

INDIAN STATISTICAL INSTITUTE

CONVOCATION ADDRESS

by

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It is now just about 25 years, since I first had the pleasure and privilege of meeting in India both Professor Mahalanobis and the very able group of friends and students whom he had gathered to form the Indian Statistical Institute. I had, indeed, before that known something of Mahalanobis' work, for I was much concerned to view, if necessary only from a distance, the movements of thought in different parts of the world associated with the rapid development of statistical understanding in my own country; and I had recognised the appearance in the East of a new movement which was putting India not far from the centre of the statistical map. A movement comparable in importance, for example, with that of *Yates* in the extension and elaboration of Experimental Design, or of that which under the impulse of *Walter Shewhart* was soon to storm through the United States under the banner of Quality Control. I need hardly say that I refer to the emergence of a statistically competent technique of Sample Survey, with which I believe Professor Mahalanobis' name will always be associated.

What at first most strongly attracted my admiration was that the Professor's work was not imitative. That is a fault which has been ascribed to Indians, but as every statistician knows, nations are composed of very many, and very different individuals. They do not share the same list of faults, and, at the present time you have only to look at any bunch of newly published books, on statistics for example, to see that this fault is by no means a monopoly of any one people. Imitative books are as common as dirt; and work of striking originality is as rare now, as it was when I first read of the surveys of the jute crop of Bengal in which the Professor was trying out his new ideas.

During the inter-war period and indeed before, there had been some discussions at the International Statistical Institute on sampling for the ascertainment of demographic and economic data. The conditions imagined were very different from those of practical work in India, and, indeed the theoretical principles also had been very imperfectly appreciated. Even so elementary a requirement as randomisation was at first ignored.

What was striking therefore in the Indian contribution to the problems of Sample Survey, was that it combined a clear realization of statistical principles with a down-to-earth experience of the practical difficulties, in a country in which education was, on the whole, backward, of getting such work done, on a large scale, and yet with the primary scientific requirement of ascertainable and demonstrable precision. From that point the standard set has never gone back, and publicly organised censuses and surveys in all parts of the world look to the Indian Sample Survey as a basis for comparison. Difficulties of course there are, in India, and also elsewhere, but the speed and economy, as well as the accuracy of sample surveys when competently organised, have now been put beyond question.

The needs of India, which are always I fancy at the heart of the Professor's thinking, show themselves again in the utilization of those aptitudes in which Indians have shown themselves to be especially gifted. From time to time as new editions of *Statistical Tables* are required, I go over those contributions of sufficient importance to be noticed in the pre-

face, especially to the combinatorial problems arising from Yate's work on experimental design and his invention of balanced incomplete blocks. Mathematicians of many nations have contributed to our knowledge of this very intriguing field, but I do not think I exaggerate if I say that the Indian names are as numerous as all others together, and this must particularly be ascribed to the fact that early in the Institute's history several of the young mathematicians brought into intellectual contact by the Institute's activity, found in this subject a type of problem ideally suited to their gifts. Again the important work in multi-factorial analysis in which I have been glad to see extensions and amplifications of my own early work, has been chiefly, if not wholly taken up by past and present members of the Institute such as *Bose* and *Roy* in North Carolina, and especially by *Rao* here in Calcutta.

Every time I see the Institute it is bigger, and I hope better. On this visit I am sure I have not seen it all. It certainly shows no sign of narrowness or standardization. Now facets are always appearing—a palaeontological museum, or a garden of Indian cultivated plants. I take these bold excursions to mean that the Director believes, as I most certainly do myself, that teaching, instruction, or training in statistics, at whatever level is bound to gravitate to an exhibitionism in useless mathematics, unless it is linked as intimately as may be, on the one side with fact-finding projects in the traditional statistical fields of demography and economics, and on the other side with opportunities to gain first-hand familiarity with at least some field in the natural sciences. Moreover, the science with which the student is to become acquainted must be genuine research in its own right, not what is eloquently called a "mock-up" for the use of students only. Visitors are often surprised, when they learn that Miss Robinson and her colleagues are actually digging up some of the early inhabitants of India, and writing a new chapter in Indian mesozoic history. They ask what has that to do with statistics. That sort of question reveals well how comparatively narrow and trivial a subject statistics was in the nineteenth century. It has *grown* since then, almost explosively; and it is certainly proper, some would say it is a prime requirement, if the Statistical Institute also widens its range of interests. The answer to the question, therefore, of what the sciences have to do with statistics lies in the part they must play in the education of any competent statistician. And that the Institute's future stands or falls by the *quality* of the education it offers.

The implementation of this broad educational policy seems to me extremely difficult. For its educational programme the Institute needs not only leaders in mathematical thought like Professor Rao, who can uphold and maintain the high place in world opinion that Indians have already won, but they need also that patient and obstinate class of scientific workers, who alone can transmit the feel and know-how of the natural sciences. There is very little of the aggressive and self-advertising about such men; though they may be among the most gifted of teachers, for whom even the best text books are no substitute at all. I do not suggest that they are easy to find, only that, here as elsewhere, they are fitted to play the most important part in scientific, technological and technical education.

These, may I insist, *are not castes*. Though literary men and journalists have often shown their aptitude for getting hold of the wrong end of the stick, by suggesting that technologists in particular are less than highly educated. Nothing could be further from the truth. Scientists indeed may, at their own risk, narrow their interests in order to gain special proficiency in one line. Technicians also may develop by ample practice very special aptitudes. The technologist must talk the language both of the scientist and of the technician. His education must be broader than theirs, though at points less intensive. He has to see both sides of the fence, and is the channel through which alone the skills of the others can be made effective. It is, I believe, in recognising Statistics as the key technology of our century, that we can appreciate the special features of the Indian Statistical Institute.