Szeged in 1934

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(edited by Reuben Hersh)

This article is based on two manuscripts written by Edgar R. Lorch for a proposed book on mathematics in Hungary, to be edited by Reuben Hersh. The book project was abandoned, for lack of manuscripts. After Lorch's death, his manuscripts were combined and edited by Reuben Hersh to produce this article.

1. WHY SZEGED? The year 1933 was dreary and dismal for most people. This was precisely at the end of my studies for the doctorate. By some miracle, I was spared unemployment. I was awarded a National Research Council Fellowship, for a year of postdoctoral study at Harvard University under the guidance of Marshall Stone.

There were four N.R.C. fellows at Harvard: Magnus Hestenes, David Nathan, Deane Montgomery, and me. Montgomery and I formed a seminar, to lecture each other on the material in Oswald Veblen's *Analysis Situs*. We were joined by Norman Steenrod, who shone by his determination to find out what was really going on.

These fellowships had been severely cut, both in number and in stipend. Nevertheless, even with the reduced stipend of $1,600 for twelve months, I managed to live in Boston like a Bohemian, dividing my activities between wooing the recalcitrant muse of mathematics and indulging in the follies of youth: drinking beer, going to symphony concerts, and jogging in the park. This extra year at Harvard was supposed to give us a "coat of varnish," as one of my friends put it. Whether it turned us into gentlemen or scholars is a moot question. It did provide a line in my curriculum vitae. Future employers were impressed.

Stone told me that the two mathematicians in all the world who could be most helpful to my development were John von Neumann and Frederick Riesz. (His Hungarian name, Frigyes, became Frederick when anglicized). von Neumann's name was well known to me, of course. Of Riesz, situated at the other end of the world, I was only vaguely aware. But Stone's remark was prophetic.

Stone and I agreed that my energies were best spent digging deeper into Hilbert and Banach spaces. That meant a frontal attack on Stone's Colloquium Series Publication, *Linear Transformations in Hilbert Space*, a remarkable 622-page book more often quoted than read. Stone's style has sometimes been subject to comment. It is infinitely correct but, like many of his other qualities, carried out "à outrance," with some bizarre results. For example, one of his theorems (p. 590) takes two complete pages—for the statement. The last chapter of the book fills 218 pages.

Stone had a special sense of humor. At one of our infrequent meetings I mentioned some problems as possible candidates for research topics. About the best one of my problems, Stone said, "Oh, I don't know. Somebody must have

worked on that problem already." The following week, while browsing in Widener Library, I came upon an article containing the complete solution to the problem. The author: M. H. Stone.

All of us Fellows were terrified what would happen to us if we couldn't locate a spot for next year. The only offer I heard about was to Deane Montgomery: a $1,600 assistant professorship at the University of Nevada. I applied for an extension of my National Research Fellowship. At this time the political super-potentates of the mathematical scene were centered in Princeton, N.J., where the Institute for Advanced Study had recently been established. The School of Mathematics was its leading school. There were about five mathematics professors at the Institute. In order to further distinguish them from ordinary mortals teaching at Columbia, Yale, or other universities, each professor had an assistant. There was tremendous variation in the duties of these assistants. It was traditional belief that Einstein's assistant did nothing. The only requirement for him was to be a Jewish exile from Nazi Germany. Hermann Weyl's assistant had normal duties: preparing in mimeographed form his professor's lectures on group theory. I cannot imagine what Alexander's or Veblen's assistants did—probably not much.

In early spring these potentates got together, counted up the mathematical plums to be handed out for the year, and made a list of the available talent who constituted the target space on which these plums were to be mapped. Then they sent the customary letters to the candidates: a three-paragraph personal letter to the candidates who had been hit, and a one-paragraph note of non-success to the poor souls who did not make it. One day I learned that one of my friends had received his letter—a good one. I gingerly went home, and sure enough, there was a letter from the Institute. The type-print covered the whole page—success! I would be able to live another year.

