilly for females. Marguerite Holloway notes, "science seems a uniquely well fortified bastion of sexism" and that, "studies of men and women interacting in groups suggest that women are interrupted more frequently, that their contributions are more often attributed to men in the group…" C. Megan Urry, Chief of the research support branch at the National Aeronautics and Space Administration's Telescope Science Institute maintains:

> Science is ultimately a guild, in which a master passes on skills…to apprentices. For reasons of ancient tradition, and

[3] Isaac Asimov, *Isaac Asimov's Biograpical Encyclopedia of Science and Technology,*revised ed. New York: Avon Books, 1976

> contemporary culture, those apprentices are predominantly male…the problem is that women are being judged by men in a system set up by men that basically reflects their [men's] standards and criteria.

Urry's synopsis of the pervasive sexism in this field suggests that male scientists may just be slower to let go of baseless sexism – very possibly because discrimination has been so thoroughly institutionalized in the sciences. Emily Carter, Princeton Professor of Mechanical and Aerospace Engineering, in her guest column, "It's the Culture, Stupid" for the DAILYPRINCETONIAN.COM exclaims:

> [Summers's] remarks vindicated for me and other women faculty in math, science and engineering (hereafter MSE) that there remains in academe a less- than- hospitable working environment for women, where blatant discrimination does not exist but subtle biases, due to the academic culture abound…finally I can turn to my male colleagues who keep insisting there are no more problems for women in academia and I can tell them what my inner soul has been saying all these long years: the problems remain, and until systemic change comes to universities, we will never see equal numbers of men and women on MSE faculty….it has nothing to do with aptitude. The aptitude is there. Many incredibly talented women are getting their Ph.D.'s in MSE these days. And departments would jump at the chance to hire these talented women. But they aren't applying. Why? Women are voting with their feet, to stay out of a culture they perceive as unhealthy…women are the canaries in the coalmines, and by golly they smell the toxic fumes.

One can surmise from the above testimony, that rather than being outraged by Dr. Summers's suggestion of possible innate inferiority-- Carter knows that to be false-- Carter is actually elated. Finally, the real problem-- historically pervasive, subtle, institution wide sexism and discrimination is illustrated for her by Dr. Summers's suggestion that perhaps we should just condemn women's brains once again. We can surmise as well from Dr. Carter's testimony that staying out of an unhealthy culture such as academia in order to have a more fulfilling life seems also to play a major role in career choice for women in the various science fields.

Scientific educational material is an area where subtle sexism has long been disseminated. Over the years at literally a molecular level scientists and science writers have teamed up to produce biology articles and texts that unconsciously and inaccurately represent the most basic sperm-meets-egg scenario. In her essay "The Egg and the Sperm: How Science Has Constructed a Romance Based on Stereotypical Male-Female Roles", Emily Martin cites numerous scientifically inaccurate examples of positive, aggressive, and even heroic adjectives applied to the work of the sperm. Conversely, the adjectives relegated to the work of the egg tend to inaccurately imply passivity, wastefulness and congenital dependency. Perpetuating these inaccuracies after they are known is the complete antithesis of science. The reality is an ingrained sex bias. Sandra Steingraber, a Bunting Fellow at Radcliffe and Harvard, has studied extensively dioramas of white-tailed dear in natural history museums, and found that the males are always depicted in a warrior-like stance, about to defend a doe and fawn. In reality Steingraber says, does and bucks unite only to mate. She further states that, "the dioramas, an educational tool, were shaped by the anthrocentric and anthropomorphic social vision of the men who designed them." Whether done consciously or not, the outcome of this subtle distortion is the same – girls are made, at a sub-conscious level, to feel weak and inferior. The impact and enormity of subtle, elemental sexist distortions as discussed above-very young girls and boys visit museum dioramas after all-- is extremely hard to gauge in terms of career choices. But it is easy to see how generations of girls could be negatively affected regarding their abilities in a world where what they are capable of and permitted to pursue has historically been defined by men. Dr. Summers does acknowledge the problem of "different socialization and patterns of discrimination",

regarding women scientists pursuing academic careers, but places this obstacle well below "issues of intrinsic aptitude…in the special case of science and engineering" as the reason for such a low percentage of tenured women in the sciences. Scientists and feminist thinkers such as Harvard professor emerita Ruth Hubbard, Dr. Sandra Harding, and Anne Fausto-Sterling are studying how scientific knowledge has been historically guided by gender socialization, both male and female. "Scientists think this is not very important. But our conceptions of how we think about the history of science shape how we are doing science now. We want to learn from the past. If we have distorted views, we should understand them," says Harding.

