Refutation of Imre Hermann's Allegation: János Bolyai Was Not Insane

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Abstract—The scientific public has relatively little knowledge about the Hungarian János Bolyai, one of the greatest thinkers of all times. Few people know that apart from being the founder of the non-Euclidean geometry he was also interested in sociology, philosophy, epistemology and linguistics. According to the renowned Hungarian psychoanalytic Imre Hermann, who lives in France, János Bolyai was mentally deranged. However, this is incorrect. The present article intends to prove that he was completely sane until the moment of his death.

Keywords—Imre Hermann, insane**,** János Bolyai, mathematics, non-Euclidean geometry, psyphoanalytic.

I. Introduction

THE main purpose of this article is to refute statements that claim Janos Bolyai was insane, such as the ones found in Imre Hermann's paper (published both in Hungarian and French) [1]. Unfortunately, this erroneous pronouncement was not only made by Hermann, but two Hungarian doctors (Mrs. Henriette Pulszky Szirmay and Károly Schaffer) even went so far as to claim that János Bolyai was schizophrenic.

Imre Hermann was and is highly respected among psychoanalysts and thus his opinion has become more widely known in the scientific sphere than, for instance, the well documented Bolyai monographs published in the Hungarian language.

János Bolyai was one of the greatest mathematicians of all time, who discovered non-Euclidean geometry. Non-Euclidean geometry is a wonderful theory of the human mind and as such is one of the most basic theories of human cognition. (According to Stephen Hawking it is one of the twenty most important theories of mankind.)

The gap between the greatness of the discovery and the insignificance of the creator may have led psychologists to believe that such a theory could only be created by a deranged mind. Many people, including Imre Hermann, claim that János Bolyai's mother, Zsuzsanna Benkő, was also insane. This is also a mistake; neither Zsuzsanna Benkő nor János Bolyai was insane. This is what this article is trying to prove.

Reading through some of Zsuzsanna Benkő's letters, it is obvious that she was a highly educated, delicate woman. She played the piano beautifully, read widely and she may have known some Latin as well.

János Bolyai was born on 15 December 1802 in Kolozsvár (Cluj) as the child of Zsuzsanna Benkő and the genius mathematician Farkas Bolyai. The young János spent two years in the village of Domáld, where Farkas Bolyai had an estate. Later they moved to Marosvásárhely as Farkas Bolyai had been invited to teach at the Reformed College there. János Bolyai was considered a child prodigy because at the age of four he said things like the stars must be very far away because they look the same from Domáld as they do from Marosvásárhely. Or if you whitewash a room a lot, it will wear out. Also, the bread oven should be turned inside out to clean it. His father took care of his education and János studied everything by himself at home. By the time he went to school at twelve years old he was already familiar with all fifteen books of Euclid, and he knew Latin and German well. Farkas Bolyai was a poetic soul, who claimed that the most important task of mathematics was to clarify the question of Euclid's fifth postulate. He stated that whoever solved this problem should be eternally commemorated. He and Gauss had become good friends between 1797 and 1799 in Göttingen and he would have liked his son to study with Gauss. Unfortunately this plan did not succeed, because at that time Gauss did not reply to his letter making this request (Gauss also lost both of his wives, as did Farkas Bolyai). Farkas Bolyai therefore sent his son to the Royal Engineering College in Vienna, which was one of the most renowned academies in Europe at that time, providing qualifications in military engineering of at least as high a standard as similar academies in Paris. János Bolyai reflected a great deal on the parallel postulate while at the academy. As soon as he graduated and was transferred to Temesvár as sub-lieutenant engineer, he wrote to his father in Marosvásárhely on 3 November that he had created a new and different world from nothing. This is how he let him know that he had developed the system of non-Euclidean geometry. And indeed, succeeding generations have confirmed that János Bolyai had created a perfect system thus paving the way for modern space theories. Unfortunately his private life was full of failures. After devising non-Euclidean geometry he was transferred to Arad, where he may have contracted malaria. The doctors failed to diagnose this disease and he was not treated correctly. Bolyai was also deeply shaken by the fact that Gauss did not publicise his non-Euclidean geometry, even attributing its discovery partly to himself. János Bolyai was convinced that his work would be appreciated by posterity so he wrote down every thought and idea. 14,000 pages of manuscript are still in existence today, which have only partly

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been studied. He died completely alone on 27 January 1860. His funeral was attended by only three civilians, although as a military engineer, a subunit was officially delegated to pay their last respects. His mathematical concepts and philosophical ideas have not been fully exhausted and elaborated to this day.

