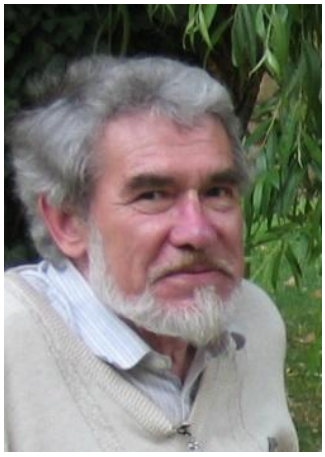
In MEMORY of VICTOR DOMANSKY



3.04.1944 — 4.09.2014

Victor Domansky, Leading Scientific Researcher at St.Petersburg Institute of Economics and Mathematics, died September 4, 2014. He is survived by his son, Anton, and grandsons, Boris and Vladislav. The news of his death saddened deeply numerous scholars, mathematicians and economists, working in the field of Game Theory in Russia, France, and Israel.

In April 2007 Victor had undergone a unique and highly successful cancer surgery that had given him seven years of a full and fulfilling life. In those years he was very active and productive in research, publishing in well-known Russian and international journals. He actively participated in conferences, gave talks at leading seminars in mathematical game theory, was in charge of several projects of the Russian Foundation for Basic Research.

Let us particularly mention the successes of his students of this last period Marina Sandomirskaia and Fedor Sandomirskiy. Both were awarded the Boris Ovsievich prize at St.Petersburg.

Victor Domansky was born 3 April 1944 in Leningrad, two months after the Siege of the city was over. He grew up in a well-educated family. The head of the family was his grandfather Boris Domansky, a highly reputable scientist, "one of the founders of automation and remote control" in the Soviet Union (see his Obituary (1974)). An excellent library and an impressive collection of paintings, etchings, engravings, and prints that filled professor's apartment in an aristocratic district of the city created a stimulating atmosphere which surrounded Victor since early childhood.

During school years he wanted to become an architect. He attended preparatory courses in architecture, and studied painting with Solomon Levin, the famous Leningrad teacher. The decision to apply to the department of mathematics at the Leningrad State University arrived shortly before the graduation from High School.

Victor's master thesis in Analitic Functions was completed in 1966; his adviser was Prof. Victor Havin. He received both his Ph.D (1974) and habilitation (2004) at the Steklov Institute of Mathematics at St.Petersburg.

In the first game-theoretic paper (Domansky (1971)) Victor applied his functional analysis skills to games. This paper was communicated to Doklady Mathematics by Prof. Yuri Linnik in 1971.

With the exception of the first two articles Victor's research is concentrated around dynamic games: stochastic games, stochastic models of resources allocation and repeated games with incomplete information.

His working style was characterized by a fantastic strategic intuition combined with a strong analytic background; he would start with an explicit solution of non-trivial concrete problems and then generalize the results. Due to this specific style the game-theoretic heritage of Victor is exceptional. For example, he explicitly described optimal strategies for a number of dynamic games and even for classes of such games. Being explicit solvable is a very rare phenomenon for dynamic games and there are only a few such examples in game theory. To find and to solve them is a big challenge and all such results are true pearls of game theory.

One of the main directions of Victor's research were stopping (or Dynkin) games. Starting from papers of Eugene Dynkin it had been always assumed that payoffs are such that optimality equations are fulfilled in pure strategies and that there is no payoff at infinity. Victor was the first who considered stopping games without these restricting assumptions (Domansky (1979)) and constructed optimal strategies for a wide class of games where players are forced to randomize their actions.

Another direction were repeated games with incomplete information that is one of the most sophisticated domain of modern mathematical game theory. Victor began his work in this area only in nineties and obtained outstanding results.

In their classical paper Jean-Francois Mertens and Shmuel Zamir (1976) constructed an example of an n-stage zero-sum repeated game with incomplete information with the value v_n growing like $\sqrt{n}$. But they did not solve this game explicitly. In the series of papers Victor Domansky and Victoria Kreps (1994, 1995, 1999) obtained an explicit solution for a class of repeated games containing this example. In particular, this explicit solution allowed them to find an alternative proof of the v_n's asymptotics. The classical proof of Mertens and Zamir is rather long and full of technical difficulties and provides no probabilistic explanation for the Gaussian distribution in the answer. Victor's proof based on strategic analysis and the central limit theorem gives an insight to probabilistic nature of the result.

One of the results from Domansky, Kreps (1994) describes all the games with two states and two actions such that v_n remains bounded as $n \to \infty$. Recently this result was extended by his student Fedor Sandomirskiy who described all such games without any restrictions on states and actions.

Note that in Domansky, Kreps (1999) for the first time the theory of optimal trans-

portation was applied to repeated games with incomplete information. Now the connection to transportation problems is one of the main tools in this area (see papers of Bernard De Meyer, Fabien Gensbittel and others).

In the last decade his most important results were about repeated games with incomplete information that describe financial market with asymmetrically informed agents. In Domansky (2007) he modified a continuous model of Bernard De Meyer (De Meyer, Saley (2002) by introducing the minimal currency unit. It turned out that such discretization is not only natural from the economic point of view but also leads to unexpected properties of optimal strategies. Victor constructed optimal strategies of both players in discrete model of infinite duration. The interesting feature presented only in the discrete situation is that the optimal strategy of the informed player prescribes him to reveal his private information in a finite number of stages and thereby forces him to loose his information advantage.

Victor Domansky initiated study of more general financial market models in collaboration with Victoria Kreps and Marina Sandomirskaia. For some generalizations new objects and instruments were required: for example, non-trivial geometric considerations, multidimensional random walks with absorption, and decomposition of multidimensional probability distributions in a convex combination of extreme points of a special form.

Some of auxiliary results obtained by Victor for game-theoretic needs are of independent interest in other fields of mathematics. These include investigations of the value of Kantorovich transportation problem in Domansky, Kreps (1998) and decomposition of multidimensional probability distributions in Domansky (2013).

Victor Domansky was interested not only in pure theoretical questions. In particular, his broad outlook allowed him to apply tools from probability to demographic problems.

Victor's wide spectrum of interests beyond the sphere of mathematics and his erudition in literature, painting, architecture were truly impressive.

Speaking about the extent of his erudition it would be fitting to emphasize its informality, such as Victor's partiality to old guides and maps, his interest in semiotic conferences in Tartu, his ability to recite great swaths of poetry from memory, Mandelstam, Zabolotsky's Columns (Stolbtsy).

Much less was known about Victor's selfless efforts to assist people who found themselves in a difficult situation because of their dissident activities or their desire to emigrate. Those whom he helped remember and are grateful.

Victoria Kreps, Fedor Sandomirskiy

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