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## **Raise Your Hand If You're A Woman in Science . . .**

By Virginia Valian

Sunday, January 30, 2005; Page B01

For the past two weeks, my e-mail in-box has overflowed with messages from women -- and some men -- about the hypotheses recently offered by Harvard President Lawrence H. Summers to explain the dearth of women in the academic sciences. One woman wrote, "It is not surprising that people are angry when they see such full-blown contemptuous arrogance." Others were shocked at his apparent insensitivity: Had he no concern for the female students and faculty in math and science at Harvard or other academic institutions?

That's an important question. Although we can't do anything about Summers's method of calling for more research into whether women and men have innate differences when it comes to mathematics and science (he told an economics conference on Jan. 14 that he was trying to be provocative), we can address the resulting controversy. There is a wealth of data about men and women in science, about cognitive sex differences, about the effects of expectations on people's behavior, and about unintended misjudgments of women and men.

Summers is not alone in his lack of awareness of the compelling evidence of the power of small differences in how we treat boys and girls, men and women. Yet those differences, I would argue, provide a better hypothesis than innate sex differences to explain the gap between the numbers of men and women in academic jobs in the sciences.

Nor is Summers alone in being unaware of the large set of experiments showing that well-intentioned people, intelligent people, people who believe in a meritocracy -- people, in short, just like many successful college presidents -- consistently underrate women's abilities and overrate men's.

The finding that emerges from the research, in experiment after experiment, is that bias is a problem not because it is deliberate, but because it is the outcome of assumptions of which we are not consciously aware. Take, for example, a study published last year by New York University professor Madeline Heilman and her colleagues. The researchers asked people to rate individual men and women who were described as holding the position of assistant vice president in an aircraft company. The evaluators' job was to rate how competent and likable the employees were. They were given background information about the person, the job and the company.

In half the cases, the employee was described as about to have a performance review (his or her competence was thus unknown); in the other half, the person was described as having been a stellar performer.

When the evaluators had received no information about how well the assistant VP was doing in the job, they rated the man as more competent than the woman, and rated them as equally likable. When the background information made clear that the person was extremely competent, evaluators rated the man and woman as equally competent. But both men and women rated the highly competent woman as much less likable than her male counterpart, and considerably more hostile.

Thus, in evaluating a woman in a male-dominated field, both male and female observers see her as less competent than a similarly described man unless there is clear information that she is a top performer. And in that case, they see her as less likable than a comparable man.

The result of the experiment by Heilman and colleagues is typical of other research: Both men and women give men the benefit of the competence doubt. Why do we do this? Because we're like Summers: We have conceptions -- what psychologists call "gender schemas" -- of what it means to be male or female. We tend to see males as capable of independent action, as doing things for a reason and as getting down to the business at hand. We tend to see females as nurturing, communal and expressive. So which person, man or woman, seems a better fit for the job of assistant VP in an aircraft company? One guess. You can expect similar results in other male-dominated fields -- such as the sciences.

Although an abundance of research of this sort exists, it has not become part of our common understanding and thus has not yet redressed the imbalances between men and women in professional life. With that in mind, it's useful to look at the three challenges that Summers presented in his speech to men and women who think elite institutions need to move faster to increase the number of women on their faculties. His comments, as reported by those who heard them, highlight some of the most common and enduring misconceptions.

Summers claimed, echoing the neoclassical economics view, that discrimination is too costly to institutions to last. Over the long haul -- perhaps a very long haul -- discrimination will wither away, this line of thinking goes. Here's the rub: Harvard has a \$20 billion endowment. Thus Harvard -- and other rich schools -- can afford to neglect a lot of female and minority talent and have shown a willingness to do so. The problems women experience in getting promotion and tenure are exacerbated at high-prestige institutions, as is shown by "From Scarcity to Visibility," a book that examines gender differences in the sciences. The deep pockets of elite schools allow them to buy the services of a lot of very talented white men. They may be paying too much for those men, but they can afford it.

