DEPARTMENT OF STATISTICS UNIVERSITY OF MUMBAI





मुंबई विद्यापीठ - संख्याशास्त्र विभागाच्या आठवणी...

BRILLIANCE MEMORIES KNOWLEDG ACHIEVEMENT TEACHING PASSION EXPERIENCE RECOLLECTIONS LEARNING PERSEVERANCE DEDICATION EXTRAODINARY EDUCATION SUPPORTIVE RESEARCH

23rd FEBRUARY, 2017

संख्यास्मृती

मुंबई विद्यापीठ - संख्याशास्त्र विभागाच्या आठवणी...



Dedicated to the memory of **PROFESSOR M.C. CHAKRABARTI**

PREFACE

The department of Statistics with the help of alumni association has been organizing one day seminar every year since 1990. The idea behind this seminar is to make available the platform for current students and alumni of the department for sharing their views of real life applications of Statistics. Usually, we invite past students of the department to give talks. They are very keen to discuss the problems faced by them when they joined the industry field and how they tackled them. Every year all the masters' students are benefited by this seminar.

This year we have made an addition to the seminar. On this occasion, we decided to felicitate all the retired faculty members of the department, right from Prof. Y. S. Sathe to recently retired Prof. U. J. Dixit which includes Prof. (Mrs.) S. M. Joshi, Prof. (Mrs.) M. R. Satam, Prof. (Mrs.) S. P. Nabar and Prof. R. G. Shenoy. Faculty members and students of the department have interviewed these six professors. The resulting conversations have been published in this 'संख्यास्मृती : मुंबई विद्यापीठ - संख्याशास्त्र विभागाच्या आठवणी...'.

I am very sure that 'संख्यास्मृती : मुंबई विद्यापीठ - संख्याशास्त्र विभागाच्या आठवणी...' will be remembered by one and all as a true manifestation of our feelings towards the professors.

Dr. (Mrs.) V. U. Dixit

Head department of Statistics

23rd February, 2017.

ABOUT THE DEPARTMENT



Standing from left : Prof. Tushar Murdheshwar, Prof. Sanjay Deshpande,
Prof. R. G. Shenoy, Prof. U. J. Dixit, Prof. (Mrs.) V. U. Dixit,
Prof. (Mrs.) Mangala ShahSeating from left :Prof. (Mrs.) M. R. Satam, Mrs. Vijaya Sathe,
Prof. Y. S. Sathe, Prof. (Mrs.) S. M. Joshi,
Prof. (Mrs.) S. P. Nabar

In today's world Statistics is the king of science. Almost every subject needs help of Statistics to analyze their problems. This was not the situation in mid nineties, when facility for a formal training in Statistics was in ISI, Calcutta (started in 1931). As a result, all important jobs in this new growing subject were denied to students from the Bombay Province. Dr. P. V. Sukhatme-former chief Statistician, F.A.O. (Food and Agriculture Organization) was very much concerned about this. He insisted that the Bombay University (now University of Mumbai) must remove this lacuna by starting formal training in Statistics. The Bombay University was basically an examining body and there were only few post-graduate departments among which the School of Economics was prominent. Due to the efforts of Dr. Sukhatme, after making financial arrangements, Principal N. M. Shah, Chairman, Board of studies in Mathematics, sanctioned a diploma course in statistics. However, he and other members of the Board thought that if only diploma course were held then good statisticians could not be produced. Rather clerks who would do statistical calculations only would be created. So in the same year he sanctioned post-graduate course and as a result department of Statistics came into existence in September, 1948. It was the first Department in the western region, for postgraduate studies and research in Statistics. It was difficult to get suitable teachers for the infant department but University was very fortunate to have Late Prof. Mukund Chandra Chakrabarti as founder head of the department.

Prof. Chakrabarti was on the staff of the Mathematics Department of the University of Dhaka. Due to partition of the country, he moved to Calcutta and was looking for good opportunities. Prof. Chakrabarti had a brilliant academic career. He was throughout first class student and stood first in his M.Sc. (Mathematics) examination from Dhaka University. He had received a thorough training in all branches of Statistics in the Indian Statistical Institute (ISI), Calcutta. Prof. P. C. Mahalanobis, Prof. R. C. Bose, Prof. S. N. Roy, Dr. K. R. Nair were some of his teachers in ISI.

It is not an easy task to build a new department and raise it to one of the best Departments but Prof. Chakrabarti handled it patiently. At the beginning John McLean, R. S. Koshal, G. S. Priyolkar, D. D. Kosambi and G. S. Sankpal, P. V. Sukhatme and V. G. Panse helped him to run the department.

For this infant department, University provided very limited space in the corner of the south wing of the University, in the school of Economics, and gave permission to use its lecture rooms only for 2 hours every day.

As time passed department got its own space on second floor facing MG road in Fort campus. There were demonstrators' room, faculty rooms, seminar room, class rooms and laboratory. By this time university recruited new faculties in the department. Only three to four lecturers and two demonstrators were appointed. Initially, with M. C. Chakrabarti, K. C. Chanda, A. M. Kshirsagar, M. N. Vartak were lecturers and M. N. Murti, Rao were demonstrators. After that Dr. Sathe, Nair, Tharthare joined the department because K. C. Chanda, M. N. Vartak, A. M. Kshrisagar left for better.

Dr. Bharati Indu Sanghavi, Ghangurde, Patel joined when Nair and Tharthare left. Meanwhile, Miss. Pradhan, Miss. Lingrass and Mr. R. G. Shenoy joined as demonstrators.