Edgar R. Lorch, Szeged, 1934

The letter was really exciting. I was being offered the job of assistant to John von Neumann! I had heard him lecture several times. He was brilliant, spoke very fast, his English was quite fluent, he made remarkably few errors. A characteristic one was to talk about "infinite serious" for infinite series. No one ventured to correct his few lapses. I had met him recently at a party. The high point of the evening was a recitation race between him and Norbert Wiener. Somehow, someone recited a line from Lewis Carroll's "The Hunting of the Snark." Norbert,

with his usual ebullience and sonorous voice, began reciting from line 1. Johnny started off in pursuit. Norbert accelerated, but Johnny came up even. We held our breaths as the lines poured out, on and on until they reached the end in a dead heat.

I made a trip to Princeton and met with Veblen, who was then running the Institute. "What," asked I, "are the duties of an assistant to Professor von Neumann?" Veblen answered with a mixture of surprise and disdain, that a mere private second class should ask such a question about a four star general. His answer staggered me. Here were the four principal duties of von Neumann's assistant:

1. To attend von Neumann's lectures on operator theory on Mondays, Tuesdays, and Wednesdays, take copious notes, complete unfinished proofs, see them through the secretarial jungle, and promptly circulate them to all American university libraries. This task alone was consuming the entire energies of a younger person, who had to be not only well-meaning but sharp, fast, clever, and tough. These notes ran to over 600 pages.
2. To be von Neumann's assistant as Editor of the *Annals of Mathematics*. This meant reading through every manuscript accepted for publication, underlining Greek letters in red and German letters in green, and circling italics. Also writing in the margins all necessary instructions to printers. The following anecdote illustrates the hazards of being editorial assistant of the *Annals* in the early thirties. A manuscript was submitted by the brilliant Soviet mathematician, Lev Pontryagin. Since paper was then exceptionally scarce in the Soviet Union, Pontryagin had taken wrapping paper, torn it into appropriate-sized pieces, and gone to work on his typewriter. Unfortunately, Pontryagin was blind. The wrapping paper was torn unevenly, and a good portion of the words and symbols in the margins were missing. No matter. The *Annals* editorial assistant retyped the paper, supplying all the missing symbols. What a hero!
3. To go once a week to the printers of the *Annals of Mathematics* in Baltimore in order to instruct them in the art of typesetting mathematical symbols with subscripts, superscripts, subsubscripts, etc. The *Annals of Mathematics* had been printed in Hamburg, Germany by the firm of Lűtke and Wolk. In view of increasing anti-Semitism under Hitler, the German connection was given up in favor of printing in the United States. But no American printer had ever before set up mathematical symbols! They were complete illiterates. Solution: let von Neumann's assistant teach them!
4. To translate into English von Neumann's numerous 100-page papers. Now that von Neumann was a professor in an American institute, it was thought that his papers should appear in English, not German. Since von Neumann was provided with an assistant, it was natural that the assistant should do this.

Items three and four were on the table for the first time. The first two had somehow been handled by the previous assistant. I left my meeting with Veblen in a downcast mood. Here I had the opportunity to work next to the most brilliant mathematician of his generation. But the job entailed such onerous duties that only someone with an iron constitution could survive. My constitution, it so happened, was not made of iron. It was made of reeds and bamboo sticks, very satisfactory under moderate pressures, but completely incapable of standing a huge overload. But what choice had I?

A few days after returning to Cambridge, I received a letter from the Dean of the Graduate School at my alma mater, Columbia University. The contents made me radiant. In view of my "outstanding work in scholarship and research," the letter said, I had been awarded a Cutting Traveling Fellowship for the following academic year. There were no conditions on the award, except to use it for travel, presumably in Europe. The stipend was $1,800 (more than I was currently receiving as a National Research Council Fellow). What should I do? I debated with myself and discussed it with others. I already had in mind the professor whom I wanted to visit: Frederick Riesz of Hungary—the man suggested by Professor Stone. Riesz worked in a town I had never heard of, Szeged. I went to my atlas and found it: the second city in Hungary. There was a university: *Ferencz-Jozsef Tudomány Egyetem*. I was mouthing my first words in a strange new language. If John von Neumann was the acknowledged genius of modern mathematics, Frederick Riesz was the dean of functional analysts. He was not well known to the world at large, but the cognoscenti had the highest respect for him. In the field that interested me, Riesz was the classic leader.

