

## Autobiography of Tjalling C. Koopman.



I was born in 1910 in 's Graveland, the Netherlands, the third son of Sjoerd Koopmans and Wijtske van der Zee. Both my parents had been trained as schoolteachers and my father was principal of the Protestant "School with the Bible". Our house was squeezed between the two sections of that school. The row of these three buildings was, as almost all houses in the village, sandwiched between one long street and a parallel, straight and narrow canal, marking one of the village's boundaries. Across the street were large wooded estates, each with meadows and a large mansion. The occupants of the mansions kept aloof from the life of the village except for the employment of coachmen, gardeners, servants and contractors. Across the canal was a path for horses and an unpaved, more sparsely-settled road belonging to another village. Small freight boats traveling between Amsterdam and Hilversum were not allowed to use their motors in 's Graveland because the buildings abutting on the canal might be damaged by the waves so generated. Instead, men called "jagers" specialized in making their horses pull the boats for the length of the village.

Every weekday morning at nine, our living quarters and the narrow strip of garden in the back were engulfed by the sound of three different hymns sung dutifully, simultaneously, but, independently, in true Charles Ives fashion, by the schoolchildren on both sides. The knowledge imparted by schools and the talent for its acquisition ranked high among the values of the family. Both parents worked to the limits of their strength to provide education fitting the talents of their children. The oldest son, Jan, became a minister of the Dutch Reformed Church and an influential leader in a Protestant student organization. During World War II, he showed great courage in both covertly and openly resisting encroachment on matters of Christian conscience by the racist policies of the occupying power. He died prematurely near the end of the war, a victim of a stray bullet from a nearby execution of hostages. Hendrik, the second son, became a chemical engineer who, in the last 15 to 20 years as a staff member of a semi-official consulting bureau, contributed to industrial planning in the Netherlands, in the former Dutch West Indies and in other developing nations.

When the oldest son was already receiving a university education while the second sought training in engineering, the family, in general, and I, in particular, were fortunate indeed when, at the age of 14, I was awarded a study stipend by the St. Geertruidsleen of Wijmbritseradeel in the Dutch province of Friesland from where my parents originated. This fund had been established before the Reformation to send descendants of the family of the donor to the University. But if there were no children of that family of the appropriate age, then the moneys available could be awarded to another promising person. This is what happened in my case. The St. Geertruidsleen has supported my studies up to my 26th birthday. I shall be forever grateful for its support which gave me financial, and therefore, intellectual independence and the opportunity to explore various fields of knowledge, before settling down to the particular combination of fields, to which my efforts have been devoted since.

I went to the University of Utrecht at age 17. In the first three years, my principal emphasis was on mathematics, in particular analysis and geometry, which were taught in a precise, but traditional style. Much of my time in Utrecht went directly into the studies I had undertaken. However, some of the long vacations in 's Graveland were devoted to broader reading. Ernst Mach, *Geschichte der Wärmelehre*, and various expositions of the theory of relativity, taught me how a whole field of science can at various junctures be on the wrong track, and how entirely new concepts may then be needed to make further progress.

The general intellectual climate in Holland required of the serious young man - or so it seemed to me - that he work himself through to a "Weltanschauung", a consistent view of the world. After a summer of reading Albert Schweitzer's *Geschichte der Leben Jesu Forschung*, I greatly upset my parents by declining to confess to the Protestant faith and become a member of the church. Then followed reading in psychology and psychiatry, and conversations with two fine people in these fields. At one time I even considered switching over to psychiatry - for which I now know I would not have been suited.

Instead, in 1930, I switched my emphasis to theoretical physics - a timid compromise between my desire for a subject matter closer to real life and the obvious argument in favor of a field in which my mathematical training could be put to use. My teacher and shining example of what a scientist should be like was Hans Kramers, after the death of Ehrenfest, the leading theorist in Holland in that period, and a very humane and inspiring person with a gentle wit.

His attitude and style in the application of mathematics to a substantive field have exerted a pervasive influence on all my later work. Below, I cite my one publication in quantum mechanics so that I can add here that Kramers's generosity and my inexperience combined to prevent his being listed as co-author of that paper. He should have been, because, although the main proposition was my own idea, Kramers, besides guiding the writing, also supplied the proof!

The early thirties brought what liberal economists called the great depression and Marxist economists described as the great crisis of capitalism. It dawned on me that the economic world order was unreliable, unstable, and, most of all, iniquitous. I sought intellectual contacts and friendship with a group of socialist students and also with a small handful of communist-oriented students and unemployed workers. Thus, Karl Marx's *Das Kapital*, Vol. I, came to be the first book in economics that I studied. While never accepting the labor theory of value, I was stirred by the famous chapter on the state of the English workers during the Industrial Revolution.

