Remembrances of Kurt Gödel

by Olga Taussky-Todd

This article is adapted from a talk given in Salzburg in July 1983. The remarks on the occasion were collected in a book, "Gödel Remembered," published last summer by Bibliopolis, Naples, Italy. The American distributor is Humanities Press International, Inc., Atlantic Highlands, New Jersey.

IT WAS MORITZ SCHLICK'S seminar on the philosophy of mathematics that put me in contact with Kurt Gödel in my first year (1925) at the University of Vienna. In this seminar we studied Bertrand Russell's book, *Introduction to Mathematical Philosophy*, in German translation. In the first meeting of this seminar the subject of axioms was discussed, in particular the axioms for number theory and the axioms of geometry. In the second meeting I dared to ask a question, namely about a connection between the two systems of axioms. This led, unexpectedly, to a long discussion between participants who enjoyed making lengthy speeches. Schlick never said a word, and I myself was unable to follow much of it. At the end of the meeting Schlick asked who would like to report on the seminar. Nobody replied. Then Schlick asked: "Who *will* report on this seminar?" Then Gödel volunteered. He started with the words: "Last week somebody asked the following question. . . ." He did not know my name, of course. However, from then on I was at least "somebody" for Gödel.

Although Gödel's home was in the mathematics seminar, although he was to become a student of Hahn's, although he was not a member of the Vienna Circle (*Wiener Kreis*), he was nevertheless an offspring of the Vienna Circle to which Hahn, Menger, Carnap, Waissman, and others belonged. The Vienna Circle was a group created by Schlick and concerned, if I understand it correctly, with the development of a language for science and mathematics. The time was ripe for such a creation in the late 1920s, because the necessity of testing the foundation of mathematical thinking, the methods of proofs, the axioms, the rules, had become pressing. It was a time of *Sturm und Drang* in mathematics. Wittgenstein was the idol of this group. I never actually saw him there, but I can testify to the fact that any argument could be settled by citing his *Tractatus*.

In spite of my admiration for Schlick, I myself left his seminar and even his private circle, to which I had been admitted. I was the youngest in age in the Vienna Circle, but I was disappointed that these gatherings could not give me guidance for my work in number theory. Had I realized what Gödel would achieve later, I would not have run away. For Gödel's results show that logic is not a subject that stands alone and is a *basis* for mathematical thinking; it is in fact *part* of mathematics.

Gödel and I were both born in Moravia, then a part of the Austro-Hungarian empire and now in Czechoslovakia. Gödel's birthplace was Brno (Brünn) and mine, Olomouc (Olmütz). Gödel's family had moved to Vienna in 1923, while my family had already gone there in 1909, then later to Linz, then back to Vienna. Gödel entered the University of Vienna in 1923. Among our teachers were the number theoretician Philip Furtwängler, Hans Hahn, Wilhelm Wirtinger (an expert on algebraic functions), Karl Menger, Walter Mayer (who became Einstein's assistant), Lense, Helly, and Vietoris (who is considered the founder of algebraic topology).

Furtwängler, under whom I wrote my thesis, had earned recognition through his early work in geodesy—I suppose during World War I. Later he emerged as the man who proved, and disproved, David Hilbert's conjectures in class field theory. He was self-taught and not, as is usually assumed, Hilbert's student; in fact, the two men never met. His first appointments were in his native Germany. He finally had an offer from Vienna, as successor to Mertens. It was only through the Royal Society obituary notice by G. Kreisel that I learned that Furtwängler's course on class field theory

almost lured Gödel into this subject. How class theory could have profited from a man like Gödel! However, elementary number theory was an essential ingredient in Gödel's work.

