THE 100TH ANNIVERSARY OF BORIS GNEDENKO BIRTHDAY

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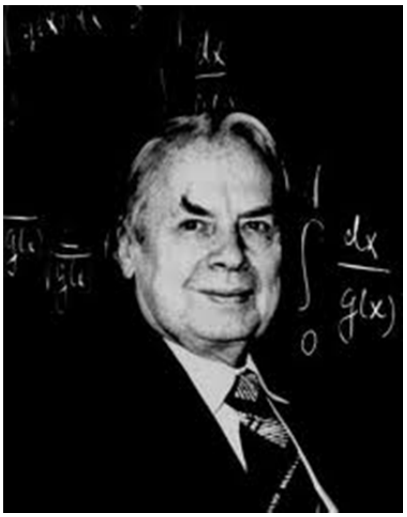
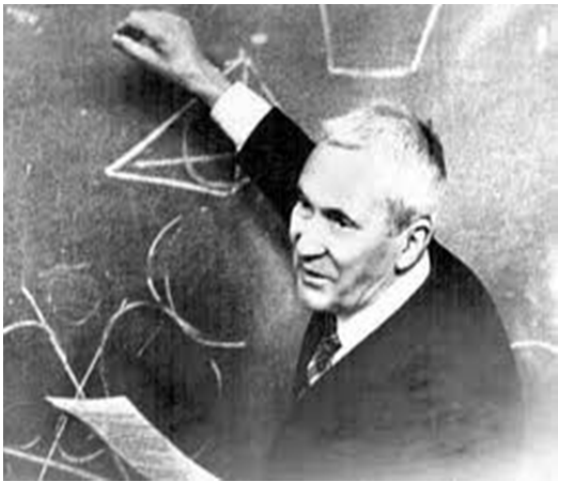


Academician of the Ukrainian Academy of Sciences Boris Vladimirovich Gnedenko by a common International opinion represents one of the most prominent mathematicians who are working in the area of Probability Theory. He combines an exceptionally delicate possession of classical mathematical methods with a deep understanding of a wide range of problems of the modern probability theory and with a permanent interest to practical applications.

A.N. Kolmogorov
"On Gnedenko's works on
the Probability Theory"
Probability Theory and Its Applications,
vol.VII, no.3, 1962.

Boris Vladimirovich Gnedenko was born on January 1st 1912 in Simbirsk, city located on the bank of the Great Russian river Volga. When Boris was only fifteen years old, he tried to enter the University of Saratov, a city on the Southern part of Volga river. However, he was turned down due to his young age. Boris was firm in his decision: he made a complaint and sent it to then Minister of Education Anatoly Lunachartsky. Soon he got a letter of permission that allowed him to enter university.



After graduation in 1930 Gnedenko taught at the Textile Institute in Ivanovo, a city, east of Moscow. In 1933 he published his first papers on the Queuing Theory concerning using machines in textile manufacture.

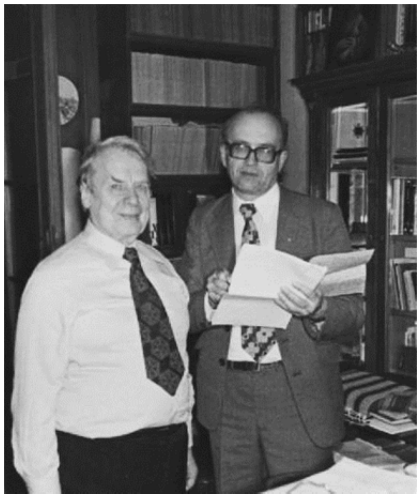
In 1934 Gnedenko undertook research at the Institute of Mathematics at Moscow State University. Gnedenko's supervisor was famous Russian mathematician Alexander Khinchin[1]. When in 1935 he left to spend two years at Saratov University, Andrei Kolmogorov[2] took supervision over Gnedenko's studies.

[1] **Alexander Yakovlevich Khinchin** (1894 –1959) was a Soviet mathematician and one of the most significant people in the Soviet school of probability theory.

[2] **Andrei Nikolayevich Kolmogorov** (1903 –1987) was a Russian mathematician, preeminent in the 20th century, who advanced various scientific fields, among them probability theory, topology, intuitionist logic, turbulence, classical mechanics and computational complexity.

Andrei Kolmogorov – probably, the greatest mathematician of the XX century – influenced most of all on Boris Gnedenko: he not only taught mathematics; he discussed with his pupil art, music, poetry. Such relations with the pupil led to their intimate friendship that continued entire life.

