

*Tadeusz Gerstenkorn**

WŁODZIMIERZ KRYSICKI
– **MATHEMATICIAN AND STATISTICIAN**
(1905–2001)

The Man has died but the memory lives forever

In 2015 we celebrated the 110th anniversary of the birth of Włodzimierz Kryszicki – a well-known scholar-mathematician whose main field of study was the theory of probability and statistics. As I was awarded the first philosophy doctor (PhD) degree conferred by him in mathematics and was his longstanding co-worker, I would like to remind you of Professor Kryszicki in view of his great merits for education and upbringing of Polish, academic youth, especially those coming from Łódź.



Włodzimierz Sylwester Kryszicki was born in Warsaw on 1st January 1905 in a middle-class family. His father's name was Piotr (Peter) and his mother's name was Aniela (maiden name Bliske). He attended classes in a well known, Wojciech Górski school in Warsaw (later renamed to Saint Wojciech – Albert school) where he passed the examination for the secondary-school certificate (Matura Exam) in 1923. The same year he started his studies at the University of Warsaw, which he completed in 1928, however he received the Master of Philosophy in Maths at the Faculty of Philology only in 1930. In 1928 he started working in his old school as a teacher. He collaborated with an outstanding educator

of mathematics – W. Wójtowicz, with whom he wrote a textbook of mathematics for first-year students of secondary school in 1937. It is notable that a bit earlier, in 1930, he published an interesting paper about covering a triangle in the form of three theorems in the magazine for teachers called “Parametr” (*The Parameter*).

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Although he didn't hold the Master's degree at this time he took part in the Congress of Polish Mathematicians in 1929. I have found a copy of a report from the Congress list of members (including W. Kryszicki) in the library of the Institute of Mathematics in Copenhagen.

In 1939, just before the outbreak of the Second World War, Kryszicki was conscripted and he was fighting as a second lieutenant until 5th October in the Army of general F. Kleeberg. After the defeat of the Polish troops, he came back to Warsaw where he worked as a teacher in a Secondary School of Mechanical Engineering (Technical School of Mechanical Engineering) until September 1941. Yet, from January 1940 until the Warsaw Uprising in August 1944, he was involved in secret teaching (final classes) in his native high school.

After the city of Łódź had been liberated W. Kryszicki settled down in the town and started working in the grammar and secondary Tadeusz Kościuszko School (before the war Józef Piłsudski School), where he supervised the first post-war Matura Exam. At the same time, he worked as a maths teacher in the Private Secondary Duczyński School, where he led the final classes.

In September 1945 W. Kryszicki began to work in the newly-established Łódź University of Technology as a senior assistant in the Department of Mathematics. In November 1948 he became an adjunct professor and not much later, in December 1951, he assumed a position of the deputy professor where he stayed until the end of August 1952.

In 1950 W. Kryszicki presented a paper *The limit theorem on terms of higher order on Bayes problem* and on its basis he received a PhD degree with honours from the Warsaw University of Technology. His PhD thesis was supervised by professor W. Pogorzelski and reviewed by professors S. Straszewicz and H. Steinhaus.

In 1955 the State Central Qualifying Committee nominated W. Kryszicki to assistant professorship (readership). He held this position at the Łódź University of Technology from June 1955 until November 1962. Simultaneously, he worked part-time at the University of Łódź where he was teaching the theory of probability (giving lectures and seminars). In 1962 W. Kryszicki was awarded the title of associate professor by The Council of the Polish People's Republic. The same year he became the Head of the Department of Mathematics at the Faculty of Chemistry at the University of Technology in Łódź, and remained at the position until 1970, when the Institute of Mathematics was created.

W. Kryszicki was promoted to full professor in 1973, and he retired in 1975 at the age of 70. It doesn't mean however that he desisted his active work at that point. He continued to conduct seminars on stochastics, which he had started out in the 1950s in agreement with the Institute of Mathematics of the Polish Academy of Sciences (PAN). Many colleagues and co-workers of professor Kryszicki, as well as engineers from other departments who were interested in statistics problems and in the use of mathematics in their fields of interest,

participated in those seminars. This work, which was carried out for many years, produced excellent results. Twelve participants of the seminar meetings, whose work was supervised by Kryszicki, received PhD degrees from the University of Łódź, and two other participants defended their theses to qualify as assistant professors (habilitation). Łódź University of Technology did not have the right to confer PhD degrees at that time, but two engineers studying at mechanical and electrical department, who were interested in statistics (participants of the same seminars) defended their theses as assistant professors at the Technical University.

