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Outlook: Women in Science

Virginia Valian
Professor of Psychology, Hunter College
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Harvard president Lawrence Summers stirred up controversy by suggesting at a conference for men and women who think elite academic institutions need to move faster to increase the number of women on their faculties that women may be innately inferior to men in math.

Virginia Valian, a professor of psychology at Hunter College in New York, was online **Monday, Jan. 31, at 4 p.m. ET** to take up that debate. She will discuss her article, [Raise Your Hand If You're A Woman in Science](#), the scientific data about men and women in science, cognitive sex differences, the effects of expectations on people's behavior and unintended misjudgments of women and men.

Editor's Note: Washingtonpost.com moderators retain editorial control over Live Online discussions and choose the most relevant questions for guests and hosts; guests and hosts can decline to answer questions.

The Estates of Riverdale Park, Md: Hello Professor Valian,

Your thought-provoking article in The Post implied that Harvard deliberately overlooked minorities and women.

Why would Harvard do that?

Virginia Valian: Sorry if I conveyed the impression of deliberately overlooking women and underrepresented minorities. I was trying to convey the opposite. We're all well-intentioned, is my assumption. I'll keep that assumption until I get evidence to the contrary. What's so interesting about the data on people's unintended judgments is that they rate women more negatively than men even when they do not have any intentional bias. I assume that the same was true at Harvard.

Laurel, Md.: For at least a couple of decades, it's been popular in American to attribute any gender difference in workplace accomplishment to some sort of societal cause like discrimination, glass ceilings or old boys networks, with the implication that if these causes did not exist neither would the gender differences. What this ignores, of course, is the even given exactly equal opportunities, men and women differ in attitudes and expectations and possibly talent in some fields.

I don't think it's just sexism to recognize that men are more visual and mathematical than women, who are more verbal. Men prefer chess; women prefer Scrabble. Among my friends' 16 to 30-year-old children, all the men are something electronics or IT-oriented; the women are in something related to biology.

Hasn't there been too much expectation of equality given very real differences that do exist?

Virginia Valian: I would say, first, that popularity of a view isn't what we want to concentrate on. We want to concentrate on where the data are. As the WP article suggests, and my book documents more fully, our expectations and evaluations and treatments of males and females differ. They differ even among parents of infants 24 hours old. (See an early paper by Luria and her colleagues.) To do the controlled experiment, we would have to treat children equally - equal expectations, equal demands, equal everything - in order to then see what the effects of hormonal differences might be.

Your question may be assuming that attitudes and expectations are built in. But we have a lot of data on the flexibility of attitudes and expectations. People aren't set in stone. Fortunately!

Prague, The Czech Republic: Hiring of women in the sciences at Harvard has declined from 37 percent since Summers has been president. Even if Summers' statements were not those later attributed to him by attendees driven to hysteria by his comments, isn't discrimination a more likely cause of the decline than differences between the structure of male and female brains? Or is that incorrect?

Virginia Valian: The decline in the hiring of women was startling, but any single year can be a fluke. You need a run of several years in order to detect a pattern. But your overall point is of course correct. If anything, the pool of talented women is larger every year, so a decline in hiring is better attributed to lack of attention to a diverse pool of candidates than to a decline in qualified women.

Washington, D.C.: I read an interesting opinion piece on the topic last week. I can't remember the author, I think it was George Will, but the point of the article seemed to be that folks have worked themselves into such a tizzy trying to dismiss Summers remarks out of hand because he put forth a possible difference between the sexes which has perceived negative connotations for females. And that some of these same folks are much more willing to accept theoretical differences when the female is cast in a superior light than the male.

Did you see the article, and do you have any comments you'd like to share on the topic?

Virginia Valian: I didn't read Will's article, but Diane Rehm read part of it when I was on her show last Thursday. My own attitude is that, on almost every cognitive variable we know of, males and females are much more alike than they are different. I don't think either sex is "superior" to the other.