II. What Is Known about His Illness?

There is evidence that János Bolyai was treated by more than ten doctors (Dr. Deely, Dr. Dávid Wachtel, Dr. Rimmel, Dr. Bélteki, Dr. Antal Kovács snr., Dr. Antal Kovács jnr., Dr. Péterffy, Dr. Engel, Dr. Kathonay). He was very good friends with some of them. If he had been insane, his doctor clearly would not have made friends with him. What is more, on the suggestion of József Engel, he was invited to the Fifth Itinerant Congress of Hungarian Physicians and Natural Historians.

In 1855 he gave a performance with one of the greatest Hungarian actresses, Kornelia Prielle, at a charity concert in aid of the orphans of Vörösmarty. He was a famous violinist, mainly performing Paganini compositions.

There is therefore no proof whatsoever to be found to support Imre Hermann's allegations. Hermann used biased and demonstrably false data in his work.

Besides the strong connection between János Bolyai and the doctors of his time, his medical prescriptions are also relevant to the case. These 53 documents, preserved in the Library of the Hungarian Academy of Sciences, Department of Manuscripts, are also interesting from a medical history perspective. The prescriptions have been examined from a professional standpoint by Prof. János Jung and Prof. Károly Csedő, both professors of medicine in Marosvásárhely.

Dr. Deely prescribed medicines for János Bolyai on both 12 and 16 January 1827 in Arad. These data are important as János Bolyai caught an illness in Arad that affected the rest of his life. When he was transferred there he was still healthy, but in the city he contracted a disease which he could never shake off. It is possible that he was treated incorrectly.

According to Dr. István Gazda, a science historian from Budapest who has recently prepared a number of works and manuscripts on medical history for printing, János Bolyai was not a hypochondriac. It was the side effects of the malaria he contracted in 1828 in Arad which plagued him for the rest of his life. Even though descriptions of the disease and its treatment were already available in Hungarian, none of his doctors recognised the source of the symptoms. As can be seen from his letters, János Bolyai often felt ill. István Gazda states explicitly that the treaments Bolyai later received all served to relieve real symptoms, and all his life János Bolyai was looking for adequate remedies for his periodic outbreaks of symptoms. He read a great deal in this regard and also took his father's advice on several occasions.

János Bolyai had the closest relationship with his doctor József Engel (1807-1870), the two even becoming friends. 14 of his prescriptions for János Bolyai have survived to this day.

At the suggestion of József Engel, János Bolyai was invited to the Fifth Itinerant Congress of Hungarian Physicians and Natural Historians (HPAN) to be held in Kolozsvár. He was called on to give a lecture on a topic he considered important. The comments he made may be of use to lecturers today:

> *"I wish to occupy your attention with only the interesting from the essential. I should like to present the fruits of almost a quarter century of the endeavours by my spirit, and what is interesting, always depends on the current circumstances."*

Thus, he claims, it is not seemly to abuse the patience of the audience, and only the interesting parts of the essence of a topic should be brought up. But what can be considered interesting is a function of the respective circumstances. These are suggestions that the modern lecturer should also heed.

Unfortunately, as far as it is known, János Bolyai did not go to Kolozsvár. The reason for this could be that seven years before, he had had to endure his second great failure when his work Responsio had not been understood. Responsio had been sent in to the 1837 open competition announced by the Jablonowszki Society in Leipzig to clarify the geometric constructability of complex numbers. Time had proved János Bolyai correct, because of the three works submitted his was the best. But, as often happens in competitions, the weakest paper won the prize. János Bolyai lost his confidence in scientific societies. He was afraid that if he presented a topic in Kolozsvár, misunderstanding would once again be his reward. He had wanted to go, though, and on receiving the invitation, it was with high hopes that he prepared to take part. It is a loss for posterity, the contemporary HPAN and for the history of science that he did not take part. A clear, well-written work by János Bolyai is thus missing, and the world is poorer for it.

