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## “Mathematicians cannot stamp out papers like bricks”

### Wolf Prize laureates speak about their life in the USSR

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*Translated with help from DeepL and Rachel McEnroe*

**Alexander Alexandrovich, Vladimir Gershonovich, let me congratulate you on being awarded the prestigious Wolf Prize in Mathematics. Both of you received your mathematical education at the Moscow State University Mehmath Department. Tell us about those years and how you decided to go to the West.**

**VD:** I was born in Kharkov, attended the 27th Physics and Mathematics School there, entered Moscow State University in 1969, graduated in 1974. I studied in the graduate school there until 1977.

Before perestroika I had neither desire nor opportunity to leave the country. In 1990 I was already working in Kharkov (Physical and Technical Institute of Low Temperatures of the National Academy of Sciences of Ukraine), then had an opportunity to get a job in the West, but refused. In 1998, I received several job offers from American universities, and my wife and I decided that we should accept one of them. We were living in Ukraine, where the economy was going downhill (for example, people were getting their paycheck advances six months late). Our

son was about nine years old, and we wondered what kind of world he would live in when he grew up. It was clear that it was a world of savage capitalism. We decided to move to a country of more civilized capitalism. This was not easy, as I had elderly parents; I could not leave without them. The University of Chicago proved able to employ my mom, and so provide her with health insurance.

I would like to add that for all my pessimism, it could never have occurred to me that Russia and Ukraine would be in conflict. The scary thing is that it has happened.

**AB:** I am a Muscovite; I attended the 2nd Mathematics School. I failed the entrance exams to Mekhmat and entered the Pedagogical Institute; then I transferred to Mekhmat and graduated in 1980. I worked at the Moscow Cardiac Center (thanks to Vladimir Mikhailovich Alexeev and Israel Moiseevich Gelfand) and then at the Landau Institute (thanks to Sasha Belavin). The first time I came to the USA was in 1988, and I began visiting MIT in the fall semester (October–November).

Since 1998, I have been at the University of Chicago, and we live most of the year in Chicago. The words “made the decision to go West” don’t do justice to how I feel: I just work in Chicago now, as I used to work in Chernogolovka.

Looking back, life in the days of my youth was remarkably free. Yes, you couldn’t travel abroad—so what? Good books (not math books—there was nothing wrong with math books) were not published much, and many were banned—but they all circulated, and people read much more than they do nowadays. The main thing is that almost no one took the official system and ideology seriously—today’s Americans or Israelis have a long way to go.

If working within the system didn't suit you, you could, say, build barns in the Baltics with your friends in the summer, and there was enough money for the whole year: to think and work on what you were interested in.

And also, from inside Russia, it was a remarkably peaceful time. Well, except for the nine-year war in Afghanistan, and that's a big "except". Now it's been 17 years of Afghanistan, and that's just a fraction of the senseless sprawling brutality that is usually not noticed.

**VD:** I fundamentally disagree with everything Sasha Beilinson said about the USSR. As far as I know, it is now popular opinion in Russia that things under socialism were wonderful; believe me, that is not true at all.

Everyone had their troubles. It was a sick system, life as in a looking-glass. And the best way to talk about the Brezhnev era is through the songs of Vysotsky.

**And was one of these troubles the notorious "fifth paragraph"?**

**VD:** Lenin taught that matter is an objective reality given to us in sensations. I would say: often in unpleasant sensations. For me—for other Jews—one of the unpleasant points of objective reality lay in the "fifth paragraph".

For other Soviet people, an unpleasant point was the lack of food and goods, when people traveled from Yaroslavl to Moscow for sausage. Vysotsky had a song, "Comrade Scientists...", about scientists being sent to harvest potatoes. I learned a little of this in Kharkov.

Working at the Institute of Low Temperatures, we had to work on the collective farm in the summer (in 1984, it had to be done for 40 days). It was hard for me for two reasons. Firstly, I am not

physically strong; and secondly, it was just annoying: I have my own schedule of math classes, when the secretary of the regional committee calls the institute and... I think the experimental scientists were no less exasperated than I was.

**AB:** The fact that in my time Jews were no longer accepted to Mekhmat was due to the uninteresting motives of the local mathematical authorities (Mekhmat Party Committee, etc.). But it was already possible to become a mathematician without studying at Mekhmat: Enter, say, the Pedinstitute or "Kerosinka", then go to Mekhmath for seminars that interested you. You only had to skip (and you could: no one really prevented you) all the meaningless ideological subjects, and then you had a lot of free time.

**VD:** Sasha was simply lucky: There were people who were able to ensure that he was able to pursue mathematics in one way or another after graduating from Moscow State University; it required a lot of effort on their part. I, too, ultimately survived thanks to the fact that I was hired at the Kharkov Institute of Low Temperatures in 1981. It was not easy: although V. A. Marchenko and other mathematicians from this institute wanted to take me, and the director of the institute B. I. Verkin was not against it, but it took a letter from N. N. Bogolyubov to the director to safeguard Verkin from the all-powerful regional committee of the CPSU (and to organize Bogolyubov's letter, it took the trouble of my scientific supervisor Y. I. Manin and other people).

I would like to add that for many years (about 1948–1987) anti-Semitism was an (unofficial) state policy, not an initiative of individuals. I. G. Petrovsky, the rector of Moscow State University, and many others resisted this policy (it required a lot of effort from them). On the other hand, there were influential mathematicians (e.g., the then director of the Steklov Institute) who

added their personal anti-Semitism to the state anti-Semitism.