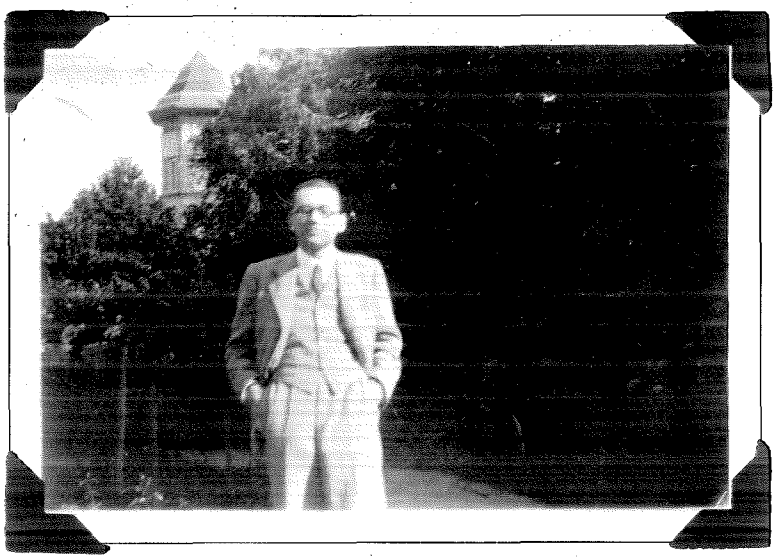
Hans Hahn was professor of geometry in the widest sense. He was also politically active for the socialist party, he wrote many papers in mathematics, he was a member of the Vienna Circle, and he was very interested in logic. But he was also an ardent follower of ESP. I myself attended one of his lectures on this subject when he fended off people who asked doubting questions. He was extremely averse to fakes who harmed the relevant research. Since Gödel was Hahn's student and had apparently similar inclinations himself, there may have been conversations between the two men in this connection. But I don't know this for certain.

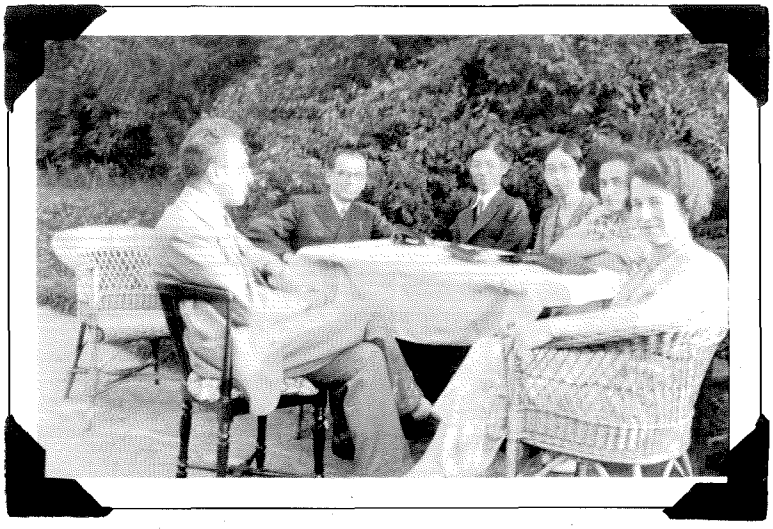
Hahn had done a great deal of work in pure mathematics. He had started off as a young man in a university position in Poland and was attached to the topology school there, but his contributions were in other branches of mathematics too. I was Hahn's assistant in my last year in Vienna (1933/34), which was also Hahn's last year of life. He was already very ill, and I practically supervised a PhD thesis for which he was the official supervisor. This thesis concerned sequence spaces and used earlier papers of his that were based on work by Helly. He made no secret of this and, in fact, he asked me to be sure to cite Helly when I gave a lecture about the results of that thesis. It was through Hahn, who recommended me to Courant at Göttingen, that I later captured a prestigious temporary appointment there,

Left: Kurt Gödel

Far left: Olga Taussky in Göttingen in the early 1930s.

Below: Taussky, at left, as Hans Hahn's assistant, in a seminar in Vienna. Hahn is seated next to her.





At the Taussky home in Vienna: Above, Gödel; and below, a tea attended by Karl Menger (left), next to Gödel. Taussky is second from right.

helping with the edition of Hilbert's papers in number theory.

I know nothing about Hahn's work in logic, but he was Gödel's thesis man, and I expect he was highly competent. I was present at a lecture on logic that he gave to an audience of nonexperts. There he stressed the fact that mathematical work was nothing but a set of tautologies. This made me unhappy, for I am a devoted number theoretician. My feelings were expressed in one of my poems by the words, "Number theory is greater than what comes later in the strict athletics of mathematics" (Primary Press, 1979).

During our student years it slowly became obvious that Gödel would stick with logic, that he was to be Hahn's student and not Schlick's, and that he was incredibly talented. His help was much in demand. One day I told him of my new system of axioms for groups. He re-proved its validity immediately. Menger asked him to study one of my papers. He saw immediately that there was only one case of the discussion that could lead to difficulties. He seemed a rather silent man, but he offered his help whenever it was needed.

