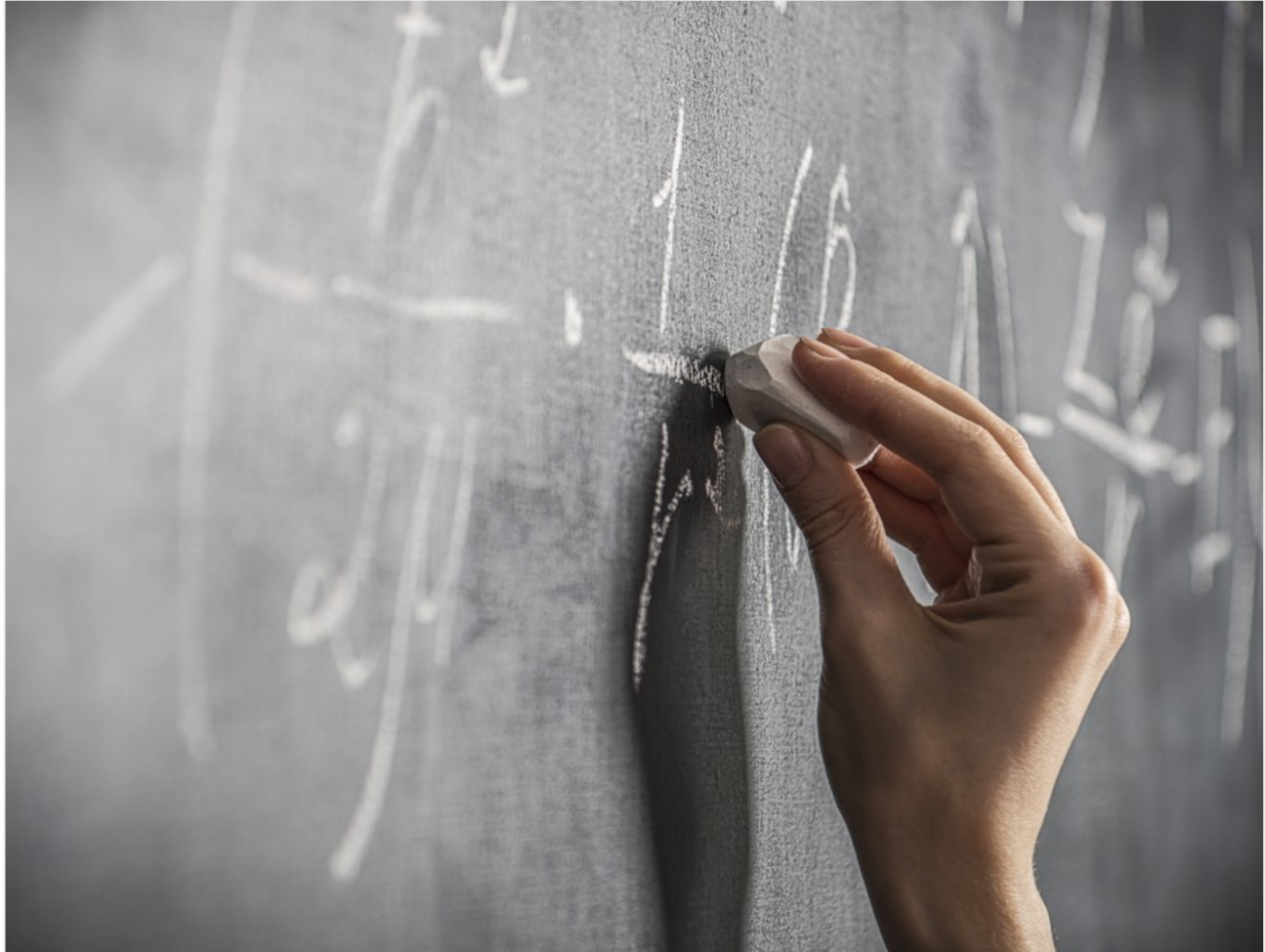


Why Are There So Few Women Mathematicians?

How a corrosive culture keeps women out of leadership positions on math journals



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As soon as mathematician Chad Topaz ripped the plastic off his copy of the American Mathematical Society's magazine *Notices*, he was disappointed. Staring back at him from the cover were the faces of 13 of his fellow mathematicians—all of them men, and the majority of them white. “Highlighting all this maleness and whiteness—what is the message that is being sent to the membership?” he wondered.

Topaz, a professor at Macalester College, knew that his field had a gender problem. In mathematics, just **15 percent of tenure-track positions are held by women**, one of the lowest percentages **among the sciences**, along with computer science (18 percent), and engineering (14 percent). “Softer” sciences tend to have more women in tenure-track positions, like in psychology (55 percent women) and biology (34 percent). Despite training in a field with so few women, Topaz had the unusual experience of having women as both his Ph.D. and postdoctoral advisors. “They rarely talked about representation issues, but I noticed that they were often the only women in the room,” he said. Topaz grew increasingly interested in understanding why women were so underrepresented in his field, and then had a daughter, who he says loves math and science. “At some point I thought, I need to be doing something *active* to contribute to addressing this problem.” So Topaz and the Macalester statistician Shilad Sen set to work by looking at a new metric of academic success: the editorial boards of academic journals.

Who’s on an editorial board may seem like an esoteric statistic, but Topaz and Sen argue that it’s a proxy for women’s leadership in a field. Think of the editors as the gatekeepers of science: They direct journals’ peer-review process, the backbone of modern science. Editors call the shots on which papers get published in their journals—and this affects the ultimate direction of a field.

On an individual level, being asked to join an editorial board is an important career milestone for academics. “Editorial boards are a great chance for professional networking,” says Sen. “It’s important for tenure and promotion, and is seen as a prestigious honor.”

