

Feminizing Science: The Alchemy of Title IX

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The physical sciences have long resisted most inanities of the postmodern university. Nonetheless, these disciplines have not rejected all foolish notions prevalent on campus today. For some time, departments of physical sciences, engineering, and mathematics (SEM) have accepted feminist contentions that their practices are responsible for the underrepresentation of women in their ranks. Efforts to reverse this situation have followed—from female-friendly admissions standards to special dorms designed to support female engineering students.

These efforts have failed to produce parity of the sexes in SEM fields—a predictable outcome given that their underlying premise is false. As their failure to deliver desired effects has become clear, proponents have rarely reconsidered their beliefs as to why female underrepresentation persists. Rather, talk has turned to use of coercive methods to augment current efforts.¹ This thinking has been inspired by the use—or more accurately, abuse—of Title IX of the 1972 Federal Education Amendments to force proportional representation of women in college sports.

Beyond Bias and Barriers: Fulfilling the Potential of Women in Academic Science and Engineering is perhaps the best example of this move towards

¹Ron Wyden, “Title IX and Women in Academics,” *Computing Research News* (September 2003), <http://www.its.caltech.edu/~westclub/TITLEIX.pdf>.

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coercive **approaches**.² Published by the National Academy of Sciences, this report is the work of its Committee on Maximizing the Potential of Women in Academic Science and Engineering. The committee was asked to:

- Review and assess the research on gender issues in science and engineering, including innate differences in cognition, implicit bias, and faculty diversity.
- Examine the institutional culture and practices in academic institutions that contribute to and discourage talented individuals from realizing their full potential as scientists and engineers. (256)

Obviously, this charge was uncharacteristic of scientific work, for it instructed the committee to *assume* that enough institutional factors are responsible for female underrepresentation to warrant an Academy report. An objective analysis would make no such an assumption—nor rule out the possibility that some institutional practices actually favor females.

Despite volumes of scientific literature inconsistent with this preconceived notion, the committee had no trouble delivering a report supportive of it. Many print and broadcast media were quick to accept yet another accusation of discrimination and gave the report credible coverage.³ More disturbing was the uncritical acceptance in the professional arena. A reviewer for the *Science* magazine website gushed that the report “wields data like a weapon to demolish myths that keep university science and engineering departments from employing women.”⁴ National Institutes of Health (NIH) director Elias Zerhouni circulated his endorsement in a news release.⁵ Vivian Pinn, director of NIH’s Office of Research on Women’s Health, announced her intent to appoint committees to evaluate all of the report’s findings and recommendations.⁶

²Committee on Maximizing the Potential of Women in Academic Science and Engineering, *Beyond Bias and Barriers: Fulfilling the Potential of Women in Academic Science and Engineering* (Washington, DC: National Academy Press, 2006). Subsequent references will be cited parenthetically.

³Among those covering the report were Reuters, the Associated Press, *NBC Nightly News*, *The Today Show*, and numerous scientific societies, influential blogs, and college publications.

⁴Tabitha M. Powledge, “Beyond Bias and Barriers,” *Science Careers* from the journal *Science*, October 13, 2006, [http://sciencecareers.sciencemag.org/career_development/previous_issues/articles/2006_10_13/beyond_bias_and_barriers/\(parent\)/158](http://sciencecareers.sciencemag.org/career_development/previous_issues/articles/2006_10_13/beyond_bias_and_barriers/(parent)/158).

⁵Elias A. Zerhouni, “Beyond Bias and Barriers: Fulfilling the Dream of Women in Academic Science and Engineering,” National Institutes of Health, news release, September 19, 2006, <http://www.nih.gov/news/pr/sep2006/od-19.htm>.

⁶The Office of Research on Women’s Health contracted with the Academy for the report, but was not the sole source of support for the project.

The next stop was Congress. In October 2007, the House Subcommittee on Research and Science Education held a hearing about the underrepresentation of women on SEM faculty. Five speakers addressed the five subcommittee members in attendance. All speakers—as well as all of the congressmen—blamed sexism for the situation and called for dramatic measures.⁷ “What kind of hammer should we use?” inquired subcommittee chair Brian Baird (D-WA).

Donna Shalala, chair of the committee that produced *Beyond Bias and Barriers*, told the subcommittee that the solution is nothing short of “a transformation of academic institutions.” She claimed, “Many excellent scientists and engineers are opting out of the academic career path because of the *perceived* hostile climate for women in hiring, tenure, promotion, and compensation.”⁸

Perceived is the operative word. What is perceived and what is real are often worlds apart.

