1984 Steele Prizes Awarded at Summer Meeting in Eugene

Funds for the Steele Prizes were given to the Society by Leroy P. Steele, a graduate of Harvard College in the Class of 1923, whose will provided that the money be used for the award of prizes in memory of George David Birkhoff, William Fogg Osgood and William Caspar Graustein. Three Steele Prizes, each currently worth $4,000, are awarded each Summer, one for expository writing, one for a fundamental research paper or monograph, and one for the cumulative influence of mathematical work extending over a career.

At the Summer Meeting in Eugene, the Expository Prize was given to ELIAS M. STEIN of Princeton University, the Prize for a Fundamental Paper was given to LENNART CARLESON of the Mittag-Leffler Institute, Stockholm, and the Career Award was made to JOSEPH L. DOOB of the University of Illinois, Urbana.

The Steele Prizes were awarded by the Council of the Society, acting on the recommendations of a committee consisting of Richard W. Beals, Charles W. Curtis, Harold M. Edwards, Frederick W. Gehring, H. Jerome Keisler, Yiannis N. Moschovakis (chairman), Lawrence E. Payne, George B. Seligman, Patricia Lilaine Sipe, and Edwin H. Spanier.

The text below includes, for each of the three awards, the Committee's citation, the recipient's response on presentation of the award, and a brief biographical sketch of the recipient.

Expository Prize

Elias M. Stein

Citation for Elias M. Stein

The 1984 award for a book or substantial survey or expository-research paper is presented to **Elias M. Stein** for his book *Singular integrals and the differentiability properties of functions*, Princeton University Press (1970). This well-written book contains a fine introduction to important areas of classical analysis followed by modern developments in harmonic analysis. It has had a deep and continuing influence on the development of a broad area of research.

Response

I am happy to have this opportunity to express my appreciation for the Steele Prize. It is gratifying to be reminded that a book written almost fifteen years ago is still considered relevant today. I would like to think of this award as acknowledging not only the value of the mathematics contained in this book, but also the contribution of all those who have continued to enrich the field since its publication.

Biographical Sketch

ELIAS MENACHEM STEIN is professor of mathematics at Princeton University. He was born January 13, 1931, in Antwerp, Belgium. He received his A.B. (1951), M.S. (1953), and Ph.D. (1955) degrees all from the University of Chicago. Between 1956 and 1958 he was an instructor at the Massachusetts Institute of Technology, then he returned to the University of Chicago as a member of the faculty (1958–1962). In 1963 he became professor of mathematics at Princeton University.

Professor Stein was an Alfred P. Sloan Foundation Research Fellow, 1961–1963, and a National Science Foundation Senior Fellow at the Institute for Advanced Study in 1962-1963, and again in 1971-1972. He has also been a Senior Visiting Fellow of the Science Research Council of Great Britain (1968) and held a Guggenheim Memorial Foundation Fellowship in 1976. He is a member of the National Academy of Sciences and the American Academy of Arts and Sciences.

Professor Stein was a Member-at-Large of the Council of the American Mathematical Society from 1971 to 1973, and again in 1984 when he was

Elias M. Stein

elected to the Executive Committee of the Council. He was a member of the *Colloquium* Editorial Committee (1976–1982, Chairman 1978–1981) and the *Bulletin* Editorial Committee (Associate Editor, Research Announcements) (1979, 1980). He delivered the Colloquium Lectures at the AMS Summer Meeting in Kalamazoo in August 1975.

He has served on many AMS Committees.

Professor Stein has given invited addresses at meetings of the Society (January 1963, April 1965, April 1966) and at the Summer Institute in 1978. He has participated in many Special Sessions at AMS meetings. He gave an invited thirty-minute address at the 1962 International Congress of Mathematicians in Stockholm and an invited one-hour address at the 1970 International Congress of Mathematicians in Nice.

His major research interests are topics in harmonic analysis related to the Littlewood-Paley theory, singular integrals and differentiality properties of functions, and pseudo-differential operators and their relations to partial differential equations and several complex variables.

Fundamental Paper

Lennart Carleson

Citation

The award for a paper, whether recent or not, which has proved to be of fundamental or lasting importance in its field, or a model of important research, is presented to LENNART CARLESON for the following series of papers:

1. *An interpolation problem for bounded analytic functions*, American Journal of Mathematics, **80** (1958), pages 921 to 930.
2. *Interpolation by bounded analytic functions and the Corona problem*, Annals of Mathematics (2), **76** (1962), pages 547 to 559.
3. *On convergence and growth of partial sums of Fourier series*, Acta Mathematica **116** (1966), pages 135 to 157.

The concepts and methods in the first two papers have had a profound influence on research in complex analysis during the past twenty years. The third paper answered a famous question in harmonic analysis which had remained open over forty years.

Response

When I was told about the committee's decision to give this Steele Prize to me I naturally looked back on the list of earlier recipients. To be added to this series of distinguished mathematicians is of course an honour that I deeply appreciate, but it also enforces a feeling of being part of a mathematical tradition. Your possibilities to achieve anything on your own are very small and conversely many more people than we usually realize have the potential to do difficult things.

If I ask you who the most famous Swedes are, the answer is obvious: The tennis player Björn Borg and the skier Ingemar Stenmark. Before them Sweden had no tradition in either field; today there are about five Swedes among the 50 highest ranking tennis players and at one time there were three top-ranking slalom-skiers, all from the same village in the north of Sweden.