In the past decade especially, gender bias has been a huge issue in academia. Marcella Bombardieri reports in her *Boston Globe* article "Gender Gap Separates Harvard, Other Top Schools":

> Harvard University has never been considered a strong leader in promoting women's equality in academia. Critics say Harvard has done less than many other top universities to acknowledge its shortcomings and try to over come them...A group of alumnae called the Committee for the Equality of Women at Harvard has been trying for several years to persuade Harvard to do an exhaustive, in-depth self study like the one that led former MIT president Charles M. Vest to acknowledge a pattern of bias in 1999.

Writes Dr. Donna Nelson of the Chemistry Department at the University of Oklahoma: "I propose that there are other hypotheticals to account for women's lower numbers and proportions, such as discouragement at school, discrimination in getting into top graduate programs, disparagement of their work, and behavior which makes women feel like outsiders." She and many other women in the sciences also cited the fact that when the applicant's sex is not disclosed, either for admission or for grant funding, the success of

women candidates rises dramatically. Former astronaut Sally K. Ride[4], along with 99 of her colleagues in the sciences wrote in a letter to the *New York Times*:

> Considerable research and experience refute the notion that the status quo for women in science is natural, inevitable and unrelated to social factors. Research also shows that expectations heavily influence learning and performance. If society and individuals anticipate that women will not perform as well as men, there is a good chance those expectations will be met.

Martha West, a University of California professor who tracks gender issues in academia said a hiring gap should be the focus at Harvard: "The hiring data at Harvard is disgraceful…the issue he [Dr. Summers] did not address is that women are receiving Ph.D.'s in record numbers in math and science, and are still not getting hired in the numbers one would expect."

Many factors including socialization, family life, and lack of positive role models for girls play a part in the low percentage of tenured female faculty members in the sciences. According to Holloway, that low percentage causes "a catch-22: more women will enter the field only when there are more women in it." Dr. Patricia Farnes writing the Afterword in the text *Women of Science: Righting the Record* asserts: "All of the scientific disciplines represented here share a common historical dynamic—the slow entrance of women into the prerequisite educational mainstreams." There is no way to know if socialization or discrimination plays the larger role in this "slow entrance" history. It must also be recognized however, that mainly due to mythical reproductive troubles, women were basically forbidden to enter into scientific study of any kind during the nineteenth century. The fact that a pattern of subtle sex discrimination on the part of many major universities, including Harvard, also plays a major role in the lack of tenured

[4] Sally K Ride was the first woman astronaut in outer space, onboard the space shuttle *Challenger* in 1983

gender diversity is clear from the evidence presented in this essay. Based on this evidence, gender discrimination-- whether intentional or not-- appears to be a leading cause of the lack of gender diversity in science academia.

While sifting through literally mountains of information and "marshalling the evidence" I could not help but wonder how many academic women scientists Dr. Summers had consulted about their respective hiring and work climate experience before he came to his unfortunate conclusion. I am convinced had he delved further into the existing cultural climate for women, he would not have deemed it good judgment to blame the current dearth of tenured women faculty in the sciences on a lack of intrinsic scientific aptitude in women.

Although President Summers is appointed by the corporation, and answers to them, he is still the leader of a preeminent international institution of higher learning. According to a recent world wide ranking of universities[5], Harvard placed first. Good judgment is crucial to Harvard's worldwide perception and reputation of excellence. Dr. Summers has shown extremely poor judgment in his quest to find a good excuse for Harvard's lack of diversity. The sheer arrogance of his suggested possible reason is as outrageous as it is irresponsible. President Summers is not providing an exemplary role model for young adults, as is his responsibility. If a powerful woman were to suggest that all men at a certain level of achievement lost the aptitude to make good judgments, I believe she would face a serious inquisition. The Harvard faculty spoke volumes to the world about how they perceive Dr. Summers with their vote of no confidence[6] last march.

[5] Times of London, November 4, 2004

[6] The Harvard Faculty of Arts and Sciences (FAS) by secret ballot on March 15, 2005 voted no confidence in President Summers

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