SOMESH DAS GUPTA

(03 September 1935 – 29 April 2006)

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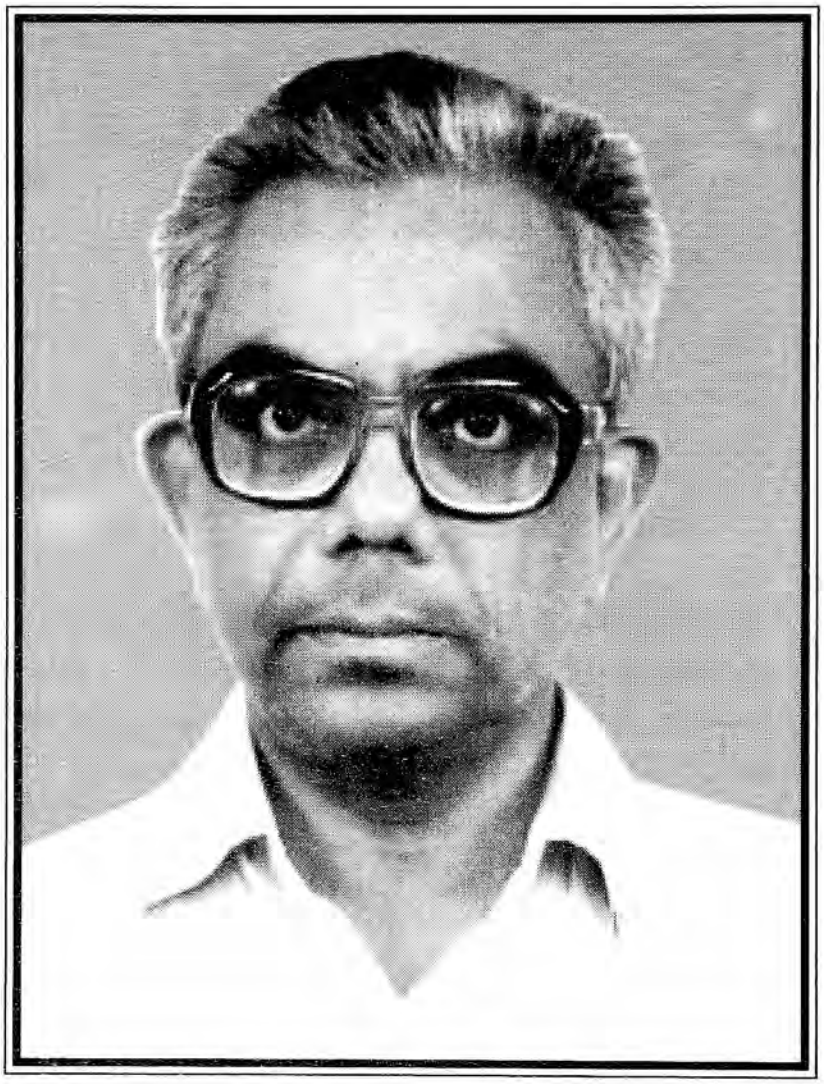

Somesh Das Gupta

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(1935-2006)

Elected Fellow 1992

CHILDHOOD AND EARLY EDUCATION

SOMESH DAS GUPTA was born on the 3rd of September 1935 in Calcutta. His parents were Suresh Das Gupta and Taru Das Gupta. He had four brothers and five sisters, all elder to him. He got married to Jarna on the 13th of August 1964. They have a son, Abijit Das Gupta who is now in the US.

Professor Somesh passed the matriculation examination in 1949 from Calcutta. Greatly influenced by his Mathematics teacher, he did BSc (Hons) specializing in Mathematics and completed it in 1953. With a scholarship, he did MSc (Statistics) from Calcutta University and got the degree in 1956. He went to the US and got his PhD from the University of North Carolina, Chapel Hill in 1962.

POSITIONS HELD

Professor Das Gupta joined as Instructor, Department of Statistics, Colombia University, New York in 1962 and subsequently worked as Assistant Professor between 1963 and 1964. He worked as Associate Professor, Department of Theoretical Statistics between 1967 and 1970. He served as a full Professor between 1970 and 1982. He was Chairman, Statistics Graduate Study, University of Minnesota between 1971 and 1973. In between he was a Visiting Professor in the University of Lund, Sweden in 1973, Stanford University in 1974 and ISI, Calcutta during 1981 and 1982. He joined as a Professor in ISI, Calcutta in 1982 and continued till his retirement in 1996. He worked as INSA Senior Scientist between 1996 and 2001.

MAJOR ACHIEVEMENTS

Professor Das Gupta is an internationally known for his expertise in multi variate analysis. His fundamental contributions to (i) Classification and Discrimination (ii) Statistical Inference (iii) Probability Inequalities, special the monotonicity can be found in all text books. His work on classification initiated the decision-theoretic development in the case of unknown parameters. His work on classifiability dealt with the fundamental problem of controlling the probability of correct classification.

He derived the monotonicity property of a large class of multi variate statistical tests and introduced a new and general approach for studying such problems. He provided the mathematical proof of some important properties of F test. His paper

on ancillarity provided a general group theoretic framework for studying ancillarity and sufficiency.

His results on probability inequalities for elliptically contoured densities and unimodal functions are quite fundamental. They initiated a new and important line of research. He generalized Brun Minkowski's inequlity and the important inequality of Anderson on convex sets. His micro analysis of unimodal functions encompasses a large variety of statistical models. He provided a proof for the monotonicity of standard classification rules in general framework and obtained useful bounds.

