ARE PROGRAMS FOR WOMEN IN SCIENCE UNFAIR TO MEN?

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In several countries where we have worked on programs of the Kovalevskaia Fund, we have encountered the question: Aren't special programs for women in science unfair to men? Occasionally this question has been asked of us directly (in Colombia, for example), but more often it is our colleagues and collaborators who confront this and similar questions when we are not there, and we later learn about it indirectly. My purpose in this article is to respond to the claim that the projects of the Kovalevskaia Fund and other feminist organizations are in some sense anti-men.

In most countries of the world one no longer finds the extreme forms of discrimination that were almost universal in Sofia Kovalevskaia's time. Outright bans on women in scientific positions are very rare in the 21st century. But this fact should not cause us to be blind to the forms of discrimination against girls and women that exist in our day.

I'd like to give a list of some of the obstacles that women typically encounter on the road to a successful career in math, science, and technology. This list is far from complete.

1. *Unequal treatment in grade school.* **In primary and secondary schools, many teachers give more encouragement to boys than to girls, and have higher expectations of them. It should be noted, however, that this greatly depends on the particular school and teacher. Many teachers do not discriminate, and some even prefer their female students, because they find them better behaved and more studious than the males. In some parts of the world girls' average performance in high school mathematics is better than boys', although in other places girls who do well in high school mathematics are considered oddities.**

So the status of girls in grade school math and science classes is quite variable.

2. *Unequal chances at university entrance exams.* **In some countries (mainly in Asia) a scientific or technical career depends upon being admitted to a good university, and this, in turn, depends on getting a high score in the university entrance examinations, especially in mathematics. These exams are very difficult, and high school courses alone are not sufficient preparation. Rather, students must take special coaching courses that prepare them for the types of questions that are asked on the exams. These courses are expensive, and parents of limited resources will often pay for their sons but not their daughters to take these extra lessons. In such cases university admissions are heavily biased toward boys — even if the girls' performance in high school is on average actually better than the boys'.**

3. *End-runs around the entrance exams.* **In a few of the countries that have difficult university entrance exams, there are various ways that parents who are willing to spend enough money can circumvent that obstacle. In Vietnam under a recent change in policy, students whose entrance exam scores fall a little below the cut-off are permitted to enroll if they pay higher tuition. In China and India, many thousands of affluent parents are now sending their children to American universities, where admission is almost automatic to anyone who can pay full cost. In both cases, more boys than girls are benefiting from these high-cost alternatives.**

4. *Social pressures.* **In many parts of the world young women are under strong social pressures not to pursue a scientific or technical career. For example, they are told that a man won't want to marry a woman who has a more advanced education than he does. They are warned that personal happiness**

(in the conventional sense of marriage and motherhood) is possible only if they abandon their intellectual ambitions.

5. *Sexual harassment.* **Sexual harassment is rampant on college campuses in many countries, and little or nothing is being done to stop it. Female students who reject the advances of sexual predators on the faculty often suffer reprisals, and the whole experience is disillusioning and demoralizing to them. Many years ago women students in Nicaragua mounted a successful campaign to get a math professor fired for repeated sexual harassment. But such victories are rare.**

6. *Nerd-geek subcultures.* **When most of the committed math/science/engineering students in a particular high school or college are male, they often form a tightly-knit subculture that is unattractive to girls. They adopt behavior patterns that reflect stereotypes about "nerds" and "geeks," and they make female students feel unwelcome and uncomfortable. This seems to be particularly true of groups of youngsters who study together in preparation for the regional and international Mathematical Olympiads. This is undoubtedly one of the main reasons why so few girls have participated in the IMO's.**

7. *Social pressures not to be assertive.* **Girls are often inculcated with the notion that it is unfeminine to be assertive, and that a woman who aggressively fights for her own interests is a "bitch." Modesty and even self-deprecation are regarded as more lady-like. Such notions stand in the way of success in scientific and technical areas, where researchers often have to compete for recognition and funding, and where male colleagues rarely exhibit much modesty or self-deprecation.**

8. *Excessive childcare and eldercare responsibilities.* **Almost everywhere, women are**

far more likely than men to be saddled with responsibility for children (including problem children and sick or disabled children) and frail parents. This hits them especially hard in their formative and most productive years. Women in their 30's and 40's are often in what is sometimes called the "sandwich generation" — with heavy burdens connected with both their children and their parents.