III. Chronological Outline of the Last Five Years of János Bolyai's Life

11 October 1856, Marosvásárhely, the last letter from Farkas Bolyai to his son Gergely: "Unfortunate Bolyai family! Though when he returned home, János said that the star of the family would rise erelong."

10 November 1856, János Bolyai writes a letter to his younger brother Gergely Bolyai.

20 November 1856, Farkas Bolyai dies.

Tamás Vass on Farkas Bolyai's last day: "On 20 November 1856 I was the student to hold vigil, assigned to the daytime period by the apparitor. This was the great Bolyai's last day! The first snow fell at dawn on the 20th, covering the ground like a thick blanket. The weather took on quite a wintery hue. I was alone in the patient's room."

21 November 1856, János Bolyai writes a letter to his younger brother Gergely Bolyai.

23 November 1856, Marosvásárhely: Farkas Bolyai's funeral.

24 January 1857, Marosvásárhely, Bolyai writes a letter to "The Honourable Imperial and Royal District Court".

16 February 1857, a fragment of János Bolyai's rent agreement. It features the name of Anna Kocsis.

8 March 1857, Marosvásárhely. János Bolyai makes a preliminary agreement with representatives of the Lutheran Church in Domáld to sell the Bolyai estate in the village.

11 March 1857, Bolyai writes a letter to Gergely Bolyai.

5 April 1857, János Bolyai writes a letter to the board of the Reformed College.

16 June 1857, Marosvásárhely. Proof that János Bolyai spends his summer in Bólya in Sámuel Ábrahám's letter to the "Honourable Imperial and Royal District Court"

Summer of 1857, he spends his summer at his younger brother's in Bólya

26 November 1857, there is a great fire in Marosvásárhely at half past five in the evening. Half of Sáros Street and the farm buildings between Kisköz and Nagyköz burn down. Bolyai mentions this in his letter to Gergely in Bólya.

After 1857, János Bolyai's annual pension is increased to 420 Rhenish Florins.

8 August 1858, János Bolyai writes a letter to Gergely Bolyai

1 October 1858, János Bolyai writes a letter from Marosvásárhely to the Department of Free Socage

7 May 1859, János Bolyai receives a call up to military service from the Marosvásárhely draft agency of the Heinrich Infantry Regiment

6 November 1859, János Bolyai writes a letter to his younger brother Gergely.

18 January 1860, János Bolyai falls very ill with pneumonia.

26 January 1860, 10 p.m. János Bolyai's "words have ceased".

27 January 1860, János Bolyai, one of the greatest mathematicians of all time, dies.

IV. The Significance of János Bolyai's Discovery

Looked at from today's perspective, János Bolyai's discovery did not have such a great effect on geometry as on modern mathematics itself. Before then mathematics had been regarded to some extent as an empirical science, but after János Bolyai mathematics became a science of pure mind rather than a material science. The discovery of non-Euclidean geometry had a decisive effect on the importance of axiomatics. Bolyai's and Lobachevsky's discovery led David Hilbert once and for all to work out the axiomatic basis for the elementary geometries, after this algebra and analysis were axiomatised, then probability theory by Kolmogorov. Today it is almost impossible to list the axiomatised mathematical disciplines, but the strict need for this became the fundamental pillar of mathematics after Bolyai and Lobachevsky. Some claim that the Bolyai and Lobachevsy geometry also had an influence on Einstein in his elaboration of the general theory of relativity. This is certainly not true. Einstein had no need at all of the Bolyai-Lobachevsky geometry. After all, Gauss could truly have felt that his surface theory would also lead to a substantiation of non-Euclidean geometries. That is, Gauss could have sensed that geometry could also be reformed from within, and there would perhaps be no need of such radical and formal systems as non-Euclidean geometry. Gauss turned out to be right, because his surface theory was then generalised by Riemann to arbitrary manifolds, and Einstein built his general theory of relativity on this, or on its improved variant.

