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# REVIEW OF THE BOOK BY MARIUSZ URBANEK, "GENIALNI – LWOWSKA SZKOŁA MATEMATYCZNA" (POLISH) [GENIUSES – THE LVOV SCHOOL OF MATHEMATICS]

L. Maligranda. *Review of the book by Mariusz Urbanek, "Genialni – Lwowska Szkoła Matematyczna" (Polish)* [*Geniuses – the Lvov school of mathematics*], *Wydawnictwo Iskry, Warsaw 2014, 283 pp. ISBN: 978-83-244-0381-3*, Mat. Stud. **50** (2018), 105–112.

This review is an extended version of my short review of Urbanek's book that was published in MathSciNet. Here it is written about his book in greater detail, which was not possible in the short review. I will present facts described in the book as well as some false information there.

My short review of Urbanek's book was published in MathSciNet [24]. Here I write about his book in greater detail.

Mariusz Urbanek, writer and journalist, author of many books devoted to poets, politicians and other figures of public life, decided to delve also in the world of mathematicians. He has written a book on the phenomenon in the history of Polish science called the Lvov School of Mathematics. Let us add that at the same time there were also the Warsaw School of Mathematics and the Krakow School of Mathematics, and the three formed together the Polish School of Mathematics.

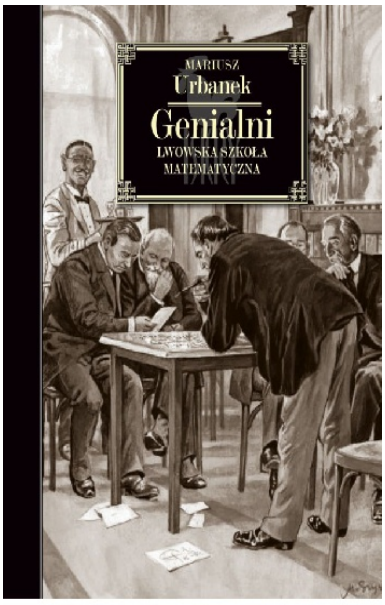


Figure 1. Front page of Urbanek's book

The Lvov School of Mathematics was a group of mathematicians in the Polish city of Lvov (Lwów, in Polish; now the city is in Ukraine) in the period 1920–1945 under the leadership of Stefan Banach and Hugo Steinhaus, who worked together and often came to the *Scottish Café* (Kawiarnia Szkocka) to discuss mathematical problems. The legendary *Scottish Book* with 198 problems of high scientific value was created from the problems registered in the Scottish Café. Many of the problems from this book found solutions some years after they were formulated.

Without any notable mathematical tradition, the school made major contribution to what is now called functional analysis (analysis of functionals or infinite-dimensional analysis) and also to operator theory, measure theory, probability, game theory, orthogonal systems and

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differential equations. In 1929, they founded the journal *Studia Mathematica* (with the first print run of 500 copies) which still continues (600 issues by now). The results and names of Herman Auerbach (1901–1942), Stefan Banach (1892–1945), Kazimierz Bartel (1882–1941), Zygmunt Wilhelm (William) Birnbaum (1903–2000), Leon Chwistek (1884–1944), Meier "Maks" Eidelheit (1910–1943), Mark (Marek) Kac (1914–1984), Stefan Kaczmarz (1895–1939), Bronisław Knaster (1893–1980), Kazimierz Kuratowski (1896–1980), Antoni Łomnicki (1881–1941), Stanisław Mazur (1905–1981), Władysław Nikliborc (1899–1948), Władysław Orlicz (1903–1990), Stanisław Ruziewicz (1889–1941), Stanisław Saks (1897–1942), Juliusz Paweł Schauder (1899–1943), Józef Schreier (1909–1943), Hugo Steinhaus (1887–1972), Włodzimierz Stożek (1883–1941), Stanisław Ulam (1909–1984), and Eustachy Żyliński (1889–1954), among others, occur frequently in many modern articles and books on mathematics.

Cooperating with each other and competing with mathematicians from the Warsaw and Krakow, they made discoveries, won fame and honors, and made careers as international lecturers.

Urbanek's book appeared in 2014 and had an exceptional amount of publicity in Poland even before publication. He describes the turbulent lifes, achievements, and careers, scientific and otherwise, of four mathematicians from the Lvov School of Mathematics: Banach, Steinhaus, Ulam and Mazur, in the interwar period (1919–1939), during the Second World War, and afterwards. They were people of great achievements and the most colorful biographies. Moreover, they perfectly present the diversity of this mathematical world.

