

INTRODUCING VOLUME TWENTYFIVE

1. The first number of *Sankhyā : The Indian Journal of Statistics* was published exactly thirty years, or one generation ago, in June 1933. In starting the twentyfifth volume I have much pleasure in announcing that Dr. C. Radhakrishna Rao would be associated with me as editor in future. The pleasure is all the greater because he is my former pupil; he attended my lectures as a student in the postgraduate course in statistics which was started for the first time in India in the University of Calcutta in 1941. After taking his M.A. degree in statistics, he joined the Indian Statistical Institute in 1943, and since then has been my colleague for twenty years. He has been, in actual fact, in charge of most of the editorial work for many years. I look forward to the day when he would assume full responsibility.

2. Having attained on this day the age of seventy, I may take the opportunity of looking both back and forward, a little. My mind goes back to 1933 when we were busy sending articles to the press for the first number of *Sankhyā*. I had started working on the multivariate distance several years earlier, and had examined a portion of a large volume of individual measurements of various anthropometric characters for a large number of castes and tribes in North India which had been published in 1891 by H. H. Risley. The measurements had been taken by the same small group of observers; and were, therefore, suitable for purposes of comparisons between castes and tribes. Karl Pearson had, however, condemned the material much earlier because of the discrepancies he had found in the average values given by Risley. After detailed scrutiny, I reached the conclusion that most of the discrepancies in individual measurements and indices could be traced to easily recognisable copying or printing mistakes, use of wrong figures taken from adjoining rows or columns, mistakes in entering index tables, or obvious arithmetical slips like a displacement of a decimal point in calculations. Out of 142 discrepancies in individual values, 133 could be corrected and corroborated with practical certainty by cross-checks with appropriate index numbers; in eight cases, the corrections were plausible although they could not be confirmed, while only one single measurement was really doubtful and had to be rejected out of total of 12,197 individual measurements and a total of 8,600 indices given by Risley. The real defect in Risley's data had occurred during the calculation of average values; the primary data of individual measurements given by him could be used with safety, especially after applying the corrections which I had used.

3. I thought it would be useful to publish the revised values of Risley's data together with the detailed evidence in support of the corrections made by me. My young colleagues, who were only three or four at that time, were strongly opposed to the publication of this paper. The scrutiny and reconciliation of discrepancies which I had carried out, they felt, could not be considered to be scientific work at all; they were eager to prevent the 'Professor' from exposing himself to ridicule in advanced countries by publishing this paper. However, due to a streak of contrariness and obstinacy, I printed this article in the first issue of the journal.¹

¹A Revision of Risley's Anthropometric Data Relating to the Tribes and Castes of Bengal. *Sankhyā*, 1, 1933, 76-105.

4. It can be easily imagined with what joy and encouragement I read the following lines in a letter dated 14 August 1933 from Ronald Aylmer Fisher :—

“You are most heartily to be congratulated on the new Journal, and very especially on your own contributions. The work on Risley’s data will be most valuable. I shall hope to hear and read more of your contributions as time goes on. It is a splendid start.”

It was characteristic of the most eminent statistician of the present age to have selected the paper on Risley’s data for special mention.

5. Fisher himself had said somewhere that the first responsibility of a statistician is to cross-examine his data. I remember the vivid description he gave me, during his first visit to the Indian Statistical Institute in 1937, about his investigations in the monastery in Austria where Gregor Mendel had carried out his experiments on the inheritance of characters in sweet peas. Mendel had announced in his last scientific publication that he would publish in another paper his results on three factor segregation, but did not do so. Fisher had an almost irresistible urge to find out why Mendel ceased publication. Searching through old records, Fisher traced the original observations which Mendel had intended to use for his unpublished paper, and found that there was perfect agreement between observed and expected results. Fisher surmised that such agreement had raised a suspicion in Mendel’s mind that his assistant, who had been helping him in these experiments, had deliberately changed the records to make them agree with expectations; Mendel had refrained from publishing the results as he could not guarantee their accuracy.²

6. My mind also goes back to the day when I had the good fortune to establish contact with R. A. Fisher. In 1923 I was working as Meteorologist in Calcutta in addition to teaching physics in the Calcutta University. Fisher was engaged in his researches on the design of experiments at Rothamsted Experimental Station, Harpenden. I had no connexion with agricultural research. By sheer chance, my attention was drawn to the question of “errors” in some agricultural field experiments, (in the form of a series of parallel plots sown with different varieties of rice, repeated in the same order in several blocks). I tried to eliminate, by crude graduation, differences in soil fertility and published a paper in an agricultural journal.³ Fisher saw this paper and immediately sent me reprints of his early papers on the design of experiments and also the paper on the distribution of the ratio of two variances.

7. While struggling with the analysis of variety trials on paddy, I had begun to appreciate the need of radical improvements in agricultural field experiments. When I read Fisher’s papers on this subject, I realized that he had not only solved the problem at a theoretical level but had also supplied the basic tables (for the z -distribution) to facilitate the use of his methods almost in a routine manner. I could also appreciate how great was his achievement. I believe, I can claim to be the first convert to the Fisherian view of statistics; I have also tried to extend his ideas to the design of sample surveys. For me, the discovery of Fisher, nearly forty years ago, was an important factor in deepening my interest in statistics which was further strengthened by the impressions of the memorable day I spent with him at Rothamsted Agricultural Station in 1926 when I met him for the first time.

