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Ion IANCU[1]

IN MEMORY OF ION VĂDUVA

Professor Dr. Ion Văduva

Abstract. We will make a presentation of the life and activity of former University Professor Dr. Ion Văduva, from the Faculty of Mathematics and Computer Science of the University of Bucharest. I met the professor as supervisor of my doctoral thesis, as a participant in various scientific events (conferences, summer schools, etc.), as a collaborator in research contracts, and as an invitee to activities and events held at the University from Craiova. On November 17, 2017, our university awarded him the title of Doctor Honoris Causa. As the organizer of this event, I had long discussions regarding the biography and activity of the professor; additionally, he has provided me with materials in this regard. All this allowed me to prepare this article.

[1] Associate Prof. Univ. Dr. at Craiova University, Romania. E-mail: <i_iancu@yahoo.com>.

1. Childhood and adolescence

Our much-appreciated mentor, teacher and colleague, University Professor Ion Văduva, was born on November 25, 1936 in the village of Cârstănești, currently in Oteșani commune in Vâlcea county, having Constantin Văduva and Maria (born Țuru) as parents. He was the eldest of the family's five children (2 boys and 3 girls).

His mother was his first "teacher", in the sense that she taught him to read and write, from the age of 3-4. He finished primary school in his native village, taking first prize in each of the four years. Regarding that period, the teacher says "many times in autumn and spring I grazed the animals between 5-7.45, after which I went to school which was close to the house.

Both I and my brothers prepared the lessons in the evening by the light of the gas lamp (at that time the area was not electrified); many times we left with the animals to graze with a bag in which we took the necessary books and notebooks and all the things that needed to be learned for the day, we prepared them out together with the animals grazing (...) At primary school, in the winter, we had difficult conditions; when we came to school in the morning, each child brought dry wood for the fire, which we collected from the slough on the river bank, or even from damaged cane fences. There were 20 of us in the class (a room of about 15-16 square meters)." In the summer of 1944 (when the country was at war) he went with his grandmother to visit "uncle Luță" from Folești. Here he met the family of the Moldovan teacher Corduneanu, a refugee and hosted in the house of his former "internship" colleague from Tighina, together with their three children. Without having kept in touch with the Corduneanu family, at the "Alexander Miller" Symposium in Iasi, in 1968, there was an emotional reunion between the "venerable Prof. Constantin Corduneanu" and Nănel Văduva (his mother called the professor Nănel).

In 1947, after graduating from primary school, he went to the Secondary School in Horezu. For 3 years he lived with his maternal grandparents, in the village of Romanii de jos, walking 3 km every day to get to school. And in his grandfather's house he had a "private teacher; namely Mrs. Xenia Pancenco, a refugee from Bessarabia during the war and who never returned to the USSR. She was a pensioner and had been a University Professor of Chemistry at the University of Odessa. Because the student Văduva brought wood to her house in the evening, Mrs.

Pancenco helped them prepare the lessons for free: "From her I learned the first solid notions of algebra, geometry, physics, chemistry or French language, and after the Teacher Reform of 1948 from her I learned the Russian language well, which was very useful in my professional career."

After graduating from the Middle School in the fall of 1950, he took the exam and was admitted to the Boys' Theoretical High School in Râmnicu Vâlcea (today the "Alexandru Lahovary" National College). He proved to be a very good student, especially in Physics, Mathematics and Russian. In the 9th grade he was awarded with the 1st Prize in the regional phase (the last at that time) of the Russian Language. He had also qualified in mathematics, but as both competitions were held on the same day, he was "instructed" to go for Russian. Among this mathematics teachers was Lucian Mănescu, a distinguished name in the mathematical school from Vâlcea. After graduating from high school, in 1953, for financial reasons, he was unable to move to Bucharest for admission to college. For one year he worked in education: inspector for popular Russian language courses (in November) and substitute mathematics teacher at the village school (from January 1, 1954).

2. University studies

In August 1954, the entrance exam to the Faculty of Mathematics and Physics of the University of Bucharest took place, which consisted of written papers in Mathematics and Romanian Language and oral exams in Mathematics, Physics, Constitution of the Romanian People's Republic, Russian Language and School Psychology. Apart from the Romanian language, where he was graded 3, in the other exams he received a 5 (maximum at that time, when the Soviet grading system was used).