The Bias Blues

Beyond Bias and Barriers is a report in the woe-is-me tradition of “gender equity” literature. Its authors see female scientists as hapless victims of an academic world created of, by, and for men. To them, university science is rife with obstacles that obstruct the paths of women, preventing them from fulfilling their potential.

It is a curious plaint. By their very nature, scientists and engineers are among the most objective individuals in the population—if not *the* most objective. This does not render them immune from bias. However, one should take due care before accusing scientists of sexism. This is a venue where someone may demand supporting evidence. The kind that can withstand true scientific scrutiny.

It is remarkable how poorly the committee fares on this count. Its executive summary asserts, “Women are very likely to face discrimination in every field of science and engineering” (3). Yet, hard data to support this

⁷See Christina Hoff Sommers, “Why Can’t a Woman Be More Like a Man?” *The American* (March/April 2008), <http://www.american.com:80/archive/2008/march-april-magazine-contents/why-can2019t-a-woman-be-more-like-a-man>.

⁸Richard M. Jones, “Hearing on Barriers to Women’s Advancement in Academic Positions,” *FYI: The AIP Bulletin of Science Policy News* (November 30, 2007), <http://www.aip.org/fyi/2007/117.html>.

claim prove elusive. As the report progresses, it reveals that female physicists earned 13 percent of new doctorates in 2004, yet were awarded 18 percent of new junior faculty positions. In math, the figures were 31 and 28 percent, respectively (81).⁹ No data are provided for engineers. However, the American Society for Engineering Education reported in 2005 that 17 percent of tenure/tenure-track assistant professors were female. Women earned 17 to 18 percent of the engineering doctorates in the preceding five-year period.¹⁰ The suggestion that sex discrimination is routine is not easily reconciled with these numbers.

The tenure data are no less striking. Although women in the physical sciences are 1 to 3 percent less likely than men to become tenured, those in the life sciences and engineering are 2 to 4 percent *more likely* than males to achieve this milestone.¹¹ Further, the committee fails to disclose that, depending on the type of institution, female scientists are two to five times as likely as males to obtain early tenure.¹²

Given these facts, one might think that feminists would be beaming with pride about the success of female scientists. Not those on this committee. They want a major effort by federal agencies, Congress, foundations, and professional societies to slay the gender inequity monster that, in their view, still does his misogynistic best to prevent advancement of women in academic SEM.

The report also alleges bias in compensation. However, a “wage gap” is found in most occupations and is therefore unlikely to explain why women predominate in some fields yet are rarely found in others.¹³ Nonetheless, the report’s treatment of the topic is noteworthy: “As faculty move up in rank,

⁹Data suggest that women do not seek academic positions proportionate to their representation in the Ph.D. pool. Thus, females may actually be overrepresented among new professors relative to their presence in the *applicant* pool.

¹⁰Michael Gibbons, “Faculty Facts,” *ASEE Prism* (February 2005), <http://www.prism-magazine.org:80/feb05/databytes.cfm>.

¹¹These data are for the period from 1973 to 2001.

¹²Rates of early tenure (during the first five years) are: doctoral institutions, males 5 percent, females 10 percent; master’s institutions, males 4 percent, females 21 percent; baccalaureate institutions, males 9 percent, females 16 percent. National Research Council, *From Scarcity to Visibility: Gender Differences in the Careers of Doctoral Scientists and Engineers* (Washington, DC: National Academy Press, 2001), 161.

¹³Differences in education, experience, and other variables account for most of the “gap.” I believe the residual few percent is more likely explained by sex differences in promotion-seeking behavior than deliberate discrimination. See my comments, “I Am Woman, Hear Me Whine,” *National Review Online* (April 3, 2001), <http://www.nationalreview.com/comment/comment-hausmanprint040301.html>.

differences between men and women become apparent in promotions, awards, and salary" (52). What does not become apparent are salary data to document this assertion. The reader is given no basis to evaluate it—the last thing one expects in a report from the National Academy of Sciences.¹⁴

The committee also hoists itself on its own petard with a graph showing average time for males and females to climb the faculty ladder at the University of California at Berkeley. Differences between the sexes are evident. However, *these disparities are noticeably larger in the social sciences* than in biology or SEM. Moreover, the difference between male and female scientists in SEM is minimal—and hardly surprising given the demands of pregnancy and childrearing.¹⁵

In addition to charging outright discrimination, the report finds fault with a sizable list of "barriers" said to impede female success in SEM. These sections prove largely unconvincing, in part because some of the alleged barriers—sexual harassment, bullying, overwhelmingly male faculty, and family-related issues—also exist where the participation of women is substantial.¹⁶

In these sections, the committee's cherry-picking of studies that suit its agenda becomes annoyingly obvious. It cites work from *outside the physical sciences* that found identical resumes rated more highly when perceived to be from males,¹⁷ but ignores a large survey that found physicians consistently rated female candidates more highly.¹⁸ Even more telling, no mention is

¹⁴The report does cite the MIT *Study on the Status of Women Faculty in Science* as evidence of pay discrimination. It ignores that the study was criticized for making this claim even though "primary salary data [for MIT professors] are confidential and were not provided to us."

