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IN MEMORIAM
EVERT WILLEM BETH
(1909-1964)

AREND HEYTING

Evert Willem Beth, who died on the twelfth of April 1964 at the age of 55, was one of the very few modern scholars who combined a wide field of deep and well-founded knowledge with meticulous research of details in fields so far apart as Aristotelian philosophy of science and mathematical logic. Though he is best known by his work on mathematical logic, he considered himself a philosopher and saw as his main task to prepare the first steps towards a philosophy that will be able to deal with modern science. There is no doubt that many of his ideas will be of great value in the development of such a philosophy.

Beth's weak health forced him strictly to organize all his activities. It is not because of vanity, but as an instance of this trend to organize his life, that he wrote a brief account of his scientific development. The present author thanks Mrs. Beth for giving him the opportunity to use these notes.

Beth's father was a good mathematician, interested in the history and foundations of this discipline. He did much for the improvement of the teaching of mathematics in the Netherlands. Evert also took interest in the didactics of mathematics, he wrote several papers on this subject, spread over a period from 1937 till 1960.

Beth himself, looking back upon the development of his philosophical ideas, divided his scientific activity into four periods. After studying mathematics, in which he made the "doctoraal examen" (corresponding about to M.Sc.) in 1932, he studied mathematics and philosophy at Utrecht, Leiden and Brussels. In 1935 he obtained the degree of doctor of philosophy by defending a thesis on "Rede en aanschouwing in de wiskunde" (Reason and intuition in mathematics). Its subject is the relation between intuition (in the sense of Kantian Anschauung) and rational deduction in Euclidean geometry. During this period Beth was under the influence of the neo-Kantian philosophy of the Marburg school, and of the positivism of the Wiener Kreis; as to the latter, Carnap's logicism attracted him more than Neurath's extreme empiricism. Similarly to Carnap's earlier work, Beth tried to effectuate a synthesis between these points of view. The distinction

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which he made between geometry as a natural science, as a deductive theory and as intuitively given, has not been as clearly conceived before.

During the second period (about 1935-1942) Beth widened his horizon and gradually became independent of traditional views and dogmas. Among those who influenced him in these years were Brouwer, Mannoury, Scholz, Tarski, Bernays and Church. From Brouwer and Mannoury he accepted mainly their negative arguments. Brouwer had severely criticized the views of Kant as well as those of Russell. The starting-point of Mannoury's significs was the relativity of every verbal expression with respect to the speaker's intention and the hearer's reaction; he denied that words or sentences have a meaning independent of the circumstances in which they are used.

Brouwer as well as Mannoury arrived at a form of psychologism. Brouwer considered the mental construction of the natural numbers as intuitively clear, while the program of Mannoury's significs consisted in a psychological analysis of the origin and result of linguistic actions. Beth allocated to Mannoury the insight which he formulated as follows: "Our self-knowledge possesses neither the authenticity and independence, nor the degree of certainty which we like to ascribe to it; it is, at least partly, derived from our knowledge, based upon understanding of other persons and of their reactions to our actions; in addition it is unreliable insofar as it is forced upon us with educational purposes." However, while Mannoury concluded that these influences should be analyzed and studied, Beth drew the conclusion that philosophy cannot be based upon the direct knowledge of mental phenomena. This meant a rejection of any form of idealism or psychologism. The influence of Scholz and of Tarski was more positive. Like Scholz, Beth was convinced that modern science should play an important part in philosophy, corresponding to its influence on contemporary thought in general, and that a thorough knowledge of science is necessary for a philosopher who wishes to reason about it. In his "Introduction to the philosophy of mathematics" (1940) he developed several parts of pure abstract mathematics as a basis for his philosophical conclusions.

Scholz's influence became even more evident in the third period, which I shall now briefly sketch, still following Beth's own exposition. His study of the Aristotelian theory of science was decisive for his further development. He became convinced that traditional philosophy had been strongly influenced by Aristotle's postulate, that the first principles of every science should be immediately evident. This is the reason why philosophy is unable to deal with modern science, which does not start from evident principles, but from hypotheses of which the consequences must be tested in experience. Taking experience in a broad sense, including not only empirical methods, but also the understanding of other people, and the sudden enlightening of the mind, he saw a possibility of including the human as well as the exact sciences. Having rejected the idealistic point of view, he was driven to some form of realism; he cherished the idea of different, so to say complementary realms of reality, leading to a pluralistic

ontology. He hoped thus to find a substitute for the irrationalistic philosophy, against which he was passionately in opposition. "I prefer rational discussions to any other form of influencing, mutual or not, because it is the only form of influencing which does not violate the freedom of the partner." He characterized his standpoint as an anti-traditional and anti-dogmatic rationalism. It is with a clear purpose that he kept his remarks on general philosophy in a sketchy and provisional form. He was well aware that the task to develop a philosophy, able to deal with modern science as well as with the complex phenomena of contemporary society, can only be fulfilled by the efforts of generations, and that insufficiently justified generalizations to which philosophers are so easily seduced, can only hamper this development, leading them into blind alleys. Thus he opposed the trend in recent analytic philosophy to consider "common sense" as a sufficient basis; he argued that formal scientific methods have at least an equal right.