Irrespective of this, it is known by few that Bolyai and Lobachevsky also worked on establishing a gravitational law.

"In a manuscript dated 1835, János Bolyai urged the elaboration of mechanics on a non-Euclidean basis. As a first step, he came up with a new, non-Newtonian gravitational law. For the radial component of the force exerted by a body of mass M on a body of mass m at a distance r, Newtonian theory gave the equation

$$F = -K\frac{mM}{r^2} \tag{1}$$

By extending the denominator of the fraction on the right hand side of (1) by 4π, the Euclidean expression valid for the surface of a sphere appears. The Bolyai-Lobachevsky geometry gave the expression

$$4\pi k^2 \sinh^2 \frac{r}{k} \tag{2}$$

for the surface of a sphere. Using this as a basis, Bolyai substituted (1) with the force equation

$$F = -KmM\left(k^2 \sinh^2 \frac{r}{k}\right)^{-1} \tag{3}$$

In his world, Bolyai intended k to have the role of the natural unit of length, and he listed giving k a value corresponding to reality as one of his problems to be solved.

With his force law, János Bolyai was half a century ahead of his time. P. Stäckel, who could have seen the manuscript containing the law, wrote the following in his paper entitled On the mechanics of multi-dimensional manifolds given in 1903: "It is interesting that Killing (in 1885) argued for the movement of a planet around its central body in terms of the law of attraction postulated by János Bolyai." Later on, in his book entitled Farkas Bolyai's and János Bolyai's geometric investigations published in 1914, Stäckel also testified that almost at the same time as Bolyai, Lobachevsky also ascertained the law given under (20), which he published in the Scientific Communications of Kazan University. So we have every right to call (20) the Bolyai-Lobachevsky gravitational law [2]*."*

The writers of these lines have still not found the manuscript which Paul Stäckel may have seen, but they have found that part of it written in distinctive János Bolyai style: notes for the manuscript in the Bolyai Collection of Marosvársárhely Teleki-Bolyai Library: BJ 1337/1, 1^{v}, BJ 1338/1, 1v, 2, 2^{v}, BJ 1339/ 1, 1^{v}, 1339/2, 2^{v}*!*

János Bolyai's manuscripts confirm that he truly was an extremely versatile mathematician with encyclopaedic knowledge.

V. EPILOGUE

In the end, quite by chance and without anyone knowing about it, everything happened according to János Bolyai's will. He wrote out his wishes in Marosvásárhely on 31 July 1837, when he was 35 years old:

"As far as the funeral pomp is concerned, I purport it be just what military honour, dignity and pomp bring: every unnecessary, useless or even harmful spending should be avoided [3]."

János Bolyai passed away peacefully, knowing that posterity would understand his ideas.

This is what he wrote to his younger brother on 8 August 1858: "I started to be concerned. Not because I am unacquainted with the idea of death or wouldn't move to the life to come quietly and with a calm spirit, or even bravely when the time comes, except for the pains of the flesh. But I am worried mostly because I would feel very sorry and hurt if the fruits of my theoretical work, the Earth's irreplaceable public loss, were in great part lost with me myself – worry thus gripped me that it may be the start of dropsy [4]."

He did not fear death and never – not in his troubling illness, nor humiliations or hardest moments of his life – had he thought of suicide. He was only concerned that his many manuscripts, notes and theories should not be lost with him. And like his many predictions, insights and geometrical systems, this too has been fulfilled. His legacy of manuscripts and unfinished papers is in a safe place: these can be found in the Library of the Hungarian Academy of Sciences, Department of Manuscripts, in the Teleki Collection, and they are even available on CD and the Internet. A large number of dissertations and papers have also been written on his ideas.

"*...But still unmatched by all the chattels of the world, the glory of his name remains forever* [5]."

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