



SIPS Paper

Dispute and agreement between two pioneers of modern probability and mathematical statistics: Andrey Kolmogorov and Richard von Mises in 1932

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Brief Description

It is well known that Kolmogorov's measure-theoretical approach (1933) differed strongly from von Mises' paradigm of probability (1919) based on relative frequencies of events and that the former finally prevailed.

It is less known that the two mathematicians appreciated and complemented each other greatly in questions which went well beyond logical foundations, including statistical tests (Cramér-Mises-Kolmogorov-Smirnov), limit theorems, Markov chains, randomness, and their interpretation of the relation between probability and reality.

The talk will focus on these broader aspects of the relationship of Kolmogorov and von Mises.

It reports about a meeting between the two in Berlin in 1931 and about a correspondence of five letters exchanged between Berlin and Moscow in 1932.

The correspondence was triggered by Kolmogorov's predominantly positive review of von Mises' German book "Wahrscheinlichkeitsrechnung und ihre Anwendung in Statistik und theoretischer Physik" (Theory of probability and its application in statistics and theoretical physics) (1931).

Kolmogorov's German book "Grundbegriffe der Wahrscheinlichkeitsrechnung" (Foundations of the theory of probability) appeared in 1933, only one year after the correspondence.

It bears only few marks of their previous discussion and of von Mises' book, one link being Kolmogorov's concern for conditional probability.

However several of Kolmogorov's later works refer to von Mises more directly.

It is therefore useful to look a bit closer at von Mises' book which is largely forgotten (partly because it was never published in English) and at the correspondence between the two giants of modern probability, relating both to von Mises' original 1919 publications in the *Mathematische Zeitschrift*.

Abstract

It is well known that Kolmogorov's measure-theoretical approach (1933) differed strongly from von Mises' paradigm of probability (1919) based on relative frequencies of events and that the former finally prevailed. It is less known that the two mathematicians appreciated and complemented each other greatly in questions which went well beyond logical foundations, including statistical tests (Cramér-Mises-Kolmogorov-Smirnov), limit theorems, Markov chains, randomness, and their interpretation of the relation between probability and reality. The talk will focus on these broader aspects of the relationship of Kolmogorov and von Mises. It reports about a meeting between the two in Berlin in 1931 and about a correspondence of five letters exchanged between Berlin and Moscow in 1932. The correspondence was triggered by Kolmogorov's predominantly positive review of von Mises' German book "Wahrscheinlichkeitsrechnung und ihre Anwendung in Statistik und theoretischer Physik" (Theory of probability and its application in statistics and theoretical physics) (1931). Kolmogorov's German book "Grundbegriffe der Wahrscheinlichkeitsrechnung" (Foundations of the theory of probability) appeared in 1933, only one year after the correspondence. It bears only few marks of their previous discussion and of von Mises' book, one link being Kolmogorov's concern for conditional probability. However several of Kolmogorov's later works refer to von Mises more directly. It is therefore useful to look a bit closer at von Mises' book which is largely forgotten (partly because it was never published in English) and at the correspondence between the two giants of modern probability, relating both to von Mises' original 1919 publications in the *Mathematische Zeitschrift*.