Most of the courses were taught by "exceptional teachers": Academician Grigore Moisil (in Algebra) and C.T. Ionescu-Tulcea (in Mathematical Analysis), in the first year. He was noticed by Professor Ionescu-Tulcea and Academician Gh. Vrânceanu, Head of the Geometry Department; the last one, attending a seminar lesson, had the joy of finding that the Văduva student solved a problem, not analytically, but with the help of polar coordinates, obtaining the solution much faster.

In the second year he had as teachers: Cabiria Andreian (in Complex Analysis), Alexandru Froda (in Algebra), Solomon Marcus (in Mathematical Analysis), Gh. Marinescu (in Differential Equations), Tudor Ganea (in Geometry). The third year courses were taught by the following professors: Octav Onicescu (Calculation of Probabilities), Nicolae Teodorescu (Mathematical Physics Equations), Victor Vâlcovici (Mechanics), Andrei Dobrescu (Geometry), Gh. Demetrescu (Astronomy).

In the 4th year, number theory was taught by Dan Barbilian, Modern Algebra was taught by Acad. Grigore Moisil (substituted by Alexandru Solianu and Constantin Popovici, when he was abroad), Differential Geometry was taught by Acad. Gh. Vranceanu, the Theory of Relativity was taught by Andrei Popovici, the Mathematical Statistics course was taught by Acad. Gheorghe Mihoc, and the History of Mathematics course by Imre Toth. In the 5th year, only one "new" teacher appeared, Acad. Miron Nicolescu, who taught the Potential Theory course, "with a special elegance and scientific attitude", as the professor said later.

His bachelor thesis, entitled *Spaces with constant affine connection attached to real algebras*, was coordinated by Prof. Gh. Vrânceanu. The results obtained here were the subject of his first scientific work, published (in 1961) in Mathematical Studies and Research.

3. Researcher at the Academy

The academician Gheorghe Vrânceanu intended to keep the student Văduva, after graduation, as an ssistant at the Geometry Department. For this purpose, when he was a student in the fifth year, he entrusted him with seminar classes in the Analytical Geometry course from the first year. However, he could not stay in the faculty because the personnel file was not clean, his parents not wanting to enroll in the "agricultural companionship", which in the end was never implemented.

As a result, he was assigned to the Romanian Academy, where in the fall of 1960 he occupied, through a competition, a position as a trainee researcher at the (newly established) section of Probability and Statistics at the Institute of Mathematics. Here he enjoyed the permanent guidance of the academics Gheorghe Mihoc and Octav Onicescu,

researchers at the Institute. At the suggestion of Professor Mihoc, he started working and publishing papers in the field of Statistical Quality Control of Industrial Production.

In 1964, the Center for Mathematical Statistics of the Academy was created, led by Acad. Gheorghe Mihoc, to which the entire staff from the Probability and Statistics Section of the Institute of Mathematics was transferred. Here, researcher Ion Văduva led a Dispersion Analysis Seminar, on which occasion he published the monograph *Dispersion Analysis*, published by the Technical Publishing House in 1970. In 1963, Acad. Octav Onicescu suggested him to study the estimation of the mode of a one-dimensional variable and a vector random based on density estimates, as well as the non-parametric estimation of non-linear regression, the topic with which he registered for the doctorate; this thesis, entitled *Contributions to the theory of statistical estimates of distribution densities and applications*, was presented in 1968, in front of a committee with the referring members: Acad. Octav Onicescu, Acad. Gh. Marinescu and Prof. George Ciucu. Academician Miron Nicolescu (Director of the Mathematics Institute as president) and Academician Gheorghe Mihoc (Scientific Coordinator) were also part of the commission.

The years spent at the Center for Mathematical Statistics allowed him to become familiar with many applied mathematical problems: mixed optimization, theory of stocks, queues, reliability, applications of graph theory, etc. In those years there was a collaboration between the Romanian Academy and the Berlin Academy of Sciences (the Academy was joint between the German Democratic Republic and the German Federal Republic). As a result of this collaboration, researcher Ion Văduva participated in several statistical control colloquiums organized in different cities in (democratic) Germany. Thus he had the opportunity to make contact with researchers from various countries and learn about their results.