Only twenty four students were admitted for M.Sc. class. There was only one examination at the end of second year but the syllabus structure was same as today, four theory papers and two practical papers. Probability, Sampling, Design of experiments, Statistical inference, Multivariate analysis and applied paper was Industrial Statistics consisting of Quality control and Operations Research. Lectures were from 12.00 noon to 04.00 p.m. In practical session, problems were solved by hand operated facit machines. Students who operated these machines always say that it was a muscle building operation. Reference books were also limited. Very few books were available for references. Books authored by, Feller (volume I and II), Kendall and Stuart, (volume I, II and III), S. R. Searle, Cochran, Hogg and Craig were available and mainly lecture notes of professors especially Prof. M.C. Chakrabarti.

Prof. Chakrabarti began to build a superb collection of books and journals in Statistics. Prof.Chakrabarti started the journal JISA (Journal of Indian Statistical Association) and initially he alone handled it efficiently. At that time the Bombay University Statistics Library was one of the best. All the credit for this goes to the patience, care and zeal with which Chakrabarti handled this task. Gradually and systematically he expanded the library and the laboratory. In addition all his personal collection of books and journals were donated to the library after his death.

The reputation of the department was steadily increasing due to several excellent students it produced. News spread to other countries too. Frank Yates, M. G. Kendall, J. Neyman, J. B. S. Halden, J Wishart, S. N. Roy, P. C. Mahalanobis, P. V. Sukhatme visited the department. The greatest compliment came from Prof. J. Neyman who wrote to Prof. M. C. Chakrabarti that whenever he came across a good Indian student, he invariably found him to be from the Bombay Department. When Prof. Neyman was once asked by an American foundation, to which place in India, a particular statistical project be assigned and grant given, he replied, "Of course

Bombay". When the inquirer said he had not heard Prof. Chakrabarti's name, **Prof. Neyman said he knew that all his good Indian students were from Bombay and he was impressed by the quality of statistical training there**.

Around 1965, the University department shifted to Jamnalal Bajaj Institute of Management Studies and thereafter permanently to the Kalina campus in 1971. In, Jamnalal Bajaj Institute of Management Studies, top floor was given for management courses, middle floor to Statistics department and the ground floor was to Mathematics department. Currently, department is situated on second and third floor in Lokmanya Tilak bhavan, Kalina campus, Vidyanagari, Santakruz (E).

One of the most important features of the Mumbai University is that, Statistics department started much earlier than Mathematics department. The latter came into existence in 1962 and interestingly Prof. S. S. Shrikhande, a statistician-cummathematician became its first head.

Faculty and Headship

Initially, the department had three to four faculty members and two demonstrators, none was a Professor. As a matter of fact the post of Professor was created only in 1965 and M. C. Chakrabarti was appointed as first Professor.

Late Professor M. C. Chakrabarti was appointed as the pioneering head of department in 1948 and remained as head of the department till his death in 1972. University made some appointments in the department but may be due to other good opportunities many of the appointed faculties left the department and joined other institutes or went for research abroad. The faculties who remained in the department permanently till their retirement are, Prof. Y. S. Sathe, Prof. (Mrs.) S. M. Joshi, Prof. (Mrs.) M. R. Satam, Prof. (Mrs.) S. P. Nabar, Prof. R. G. Shenoy and Prof. U. J. Dixit. Prof. U. J. Dixit with his wife Dr. (Mrs.) V. U. Dixit also decided to shift Fiji in the year 2000 but very fortunately they returned and have remained in the department since then.

Some of the other faculty members who were there in the department for some period of time are,

K. C. Chanda	K. S. Rao	C. R. Nayar
M. N. Vartak	Sheela Talawalkar	S. K. Tharthare
A. M. Kshirsagar	V. P. Bhapkar	S. D. Varde
V. N. Murthy	V. N. Patankar	A. P. Gore
Manda Rohatagi	Susy Philipose	R.B. Bapat
B. K. Kale	Bharti Sanghavi	Sushama M. Bendre
Venkutai Patil	Suresh Phatarphod	T. M. Murdeshwar
B. S. Bhate	P. D. Ghangurde	S. Ravi
P. S. Rao	C. A. Patel	Shubhangi Late
M. K. Wagholkar	Girish Aras	

Dr. Y. S. Sathe, with a research degree from University of North Carolina, Chapel Hill and Post-doctoral experience in the National Institute of Health in Washigton DC, joined the department in 1965 as Reader and retired as Professor and Head in March, 1990. Dr. (Mrs.) M. R. Satam joined department as Demonstrator in November, 1967, became Lecturer in 1971 and retired in April 2004. Dr. (Mrs.) S. M. Joshi joined the department in October, 1979 as Lecturer and retired as a Professor and head in June, 1998. Dr. (Mrs.) S. P. Nabar and Dr. R. G. Shenoy joined the department in July, 1973 and October, 1974 respectively as demonstrator initially and both of them became Lecturer in July, 1975. Dr. R. G. Shenoy superannuated in December, 2010 and Dr. (Mrs.) S. P. Nabar in February, 2013. Thereafter Dr. U. J. Dixit joined as a lecturer in February, 1988. All these faculty members who joined department are students of Prof. Y. S. Sathe. Dr. U. J. Dixit retired in June, 2016. Dr. (Mrs.) V. U. Dixit, Dr. S. P. Gite joined the department respectively in the years June, 1997, April, 2004 as Lecturer. Dr. (Mrs.) V. U. Dixit became Associate Professor in 2008. Recently A. D. Dabade, Prof. Raju. K. Lohot and Prof. Priyesh. D. Tiwari joined department in October, 2013, August, 2015 and August, 2016 respectively as Assistant Professors. Dr. R. G. Shenoy superannuated in December, 2010, Dr. (Mrs.) S. P. Nabar in February, 2013 and Dr. U. J. Dixit retired in June, 2016.