Arlington, Va.: I agree that expectations and treatment can really affect girls/women in math and science. When I applied to go to MIT, the head of my school asked why I was applying since I wasn't "mathematically and scientifically minded" -- even though I was salutatorian and acing all the AP-level math and science classes. As an undergraduate in aerospace engineering, my ideas weren't taken seriously by the males in my senior design group until one of the guys would mention the same idea, then it was considered a great idea. I've persevered in the sciences -- I'm now in environmental engineering which has a lot more women than other engineering fields -- but it's been frustrating. Until we can break that myth that women aren't as good at math and science -- and instill that in children (especially boys) as they are growing up -- I don't see the problem getting any better.

Virginia Valian: Many of the letters I have received from women mention the assumption on the part of those who counsel them that, because they were women, they could not aspire to a career in math or science. Talent isn't so plentiful that we can afford to waste half of it!

Your comment about children is well-taken. We could do much more in grammar school to help children understand how gender works. Children could do small experiments on some of the phenomena that have been researched on adults and thus take a more dispassionate view of gender as well as learn about the scientific method.

Virginia: Do you have any statistics on female tenure members with kids and without kids?

Virginia Valian: A book I mention in the WP article, edited by Long, entitled "From Scarcity to Visibility", examines the effects of childcare. Those data suggest that if (big if) women remain full-time, the women with children receive tenure at the same rate as the women without children. And both are worse off than men with or without children. In other words, there's a negative consequence of being a woman, whether or not you have children.

But, there was that big if: women are much more likely to work part-time or become unemployed if they have children. Working fathers do not do their share of child care or housework. So, to young women I would say, choose your partner wisely!

Mason has data that appear to contradict the data in "From Scarcity to Visibility",

suggesting that having children very early in one's career is damaging for women's professional life. But most of the data I'm aware of suggest that what makes the difference is becoming part-time. If you can remain full-time, you can succeed.

Women can and do have a personal life and a professional life.

Columbia, Md.: In the study you cited where Asian girls scored better than American boys, you failed to mention where the Asian boys fell in the ranking. Would you please cite this study specifically? I have a feeling I know the answer already.

Virginia Valian: The study is by Lummis and Stevenson, comparing 1st, 3rd, and 5th grade boys and girls in the US, Taiwan, and Japan. On achievement tests, there were no sex differences within each nation, but the US was last. On application tests (and those are the ones I was referring to), there were no sex differences on most subtests and the US was last. When there were sex differences, boys scored higher than girls in all three nations and on the same subtests. But the cross-national differences were much larger than the within-nation sex differences.

To me, then, there are two questions: why are there such large cross-national differences?; why are there the consistent small sex differences?

Arlington, Va.: The uproar at Harvard over Lawrence Summer's comments bring back memories of high school for me. I had a great science teacher, who happened to be male. He encouraged me, a woman, to apply to a highly ranked university and pursue a degree in chemistry. I've since graduated, earned my Ph.D and have accepted a position at a top research school. My other friend, however wasn't as fortunate to have such a supportive teacher. Her physics teacher tried to dissuade her from pursuing a science degree. The teacher told her that since she's Jewish she'd be better off pursuing a degree in finance, since "her people were very good with money." There's still plenty of sexism/racism, etc. in our public schools.

Virginia Valian: Your comment brings out the importance of challenge and encouragement. Most people, male and female alike, are influenced by what others think they are capable of and what others think it is reasonable for them to aspire to. We need to set high standards for all children and encourage them to meet those standards, independent of sex, race, ethnic background, and so on.

New York: I wonder if we're all being misdirected by this semi-public huffing and puffing in Boston? Isn't there a lurch to consciousness raising on the wrong issue going on? Isn't the real news story the unwillingness of the Harvard faculty to hire women, not

Larry Summers truly harmless speculations or Nancy Hopkin's discussion of her constitution?

Virginia Valian: I agree with you that the individuals involved in the story don't matter - even though we wouldn't be having this conversation if it weren't for those individuals. And the generally lower performance of high-prestige schools in hiring women is the focus. Discussion of neurologically- and hormonally-based sex differences is also important, since beliefs in their importance may be underlying the difficulties women experience.