It was my great fortune to have been introduced to mathematics by Arne Beurling; the tradition that he, T. Carleman and M. Riesz initiated is very obviously responsible for the good standard of mathematics in our country. Personally I am very happy for this opportunity to express to Arne Beurling my gratitude for having guided me into a fruitful area of mathematics and for having given an example that only hard problems count.

The tradition has of course met me in many other disguises. When I was a student at Harvard in 1950-1951, A. Zygmund and R. Salem were also in Cambridge and I learned very much from them. They also encouraged me to try to use Blaschke products as examples of a Fourier series which diverges a.e. I worked hard at that then, and all through the years I tried different ideas. Then finally, in 1964 or so, I realized the basic reason why there should exist an example. Very briefly we can describe the main feature of the trigonometric system $\cos nx, n \leq 2^m$, by writing down a matrix of ± 1 giving the sequence of $\text{sign}(\cos nx)$ which can occur. This matrix is essentially $2^m \times 2^m$, i.e. very few sequences of signs occur which, of course, is very favourable for examples of divergence. (This is also the basic idea behind the fast Fourier transform.) To my great astonishment, it now turned out that for a random $2^m \times 2^m$ matrix there is no example and then a proof of the convergence theorem came naturally.

Tradition is vital in mathematics but one should not be its slave.

Lennart Carleson

Biographical Sketch

LENNART A. E. CARLESON was born on March 18, 1928, in Stockholm, Sweden. He received his Ph.D. degree from Uppsala University in 1950. In the course of his career, he was a visiting professor of mathematics at the Massachusetts Institute of Technology (1957-1958, 1974-1975), at Stanford University (1965-1966), and currently holds an appointment at the Mittag-Leffler Institute in Stockholm. From 1979 to 1982 he was President of the International Mathematical Union.

Professor Carleson gave an invited thirty-minute address at the International Congress of Mathematicians in Stockholm in 1962, and a one-hour address at the International Congress in Moscow in 1966.

Career Award

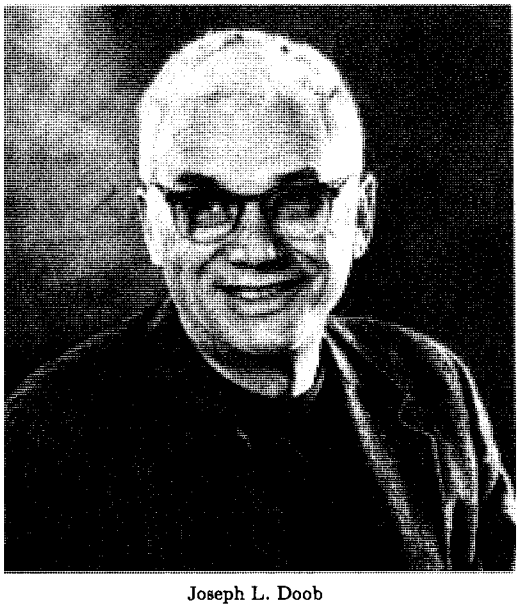
Joseph L. Doob

Citation for J.L. Doob

The award for the cumulative influence of the total mathematical work of the recipient, high level of research over a period of time, particular influence on the development of a field, and influence on mathematics through Ph.D. students is made to **J. L. Doob** for his fundamental work in establishing probability as a branch of mathematics and for his continuing profound influence on its development.

Response

Up to the late 1920s, probability theory consisted of the mathematical analysis of certain not very clearly defined phenomena called "probabilistic." Attempts to delimit these phenomena precisely have not been successful to this day, and mathematicians usually find it prudent to refer this nonmathematical indentification problem to statisticians and philosophers. Present day mathematical probability theory however, although inspired by probabilistic phenomena, is a self standing part of pure mathematics, with important applications to potential theory, partial differential equations, functional analysis and other fields of pure mathematics.



Joseph L. Doob

The development of mathematical probability was made possible by the identification of the basis of the subject with measure theory. After incomplete attempts by others, Kolmogorov (1933) gave the proper mathematical definitions of random variables and their expectations and conditional expectations. Progress thereafter was rapid, as mathematicians began to take these definitions seriously, so that rigorous work was possible, not only as in the past on mathematical problems suggested by probabilistic phenomena, but on probability theory itself. There was a lonely but golden period when the few happy probabilists could develop their subject in isolation. Then came the flood of eager new researchers, but there will be many more similar periods to rejoice young mathematicians in other new fields.

Biographical Sketch

JOSEPH LEO DOOB was born on February 27, 1910, in Cincinnati, Ohio. His professional education was at Harvard University (A.B. 1930, A.M. 1931, Ph.D. 1932). He was a National Research Fellow in mathematics at Columbia University (1932–1934) and in 1934-1935 he was associate theoretical statistician and Carnegie Corporation fellow at Columbia. In 1935 he was appointed associate in mathematics at the University of Illinois and remained there, becoming a full professor in 1945 and professor emeritus in 1978.

He has served the Society on many committees, including the Executive Committee of the Council and the Editorial Committees of the *Bulletin*, *Transactions* and *Memoirs*, and *Mathematical Reviews*. He was Colloquium Lecturer in September 1959 and President of the Society in 1963 and 1964.

He is a member of the International Statistical Institute, a fellow of the Institute of Mathematical Statistics (President, 1950), a member of the National Academy of Sciences, of the American Academy of Arts and Sciences, and is a foreign associate of the Académie des Sciences (Paris). He received the National Medal of Science for 1978-1979. His major research interests are probability and potential theory.