Y.S. Chow and My Columbia Years

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Y.S. Chow was instrumental in promoting statistics as a field of Ph.D. study for Chinese mathematics students. In 1979, shortly after the U.S. opened its embassy in Beijing, the president of Zhejiang University led a delegation to visit Columbia University. As a Zhejiang University alumnus, Y.S. Chow was asked to participate in hosting the prestigious visitors. When Herbert Robbins received this delegation, he took up Y.S. Chow's suggestion to offer a fellowship for Ph.D. study in statistics to the mathematics department at Zhejiang University. Shortly after, Robbins made a similar offer, also upon Y.S. Chow's suggestion, to the mathematics department at Fudan University, as the mathematics faculty at Fudan originated from Zhejiang University. Zukang Zheng and I were the beneficiaries of this offer to Fudan. Both Zukang and I were graduate students at the Institute of Mathematics at Fudan, respectively in the probability and statistics group led by Jiagang Wang, and the functional analysis group led by Daoxing Xia and Shaozhong Yan. However, as our education was interrupted during the Cultural Revolution, we did not have college transcripts and other standard credentials to support our application. Y.S. Chow overcame bureaucratic hurdles to get us admitted based on recommendation letters from our professors, after we were rejected by the admissions office of Columbia's School of Arts and Sciences.

Zukang and I arrived at Columbia in late September 1980, almost one month after the beginning of the fall semester. In addition to our passport and visa applications, the delay was largely caused by slow airmail. The application form from Columbia took about two months to arrive, and our letters to Y.S. Chow needed more than two weeks to reach him. Sanping Chen from Zhejiang University missed an entire semester and had to join SUNY at Stony Brook before transferring back to Columbia. We had a difficult journey of about 48 hours to come to the U.S., as mainland Chinese airlines had to fly through Iranian airspace to reach the West in 1980, and our flight got stuck in Pakistan due to the sudden outbreak of the Iran-Iraq War. Upon our arrival, Zukang and I were warmly welcomed by the statistics faculty and fellow Ph.D. students, especially Y.S. Chow and senior students from Taiwan, including Lancelot Wu, Fu Chang, Regina Liu, and Huajing Jeng. Ching-Zong Wei had just finished his Ph.D., but he frequently showed up in the large office shared by statistics Ph.D. students in the semi-basement of the Mathematics building during his visits to Columbia from Maryland, actively sharing his wisdom and research experience and sometimes challenging us with interesting questions and puzzles. The statistics department at Columbia also hosted many visiting scholars from China, largely through connections to Y.S. Chow, including Yongguang Zhang from Chinese Academy of Sciences, Jiadin Chen from Peking University and Chuntu Lin from Zhejiang University. Chengjun Tian was a visiting scholar from Zhejiang University early on, but later returned as a graduate student and quickly finished his Ph.D. with T.L. Lai. During this time, Y.S. Chow frequently hosted parties for graduate students and visitors alike at his Dobbs Ferry home in the Westchester suburb of New York City. I met Y.S. Chow's friends in his parties, including Henry Teicher and Bob Berk, both of whom I became colleagues with when I joined Rutgers. After dinner, we typically stayed for

hours to converse, listening to Y.S. Chow discuss mathematicians, American and Chinese culture, wars, and politics. After the party, Y.S. Chow would drive us to our train stations in the Bronx and Yonkers, or back to the city if we missed the last train.

The statistics faculty at Columbia was much smaller than it is now when I was a student, and was composed of Herbert Robbins, Howard Levene, Y.S. Chow, T.L. Lai, John Van Ryzin, Burton Singer, Steven Lalley, and Ioannis Karatzas. We took mathematical statistics from Robbins and Lalley, advanced probability from Chow, regression theory from Levene, stochastic processes from Karatzas, time series from Lai, survival analysis from Van Ryzin and sequential analysis from Lalley. Y.S. Chow was a dedicated teacher. His lectures were characterized by depth and rigor but also colored by interesting stories and historical comments. In addition to the two regular classes per week, Y.S. Chow sometimes offered an additional class to cover more advanced problems on topics such as renewal and Tauberian theorems, martingales, and optimal stopping. Sometimes these problem-solving sessions went overtime and Y.S. Chow took the whole class to dinner.

I started to work under the guidance of Y.S. Chow at the beginning of my second year at Columbia, right after passing the qualifying examination. My decision was motivated by Y.S. Chow's research as well as his warm personality. He was interested in the almost sure limit points of normalized random walks with infinite or undefined mean. The problem was considered in the fifties by Cyrus Derman and Herbert Robbins and much developed in the sixties and early seventies by Harry Kesten, William Pruitt and others. We used truncated stopping rules to extend an integral test of K. Bruce Erickson for the divergence of the sample mean to general normalized random walks. I also used large deviation theory to derive an integral test for the finiteness of the lower limit of normalized random walks. Y.S. Chow's office, where we meet to discuss problems, was largely occupied by a big table in the middle with many foot-high stacks of papers on it. But Y.S. Chow was still organized. I was always amazed when he quickly found the relevant materials from the right stack. Sometimes Y.S. Chow shared his office with visitors. This gave us opportunities to get to know his guests, including Herman Chernoff. Y.S. Chow always emphasized the importance of having a solid foundation. He lent me quite a few books to read from his personal collection, including his book with Siegmund and Robbins on optimal stopping and Bellman's on dynamic programming. I was quite embarrassed when I returned a very much unread Zygmund's "Trigonometric Series" to him. He was very fond of places like Urbana-Champaign and Purdue where young researchers would have the tranquility to become true scholars. New York City had too many attractions from his perspective. He encouraged me to read cutting-edge papers to find research problems myself. This led to the second topic of my thesis, nonlinear renewal theory, after I read papers by T.L. Lai, David Siegmund and Michael Woodroofe. Toward the end of my graduate study, Y.S. Chow gave me two great pieces of advice. With regards to recommendation letter writers, he advised me to ask those outside people whom I believed would most appreciate my work. I asked Michael Woodroofe and Harry Kesten, and both kindly agreed to support me. More importantly, Y.S. Chow advised me to join SUNY at Stony Brook so that I would be able to see Herbert Robbins and work with him in statistics at the onset of my career.

I believe that without the help of Y.S. Chow at the very beginning, I would not have earned a Ph.D. in statistics, and without his advice four years later, I would not have become a statistician.