Science
AAAS

Does the Harrison Case Reveal Sexism in Math?

PAUL SELVIN, *et al.*

Science **252**, 1781 (1991);
DOI: 10.1126/science.252.5014.1781

Does the Harrison Case Reveal Sexism in Math?

Denied tenure at UC Berkeley, mathematician Jenny Harrison is suing the university for alleged sex discrimination

THE UPPER ECHELONS OF ACADEMIC MATHematics are one of the last bastions of male exclusivity in U.S. academics. In the top ten departments of mathematics there are 303 tenured men—and four women. Harvard, MIT, Princeton, Yale, Stanford, Caltech, and Chicago have no tenured female faculty. Columbia and Michigan each have one; UC Berkeley has two. The reason usually offered in defense of such depressing statistics is the paucity of qualified applicants. And indeed, two decades ago, when today's high-level faculty were being formed in graduate schools around the country, the pool of women PhDs in math was small. But today, 22% of PhDs in math go to women—and yet the totals for the younger, untenured professors at the top ten schools are equally depressing: 86 men, one woman.

The persistence of such an imbalance suggests statistics isn't the only factor working against women in mathematics. And that is exactly the claim made by 42-year-old mathematician Jenny Harrison, who is now suing the University of California at Berkeley, where in 1986 she was denied tenure in the math department. Harrison's suit against the University of California, filed in September 1989 in Alameda County Superior Court, alleges that the departmental decision to deny her tenure, and the handling of the subsequent appeals process, reflects a bias against women.

Harrison's supporters (including some eminent mathematicians) say she measures up well against the men who received tenure in Berkeley's math department in recent years. Her critics—including one of two tenured women in the department—think Harrison is a sore loser who doesn't meet the standards of the Berkeley department, which hires, they say, only "the best in the world." This sharp clash of opinions is likely to persist for a while. One reason, of course, is the suit. Another is that, in a remarkable new twist, Harrison has been invited to reapply for tenure by the current chairman of the department. Whether Harrison's supporters or her detractors are correct, her case provides a window onto the complex politics and high emotions unleashed as women enter the realm of higher mathematics.

Even the staunchest defenders of Berkeley's math department acknowledge the problems it has had in the past in relation to women. Alberto Grunbaum, the department's current chairman, admits to the math department's "terrible reputation" in the past as a place for women to work (though he argues that things have changed dramatically). Berkeley's biggest embarrassment came in 1975, when Julia Robinson was elected to the National Academy of Sciences. Robinson had worked as an occasional math lecturer at Berkeley for more than 25 years—but was never offered a job until immediately after being elected to the academy.

It was against this background that the Harrison case arose a decade later. Harrison's career began with a PhD thesis from the University of Warwick in England on the question of whether jagged motion can be made smooth by looking through an appropriate lens. Her answer was no, and James Yorke, a mathematician at the University of Maryland and director of the Institute for Physical Sciences and Technology, calls her thesis a "major result," a term mathematicians use for a significant finding. "The same problem was attacked by Charles Fefferman and William Thurston—both Fields prize-winners," Yorke points out, "and while they were able to come to the same overall conclusion, it was clear that her approach was far more elegant." This, and her later work, says Yorke, means "she should get tenure anywhere in the world."

Harrison's later work involved solving one of the main problems in dynamics and differential topology, according to Charles Tresser, a mathematician at IBM, Yorktown. Known as the C-2 Seifert conjecture, that problem addresses something that might be (loosely) thought of as the question of whether you can comb a hairy ball smooth with no cowlicks or parts. The problem, which had been around since 1950, was partially solved in 1971 and solved in more complete form by Harrison in 1981 when she was spending time away from Berkeley as a tenured faculty member at Oxford University. This is widely considered to be her second "major result."

PITCHING A SHUTOUT: WOMEN IN MATH

Department	Tenured women	Total tenured	Untenured women	Total untenured
Berkeley	2*	64	0	1
Cal. Tech.	0	19	0	1
Chicago	0	33	0	20
Columbia	1**	12	0	21
Harvard	0	18	0	13
MIT	0	40	0	13
Michigan	1	44	1	3
Princeton	0	35	0	12
Stanford	0	22	0	2
Yale	0	16	0	0
TOTAL	**4**	**303**	**1**	**86**

*One shares joint appointment with UCLA and is currently on long-term leave there
**Tenured at Barnard College

Goose eggs. *There are only four tenured women in the top ten math departments in the United States. Jenny Harrison claims that sexism prevented her from becoming the fifth.*

Harrison, who recently finished a year as a visiting lecturer at Yale but now has no university appointment, has just come up with what some are calling her third major result. "She is one of the people who is putting math into fractals in a spectacular way," says Boston University's Robert Devaney, who says her latest results are "beautiful, just wonderful."