¹⁵The average female in the social sciences took almost two years longer than her male colleague to advance from assistant professor to full professor step 6. In biology and SEM, the difference was less than a year. Further, national data quoted in the report found that females are 8 percent less likely than males to receive tenure in the social sciences. As reported above, the success rate for women in SEM is considerably better.

¹⁶The report assumes that sexual harassment and bullying is a problem in academic SEM but presents no evidence. Moreover, for these factors to have significant explanatory value, one needs data showing their incidence to be more problematic in SEM than in other fields.

¹⁷The report also fails to acknowledge research that finds, contrary to common belief, that attitudes about females are more positive than attitudes about males. See, for example: Alice H. Eagly and Antonio Mladnic, "Gender Stereotypes and Attitudes Toward Women and Men," *Personality and Social Psychology Bulletin* 15 (December 1989): 543–58, and Martin S. Fiebert and Mark W. Meyer, "Gender Stereotypes: A Bias Against Men," *The Journal of Psychology* 131 (July 1997): 407–10.

¹⁸Cindy J. Smith, Paul Rodenhauer, and Ronald J. Markert, "Gender Bias of Ohio Physicians in the Evaluation of the Personal Statements of Residency Applicants," *Academic Medicine* 66, no. 8 (August 1991): 479–81.

made of a similar survey sent to all department heads in an unnamed physical science. No statistically significant differences in ratings of identical male and female resumes were found even though this study was done *almost forty years ago*.¹⁹

There are enough examples like these in *Beyond Bias and Barriers* to make clear that it is not an objective review. It is an effort to advance an ideology—and a rather amateurish one at that.

The Panel's Prescription

Most chapters of the report include recommendations for increasing the participation of women in SEM, particularly in the university. Some are useful, such as the suggestion that institutions revisit policies regarding dual-career couples.²⁰ Others make no sense—among them the call for paid parental leave for graduate and post-doctoral students, as well as coverage of childcare and eldercare expenses when scientists travel. That the absence of these benefits affects women's participation in SEM is doubtful; many fields lack such perks yet are almost exclusively female.

Of all the recommendations, one merits particular scrutiny. It is the call for creation of a "gender equity" bureaucracy involving the federal government, professional societies, and an inter-institutional compliance agency. Working in concert, these players would set "gender equity" standards for SEM, collect data, monitor universities for compliance, and impose penalties for violations.

Accepting a burdensome regulatory regime absent data justifying such intervention would set a terrible precedent. Such endorsement would reinforce beliefs that discrimination and "barriers" explain the underrepresentation of women in SEM. Research from the university itself shows this notion to be untenable. For the university to acquiesce to regulation that presumes the existence of widespread discrimination therefore would be

¹⁹The paper claims a "definite [but non-significant] tendency" for an average male to be preferred over an average female. What this means is anyone's guess; the authors withheld all data. Perhaps it is best described as an undefined tendency that may have occurred by chance. Arie Y. Lewin and Linda Duchan, "Women in Academia: A Study of the Hiring Decision in Departments of Physical Science" *Science*, September 3, 1971, 892–95.

²⁰Marriages within the same or related disciplines are more common in the sciences than other fields. Thus, such policies as prohibiting employment of married individuals in the same department disproportionately impact scientists.

tantamount to proclaiming that the truth does not matter. Moreover, the proposed regulatory scheme envisions use of Title IX.²¹ This should concern every member of the faculty.

The committee gives little insight into how it would apply Title IX to the academic sciences. It simply includes a slightly modified version of the “three-prong” compliance test that has had devastating effects on male college sports. Under the committee’s version of the test, universities must do one of the following:

- provide participation opportunities substantially proportional to the ratio of males to females in the student body²²
- show a history and continuing practice of upgrading girls’ and women’s programs²³
- meet the interests and abilities of women on campus²³ (239)

The committee does not say whether it would apply these mandates on a department-by-department basis or to the combined enrollment of all SEM disciplines. Though the latter would be less burdensome than the former, either scenario would be disastrous.