Professor Kryszicki also reviewed around twenty PhD theses conducted at Łódź University of Technology, in the Textile Research Institute in Łódź, in the Telecommunication Institute, and at the Maria Skłodowska-Curie University in Lublin as well as a number of postdoctoral theses. Ten of present or former professors working at the University of Łódź and Łódź University of Technology were students or co-workers of professor Kryszicki.

From 1958 until 1975 (during 17 years) professor Kryszicki was a reviewer of the reporting journal *Zentralblatt für Mathematik und ihre Grenzgebiete* issued by Deutsche Akademie der Wissenschaften zu Berlin. He wrote several dozen of reviews.

Professor Kryszicki was the author of 44 scientific papers. At first sight, it does not seem like an impressive number. But only seemingly! Although the professor was an extremely hard-working person, he was not able to produce more papers due to his academic as well as social duties (apart from the exhausting didactic work). He was the vice-dean of the Textile Faculty and the head of the Scientific Council of the Institute of Mathematics. He developed the maths curriculum for working candidates for technical studies and the maths curriculum for Officers Schools. Between 1968 and 1972 he was involved in lecture broadcasts on television – at that time a very modern form of teaching maths, especially dedicated to young, working people, during their first or second term of studies at a Higher Technical University (the so called: TV University of Technology). Besides, professor Kryszicki was very busy with publishing many widely-read course books of mathematical analysis (co-author: Lech Włodarski), theory of probability and statistics. Moreover, he was actively involved in building broad international connections. As far back as 1949 Kryszicki took part in the Twelfth Congress of Polish Mathematicians and the Fifth Congress of Czechoslovakian Mathematicians in Prague. Many times, i.e. in 1958, 1961, 1963, 1967 (Magdeburg), 1965 (Berlin), 1964 (Dresden), 1964 (Leipzig), 1984 (Frankfurt) he participated in the so-called colloquiums regarding statistical quality control. It was the result of his collaboration with the German Academy of Science in East Berlin (dr Egon Schindowski – German Democratic Republic – GDR) and the Higher Technical School in Magdeburg (prof. Karl Mannteufel). At the end of 1963 professor Kryszicki was invited to

spend one month in Paris at the well known Institute of Statistics (l'Institut de Statistique). It was the result of permanent connections with the French Journal: *Revue de Statistique Appliquée*, that was being fetched to the University of Technology by professor for many years. After his retirement professor Krysicki still actively participated in many international conferences, i.e. in Journées de Statistique (1983), in Debreczyn (1984), in Varna (1985), in the Fifth Pannonian Symposium on Mathematical Statistics in Budapest (1985), in the Congress in Rostock (GDR 1985), and in the Eighteenth European Statistical Meeting in Berlin (1988). Of course, he took part in many national conferences, mainly in Wisła and Błażejewko, during which many papers on probability and mathematical statistics were presented. Krysicki also participated in dozens of conferences regarding the applications of mathematics, which were organised by Polish Mathematical Society and the Institute of Mathematics of Polish Academy of Science. It was quite obvious. As a matter of fact, just after the war, in 1946, Krysicki co-created the Łódź Branch of the Polish Mathematical Society of which he was the president in years 1949–1952 and vice-president between 1953 and 1956. However, to my mind, the reason for a limited amount of scientific papers being published by Krysicki was the fact that he never signed his students' and co-workers' work, even when he was the person who provided invaluable advice and help during the creation process. (It should be noted that nowadays such an ethically doubtful 'co-signing' phenomenon is almost an (unconcealed) standard in many academic communities.) In this way professor Krysicki gained a circle of committed and perennial participants of seminars, who were his friends, too.