But in 1986, in what insiders say was a close vote, the Berkeley math department decided not to give Harrison tenure. The department tends to hire—even as assistant professors—only those it considers worthy of tenure, and Harrison was the first to be denied tenure in 15 years. Morris Hirsch, a tenured professor at Berkeley who works in a closely related field and is one of Harrison's strongest supporters, says he thinks "people

were misled" when Harrison's tenure case was presented for a departmental vote. Hirsch, one of five professors on the personnel committee responsible for presenting her case, thinks the committee, which summarizes and interprets a candidate's record, could have offered a stronger case. "The same case could have been presented to the department and looked very strong....If she were a man, it would have been a more routine case."

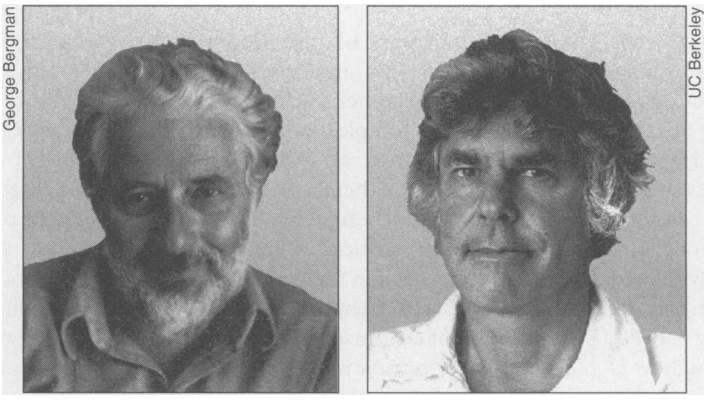
The picture presented to the department, according to several professors present at the meeting, was that of a candidate who hadn't published much, had letters of recommendations that were a mixed bag, and whose best work had had little impact in the math community. Harrison and her supporters argue that those criticisms are unfair. "I had at least as many papers as three men tenured during the time I was at Berkeley," Harrison says, "and the number of my major results compared favorably with several—about half—of the eight [men who were promoted to tenure]."

An examination of publication lists supports Harrison's claim that she had as many published papers as several of the men who got tenure while she was at Berkeley. And Jerry Marsden, winner of the prestigious Norbert Wiener prize in 1990 and a member of the department who works in Harrison's field, arrives at the same judgment as Harrison about her major results. He knows the work of five of the men who received tenure well, he says, and Harrison is "somewhere in the middle" of that group in terms of her major results. At the time of the tenure decision, he says, she had one major result beyond her thesis, as did three of the men; one man was given tenure without any major results.

Harrison and her supporters also criticize the letter sent out by the department's vice chairman at the time, Marc Rieffel, soliciting opinions from math colleagues of her work. That letter, they say, was sent to an unusually large number of people, including mathematicians who were famous but not familiar with Harrison's work. "Of course they sent back polite letters which said little of her work," says Hirsch. "People who knew her work the best wrote the best letters."

Furthermore, Harrison backers say that the letter requesting comments contained language that seemed to invite negative replies. Hirsch calls Rieffel's missive "completely improper," adding that it "put words in people's mouths." (Hirsch says he didn't read the letter until after Harrison was denied tenure, and so didn't object at the time).

Morton Brown, a mathematician at the University of Michigan who was one of the recipients—but who has no obvious stake in the Berkeley math department's tussle—told *Science*: "There were questions in the letter that one doesn't normally see." One example: "Do you think it likely that during the next decades her research will progress at the expected rate?" Brown says he thought that was a "peculiar question," adding that earlier, the letter asks for a "frank evaluation." Says Brown: "It's not clear if that's a code word or not, but it's a slightly surprising word."