Prof. M. C. Chakrabarti was the founder head of the department from 1948 to his sudden death in 1972. After that Prof. Y. S. Sathe shouldered the responsibility till his retirement in March, 1990. Prof. (Mrs.) S. M. Joshi was heading the department from 1990 to 1998. In 1998, Prof. (Mrs.) S. P. Nabar became head and headed till 2001. After introducing scheme of rotation of headship, Prof. R. G. Shenoy became head and was head till 2004. After that Prof. U. J. Dixit became head of the department till 2007. Headship again returned as per seniority to Prof. (Mrs.) S. P. Nabar from 2007 to 2010 and then Prof. R. G. Shenoy till his retirement December, 2010. Prof. U. J. Dixit became head again in 2011 to 2014. Currently Dr. (Mrs.) V. U. Dixit is heading the department from March 2014.

Research

The Department is mainly popular in the field of Design of Experiments. This is due to the keen interest of Prof. M. C. Chakrabarti in this field. Proof of the famous inequality b≥v in balanced incomplete block design is one of the main features of his research. His knowledge of the theory of numbers was quite useful in the field of construction of designs. He had a number of publications that included a wide variety of topics ranging from remainder terms in interpolation formulae to skewness and kurtosis of statistical distributions. He guided ten students for Ph.D. out of which many of them were in Design of Experiments. A few important statistical results obtained by Chakrabarti's students in the Department, under his guidance are,

- A necessary and sufficient condition for balancing in an experimental design is the equality of the non-zero latent roots of the C matrix of the design.
- The use of Kronecker product of incidence matrices in the construction of PBIB design.
- The optimality of BIB designs and Youden square designs.

He and his students used Matrix Algebra extensively because of which his reputation in the field of experimental designs reached everywhere in India and abroad. He wrote a book "Mathematics of Design and Analysis of Experiments" published by the Asia Publishing House in 1962 which is now a reference book for Design of Experiments for Post-Graduate course in Statistics in almost all the Universities. Ten students from the department were fortunate to pursue research degree under his guidance. Some of them are Prof. Babubhai Shah, Prof. M. N. Vartak and Prof. D. Raghavrao. One most important thing about him is that, he has never written his name as co-author in any of the research paper with his Ph.D. students though he had a significant contribution in it. He was the "Man of Principles"

Prof. Y. S. Sathe has proficiency in varied area of research such as Statistical Inference, Design of Experiments, Reliability estimation, selection and ranking of binomial populations, problems in sequencing of jobs on machines and inventory models etc. He obtained MVUE in coin tossing problems; also he obtained an unbiased estimator and a sequential test for correlation coefficient. His research interest was in bounds and inequalities also. He obtained sharper variance bounds for unbiased estimation in inverse sampling, bounds for Pearson type-IV tail probabilities. He obtained bounds for the variance of the busy period of the $M/G/\infty$ queue. He obtained bounds for the probability of the occurrence of at least m events out of n events. He guided eleven students for Ph.D. and nine students for M.Phil. He has published more than sixty five research papers in reputed international journals. He has research papers in optimality and construction of designs with R. G. Shenoy also.

Prof. (Mrs) S. M. Joshi has given valuable contribution mainly in Statistical Inference. She estimated scale parameter of the exponential distribution with a known linear relation between the location and scale parameter and also parameters of an invariant family of distributions. She also obtained bounds on circular error probabilities. She derived statistical tests for scale parameter of the exponential distribution with known coefficient of variation with S. P. Nabar and with Shah for inverse Gaussian distribution. She also considered inferential problems of the Nile. She has more than sixteen research papers on her name. She guided nine students for M.Phil. and one student for Ph.D. Prof. M. R. Satam, has interest in Statistical Inference and Design of Experiments. She obtained unbiased estimator and SPRT for the correlation coefficient. She obtained exact expression for the probabilities of various events with the selection of the better of two binomial populations. She published more than eighteen Research papers, guided nine students for M.Phil. and one student for Ph.D.

The primary research field of interests of Prof. (Mrs.) S. P. Nabar was on bounds and inequalities. She has also contributed in estimation of parameters in the problem of Nile with Prof. (Mrs.) S. M. Joshi. Her valuable research work is in the field of quality control also. Some of her important research articles contained,

- Cumulative sum control chart for the inverse Gaussian distribution
- Acceptance sampling plan by variables for inverse Gaussian distribution
- Inference on P(Y < X) in the binormal distribution
- Estimation problems of Two-Piece logistic distribution and bilognormal distribution

She has published more than twenty five research papers in national and international journals. She guided eleven M.Phil. students and three Ph.D. students.

Prof. R.G. Shenoy has main interest in Design of Experiments. A few important results he obtained are;

- Optimal values of s when N = 3 (Mod 4) and N < 100 for A-optimal weighing designs.
- The designs which are A-optimal in D(N,n) are not necessarily A optimal in Do(N,n).
- Construction of designs.

He published more than fifteen Research papers in reputed national and International journals and guided for M.Phil. to nine students.

