PHILOSOPHY OF SCIENCE

Feminists Find Gender Everywhere In Science

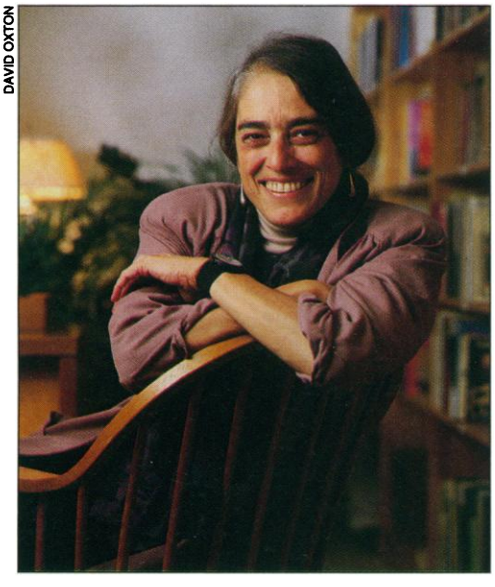
Ask a group of well-read scientists whether women do science differently than men, and one name will almost certainly come up in the discussion that follows: Evelyn Fox Keller. Keller, a physicist-turned-philosopher who is a professor of science, technology, and society at the Massachusetts Institute of Technology, is one of a number of philosophers of science who are examining the influence cultural assumptions—and specifically assumptions about gender—have on science. Keller is often credited with saying women approach science differently than men do, but she says that's a misconception. "That mistranslation is so insistent, I have really puzzled over it for years," she says.

The key to the mistranslation lies in the fact that sex and gender are different concepts that are frequently treated as if they were identical. Sex (being a man or a woman) distinguishes human individuals. Gender, in contrast, is a set of categories—assumptions, stereotypes, if you will—embodied in the social messages that fly around us throughout our lives. Among those assumptions, say Keller and others in the field (many of whom were drawn into it by her 1985 book, *Reflections on Gender and Science*), is the characterization of science as a "masculine" activity. "I'm interested in the ideological equation of masculinity and science and how that equation has shaped the forms, the questions, and the goals of scientific research," says Keller.

"My aim is to restore science to the best science is capable of."

—Evelyn Fox Keller

The issue of whether women do science differently from men is difficult to resolve, says Keller—and most likely irrelevant, since it is impossible to separate the woman from the cultural messages she's bombarded with. First come messages telling her what it means to be "feminine": intuitive and relational in her thinking. Later come the conflicting messages telling her that to be a scientist, she must think objectively and linearly, traits our society labels "masculine."



DAVID OXTON

Keller traces this opposition between objectivity and subjectivity to the masculine ideals of 17th-century England, where much of modern science has its roots. Although that opposition usually narrows the perspectives scientists take, creative individuals can cast off narrowing assumptions. Keller's favorite example is Cold Spring Harbor geneticist Barbara McClintock, who won the Nobel Prize for her discovery of transposable elements in the DNA of corn.

Rather than remaining detached from her experimental subject, McClintock spoke in terms of "listening" to what the corn had to tell, even when she "heard" things that violated the prevailing dogma, which included the notion that DNA sequences stay put. "She didn't adopt a masculine ideal, nor did she adopt a purely feminine ideal," says Keller. "She made use of the full range of human capacity...and all her intuitive strengths, in the service of science." And she adds: "It doesn't matter that she was a woman. One could find men in that tradition as well."

Keller has been joined by a growing number of other feminist scholars, some of whom concern themselves with specific "gender assumptions," which they argue affect the shape of research projects and their conclusions. One example that comes up repeatedly in such discussions is a decades-long emphasis by the National Institutes of Health (NIH) on clinical trials that include only men—something NIH Director Bernadine Healy has made an effort to address.

Primatology is frequently cited as a field in which the gender of the researcher has had a significant influence on research results (see story on page 428). But many of the examples cited by feminist scholars come from the history of biology, which, they say, is often molded to fit gender-based scenarios. In the field of reproductive biology, for example, several feminist philosophers have pointed out that the view of the egg as passive and the sperm as active nicely fit social stereotypes of men and women. As a result, they say, the egg's active role in fertilization went unexplored for decades.

Londa Schiebinger of Pennsylvania State University links Linnaeus' naming of the class *Mammalia* to the fact that wet-nursing was a hot social issue at the time: Linnaeus and others were trying to convince women that nursing their own babies was the "natural" thing to do, says Schiebinger, and a name that focused on the mammary glands of animals gave that cause a boost.

The conclusion that feminist scholars draw from these—and many other—examples is that "science is totally inside culture," says Sandra Harding of the University of Delaware. "All kinds of social meanings are used to constitute the very ways in which science goes about its projects." And that means that "there is no such thing as value-free science," adds Anita Solow, a mathematician who teaches a course on gender and science at Grinnell College in Iowa. "If you look at science in the past, not just bad science...but even the good stuff that works beautifully, it is a creation of the culture and context" in which it was created.

