

Book Review. Oláh-Gál Róbert's *Bolyai-Sommázat*

EDITH DEBRENTI

Affiliation: Faculty of Economics & Social Sciences
Partium Christian University, Romania
Email: debrenti.edit@partium.ro

The *Bolyai-Sommázat* is for everyone interested in “the boy who bent space,” the biography of the Bolyai father and son, and the circumstances of the creation of one of the most significant achievements of the human spirit, *The Absolute Science of Space*. It provides lavish reading to anyone interested in the history of Transylvanian culture, the era of language renewal, and the 1848 War of Independence in Transylvania. 3 November 2023 marks the 200th anniversary of János Bolyai’s famous letter to his father in Timisoara, in which he informed him that he had created a new and different world out of nothing (Oláh-Gál, 2022). To mark the occasion, UNESCO has declared 2023 as the Bolyai Memorial Year.

The book aims to show the human side of the two mathematicians and their work, not only through their research activities but also through their everyday human tasks and actions and their relationships with family members, acquaintances, friends, neighbors, and servants. We also learn more about the relationship with each other and gain a better insight into a more nuanced, more human father-son relationship. Perhaps we will better understand the father’s dissatisfaction, sometimes frustration, and impatience with his son, and we will also better understand the son who, for a lifetime, does not receive the recognition he deserves for his work and achievements. There is no other scientist for whom there is such a gap between achievement and the recognition it deserves.

According to the author, the *Bolyai-Sommázat* is not a traditional biography of Bolyai, or a volume presenting the work of Bolyai, but a selection of writings which have contributed to sharpening and clarifying the image of the Bolyai and correcting some biographical errors. Throughout the 351 pages—the result of thirty years of work—Oláh-Gál contributed a great deal to the study of the Bolyais by presenting the Bolyais’ letters, from family correspondence to letters written to contemporary scholars, such as Farkas Bolyai to Friedrich Gauss.

What is new in the book, compared to previous biographies, is that it sheds a different light on the history of the Bolyai family of Bólya, which goes back 700 years, being one of the oldest families in Transylvania and Hungary. The family's history is worthy of a novel, tracing the history of Transylvania from the conquest to the present day. The family's genealogy goes back to 1296, and its ancient nobility can be verified by archival records from 1770. The writing of the history of the ancient Bolyai family is the merit of Farkas Bolyai's brother, Antal Bolyai, who was a true Bolyai family researcher, as his correspondence reveals. We learn about the history of the family coat of arms—over time, the Bolyai used many different coats of arms because, through their marriage, there were times when they used their wives' family coat of arms. The ancient coat of arms has a right hand holding a sword.

Farkas Bolyai's younger son, Gergely, drew the family tree. The book contains a record of the most prominent members of the Bolyai family. Almost all the Bolyais were extraordinary people in some way. János Bolyai mentions several times in his writing that the Bolyais were ill-tempered, even pugnacious, people. In the Bolyai documents preserved in the Teleki-Bolyai Library, the author found a note which reveals that Farkas Bolyai's grandfather, Gábor Bolyai, was murdered by peasants in Bólya in 1769—a strange finding because researchers of family history do not mention this sad aspect.

The book contains many letters and manuscripts concerning how the Bolyai family property, money and inheritance were distributed. He concludes that János Bolyai was the only member of the Bolyai family who, as far as we know, was able to give up the benefits due to him by right to preserve brotherly love. His brother, Gáspár Bolyai, wrote a very 'wicked' biography of his brother János at the request of the then Secretary General of the Academy. This writing was the source of the false image of János Bolyai, which is still in the public consciousness today, that he was a duelist, a man-avoider, a self-serving, self-deluded bad man.

The author also wants to nuance the image of János Bolyai's mother, Zsuzsanna Benkő, by emphasizing that, compared to the bourgeois girls of her time, she was an educated, sensitive, modest and very religious soul, an extraordinary individual, a clever woman who could value spiritual values over material ones.

We also learn a lot about Farkas Bolyai's greatest patron and mentor, Baron Simon Kemény Jr. All the Bolyai monographs, even the most eminent Bolyai researchers and historians, have wrongly given his date of birth. Oláh-Gál reveals from the Hungarian National Archives that the baron was born in 1774 and was one year older than Farkas Bolyai, not four years younger as everyone had believed until then. Farkas Bolyai and the family of Baron Simon Kemény of Magyargyerőmonostor were closely connected throughout their lives.

We get to know other members of the Bolyai family. Gergely Bolyai, the younger brother of János Bolyai by 24 years, born of his father's second marriage, and the last of the family to live in the company of the two great Bolyai, who wrote the family history and who was a little bit in the background, with a quiet fate. We also get to know Antal Bolyai, Farkas Bolyai's younger brother, a bachelor. The notary in a Hungarian county took care of the ancient Bolyai farm. For nearly 20 years, he fought without success to regain the old Bolyai estates; with his death, the successors came to an agreement, the contract of sharing became love, and Gergely Bolyai married his cousin Karolina. (Of the three Bolyai men, Gergely was the only one to live a long, quiet, and peaceful family life.)

We can read about Farkas Bolyai's meeting with Gauss, their years together in Göttingen, their shared interests, especially in philology (they were both excellent philologists), and their friendship and correspondence that lasted until the end of their lives. When they parted, they gave each other a pipe, with the instruction that on the last evening of each month, preferably between 7 and 10 p.m., they should smoke a pipe, thinking of each other, recalling each other's spirits and meditating on each other. Anecdotes about Farkas Bolyai are also included in the book, as legends about him were still being written in his lifetime.