Professor F. Riesz Szeged, 1934

I wrote to Riesz asking if I could spend some months with him. I wrote to von Neumann and Veblen, explaining that my nervous constitution would not allow me to perform adequately the duties of Von Neumann's assistant. (I heard subsequently that the position that had been offered to me was divided into four pieces. Heaven knows, each quarter was substantial enough.) Riesz wrote me a short, pleasant letter accepting my proposal. The die was cast. Off to Szeged!

II. SZEGED. In the early twentieth century, there were only a few universities in Hungary. The one in Budapest, the nation's capital, was the most important. Next was the one in Kolozsvár, capital of Transylvannia, a rich region of which all Hungarians were proud. In fact, Kolozsvár was Hungary's second capital, the seat of a host of administrative offices. When Frederick Riesz was a young man, he had a friend and rival in a closely related field, Lipót Fejér. Both were outstanding analysts, both at the University of Kolozsvár. In retrospect, Riesz was much deeper and was to have much greater influence internationally. When a position opened

at Budapest, it was Fejér who received the call. This meant that Riesz remained at Kolozsvár.

The dismemberment of the Austro-Hungarian Empire by the Treaty of Trianon following World War I was a catastrophe for Hungary, economically and psychologically. It lost two thirds of its territory. All of Transylvania was awarded to Romania. The entire Hungarian administrative apparatus at Kolozsvár (henceforth to be known as Cluj) was moved into the new, smaller Hungary. This included the university. Where should it go?

On the southern border of the new Hungary was a sleepy town called Szeged, now the second largest in the country. This city was the natural bastion against the Yugoslavs and Romanians, and the center of a rich agricultural area called the *Nagyalföld*. Here the university was transported, with its entire faculty—including F. Riesz. The mathematics faculty founded a journal, the *Acta Scientiarum Mathematicarum*. (For short it is called the Szeged *Acta*, to distinguish it from the original *Acta Mathematica* in Sweden and the *Acta Mathematica Hungarica* in Budapest). Within a few years the Szeged *Acta* had a world-wide reputation. Every serious mathematics library receives it. So, Szeged is now known all over the world—at least to mathematicians.

In 1934 Szeged was an agricultural town of 120,000. There may have been three automobiles. They belonged to the mayor and the chief of police. There must have been a taxi also, for I remember riding in it. The town lived on three activities. It was a garrison town, swarming with officers and soldiers. The hated Romanians and Yugoslavs were only fifteen kilometers away. It was a market for the huge fertile plain surrounding it. And it was a university town, with full range of studies, distinguished faculty, and tens of hundreds of serious students. From the American point of view, it was at the end of the world.

Placid is the word which best fits Szeged. *Unhurried* is appropriate too. With broad streets (one or two would qualify as avenues) and low, separated buildings, it was a city one could live in—providing one had something to do. It was not a city for excitement. There wasn't one tourist in town. In 1934, there was one foreigner. Virtually no one from Budapest had ever been in Szeged. This is probably true even today. Very few streets were paved. A few were cobble-stones. The rest were packed dirt. Sidewalks existed in the innermost part. Elsewhere, one walked in the street, stepping aside for the farmer's cart plodding along or the horse-drawn coach, its driver lashing at the none too elegant horse.