The first option would presumably require the proportion of males and females “substantially” to match their overall enrollment. It reflects a conviction that the sexes have or should have identical interests, and as a consequence, deviations from proportional representation indicate discrimination. As will be discussed shortly, an entire sub-discipline in psychology refutes this tenaciously held belief.

In some fields of science—physics and engineering, for example—males often outnumber female students by 4:1 (and sometimes more). It is unlikely that departments with such lopsided enrollments could approach a 1:1 ratio simply by adding female students. Even if cost were no object, finding sufficient numbers of qualified and interested females would be a daunting

²¹The Title IX statute states: “No person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving Federal financial assistance.” The Department of Education interpreted this well-meaning statute into regulations clearly contrary to congressional intent.

²²The word “opportunities” is misleading. With sports, institutions are required to achieve substantially proportional *participation*.

²³The committee modified the standard wording by replacing “underrepresented sex” with “girls and women” or simply “women.” Why it did so is unknown; certainly the appearance is that the committee wants Title IX regulations to cover females only.

challenge. Accordingly, achieving proportionality would almost certainly require the exclusion of men—regardless of how well qualified—just as application of Title IX's bizarre concept of equality to athletics has caused the elimination of more than three hundred male teams.

Although proportionality is the “gold standard” for demonstrating compliance with Title IX, a university could opt for another method if unable to achieve it.²⁴ The first alternative is compliance through “upgrading women’s programs.” This may be workable in college athletics because the sexes play on separate teams. But they are not separate in the classroom, nor is it necessary for them to be. In fact, it is difficult to imagine anything more counterproductive than special science programs for females. Such programs would merely reinvigorate arguments that women cannot succeed in “real” science classes. Thus, it appears that this option is not viable and that the committee failed to consider whether a standard designed for sex-segregated situations makes sense for coeducational ones.

The other alternative permitted when proportionality is not possible—“meet[ing] the interests and abilities of women on campus”—implies a right for any interested female on campus to be accommodated if she meets certain standards.²⁵ A university seeking to comply under this option would presumably have to set minimum qualifications that, in its experience, predict a good chance of completing its SEM programs.

Such a mandate should set off alarm bells throughout academic SEM. American science has not taken its preeminent position in the world by accepting those who meet minimum standards. It owes its success to a tradition of seeking the best and brightest. Moreover, the notion that an academic institution is obliged to accommodate every female on campus who meets minimum qualifications takes the quota mentality to a new level. It would confer a right to enter a campus SEM program regardless of where one was initially admitted. Granting female students special rights to academic accommodation sounds like a recipe for endless litigation. It is also unlikely to create an atmosphere of mutual respect.

Oddly enough, female faculty (as well as male) could end up the big losers if Title IX is applied to academic SEM. The penalty for noncompliance is

²⁴Only the proportionality option is considered the “safe harbor” that insures freedom from regulatory action.

²⁵This implication is made clear by the usual language of this option, which requires an institution to meet the interests of the underrepresented sex “fully and effectively.”

applied university-wide. The committee opines that loss of all federal funding, as provided for by law, is excessive. As an alternative it suggests "withdrawal of an institution's ability to compete for federal funds for a given period" (240). If imposed, an institution's female (and male) scientists would lose their right to seek federal funds for the prescribed time period. The committee does not explain why they should be penalized for what is beyond their control. Other potential losers include some of the women seeking careers in such fields as veterinary medicine, optometry, and pharmacy.²⁶ After all, men pushed out of SEM have to go somewhere. One can reasonably expect some to choose other scientific fields, increasing competition for places that women hope to earn.

The report does not consider such impacts, nor stop with Title IX. It mentions an Executive Order and other laws that the committee sees as useful for addressing "inequities" in SEM. One shudders to think where all of this could lead.²⁷ The *New York Times* recently reported that Title IX "compliance reviews" now being performed by federal agencies include "taking inventories of lab space and interviewing faculty members and students in physics and engineering departments" at selected universities.²⁸

The potential for unintended consequences from imposing Title IX on academic science is obvious, but its magnitude is difficult to predict. The regulations have succeeded in dramatically reshaping athletics because students are easily classified as athletes or non-athletes. Degree completion is more complex. Rules may be used to deny males the right to major in computer science, but can the law stop them from majoring in English and taking the equivalent of such a major as electives? If not, what purpose would be served? The regulated have a long history of figuring out how to circumvent the silliness of regulators. One cannot rule out the possibility that they will ultimately find ways to turn a gender quota bureaucracy on its head.

²⁶Women are now overrepresented among new graduates in these fields. It is not difficult to understand why. These professions are consistent with their interest in health and often offer appealing working conditions: part-time positions, flexible hours, and/or no travel obligations.

