

SOME REMARKS AT THE PRIZE
CEREMONY IN CUBA

(excerpts)

Neal Koblitz

...

We have a new situation now with the admission by the U.S. government, after more than half a century, that the embargo and its other hostile acts failed in their objective of defeating the Cuban Revolution. This formal admission by the President of the United States was dramatic and historic, and it opened the door to a normalization of relations between the two countries. I want to comment on this situation from the perspective of the Kovalevskaja Fund.

...

One of the basic principles of the Kovalevskaja Fund is that any country that wants to realize its scientific and technological potential must encourage and support women's participation in the sciences. Moreover, with the growth of globalization and consumerism world-wide, it often happens that women are more inclined than men to choose a career in the sciences.

For example, in the 1980s and 1990s Mexico was carrying out a process of privatization, with increased support for the private sector and reduction of support for the public sector. In 1991 Ann took part in a seminar commemorating 100 years since Kovalevskaja's death that was organized by the late Mary Glazman and other Mexican women mathematicians. The Mexicans explained to Ann that many men had abandoned careers in scientific research in order to find more lucrative work in the private sector. As a result, discrimination against women was decreasing in the public universities and institutes, and women's participation in scientific research was on the increase. As Ann put it, good things happened for a bad reason.

In Vietnam as well, there was a big increase in the private sector in the 1990s. After the normalization of relations with the United States in 1994 and the complete incorporation of Vietnam into the global economy, many companies opened branches in Vietnam in order to take advantage of the relatively cheap labor and the Vietnamese market. One result was a great distortion in the economic incentives: a routine job in one of the local corporate bureaucracies paid better than a full professorship at a university or a senior research position at a government institute.

Vietnam also experienced a cultural invasion — consumerism imported from the U.S., Japan,

and South Korea — that affected young people greatly.

It should be noted that Vietnam, like China, has an ancient tradition of veneration for the scholarly professions, and that this tradition survived the two long anti-colonial wars against France and the United States. Taking into account the country's extreme poverty after those wars, Vietnam was able to maintain a rather high educational and scientific level. For example, during the 1980s the future mathematician Ngô Bảo Châu won gold medals two years in a row at the International Mathematical Olympiad. He became a famous mathematician, in 2010 winning a Fields Medal (which in mathematics is the equivalent of a Nobel Prize).

However, my Vietnamese colleagues are very worried by a trend during the last two decades: most of the youngsters who participate (and do very well) in the math olympiads (almost all of whom are boys) later abandon their mathematical studies in order to prepare themselves for a career in finance and industry, so as to earn a good salary in the corporate bureaucracies. Vietnamese mathematicians are not confident that the next generation can produce a second Ngô Bảo Châu who might win the Fields Medal in the 2030s or 2040s.

I also have doubts about whether Vietnam will produce a second Ngô Bảo Châu. But perhaps it will produce a second Maryam Mirzakhani (the Iranian woman who won a Fields Medal last year; she was actually the first woman to do so). In order for this to happen Vietnam must stimulate much more participation by girls and women in mathematical and scientific activities, including the International Mathematical Olympiads and the International Mathematical Contest in Modeling. This will be the main topic of discussion during my next visit to Vietnam on behalf of the Kovalevskaja Fund in September.

In a patriarchal society that is being heavily influenced by the ideology of consumerism, the socialization of boys conveys the message that the measure of success in their life is going to be their salary and their material possessions. Meanwhile the socialization of girls is a little different and in some sense subtler — they can have a good life without necessarily earning a big salary.

This socialization of girls has some very negative consequences; for example, many women feel pressured not to combat discrimination in employment and lower pay for comparable work, and to accept the notion that female-dominated professions should pay worse than male-dominated ones.

On the other hand, on occasion the same socialization can have positive consequences, as occurred in Mexico when women started to occupy important positions in the public universities and research institutes and were not tempted by the salaries in the private sector.

I don't want to exaggerate the gender difference. There are obviously many people of both sexes who believe that a happy life is not the same thing as having a lot of money and a big house. And many women as well as men fall into the trap of consumerism. However, I'd like to suggest that in many situations women are typically better able than men to resist the false values of the capitalist economy. When we ask "Who among the young will defend the achievements of the Cuban Revolution, in the sense of dedicating their professional life to the advancement of health, education, and science?" — in the future the answer might well be "mainly the women."

Thank you.

ABSTRACTS OF CUBAN PRIZEWINNERS' WORK

Dr. Karina García:

Our work illustrates how mathematics can be applied to model biological processes, in particular, problems in immunology. We developed a model based on nonlinear differential equations that describes the interaction of T-cells from the immune system with chemical cancer treatments that are designed to induce an anti-tumor immunological response. We were able to give an explanation of the paradoxical phenomenon that a certain clinical tumor treatment (called IL-2) with molecules that are involved in T-cell growth is not very effective in inducing an immunological response. We were also able to prescribe modifications in this tumor treatment that are likely to significantly increase its effectiveness. This led to a new treatment that has met with success in animal experiments and is currently starting its Phase I clinical tests. This work shows the practical utility that theoretical mathematics can have in other branches of science, such as medicine.

Dr. Elizabeth Rodríguez:

Our work concerns the propagation of photons (radiation) in a dense, hot, magnetized medium. The first application is to exotic phenomena on a cosmological scale, for example, in the so-called magnetars (a type of neutron star) and, conjecturally, during the earliest minutes of the universe.

The second application is on a much smaller scale, where we've been able to adapt our techniques to study photon propagation in two-dimensional grafene, which is used to study the Quantum Hall Effect and the Quantum Faraday Effect. Grafene, which was first obtained experimentally in 2004, is expected to have many applications. In particular, the "relativistic" nature of graphene makes it possible to design inexpensive experiments to test physical theories without the need for particle accelerators.

Dr. Margarita Suárez:

Fullerenes are the third most stable form of carbon after diamond and graphite. Chemists like them because of their beautiful structure and their versatility that leads to new allotopes. In our work we develop new methods for obtaining chiral fullerenes. This is an important step toward obtaining the nanostructures of chiral carbon that are needed in different branches of science such as medicine and organic molecular electronics. We have also been able to generate hybrid steroid-fullerene molecules, in which the steroid has the effect of increasing solubility and thereby facilitating biological studies of these allotopes.