

Cartan, Europe, and Human Rights

Jean-Pierre Bourguignon

Remembering Henri Cartan, a Highly Influential Mathematician, a Passionate Advocate for Europe and Human Rights

Henri Cartan died on August 13, 2008, at the age of 104. His professional life had been extremely full, with many commitments, some strictly mathematical and others addressing more general societal issues.

His scientific achievements, and in particular his involvement in the birth and development of the Nicolas Bourbaki group, will be presented and discussed elsewhere.

His role as a teacher at the Université de Strasbourg, both in Strasbourg and in Clermont-Ferrand, where the university moved during the war, then at the Université de Paris, and most notably at the École Normale Supérieure (ENS), left a long-lasting impression on the many mathematicians who attended his lectures. The seminar that he organized and forcefully led at ENS in the 1950s has become legendary. His role in shaping a new generation of mathematicians cannot be underestimated, as he both attracted exceptional people and offered them the most advanced teaching, while orienting them towards worthwhile and challenging problems.

I personally followed his famous “Introduction à la topologie algébrique” course in 1967–68 but had to do it at a distance, as I was at that time a student at École Polytechnique with a busy schedule there.

Henri Cartan spent the last years of his career in the early 1970s as professor in Orsay at the mathematics department of the newly founded Université Paris-Sud.

He kept informed about what was happening in the mathematical community at large up to the very end of his life. Getting a few words from Henri

Cartan on one of his personal cards was always moving and a delight because of the care taken in the wording.

A first manifestation of Henri Cartan’s public concern for the free circulation of scientists occurred in connection with the International Congress of Mathematicians held in Boston in 1950. The visa application Laurent Schwartz had made to attend the ICM, where he was to receive the Fields Medal, had been set aside by the U.S. Embassy in Paris. In order to exert maximum pressure, Henri Cartan collected the passports of all the French ICM participants and threatened that there would be no French participation if Schwartz was not allowed to enter the United States. Schwartz received his visa at the very last minute, but still in time for the French delegation, led by Henri Cartan, to take the boat in Le Havre to cross the Atlantic.

Later, in 1974, he, Schwartz,¹ and a few concerned mathematicians engaged in the defense of a number of mathematicians prosecuted by their governments, such as Leonid Pliouchtch, Andrei Chikhanovitch, and Anatoli Chtcharanski in the Soviet Union, José Luis Massera in Uruguay, and Sion Assidon in Morocco. All kinds of pressures were exerted, and in the end the action of the Comité des Mathématiciens proved remarkably successful.

Later in this article, two eminent German mathematicians discuss Henri Cartan’s remarkable contributions to the German-French cooperation in difficult times, and in particular his (communicative) determination to restore the flow of exchanges right after the Second World War. His scope was broader than German-French relations and embraced Europe as a whole. He in particular tried and set the practical foundations of an academic Europe by ensuring that students would be able to move from one institution to another while progressing in their studies.

He made a very public political stand for Europe through his engagement in the “Mouvement Fédéraliste Européen”. This led him to become a candidate for the European Parliament.

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¹See L. Schwartz, *A Mathematician Grappling with His Century*, translated by L. Schneps from *Un Mathématicien aux Prises avec le Siècle* (Odile Jacob, 1997), Birkhäuser, Basel-Boston-Berlin, 2001 (ISBN 3-7643-6052-6).

Reinhold Remmert

Henri Cartan 1904–2008

In December 1949 Henri Cartan came to Münster for the first time after World War II. I was a freshman. Heinrich Behnke encouraged me to attend Cartan's lecture. I went out of curiosity. The speaker discussed his forthcoming paper on ideals and modules of holomorphic functions, *Oeuvres II*, p. 618. I understood nothing. However, I felt as if I were in good company. After the talk there was a reception. Cartan concluded his short address (in German) with the toast "À l'Europe!" I must have looked like a doubting Thomas.

In 1952 Cartan became Doctor Honoris Causa of the University of Münster. This was his first honorary degree. In his words of thanks he pleaded strongly for the reconciliation of scientists on both sides of the Rhine.