Gender calculus. *Morris Hirsch* (left) *thinks Jenny Harrison got a raw deal because she is a woman. Steve Smale isn't so sure; he thinks her gender inflamed opinions on both sides.*

Rieffel, author of the criticized letter, says the critics are "snatching at straws." He adds: "I don't see anything that's unusual or wrong with asking about a person's productivity in the future." The number of letters was "on the high side," he says, because Harrison supplied a list of eight possible referees and various members of the department asked for others. "The idea that this was some kind of search for letters that would 'do her in' is crazy," says Rieffel. Famous mathematicians who "weren't intimately familiar" with her work could put it in context by taking a "broader view," he argues.

Harrison and her proponents also contend that her accomplishments were minimized at a crucial juncture in the meeting where her tenure case was decided. A senior member of the department, they say, brought up something Hirsch says had never been considered in tenure decisions for men—the Science Citation Index. That faculty member said that there were only three references to her thesis in the index. "It sounds quite negative," says Hirsch, "until you stop to think: 'How does it compare to other people who are being promoted?'" According to an analysis by Nancy Stern of Hofstra University published in *Social Studies of Science*, the average paper written by a mathematician in the National Academy is cited just 2.5 times. Harrison says there are 11 citations in the literature to her thesis—although not all of them appeared in the issue of the Citation Index referred to at the meeting.

Whether this adds up to a case of discrimination is a question that produces sharply divided opinions. Perhaps the most resounding no came from the university's powerful Privilege and Tenure Committee. Harrison appealed her department's verdict and in September 1989, after 80 hours of testimony from 25 witnesses, the 5-member committee (which included two women) unanimously concluded that "there is no demonstrable evidence to the charge that gender discrimination existed in the department or that it influenced the mathematics' faculty assessment of Dr. Harrison's case."

According to psychology professor Sheldon Zedeck, who chaired the committee, use of the Citation Index is not against procedural rules, and the controversial solicitation letter was not shown to have a negative impact. Harrison, says Zedeck, "was not able to demonstrate that there was bias in the department that influenced the behavior of the faculty members."

Grunbaum, the department's current chairman—and the man who invited Harrison to reapply for a tenured position—also denies that her rejection was due to sexism. "I would be the first to make a stink if Jenny had been treated unfairly," says Grunbaum. Marina Ratner, one of the two tenured women at Berkeley, calls Harrison's campaign a "disgrace" and says it hurts Ratner's reputation and the reputation of other deserving women. "I agree that there is a lot of sexism at this university and in math in general, but not in Harrison's case," Ratner said. She thinks many of her colleagues are afraid to criticize Harrison for fear of "being accused of sexism."

As for the glowing words others offer about Harrison, Rieffel argues that "there is a tendency for people to have a higher opinion of younger people working in their own [subdiscipline] as opposed to younger people working in other [subdisciplines]." Rieffel also believes mathematicians distant from Berkeley don't realize how much the department's standards have risen in the last three decades. They would be "likely to say that someone meets 'Berkeley standards' when in fact this may not be the case, since it is the older standards they may be applying," says Rieffel.

But others—including two assistants to the university chancellor charged with monitoring discrimination in tenure cases—think Harrison was treated unfairly. English professor

Frances Ferguson recommended that an expert in Harrison's field from another campus be appointed to the review process—but that step was never taken. Forestry professor Sally Fairfax, who replaced Ferguson in 1986 as part of the normal rotation in the position of chancellor's assistant, cited sex discrimination and recommended that the chancellor overturn the departmental decision and grant Harrison tenure—but that too came to naught.

Inevitably, word of the decision spread into the international math community. Harrison's colleagues "ganged up on her and cheated on her," says Christopher Zeeman, one of the most influential mathematicians in England. Zeeman, who thinks Harrison is "clearly of Berkeley quality," says he has taken a particular interest in her case because he advised Harrison in the early part of her graduate work at Warwick. "The unfairness of the assessment of Jenny Harrison at Berkeley is well known in the international community," Zeeman claims.

Somewhere between the extreme positions is Stephen Smale, a mathematician at Berkeley and a winner of the Fields prize (math's equivalent of the Nobel prize). Smale thinks Harrison was a "borderline" candidate for tenure. Although he says her case was "not very strong," he thinks she was better than at least one man who was tenured and that her relative merits with others were "arguable." Smale adds that he isn't sure whether improper procedures occurred in the tenure decision, but "the fact that she is a woman brings out all sorts of emotions and partisanships. Weaknesses get magnified—that's where sexism plays a role. Other people support her because she is a woman."