The deepest first impression was the horses, and the carriages they pulled. The horses, horses, horses. And in summer, the flies. These horses would invariably salute the bystander as they went by. One heard the clop-clop of their hooves as they approached from behind. At the moment of passing, just as the coachman was cracking an oath and his whip, the nags would greet you. Up went their tails, out came five or six steamy, greenish-brown balls which splattered the pavement. It was like the salute of a platoon of soldiers passing a reviewing stand. Oh horses of Szeged, where are you now? You deserve to be in the Valhalla for quadrupeds!

Every day at twelve o'clock, Szeged observed the great social event of the day: the *korzo*. The entire town gathered, or so it seemed, on one of the few fashionable streets, some three of four blocks long, and paraded on foot back and forth for thirty to forty minutes, looking right and left with a view to recognizing the greatest number of people and greeting the greatest number of friends. Everyone dressed well, and if possible better. In the winter, one put on one's finest overcoat. Every man wore a hat. The greeting, to a man or to a lady, was raising the hat completely off the head, simultaneously making a pronounced bow, all the

while continuing to walk briskly forward. This courteous greeting was a Hungarian custom ingrained firmly in youth, and not easily forgotten in later years. I remember receiving such a greeting in 1950 in Cambridge, Massachusetts, across a 70 meter avenue, from that most courteous genius, John von Neumann. Sometimes the two greeters would stop to converse a minute. Then the words exchanged were "*Szervusz*" between two young men, and "*Kezét csókolom*" from a man to a lady. This *korzo* performance kept up furiously for thirty to forty minutes. The crowd was so thick that one felt one was in Times Square. Then all of a sudden the crowd would dissolve, the street became deserted, and Szeged returned to its usual somnolence.

Postdoctoral students lived in dormitories such as the Eötvös Kollégium. Each had an adequate room, with cot, table and hard chair. The room was kept in order by a hall boy, who would run errands for a tip. The entrance to the Kollégium was locked at 11 p.m. Access for latecomers was by ringing a bell to waken the concierge. After midnight you had to pay a fee. Poor students couldn't afford it, and were in their rooms by 10 p.m. The "rich" could spend their evenings drinking wine in the cafes and return at all hours. This was especially true during carnival, when merriment went on until the wee hours of the morning.

The carnival period was the welcome sign that the long, bitter, sunless winter was coming to an end, and the dreary routine of work and study was going to be broken. The merriment took the form of good-natured drinking and frenzied dancing. Each café had one or two orchestras, and the music continued with scarcely a pause until after four in the morning. Scores of young men were present, including students and officers. Also present was a group of modest young ladies, each accompanied by her chaperone. The boys outnumbered the girls about four to one. The girls wore formal evening gowns. But remember, we are in Szeged, not Budapest, and the year is 1935, not a very affluent time. So the dresses were of satin or cretonne, definitely not too sparkling. During the course of the carnival a girl might be seen alternating between two dresses.

The favorite music was, of course, the Viennese waltz. It was played with a frenetic élan from beginning to end, passing through all the dances of Johann Strauss and Ferenc Lehár. At the end of each dance, the orchestra would immediately break into the next swirl, even before the vigorous applause for the last dance had died out.

The boys formed groups of four or five who would dance with the same girl. As soon as one boy had exhausted himself, having spun his partner and himself to the point of dizziness, his companion would come up, tap him on the shoulder and shove off with the hapless girl. At the end of that dance, a third boy would come up and repeat the act. The young lady had started the evening like a cool, fresh flower, but little by little she had become a steamy mass of limp flesh, flushed in the face and perspiring under the arms. And let her beware of begging off, claiming that she was tired! Thenceforth she would be ostracized, and not dance again. It was pitiful to see each girl pirouetted around the floor while her squadron of predators sat at a table, sipping wine a bit too freely, and from time to time addressing a courteous phrase to the chaperone, who was having thoughts about their qualifications for matrimony, and about how times had changed (for the worse) since she was young.