**What advantages do you think the Soviet school of mathematics had?**

**VD:** This school of mathematics may be called Soviet, but it had nothing to do with the Soviet regime. It is mathematics that developed during the Soviet period of history.

**AB:** In fact, Moscow was probably the best place in the world to learn math back then. It is absolutely impossible to do math if you are not interested in it. And there were a lot of people who experienced math with joy, who went to the seminars. There was a big seminar by Gelfand, smaller ones by Manin, Arnold, Novikov... There was nothing like this anywhere else, except in Paris in the 60s. About three years ago I wrote a short text about Gelfand's seminar to elaborate a little further.

**VD:** Indeed, Moscow was a wonderful place to study mathematics. But there was a big gap between the level of mathematics in Moscow and that of most other cities of the USSR.

**An attempt to comprehend the various fields of mathematics to which you've devoted yourself would harm our readers' health. Tell us: In your opinion, which of them have become widely used in physics?**

**VD:** One of my papers (jointly with M. Atiyah, Y. I. Manin and N. Hitchin) was devoted to the so-called instantons. It was one of the first examples of doing something useful for theoretical physics in algebraic geometry that impressed physicists. Physicists are smart people; they can do math (not always by rigorous methods) much better than mathematicians, so it's hard to surprise them with anything. But after our work

they realized that they needed algebraic geometry, and after ten years, most physicists had learned it. People doing string theory now know algebraic geometry.

In the 1980s, I was involved with mathematical objects called quantum groups. These objects were invented under the influence of the theory of quantum integrable systems, which was started by physicists, then developed by mathematicians of the Leningrad school of Ludwig Dmitrievich Faddeev.

I tried to understand their work, which was not easy. Then I realized that the key role there is played by certain Hopf algebras, which one might call quantum groups. This approach helped to understand many earlier results and to obtain a number of new ones. Many people working in the field liked this approach and started using it. Quantum groups became commonplace among mathematical physicists.

**Tell me, how prestigious is the Wolf Prize for mathematicians? After all, there is also the Fields Medal for young scientists, and the Abel Prize...**

**VD:** I don't care about it; Sasha thinks even less about it. It's prestigious, but on the other hand, it's all a vanity of vanities. We each have much more important things in life (like the health of family members).

**Working in the USA, do you follow the situation in science in Russia and Ukraine?**

**VD:** If we talk about the area of mathematics we are engaged in (algebraic geometry), it is well represented in Moscow, and we know to some extent what is going on there.

In Ukraine, I think algebraic geometry is almost completely unrepresented. It is good to see that there are wonderful young

people doing math in Moscow (in particular, at the Moscow State University Mekhmat Department, the Mathematics Department of the Higher School of Economics, and the Steklov Institute of Mathematics). Of course, people lack money.

**AB:** That there is not enough money is a fact of their situation; another fact is that it's not about them. Four years ago I lectured at the annual summer school in Yaroslavl, and a lot of people came to the school, and from the provinces: It was awfully fun! There are wonderful students at Vyshka, many of whom go on to graduate school in the West, but many stay, and there are more and more of them.

**You must have followed the reform of the Russian Academy of Sciences, under which FANO was created to manage academic institutions. Now it is subordinated to the new Ministry of Science, but over the past four years, it has managed to highlight striking initiatives. At the beginning of the year, your mathematical colleagues at Steklov Institute of Mathematics were outraged when they were required to double their number of publications in exchange for a twofold increase in their salaries. What do you think of that?**

**VD:** Of course, mathematicians cannot stamp out papers like bricks, and that case speaks to the level of this FANO.

**AB:** I am not really aware of all the *peripeteias*, but it seems to me that this is a kind of Petrine reform of the Russian church, where FANO is an analog of the Holy Synod. Of course, everything depends on who will be appointed chief prosecutor of this FANO. But the old system was reasonable: It gave old scientists a meaningful job—to lead the

Academy—and young working guys freedom—without which it is impossible to work meaningfully—and protection from the *marasmus* coming from above.

The current system of grants and accompanying “reporting” is a feeding trough for an ever-expanding pseudo-scientific public, which has nothing to do with science, and for science itself, is outright murder.

**But on the other hand, mathematicians, however delicate they may be, the state wants to evaluate them somehow by paying them money. How does this happen in the United States?**

**VD:** Scientometrics is a very blunt instrument. Every math department in the universities of the US has its own traditions. And the better the university, the less mathematicians and administrators pay attention to formal indicators (number of publications, Hirsch index...).

For example, say our department decides to take some person. Even if there is no money, but we say that this is a very good mathematician, the money is found. In good private universities, the role of scientometrics is minimal. In public universities, the number of publications seems to play a more significant role.

The number of articles should, of course, be monitored, but the opinion of specialists is very important. A good administrator always understands who to ask for advice when hiring. And there are such people in the USA, Russia, and the<sup>1</sup> Ukraine.

In the USSR, all PhDs were equal, and most administrators cared about “crust” when hiring. In the US, it is not so; what university the PhD degree comes from is important, but even more important is the

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<sup>1</sup> Perhaps «на Украине» was not VD's choice of words, but rather, *Gazeta's*.

system of letters of recommendation. This system implies a certain moral level of both the recommenders and those who read these letters.

**What would you wish to Russian math students who want to stay in science?**

VD: Good luck.

AB: To do only what you are truly interested in. And not to take seriously most of the things that are taken so seriously—yourself, to start.

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