9. *Age limits that discriminate.* **Some programs for support of young scientists impose strict age limits, and this effectively discriminates against women, who are more likely to experience delays caused by childbirth, childcare, eldercare, and other family pressures. More generally, popular stereotypes that identify youth with greater promise can also work against women, who tend to receive their Ph.D.'s at a later age.**

10. *Bias toward foreign ties and titles.* **In many Third World countries, ties with Western countries — and especially a degree from an American university — have acquired far more prestige than is warranted. (I wrote about this in an article about internalized colonial thinking in the 2011** *Kovalevskaia Fund Newsletter*.**) Because of family and other social pressures, women often are unable to leave their homeland for extended periods of time. Even if they have a degree from an excellent Ph.D. program in their own country, they often cannot compete for a top job with a man who has a U.S. Ph.D. (even if it is from a very** *weak* **American graduate program).**

11. *Old boy network.* **Even in scientific fields, hiring is often determined not by objective criteria, but by networks of friends who do favors for one another. In most cases men are more likely to be integrated into these networks than women are — hence the term "old boy network."**

12. *Being eclipsed by male authors of joint papers.* **In most areas of science and engineering the vast majority of publications are multiply-authored. Even if a woman played an equal or greater role in the work, often it's the male authors who are assumed to be the principal ones, and they tend to be the ones invited to speak on the work.**

13. *Bias in student evaluations.* **This seems to be a problem mainly in the United States, where university administrations in recent years have been paying close attention to student opinion surveys when they evaluate instructors for tenure and promotion. However, many studies have shown that students tend to discriminate against women in their evaluations, especially in tough introductory courses (such as calculus). One study, for example, showed that if a woman wants to get ratings as high as a man's, she must spend a lot of extra time "nurturing" and catering to the students (whereas the man can be somewhat aloof from the students). Of course, this "mothering" role, if the woman chooses to play it, interferes tremendously with her research.**

14. *Onerous service responsibilities.* **This also seems to be most notable in American universities. Women often get saddled with the most time-consuming and draining jobs, such as advising large numbers of weak students, mentoring teaching assistants, and handling student complaints. Men, on the other hand, often grab the nice-sounding service responsibilities that require little time or work. (My own personal favorite was member of the Strategic Planning Committee of the University Honors Council, which ended up taking just one afternoon of my time, followed by a wine-and-cheese reception.)**

15. *Gender segregation in institutes vs. universities.* **In several countries where women are relatively well-represented on many of the science faculties of the**

public universities, they are nevertheless almost entirely excluded from the most prestigious and desirable scientific positions, which are at government and/or private research institutes.

I am sure that many readers of the *Kovalevskaia Fund Newsletter* could add several more items to this list, which is not intended to be an exhaustive enumeration of all the hurdles that women face.

Despite this long list of forms of discrimination against women, in our travels we have found that there is widespread worry that the modest programs that have been established for women are "unfair to men," because they are not eligible for them.

For example, in the 2008 *Newsletter* I reported that we had encountered this sentiment in Colombia when we presented a Kovalevskaia Fund proposal to help fund girls who wanted to participate in training programs for the Mathematical Olympiads. Although the organizers of those Olympiad activities agreed to accept funding for that purpose, in fact nothing happened. During the three years since that program supposedly started, not a single dollar has been disbursed. We strongly suspect that the reason is a certain reluctance among the trainers to support any form of special effort to increase female participation in the Math Olympiads.

This attitude is hard to understand. As I wrote María Losada (who is a key organizer of Math Olympiad activities in Colombia) on 14 August 2007,

> **...in the long range, the math olympiads will be healthy, strong institutions only if they are seen to be in step with the rest of society. If the IMO's, for example, continue to be almost exclusively male — at a time when approximately 30% of North American math Ph.D.'s go to women — then it will appear more and more like an outmoded**

> **institution that is not representative of the world of mathematics and science. So it should be a vital interest of everyone who believes in the value of the IMO's to do whatever they can to get a more reasonable gender balance....**

Many people in different parts of the world understand that the continued under-representation of women in the sciences not only is wrong from the standpoint of women, but is also detrimental to the future technological and economic development of their country. A nation cannot reach its full potential if it is failing to utilize the intellectual resources of half of its population.

In the United States, the National Security Agency has for many years given financial support to efforts to increase women's participation in the mathematical sciences — much of it through the Agency's collaboration with the Association for Women in Mathematics. Part of the reason for the NSA's interest in this question is that their regulations forbid them from hiring non-U.S. citizens. If there are not enough highly-trained Americans, they do not have the luxury that private companies have of bringing in large numbers of brilliant immigrants from China, India, and elsewhere. Thus, it is in the NSA's direct interest to increase the number of Americans from under-represented groups (such as women) who enter the quantitative sciences.

In addition, the NSA has a broader motive in wanting more women to enter the mathematical sciences. The Agency believes that American leadership in both military and civilian technology depends upon producing a new generation of top researchers. A major component in this endeavor is to encourage more American young women to study math and science and choose careers in technical areas. In other words, they see the issue in national security terms.

It is interesting that one country where we have encountered no opposition at all to special programs for women is Cuba. This may seem surprising to people who know that *machismo* is a continuing problem in Cuba, and that Cuba has a long way to go to achieve full gender equality. However, to the best of our knowledge no one has objected to the collaboration between the Cuban Academy of Sciences and the Kovalevskaia Fund in granting prizes to women scientists. It seems that the Cuban scientists have reached a consensus that more female participation in science and technology is of strategic importance for the future of their country. Thus, they see such projects not as anti-men, but as pro-Cuba.

There is not much that the U.S. government's National Security Agency and the leaders of Cuba agree upon. But one point of view that they *do* have in common is that they both have a clear understanding that increased participation of women in the sciences is vitally important for their country's future.