During the summer of 1937 Gnedenko went on a hiking expedition to the Caucasus along with some fellow researchers. There he met Andrei Kolmogorov and joined him to continue his vacation.



In 1937 Gnedenko presented his Candidate of Science[3] dissertation on the theory of infinitely divisible distributions. After the award of C.Sc. degree he was appointed as an assistant researcher at the Mathematics Institute of the Moscow State University.

In the beginning of November of 1937 Boris Gnedenko was drafted to the army and was sent to city of Bryansk located in the Western part of the Soviet Union. However, in few weeks he was arrested and put in local jail.

It happened that one of his companion of that Caucasus trip informed KGB (then NKVD) about "hostile Kolmogorov's attitude". KGB needed some "official confirmations", so they seized Gnedenko, who was the best Kolmogorov's friend, to get some "needed information" from him. Gnedenko was imprisoned with more than hundred other prisoners in a jail cell intended for six people. His interrogators demanded that he had to confirm that Andrei Kolmogorov was the ringleader of a group of "enemies of the people" centered in the Mathematics Department of the Moscow University. Daily interrogations during almost half a year period (sometimes several days in a row he was held under bright light of spotlight) did not broke Boris Gnedenko. Though he was promised to be released if he would "cooperate" with investigators and confirmed Kolmogorov's guilt, Boris Gnedenko refused to give such false evidence.

I had known about this in a very interesting way. In 1972 at the banquette following defense of Dr.Sc. degree by Alexander Dmitrievich Solovyev[4], Andrei Kolmogorov pronounced a toast for Boris Gnedenko who was an actual Solovyev's advisor. At the end Andrei Kolmogorov added: "However, first of all, I would like to drink this glass of wine for Boris as a Man!" Such toast, being rather unusual for Kolmogorov, made me curious. I came to the place where Kolmogorov sat, found a free place and asked him what he meant by the conclusion of his toast. He answered: "You know, Igor Alexeevich, Boris saved a life of one man…" I knew Andrei Kolmogorov in person; we met occasionally frequently enough, so I understood that he would say nothing more.

Some days later I came to Boris Gnedenko home. We had a lot of various work together: I was his deputy in journal "Reliability and Quality Control" (now Methods of Quality Management"), his deputy in Moscow Reliability Consulting Center on Reliability and some other activities. So, I visited Boris Gnedenko sometimes twice in a week. (Here, by the way, I frequently met Andrei Kolmogorov who lived in the same building). At that particular day, Boris Gnedenko stayed too long at his Department, and I had a chance to talk a bit with his wife.

She told me the story about her husband detention, and explained that "if Boris would be broken by KGB, Andrej would be severe punished". (Soviet regime used to "enemies of the people" only

[3] Candidate of Science (C.Sc.) is the first postgraduate scientific degree in Russia and the former Soviet Union. The second (and highest) postgraduate is Doctor of Science (Dr.Sc.). Difference in these degrees reminds the difference between Associate Professor and Full Professor. For information: in the former Soviet Union there were under hundred thousand C.Sc.'s, and under ten thousand Dr.Sc.'s.

[4] **Alexander Dmitrievch Solovyev** (1927-2001) was a prominent Russian mathematician, one of the founders of the Soviet School of Reliability.

"the highest level of punishment", i.e. death penalty.) She asked me not to tell about this anybody and motivated it: "Neither Boris, nor Andrei like to remember tha t time…"

I kept this secret (even from Boris Gnedenko himself) until he told this story during his interview to journal "Statistical Sciences" in 1991 (I was a translator for him).

Now let us return to the following events.

Without warning Boris Gnedenko was released after six months of imprisonment. After a real battle with Soviet bureaucracy, Andrei Kolmogorov and Alexander Khinchin reinstated Gnedenko to his post of Assistant Professor in 1938. He retained a "black mark" on his record indicating that he was not to be trusted. Because of his "disloyalty", he was not allowed to join the Soviet army in 1941 when the German forces attacked.

At the beginning of June 1941 he defended his Doctor of Science dissertation that consisted of two parts: Theory of Summation of Independent Random Variables and Theory of Maximum Term of a Variation Series.

In 1945, on the recommendation of Kolmogorov, Gnedenko was elected to the Ukrainian Academy of Sciences. He became professor at Lvov University. In 1949 Gnedenko moved to the Kiev University and later in 1955 he was appointed as Head of the Physics, Mathematics and Chemistry Section of the Ukrainian Academy of Sciences and he became Director of the Kiev Institute of Mathematics.