Still, with this merriment, there was political tension in the air. It was all over Europe, and Szeged shared it. Newspapers were avidly read; some people spent two hours a day on them. The situation with the immediate neighbors, Yugoslavia and Romania, was quite dangerous. An innocent visit by taxi to their triple border

Edgar R. Lorch, in the library at Szeged, 1934

with Hungary, just a few kilometers away, evoked an alarming response from the border guards on the other side, enough to make one cut short the visit. But everyone who had perspective had his eye on Germany. The last war had been bad enough. What would happen now? On a visit to Budapest I met the Minister of Commerce and his charming, well-to-do family, including his beautiful twenty-year-old daughter. The father stated his problem bluntly. He was a Jew. He could read the writing on the wall. He saw what was going to happen in Germany. He would be the happiest man in the world if I would marry his daughter and take her away from Europe. Poor man! What happened to him? And what happened to the sweet young girl?

III. RIESZ FRIGYES. At a European congress of mathematicians around 1910, three or four outstanding young mathematicians sipping tea in a café decided to send a postcard to a highly esteemed English colleague, G. H. Hardy. No one signed his name. Instead, each put down the one formula he had discovered which had made him famous. Riesz put down his representation formula for the general linear functional on the space of continuous functions $C_{(0,1)}$, which is now known as the Riesz representation theorem: $Ff = \int_0^1 f(x)d\mu(x)$. Needless to say, Hardy needed no prompting to unravel the card. Among the cognoscenti Frederick Riesz was already a world-known figure.

Besides his representation theorem, his most famous contributions include: the central role in creating the theory of compact linear operators; recreating the Lebesgue integral without relying on measure theory; the use of subharmonic functions as basic tools in potential theory; introducing the spaces L^p, H^p, and C into mathematics, and the basic work on their linear functionals; the ergodic theorem; the proof that monotonic functions are differentiable almost everywhere; the Riesz-Fischer theorem, which is a central result about abstract Hilbert space, and is also essential for the proof of the equivalence between Schrödinger's wave mechanics and Heisenberg's matrix mechanics.

Riesz was a quiet man who sometimes may have given the impression that he was unapproachable. That impression was incorrect. In his later life in Szeged, he acted the part of a "vieux garçon," always pleasant with the people around him, usually deep in thought. People there could hardly have conceived that he was a mathematical genius. Local people (excluding university intimates) were amazed

that someone had come all the way from New York to be close to him. Many times I was taken aside and asked, "Is he really that famous?"

His lack of attention to others may have given the appearance of displeasure. He knew his own worth fully, and calmly steered his course. Undoubtedly he was troubled at having been kept in Kolozsvár and Szeged most of his life, not receiving recognition from his country by a call to Budapest until he was late in years.

The people he came in contact with—excluding, of course, his mathematician colleagues—thought he was a strange, inoffensive man. To them he was a sort of teddy-bear—short, rather corpulent, unhurried in movement, slow, mumbly, and parsimonious in his speech. He could invariably be found, either in his easy chair at the Institute, at lunch at his table in the Hotel Tisza, or at supper in his club. His meals would last three hours—well, perhaps not always, but certainly two and a half. After eating copiously with his napkin under his chin, he would light up his cigar, have the waiter bring the day's newspapers, and plunge into a complete reading of at least five of them. From time to time a cloud of smoke would rise from behind his paper, or he would throw back his head, close his eyes, and after a pause mutter "*Ja uj*, I see now." Then back to the paper. Finally, he would rise and slowly, very slowly, walk to his apartment.

During this walk, he would frequently stop and turn to me, his eyes blazing with pleasure. He would get close, probably because he was short-sighted, and push me back with his stomach. Then he would tell me, ever so briefly, about a new idea for a proof made "*pour épater le bourgeois*." He loved mathematical pranks. For example, in the fields of measure, integration, and differentiation, the classic order of development is the one I have just written down. Riesz showed that the three subjects can be developed in any order. He loved being a bad boy, upsetting preconceived ideas.