The major field of research of Prof. U. J. Dixit is Statistical Inference. He considered estimation, Bayesian as well as classical method of estimation of distributions such as Gamma, Weibull, Uniform, Pareto, binomial with outliers. He also extended results for bivariate and trivariate distributions. He has more than

forty research papers on his credit. He guided four M.Phil. students and five Ph.D. students. Currently two students are working under him for Ph.D. He has written a book on Statistical Inference titled "Examples in Parametric Inference With R" published by Springer in 2016. He visited many Statistics departments of abroad universities such as, University of Wollongong, Australia; Florida state University, U.S.A.; National University of Singapore. He was selected as first international fellow of Rothamsted by Rothamsted Experimental Station. U. K. in 1993. He was senior Lecturer in department of Mathematics and Computing Science, University of South Pacific, Suva Fiji during 2001 to 2003. He was awarded for EXCELLENCE IN RESEARCH AND TEACHING by University of Mumbai in 2008.

Dr. (Mrs.) V. U. Dixit has interest in statistical inference. She has published more than ten research papers. Her current interest is in inferential problems of two piece distributions. Right now three students are working for Ph.D. under her guidance. Dr. (Mrs.) Dixit was Lecturer in Department of Mathematics and Computing Science, University of South Pacific, Suva Fiji from February, 2003 to June, 2003.

Dr. S. P. Gite is working in Inventory Models. He has published more than six Research papers.

Prof. R. K. Lohot is keen to work in Design of experiments. Prof. P. D. Tiwari is interested in statistical inference.

The Department has published more than three hundred research papers in refereed journals of international repute. Prof. U. J. Dixit and Prof. (Mrs.) M. R. Satam edited a volume "Statistical Inference and Deign of Experiments" published by Narosa Publishing house in Golden jubilee year of the department, 1998. Department has organized many international conferences. Recently in June, 2016 department had organized the International conference.

Interaction with Industry

The faculty members offer statistical consultancy to the researchers and industry people, from Mumbai city and research institutions all over the country. The consultancy activities, particularly outside the University, have strengthened the desire to apply modern methods amongst potential users in industry, medicine, and other fields. Hospitals and research institutes approach the Department for help as well as collaboration. Department has provided consultancy services to companies like Parle Productions(P) Ltd., Richardson Hindustan Ltd., Pfizer Ltd., Zydus Cadila Ltd, Indian Oil Corporation Ltd. Fractal Analytics Ltd., M-Ideas etc.

Placement

The Department has started the placement activity from 2000. Prior to that also students were placed in companies like, Telco, Novartis, Pfizer etc. In 2000, Novartis offered job opportunity to almost all second year students of the department so faculty members of the department decided to start placement committee. It undertakes many tasks, the prime one being that of looking after the campus interviews. The committee consists of a teacher, co-ordinator and seven to eight student representatives. Till today Prof. (Mrs.) S. P. Nabar, Prof. R. G. Shenoy, Prof. U. J. Dixit, Dr. (Mrs.) V. U. Dixit, worked as teacher coordinator. Currently Dr. A. D. Dabade is coordinating the committee. Right from the beginning of placement committee, every year almost all successful students get placed in various companies such as:

A.C. Nielsen - ORG MARG	ICICI Prudential	Quintiles Spectral
Accenture	IGATE	Research International
Birla Sun Life	IMRB	Reserve Bank of India
Cartesian	IMS Health	SAS Institute
Citibank	J. P. Morgan	Siemens
Cognizant Technology Solutions	Kotak Mahindra	Siro India

Fractal Analytics Ltd.	MADISON	Sun Pharma
GE Capital	Novartis	TCS
HDFC	Pfizer	Idea
BARC	Reliance-Retail	Magic9

Syllabus

If any of the students would ask to Prof. M. C. Chakrabarti what is the syllabus for exam? He would always reply, whatever I have taught in class will be syllabus. It was Prof. Y. S. Sathe who introduced a structured syllabus.

From time to time syllabus of M.A./M.Sc. Statistics course has been revised and changes have been brought in that to suit industry needs. Several new topics were included like, Bootstrap and Jacknife methods, Optimality of Designs, Factor Analysis, and Cluster Analysis and ridge regression etc. Several new courses were introduced in theoretical as well as applied statistics like advanced probability, stochastic process, sequential decision theory, bio-statistics, non-linear programming etc. from time to time.

Currently, syllabus consists of Probability Theory and Sampling, Linear Models, Distribution theory and Estimation theory, Design and analysis of Experiments for M.Sc. Part I. For M.Sc. part II, Multivariate analysis, Testing of Hypotheses are the core papers and remaining two courses are optional. Student can select any two from available optional courses. The optional courses are, Bayesian analysis, Bioinformatics, Biostatistics, Clinical research, Contingencies, Data Mining, Financial Mathematics, Statistical Process Control, Non-Parametric Inference, Operations Research, Advanced theory of designs, Categorical Data Analysis, Econometrics, Measure theory, Statistical Decision Theory, Genetics, Stochastic Processes, Reliability and Survival Analysis etc. With the advent of the computers, the globe has witnessed the importance of preserving and analyzing a plethora of data. As a result, there is an increasing demand for appropriate analytical and interpretation skills. So, statistical software such as SAS, SPSS, MINITAB, R have also been included in the syllabus.

New courses

Twenty-First century experienced information explosion. To manage this information we need knowledgeable people. To live up to its reputation of excellent teaching and research, department started two post graduate diploma courses in applied statistics with software (PGDASS) and actuarial science (PGDAS) in June 2006 with strength of 50 students each. Including the core faculty of the department, following faculty from the various industries have taken interest in designing and teaching these courses.