4. Specialization in computer science

In 1966, Italian computers of the second generation, of the *Oliveti 101 Program* type, arrived in our country. One of them was assigned to the Center for Mathematical Statistics, giving the researcher Văduva the

opportunity to familiarize himself with elementary notions of computer science (algorithm, program, programming, etc.) and write the first programs; these referred to simple statistical calculations: calculation of the mean, dispersion and correlation coefficient. In the spring of 1968, the Center proposed that the researcher Ion Văduva go to a *specialization in computer science in England*, with a scholarship offered by the Romanian State.

He was admitted to the University of Manchester for a *Master of Science in Automatic Computation, by Research*, lasting at least one year. Professor J. Tennant-Smith set his research topic entitled *Computer Simulation for Queueing Problems Illustrated by a Machine Interference Problem*. He learned to program in *Atlas Autocode*, *Hartran* (a version of Fortran), and *Cobol*.

After presenting the results obtained in the research, he was proposed to stay another year, being offering the position of lecturer in the discipline of Probability and Statistics for the form of *Master by Examination*. He did not receive the approval of the authorities in Romania who told him that he must return because he is "very useful in the country with the training already obtained". In the time left until his return, he developed his thesis. Normally it had to be submitted in October, but on August 1st he had to return to the country. An exception was made and he was allowed to defend it on July 26, 1969. Thus he obtained the title of *Master of Science in Automatic Computation (by Research)*, conferred by the Chancellor (Rector) in the public meeting on December 16.

5. Director of the University Computing Center

Since there was no position at the Center for Mathematical Statistics according to the specialization in England, in January 1970 he was offered the position of Technical Director at the Computing Center of the University of Bucharest (CCUB), founded in 1962 by Acad. Grigore C. Moisil, as a Laboratory associated with the Department of Algebra of the Faculty of Mathematics of the University. Starting on February 1, 1970, he went to his new job.

To stimulate research, two scientific seminars were organized: *Stochastic modeling and simulation* (coordinated by Ion Văduva) and *Theory of programming languages* (coordinated by Liviu Sofonea). The center was

reorganized into 3 compartments: Analysis Laboratory, Programming Laboratory and Computing Equipment Operation Compartment, with a requirement of 124 positions; however, the highest number of personnel was reached in CCUB in 1979 (78 people).

The team led by Liviu Sofonea tackled a research field related to the specification and implementation of software products (including compilers) generically called the PLUB (Programming Language of the University of Bucharest) Project, and the one led by director Ion Văduva, the SIMUB simulation language, having the same specifications as GPSS (General Purpose Syustem Simulation) of the IBM company, but being implemented for the FELIX C-256 computing system, with which CCUB was equipped. More advanced facilities than in GPSS have been implemented in SIMUB, such as statistical facilities and facilities for the use of high-performance generators of non-uniform random variables.

In the period 1973-1982, CCUB organized, under the auspices of UNESCO, nine annual editions of a postgraduate course "Informatics and Mathematics applied to scientific research". The course was held in English, and the students came only from developing countries.

6. Didactic activity

In February 1970 the director Ion Văduva was appointed Associate Professor at the Department of Applied Analysis, and in February 1991 he became a professor. The first courses taught were Stochastic Operational Research Models (the theory of queues, stocks and reliability) and Multidimensional Statistical Analysis. Then he introduced an optional course in Simulation Theory, which soon became a compulsory course in the last year of studies. He also published the first monograph in this field in 1977, *Computer simulation models*, for which he received the "Simion Stoilow" Award of the Romanian Academy.

In 1971, for the first time, the question of creating some specializations in computer science, by the mathematics faculties, was raised. Lecturer Ion Văduva received the task of proposing educational *plans and programs* for the Faculty of Mathematics in Bucharest. Among the subjects proposed were: Databases, Operating Systems, Languages and Compilers,

Computer Systems, which are still studied in any computer science faculty. Other subjects taught, over time, are: Simulation and the Monte Carlo method, Computer systems, Basics of computer science, Computer science, Modeling and simulation, Computerized stochastic models, Reliability of software systems.

The areas of interest in which he has done research are: Mathematical Statistics, Computational Statistics, Simulation, Monte Carlo Method, Stochastic Modeling, Reliability and Renewal, Program Reliability, Intelligent Systems Based on Uncertain and Imprecise Knowledge, Management Information Systems, Fuzzy Modeling, Multi-Attribute Decisions Making, Scan Statistics.