²⁷Consider that "the Clinton OCR [Office of Civil Rights] bragged of having investigated almost forty school districts on the basis of underrepresentation of girls in math and science classes in 1997." Jessica Gavora, *Tilting the Playing Field: Schools, Sports, Sex and Title IX* (San Francisco: Encounter Books, 2002), 120.

²⁸John Tierney, "A New Frontier for Title IX: Science," *New York Times*, July 15, 2008, <http://www.nytimes.com/2008/07/15/science/15tier.html>.

A Matter of Interest

The Committee asserts: “[I]t is not poor high school preparation, ability, or effort, but rather the educational climate of science and engineering departments that correlates with the high proportion of undergraduates who opt out of science and engineering” (63).²⁹ To the contrary, research from the field of vocational psychology demonstrates that the primary factors in career choice are not external, but internal. One can think of them as a function of personality.

The aspects of personality that best explain career choice are represented in assessment tools designed to help individuals determine the occupations best for them. Two of these are the Strong Interest Inventory and the Study of Values. Each scores an individual’s career interests based on six *themes* or *dimensions*. On the former, the largest sex difference is on the *realistic* theme, where males far outscore females.³⁰ Males also score higher on the *investigative* theme, but the difference is considerably smaller. On the Study of Values, the largest sex difference is on the *theoretical* dimension, with the average male outscoring the average female. These differences do much to explain female underrepresentation in certain SEM fields. Women are most underrepresented in scientific occupations classified as investigative-realistic and known to attract those with a strong theoretical bent.

The Strong Interest Inventory also includes Basic Interest Scales. Females show far less interest than males on the mechanical, military, and athletic scales, and somewhat less on the math and science scales.³¹ Thus, Title IX activists are ironically determined to increase the participation of women in two of the three areas where they express the least enthusiasm. It is fair to ask why.

Attempting to lure capable women into SEM fields incompatible with their interest profiles does them a disservice. For those bound by the American

²⁹Women now earn 62, 56, and 45 percent respectively of college degrees in biology, chemistry, and math. Fully 60 percent of female undergraduates who leave engineering transfer to a life, physical, or computer science. These facts are inconsistent with the assertion that they “opt out of science” due to a “chilly climate.” Moreover, while much is made of the paucity of female science faculty, no relationship exists between the proportion of female faculty and female students. See my critique, *Plenty of Nonsense: How the Land of Plenty Report Denies Female Scientific Achievement* (Arlington, VA: Independent Women’s Forum, 2000), 11, <http://patriciahausman.com/uploads/cwamsetcrit.pdf>.

³⁰Mentions of one sex outscoring or outperforming another refer to averages. For example, “Males outperform females” means that the *average* male outperforms the *average* female, not that all males outperform all females.

³¹Females score higher than males on the social and artistic themes of the Strong Interest Inventory. Scores on the Basic Interest Scales reflect this: females score much higher on art and music/dramatics scales, and somewhat higher on social service and office practices.

Psychological Association Code of Ethics, it would be of questionable compliance with the obligation to practice consistent with scientific principles and avoid harm to clients and patients. Being part of a demographic group that has achieved equal participation with another group has never been shown to predict career satisfaction and success. What predicts a good outcome is an occupation consistent with one's interests, values, abilities, and skills.

Larry Summers Was Right

Many academics prefer not to discuss sex differences in ability—for obvious reasons. But the committee takes the subject on, as it was asked to do. In the process, it demonstrates a worrisome capacity to divorce itself from reality. The first point of its executive summary states:

Studies of brain structure and function, of hormonal modulation of performance, of human cognitive development, and of human evolution have not found any significant biological differences between men and women in performing science and mathematics that can account for the lower representation of women in academic faculty and scientific leadership positions in these fields. (2)

Literally hundreds, perhaps thousands, of studies report findings contrary to what this statement suggests. The apparent implication—that “bias and barriers” provide the only meaningful explanation for female underrepresentation—is also inconsistent with specific comments in the text.³²

Further, this bold assertion is at odds with a previous report from the Academy's Institute of Medicine (IOM). Prepared by a panel with considerably more expertise in human biology, the IOM study found that:

Sex hormones not only act in prenatal life, to organize the brain for later behavior, but also continue to exert effects later in life. This is clearly seen with respect to cognitive abilities...studies indicate that female sex hormones appear to enhance performance of those skills usually