Parag Mahulikar	Gopal Joshi	Sheela Barpande
Dr. Sharad Varde	Sunanda Asuti	Sunil Savalkar
Chandrakant Nimkar	Suniti Nagpurkar	Varsha Parulekar
Sunil Shirvaikar	Jitendra Tawde	Ashwini Mathur
Pravin Late	Anagha Bhatkhande	Dr. Mandar Oak

Initially Prof. (Mrs.) M. R. Satam was coordinating these courses. After she stepped down in 2013, Prof. Anil Arekar has shouldered the responsibility.

Computing facility

Earlier, Facit machine was used for solving the problems. In 1979, department brought electrical calculators and in 1982 electric pocket calculators. Now the department has excellent computing facility. The first computer was purchased by the department in 1985 to cope with the new emerging computing facilities in statistics. By the end of 1999 the department was having almost thirty computers. In 2006, due to the launching of new post graduate diploma courses, department received grant from University which made possible for the department to create two well equipped statistical laboratories. The laboratories have hundred Pentium based machines connected in network. All computers are connected to Internet. In 2000, Novartis donated SAS software to department. Currently department is having following Statistical Software,

- Statistical Application Software (SAS)
- Statistical Package for Social Sciences (SPSS)
- Minitab
- R-Language

The students are being trained in other prominent statistical software packages such as Weka, SQL for Data Mining.

Students

In 1971, strength of students of M.Sc. degree was increased from 24 to 50 and in year 2008 it increased to 60 students. The department has produced eminent statisticians of National and International repute.

Students who cleared NET/SET examination recently

Mangala Deshpande	Sunila Datar	Daksha Gurav
Sanjay Karande	Rahul Tiwari	Rakhi Kambale
Raju Lohot	Namrata Nagvekar	Sheetal Chabukswar

Students who cleared papers of Acturial Examinations

Gopal Joshi	Dhanashree Ketkar	Anuja Tipnis
Sunil Sawalkar	Harshada Shringarpure	Dipesh Gohil
Amrut Shintre	Andrea Noronha	Advait Bhagwat

Dhanashree Ketkar	Milind Kokate	Rohan Mayekar
Siddharth Talukdar	Prachi Vaishnav	Jharna Shah

Shraddha Jadhav	Pranita Adarkar	Trupti Kotkar
Ashwini Karndikar	Manali Yardi	Meghna Patel
Akshay Moghe	Himanshu Patel	Saumya Nair
Aditi Shah	Salim Shaikh	Dhaval Jasani
Nidhi Dubal	Shraddha Kulal	Chaitali Nikam
Sanket Sawant	Vikas Dubey	Vinayak Pawar
Tejal Kothmire	Nithya Esaki	Gaurav Apraj
Aditi Jawake	Thejas Iyer	Kajal Bagadia
Vedant Kondkar	Shailesh Wafelkar	Rutuja Medhekar
Priya Mourya	Atul Patil	Disha Ghate
Sumeet Belhekar	Tushar Salunkhe	Trupti Apraj
Prajakta Ghadi	Swarada Paranjape	Mandar Vedpathak
Ajay Mourya	Balachandra D.	Aishwarya Menon
Sheeja Mathai	Chinmayi Pawar	Melissa Lisa
Zalak Shah	Deepak Sharma	Vaidehi Bhopatkar
Apurva Joglekar	Akash Chaurasia	

Went abroad for research / study

Anand Dixit	Nivedita Bhakta	D'lima Walter John
Trupti Chaure	Aniruddha Rao	Dilip Chavan
Namrata Date	Imran Jiwani	Nehali Mhatre
Sayali Pokal	Shalan Kernel	Anwesha De
Amrut Shintre	Gayatri Diwekar	Mayuri Lotia

Best Student of the department award:

Department always encourage students for curricular as well as extracurricular activities. In the year 1990, when Prof. Y. S. Sathe retired, the Dr. Y. S. Sathe Felicitation Committee decided to give a prize of "BEST STUDENT" to the student of the department who along being academically excellent also participates in co-curricular and extra-curricular activites. Some of the students who received this "BEST STUDENT" award for recent years are,

Vaidehi Dixit	Arvind Mangle	Advait Bhagwat
Sandnya Dalvi	Dhanashri Ketkar	Anand Dixit
Anuja Tipnis	Dimple Doshi	Dhanashri Ketkar

From the Department more than 30 students had obtained Ph.D. in various fields such as Statistical inference, design of experiments and operations research.

A. Late Professor M.C. CHAKRABARTI

- 1. **B. V. Shah:** "Some aspects of the construction and analysis of incomplete block design", 1960.
- 2. M. N. Vartak: "On some applications of the kronecker product of matrices to statistical designs", 1961.
- 3. **D. Raghavrao:** "Some contributions to the design and analysis of experiments", 1961.
- C. R. Nair: "Some contributions to serially and partially balanced designs", 1968.
- M. Bhaskar Rao: "Some contributions to the design and analysis of experiments, with special reference to weighing designs, partially balanced designed and designs for two-way elimination of heterogeneity", 1968.
- 6. **Hiralal Agrawal:** "Some contributions to the design of experiments with particular reference to common treatments between blocks, two-way elimination of heterogeneity and balanced block designs", 1968.
- 7. **B. I. Sanghvi:** "Some contributions to continuous sampling plans",1968.
- 8. A. R. Rajeswari: "Theory of non-premptive priority queue and its applications", 1969.
- 9. Susy Philipose: "Operation Research", 1972.
- 10. G. V. Shenoy: "Some aspects of Operation Research", 1972.

