

BOOK REVIEW

Glimpses of India's Statistical Heritage, edited by J.K. GHOSH, S.K. MITRA AND K.R. PARTHASARTHY, Wiley Eastern, New Delhi. 1992. pp. xii + 293. Price Rs. 60/-.

The motivation for this book is best expressed in the words of the distinguished editors themselves:

“Already several of the eminent Indian statisticians like R.C. Bose, S.S. Bose, S.N. Roy, K.B. Madrava, U.S. Nair, H.K. Nandi, etc. and Mahalanobis himself are not amidst us any more. Whereas R.C. Bose and Mahalanobis have left some impressions of their own scientific lives, we really do not have any authentic accounts of the successes and failures in scientific endeavours of the other stalwarts, except in the form of their research papers in journals and books. Several other eminent statisticians who grew up in that milieu are either retired or on the verge of retirement. Still more disturbing is the fact that many members of this statistical family do not find themselves at home in our country, for a variety of reasons, including among others, the lack of fruitful scientific role here and have therefore decided to settle down permanently abroad. This situation propelled us to think that it would be worthwhile to compile and publish a brief account of the scientific lives of some of these outstanding senior statisticians in their own words in a single volume which can serve as a source of inspiration for future generations of aspiring statisticians of a developing country like ours. The need for such a source seems to be particularly accentuated in the present time when we have to face several challenges in an administrative, political and scientific environment favourable for a systematic and rational approach to solution of practical problems. It is also our hope that some of these autobiographical articles will also remain as a record of creative endeavour in all its mystery, inevitability and accident”.

The Indian National Commission for the History of Science has expressed similar feelings about keeping records of the reminiscences of all eminent Indian scientists in the form of autobiographical notes, interviews, video-cassettes, etc. which may inspire future generations of scientists and which can also give an idea of the struggles and achievements of the Indian scientists of the 20th century.

The present book contains autobiographical accounts of 10 eminent Indian statisticians of the modern period and in some sense gives a history of the development of statistics in India.

The ten accounts differ widely in their scope, coverage and style. It appears that the editors did not find it easy to provide any guidelines to the eminent

authors in advance and after these accounts were received, it was too difficult to introduce uniformity of style. Thus, three biographies cover 177 pages, while other 7 cover only 116 pages. The space given to research also varies from 10% to 100%

The overall impressions that one gets from the book are:

1. P.C. Mahalanobis played a dominant role in placing Indian statistics on the world map through the great encouragement he gave to all young researchers. In fact, but for him, many of the Indian statisticians whose autobiographies are recorded here might have ended their careers as lecturers in some colleges.

2. The atmosphere of academic freedom which Prof. Mahalanobis created at the Indian Statistical Institute did a great deal for nurturing talents of statisticians. The visits of eminent foreign mathematicians, statisticians and biologists, which he organised, provided a great impetus to research. In fact, interaction with some of the visiting scientists provided the main impetus for research for some of the eminent biographees.

3. Most of the biographees (though not all) received training abroad and had the good luck to come into contact with some of the most creative statisticians of the twentieth century. In fact, some of them were very active abroad and became inactive and busy with administrative duties on their return to India, when they did not find the same invigorating atmosphere here. However, there were some who continued their activities both in India and abroad.

4. Prof. Mahalanobis laid a great deal of emphasis on the interconnection between theory and practice and this had a great deal of influence on the thinking of the statisticians of that period.

The first essay is by Raghuraj Bahadur, who according to Neyman, is "the brightest of 250 stars of an Indian origin shining all over the USA in the field of statistics" and who according to the editors "was a very unusual teacher at ISI and by his gentle wit and meticulous attention to ethical values, respected his colleagues and young students on an equal footing and created an atmosphere in which quest for new knowledge reigned supreme". His essay is a research paper in which he answered a colleague who had raised a question about what motivated him earlier to study Transitive Sufficiency. This illustrates how new research grows out of efforts to clarify the result of earlier research and through interaction of scientists among themselves.

The second account is by D. Basu, well known for Basu theorems on complete sufficient statistics and for his critical essays on foundations of statistical inference. He did his PhD under Prof. C.R. Rao and taught at ISI till 1975, when he migrated to USA. His mathematical guru was late Prof. T. Vijayraghavan, "I never met another teacher with a more insightful

understanding or a greater love for mathematics''. An early major event of his life was the visit of the distinguished statistician Abraham Wald to ISI. Basu studied his papers and books intensively to prepare himself for this visit and in this process, he discovered an error in Wald's work which Wald accepted gracefully. "Four decades have gone by, but I can still visualise Wald's lectures to us. For the sheer elegance of the mathematical results presented to us and the disarming clarity of exposition of the speaker, these lectures have never been surpassed in my experience''. Wald invited him to work with him at Columbia University, but unfortunately Wald died in a plane crash at Nilgiri Hills soon after. Basu learnt a lot from counter-examples and he gives a counter-example here, from which he concludes that all samples are not equally informative and he even proceeds to define information as the likelihood function generated by the given data.