Washington, D.C.: Thank you for the well-written piece on this topic. In particular, I thought the comparison between the performance U.S. boys and Japanese girls was particularly noteworthy. How do you think standardized tests in the United States, and their importance under No Child Left Behind, is affecting math and science curricula? Could "teaching to the test" actually break through stereotypes regarding girls' performance as teachers strive to raise overall scores?

Virginia Valian: It could go either way, I think, depending on how people interpret "no child". You could raise the mean by concentrating on a few children, or a small group of children. Keep in mind, too, that on most tests, girls and boys perform equally well. If anything, girls outperform boys. It's only on particular tests, like the SAT and GRE, and particular subcomponents, that there are gender differences. I'm not sure if the standardized tests in grammar schools pick up those differences.

Ann Arbor, Mich.: I've heard it said often that nowadays it is "easy" to be a woman engineer/scientist in academia because everyone is looking to hire them, give them awards, etc. Are there any data that speak to the relative qualifications of women vs men hired at a given institution, or awarded a particular distinction (e.g. Young Investigator awards)?

Virginia Valian: The data I know of that are relevant are from the NSF, which polls young PhDs on their employment plans right after graduation. There is no difference in the percentage of males and females who have job prospects.

You may have heard about a new grant that NIH has - Pioneer Awards, awarded after nomination. Ten went out this year - all to men. Were women nominated? We don't know.

In most professional societies, more awards go to men than to women, even accounting for differences in representation.

Perhaps the most relevant study in this regard is by Wenneras and Wold, who analyzed

the recipients of the Swedish Medical Research Council's post-doctoral fellowships in 1995. That year, women were 46% of the applicants but only 20% of the recipients. W&W's analysis showed that, as was appropriate, judges' scientific competence ratings determined who got a fellowship. They also found, as was appropriate, that for male applicants, their productivity and the prestige of the journals in which they published were linearly correlated with their scientific competence ratings. W&W called that combination total impact points. Female applicants had to receive 100 total impact points before their rating was the same as that of males with 40 impact points. Women are judged less positively than men, even when they have the same credentials.

Montgomery County, Md.: Thank you for a good column, and thank you for chatting with us. As one of those harsh statistics who has chatted with several other similar data points, I'd like to share my experience and opinions.

I am a woman Ph.D. in the physical sciences who always grew up wanting to be a scientist. I love it and have always excelled at it and math (and mental rotation too!). Throughout my graduate research, I never felt any real doubt that I would keep going as an academic. As a post-doc on the other hand, I became disillusioned with the possessiveness and antagonism of my academic peers (not only towards me, but towards others of either gender as well). In two successive major projects, the razor wire wall that I found trying to get my work published (and it was good work - much tighter and relevant than most I see published) was amazing. It finally wore me down emotionally, as I felt I spent most of my time not doing science, but fighting pettiness to communicate my work or get funding. Now it may well be that with a female name on papers and proposals, I got more than my due (colleagues did express amazement at the level of my difficulties). But I also think that I (and many other women 'drop-outs' I've talked to since) simply don't have the temperament or patience to deal with this silliness: "Life is too short to collaborate with jerks". I began to hate going in to work each day. I dropped out, and am now severely underemployed (adjunct teaching) - happier in some ways, but frankly, really angry sometimes too.

Now I realize that there is a thin line between maintaining that women often don't have the "ambition" (or some other adjective) for science, and postulating what I think - that many of us simply don't have the combativeness for it (I was just not brought up that way!). I've occasionally brought this up in mixed circles to have it greeted with anger from other women: how dare I suggest that many women simply aren't cut out for this (I am speaking in dangerous generalities for brevity, please forgive). But I -am- ambitious, aggressive, assertive, and no shrinking violet. To me there is a difference between aggressively going after the fruit you want, and aggressively stomping on others who may be coming up behind you reaching for what is nearby. And I have no taste for the latter. So I quit. And I believe it is science's loss even more than mine.

So I guess my question is - of all the articles I read about why there is such a steep attrition of women in science between Ph.D. and faculty positions, why does this one

rarely get discussed - that we may be repelled by the dysfunctional warlike culture of science academia? I sense that such a discussion might easily be misunderstood by many as a 'women are too gentle' argument, so it is rarely broached. But I sure would like to understand it better for my own benefit. Any thoughts?