Austria was not a very prosperous country in those days, so the mathematical seminar enriched its library by publishing the journal *Monatshefte*. The seminar members thus had a lively exchange with the publishers of other mathematical journals in many countries. In addition, by including reviews of books, which the local reviewers had to return to the library, they acquired many books. Gödel took on a number of these reviews. In addition, he was an editor of Menger's journal *Ergebnisse eines Kolloquiums*.

I was working on my dissertation at this time. Shortly before I received my doctorate, my family moved back to Vienna. I was then allowed to invite colleagues to tea. Gödel enjoyed these invitations, but he was always very silent. I have the impression that he enjoyed lively people but didn't like to contribute to nonmathematical conversations himself. On the whole these tea parties were for colleagues of my own age group, or for visitors to Vienna whom I had met and whose work was not unfamiliar to me. They were either class field experts such as Iyanaga from Japan (a student of Takagi) or attached to Menger's school. Menger himself came too. There was also Midutani, a statistician, but I do not know how he came to join Menger's group. But, as usual, I was asked to check his work. Most visitors came on sabbatical from the U.S., or from Japan.

I did not realize that Gödel, who clearly seemed to enjoy himself, felt superior to this circle, as in fact he was. He somehow heard that I had invited Hahn and the great Takagi, on his visit to Vienna after the Zurich conference, to meet my family, and he remarked that I counted him among the *minores gentium*. This is a medical term for doctors not of the highest standing, who of course could not command the highest fees. (In Austria doctors still conversed in some sort of medieval Latin slang, partly to prevent patients from understanding them.)

There is no doubt that Gödel had a liking for members of the opposite sex, and he made no secret about this fact. Let me tell a little anecdote. I was working in the small seminar room outside the library in the mathematical seminar. The door opened, and a very small, very young girl entered.

She was good-looking, with a slightly gloomy face (maybe timidity), and wore a beautiful, quite unusual, summer dress. Not much later Kurt entered, and she got up and the two of them left together. It seemed a clear show-off on Kurt's part.

That same girl changed quite a bit later; maybe she became a student. She came to talk to me occasionally, and she complained about Kurt being so spoiled—having to sleep long in the morning and similar items. Apparently she was interested in him and wanted him to give up his prima donna habits. Quite a bit later she handed a paper to Professor Menger, something on topological spaces. Early on in my life many people have handed chores over to me, chores of all sorts. This is still the case, and I still do not know what to do about it. Hence, Menger asked me to check her work. It really was not in my line. The best I could do was to sit down with the girl and read it with her, making her explain it to me. It appeared soon that she was unable to do so but was truly grateful to have somebody to talk to about it. It also appeared that she wanted to show Kurt that she could do something.

Gödel was well trained in all branches of mathematics, and you could talk to him about any problem and receive an excellent response. If you had a particular problem in mind, he would start by writing it down in symbols. He spoke slowly and very calmly, and his mind was very clear. But you could talk to him about other things too and his clear mind made this a rare pleasure. I understand that Einstein had many conversations with him.

In due course I heard that Gödel's 1929 dissertation, *"Über die Vollständigkeit des Logikkalküls* (On the completeness of the calculus of logic)" was an extremely important achievement and that Schlick was very much impressed with Gödel's philosophicum—the one-hour examination in philosophy, which forms part of the D.Phil. examination. He achieved the position of *Privatdozent* (so-called *Habilitation*) at a very early date with a paper called *"Formal unentscheidbare Sätze* (Formally undecidable statements)." Gödel gave me copies of his first two fundamental publications. Unfortunately, I lent them to a colleague, from whom I could not extract them later. From the well-known Austrian mathematical historian Auguste Dick I learned that Hahn had written in his recommendation, *". . .Eine Lösung ersten Ranges, die in allen Fachkreisen grösstes Aufsehen erregte und—wie sich mit Sicherheit voraussehen lässt—ihren Platz in der Geschichte der Mathematik einnehmen wird."* (". . .A solution of the top rank, which provoked the greatest respect in all mathematical circles and, as can be confidently predicted, will take its place in the history of mathematics.") This did in fact happen and shows Hahn's correct appreciation. By 1931 he had already achieved worldwide fame, only a year after receiving his doctorate. He had proved the existence of undecidable mathematical statements and had given a shock to the world of logicians and mathematicians. But he had achieved even more: he had shown something that any person with a minimum of background can understand. This is a very important accomplishment in my opinion. Gödel achieved many other results, perhaps just as important, but this is the one mainly associated with his name.