In 1953 Karl Stein attended a conference on several complex variables in Brussels. Cartan and Serre presented their Theorem A and Theorem B for Stein manifolds to a dumbfounded audience. Back in Münster, Stein said to me: "The French have tanks. We only have bows and arrows." ("Die Franzosen haben Panzer, wir nur Pfeil und Bogen.")

Complex manifolds with many holomorphic functions were baptized "variétés de Stein" by Cartan. In the late 1950s Cartan teased Stein at a conference in Oberwolfach: "Cher ami, avez-vous aujourd'hui une variété de vous dans votre poche? (Dear friend, do you have one of your varieties in your pocket today?)" Stein looked embarrassed and said: "I never use that expression." Cartan advised him to circumvent the notation by using a variation of a well-known phrase of Montel: "... les variétés dont j'ai l'honneur de porter le nom (... the varieties whose name I have the honor of bearing)."

Henri Cartan was on very friendly terms with Heinz Götze, the wizard of Springer Verlag, Heidelberg. Both men were extremely pleased when, in 1979, the *Oeuvres* of the French mathematician Cartan were published by the German publishing house. During the ceremony at La Tour d'Argent, where the leather-bound volumes were presented, numerous jubilant toasts à l'Europe were given.

In 1981 Götze suggested having the famous ten papers by Kiyoshi Oka edited. I asked Cartan for advice. He immediately agreed to write commentaries. Later he told me that he enjoyed doing this, however completely underestimated the work involved.

The last time I met Cartan was in 1997 in Paris at the "Journée en l'honneur d'Henri Cartan". We talked about bygone years and his friendship with Behnke and Stein.

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Cartan with Laurent Schwartz and André Weil, Murols, 1954.



Henri Cartan and Laurent Schwartz, Paris, 1994.

Friedrich Hirzebruch

Henri Cartan 1904–2008

I met Henri Cartan for the first time in Oberwolfach in 1951. We met for the last time during the celebration of his 100th birthday in Paris 2004. I gave a lecture with the title "Henri Cartan: A great friend, mathematician, and European". I shall use the part of this talk that does not overlap Remmert's report.

On the occasion of Behnke's eightieth birthday on October 8, 1978, celebrated in Münster, Henri Cartan gave a beautiful dinner speech. We were all sad that Heinrich Behnke unexpectedly could not attend the dinner because of illness. He died

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Orly Airport, 1976, Cartan with Schwartz (left) and Haniack (right).



With Mrs. Cartan, Orlov, and Sakharov, Paris, 1988.

one year later. Cartan's dinner speech was printed by Springer-Verlag under the title "Quelques souvenirs par Henri Cartan". In his speech Cartan recalled his first visit to Münster in 1931. Behnke, a young professor, then thirty-two years old, had decided to make Münster an active and interesting center for the young people around him. For this purpose he had invited a young French mathematician of twenty-six years having related interests who gave four lectures in German and one in French during his one-week visit. Cartan met Peter Thullen, and this was the beginning of a scientific cooperation and long-lasting friendship. Cartan reported also about his second visit to Münster in 1938. In the meantime the famous *Ergebnisse-Bericht* (Springer-Verlag) by Behnke and Thullen had appeared in 1934. Thullen had left Germany. The political atmosphere was depressing. There were not many students. But still mathematics

went on. Behnke's assistant was Karl Stein, who had received his Ph.D. degree in 1936.

During the war, the friendship between Cartan and Behnke was not interrupted; Behnke, for example, received a mathematical letter from Oka in December 1940 and informed Cartan about it. In 1943 Cartan's brother Louis was deported to Germany. About this tragedy, Cartan says in "Quelques souvenirs" addressed to Behnke:

"Je ne puis pas non plus oublier toutes les démarches que vous avez faites durant les années 1943 et 1944 (en vain, hélas) pour tenter de retrouver la trace de mon frère Louis, déporté en Allemagne au mois de février 1943, et qui ne devait jamais revenir. (I cannot forget, too, all the efforts you made during the years 1943 and 1944 (in vain, alas) to try to find any trace of my brother Louis, who was deported to Germany in the month of February 1943, and who never returned.)"