He also initiated works in area of computer programming and was the author of the first textbook on the subject published in the USSR.

Here he raised a group of talented pupils: Bronius Grigelionis[5] Igor Kovalenko[6], Vladimir Korolyuk[7], Tadeush Marianovich[8], Vladimir Mikhalevich[9], Manfred Shneps-Shneppe[10] , Anatoly Skorokhod[11] Ekaterina Yustchenko[12] and others who represented Soviet School of Probability Theory and Statistics.

In 1960 Boris Gnedenko returned to the Moscow University, becoming Head of the Department of Probability Theory in 1966. He held this post for thirty years until his death.

Gnedenko wrote hundreds of papers and tens of books. His books were re-published in the Soviet Union, translated into different languages. In 1949 he published a work, jointly with Kolmogorov, *Limit Distributions for Sums of Independent Random Variables* which contains a description of much of his early research.

One of Gnedenko's most famous books is *Course in the Theory of Probability* which first appeared in 1950. Written in a clear and concise manner, the book was very successful in providing a first introduction to probability and statistics. It has gone through eight Russian editions and has been

[5] **Bronius Grigelionis** (born 1935) is a Lithuanian mathematician, academician of the Lithuanian Academy of Sciences.
[6] **Igor Nikolayevich Kovalenko** (born 1935) is a Ukrainian mathematician working in reliability and queuing theories; academician of the Ukrainian Academy of Sciences.
[7] **Vladimir Semenovich Korolyuk** (born 1925) is a Ukrainian mathematician who made significant contributions to probability theory and its applications, academician of the Ukrainian Academy of Sciences.
[8] **Tadeush Pavlovich Marianovich** (born 1938) is a Ukrainian mathematician, Deputy Director of Institute of Cybernetics, correspondent member of the Ukrainian Academy of Sciences.
[9] **Mikhalevich Vladimir Sergeevich** (1930 – 1994) was a Ukrainian mathematician, Deputy Director of Institute of Cybernetics, academician of the Ukrainian Academy of Sciences.
[10] **Shneps-Shneppe Manfred Alexandrovich** (born 1935) is a Latvian mathematician, now a Professor of the Moscow University.
[11] **Skorokhod Anatoly Vladimirovich** (1930—2011) was Ukrainian mathematician, academician of the Ukrainian Academy of Sciences.
[12] **Ekaterina Logvinovna Yustchenko** (1919-2001) was Ukrainian cybernetic, author of one of the first computer languages of high level, correspondent member of the Ukrainian Academy of Sciences.

translated into English, German, Polish and Arabic. In 1966, along with Igor Kovalenko, he published "*Introduction to Queuing Theory"*.

In his later work Gnedenko had been interested in probability theory applications to areas such as reliability and quality control. In 1965 he wrote an excellent text "*Mathematical methods of reliability"* in 1965 with Yuri Belyaev[13] and Alexander Solovyev. This book became "The Reliability Bible" in the Soviet Union and soon had been translated into many languages.

We should mention also about Gnedenko's interest in the history of mathematics. His "*Outline of the History of Mathematics in Russia" is* a fascinating book which looks at the history of mathematics in Russia. The work of many famous mathematicians is discussed in detail such as that of Nikolai Lobachevsky[14], Victor Bunyakovsky[15], Mikhail Ostrogradsky[16], Pafnuty Chebyshev[17], Andrei Markov[18], Alexander Lyapunov[19], and Sofia Kovalevskaya[20].

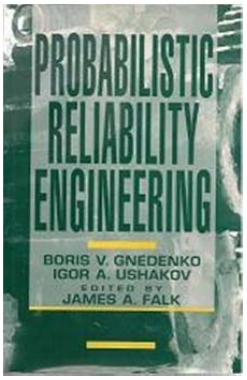
Boris Gnedenko was a brilliant lecturer. During our multiple mutual business trips, I was lucky to attend a number of his lectures for audience of various levels: from practical engineers to postgraduate students. He easily found a path to soul and brain of any audience.