I saw Gödel in 1931 at the conference of the German Mathematicians Association in Bad Elster. It was there that he met Ernst Zermelo. I think that perhaps no other person is alive who remembers this event. I had good reason to know about it, for I worked then with the number theoretician Arnold Scholz, who was a great class field theory expert. Both Scholz and Zermelo worked in Freiburg. Scholz was eager to help Zermelo and thought a discussion with Gödel would achieve this. But Zermelo was a very irascible person. He had suffered a nervous breakdown and felt ill-treated, but had actually recovered at that time. He had no wish to meet Gödel. A small group suggested lunch at the top of a nearby hill, which involved a mild climb, with the idea that Zermelo

Ernst Zermelo at Bad Elster.

should talk to Gödel. Zermelo did not want to do so and made excuses: he did not like Gödel's looks (he actually had not met him); the climb was too much for him; there would not be enough food if Gödel came along too. When Gödel joined the group, however, the two immediately started discussing logic, and Zermelo never noticed that he had made the climb.

The peaceful meeting between Zermelo and Gödel in Bad Elster was not the start of a scientific friendship between two logicians. The trouble with Zermelo was that he felt he had already achieved Gödel's most admired result himself. Scholz seemed to think that this was in fact the case, but Zermelo had not announced it and perhaps would never have done so. It is not impossible that others too had some of Gödel's results. However, it seems to me that it needs an energetic person to take over and, with full knowledge of the work that is in the air, give creative guidance for the future. I doubt that Zermelo was such a person.

Gödel suffered not infrequently from severe mental breakdowns. I do not know whether they were caused by the overstrain he suffered through the creative processes he made his brain carry out or whether they were just in his makeup. Auguste Dick has supplied me with an amusing remark by Furtwängler concerning Gödel's result when the latter had one of his paranoia attacks: "Is his illness a consequence of proving the nonprovability or is his illness necessary for such an occupation?" I felt honored when his older brother Rudolf, a medical doctor, discussed his anxiety about Kurt with me when I tried to telephone Kurt during one of these attacks. In addition Kurt had some physical ailments. But he did not spare himself—a trait already noticeable in his performance in the Schlick seminar when I first met him. He was convinced of the value of his ideas and wanted to make sure that they were known and appreciated.

The famous mathematician David Hilbert had, among other tremendous achievements, made a list in 1901 of the unsolved mathematical problems he considered the most important. By doing this he channeled mathematical research for a long time afterward. In particular, his first two problems concerned the foundations of mathematics. Although Hilbert's problems became the basis for Gödel's work, Gödel was critical of Hilbert's claims and aims. He spoke to me about this and lashed out against Hilbert's 1932 paper *"Tertium non datur,"* saying something like, "How can he write such a paper after what I have done?" (Gödel had already proven undecidability.)

Gödel's father died young, apparently leaving the family well provided for financially. But it was never clear to me whether Kurt was given his own share of the fortune then, or whether his mother received all of it. It is my guess that he did not earn a penny until his first invitation to Princeton. And then after that he presumably had no income until the second invitation. He then stayed in Vienna as an unpaid *Privatdozent* until he left Austria for good.

On Gödel's first visit to Princeton in 1933, several colleagues, including myself, went to see him off at the train station, where he boarded the Orient Express. Later he confided to me that this was not his actual departure from Vienna. He was taken ill before reaching his boat; he took his temperature and decided to return home. His family persuaded him to try again, however. I do not recall anything he told me about Princeton or about the United States apart from the fact that the steaks he ate were very small.

During his second stay in Princeton his health broke down. I heard about this in Cambridge about 1936 via a student of Miss Stebbing, a professor of logic in London, who had heard it from Schlick. Schlick was supposed to have been pessimistic about Gödel surviving much longer. I was truly upset when this was reported. (Gödel lived, however, until 1978.)

I saw Gödel and his wife again in 1948. Although I had not seen him since before the war, it seemed as though we had seen each other the day before. My husband, Jack, and I were staying at the Institute for Advanced Study in Princeton, attached to the von Neumann project and living in one of their little houses. (The war years had transformed us into numerical analysts, and Jack had close connections with von Neumann from when the latter had visited Great Britain.)

In 1948 Gödel had not yet obtained the title of professor. It is hard to believe. There was a time when Einstein's influence there was not strong, although I do not know whether Einstein tried to do something about Gödel's position. But Einstein had great friendship for Gödel.

In Princeton, as in the old times in Vienna, I invited Kurt to tea. □