The third essay is by Late Prof. V. S. Huzurbazar, who unfortunately died before this book was published. Huzurbazar got a scholarship at Cambridge and registered under the famous Harold Jeffreys for his PhD degree. Jeffreys had done outstanding work on inverse probability and Bayesian inference, but unfortunately at that time, he represented a one-man school in this field. Moreover, at that time he was more interested in geophysical problems. He even suggested that Huzurbazar may change his supervisor, but Huzurbazar persisted and the reward was unexpected in the form of some bright ideas generated from the lectures of Dr. Daniel and the book by Kendall. He did some outstanding work on sufficient statistics, which Jeffreys reported in the third edition of his book on Theory of Probability. After coming back to India, he joined Poona University and built up a good research centre, but could not continue his own tempo of research.

The fourth account by C. Kallianpur is really enjoyable and the type of essay one would like to see in a book of scientific reminiscences. He describes his scientific collaboration or even marginal interaction with scientists like Robbins, Mahalanobis, Wiener, Fisher, Linnik, Von Neumann, Masani, Striobet, Balakrishnan, Hotelling and even Einstein. After his PhD from North Carolina, inspired by the idealism of those days, he desired to come to India and Mahalanobis provided him the opportunity by giving him a job at ISI. Here, he was asked to prove the unbiasedness of an estimate and to find its variance and he succeeded in solving this problem by using the results of some papers of his supervisor. He attended a course on statistical inference by Fisher, but Fisher could not explain clearly his fiducial theory, though it was satisfying to listen to an exposition by Fisher himself, who, according to Prof. Linnik, was the only genius statistician.

Kallianpur describes vividly his encounters with the mathematical genius Wiener. Wiener would go to black board with him, discuss problems for hours together, sometimes talking to himself, throughout deeply involved. He generated an interest in non-linear prediction theory in which Kallianpur worked

later, though he worked on the lines of Kalman and Busy, rather than on the lines of Wiener. He also describes his work on White Noise Calculus, Stochastic filtering theory and Stochastic models in neurophysiology. Some of the anecdotes he describes about Dirac, Neumann, Einstein and Fisher make very interesting reading.

The fifth essay by D.B. Lahari is the autobiographical letter written by the author to one of the editors. Lahari was a self-taught statistician who was "conscience keeper" of Mahalanobis on sampling theory. He was also entirely Indian made or ISI statistician on whom the impact of outside statisticians was minimal. In spite of being a statistician, he continued his interest in number theory.

The sixth biography, of P.R. Masani, presents a case in contrast to Lahari's. Masani left India after his BSc for Harvard where he did his MA and PhD and worked with such famous mathematicians as David and Garret Birkhoff, Von Mises, Marston Morse, Henry Cartan and Solemn Bochner. He came back to India after 8 years, but even here he had a remarkable collaboration with Wiener, during the latter's visits to India. These led to the famous Wiener-Masani theory of Multivariate stationary stochastic processes. He also wrote a number of remarkable papers on Helices in Hilbert spaces and their applications to probability theory and on Generalised Harmonic Analysis. Later, Masani edited the five volumes of collected works of Wiener.

The seventh statistician, K.R. Nair, made his outstanding contributions to construction and analysis of designs at ISI in collaboration with R.C. Bose and C.R. Rao. Though he did his PhD under Hartley and Pearson at London, most of his work was done at ISI and as Director of Central Statistical Organisation.

Prof. C.R. Rao, in some sense, represents a truly Indian statistician. Today, his name is a household name in the family of statisticians, due to the well-known Cramer-Rao inequality and Rao Blackwellisation of unbiased estimates and due to his book on Linear estimation, which has been translated into Russian, Japanese, Chinese, German, Czech and Polish languages. His papers are going to be published in four volumes by ISI. In this account, he gives a remarkable survey of his researches on lower bounds of variance, sufficient statistics, quadratic differential metrics, familial correlations, design of experiments, linear models, efficient score tests, multi-variate analysis, Fisher consistency, first and second order efficiencies, growth curves, characterisation of probability distributions, factor analysis, measures of entropy and cross-entropy, etc. Prof. Rao has guided 55 PhD theses.

The ninth essay by Prof. S.S. Shrikhande describes the part he played in proving falsity of Euler's conjecture about orthogonal Latin squares. He has played a significant role in the development of combinatorics in India.

The final essay is by Dr P.V. Sukhatme, founder of Indian Society of Agricultural Statistics and well known for his outstanding contributions to Survey Sampling and Nutrition. His account also describes the growth of agricultural statistics in India.

The editors have done a signal service to students, teachers and research scholars in statistics by collecting together these inspiring accounts of lives of eminent statisticians. They have also done a service to history of Indian science in the modern period, by helping in keeping alive memories of the times in which these scientists grew up in our country.

It is hoped that all students, teachers and research scholars of mathematics and statistics will read the book carefully. It is also hoped that similar accounts of Indian heritage in other disciplines will be made available soon by other scientists.

CSIR has done a good job by subsidising the publication of this book, enabling the publisher to make this extremely well-produced book available at a reasonable price.

J.N. Kapur
Jawahar Lal Nehru University, New Delhi