In 1971 he became PhD supervisor, and from October 2007 he remained at the faculty as a consulting professor. Under the coordination of his lordship, computer scientists/mathematicians from countries located on four continents: Europe, Asia, North America and South America have obtained the PhD title. These are: Romania, Bulgaria, former Yugoslavia, Moldova, Syria, Jordan, Palestine, Iraq, Iran, China, Mexico, Venezuela, USA.

Many of the Romanian doctors were, or became, teaching staff in various university centers in the country: Bucharest (University, Polytechnic University, Economic Studies Academy, Technical University of Constructions, Spiru Haret, Hyperion), Iasi, Craiova, Brașov, Pitesti, Ploiesti, Constanta. Some of them held important positions in the universities where they worked, starting from Head of Department to Rector. The same happened with doctors from other countries; for example, Luios Antonio Perez Gonzalez became a professor and Rector at the Polytechnic University of Toluca, Mexico.

7. National and international recognition

As a recognition of his scientific and didactic value, the professor was requested and participated in more than 200 doctorate or promotion commissions for teaching positions at many universities in the country and reviewed works (books or articles published in local magazines). He paid special attention to the new universities: Craiova, Pitești, Brașov, Constanța.

We give as an example the collaboration with the University of Craiova, whose main purpose was to prepare the conditions for making

the leap from Pedagogical Institute to University. This began in 1962 when, at the initiative of Academician Miron Nicolescu - the director of the Mathematics Institute of the Romanian Academy - monthly scientific seminars began to be organized within the Mathematics Department of the Pedagogical Institute, in which Bucharest researchers could also participate; the first were Ion Văduva and Ion Suciu, to whom, from 1964, Adrian Corban was added. They came to Craiova for several days, where exhibitions were presented and journals and books from the library of the Institute of Mathematics were brought.

Starting from 1966 (when the University was founded) Professor Văduva participated (at least once a year) in various scientific events such as: National Symposium on Probability Theory and Operational Research - organized, every 2 years, in collaboration with the Faculty of Mathematics of the University of Bucharest, symposia organized by the Department of Mathematics or the Society of Mathematical Sciences; the last participation was at the Informatics Department conference in October 2012.

In recognition of the scientific contribution made by Professor Văduva in the areas of research addressed and the support offered to the University of Craiova, it granted him, on November 17, 2015, the title of Doctor Honoris Causa.

His managerial abilities, proven when he was director of CCUB, were reconfirmed in the period 2000-2004, when he was vice-dean of the Faculty of Mathematics and Informatics in Bucharest. Over the years, he has been active in many commissions of the National Informatics Commission, the Central Informatics Institute, the Ministry of Education, in the commissions for the development of informatics education.

Professor Ion Văduva enjoyed great international recognition, given by an impressive number of participations in various activities abroad. Thus, he worked as a Research Worker at: GMD-Bonn (three months in 1974 and one month in 1976); Sheffield Hallam University (U.K., two months in 1992); TH-Darmstadt (Germany, 3 months in 1993). For three months (December 1973-February 1974) he taught courses in Mathematical and Computer Statistics at the Academy of Sciences of Albania (newly created). He was also a member of two PhD committees at TU-Delft (Netherlands) in 2009 and 2010.

The list of participations with papers at conferences from abroad is impressive: **Sweden**: Stockholm (1966); **Great Britain**: Cambridge and Sheffield (1969), Lancaster (1971); **Germany**: Berlin, Leipzig, Rostok, Magdeburg, Dresden, Bonn, Aachen, Karlsruhe, Hamburg, Darmstadt (1963, 1964, 1966, 1971, 1974, 1976, 1981, 1990, 1993, 1998, 2003); **Austria**: Bad Tanzmansdorf (1983); **Czech Republic:** Prague (1984); **Bulgaria**: Sofia (1963, 1995, 1999); **Russia** (1971, 1988); **Poland**: Warsaw (1984); **Hungary**: Budapest, Debrecen, Szeged (1967, 1978, 1979); **Italy**: Padua (1996, 1999, 2002); **Spain**: Salamanca (2001); **Greece**: Patras (1999); **France**: Paris (2001), Lille (2005, 2006); **Belgium**: Leuven (2001); **The Netherlands**: Delft (2002); **Switzerland**: Zurich (2005); **Slovenia**: Ljubljana (2007); **Mexico**: Toluca, Mexico (2009). At the International Congress of Applied Mathematics, November 4-8, 2009, organized by the Polytechnic of Toluca, Professor Văduva had the honor of opening this important scientific event.

