# Feller, William | Encyclopedia.com



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(*b*. Zagreb, Yugoslavia, 7 July 1906; *d*. New York, New York, 14 January 1970)

*mathematics*.

Feller was the son of Eugene V. Feller, a wealthy owner of a chemical factory, and ida Perc Feller. William was the tenth of twelve children, the youngest of six boys. He was educated by private tutors until he entered the University of Zagreb in 1923, from which he received the equivalent of an M.S. degree in 1925. He received his Ph.D. degree in 1926 from the University of Gottingen, where he remained until 1928. In 1928 he moved to the University of Kiel, where he headed the applied mathematics laboratory until he moved to Copenhagen in 1933, after Hitler came to power, After a year in Copenhagen, he moved to the University of Stockholm to be research associate in the probability group headed by Cramér.

During his Stockholm stay he married Clara Mary Nielsen (27 July 1938), a student of his at Kiel, who as a Danish schoolgirl had bicycled with her friends across the German border carrying anti-Nazi pamphlets. There were no children of this marriage. In 1939 the Fellers immigrated to the United States, where William became a professor at Brown University and the first executive editor of *Mathematical Reviews* This international review, founded in 1939 because the German review had come under Nazi control, has been an invaluable mathematical tool, and much of its success is due to the policies set by Feller. In 1945 he accepted a professorship at Cornell University; he remained there until 1950, when he moved to Princeton University as Eugene Higgins professor of mathematics.

Although Feller's research was almost entirely in pure mathematics, he had more than an amateur's interest in and knowledge of several scientific field, including statistics and genetics. He took an excited delight in applications of pure theory, and nothing pleased him more than finding new applications. He wrote several papers applying probability theory to genetics and spent the academic years 1965–1966 and 1967–1968 at Rockefeller University, where he held an appointment as permanent visiting professor and enjoyed close contacts with geneticists.

Before kolmogorov's measure theoretic formulation (1933) of the basic concepts of probability theory, this theory was a barely respectable part of mathematics, with little interaction with other parts. Probability results were solutions to isolated mathematical problems suggested by a certain nonmathematical context. After 1933 these results took their places in an overall mathematical framework, and probability theory began a rapid developmen. A host of researchers, with a few great leaders such as Kolmogorov (Soviet Union), Lévy(France), and Feller, transformed mathematical probability intoone of the liveliest branches of contemporary mathematics, contributing as much to the newest aspects of other branches as it drew from them.

Feller's first probability paper appeared in 1935. In this and many later papers, he discussed the properties of successive sums $S_1, S_2, \ldots$ of a sequence of independent random variables. Under what conditions does suitably normalized $S_n$ have a nearly Gaussian distribution when $n$ is large? What are asymptotic bounds for $S_n$ when $n$ is large? One of Feller's first results was a set of necessary and sufficient conditions answering the first question. One of his deepest papers answers the second, under appropriate conditions.

In 1931 Kolmogorov gave the first systematic presentation of the intimate relations between parabolic partial differential equations and the probabilistic processes now called Markov processes.Feller completely transformed this subject. First he refined and extended Kolmogorov's work. For example, he proved that the equations in question(in a more general framework than Kolmogorov's) have probabilistically meaningful solutions. Later, he put the analysis in a functional analysis framework, applying semigroup theory to the semigroups generated by Markov process transition probabilities of very general types. He linked the boundary conditions for the differential equations with the domains of the semigroup infinitesimal generators and with the conduct of the process sample paths at the boundaries of the process state spaces, incidentally defining new abstract boundaries when necessary.In particular, Feller found a beautiful form for the infinitesimal generator of the most general one-dimensional diffusion. In much of his work, Feller was a pioneer, yet he frequently obtained definitive results.

One of Feller's greatest legacies, containing research at every level, is his two-volume work *An Introduction to Probability Theory and Its Applicatiosn* (1950–1966). He never tired of revising the material in these volumes, in finding new approaches, new examples, and new applications. No other book on the subject even remotely resembles these volumes, with their combination of purest abstract mathematics and intersting applications, employing a dazzling virtuosity of analytical techniques and written in a style betraying the bubbling enthusiasm of the author. The style has made the book popular even among nonspecialists, just as its elegance and breadth have made it an inspiration for specialists.

Mathematical statistics is based on probability theory. Feller made a caustic critique of extrasensory perception experiments, and kept in touch with such statistical controversies as the effect of cigarette smoking on health. It is typical of him that what roused his ire more than the issues in such controversies was the attempt by some statisticians to strengthen weak statistics with irrelevant emotional appeals.

Those who knew him personally remember Feller best for his gusto, the pleasure with which he metlife, and the excitement with which he drew on his endless fund of anecdotes about life and its absurdities, particularly the absurdities involving mathematics and mathematicians. To listen to him lecture was a unique experience, for no one else could lecture with such intense excitement.

Feller was a president of the Institute of Mathematical Statistics. He was a member of the National Academy of Sciences and of the American Academy of Arts and Sciences, a foreign associate of the Royal Danish Academy and of the Yugoslav Academy of Sciences, and a fellow of the (British)RoyalStatistical Society.He was named to receive the 1969 National Medal of Science shortly before his death but died before the awards ceremony; his widow accepted the medal on his behalf.

# BIBLIOGRAPHY

1. Original Works. Some of Feller's early research was published under the name Willy instead of William.His writings included:"Zur Theorie der stochastischen Prozesse (Existenz-und Eindeutigkeitssätze)," in *Mathematische Annalen*, **113** (1937), 113–160; "The General Form of the So-Called Law of the Iterated Logarithm," in *Transactions of the American Mathematical Society*, **54** (1943), 373–402; "The Fundamental Limit Theorems in Probability," in *Bulletin of the American Mathematical Society*, **51** (1945), 800–832; "Diffusion Processes in One Dimension," in *Transactions of the American Mathematical Society*, **77** (1954), 1–31; "On Boundaries and Lateral Conditions for the Kolmogorov Differential Equations," in *Annals of Mathematics*, 2nd ser., **65** (1957), 527–570; and "On the Influence of Natural Selection on Population Size," in *Proceedings of the National Academy of Sciences*, **55** (1966), 733–738.

**II** Secondary Literature. See *Annals of Mathematical Statistics*, **41** , no.6 (1970), iv-xiii, for an obituary, photograph, and complete bibliography. See *Proceedings of the Sixth Berkeley Symposium on Mathematical Statistics and Probability*, **II** (Berkeley, 1972), xv-xxiii, for obituaries and a very youthful picture; and see *Revue de l'institut international de statistique*, **38** (1970), 435–436, for another obituary.

J. L. Doob