We also learn a lot about János Bolyai's childhood, which was perhaps the happiest period of János's and his parents' lives. John loved the village of Domáldo, where the nature, the open sky, the unlimited space, the quiet life left a deep impression on the little child (Oláh-Gál, 2022). His talent for maths showed itself early on, his interesting thoughts on maths occupied him from an early age, he asked questions, wondered about the world, knew the stars, learned German, Latin and the violin. Mathematics was taught to him by his father. At the age of nine he was introduced to the first six books of Euclid. Besides number theory, he was also interested in problems of analysis. In terms of geometry, he was interested in a famous problem of antiquity and claimed to have written a new method he found for squaring the parabola (Oláh-Gál, 2022). The idea occurred to him as a simple thought without formula when he woke up one morning.

Farkas Bolyai and Sándor Kőrösi Csoma had many teachers in common at the famous Bethlen Gábor College in Nagyenyed, and we can read many interesting stories about them. Ádám Herepei was the former teacher of Farkas and Csoma Sándor Kőrösi, who made them learn about the prehistory of the Hungarians. Farkas Bolyai was also greatly influenced by Mihály Szathmáry Pap, professor of theology. János Bolyai's favorite teacher was Samuel Köteles, who taught philosophy, logic, and ethics in Târgu Mures, and whom he often quotes in his manuscripts. It is also possible to know who his classmates were and whom he studied with in 1817.

The book reveals that Farkas Bolyai did not send his son to Göttingen, on the one hand, because Gauss did not respond to his request; on the other hand, because he changed his mind and saw the financial advancement of the Bolyai family being ensured if János became a military engineer or at least an officer. At that time, the military academy in Vienna was the elite training school of the Austrian monarchy, perhaps the highest level of teaching in the monarchy (János Bolyai's tuition fees were very high, almost 8,000 forints). During his studies in Vienna, he visited Károly Szász—later a professor at Aiud, on Sundays—who was an educator in Vienna, and they developed a warm friendship.

We also read about János Bolyai's children. Most biographies refer to two children, but here we learn that he had three children who carried the Bolyai name; moreover, his wife had a fourth child during their marriage. János Bolyai was ill all his life and had a close relationship with his servants and doctors, about whom we can also find details.

The Bolyais were not revolutionaries in the political sense at the time of the 1848 revolution, but they dared to take responsibility for their political worldview. János Bolyai was very fond of Târgu Mureș; he even calls it his hometown, although we know that he was born in Cluj Napoca. The relationship between the city and the mathematician is also more nuanced than we have known. We find out where he lived, whom he befriended during his retirement years, and who his neighbors were. He was also willing to work for the community. For example, he did a free design to upgrade the city dam and mill, performed at charity concerts. He liked to socialize, and loved to play chess. He was as much a citizen of Târgu Mureș as people born there.

From the book, we learn in which house János Bolyai died, and that his grave has been moved in the meantime (his ashes were exhumed on 7 June 1911). He was buried next to his father, and a gravestone would finally be erected in his honor from public donations. The author remarks that the common grave is a place of pilgrimage for all those who can appreciate the values of science (Oláh-Gál, 2022).

The book gives us an image of the philosophical background to the geometry of Bolyai—János was aware of the meaning of Kantian philosophy and fully grasped its depth. According to him, from our birth, our view of space can only be Euclidean. In Oláh-Gál's wording, he was the first to reject this idea, showing that there was another geometrical system. In his work, he arrived at the possibility of non-Euclidean geometry in a purely logical and philosophical way.

In the book, we get an insight into the most significant elements of Bolyai geometry, its nature, and its characteristics, and by reading it, we accept that the problem of parallelograms is only a matter of detail. In his geometry, for example, the circle can be squared—

in other words, with the help of a pair of compasses and a ruler a circle can be constructed into a square the area of which is equal to that of the circle—something that is impossible in Euclidean geometry. Other differences are that in Bolyai geometry, the sum of the angles in a triangle is less than two right angles, that two (non-intersecting) parallel lines can be drawn from a point outside a line, that there are also divergent lines, that there is no similarity, that the area of a triangle depends only on the size of its angles, and that the triangle with all its angles zero has the largest area.

In our ordinary world, there is no good, natural, simple example of an object on which Bolyai geometry is fully valid. Non-Euclidean geometry works on a very, very small part of the pseudosphere, or on a kale leaf, but this is finite, it cannot be stretched to infinity. János Bolyai's mathematical research has always been characterized by originality and to the point, and he did not stop working in this field even after the creation of *The Absolute Science of Space*.

In the remainder of the book, the author presents many more interesting facts about Bolyai discovered during research, such as János Bolyai's ideas on freedom of the press and his manuscript evoking Sándor Petőfi. It presents images of Domáld, analyzes some of János Bolyai's comments, and redefines the relationship between Gauss and János Bolyai.

A very important part of the book is the Bolyai chronology, which we find in great detail—broken down into a day by the day account—when and where the Bolyais were, what happened to them over a period of almost a hundred years between 1768 and 1860.

References

Oláh-Gál, R. (2022). *Bolyai-Sommázat*. Editura Pro-Print.