(Incidentally, my experience leads me to believe that we DO need to get more women in these positions in order to keep the good ones as they arrive. A female mentor or two might have made a world of difference for me.)

Virginia Valian: Let me mention here what I think is a positive force, which I also mentioned in the WP article. The National Science Foundation, via its ADVANCE Institutional Transformation Awards, recognizes that colleges and universities are not cultivating and rewarding talent equally across social groups. Via these awards - 19 of which have been earned so far - there is a dedicated attempt to ensure that we do not lose talented women - and men - because of too much attention being given to the person who speaks the loudest and the most frequently.

Your observation is one that I have heard at many institutions where I have lectured. I think the NSF awards are making a difference both at their home institutions and more generally. I recently read a short comment by a distinguished male researcher at an elite institution: he thought that women were more likely than men to make profound discoveries, in part because they were not always looking over their shoulder.

I'm sorry you left.

Madison, Wis.: I'm a woman about to graduate with a degree in chemistry, and I feel like throughout my academic career the male/female balance has been pretty much even. But embarking on graduate work, I've noticed that more and more of the women are going for careers in secondary education or industrial chemistry. Many of them note that their desire to have and raise children pushes them out of the academic track. I think that part of the underrepresentation could be attributed to an academic culture that puts so much emphasis on publication, which is difficult to achieve when you can't be in the lab (i.e. pregnant and nursing.)

Virginia Valian: In my view, one of our most important tasks for the future is to make child care an activity that mothers and fathers engage in equally. That would transform our workplaces.

Houston, Tex.: To ignore gender is to ignore an intrinsic part of who we are. Maybe men ARE better (by nature or nurture) at math and physical science, and maybe women are better at communication and empathy. However, to assume that one is incapable of a task due to gender is wrong. When I was in first grade, I was told that only men could be

doctors. This May, I'll graduate with both an MD and a PhD. My sister was routinely ignored in her engineering classes, even after setting the curve. She graduated third in her college class, went on to get a MS, and now teaches high school math. But we did not do this "in spite of" our gender, but because we, as individuals, possessed those talents.

I think that the largest hurdle that female scientists/physicians face is the perception that we are mothers first, and professionals second. A man is rarely asked how he plans to balance career and family (my husband is also a scientist), but I was routinely asked during job interviews about plans for children, how I would handle an 80-hour work week (medical residency), and how my husband felt about my working and not staying home. Upon speaking to female physicians and scientists, the MOST important thing for their happiness and success was a supportive spouse. Routinely, they have told me that, had it not been for a partner willing to sacrifice for the family (stay home with sick child, grocery shopping, housework), they would not have been as successful. I am lucky to have such a spouse, but not all women are. I have repeatedly been told that I should plan on staying home after children because if I don't, I am selfishly putting my career above my family. With that type of pressure, why is it any surprise that women are unwilling to embark upon potentially wasted training for careers in science and math?

We need to celebrate our individual talents, and not make assumptions based upon perceived gender differences. And to realize that both men AND women can be both parents and professionals.

Virginia Valian: Please note that you were asked illegal questions!

And, I would say that you chose wisely and well in your partner.

Capitol Hill, Washington, D.C.: Good afternoon Professor Valian!

Suppose Larry Summers phoned you and said, "Virginia, Harvard is, and always will be, committed to hiring the very best talent. How can I recruit more women?" What would you tell him?

Virginia Valian: Please see the following web sites for starters:

www.hunter.cuny.edu/genderequity

www.hunter.cuny.edu/gendertutorial

These two sites have excellent resources and also have links to the other 18 ADVANCE institutions.

Educate everyone in the institution about how gender works. We now have a lot of good experimental data that deal with the effects of gender schemas on our perceptions and evaluations of others and a good understanding of the accumulation of advantage - the many small events that add up either to a great deal of advantage or disadvantage.

Look at the best practices being followed by schools that have ADVANCE awards as well as by schools that do not.