Meanwhile, people at institutions with heavy teaching responsibilities, few resources and insufficient staff have neither the time nor the money to perform the scholarly research they were trained for and that might win them jobs at more prestigious institutions. Women are overrepresented at such underfunded institutions, where they cannot reach their full potential. So when Summers looks around, he will mistakenly think that he isn't

missing anything: Where, he will say, are all those super-productive women that I'm supposedly not hiring? And he's right, in a way. Those potential stars are performing beneath their abilities -- just like their white male counterparts who aren't at elite schools. What society is losing out on isn't immediately apparent.

Another point often raised is that women don't put in the hours, and Summers followed that line, too, when he suggested that women don't want to work 80-hour weeks. The implication was that women wouldn't wind up at, or stay at, a place like Harvard. The first assumption is that 80-hour workweeks are a necessary condition for intellectual creativity and excellence, for either men or women. That assumption has very little data going for it. The second assumption is that women who do put in 80-hour weeks receive the same rewards as men. That assumption has a lot of data going against it, as we have seen.

By far the most provocative discussion inspired by Summers's comments is whether women may be innately inferior to men in math. Women do score lower, on average, than men on the standardized math tests that are part of the SAT and GRE (Graduate Record Examination). We already know, from research by sociologists Yu Xie of the University of Michigan and Kimberlee Shauman of the University of California (who were examining the reasons that women do -- and don't -- leave science), that the differences on math tests do not account for the gender gap in who chooses to major in science. The gender gap persists even when you take test scores into account. So in a sense the question is moot.

We also know that the differences within each sex are far larger than the average difference between the sexes. And we know that sex differences in math are smaller than cross-national differences. One study, comparing the United States, Taiwan and Japan, found that Japanese girls in grammar school scored almost twice as high on certain tests as American boys and almost always scored distinctly higher.

Maybe Asians are innately better at math. If so, following Summers's reasoning, Harvard should be preferentially hiring Asian women over American men. (We don't know what's behind the large cross-national differences -- although education is key -- and, as Americans, we're a little reluctant to think we're inferior.)

In the meantime, we don't cultivate women who are strong in math. A study of seventh- and eighth-graders in the top 1 percent of math performers shows that the girls do not improve their scores over a four-year period to the same extent that boys do; nor do girls in that top pool continue in math and science at the same rate as boys. We cultivate and nurture mathematically inclined boys. And children -- like adults -- have a tendency to fulfill expectations. We expect boys to excel at math and treat them accordingly. Shouldn't we do the same for girls?

There is one cognitive ability that appears to be linked to sex differences in hormones. It's called mental rotation: the ability to look at a picture of a three-dimensional block figure and imagine it rotated in space. Males are much better than females at this task (although,

with practice, someone of either sex can improve), and that result appears to be related to testosterone level. Girls who have experienced excess androgen in utero show higher mental rotation scores than normal girls. That's the kind of evidence we need to demonstrate a hormonal connection. We don't have that evidence for math or other cognitive differences. Does mental rotation ability matter? Maybe for a couple of scientific fields, but on balance, differences in math abilities seem better accounted for by differences in what we expect of women and how we treat them.

The National Science Foundation has recognized that the nation loses out if colleges and universities squander the talents of women faculty members. And if women are going to thrive in math and science, academia has to change. To speed that change, the NSF has awarded ADVANCE Institutional Transformation Awards to 19 schools, of which Hunter College, where I teach, is one. And there are already results from this ambitious new program: These schools are hiring more women, improving their promotion and tenure policies, and doing more to ensure that women have the resources to do their best work.

Summers now says he was wrong to have spoken in a way that has sent an unintended signal of discouragement to talented women. He also has pledged \$25 million to promote the hiring of women and minorities at Harvard.

That message would have been a welcome addition to his comments at the Jan. 14 conference. The most important message, though, is that if we raise expectations of women in science -- and give them the resources they need -- they will make it to the top.