In addition, Professor Ion Văduva was a member of numerous professional associations, commissions, editorial groups: American Mathematical Society – since 1980; International Association for Statistical Computing – since 1992; Biometric Society – since 1966; Association for Computing Machinery – since 1995; The Romanian Society of Probabilities and Statistics – founding member; Romanian Society of Econometrics – founding member and Honorary President since June 2012; Editorial staff of STATISTICS magazine in Berlin, between 1976-1992; The editorial team at the Annales of the University of Bucharest – Computer Science; Commission 5 (Computer Science) of MCT for approving computer science research (since 1993); Scientific Council of the Central Computer Science Institute (since 1995); INFOSOC Monitoring Commission.

8. Conclusions

From the previously presented, it follows that Prof. Ion Văduva

- had an important role in the development of computer science in our country, being one of the pillars on which it relied from the beginning;

- made relevant scientific contributions in all the fields addressed;
- showed exceptional human qualities and genuine leadership;
- he was a man of vast culture who, in the last part of his life, also showed his talent as a writer; the storyteller I had noticed from our meetings at the "summer schools" and from the many visits made to the University of Craiova.

In fact, the existence of his career was intertwined with the evolution of computer science and applied mathematics in our country. All of us who knew him had something to learn from him, some of us owe him career guidance. We remain deeply indebted to him and will keep his memory alive.

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Appendix

1. Published articles

We present, below, the list of scientific articles published in journals or in conference volumes.

1. I. Văduva, V. Istrățescu, "Products of statistical metric spaces", St. Cerc. Mat., No 2, Year XII, (1961), 567-574 (in Romanian).
2. I. Văduva, "On spaces with constant affine connection associated with real algebras", St. Cerc. Mat., No 2, Anno XII, (1961), 535-541 (in Romanian).
3. I. Văduva, "Some applications of mathematical statistics in industry", Statistical studies, Papers of the Central Directorate of Statistics, Nov. 1962, p. 1961-1970 (in Romanian).
4. I. Văduva, "Sequential tests for exponential families", Rev. Roum. Math. Pures et Appl., Tom VII, No 4 (1962) 706-716 (in Russian).
5. I. Văduva, "Response surfaces", Statistics Studies. Papers of the Central Directorate of Statistics, Dec. 1962, 109-122 (in Romanian).
6. I. Văduva, A. Sâmboan, "Response surfaces and regression theory", St. Cercet. Mat., No 2, Year XIV (1963) 307-314 (in Romanian).
7. I. Văduva, "Estimation of a k-dimensional probability density", St. Cerc. Mat., Year XIV, 4 (1963), 653-660 (in Romanian).
8. I. Văduva, "On probability density estimation of a sum of independent variables", Com. Acad. Rom., Tom XII, 7 (1963), 583-588 (in Romanian).
9. I. Văduva, "On the estimation of the modulus of a random vector", Statistical studies. Proceedings of the third scientific meeting of DCS, Dec. 1963, 173-178 (in Romanian).
10. I. Văduva, "On the approximation of c^2 and F uncentered distributions", Rev. Statist., 7 (1964), 44-47 (in Romanian).
11. I. Văduva, "Functional methods in the estimation of the distribution density of a random vector", Statistical studies (IV). Proceedings of the scientific consultation of the DCS, Dec. 1964, 173-168 (in Romanian).
12. I. Văduva, R. Theodorescu, "Statistical quality control for several simultaneous characteristics II, analogues of the caliber method with

narrowed limits", Wiss. Z.K. Marks Univ. Leipzig, 15 Jahrgang, Mat. Nat. Wiss. R. 2 (1965), 279-280 (in German).
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- Association for Computing Machinery – since 1995
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- Romanian Society of Econometrics – Founding member and Honorary President – since June 2012
- The editorial team of the journal STATISTICS, Berlin – between 1976-1992
- The editorial team of the journal Analele Universității Bucureşti. Informatică
- Commission 5 (Informatics) of MCT for the approval of computer science research – since 1993
- Scientific Council of ICI – since 1995
- INFOSOC Monitoring Commission