Riesz and I both had quiet personalities. When we walked together, each of us was absorbed in his own mathematical thoughts. But I could interrupt him with a question, which he accepted without fuss, to be disposed of in any of a variety of ways. To: "Do you know an example of such and such"; or "Why in the theory of absolutely convergent series does it seem that . . . ," he might answer: "Aha, that is a good question." After an abundant meal and his reading of all the local newspapers, he would tap me on the arm and say, "I have your example. Consider . . . " Or simply, "Oh, no. You must not ask that question," and half wink. Once, after I suggested a problem, he repeated it slowly twice to make certain he understood. Then, absolute silence. After a half hour, he exclaimed, "Ja uj. I have it. Yes, I have it," and he leaned to me, his eyes full of joy and mischief. But that was the end of it. He never made me privy to his solution.

Riesz's younger brother, Marcel, was also a very distinguished mathematician, a brain export from Hungary to Sweden. Their interests were not identical, but they did publish one very important result together, known to all as the theorem of F. and M. Riesz. Fred was very fond of his brother, and spent every summer with him. The two were a prize exhibit at any mathematical congress. However, Marcel knew what the score was. Once at a meeting, a mathematician seeing them exclaimed, "Ah, here are the two Riesz!" "No," returned Marcel, "there is only one Riesz."

Riesz was a dangerous man to collaborate with. He was constantly having new ideas, and his latest brain child was his favorite. This could have disconcerting results for his collaborator. The experience of his former assistant, Tibor Radó, illustrates this.

During the academic year, Riesz lectured on measure theory and functional analysis. Radó would take copious notes. When summer came Riesz would leave for a cooler spot (Győr). Radó would sweat it out in Szeged for three months, writing up the lecture notes for publication in the fall. At the end of September, Riesz would put in his first day at the Institute. Radó would come to the library to greet his superior, proudly carrying a stack of eight hundred hand-written pages, which he placed in Riesz's lap with a look of great satisfaction. Riesz would glance at the bundle, and raise his eyes with a mixture of kindness and thankfulness, and at the same time with a spark of merriment, as if he had pulled off a fast one. "Oh, very good, very good. Yes, this is very nice. But I tell you, during the summer I had an idea. We will do it another way. You will see when I give the course. You will like it!" This took place many years in a row. The book was not written until eighteen years later, with Béla Szőkefalvi-Nagy as co-author.

Riesz was a quiet, law-abiding citizen. He respected the laws which mesh us in. But he also had a sense of humor, and enjoyed enormously any situation which made the "administration" look foolish. I was involved in one of those situations. When I arrived in Hungary, I had a visa valid for three months. Around the end of November, I received notice from the police that my visa was about to expire. Riesz forthwith asked his assistant (secretaries were unknown at the university) to prepare a statement that I was carrying out research under his supervision, and requesting my visa be extended for six months. On Friday afternoon the letter was typed on Institute stationery, and signed by Riesz with all his titles. The next morning, equipped with the letter and my passport, I went to the police. The day was beautiful, lighted but not heated by a late fall sun. The city was quiet and seemed well-disposed. After a short wait I was shown to the Chief. He received me courteously, and read the letter. But then he gave signs of indecision. He called in his second in command. They began an animated discussion. At first the second in command just listened. Then he seemed to become completely of the opinion of his Chief. The two of them came over to their petitioner, who was getting nervous, and began a long explanation in Hungarian, which at first I did not understand. By and by, I got the point. The letter was fine, except that the Institute's rubber stamp had not been added to it. Without the rubber stamp, the letter was not valid.

I rushed to the Institute. It was Saturday, and no one was in. But I had a key. I thought I would simply go in, go to the one and only desk, open its one and only drawer, take out the one and only rubber stamp, stamp it on my letter, and then rush back to the police with my letter in A-1 order.