Later, in the Amsterdam period, I also had the good luck to be introduced by Kramers to his friend Jan Romein, a fine historian with a marxist outlook and, later, Professor of History at the City University of Amsterdam. I was taken into the friendship of this kind and reflective scholar and his wife, Annie. From Romein, I received a sense of the many forms of historical and political experience of mankind, and of the fragility of the more democratic forms of social and political organization.

From my explorations of Marxist thinking in my student years, I have retained a lifelong interest in the prior formulation of that fundamental part of economic theory that does not require specifying the institutional form of society to be used as a framework for the description and comparison of different economic systems.

Still in Utrecht, a physicist friend had mentioned to me that a new field called mathematical economics was being developed, and that Jan Tinbergen, a former student of Ehrenfest, was the leader in this field in the Netherlands. This information opened the way for me to apply my mathematical training to a subject still closer to human concerns. Probably in mid-1933, Tinbergen received me cordially and included me among the small number, I moved to Amsterdam where Tinbergen was then lecturing once a week. In the first half of that year, I had the privilege of almost weekly private tutoring from him over lunch after his lecture. I have been deeply impressed by his selflessness, his abiding concern for economic well-being and greater equality among all of mankind, his unerring priority at any time for problems then most crucial to these concerns, his ingenuity in economic modeling and his sense of realism and wide empirical knowledge of economic behavior relations.

On Tinbergen's advice, I now read Cassel, and, with a group of friends, Wicksell. I also studied econometric and statistical literature. For my doctoral dissertation, I chose, staying close to my training, a subject in mathematical statistics aimed at application in econometrics. In the fall of 1935, I spent four months in Oslo with Ragnar Frisch, this giant of mathematical economics whose finest work tended to remain hidden for long periods in mimeographed lecture notes. At his request, I gave some lectures on the new ideas in statistics then being developed in England by R.A. Fisher, J. Neyman and others. However, I did not succeed in persuading him that probability models were useful in assessing the significance and accuracy of econometric estimates. I, in turn, departed impressed, but not persuaded by his econometric approach either.

Since my dissertation was to be presented to the Faculty of Mathematical and Physical Sciences, Kramers, who had moved to the University of Leiden, agreed to be the thesis supervisor, consulting with Tinbergen about the economic aspects. The degree was granted in November 1936 by the University of Leiden.

In Amsterdam I also met my future wife, Truus Wanningen, among a small group of students of economics whom I tutored in mathematics. Among our shared interests were economics, music, nature, love, and independence from the views and lifestyles of our parents. We married in October 1936.

For the two academic years 1936-1938, Tinbergen was called to the Financial Section of the League of Nations for what became his pioneering work on a model of business cycles in the United States. I was then asked to take over his lectures at the School of Economics in Rotterdam in those years, and, later, to succeed him in 1938 in Geneva to construct a similar model for the United Kingdom. In the two years in Geneva, I learned much from James Meade about the economics of welfare and the

problem of optimum population. As to the project I was appointed for, it gradually became clear to me that I lacked the flair and the breadth of empirical knowledge required for the task. The project was discontinued at the outbreak of World War II.

When the war spread to Western Europe, I managed to move with my wife and our six-week old daughter to the United States in June 1940. I shall always remember the essential help given to us by Samuel Wilks of Princeton University and Mrs. Wilks in that difficult time.

The scientific fall-out from my work as a statistician for the British Merchant Shipping Mission in Washington during the war has already been described by Professor Ragnar Bentzel in his remarks at the Nobel award ceremony. My direct assignment was to help fit information about losses, deliveries from new construction, and employment of British-controlled and U.S.-controlled ships into a unified statement. Even in this humble role, I learned a great deal about the difficulties of organizing a large-scale effort under dual control - or rather in this case, four-way control, military and civilian cutting across U.S. and U.K. controls. I did my study of optimal routing and the associated shadow costs of transportation on the various routes, expressed in ship days, in August 1942, when an impending redrawing of the lines of administrative control, left me temporarily without urgent duties. My memorandum, cited below, was well received in a meeting of the Combined Shipping Adjustment Board (that I did not attend) as an explanation of the "paradoxes of shipping" which were always difficult to explain to higher authority. However, I have no knowledge of any systematic use of my ideas in the combined U.K.-U.S. shipping problems thereafter.