Examine recruitment policies. See particularly the materials put together by the University of Washington (led by Dean of Engineering Denton). I also have compiled a list of errors that people are likely to make in the recruitment process, the retention process, and in creating a desirable environment.

Recognize that the institution will change - but the change is likely to be for the better.

New York, N.Y.: I thought it odd that you recommended educating boys (especially) about gender when they are young to prevent future discrimination in hiring. That sounds like wholesale social engineering right out of A Brave New World, or out of a sticker on a high school biology textbook in Georgia. Why are we assuming that men are the problem, when women probably hold the same negative attitudes about women (and men) that men do? Isn't the MIT biologist who "almost blacked out" and leaked this story to the press, violating the confidentiality agreement of the conference, (especially) to blame for her own negative attitudes toward men? I've heard she has sued every university she has worked for.

Virginia Valian: I advocate educating everyone, male and female alike. In my article and in my book I make clear that, in every published experiment that I know of that looks at implicit evaluations, there are no sex differences. I do not think that men are the problem. We all underrate women and overrate men. We can learn to do otherwise.

Fullerton, Calif.: I've heard that boys have better at spatial abilities and girls have better at verbal skills - among other things. Has there been a study where the same group of boys and girls were given tests during their development to see if and/or when those skills were ever the same? Or were boys always better spatially and girls always better verbally?

Virginia Valian: "Spatial" and "verbal" are somewhat too broad. It is mental rotation in particular that boys are better at, and it does start early (see research by Huttenlocher and Cohen). There is some evidence (see work by Casey) that sports experiences are relevant, but in girls that is limited to girls with left-handers in their family. You can see that it's complicated!

In the verbal domain, the only major sex difference is in writing, where girls far excel boys. I don't have the data on the timing of that at my fingertips.

New York: I've noticed that the last few questions have all been anecdotes by women rather than statistical evidence. Either this proves Summers' point, or the moderators are sexist and refuse to answer the many less agreeable and probably more male questions in queue. That this question will not be answered either is proof of your sexism. This whole thing is rigged.

Virginia Valian: I find that males and females alike supply anecdotes. In fact, no one has written with any data. I supply the data.

McLean, Va.: Could it be something about American cultural expectations for girls? Here's my experience in Africa, Europe and America.

I'm originally from Sierra Leone in West Africa. There weren't many girls doing physics, chemistry in high school (many more did biology) but those of us who did do science and engineering in high school and college and excelled at it were treated like "rock stars." We were the "in girls!" Girls and boys wanted to hang out with us. When I went to study chemical engineering in West Germany, I was treated as a peculiarity -- an African woman studying engineering. When I excelled at it, people were rather puzzled and wanted to know how -- so I was treated like an anthropology investigation. Now I work in the states -- I'm treated like a woman with an exotic background! Maybe my African brethren are the most progressive of all.

Virginia Valian: Interesting!

College Park, Md.: As a female scientist I've been fortunate to have had the opportunity to meet and work with a number of talented female scientists. I find however that relative to men in science the women are much less likely to have children. I think the absence of female role models with children is a main contribution factor to the problem of retaining women in the pipeline. Young female graduate students and female postdocs assume that the absence of role models with children means that it must be impossible to balance family with a scientific career. Some of male mentors have actually gone out of their way to suggest to me that it just can't be done, and that the women who try are crazy. Essentially, I think there are huge issues with mentoring which need to be addressed, and I'm curious if the NAS or other scientific organizations are making any steps towards addressing this.

Virginia Valian: As I said, the data show that it is possible to have a personal life and a professional life.

Another way of looking at the equation is that women with children are less likely than women without to have a satisfying professional life.

Washington, D.: Are science and math the only areas where women are underrepresented? What about law, politics and medicine?

Virginia Valian: Women are underrepresented at the top of all the professions. The problem is not unique to math and science.

Virginia Valian: Thank you, everyone, for your questions. Please look at the materials provided on the web sites that I've mentioned.

The data and theories in social and cognitive psychology, and in economics and sociology, are very helpful for understanding the underrepresentation of women. The anecdotes help give live to the discussion, but can never substitute for empirical data.