Urbanek's book has a large potential for popularization, as the knowledge of the average Pole about Polish world-class scholars is confined to Nicolaus Copernicus (Mikołaj Kopernik) and Marie Skłodowska-Curie (incidentally, the latter is rarely associated with Poland by the international public – she usually goes by Marie Curie, Pierre's wife). The story of Stefan Banach and the phenomenon of the Lvov School of Mathematics is well worth knowing too.

Urbanek's book is an example of good advertising of mathematics to ordinary people, since it is written in very elegant Polish and is quite a good read. However, it contains no mathematics. The author's style is extremely light and accessible. This is an intriguing book and it reads like a riveting novel. Part of this is due to the interesting heroes. Their biographies give an insight into these turbulent times. The author does not only focus on the interwar period, but accompanies the mathematicians to the end of their lives.

Urbanek took a lot of information from the books by Hugo Steinhaus [37] and Stanisław Ulam [41]. Important to his narrative were also books by (in order of publication): Kazimierz Kuratowski [15] and [16], Roman Kałuża [14], Marek Kac [13], Roman Duda [8], Emilia Jakimowicz and Adam Miranowicz (ed.) [12]. I will provide these and other references at the end of this review. I believe Urbanek used Polish versions of the above books.

In the eyes of a historian of mathematics, however, Urbanek's book is written carelessly. In addition, it contains too much specious information and made-up stories, which are usually more interesting than the true stories. This probably explains why the book is selling well and has had a huge amount of favorable reviews in Poland by people not related to mathematics, who have been delighted with the book and have praised it unreservedly.

In the book, however, there is actually no mathematics at all. To be precise, on page 35, Urbanek mentions the Banach–Tarski paradox, and on page 79, he formulates the Fermat problem (but his explanation of the problem is totally wrong). I understand that the book deals with people who worked with quite abstract problems, but Urbanek should at least satisfy some mathematicians, informing about monograph *Collected Papers* of Banach [5,6],

where there are reprinted his papers, and is present a short text on mathematical topics covered in these monographs. Thus, he should mention that the most known work of the Polish mathematician Stefan Banach is his book [3] on linear operations, where appeared B-spaces, now called *Banach spaces* and fundamental theorems of functional analysis. Banach's monograph [3] was so important that it was reprinted many times and translated into English, Ukrainian and Russian. Namely, it was reprinted in 1955 and 1988 by Chelsea, in 1979 in Vol. 2 of Banach's *Collected Papers* [6], in 1993 by Éditions Jacques Gabay. Today it is freely accessible on the EuDML platform or on the website *http://kielich.amu.edu.pl/Stefan_Banach/e-index.html*. Moreover, monograph [3] was also translated into English in 1987 by F. Jellett with comments by A. Pełczyński and Cz. Bessaga, and published by North-Holland, into Ukrainian in 1948 by Miron Zarycki, and in Russian in 2001.

The Ukrainian mathematician Miron Zarycki translated [3] into Ukrainian in the years 1939–1940, but the book was published in Ukrainian only in 1948 with the changed title page *A Course of Functional Analysis* [4], adding in brackets on the second page *Linear Operations*. This translation of Banach's book was approved as a handbook at universities and the educational institutes of Ukraine, and it was printed in forty-eight thousand copies. More details about Ukrainian translation can be found in the article by Plichko and Prytuła [35]. The Russian translation by L. I. Tuchinski appeared in 2001, in Izhevsk on 272 pages, printed in the number of one thousand copies, and with a two-page preface written by Vladimir M. Tikhomirov.

The starting point for the book [3] was Banach's doctoral dissertation [1] *On operations on abstract spaces and their application to integral equations* defended in 1920, in Polish, at the University of Jan Kazimierz in Lvov (the promotion took place on 22 January 1921) and it was published (in French) in 1922 in a third number of a new Warsaw journal *Fundamenta Mathematicae*. Note that both Banach's 1922 paper and Banach's 1932 book are reprinted on pages 305–348 and 13–219, respectively, in his *Oeuvres* [6].