Since 1950, the year in which he locates the beginning of his fourth period, Beth's scientific program consisted in meticulous research of detail, directed by his conception of a future philosophy. For diverse reasons he was attracted by symbolic logic. He had always been interested in the foundations of mathematics and in the philosophical problems connected with them. He became convinced that logical deduction is essential in mathematics as well as in the natural sciences. Above all it was by Tarski that he became convinced of the importance of symbolic logic for the foundations of science and for philosophy in general. Tarski's rigorous semantics are the link between the purely formal developments and the interpretation. In his method of "semantic tableaux" Beth gave a formalistic system which is more directly inspired on the semantic interpretation than any other formalization of logic. It is remarkable that this method yields simpler proofs of several theorems of formal logic, for instance of Craig's theorem; on the other hand, Beth used it as a tool for clarifying questions of traditional philosophy. He also extended the method to intuitionistic logic; though his alleged completeness proof for the intuitionistic predicate calculus was insufficient, the system itself is interesting. Another contribution to intuitionistic logic was his notion of an I-variation, which serves as a substitute for the binary valuation in classical logic. Another result in symbolic logic was that on Padoa's method in the theory of definitions, now generally known as Beth's theorem.

Since 1960 Beth had the direction of a research group on logic, sponsored by Euratom. In this connection he became interested in the proving of theorems by computers. It was not Beth's fault that the greater project of which this group was planned to be a part, did not succeed, so that his group became isolated and had to be dissolved soon after his death. Under his direction research on automatic proof procedures, mechanical translation and on logical problems was begun; much of it is continued by his pupils. This work was but a small part of Beth's didactical and organizing activity.

In 1946 he was appointed to a part-time professorship of logic, philosophy of science and its history in the University of Amsterdam; in 1948 this became a full professorship. His chair was a new one, intended to introduce in the Netherlands the modern trends in the philosophy of science. Beth attacked this pioneer task with all his energy. He created an "Institute for foundational research and philosophy of science" in the University and organized courses and seminars. Many students took philosophy or symbolic logic as a minor or major subject, or prepared a thesis under his direction. He was the main founder of the Netherlands Society for Logic and Philosophy of Science. By these activities he created a favourable atmosphere for the study of these subjects. He was also active in the organization of the International Association for Logic and Philosophy of Science; he saw his efforts rewarded by the incorporation of this Association as a Division in the International Union for History and Philosophy of Science, recognized by I.C.S.U.

In 1952 he worked as a Research Associate at the University of California in Berkeley. Here he deepened his knowledge of symbolic logic. In 1957-1958 he taught as a Visiting Professor at Johns Hopkins University in Baltimore. His international contacts were fruitful for his colleagues and his students; many leading scholars from abroad lectured in his seminar.

He gave numerous lectures, popular or scientific, on his work. His list of publications contains 161 papers and 23 books. Part of the books are written in Dutch; they were destined to stimulate the study of philosophy of science in our country. In later years he wrote three books in French on his philosophical ideas. [K,R,S]. The book [V], written in cooperation with J. Piaget, deserves special mentioning. In [U] he gave an encyclopedic survey of technical as well as philosophical research in the foundations of mathematics. The last chapter of this book contains a clear exposition of his philosophical ideas. During his last years he prepared two books [X] and [Y] containing loosely connected chapters on the ideas which he hoped would be fruitful in the future. Both appeared posthumously.

He did the greater part of the editorial work for the series "Studies in Logic and the Philosophy of Mathematics" founded by his initiative.

His merits were rewarded by his election in 1953 to the membership of the "Koninklijke Nederlandse Akademie van Wetenschappen" (Royal Dutch Academy of Science) and by a honorary doctorate in the University of Gent, conferred on him in 1964, when he was already too ill to travel to Gent in order to receive it.

By Beth's death the Netherlands, and especially the University of Amsterdam, lost their leader in the field of logic and philosophy of science. Personally I miss the friend and colleague who was always ready to let me profit from his extensive knowledge and from his deep insight.

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The following abbreviations are used:

Annalen	Annalen van het genootschap voor wetenschappelijke philosophie.
ANTW	Algemeen Nederlands tijdschrift voor wijsbegeerte en psychologie.
BAMS	Bulletin of the American mathematical society.
BJPS	British journal for the philosophy of science.
CNRS	Centre national de recherche scientifique.
IM	Indagationes mathematicae.
Med. KNAW, NR	Mededelingen van de Koninklijke Nederlandse Akademie van wetenschappen (Nieuwe reeks).

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University of Amsterdam
Amsterdam, Netherlands