RESEARCH WORKS

(a) Classification Problems

The classification problem was first considered by Fisher who suggested a heuristic rule in the case of two normal populations. The Mahalanobis-distance introduced later on played an important role in the area. Wald considered this problem from the decision theoretic viewpoint when the parameters of distribution are known. The problem was also studied by CR Rao and TW Anderson. He gave a series of results from the decision theoretic view point when the parameters are unknown, in particular, he derived the admissible minimax rule in an invariant class for the multivariate normal two population problem and obtained a lass of admissible Bayes rules in the case of exponential family of distributions. Das Gupta's paper on non parametric classification rules is also a pioneering work. He studied classification rules based on U statistics and distance functions.

The first systematic theoretical study on classification error was done by Das Gupta, he derived the monotonicity property of the error probabilities of a class of standard rules in the multi variate normal two population problem and studied the 'plug in' and the 'leave one out' estimates of the misclassification probabilities.

Das Gupta introduced the concept of classifiability in relation to the problem of controlling the error probabilities arbitrarily and studied different cases of classifiability for appropriate sampling design. The classification problem for the growth curve model and, in particular, for the dependent training sample was first considered by Das Gupta and Bandopadhyaya. His joint paper on the rank nearest neighbour rules is an important contribution to this area. The asymptotic properties of these rules were rigorously studied for the first time. His paper on the two population normal classification problem with known mean vectors has led to considerable development later. The empirically optimum rules for pattern recognition was introduced by Das Gupta. His work on pattern recognition gives a theoretical foundation for the available results when the signals are subjected to error. His review paper on classification is one of the most cited papers. He was a

Member of the Editorial Board for the book entitled '*Hand Book of Statistics II*' which deals with classification problems.

(b) Multivariate Analysis

Das Gupta and Anderson initiated the study of power functions of multivariate tests in the theoretical set up and their techniques have led to considerable development in this area. Their papers on tests for MANOVA, tests for independence and tests for equality of covariance matrices are pioneering in this area. His work on power function of some tests relating to dispersion matrices presented many new techniques and resolved important issues. It was conjectured by CR Rao that the inclusion of additional variates may not be always better for the Hotelling's T2 problem. Das Gupta and Periman in a pioneering work proved that the inclusion of additional variates would lead to a reduction of power unless the additional distance is sufficiently large, they have suggested a new test for additional distance.

It was known for a long time that the power function of ANOVA F test decreases with the increase of hypothesis degrees of freedom, and increases with an increase of error degrees of freedom. They provided the first theoretical proof of this important popular result. Das Gupta's papers on non central matrix beta distribution and tests for multiple and partial correlation coefficients led to considerable investigation later on.

The first bibliography of all publications on multi variate statistical analysis was a joint work of Anderson, Das Gupta and Styan. This important bibliography gives subject matter codes and authorwise listing of all publications.

(c) Probability Inequalities

Das Gupta's most fundamental contribution was on probability inequalities. His results have been used effectively for studying multivariate tests and confidence regions and dependence. His joint work on probability inequalities for elliptically contoured distributions is one of the most cited papers in this area. His study on the generalization of Anderson's inequality and micro analysis of multi variate unimodality are quite fundamental. His extensive study of Brunn-Minkowski's inequality not only provided some rigorous and lucid proofs of some of the generalizations of Brunn-Mikowskii inequlities, but also gave significant insight into the different concepts of multi variate unimodality. A number of articles in Farrell's book entitled "Multi Variate Calculations" and in Tong's book entitled "Probability Inequalities" and several chapters in the book by Dharmadhikari and Jog Dev on unimodality are based exclusively on Das Gupta's work on probability inequalities.

Das Gupta's study of chi square and F distributions in relation to TP2 prop[illegible] has led to some interesting and useful bounds. His study on majorisation for

comparing multi variate populations presents many important aspects of this problem.

(d) Statistical Inference and Other Topics

Das Gupta's early work on point bi-serial correlation and its generalization and results on discrimination function coefficients are very often cited. His work on ancillarity and sufficiency based on group structure are quite pioneering; in particular, that the group structure of an invariant model could be used for studying ancillarity, sufficiency and independence. His step down technique for multiple decision problems was applied to a variety of statistical problems to derive optimal procedures. His paper on BLUS residuals and testability gave geometrical insight into these problems. Das Gupta and Bhandari have shown that two independent convex symmetric statistics U(X) and V(X), with X distributed as N(O, In) could be unlinked in the sense of Linnink. This answers some of the unsolved problems in this area. Das Gupta and Goswami have obtained interesting characterisations of uniform distribution through order statistics.

Das Gupta has pointed out that the usual paired t-test for assessing the effect of a drug may be misleading. In this context he has defined the gross effect and the differential effect of treatment and presented tests for assessing these effects. This result clears the blind spot that existed earlier. He considered along with Mukherjee the problem of optimum allocation of response variables in a multi response incomplete experiment.

AWARDS AND HONOURS

Das Gupta was elected Member, International Statistical Institute in 1979, Fellow, Institute of Mathematical Statistics, USA 1973, Fellow, American Statistical Association 1973. He was a Fullbright Scholar in 1960. He was elected fellow of INSA in 1992. He was a member, Editorial Board (International) of Multi variate Analysis during 1976-83. He was a Visiting Scientist, USSR Academy of Science 1989. He was Editor of *Sankhya, Indian Journal of Statistics.*

Professor Das Gupta passed away on 29th April 2006.

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