Urbanek could also mention the importance of Steinhaus's mathematical publications, since 84 of them were republished again in his *Selected Papers* [38] (this time he cited this book on page 272), from his collection of all 225 papers previously published in various journals. The papers that originally appeared in Polish have been translated into English and thus made more generally available. The papers selected are on a wide variety of subjects, including trigonometric and orthogonal series, set theory, measure theory, functional analysis, probability theory, the theory of games, and topological methods in geometry; some of Steinhaus' popular articles are included, and some of his papers on applications of mathematics in biology, medicine and other fields.

Let us note that there is also book *Selected Works* of Ulam [40], although there is no such book with Mazur's reprinted papers. Ulam's book [41] is a valuable supplement to his selected works [40].

In the title, the Lvov mathematicians are called geniuses. The author, however, does not attempt to convince us of this. He describes in detail "humanistic achievements" of Steinhaus or Mazur's life and socialist sympathies, but remains silent about their achievements in the field of mathematics!

Arguably, to the question: Can one explain what the Lvov mathematicians did to a lay person? the answer must be: No, you can't! This excuses the author of the book, who is not a mathematician, to a certain extent. Similarly, I can assert that the Poles do not feel pride in the Lvov School of Mathematics, because usually they know nothing about it.

On pages 245–259 of Urbanek's book, we find a conversation with professor Roman Duda,

mathematician and historian of mathematics. From it, we learn more about Banach and his monograph from 1932 and about other mathematicians from the Lvov School, especially Steinhaus, Mazur and Ulam. The conversation ends with Duda's statement that the Lvov School of Mathematics was the greatest Polish contribution to science. On pages 261–269, the author puts together important dates of the Lvov School of Mathematics (as in the book [12]), starting from 1887, the year of Steinhaus' birth and ending in 2002, when a book [7] of poetry by Susan H. Case, *The Scottish Café*, appeared. This is followed by an index of people and a bibliographical list. The book also includes archival photographs.

Urbanek's book on the Lvov School does not seem to me as good as the book by Duda [8] (other editions [10], [11]) or the book on Alfred Tarski [29], because it provides no information about the original mathematics and disputes over scientific topics. In the reviews of the English version of Duda's book I wrote (cf. [21, p. 4], [22, p. 215], and [23, p. 76]):

> *this book is a must for everyone interested in the history of functional analysis or in the history of mathematics in Poland.*

An excellent book for a mathematician interested in mathematical analysis and the history of Banach spaces is the monograph by Albrecht Pietsch [33]. It is written in a friendly style and eminently readable. In my review I wrote (cf. [19, p. 158]):

> *This book is a history of mathematics, not a history of mathematicians. The author writes mainly about ideas and proofs, and less about people. In addition, he is not interested in who first proved the theorem, but why and how it was proved.*

Let us mention an excellent biography of Stefan Banach by Roman Kałuża [14] from 1992 and a beautiful collection of articles on Banach with a large number of his photographs and a series of biographical materials about him, collected by Emilia Jakimowicz and Adam Miranowicz and published in both Polish and English [12].

As a mathematician who writes about the history of mathematics, I am terrified that Urbanek's book has begun to be a source of quotes even for mathematicians and authors of papers about the Lvov School. A mathematician or a mathematics historian should not do this. I will even say more bluntly that no translation of this book into English should be approved by any reviewer who is a mathematician. Perhaps, however, as Pogoda hopes ( [36, p. 180]), Urbanek's book will inspire other authors to write a real biography of the great Polish mathematicians.

From my references, at the end of this review, you can find the following references in the Urbanek's book: [7], [8], [12]–[17], [30]–[32], [37], [38] and [41], but I wanted to put additional information on English translations of Polish texts and vice versa. In addition, his list lacks the number of pages of the book or pages on which the publication was quoted article, which is why I have supplemented in my citations these data, important for people who want to reach the original paper, especially for mathematicians and mathematics historian.

What's more, some my important references are not in his book, for example, [1]–[6], [9]–[11], [18]–[24], [27], [29], [33]–[36], [39], [40], and especially not [26], where there are additional informations about scientists from Lvov.

We will now present several pieces of false information found in the book and misprints or errors (some of them come from the Plichko [34] and Pogoda [36] reviews).

