



Can Mathematics Light the Way?

Allyn Jackson

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At the most recent Joint Mathematics Meetings, held in January in Atlanta, I attended two extraordinary lectures. The first was by Alice Silverberg, who spoke on Diffie-Hellman key cryptography. After a lucid exposition of the basics, she worked up to new results she and her collaborators have obtained, which provide mathematical insights into why the Diffie-Hellman method is effective—and why it sometimes isn't. Into the talk she wove an *Alice in Wonderland* theme, illustrated with the lovely, gently humorous drawings of John Tenniel that accompanied the original edition of that classic.¹

The mathematics was beautiful, the presentation accessible, entertaining, and polished. What more could you ask for? Well, Alice Silverberg did ask for more—more of herself, more of her audience, more of her community. In the last twenty minutes of the talk, she reflected on what she learned in collaborating with cryptographers, whose needs and approaches are very different from those of mathematicians. The lessons she distilled from this experience were simple and profound. Listen to others. Give them your whole attention. Listen without half your mind planning what you will say. Do not assume you can read the other person's mind. Instead, ask what's on his or her mind. If someone makes you angry, don't respond in anger. Get curious, not furious, she said, using a phrase borrowed from a 2016 book written by Martin Hellman—the same Hellman of Diffie-Hellman—together with his wife, Dorothy Hellman.

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¹ Silverberg wrote a brief outline of the lecture for the "JMM 2017 Lecture Sampler" that appeared in the January 2017 issue of the Notices.

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DOI: <http://dx.doi.org/10.1090/noti1518>

It would be easy for such a lecture to slide into pompousness, but Silverberg's sense of humor prevented that, as did her humility. She did not present these lessons as ones she has mastered herself. Rather, she encouraged her fellow mathematicians to welcome the experience of

allowing deep mathematical interactions—which are essentially encounters with truth and beauty—to influence other parts of their lives, especially their attitudes toward others.

After her talk, I thought, "Of course it was a woman who had the daring to talk about how mathematics can lead us toward more humane living. Women mathematicians are changing things. Let's hear a cheer for the distaff side of the community!"

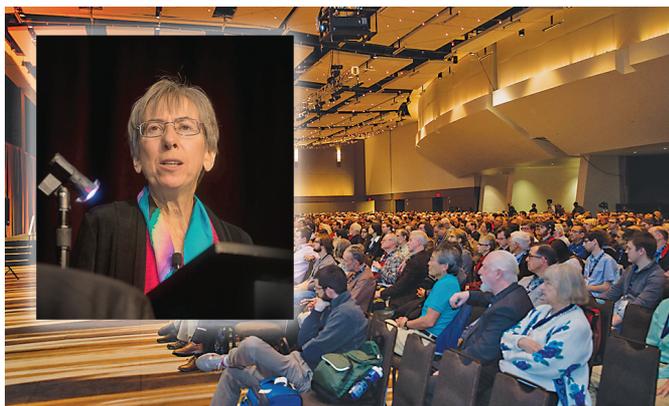
My rather chauvinistic reaction—and here I am referring not to male chauvinism but to the female brand—was blown out of the water by another lecture I attended, that of retiring

MAA president Francis Su.²

Profound and wide-ranging, Su's lecture is difficult to summarize, but let me try: Mathematics can transform the human heart, turning it toward compassion. Let this transformation resound in your interactions with students. A quotation of Simone Weil formed a leitmotif in the talk: "Every being cries out silently to be read differently." Su called on the audience to read their students' struggles differently—to read them with empathy and to respond with encouragement.

He began the lecture by quoting from a poignant letter he had received from Christopher, a prison inmate who had been studying mathematics. Su's voice cracked slightly as he read from the letter, which told the story of a life gone wrong at an early age through drugs and crime, but one that was in the process of redemption through

²The full text of Su's lecture, "Mathematics for Human Flourishing," is available on his blog, <https://mathyawp.wordpress.com> and will appear in an upcoming issue of the American Mathematical Monthly.



Silverberg encouraged fellow mathematicians to welcome deep mathematical interactions.

study of mathematics. “When you think of who does mathematics, do you think of Christopher?” Su asked. “Every being cries out silently to be read differently.”

Mathematics has the power to redeem by bringing the mind into contact with truth and beauty. But this contact frequently leads to struggles not with the mathematics itself, but with the social and institutional structures in which mathematics is embedded. Too often mathematics students lack a sense of belonging, of being worthy, of being understood. Su described how Simone Weil herself struggled with mathematics, standing as she did in the shadow of her prodigiously talented brother, André Weil.

Su also recounted stories of students whose mathematical work was hampered by prejudice. In one example, a female student with a gender-neutral first name had top grades on homework in her mathematics class—until the grader found out that this impressive student was not male. After that, her homework scores dropped, with points taken away on the basis of vague comments like “give more detail.” In another example, a student who had done great work in a summer mathematics program was told by a faculty member at her home institution that she should change from mathematics to an “easier” profession. Eventually she switched to engineering.

Su also spoke of his own experiences growing up in a town in south Texas, where his was just about the only Asian family. He desperately longed to be white. (This resonated with me: As a white kid in a predominantly black middle school, I wanted to be black so badly that I asked my parents to buy me an afro wig.) In graduate school at Harvard, he felt out of place because he lacked an Ivy League background. One professor even told him he didn’t belong in graduate school. Su was on the verge of quitting when another professor reached out to him and became his advisor. Su also witnessed the toll taken on Harvard undergraduates burdened by hierarchical structures, such as the two levels of honors calculus sitting above the regular calculus class. Even though they’d made it into honors calculus in one of the top universities in the world, the students in the “lower” honors calculus felt inadequate.

Many of us have such tales to tell. I had been a straight-A student in high school, so as a freshman I was confident I would do well in Calculus 1A. The course had a couple hundred students, but I was pretty fearless and



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raised my hand often to ask questions in the huge lecture hall. One day after class, the professor said to me: “Keep asking questions. It’s good to hear from the B students.” That stopped my questions. As predicted, I got a B in Calculus 1A—my only non-A grade as a math major. And as in many tales of this sort, not everything in mine is black and white. This professor was actually an outstanding and wonderful teacher who cared deeply about students. He would have listened had I found the courage to tell him about the effect of his comment.

“Every being cries out silently to be read differently.” As Su repeated this quotation several times in the lecture, Simone Weil’s insight itself seemed to cry out to be taken to heart. Painting a collective portrait of students and their struggles, Su called upon his colleagues to seek out one student who faces challenges and to become a long-term advocate for that student. “Be the one who says ‘I see you, and I think you have a future in math.’ Be the one who searches out opportunities for them. Be the one who pulls them towards virtue. Be the one who calls them up when they’ve skipped class and asks ‘Is everything okay? What are you going through?’”

This was no ordinary math lecture. When the audience, rapt throughout, got to their feet for a standing ovation at the end, many had tears in their eyes—as did Su.

Silverberg’s and Su’s talks took place just days before the presidential inauguration that capped one of the most divisive races in the history of the US, and against an international backdrop of suspicion and outright fear about the future. While neither lecture addressed political issues, societal discord weighed heavily on both. By showing how mathematics can open hearts to greater empathy, greater understanding, greater humanity, Silverberg and Su posed a challenge: Can mathematics light a way toward a better world?

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