Easier said than done! When I opened the drawer, I found not one rubber stamp, but fifteen: Airmail, First Class, Registered, Printed Matter, and so on. They were all Greek to me. I decided on the following solution. (To this day I don't know where I got the nerve). I took a blank piece of Institute stationery, and on it printed each of the fifteen rubber stamps. Then I ran back to the police, jubilantly pointed at the fifteen imprints on the paper, and said to them, "Just show me which one you want, and I'll go back to the Institute and put it on the letter for you!" The police didn't understand one word of this speech, but they grasped the situation: they were dealing with either a child, a feeble-minded person, or a dangerous character. And what kind of offices are they running at the University, with sacred seals left within reach of any American amateur spy? After a quick consultation they gave me my visa and ushered me out of the office, with severe admonitions which were not understood.

On Monday, I reported these happenings to Riesz. When he understood my offense against officialdom, he collapsed in laughter. For weeks he repeated the

story to everyone. I am sure his opinion of me shot up. It was the kind of thing he would gladly have done himself in younger days.

When I first met Riesz, I expected to communicate in French. Although he still wrote French of considerable elegance, he was no longer in his French period. I never heard him utter more than a passing phrase in German—at most, he might tell a German-Hungarian joke. He had been studying English for the past three years, and so English became the language between us. His study of English had been exceptionally thorough. Not only had he assiduously studied grammar and composition, he had read much literature, including a good number of the plays of G. B. Shaw. As a distinguished professor, it was understood that he was capable of learning anything he wanted to in the seclusion of his room. In fact, he never had an English teacher with whom to exchange a single word. (There was one English teacher in Szeged, an unmarried lady who had been living there for almost twenty years, teaching the few adventurous souls who were intrigued by things British.)

It was to me that Riesz uttered his first words of English, after three years of study. The results were strange and at times, with the best of good will on both sides, slow. Sometimes Riesz corrected my English pronunciation. For example, once I asked whether a goose that had just been brought was well-cooked. He did not understand until it came to him in two syllables. "Coo-kud," he corrected, and set to with a twinkle of satisfaction.

Spoken languages are a common topic of conversation among Hungarians, since their native tongue is so impenetrable to foreigners. In one group the question was once raised, what languages did Riesz speak? "Riesz speaks no language," answered a waggish tongue. This was in a way a compliment. Riesz' mind was so much faster than his tongue that he had pretty much given up trying to get his tongue to keep up with his mind. He was such a perfectionist that at the moment he was starting to send a message, he would already have improved it twice, so he just suppressed the whole thing. But of the written word he was a master.

During the four or five holidays and long weekends during the year, Riesz always asked me to join him on an excursion. Our home in Budapest was the Hotel Gellért, at the foot of the rocky cliffs facing the Danube. It was probably the finest hotel in the city, known for relaxed lounges, beautiful rooms, delicious cuisine and, of course, its thermal baths. We spent many hours in its pool. I still see next to me the walrus-like body of F. Fiesz, swim-floating very slowly while dreaming up some theorem. In the afternoon we would visit local colleagues at Fejér's home and hear the latest international gossip. Once during the late fall we took a three-kilometer walk in the Tátra Mountains of north-east Hungary. The walk took less than three hours—but not much less.

Riesz and I collaborated on one joint paper while I stayed with him. I did not have the experience so poignantly described by Radó. Our paper concerned the formula $A = \int dE(\lambda)$ for unbounded self-adjoint transformations in Hilbert space. The question, of course, was to go from the bounded case (known for thirty years) to the unbounded. Von Neumann and Stone had accomplished this by using bilinear forms and Lebesgue-Stieltjes integration, from which the final result could be pieced together, providing one was still following. Riesz had looked at this problem, and was not satisfied with the existing proofs. We joined forces to produce two new proofs clearing away the complexities of integration theory, showing that the unbounded case can be reduced to a sequence of bounded cases which can then be pieced together. (I went back to this formula for the last time in 1950, showing it can be obtained by complex integrals of the Cauchy type, all in the uniform topology of operators.) The joint paper was written up by me and sent to

Ray's Visit to Szeged in May 1989

The purpose of our visit to Hungary in May 1989 was to celebrate a collaboration between American and Hungarian mathematics of old days (1934). The arrangements fell mainly in the hands of Hungarian Italianists who of course invited me as their American colleague to a lecture in their department. The intermediary between us and the Italian Department in Szeged was Péter Sárközi, Chair of Hungarian Literature at the University of Rome who had organized step by step in detail our stay in Hungary.