Sorting out this tangle of opinion and fact could soon be the job of a jury. In the meantime, Harrison, who is $50,000 in debt from legal fees, faces the choice given her by Grunbaum: Reapply to the Berkeley math department for a tenured position (Grunbaum says her third "major result" may change the minds of some faculty about whether Harrison deserves tenure) or spurn the offer and play hardball in the courts. She says other schools have expressed an interest in hiring her, but she's not ready for that option: "If I felt I was the only one harmed, I might consider leaving, but I saw a pattern involving other women. I feel morally obliged to do something. I'm not walking away from this thing until it's settled."

Eventually Harrison's case will be settled. By itself, of course, it won't resolve the problems faced by women in academic mathematics. But the lessons of the case will be instructive for more than one department of mathematics. And if Harrison does accept Grunbaum's offer and wins tenure the second time around, her struggle will have raised the total number of women tenured in the top ten mathematics departments by 25 percent: from four to five. ■ PAUL SELVIN

Paul Selvin is a postdoc in biophysics at Lawrence Berkeley Laboratory.

Funding Cutoff Threatens Thai Science

Hong Kong—On 23 February, when the attention of the world was firmly fixed on the Persian Gulf, a bloodless coup d'etat in Thailand brought down the government of Prime Minister Chatichai Choonhavan. The little-noticed coup, carried out by commander of the armed forces General Sundhara Kongsompong ostensibly to stamp out government corruption, drew an immediate condemnation from the United States, followed by suspension of economic aid to its longtime Asian ally. The cutoff—which is mandated by U.S. law when a democratically elected government is overthrown—has wreaked havoc with bilateral scientific programs worth some $3 million in funds from the U.S. Agency for International Development (USAID) this year, to the dismay of both U.S. and Thai scientists.

Typical of the damage caused by the suspension of aid is the disruption suffered by a 5-year joint venture involving the University of Rhode Island (URI) and the Prince of Songkla University (PSU) in Hat Yai, in southern Thailand. The aim of the project was to establish a Coastal Resources Institute, known as CORIN, that would offer a master's degree program to train a cadre of coastal zone managers, initially for Thailand and eventually for all of Southeast Asia.

"After 3 years of hard work in setting up what has widely been viewed as a model for a university-based center of excellence in coastal resources management, the United States will lose its initiative and influence," complains a frustrated Stephen Olsen, the director of URI's Coastal Resources Management Project. Industrial development, tourism, and aquaculture are booming in Thailand, notes Olsen, and expertise in coastal resources management is desperately needed. Already, he says, unplanned industrial growth has spoiled some coastal resorts, such as Pattaya.

The cutoff has tested the traditional patience of the Thais. The U.S.-educated president of the Prince of Songkla University, Phasook Kullavanij, is bitter: "The aid programs are important because they encourage the Thai government to support more research in our country," he says. "Due to the suspension of U.S. aid, many of PSU's R&D programs have had to be stopped or scaled down drastically." The result is that after months of planning and convincing Thai scientists to join the CORIN project, there is no money to pay salaries. Says CORIN director Somsak Boromthanarat, "CORIN staff have lost their morale and are looking for other jobs."

The cutoff has also cost the URI group, which runs programs in several countries, 15% of its total budget and threatened the jobs of at least nine U.S. scientists working on the CORIN project. Moreover, URI officials have had the sad duty of informing five Thai PhD students who had just been admitted to U.S. universities following a grueling application process that they could not come unless they can find their own money. Other Thai students have been cut loose by other U.S.-funded programs. In all, USAID estimates that 30 Thai students are in a similar bind. As a result, top-notch Thai students are now looking to Dutch, Australian, and Canadian scholarship programs for assistance.

Some Thai scientists are now saying that dealing with USAID is too much trouble. They point out that the United States is the only nation that suspended economic aid following the coup—indeed, Japan announced that it would continue its close relations with Thailand, providing $614 million in economic aid in 1991. But the U.S. government's hands are tied: According to U.S. law, aid cannot be restored until there is a new election in Thailand. Thus, despite the lifting of martial law on 2 May, the lack of any overt civil discontent, and a pledge by the ruling military council to hold elections early next year, Washington has directed the USAID office in Bangkok to close down by 23 October. ■ GREGOR HODGSON

Gregor Hodgson is a biologist and free-lance writer based in Hong Kong.