CELEBRATIO MATHEMATICA

Kai Lai Chung

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Kai Lai Chung, a leading probabilist of the second half of the 20th century, was born in 1917 in Shanghai, China, to a family with roots in Hangzhou in Zhejiang Province. He entered Tsinghua University in 1936; he first studied physics but graduated in mathematics in 1940. During the war with Japan, several major universities in the Beijing–Tianjin region moved to the southwest city of Kunming and regrouped as the National Southwestern Associated University. While there, Chung worked in a position analogous to that of assistant professor. He first started doing research in number theory with the number theorist Lo-Keng Hua, and then switched to probability theory with the mathematical statistician Pao-Lu Hsu.

In 1944, Kai Lai Chung won a highly competitive Boxer Rebellion Indemnity scholarship for study in the United States, and arrived at Princeton University in December 1945. He completed his Ph.D. thesis in 1947 under the supervision of the Swedish statistician Harald Cramér, who was visiting Princeton at the time. Chung's thesis was titled *On the maximum partial sum of sequences of independent random variables* [1948]; in it he proved the famous Chung's law of the iterated logarithm. Subsequently, he held academic appointments at the University of Chicago, Columbia University, University of California at Berkeley, Cornell University, and Syracuse University. He joined Stanford University in 1961 and remained there until his retirement in 1988.

Over the years, Kai Lai Chung held extended visiting appointments at several institutions, among them University of Strasbourg (France), University of Pisa (Italy), and the ETH (Eidgenössische Technische Hochschule) of Zurich (Switzerland). He was a George A. Miller Visiting Professor at the University of Illinois at Urbana–Champaign in 1970–71, and a Fellow of the Institute of Mathematical Statistics. In 1976 he was made an Overseas Fellow of Churchill College of the University of Cambridge.

Kai Lai Chung was a highly innovative mathematician, and his research had a major influence on several areas in probability: sums of independent random variables, Markov chains in continuous time and especially their boundary theory, time reversal of Markov processes, probabilistic potential theory, Brownian excursions, and gauge theorems for the Schrödinger equation. He authored 133 journal articles spanning a period of 70 years. A selection of his works was published in 2008 by World Scientific in celebration of his 90th birthday. In addition to his research articles, Chung's eleven books have influenced

several generations of students of probability, both at the graduate and undergraduate levels. He was well known for his elegant and lively prose, as well as for his clear and precise exposition. His widely used graduate text, *A Course in Probability Theory* [1968], first published in the late 1960s, is now in its third edition, and his popular undergraduate text, *Elementary Probability with Stochastic Processes* [1974], currently in its fourth edition (with Farid AitSahlia as coauthor), has been translated into many languages, including English, Chinese, German, Persian, Russian and Spanish.

Kai Lai Chung taught probability for nearly 40 years and supervised 15 Ph.D. students. The Mathematics Genealogy Project currently lists a total of 142 academic descendants. His enthusiasm for mathematics was evident in his energetic classroom and research presentations and in his lively, spirited and candid one-on-one discussions. He is particularly remembered by collaborators and colleagues for stimulating questions, delivered in person, by letter, over the phone and, in later years, by fax.

In 1981, Kai Lai Chung, along with Erhan Çinlar and Ronald Getoor, initiated the Seminars on Stochastic Processes. These meetings, with their innovative structure of just a few formal talks, allowing plenty of time for informal discussions and research problem sessions, have continued as highly successful annual conferences to this day. The 1987 Seminar, held at Princeton University, honored Kai Lai Chung and Gilbert Hunt around the time of their retirements. Among the other participants were Claude Dellacherie, Paul-André Meyer, and Jacques Neveu, who came from France to honor Chung and Hunt, and also to tell of their respective influences on the French school of probability. The 2010 Seminar, hosted by the University of Central Florida on March 11–13 of that year, had a special session to commemorate Kai Lai Chung's contributions to probability.

Kai Lai Chung also played an influential role in the development of modern probability theory in his native China immediately after the chaotic years of the Cultural Revolution (1966–1976). His visit to China in 1979 (together with Joseph Doob and Jacques Neveu) was the starting point for renewed contact of Chinese probabilists with the West. He visited China many times thereafter, giving numerous lectures and short courses, and helped young Chinese students gain opportunities to study in the United States. A conference, titled *From Markov Processes to Brownian Motion and Beyond*, was held at Peking University on June 13–16, 2010, to honor the memory of Kai Lai Chung and his contribution to the development of modern probability theory in China.

Kai Lai Chung's zest for life, combined with his energetic curiosity, was apparent to all who knew him. Besides pursuing mathematics, he also had a broad range of cultural interests. Educated in a classical Chinese tradition in his youth, Kai Lai Chung was deeply familiar with the Chinese literary heritage and forms of the Chinese language. His family recalls how, in his many travels to China from 1979 onwards, following the opening of diplomatic relations between China and the United States, he sought out and helped re-establish the stature of many writers, poets, painters, and calligraphers he counted as old friends. His passion for culture was not restricted to that of his homeland. He traveled extensively, making the acquaintance of many mathematicians around the world. He was an avid hiker and walker, and while traveling always made sure to visit important historical, cultural, or natural sites. He surprised many with his wide-ranging and intimate knowledge of literature, history, and music, especially opera. He spoke several languages and practiced them with the many visitors who came to see him at Stanford from

France, Germany, Italy, Russia, and other countries over the years. In his later years, he taught himself Italian in retirement and published a mathematical paper in that language.

Kai Lai Chung passed away on June 1, 2009, at the age of 91.

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