P. 7: in 1935, Saks was not coming to the Scottish Café because at that time he lived in Warsaw;

p. 17: Minkowski was not of Polish descent;

p. 25: Vitalij Milman does not come from Kharkov and he has not written a book on Stefan Banach (he only posted some information about Stefan Banach on internet);

p. 27: he quotes Kałuża [14] on eight bad grades, which is not true as it is easy to verify in [12], because there are scans of Banach's school certificates;

p. 29 (we read): "Mathematics of Lvov has not been more advanced from Cracow, to make a difference" [in 1910]. However, in 1910 Cracow mathematics was at incomparably higher level than Lvov! Here Zaremba was active, Żorawski had already a great position in the world – and Lvov did not count in general;

p. 31 and p. 282 (name index): Steinhaus' wife was Stefania Szmosz not Stosz;

p. 32 (we read): "Eustachy Żyliński was not able to lecture himself". This is not possible! He was born in Poland, his parents were Polish, therefore he had no problem with the Polish language and cerainly not with mathematics (in 1914, he became a "magister" at the Saint Vladimir Royal University in Kiev, which at that time was more difficult than to defend a PhD in Poland). He was fluent in Polish, Russian, French and English. The author should consult my article [18];

p. 33: The text on Banach is repeated after [Ka92, p. 51] where it was fabricated;

p. 34: it seems to me that Banach's supposed way of passing doctoral examinations does not correspond to the truth (it comes from A. Turowicz);

p. 34: we read that Banach passed Loria's astronomy exam. No! Banach passed Loria's physics exam. Loria was a professor of physics, and the exam took place on 3 November 1920. Moreover, that with Banach's habilitation was simpler. No, it was not easier than a doctorate;

p. 35: Banach's integral. There is no such term as Banach's integral;

p. 54: it should be Władysław Orlicz instead of Włodzimierz Orlicz;

p. 42 (we read): "during a banquet at the mathematical congress in Georgia Banach . . ." No, Banach was not at the mathematical congress, but he was there to sign a socialist cooperation with the University of Tbilisi.

p. 63: Bartel defended his PhD in 1911, not in 1914;

p. 64: Leon Chwistek was a well-known figure in the interwar Poland but to compare him with Bertrand Russel and Alfred Whitehead is an exaggeration;

p. 65: of course, the binary numeral system was not created by Chwistek;

p. 66: the Faculty of Philosophy was divided into the Humanistic Faculty and the Faculty of Mathematics and Natural Sciences in 1924, not in 1929;

p. 67: Alina Dawidowicz née Chwistek was not a professor of the Jagiellonian University;

p. 75: Banach did not lecture in descriptive geometry;

p. 112: H. Steinhaus and J. Schauder are Polish, but before they started at the Lvov University they were Jewish;

p. 125: it is unlikely that Bartel was offered a seat in the Supreme Soviet of the Soviet Union and refused;

p. 128: we read that Mazur was hiding from the Ukrainian police. Ukrainian police did not exist at that time!;

p. 143: Jerzy Albrycht in 1941 could not have been a feeder of lice because he was only 17 (born in 1924), at most he could have been an injector or preparator. Anyway Albrycht was not even employed at the Weigl Institute;

p. 165: In the autumn of 1944, Banach was interrogated several times by Ukrainian prosecutors. No — only twice. The text here comes from my joint paper with Prytuła [25].

p. 240: we read: Enflo convincingly substantiated evidence of the problem 153 from the Scottish Book for which he received a reward — a live goose! The solution of the problem 153 by Enflo was not so easy to solve and present. The Swedish mathematician Per Enflo started his work in 1967–1968 and completed it only in 1972 when he was 28 years old (it was published in Acta Math. in 1973). He constructed a separable Banach space without the approximation property, thus without a Schauder basis. He presented a lecture on the solution in Warsaw, after which Mazur handed him a live goose, as the award he had promised in 1936. A Polish newspaper published a photo of the moment; it is a pity that the book under review does not contain a photo of such a remarkable event. The photo can be found in several places, for example, in the English translation of [14] or in [22, p. 206]. By the way, the goose was cooked for him by Żelazko's wife. Let us mention that on pages 240, 268, and 279, Enflo's name has erroneously two dots over "o" (many Polish authors have misspelt Enflo's name);

p. 261: S. Banach started his studies at the Lvov Polytechnic in 1910, not in 1911;

p. 262: S. Mazur started his studies at the Lvov University in 1923, not in 1924.

Finally, if someone is looking for anecdotes about mathematicians from the Lvov School, Urbanek's book is a good source, even though there are many more anecdotes about them. Of course, it was good that he reminded people of these mathematicians because not much has been said about them in Poland. His book, however, cannot be considered a historical source on the Lvov School of Mathematics, and especially mathematicians should not do that.

This is a non-genius book about some of the Lvov mathematical geniuses.

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