³²For example, the report states, “Meta-analyses and examinations of data from several national standardized tests have found the gap in mathematical performance narrowing while gaps in verbal performance, visuospatial rotation, and SAT-M scores have held steady” (33). With the exception of verbal performance, these gaps favor males. A chart showing the size of sex differences on various math tasks by age group appears on page 36, and the report mentions some biological bases for cognitive differences. While these differences alone do not account for the underrepresentation of women among SEM faculty, to suggest no role for them is to abandon intellectual seriousness.

performed better by females, whereas they cause a decrement in performance of those skills usually performed better by males.³³

Certain quantitative and spatial abilities are essential for some of the physical science and engineering disciplines. Noting that males outperform females in key tasks, the IOM report states:

Reviews of the relationship between quantitative skills and spatial ability find that spatial ability is an important factor in predicting performance on advanced mathematics tests and that this relationship is especially strong at the highest levels of mathematics performance.³⁴

The committee makes no mention of the IOM report.³⁵ This is but one of many glaring omissions. It also says nothing of a consensus report on cognitive ability published by the American Psychological Association that stated:

Large differences favoring males appear on visual-spatial tasks like mental rotation and spatio-temporal tasks like tracking a moving object through space....Some quantitative abilities also show consistent differences. The math portion of the Scholastic Aptitude Test shows a substantial advantage for males...with many more males scoring in the highest ranges. Males also score consistently higher on tests of proportional and mechanical reasoning....The importance of prenatal exposure to sex hormones [to factors underlying these differences] is well established.³⁶

Strangely, a discussion of mechanical reasoning and the sizable sex difference in this ability is nowhere to be found.³⁷ This omission, coupled with other comments, leaves the impression that the committee believes mathematical talent to be the only ability important for success in engineering and certain physical sciences. Granted, this is a common misconception, but an Academy report is not where one expects to find it. Further, such omissions are not the only problem. The report also contains troubling errors (see box).

³³Theresa M. Wizemann and Mary-Lou Pardue, eds., *Exploring the Biological Contributions to Human Health: Does Sex Matter?* (Washington, DC: National Academy Press, 2001), 98.

³⁴*Ibid.*, 89.

³⁵It is ironic that the IOM report was overlooked. It was the work of a group headed by MIT biologist Mary-Lou Pardue. Three of Pardue's colleagues, including her former dean, were on the committee. Fellow MIT biologist Nancy Hopkins chaired a panel that oversaw the committee's work.

³⁶American Psychological Association Task Force on Intelligence, "Intelligence: Knowns and Unknowns," *American Psychologist* 51 (February 1996): 77–101.

³⁷Tests of mechanical ability and/or knowledge typically produce an effect size (d) of 0.7 to 1.0 favoring males. Most cognitive differences between the sexes are smaller, although three-dimensional mental rotation is not.

An Academy of Errors

The most astonishing aspect of *Bias and Barriers* is how inaccurate it is. Errors, distortions, and misrepresentations are all too common. Some examples follow.

Example 1: Internal Inconsistency/Factual Inaccuracy. *Because men and women do not differ in their average abilities and because they have now achieved equal academic success in science through the college level, there is no sex performance difference for the biological studies and theories to explain* [42].

This is the report contradicting itself. Elsewhere, it acknowledges male advantage in certain mathematical and spatial abilities—and even displays a chart showing the size of male math advantage by age.³² This is to say nothing of what the report fails to mention: male advantage on the NAEP science test, as well as on all AP science tests, College Board science achievement tests, and GRE science tests.³⁸

Example 2: Factual Inaccuracy. *People with strong spatial skills are less likely than those with high verbal skills or high overall intelligence to have earned credentials at every academic level and more likely to work in blue-collar occupations that do not require advanced education* [31].

This is a serious misrepresentation of an important study.³⁹ Spatial ability per se was *not* associated with lesser academic achievement. The above description was accurate only for the group that had high spatial ability *but not high verbal ability*. Educational achievement was impressive among those with high spatial, mathematical, and verbal abilities (the “high intelligence” group). Given that the paper is titled “...the Role of Spatial Visualization in Becoming an Engineer, Physical Scientist or Artist,” this portrayal of spatial ability as a characteristic of blue-collar workers but not of those who mastered rigorous academic programs is a rather glaring error.

Example 3: Factual Inaccuracy via Selective Presentation. *Graduate Record Examination scores and undergraduate grade point averages are poor predictors of PhD attainment rates* [75].⁴⁰

The committee relies on one study from 1991 to document this claim. It ignores a 2001 meta-analysis of 1,521 studies that showed the GRE to be a good predictor of degree attainment—with GRE subject tests especially predictive.⁴¹

Example 4: Assertion as Fact/Citation Mismatch. *In group meetings, female students reported that often their remarks were barely recognized by other group members, while the comments of their male peers were met with enthusiasm and support. Other studies reiterate this finding—that women are indeed “left out of informal networks” of communication* [76].