B. Professor Y. S. SATHE

- 1. **S. D. Varde :** "Some problems of estimation in two parameter exponenial distribution with special seference to reliability", 1970
- 2. V. Y. Salpekar: "Bounds for some standard distribution Function", 1973.
- 3. M. R. Pradhan (Mrs M. R. Satam): "Contributions to some problems in sequential sampling in case of dichotomous response", 1975.
- 4. V. S. Varde: "Some problem of estimation in discrete distributions and in accelerated life testing", 1975.
- 5. **S. M. Joshi:** "Distribution free slippage tests for location parameter in k sample and some problems estimation of the location parameter with known coefficient of variation", 1976.
- 6. S. R. Lingras (Mrs. S. P. Nabar): "Bounds for the probability integrals of various probability distributions", 1982.
- 7. S. P. Shah: "Approximation for the variance of some estimators", 1982.
- 8. **S. C. Panandikar:** "Some contributions to design of experiments with special reference to resolvable BIB designs, generalized group divisible design, generalized Kronecker product designs and block structure properties", 1983.
- R. G. Shenoy: "On MV- optimality and A- optimality of chemical balance weighing designs with special reference to number of weights equal to 4k+3", 1988.
- 10. B. V. Cadambi: "On some sequencing problems", 1988.
- 11. U. J. Dixit: "On estimation of parameters of the gamma distribution in the presence of outliers", 1989.

C. Professor S. M. JOSHI

1. M. N. Shah: "Statistical inference related to the inverse Gaussian distribution", 1992.

D. Professor (Mrs.) M. R. SATAM

1. **Mangala S. Deshpande**: "Some problems in design of experiments related to bibd & ternary designs etc", 2002.

E. Professor (Mrs.) S. P. NABAR

- 1. **S. P. Barpande:** "Some problems in statistical inference with special reference to binomial distribution", 2002.
- 2. **Amita Dalvi:** "Change point distribution and related problems in statistical inference", 2007
- 3. **Shailaja Deshmukh:** "Study of bilognormal and two piece logistic distribution." 2008

F. Professor U. J. DIXIT

- 1. **Parviz Nasirival:** "Estimation of the scale parameter of the exponential distribution in the presence of outliers generated from exponential distribution or uniform distribution", 2001.
- 2. Shilpa Khare: Estimation of the parameters of the bivariate exponential distribution", 2003.
- 3. Kalpana Phal: "Estimation in the presence of outliers", 2006.
- 4. **Mehdi Jabbari Nooghabi:** "Estimation of the parameters of a pareto distribution in the presence of outliers.", 2012
- 5. **Sushmita Jain:** "Aspect of ranking and selection in bivariate exponential and uniform distributions", 2013

From the department 55 students had obtained M.Phil in various fields such as Statistical inference, design of experiments, multivariate, operations research etc.

A. Professor Y. S. SATHE

- 1. V. M. Govilkar: "Characterization of some distribution function",1985.
- 2. C. R. Sovani: "Some techniques in discrimination",1986

- 3. **A. P. Pradhan:** "A study of some forecasting methods with application to bank deposits data",1986.
- 4. Jyotsna P. Tendulkar: "Probability Inequalities of tchebycheffs type",1986.
- 5. **M. N. Welling:**"Odds ratio as a measure of association between attributes with unordered categories and combination of odds ratio",1989.
- 6. **M.S. Paranjape:** "Statistical investigation of probable cause of delay in disposal of rent act suits of small causes court bombay",1990.
- 7. **Dinesh Panjwani:** "Estimation of common mean for two normal populations and recovery of interblock information",1990.
- 8. Neelima Shah: "Some problems in log linear models for qualitative data",1991.
- 9. Lalitha Dhara:"Variation in family size due to sex preferences and stopping rules", 1990.

B. Professor (Mrs.) S. M. JOSHI

- 1. **S. M. Patil:** "The Secretary problem with special reference to the no information problem",1985.
- 2. **R. J. Pawar:** "Non-Parametric estimation: A review of the Jcknife, the Bootstrap and cross validation",1986.
- 3. **A. P. Patil:** "Estimation of specified points of single dose response curve with special reference to Ed 50", 1988.
- 4. Leela Subramanian: "Ancillary Statistics", 1988.
- 5. **Rajesh David:** "Multi Echelon Inventory Techniques in systems with low demand rate items",1990.
- Bharati N. Sodha: "Estimation of parameter of negative binomial distribution",1990.
- 7. Shwetha R. Kamat: "Sequential procedures for the estimation of parameters of negative exponential distributions",1991.
- 8. **Joseph George:**"Random number generation and testing : An analytical study with special reference to probability distribution",1994.
- 9. Prasad Patki: "Estimation of the binomial parameter n", 1991.

10. **Sudha M. Phatak:** "A study of compound poisson distribution sichel and poisson inverse gaussian", 1992.

C. Dr. M. R. SATAM

- 1. P. M. Saraph: "Some single machine scheduling problems",1985.
- 2. Sulbha G. Raosaheb: "Some aspects of tandem queuing system",1989.
- 3. **S. S. Naralkar:** "Study of some of the incomplete block designs with special reference to variance balancedness, robustness and construction",1990.
- 4. Sita Ramanan: Consecutive K-out of n failure system",1991.
- 5. Vinaykumar Shrivas: "Hadamard Matrics",1991.
- 6. Anjali V. Oak: "Point estimators of the parameters and reliability",1991.
- 7. Kavita K. Jain:"The elevation of medical screening procedures",1992.
- 8. **K. G. Rajan:** "Study of shrinkage estimators with special reference to exponential distribution",1994.
- 9. **Pradnya Tamhankar:** "Support of balanced incomplete block designs and some results based on block intersection",1994.

