



## **Narahari Umanath Prabhu**

April 25, 1924 – October 14, 2022

Professor Emeritus Narahari Umanath Prabhu (Uma to his colleagues and friends) was an influential figure in the development of the mathematics of systems that evolve randomly but in systematic ways (“stochastic processes”) and their application in real world domains such as waiting lines (“queueing”), dams and other storage systems, insurance, and data communications.

Uma was born in Calicut (Kozhikode) on the southwestern coast of India. He was the ninth of eleven children in a poor family. The first in his family to attend college, he earned a B.A. in mathematics from University of Madras (Chennai) affiliate Loyola College, an M. A. in statistics from the University of Bombay (Mumbai), and an M.Sc. degree in mathematics from the University of Manchester, all at the top of his class. With his later help, his younger siblings also attended college.

After several years as a lecturer and then department head at universities in India, in 1955 Uma arranged for his wife Sumi and their two young daughters to be cared for by their extended family and travelled to England for the M.Sc. at Manchester, which entailed a thesis titled “Solution to Some Dam Problems.” There, he was a student of Cairo-born probability theorist Joseph Mark Gani, and the two continued to collaborate afterwards. In 1960, Joe Gani moved to the University of Western Australia. Uma and his family joined him there from India the following year.

In 1964, Joe Gani and Uma Prabhu moved to Michigan State University with the objective of establishing the field of stochastic processes in the MSU mathematics department. That effort encountered difficulties that led to both leaving MSU the following year - Joe Gani to the University of Sheffield in England and Uma Prabhu to Cornell.

While in Australia, Uma had written the book eventually published as *Stochastic Processes: Basic Theory and its Applications*. The publisher had sent the manuscript to Cornell math professor Frank Spitzer for review. Professor Spitzer gave such a glowing anonymous review that Uma asked to know his name. The result was a correspondence between them that led to Spitzer's recommending Uma for a position at Cornell. When Cornell Engineering's Department of Industrial Engineering and Operations Research was formed in 1965, Uma joined it as an associate professor and was promoted to professor two years later. In 1994 he was elected professor emeritus.

By its 50<sup>th</sup> anniversary in 2015, the department had become the School of Operations Research and Information Engineering (ORIE). The occasion was also celebrated as the 50<sup>th</sup> anniversary of Professor Prabhu's arrival at Cornell. At the celebration, Professor David Shmoys, the school's then director, said that Professor Emeritus Prabhu "set a tone and character for what kind of place Cornell ORIE was and is today in no small part due to his own actions. Uma's special warmth and caring was something that permeated the place." He was a mentor to many of the junior faculty members well before any position of mentor came into existence.

The limited duration of his scholarship to the University of Manchester enabled Uma to complete only the M.Sc. degree, and he did not pursue further student credentials. As Frank Spitzer reportedly told him, "You wrote a book-- that is your dissertation!"

Uma supervised nearly a score of successful Cornell Ph.D. students, several of whom rose to high positions in academia and industry. He published more than 60 professional papers and five books and edited several other works.

Uma Prabhu developed a close and continuing relationship with his Ph.D. students, regarding them as his "spiritual children." As Technion – Israel Institute of Technology Professor Emeritus Haya Kaspi said, "He had an unconditional sense of responsibility for the learning process of his student." Suman (Sumi) Prabhu, his wife of 66 years, who died in 2017, added to the warmth of the professor-student relationship, with her excellent cooking and familial hospitality.

At the end of each term, Professor Prabhu reminded his students to remember the world outside Cornell. He believed that their goal at Cornell was not simply to earn a piece of paper – their degree – but to figure out what they wanted to do in the wider world.

Throughout his career, Professor Prabhu was a prolific letter writer. He maintained contact with the international community of scholars of stochastic processes in general and the theory of queueing in particular. In many of his letters he encouraged scholars to send their students to Cornell, which helped increase the diversity of the department (of which he was the first faculty member "of color"), college, and university. He also promoted the international evolution of his chosen field of study.

As former ORIE Director Sidney Resnick has pointed out, "it is easy to forget what the academic map looked like in the 1970s and 1980s for an applied probabilist like Uma Prabhu. Applied

probability and applications, in general, were suspiciously regarded by mathematicians, and computation was at best difficult. Slowly things changed in large part due to people like Uma.”

In particular, in 1973 Uma Prabhu was one of the founders of *Stochastic Processes and their Applications*, now an official Bernoulli Society publication published by Elsevier. He and Professor Julian Keilson of the University of Rochester were the inaugural principal editors, with Professor Prabhu serving in that role for the first dozen years of publication. Initial volumes carried this statement from the Principal Editors: “The journal will be exacting and scholarly in its standards. Every effort will be made, however, to promote innovation, vitality, and communication between disciplines. Review papers will be sought out, and discussion of unresolved problems and potentially fruitful avenues of inquiry will be encouraged.”

In the 1980’s, Professor Prabhu polled many of his peers to assess the need for a journal in the relatively specialized field of queueing theory, about which he had written in the seminal book *Queues and Inventories* (1965). Replies were nearly all positive, and *Queueing Systems: Theory and Applications* (QUESTA) with Professor Prabhu as founder and first editor, came into being. It became the flagship journal in the area and is now published by Springer.

Uma Prabhu read and wrote poetry. He recited works of Israeli poet Yehuda Amichai and Egyptian Greek poet Constantine Cavafy (author of *Ithaka*), and until the end sang the songs of Bengali poet, writer, playwright, composer, philosopher, social reformer, painter, and Nobel Prize laureate Rabindranath Tagore.

Uma and Sumi lived a simple life. They were thus able to create two Cornell endowments.

The first, endowed in 1999, supports the Rabindranath Tagore Modern Literature Lecture, an annual series of seminars, free and open to Ithaca area residents, on aspects of modern Indian literature written in Indian regional languages and English. The series is under the auspices of the Cornell South Asia Program. Speakers have been drawn from among novelists, poets, playwrights, screenwriters, columnists, critics, translators, musicians, and professors, and, like Tagore, are typically engaged in a combination of these activities. Asked why the Prabhus chose Tagore to honor, Uma replied that “Tagore brought East to West and West to East.”

Following Sumi’s death, Uma paid homage to his late friend and mentor Frank Spitzer, who had urged Cornell to hire him, by making a gift to establish the Frank Spitzer and Narahari Prabhu Professorship of Mathematics. The gift, matched by the Winokur Future Faculty Initiative, was augmented by an estate gift from Uma’s retirement account. The terms of the gift provide that preference is that it supports a professor who teaches probability.

“Frank Spitzer brought out the best in me, and I’ve wanted to honor him for a long time,” Uma said in a 2019 interview.

Narahari Umanath Prabhu is survived by his daughter Vasundhara Prabhu (Vas) and her husband Bob, and by his daughter Purnima Prabhu and her daughters Basyah Prabhu and Aliyah Prabhu.

Written by Mark Eisner, Sidney Resnick, and Gennady Samorodnitsky