Although conceding that scientists are influenced by their culture, other philosophers and working scientists believe the feminist philosophers overrate the subjective element in science. Margarita Levin, a philosopher of science at Yeshiva University in New York, admits cultural context influences scientific perspective, because "we are human beings, not robots." But she argues that the self-correcting nature of science assures that the truth eventually will out. "If you have a hypothesis, it will probably be influenced by the time in which you live, or by the paradigms under which you are operating," she says, "but nature has a way of smacking you in the face with the reality, the truth of what is really going on."

It's not so easy to get a reaction to the feminist philosophers from working scientists, because few are familiar with the feminist arguments. The feminists attribute that to a knee-jerk defensiveness they say

Gaining Standing—by Standing Out

"If you want to participate in a profession at the highest level, you have to be good and put your uniqueness to an advantage. There are few black women in physics, so people remember Shirley Jackson." The speaker should know, because she *is* Shirley Jackson, professor of physics at Rutgers University. The audience: a group of young women at a meeting last November at Trinity College in Washington, D.C., where the focus was on how women can succeed in science.

Throughout her career, Jackson had little choice about standing out. In 1964 she was one of 45 women and a handful of blacks in the 900-member freshman class of the Massachusetts Institute of Technology (MIT). But rather than being inhibited, Jackson learned to exploit her visibility, for herself and, later, as she rose through the ranks, for other female and black scientists. "I believe in public service," Jackson says now. "If you do a good job, you can both advance your own situation and accomplish something for people who have been typically left out."

Not that it's been smooth sailing. When Jackson arrived at MIT from Roosevelt High School in Washington, D.C., where she had been valedictorian, she was unprepared for the loneliness. "The irony is that the white girls weren't particularly working with me either." The white women refused to sit at the same table with Jackson in the cafeteria and made it plain they didn't want her in their study groups. "I had to work alone," recalls Jackson. "I went through a down period, but at some level you have to decide you will persist in what you're doing and that you won't let people beat you down."

Despite the social isolation, Jackson thrived academically and worked in a materials science lab where she had "a very good time." By the time she had graduated, she'd learned to survive at MIT so well that she was offered fellowship support to stay on and earn a Ph.D. in physics, which she did, with an emphasis on high-energy particle physics theory. In what would become her trademark combination of self-help and help for others, she made time to lobby the university to admit more minorities. From MIT she pushed on to Fermilab in Illinois and CERN in Geneva for postdocs, where she got used to being one of the few women and the only black person at meetings. In situations like that, "if you give a physics paper, it had better be good—because people will remember."

When Jackson gave a paper, it usually was good. She did well in the arcane world of particle physics, but the pleasure she had experienced in the materials science lab at MIT stayed with her. When she was offered a job as a condensed matter theorist at AT&T Bell Laboratories, in 1976, she accepted. At Bell Labs she combined her interests, bringing the perspective of a theoretical particle physicist to the study of gases, films, and semiconductors.

The courage of the outsider has been a great asset to Jackson. Yet while an independent style enabled her to survive alone in the MIT cafeteria, it had drawbacks in the collaborative world of research. "I was still pretty much of a loner. I tended to do my own thing, and that's not always the best way to do things in science. That's why when women are isolated—or blacks or any minority— it can be very destructive."

In recent years, Jackson has worked to change to a collaborative mode. Last year she moved to Rutgers, in part so she could share her ideas with students. "I wanted to have graduate students, to build my own research groups." She's been invited to join influential committees in her field, as well as the National Academy of Sciences Committee on Women in Science and Engineering. One membership gives her particular satisfaction: Last June, after 15 years as a term member, she was elected a life member of the MIT Corp. (the board of trustees), thereby becoming a permanent insider at an institution where she once was as far as anyone could be from the inner circle.

–Ann Gibbons

SHARON GUYNUP

Outside in. Physicist Shirley Jackson, once shunned in the MIT cafeteria, is now an MIT board member.

scientists exhibit when they feel their objectivity is being questioned. "Saying there is no such thing as value-free science is a very threatening statement to scientists," argues Solow. But even those scientists who do understand the feminist arguments often remain skeptical. Analysis of cultural context is a waste of time, says one physicist familiar with the feminist literature, who requested anonymity. "Newton's laws work," he says, "and that's the only thing I need to know about Newton."

But that physicist, and those like him who interpret the feminist critique as "science-bashing," is missing the point, says biologist and feminist scholar Anne Fausto-Sterling of Brown University. "All of us who are working in this area have moved beyond the kind of critique that says wrong science is being done." The point, she says, is that science can be improved by the recognition that cultural context does influence one's perspective. "It ought to be part of the scientific method," adds Elizabeth Potter, director of women's studies at Mills College in Oakland, California, "to look for social assumptions."

If such views were more broadly recognized, how would they change science? One change advocated by many feminists is an increase in diversity among scientists, since people with different cultural experiences may bring different perspectives to their work. Another approach is advocated by Keller, who believes that, rather than bringing diversity to science from outside, researchers ought to release a diversity of perspectives from within—by freeing themselves from confining assumptions. "My aim," she says, "is to restore to science the best that science is capable of. That doesn't mean through women, it means to create a context in which everyone can make use of the full range of human potential." But the first, and most challenging, step toward such goals is for the feminist philosophers of science to get mainstream scientists to listen to their provocative premises.

–Marcia Barinaga