

A. I. KHINCHIN'S WORK IN MATHEMATICAL PROBABILITY¹

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Alexander Iacovlevich Khinchin was born in 1894 in the Russian village Kondrovo, of the Kaluga district, where his father was the chief engineer of a paper factory. In 1911 he entered the University of Moscow, with which he continued to be associated throughout his whole life, first as a student and later as an academic teacher and research worker. He died on November 18, 1959.

The mathematical work of Khinchin covers a broad field, including the theory of functions of a real variable, number theory, mathematical probability theory and its applications to statistical physics, queueing problems and information theory. In the present paper, it will only be possible to give a brief and incomplete review of his work on probability and its applications. However, it must be emphasized that this is an artificial limitation, which makes it impossible to give the reader an adequate idea of the remarkable internal unity of his work in the various fields where he was active as a creative mathematician.

Khinchin's earliest papers on probability appeared in 1924. During the 1920's and 1930's he published more than fifty works on probability and its applications, including the remarkable monographs [65] and [92]. In order to appreciate his work during this period at its full value, it is necessary to compare the scientific standing and general character of mathematical probability theory in 1920 and 1940.

About 1920, R. von Mises summed up a critical review of the situation in the statement that "to-day, probability theory is not a mathematical science." There was no satisfactory definition of mathematical probability, and the conceptual foundations of the subject were completely obscure. Moreover, with few exceptions, mainly belonging to the French and Russian schools, writers on probability did not seem aware of the standards of rigour which, in other mathematical fields, were regarded as obvious.

At the end of the 1930's, the picture has radically changed. Mathematical probability theory stands firmly established on an axiomatic foundation. It is a purely mathematical discipline, with problems and methods of its own, conforming to current standards of mathematical rigour, and entering into fruitful relations with other branches of mathematics. At the same time, the fields of applications of mathematical probability are steadily and rapidly growing in

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¹ *Editorial note:* This article was invited by the editor as an obituary of Khinchin. The *Annals* is indebted to Professor Jerzy Neyman and to the University of California Press for permission to reproduce here the bibliographical of Khinchin's works that appeared in the *Proceedings of the Fourth Berkeley Symposium on Mathematical Statistics and Probability* (1961) 2 10-15. That *Proceedings* also contains articles on Khinchin by B. V. Gnedenko and by J. L. Doob. Another article by Gnedenko has appeared in *Uspehi Mat. Nauk* 15 97-104, and one by Gnedenko and A. N. Kolmogorov in *Teor. Veroyatnost. i Primenen.* 5 3-6.