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And Topaz and Sen’s research shows that women are being left out of these opportunities. In their analysis of 13,000 editorship positions on 435 math journals, they found that just under 9 percent of all math journal editorial positions are held by women. The median journal has an editorial board with 7.6 percent of editorships held by women, but one in ten journals have no female editors at all.

These numbers show that something is going on in the field of mathematics, but more research is necessary to understand what’s driving the disparity. One factor Topaz and Sen believe contributes to it is what they call the “brilliance effect”: the belief that natural brilliance or knack for a subject drives success, rather than hard work or persistence. And,

sadly, women are less likely to be seen as brilliant. [One recent study](#) that analyzed reviews of professors on the site RateMyProfessors.com found that in fields where the words “brilliant” and “genius” were less likely to be attributed to women, women were less likely to reach upper levels of academia. “The implication is that to be a mathematician you have to be brilliant, and women are not brilliant,” says Topaz.

Even when women *are* brilliant, their accomplishments may be viewed differently by colleagues. Maria Emelianenko, a mathematician at George Mason University, told me about a colleague at another university who experienced this on her first day as an assistant professor. “When she arrived, she had a sign on her door that said ‘Mrs. Smith’—but the rest of the signs in the department all read ‘Dr. So-and-So.’ She’s on the same level as her other colleagues, but somehow they referred to her differently.”

Other times, female mathematicians’ accomplishments are chalked up to the “gender card.” Mathematician Sarah Brodsky says that after she was awarded the National Science Foundation’s prestigious Graduate Research Fellowship, there were colleagues who told her that she’d won the award only because she’s a woman. This kind of thinking—that women’s professional accomplishments are due to tokenism, not their abilities or hard work—plays a role in why women may be overlooked for leadership roles in their field, like editorial positions. “[Editorial boards] are looking for someone who is mature, has expertise, and can review articles and point toward directions that elucidate deficiencies in others’ work,” says Emelianenko. “They want to be assured that this person is very well-qualified. But this doubt—“this lady has published a lot and gotten some grants, but it’s because she’s a woman”—may hurt women.”

It could also be the case that women in math are producing less work compared to their male colleagues. Working women shoulder more of housework and child-rearing responsibility than men, which could have a real affect on their output. Emelianenko says she’s seen colleagues struggle to balance family responsibilities with work. “One colleague had a C-section and had to teach in a week,” she says. “She didn’t think she could fight for her rights, because [the colleague’s department] had no departmental policies about it, and she was on the tenure track, so if she refused to do it she worried she would not get the job she wanted.”

But even if some women are producing *less* work—or God forbid, taking a few days off to have a baby—that says nothing about the quality of their work. “I don’t have time to write 10 articles a year, but say I write two—two that are not incremental papers, but something deeply interesting and thorough,” says Emelianenko. But academic environments often reward quantity of output over quality.

Gender disparities may be especially pervasive in mathematics due to the culture of the field. It has traditionally been a male-dominated field, and it can feel like an old boys' club to many women. Brodsky tells me when she entered her graduate program, she was one of six women in a cohort of 40. She was horrified to learn from a classmate that her male colleagues had exclusive social outings. "They would get beers after work and rank the six of us in terms of who was hottest and most fuckable," she says. After discovering this, it was hard to feel like she was being taken seriously. "That's one good example of why I could never feel like an actual colleague—[we women] are just gossip to discuss."

“A lot of editorial boards have one woman, and not a lot have two. One can be a token, but the move from one to two could be huge.”

Of course, sexist behavior and harassment are not specific to math. But there are other aspects to the culture of math that contribute to an environment that undervalues women, like its reverence for objectivity. "Part of what sets math apart from other fields is the belief, on the part of the practitioners, in the ultimate perfection of their system," says Moon Duchin, a mathematician at Tufts University. In academia, and especially math, objectivity is an ideal quality: scholars must separate themselves from their work. But humans, by nature, make subjective and biased decisions even if they are striving for objectivity. Those committed to scholarly objectivity may pass off their personal beliefs as ultimate truths without recognizing their own biases may have crept in. Duchin recalls a conference she attended as a second-year graduate student where mathematicians were 'objectively' rating colleagues. "The game of the evening involved naming two people, and everyone had to say who was better. That's a particularly crass example," she says, but it illustrates the pervasive belief in the field that there's an objective way to measure who is a "good" mathematician. "If that's your ideological commitment, then of course you're going to discount implicit bias."

Topaz, Sen, Duchin, Emelianenko, and Brodsky all shared ideas about how their field could eliminate barriers for women, from anonymizing paper submissions to reduce bias associated with male or female names and developing better parental leave policies to making a point of including multiple women on editorial boards. "A lot of editorial boards have one woman, and not a lot have two. One can be a token, but the move from one to two could be huge," says Duchin.

But addressing the disparity will take more than changing journal practices; many mathematicians say they've seen firsthand how gender disparities begin early in students'

education. Sen says it's common in his own classroom. "Women come into my introduction to computer science class and when they don't quite get something, they think, *I don't get this, it looks like everyone else is getting this, I'm just not good at this,*" he notices. But men, he says, just figure everyone else is equally stumped. "They think 'I don't get this, everyone else in the class doesn't get it either.'" Studies have found similar differences in male and female confidence in math with [high school](#) and even [elementary school students](#). Sen says he thinks it's important to address these attitudes with his students, and normalize the idea that people need time to digest new concepts. "The biggest impact I can make is in my classroom, especially in the intro levels, where the culture is coagulating."

Sen and Topaz are hopeful that more participation from women, especially in top ranks, will improve the field. "There's research that shows that the best decision making happens when you have a diverse group of people," says Sen. "If half the world's population is not participating in math, you're missing out on half of the really good people."



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