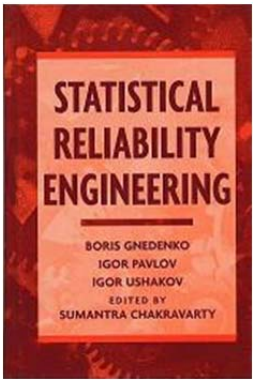
His seminar at Moscow State University attracted tens of applied mathematicians and practical engineers. Then Boris Gnedenko established the Reliability Consulting Center that served for reliability and quality practical engineers. Gnedenko's authority and personal charisma help to involve tens of high level professional for consulting and lecturing on voluntary basis. Consultations took place every day (and sometimes more than one a day); twice a month there was a lecturing day of 2 lectures. People came to these lectures from all parts of the Soviet Union: from Western boarders to Far East, from Kola Peninsula to Caucasus and Central Asia.

At the end of this note I would like to share with my own experience of relations with Boris Gnedenko. As I already wrote, I met him very often in informal situations. We met at several editorial boards or at scientific councils where both are members, however mostly I visited Boris Gnedenko at his home. Every time I was invited in the host's home office. Usually a soft classical music was heard… Any discussion began with showing me something new: new collection of poetry, new album with beautiful reproductions, new musical records… Our tastes in fine art coincide: we both loved French impressionists very much. I loved them very much, however Boris Vladimirovich in addition knew them very well! He taught me that knowledge of a history is a necessary condition for real understanding in any area of interests.

[13] **Yuri Konstantinovich Belyaev** (born 1932) is a Russian mathematician, one of founders of the Soviet School of Reliability Theory.
[14] **Nikolai Ivanovich Lobachevsky** (1792 –1856) was a Russian mathematician and geometer, renowned primarily for his pioneering works on hyperbolic geometry.
[15] **Viktor Yakovlevich Bunyakovsky** (1804–1889) was a Russian mathematician, member and later Vice president of the Petersburg Academy of Sciences.
[16] **Mikhail Vasilyevich Ostrogradsky** (1801 –1862) was a Russian and Ukrainian mathematician, mechanician and physicist. Ostrogradsky is considered to be a disciple of Leonhard Euler and one of the leading mathematicians of Imperial Russia.
[17] **Pafnuty Lvovich Chebyshev** (1821 –1894) was a Russian mathematician.
[18] **Andrei Andreievich Markov** (1856 – 1922) was a prominent Russian mathematician. He is best known for his work on theory of stochastic processes. A primary subject of his research later became known as Markov chains.
[19] **Alexander Mikhailovich Lyapunov** (1857 –1918) was a Russian mathematician, mechanician and physicist.
[20] **Sofia Vasilyevna Kovalevskaya** (1850 –1891), was the first major Russian female mathematician,

After my move to the United States, Boris Gnedenko twice visited me there. First time he visited me when I had an open heart surgery. He came with his son Dmitry just the day before my hospitalization. In few days we began long but slow walking tours in Arlington and Washington. We talked about everything except mathematics. (At that time we already completed our two books on probabilistic and statistical reliability engineering for John Wiley & Sons.)





When we discussed poetry, Boris Gnedenko told me that his beloved poet was Alexander Pushkin[21], and I responded that mine is Vladimir Mayakovsky[22]; and Pushkin does not touch my heart. Boris Gnedenko responded me in a very much his style: "Love to Pushkin comes with age…" (Pushkin indeed became closer to me though still is not my beloved… And I will be 80 very soon☹.) Another time when I told that doesn't know Mendelssohn's[23] music except his "Violin Concerto" and, of course, "Wedding March", he softly advised me: "You should listen him more…" And indeed, Mendelssohn became one of my most beloved composers!

Such was Boris Gnedenko: always soft and polite, however firm and principal in his opinion. He was very considerate to people around him, he was very tolerant to other opinions even if they contradicts his own. He was a very educated man in many areas in sciences, music and art, however he never showed his superiority.

Boris Gnedenko possessed an unusual sense of humor. He could find unexpected words in various situations. Once we walked through the famous Arlington Military Cemetery, and I remember how he pronounced with a soft and smile: "We are here at the meeting with our future…"

I understand that I have an exceptional luckiness that I met and had such a close relations with this Great Man.

San Diego, December 2011.

[21] **Alexander Sergeievich Pushkin** (1799 – 1837) was a Russian poet and writer who is considered by many to be the greatest Russian poet and the founder of modern Russian literature.
[22] **Vladimir Vladimirovich Mayakovsky** (1893 –1930) was a Russian and Soviet poet and, among the foremost representatives of early XX century Russian Futurism.
[23] **Felix Mendelssohn** (1809 – 1847) was a German composer, pianist and conductor.