The committee treats the perceptions of these females as a “finding,” a practice it engages in repeatedly. This is akin to accepting the plaintiff’s allegations in a lawsuit as established fact. In this instance, one cannot assume that male peers or neutral observers would agree with the women’s claims. Additional data are needed to evaluate them.

It is sobering to see an Academy report blur the distinction between assertion and fact. Also, the citation for the second sentence appears to be in error. The cited work is not about how or whether women in science obtain information. It is an analysis of hiring by chemistry departments.

³⁸A detailed chart showing sex differences on many common math and science tests used for college and graduate school admission can be found at <http://patriciahausman.com/uploads/selectsamples.pdf>. These tests are taken by a select subset of the population, and as a result, statistical artifacts may affect the measurement of group differences. However, male advantage on GRE engineering, computer science, and physics ($d=0.6$) and GRE math ($d=0.9$) is of sufficient magnitude that even the most ardent feminist should be hesitant to claim that the sexes show equal achievement.

³⁹Lloyd G. Humphreys, David Lubinski, and Grace Yao, “Utility of Predicting Group Membership and the Role of Spatial Visualization in Becoming an Engineer, Physical Scientist, or Artist,” *Journal of Applied Psychology* 78, no. 2 (April 1993): 250–61.

⁴⁰Similarly, the following appears on page 25: “Measures of aptitude for high school and college science have not proved to be predictive of success in later science and engineering careers.” This may be the most ignorant statement ever made in an Academy report.

⁴¹Nathan R. Kuncel, Sarah A. Hezlett, and Deniz S. Onez, “A Comprehensive Meta-Analysis of the Predictive Validity of the Graduate Record Examinations: Implications for Graduate Student Selection and Performance,” *Psychological Bulletin* 127, no. 1 (January 2001): 162–81.

The essential point is absolutely not that females lack the ability to succeed at the highest levels of SEM. It is that fewer women than men have the cognitive pattern associated with such success. This is especially true for fields where mental rotation and mechanical abilities are critical, as far more males than females are gifted in these domains. Pretending that these differences do not exist will not make them disappear, for all are rooted in human biology. Their interaction with the differences in interests described earlier produces the underrepresentation of women in SEM that feminists (and others) erroneously attribute to discrimination.

The Role of the National Academy of Sciences

This is not the first time that the Academy has found itself with conflicting reports. In 1984, the General Accounting Office (GAO) published an analysis of two Academy reports that took conflicting positions on whether Americans should change their diets to prevent chronic disease.⁴² GAO had been asked to investigate by members of Congress concerned that the Academy was confusing the public.

GAO tried to reconcile the conflict, saying that the reports were designed for different purposes and that the Academy does not expect that its committees always will agree. Though the first explanation was more spin than fact, the second was fair enough. It is axiomatic that two scientists can reach different conclusions from the same data. Unfortunately, this reasoning cannot reconcile the conflict between *Bias and Barriers* and the IOM report. The Academy can defend conflicting opinions, but cannot defend conflicting versions of the facts.⁴³ One of these reports is obviously inaccurate. It is perfectly clear which one that is.

GAO's report also discussed membership on Academy committees. All members of the committee that prepared one of the two health reports were among a distinct minority critical of the government's dietary advice. GAO noted that the firestorm of criticism that ensued "made [the Academy] especially sensitive to the issue of balanced group memberships on studies

⁴²General Accounting Office, *National Academy of Sciences' Reports On Diet And Health—Are They Credible And Consistent?* GAO/RCED 84-109, Washington, DC, General Accounting Office, 21 August 1984, <http://archive.gao.gov/d6t1/125146.pdf>. GAO is now known as the Government Accountability Office.

⁴³The exception here would be a change in the data. No such change occurred between the writing of the two reports.

about diet and health.”⁴⁴ One has to ask: why is the Academy not “especially sensitive” to the need for balanced membership regardless of topic?

The question is relevant because the *Bias and Barriers* committee was similarly not a balanced panel of scientists—four of the eighteen were not scientists at all.⁴⁵ It appears that almost all have a history on the same side of this issue.⁴⁶ Robert Birgeneau, for example, was the dean who embraced the nearly data-free *Study on the Status of Women Faculty in Science at MIT* as “data-driven.” Former Duke University president Nannerl Keohane was involved in the termination of Harvard President Larry Summers, while Harvard psychology professor Elizabeth Spelke was among his most outspoken critics.⁴⁷ Even a staff writer was not neutral, but the author of a book challenging the concept of biologically based sex differences in cognition and behavior. As if this were not enough, MIT biology professor Nancy Hopkins—who initiated the Larry Summers incident by running from the room and apparently contacting the news media—served as chair of the Guidance Group that oversaw the committee’s work.