D. Professor S. P. NABAR

- 1. **S. P. Barpande:** "Bayesian single sampling plan by attributes for discrete prior distribution",1985.
- 2. **P.A. Sapre:** "Estimation of population mean by using auxiliary information with specific reference to the ratio method of estimations",1986.
- 3. S. C. Deshmukh: "Stein type estimators of the mean vector of multivariate normal distribution",1988.
- 4. U. G. Takle: "Knap sack problem A survey of solutions and application studies",1989.
- 5. **P. P. Khandeparkar:**"The Capture Recapture Models",1989.
- 6. J. J. Rupani:"Tolerance limits",1990.
- 7. S.D. Bilgi (S. R. Koppikar): "Inverse Gaussian distribution", 1991.
- 8. Anjali S. Panigrahi: "Economics design of control charts", 1992.

- 9. Jigisha M. Randeria: "Optimality and uniqueness of statistical estimating functions",1992.
- 10. **Nagapati R. Hegde**:"The Statistical inference on Pr [Y < X] in the normal and exponential case",1994
- 11. V. M. Mathew:" Circular error probabilities",1995.
- E. Professor R. G. SHENOY
 - 1. A. M. Deshpande: "D-Optimality of chemical balance weighing designs",1989.
 - 2. F.A. Gariwalla: "Cumulative sum schemes –unvariate case",1990.
 - 3. Jyotirmayee P. Atre:"E Optimality of block designs",1990.
 - 4. **A.S. Ajgaonkar:** "Weights of Hadamard matrices and Orthogonal designs:,1992
 - 5. Ujjvala D. Kulkarni: "Serially balanced sequence",1992.
 - 6. Padmaja Joshi:" Asymmetrical factorial fxperiments",1992.
 - 7. Prashant A. Shah:"On A-optimality of chemical balance weighing",1992.
 - 8. Saju Varghese: "Non circular repeated measurement designs",1993.
 - 9. Saroj V. Phadnis:"Balanced treatment incomplete block designs",1994.
- F. Professor U. J. DIXIT
 - 1. Shailaja G. Kelkar: Empirical Bayes' Methods",1992
 - 2. **Smita D. Chawak:** "Study of the estimation of the scale parameter in the presence of an outlier",1993.
 - 3. **Rajendra M. Patil:**"Prediction Intervals for future observation in case of exponential distribution",1993.
 - 4. Amrit S. Rajwadkar: "A study of Burr distribution",1994.

G. Dr. S. M. BENDRE

- 1. K. D. Phal: "Characterization of distribution through some properties", 1989.
- M. J. Gholba: "Recurrence relations and bounds on moments of order Statistics", 1989.
- 3. A. S. Gabhe: "Some modified non-parametric tests for location alternatives",1991.

International Awards

1. SIDDHARTH DALAI:

Former Vice President at Telcordia Technology. Currently he is the Vice President of Xerox Corporation. He has received the US President Award.

2. ULHAS J. DIXIT:

He was selected as 1st Rothamsted International fellow from Rothamsted Experimental Station, UK which was the first department of Statistics in the World.

Distinguished Alumni

- 1. S. R. Mehta Principal and Fellow of Actuary
- 2. **A. M. Krishnasagar** Retired Professor and Head, Department of Statistics, University of Michigan, U.S.A.
- 3. Ram D. Pradhan Ex-Governor.
- 4. M. G. Diwan Former Chairman L.I. C. India
- 5. Girish Karnad Dyanpith Award
- 6. **Y. S. Sathe –** Retired Professor and Head, Department of Statistics, University of Mumbai.
- 7. A. P. Pradhan Ex.- VC Yashwantrao Open University
- 8. S. M. Vidwans Director of Bureau of Economics and Statistics.

- 9. Satish Vyas Eminent musician
- 10. Late J. R. Rele Director IIPS.
- 11. V. R. Panchmukhi Retired Professor and Chairman of ICSSR, Ex. Member of planning commission of India.
- 12. Jhelam Paranjape Odissi dancer.
- 13. **S. M. Joshi -** Retired Professor and Head, Department of Statistics, University of Mumbai.
- 14. M. R. Satam Retired Professor, Department of Statistics, University of Mumbai.
- 15. **R. G. Shenoy -** Retired Professor and Head, Department of Statistics, University of Mumbai.
- 16. **S.P. Nabar -** Retired Professor and Head, Department of Statistics, University of Mumbai.
- 17. **U. J. Dixit -** Retired Professor and Head, Department of Statistics, University of Mumbai.

Eminent Statisticians in international level

- **1. V. P. Godambe:** Retired Professor and Head, Department Statistics, University of Waterloo, Canada.
- 2. J. N. K. Rao: Prof. of Statistics, Carleton University Ottawa, Canada
- 3. Late M. Bhaskar Rao
- **4.** Late M. N. Vartak: Retired Professor and Head, Department of Mathematics, I.I.T. Mumbai.
- 5. D. Raghavrao: Professor of Statistics, Temple University Philadelphia, U. S. A.
- **6. N. U. Prabhu:** Retired Professor and Head, Department of Statistics, Karnatak University, Dharwad.
- **7. Late V. P. Bhapkar:** Retired Professor and Head, Department of Statistics, University of Kentucky, U.S.A.