Already in 1946 Cartan came to Oberwolfach, where he met Behnke again after eight years. The Oberwolfach guest book records that Cartan participated in a concert (Haydn, Bach, Beethoven) on November 1, 1946, and lectured on Galois theory for noncommutative fields on November 4, 1946. In this way Cartan began his efforts to reconcile the mathematicians on both sides of the Rhine (cf. Remmert's contribution).

Cartan was always interested in the work of Behnke and his students, in particular Stein, Grauert, Remmert, and myself.

For Stein's sixtieth birthday (1973) Cartan lectured at a conference in Munich and wrote an article "Sur les travaux de Karl Stein". He reported in particular about Stein's *Habilitationsschrift* (1940), which concerns Cousin's second problem. The title (translated into English) is: "Topological conditions for the existence of holomorphic functions with a given zero divisor". This is related to the famous Theorem B of Cartan and Jean-Pierre Serre.

Cartan reported about my thesis (written under Behnke and Hopf) in the Bourbaki seminar of December 1953. In the thesis I had introduced complex spaces of dimension 2 and described the resolution of their singularities.

In his *Habilitationsschrift*, Hans Grauert proved that, for a Stein manifold X and a complex Lie group L , the classification of topological principal fiber bundles over X with structural group L coincides with the classification of analytic principal fiber bundles over X with structural group L . This includes the solution of Cousin I and II ($L = \mathbb{C}$ or $\mathbb{C}^*$, respectively). Grauert published his work in three parts in *Mathematische Annalen* in 1957 and 1958 and thanked Cartan for advice. Cartan lectured on



With Marston Morse, Princeton, 1966.

Grauert's results in the "Symposium Internacional de Topologia Algebraica, Mexico 1956".

In his contribution Remmert shows that Henri Cartan was a real European. I want to emphasize this by the following remarks:

The first European Congress of Mathematics took place in Paris from July 6 to July 10, 1992. In his opening speech, Cartan calls the congress an event of great importance showing that the mathematicians know the solidarity of the countries of Europe, which are different in so many ways but have a rich common heritage and a common future. Cartan was especially glad that this first European Congress reunited the mathematicians from the two parts of Europe that were separated for such a long time. Cartan's eighty-eighth birthday was celebrated during the first European Congress at the residence of the German Ambassador in Palais Beuhaus.

The Association Européenne des Enseignants (European Association of Teachers) was founded in Paris in 1956. Cartan was president of the French section. As such he took the initiative to invite participants from eight European countries to a meeting in Paris in October 1960. Emil Artin, Heinrich Behnke, and I were the German members. The second meeting of this committee was in Düsseldorf in March 1962. As a result, the *Livret Européen de l'Etudiant* (European Student's Record) was published and distributed by the European Association of Teachers. The booklet contained a description of minimal requirements for basic courses. It was supposed to increase the mobility of students from one country to another. The professor of one university would mark in the booklet the contents of courses attended by the student. The professor at the next university would then be able to advise the student in which courses to enroll. The booklet was not used very much. For



Cartan with Shiing-Shen Chern, in front of Dolomieu town hall, 1984.

me it was often useful when reforms of the contents of courses were discussed.

The efforts of Cartan to harmonize mathematical studies in Europe date back more than forty-five years. Now we are implementing the Bologna process. In all European countries bachelor's and master's degrees are to be introduced. Is this the harmonization we wanted?

Cartan, the European, was also active at the international level. He was president of the International Mathematical Union for the four years 1967 to 1970. He addressed the International Congress of Mathematicians in Nice in 1970 during its opening ceremony and announced the names of the Fields Medal winners. Sergei Novikov, one of the four winners, was unable to attend, indicating the political difficulties of the time.

The mathematicians of my generation, from Germany and everywhere else, learned from Henri Cartan. His papers, books, and seminars were a source of inspiration. He showed us the right way of developing international cooperation. He and his wife were charming hosts for many visitors to Paris. He has left us, but we will always remember him with gratitude.