Krysicki was particularly interested in stochastics. I believe he was the first person who introduced various issues related to the probability theory and statistics (without too much theory) into the curriculum of the Textile Faculty of University of Technology. The passion for the randomness issues can be well seen in the first papers written by professor. In 1955 the paper titled: *On the joint problem of Bayes and Bernoulli* was published in *Zastosowania Matematyki – Applications of Mathematics* journal. The result was so interesting that another paper written by Krysicki (together with V. Fabian and H. Steinhaus) was published in the next issue of this journal in 1956: *Three voices in discussion*. Several years later, in 1963, this paper was expanded with the participation of prof. Mikołaj Olekiewicz from Lublin University and published again in the same journal. The paper describes a very interesting problem of two-stage statistical test, where the first stage, conducted on the basis of the binomial distribution, is used as a base for conclusions on the probability of obtaining a certain result in the second step of the analysis. Bayes formula is used in the paper and many different variants are investigated. This interesting statistical reasoning scheme was then further investigated and deepened by T. Gerstenkorn

in 1990 (*Fasciculi Mathematici* 236), who considered in the research the inflated Pólya distribution (which enabled generalization of the problem and its extension to many particular cases), and also in 1993 by the same author, using the Pascal distribution in the prognosis (*Zeszyty Naukowe Politechniki Łódzkiej nr 687* – Scientific Notebooks of Łódź University of Technology no. 687).

The Poisson theorem, although known for many years, was precisely analysed by Kryszicki in an unexpected manner. It was known, that this theorem is the limit theorem (under certain assumptions) for the Bernoulli formula, and that Poisson formula can be applied for large samples instead of the binomial formula. However, there was a problem with an accurate analysis of the occurring error. The rate of convergence and the so-called main – principal term were both introduced in the paper written in 1957. Obtaining such a result required quite complicated mathematical operations.

At the same time, asymptotic formulas were being developed in many fields of mathematics and they attracted a lot of attention. Kryszicki developed a limiting formula based on the previously presented theorem on Bayes problem. The outcome was so interesting that professor Waław Sierpiński decided to present the paper during a session of the French Academy of Science on 17th July 1961. It was also published in the Academy's journal (*Comptes Rendus Hebdomadaires*).

The research domain of professor Kryszicki was also connected with the problems of statistical estimation. The first paper in that field referred to the application of the method of moments, the estimation of parameters of a mixture of two Rayleigh's distributions and was published in the known French statistical journal *Revue de Statistique Appliquée* in 1993.

In statistical praxis we often encounter an occurrence of a mixture of two populations with the same distribution but with different characteristics. They are especially vital in such situations when the mixtures refer to the probability distributions whose applications are important. It was the reason why the problem of mixture (in other words: compound) of two Laplace distributions became of interest to professor Kryszicki. In the paper of 1967 (with Edward Kaćki from the Technical University of Łódź) this problem was elaborated on using the method of moments for the evaluation of the parameters of that mixture.

As far as the problems of mixtures are concerned, that is of compounding of probability distributions, the most important paper surely is the one published in 1972 in *Demonstratio Mathematica* that refers to the estimation of parameters of a compound of any number of exponential distributions. The hitherto existing papers referred principally to the mixture of two distributions. The paper of *Blischke* of 1984 as an elaboration referring to a greater number of distributions but only to the Bernoulli distributions and a publication of *Kabira* from 1968 refers to the mixture of continuous type distributions but with an assumption that

the random variables are limited to final intervals. In the discussed paper W. Kryszicki investigates the estimation of parameters of a mixture of any final number exponential distributions (important in statistical praxis) without the limitation of range of the random variables to final intervals.

After having retired in 1987 professor W. Kryszicki published a paper in the journal of Humboldt University in Berlin with a very interesting result giving conditions on which a mixture of two distributions produces a one or two modal distribution. He discussed that problem also in 1992 in *Roczniki Polskiego Towarzystwa Matematycznego "Zastosowania Matematyki" – Annals of the Polish Mathematical Association "Applicationes of Mathematics"*.

A paper by professor W. Kryszicki of 1993 (with M. Kałuszka – now a professor of the Technical University in Łódź) referred to some inequalities for characteristic functions. Professor Kryszicki was scientifically very active till his death. Still in his late years he had the time to publish seven scientific papers. They referred to some new properties of exponential distribution, beta distribution and to the problem of decomposition of distributions. In 2002, after his death, he was nominated as the **MAN of the YEAR 2002** by the American Biographical Institute.

The academic text-books by W. Kryszicki were used by a large number of students during countless years (and as I think, they are still used). Namely, they were eminently written from the point of view of each student, they plainly interpreted the theory by various examples, were very well suited for self-study and very useful in fathoming of difficult mathematical problems. The number of editions is the best proof of their popularity.

Professor Kryszicki was in good physical shape till the end of his days. He lived to be 96 years and passed away on September 19, 2001. He is buried at the municipal cemetery Zarzew in Łódź. He left two daughters; one is a chemist, the other a physicist. His wife, who was a teacher, had died earlier.

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