²R. A. Fisher: “Has Mendel’s work been rediscovered?” *Annals of Science*, 1, 115-137, 1936.

³Probable error of field experiments in agriculture. *Agri. Jour. Ind.*, 1925, 20, 96;

8. I also recall that it was at Fisher's suggestion (as I came to know much later) that the newly established Imperial (now Indian) Council of Agricultural Research offered me in 1928 an annual grant of Rs. 2,500 (about £200, a princely sum for us in those days) to have a research assistant to take up some work in statistics. This grant led the way to the future development of the integrated programme of theoretical research, training, and applied projects which has been a characteristic feature of the Indian Statistical Institute.

9. Fisher came to our Institute on eight occasions. He always stayed in our house in the Institute in Calcutta. This gave me and my young colleagues the opportunity to profit by his stimulating discussions and suggestions. The special needs of an underdeveloped country like India, had made it continually necessary for us to increase the scope of application of statistical methods in widely differing subject fields in natural and social sciences, technology and economic planning. In such developments we received powerful support from R. A. Fisher, who quite early had a clear view of statistics as the new technology of the modern age.⁴ He also first formulated, in a precise way, the concept of the Indian Statistical Institute as higher technological institution having an analogous function in respect of statistics, although on a much smaller scale, to that of the higher technological institutions like the Zurich Federal School of Technology or the Massachusetts Institute of Technology, which had been established a hundred years ago to provide an integrated programme of research, training and projects in the field of engineering and technology. In all these ways, Ronald Fisher had exercised more influence than any one else in the shaping of the policy and programme of the Indian Statistical Institute of which *Sankhyā* is the official organ.

10. R. A. Fisher had said somewhere that he had learnt his statistics through computation, I presume, in the dual sense that no theoretical formulae are of any value unless these can be used in numerical terms at a concrete level, and also that statisticians have to do the 'dirty work' of computation with their own hands. On the occasion of his first visit to the Institute in December 1937, he requested me to give him a hand calculating machine. For his seven subsequent visits, a desk calculator always used to be placed in his room in advance; he used such a calculator every day during his last stay in Calcutta up to the middle of February 1962.

11. I am recalling the two points made by him, namely, the need of cross-examining the data and the importance of computational work in statistics, because both these points are of crucial significance in the future development of statistics in India. During the last thirty years or the first generation of this journal, there has been a good deal of advance in the field of statistics in India. Indian statisticians have come to enjoy a good reputation abroad. Paradoxically, the Indian statistical system in respect of flow of factual information is recognized, within and outside the country, to be very weak. This is due to the fact that collection, processing and publication of official statistics are still treated as administrative matters, subject to the principle of a monopolistic jurisdiction of one single administrative agency for each type of information. The acceptability of statistical data is determined

⁴Annual Review by P. C. Mahalanobis, *Indian Statistical Institute: Annual Report: 1960-61*, 78-81.

Address by R. A. Fisher at the First Convocation of the Indian Statistical Institute, 12 February,

by the status of the authority responsible for their collection or publication, usually without any assessment of the reliability of the information.

12. The only way to improve the quality of official statistics in India is by testing their accuracy in accordance with accepted scientific principles, by using checks and cross-checks provided through multiple observations or through independent sources of information. Sample surveys, with multiple and parallel or inter-penetrating network of sub-samples, provide a speedy and economical way of ascertaining the margin of uncertainty in an objective manner. It has been therefore, the policy of this journal to attach special importance to methods and practical applications of sample surveys. The need of doing this would continue in future.

13. In the second generation, if I may call it so, of the journal, we feel one of its important tasks must be to foster the growth of the spirit of criticism without which the advancement of science is not possible. In the early years, we used to publish book reviews and also selective reviews and abstracts of statistical papers published elsewhere; much to our regret, we have not been able to maintain these two features. We feel it may be particularly helpful to use reviews of articles and books, in a purposeful manner, to promote the growth of a critical appreciation of the quality of research and of advances in the collection, processing and analysis of statistical information in India. In future, it would be our policy to welcome reviews both of papers published in journals and books.

14. From the very beginning, to help in the advancement of statistics in an underdeveloped country like India, we had adopted certain lines of policy which are somewhat unorthodox, for example, reprinting papers published elsewhere to make them more easily available in India, publishing statistical materials and data for purposes of record, or giving attention to primary work like scrutiny of data and computations. It is our intention to continue these features. At the same time, we shall continue to welcome contributions from all over the world, as we have been doing from the first issue of the journal.

15. I should like to take this opportunity of placing on record my sense of gratitude to the late Narendra Nath Mookerjee, who with characteristic generosity had helped in the publication of the journal from the Art Press, in the early years. I remember the services rendered by my two young colleagues, Subhendu Sekhar Bose and Sudhir Kumar Banerjee, who passed away at a very early age. In recent years, we are grateful for the help we have received from Anikendra Mahalanobis, Krishna Birendra Goswami and Dyutish Ranjan Banerjee in the publication of this journal. We offer our sincere thanks to the workers of the Eka Press, who have always helped ungrudgingly in printing the journal.

16. It was an adventure, even foolhardy, to have started a statistical journal in India thirty years ago when our resources in research and in material equipment were meagre. It is because of the friendly cooperation and support which we have been receiving from within and outside India that this journal could make a place of its own in public esteem. We offer our most sincere thanks to our friends and contributors in India and abroad for their kind cooperation, and seek their continuing support in future.