The committee also included chair Donna Shalala, president, University of Miami, and well-known advocate of quotas and speech codes; Lotte Bailyn, professor of management, head of the Sloan School Gender Committee, and member of the Committee on Faculty Diversity, MIT; Barbara Grosz, dean of science, professor of computer science, and former interim dean for affirmative action, Harvard University; Jo Handelsman, professor of plant pathology, University of Wisconsin, and recipient of several awards for her campus “equity” activities; Geraldine Richmond, professor of chemistry, University of Oregon, and founder and chair of the Committee on the Advancement of Women Chemists; Ruth Simmons, president, Brown University, and founder of the first engineering program at a women’s college; Elaine Weyuker, computer scientist and fellow, AT&T Laboratories, and co-chair of the Committee on Women in Computing of the Association for Computing Machinery; and the late Denice Dee Denton, former chancellor, University of

⁴⁴General Accounting Office, *National Academy of Sciences’ Reports On Diet And Health*, 14.

⁴⁵These included the chair, Donna Shalala, whose doctorate is in political science, as well as Nannerl Keohane, Ruth Simmons, and Alice Rivlin, who hold degrees in political science, romance languages, and economics, respectively.

⁴⁶Nonetheless, when Harvard president Larry Summers was under siege, Ruth Simmons did defend his expression of his views as appropriate (in principle).

⁴⁷Birgeneau is currently chancellor of the University of California at Berkeley; Keohane is a visiting professor at Princeton.

California, Santa Cruz. Denton was known for her vigorous efforts to recruit women while dean of the College of Engineering at the University of Washington.⁴⁸

It is instructive to note who was not on the committee. Not a single member came from a four-year college—an academic option that has allowed many female scientists to have successful careers. Not one was a vocational psychologist or psychometrician—professionals with expertise critical to the questions before the committee.⁴⁹ Indeed, it is unclear that anyone other than Elizabeth Spelke has ever published on the psychometric or biological aspects of human sex differences. It is baffling that the Academy would assign questions about such issues to a panel composed primarily of individuals whose expertise lies elsewhere. Moreover, the inclusion of only those who support government intervention to alter the sex ratio of academic science may cause problems relative to the Federal Advisory Committees Act.⁵⁰

A one-sided, inaccurate, and internally contradictory report prepared by a committee lacking critical scientific expertise is not an appropriate basis for formulating public policy. At the very least, the Academy should have the errors corrected. It should also allow different points of view to be heard—if only to give a more accurate portrayal of the lives of women scientists. The great irony of *Bias and Barriers* is that it inadvertently undermines its own purpose. The false portrait it paints of the environment for women in the physical sciences and engineering—as unwelcoming, abusive, and misogynistic—is so depressing it would make any interested female wonder why she should consider it.

⁴⁸Also serving on the committee were Alice Agogino, professor of mechanical engineering, University of California; Ana Mari Cauce, professor of psychology and ethnic studies, University of Washington; Catherine DeAngelis, professor of pediatrics, Johns Hopkins School of Medicine and editor, *Journal of the American Medical Association*; Shirley Malcom, head, Directorate for Education and Human Resources Programs, American Association for the Advancement of Science; Alice Rivlin, economist and senior fellow, Brookings Institution; Joan Steitz, professor of molecular biophysics, Yale University School of Medicine; and Maria Zuber, professor of geophysics, MIT.

⁴⁹Such experts were also absent from the review panel, which may have had even less expertise in the science of human sex differences than the committee. Two reviewers were also contributors to the report. If the Academy does not recognize this as a conflict of interest, surely it would concede that it creates the appearance of one.

⁵⁰FACA prohibits government agencies from relying on advice obtained under a contract with an Academy committee unless prescribed steps were taken to insure that its membership was “fairly balanced.” NIH did contract with the Academy for this work; NSF also provided funds. However, I will have to leave it to the attorneys to determine whether the statute applies here.

If the Academy continues to support the committee's unscientific policy proposals, Title IX regulation may soon be imposed on selected departments of the university. Should this happen, feminists will have succeeded in imposing a Lysenkoist mandate on the academic sciences. It will be a tragic day for feminism if it brings science that low, and an even more tragic day for the Academy if it allows policy based in fantasy rather than fact to be implemented.

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