In mid-1944 my work at the Merchant Shipping Mission fizzled out due to another reshuffling of responsibilities, this time between the Ministry of War Transport in London and its representation in Washington. I corresponded with Jacob Marschak with whom I had had many discussions in Oxford in 1939 and in New York in 1940-41. He invited me to join the staff of the Cowles Commission for Research in Economics, affiliated with the University of Chicago. This was the beginning of a long period of close interaction, collaboration, and personal friendship with Marschak, a gentle, wise, and witty scholar who sees through pretence and timidity alike. In Chicago, Marschak created a rare kind of research environment, by shrewd selection of staff members and by a truly open style of work and discussion. Over an extended period, the focus was the construction of econometric models of the kind pioneered by Tinbergen. Since this work and the names of the participating scholars have become well-known, I shall only mention two other intellectual sources. The idea that the approximate simultaneity in the determination of different economic variables should affect the method of estimation of behavior parameters was, by my knowledge, the unique contribution of Trygve Haavelmo. The related work in Chicago on identifiability of economic relations is the inferential counterpart of Frisch's concept of "autonomy" of economic relations set out in a memorandum prepared in 1938 for a discussion of Tinbergen's work for the League of Nations. As far as I know, this memorandum has not been published, but it was known to both Haavelmo and myself at that time.

My work on the transportation model broadened out into the study of activity analysis at the Cowles Commission as a result of a brief but important conversation with George Dantzig, probably in early

1947. It was followed by regular contacts and discussions extending over several years thereafter. Some of these discussions included Albert W. Tucker of Princeton who added greatly to my understanding of the mathematical structure of duality.

In 1948, I succeeded Marschak as Director of Research for a six-year period. In 1955, Mr. Alfred Cowles and other members of the Cowles family shifted their generous financial support to Yale University while, simultaneously, five members of the staff of the Cowles Commission, including myself, accepted appointments at Yale. A new Cowles Foundation for Research in Economics at Yale University was set up with James Tobin as Director. In most of my Yale period, my research, chiefly on optimum allocation over time, had more of a solitary character. But there was also another six-year stint as Director, 1961-1967, and a joint study with my Yale colleague, J. Michael Montias, on the description and comparison of economic systems while both of us spent the year 1968-1969 at the Center for Advanced Study in the Behavioral Sciences at Stanford, California.

My work in activity analysis and in optimal economic growth has been described in more detail by Professor Bentzel and in my Nobel lecture.

As a result of service on a committee for the National Academy of Sciences of the U.S., I have, in recent years, become interested in the application of the techniques of optimization over time in the field of the supply of energy. In part, as a result of this interest, I made a one-year visit to the International Institute for Applied Systems Analysis in Laxenburg, Austria. At IIASA I learned to see energy problems through the eyes of several different professions. I also served as leader of the Methodology Project at IIASA in the second half of 1974, succeeding George Dantzig in that function.



Our family has three splendid and, now, adult children. Their choices of professions and spouses have leaned toward the life sciences, thus enlarging the range of discussions at family reunions. Even before, but particularly after they left home, my wife and I have travelled for professional purposes to many parts of the world, with extended stays in Western Europe (1950), Italy ('65), The Soviet Union ('65, '70), India, New Zealand and Australia (all '69), Poland ('72) and Austria ('74). My wife has also given me and others great support, as an economic bibliographer, as a general critic of ideas and actions, and as an advisor on important decisions, including those I ultimately regard as my own. She has helped in the writing of these notes.

My wife, Truu, makes beautiful photographs and weird etchings and drawings. I have at various times written music, which has come out best when for voice, perhaps because then, the poet has already supplied the form.

PUBLISHED WORKS:

"Ueber die Zuordnung von Wellenfunktionen und Eigenwerten zu den einzelnen Elektronen eines Atoms," *Physica* 1, no. 2, 1934, pp. 104-113.

"Exchange Ratios between Cargoes on Various Routes (Non-Refrigerated Dry Cargoes)." Memorandum for the Combined Shipping Adjustment Board, Washington, D.C., 1942. Publ. in *Scientific Papers of Tjalling C. Koopmans*, Springer Verlag, 1970. pp. 77-86.

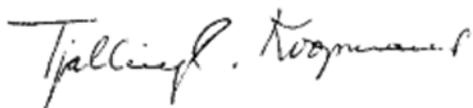
"On the Description and Comparison of Economic Systems," (with J. Michael Montias) in *Comparison of Economic Systems*, A. Eckstein, ed., Berkeley, Univ. of California Press, 1971, pp. 27-78.

References to other work are given at the end of the Nobel lecture and in *Scientific Papers of T.C.K.*

From *Nobel Lectures , Economic Sciences 1969-1980*.

Addendum: Tjalling Koopmans died in 1986.

1974 1976 The Bank of Sweden Prize in Economic Sciences in Memory of Alfred Nobel 1975 Press Release Leonid Vitaliyevich Kantorovich Autobiography Curriculum Vitae Tjalling C. Koopmans Autobiography Last modified May 7, 2001 Copyright© 2001 The Nobel Foundation The Official Web Site of The Nobel Foundation.

A handwritten signature in black ink, reading "Tjalling C. Koopmans". The signature is written in a cursive, flowing style.