The "homecoming" celebrated at the József Attila Tudományegyetem by Ray's old mathematical friends was a touching event. I sat with a group of young students in the back of the classroom. While my husband was filling a wide, beautifully clean blackboard with white mathematical formulas, three old gentlemen in the front row were nodding approvingly. The three of them (all tall, straight, elegantly dressed) questioned and answered afterwards, laughing heartily at some detail of the past and quizzing each other on the development of a famous theorem. Finally, they posed for pictures in the mathematical library, and in front of the "József Attila" building. Everything around us looked like those three men: elegant, decorous, serene.

Our days in Szeged glided by peacefully, sunny and serene: meetings at the University, lunches at the Hotel Tisza, dinners at the "Hungarian," where gypsy violins played so passionately that I felt like jumping up and dancing the csárdás. We lived in a Collegium called "Herman Ottó," a ten-story prefabricated building, a student dormitory, reasonably solid, comfortable and very clean, and at walking distance from the river Tisza, which destroyed the town almost completely in 1887. The river has a personality of its own: wide and overflowing with water, it has a menace which keeps the town on edge. Ray felt completely at home. He was peacefully working at his mathematics.

Maristella de Panizza Lorch, Professor of Italian
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the *Transactions* of the A.M.S. in September 1935, after I had returned to New York. Riesz never had a chance to have a better idea on how to do it.

While I lived in Szeged, I published a paper on functions of self-adjoint transformations in which I replaced the previous definition by bilinear forms and Lebesgue-Stieltjes integration with a theory of measure determined by a resolution of the identity, where the measure of a set is a closed linear manifold. This measure has the virtues that the measure of the intersection and union of sets is the intersection and union of the measures, and the measure of a set essentially determines the set. Riesz was much interested in this paper, and made many useful suggestions while I was writing it.

The optimal relation between a mentor and his disciple is seldom achieved. The relation between Riesz and me was optimal. It was warm, intimate, continuous, without pressure, very calm, leaving each of us free to develop his own thoughts. My stay with him was a perfect amalgam of a healthy, pleasurable life and an

uninterrupted communication of mathematical ideas. Access to mutual discussion was free, but never overused. Frederick Riesz was indeed a perfect teacher and a warm companion.

At the end of May I left Szeged. I was grateful for all he had done, but it was only much later that I appreciated reasonably well his contribution to my education. On the overnight train from Budapest to Venice, a young Hungarian man accompanied by a young woman kindly asked me in poor German to leave them the compartment for the night. They had just been married that day and were beginning their honeymoon. On arrival at Venice the next morning, he opened the corridor window and got off the train, while his bride, who spoke only Hungarian, lowered their suitcase through the window. Then a terrible thing happened. The train pulled out, with her still on it. The poor girl was cut off from everything that she knew, everything she had been living with. I knew what she felt. Hadn't I too just been cut off from my previous life?

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THE CHAUVENET PRIZE

The Committee on the second award of the Chauvenet Prize recommended that the award be made to Professor T. H. Hildebrandt of the University of Michigan for his paper on "The Borel theorem and its generalizations" published in the *Bulletin* of the American Mathematical Society, volume 32(1926), pages 423–474. Professors A. J. Kempner and D. R. Curtiss for the committee stated that "the paper presents in clear and elementary fashion, and with adequate references to literature, the development of a rather broad range of ideas and results connected with the Borel theorem. It gives the reader a compact picture not easily obtained by independent reading of the scattered literature on the subject." The Trustees adopted the recommendation and the award was announced at the annual business meeting. The prize, $100 in cash, has since been conferred.

—*American Mathematical Monthly*
37, (1930) p. 113.