- 8. S. R. Adke: Retired Professor and Head, Department of Statistics, University of Pune, Pune.
- **9. S. R. Paranjape:** Retired Professor and Head, Department of Statistics, University of Pune, Pune.
- **10.** Late C. G. Khatri: Retired Professor and Head, Department of Statistics, Gujarat University, Ahmadabad.
- 11. K. V. Mardia: Professor of Statistics, University of Leeds, U. K.
- **12.** L. M. Shah: Retired Professor and Head, Department of Statistics, S. P. University, Anand.
- 13. S. K. Mitra: Director, Indian Statistical Institute

From Convener Dr. (Mrs.) V. U. Dixit



It gives me great pleasure to write about all respected retired professors from Prof. Y. S. Sathe to Prof. U. J. Dixit. I joined the department in December 1989 as a Senior Research Fellow of CSIR. With the permission of Prof. Sathe my CSIR fellowship was transferred from Department of Statistics, Shivaji University, Kolhapur to University of Mumbai. During my research work all professors encouraged me and Prof. Sathe actually helped me in writing the thesis. I had several helpful discussions with Prof. Sathe for my research work. I am thankful to him and Prof. U. J. Dixit for their help and encouragement throughout my research work.

After completing my Ph.D. in 1994, I got first job in Sathaye College, Parle which was because of Prof. (Mrs.) Nabar and Prof. (Mrs.) Barpande and after one year, in the University department because of Prof. (Mrs.) Joshi in June 1997. During this period also all were very much helpful, encouraging and supported me at every stage. At that time, I had not imagined that in the future my children Anand and Vaidehi will also join the department for M.Sc. As their professors, they all helped them in their studies and encouraged them at every stage.

As a Head of the department, I am really thankful to all for their help to the department as visiting professors and working as examiners, moderators and chairpersons for the M.Sc. examination even after their retirement.

My colleague Dr. A. D. Dabade in the department firstly suggested this idea of publishing a book of glorious memories of all the retired Professors with the department. Other faculty members of the department, Raju and Priyesh were impressed by the idea and immediately agreed to help. As a result department is now publishing "संख्यास्मृती मुंबई विद्यापीठ - संख्याशास्त्र विभागाच्या आठवणी...".

Due to efforts of my students and now colleagues Raju, Priyesh and visiting faculty as well as students of the department, Dr. (Mrs.) K. D. Phal, Dr. (Mrs.) S. N. Khare, Prof. (Mrs.) P. P. Khandeparkar, Prof. (Mrs.) Leela Subramanian, Prof.(Mrs.) Annapurna it has become possible to publish this book.

I am sure that these conversations will definitely inspire all the students and alumni for their current studies and future plans.

Conversation of Prof. Yashwant Sadashiv Sathe

With Dr. (Mrs.) K. D. Phal and Prof. Priyesh D. Tiwari



KDP: Tell us about your childhood and school days?

- YSS: I completed my primary education upto fourth standard in a school in Ahmednagar, then my family shifted to Pune, where I continued with my further schooling at Bhave High School, Pune.
- KDP: Where did you do your bachelors?
- YSS: In our times, if you passed SSC (11th grade) with first class there were only two options: Engineering or Medical. I went for engineering but left after one year and applied to B.Sc. Statistics course at Fergusson College in Pune.
- PDT: What led you to choose Statistics?
- YSS: In beginning I had not much idea about Statistics but I liked Mathematics. In Fergusson, a South Indian student who had been previously admitted, left for USA and I was fortunate to get admission.
- PDT: Was there any provision of merit/waiting list at the time?
- YSS: No, there wasn't either of them.
- KDP: Who were your professors in Fergusson college?
- YSS: Dr. A.R. Kamat, Prof A.B. Shah.

- PDT: What was the syllabus at undergraduate level?
- YSS: Major part of the syllabus was 'Sampling'. Other topics covered were Designs of Experiments, Inference, etc. It was mostly theoretical with a strong mathematical base with less applied components.
- KDP: Why did you decide to come to Mumbai University for M.Sc.?
- YSS: There was no post-graduate course in Statistics in Pune at that time. Pune University started M.Sc. course in 1953, while, I completed my Masters in the same year from Mumbai University.
- KDP: What did your syllabus for M.Sc. include?
- YSS: We had topics like 'Multivariate Analysis', which Prof. A.M. Kshirsagar taught us, 'Estimation theory', 'Testing of Hypothesis' etc. We had more topics from Mathematics, like Matrix Algebra.
- PDT: Did you have Measure Theory in your syllabus?
- YSS: No, we did not have Measure Theory and Real Analysis then. But later, I learnt Measure Theory at University of North Carolina.
- PDT: What books did you refer to during your masters?
- YSS: There weren't many books then. We would usually refer to the two volumes of Kendall's.
- KDP: Can you tell us about a few of your classmates?
- YSS: Bhapkar, who joined Pune University, then went to Kentucky University, Mahajan and Danayat were some of my classmates I remember.
- KDP: Mahajan sir, the one who joined Fegusson College?
- YSS: No, It's not him. He joined Statistical Bureau of India and I don't remember what Danayat did after M.Sc.
- KDP: What was your next step after M.Sc.?
- YSS: I took up a teaching position at Fergusson College at the department of Statistics. I taught there during the period 1953-58.
- KDP: How did you get selected in Fergusson College for lecturership?
- YSS: Prof. Chandratre was the one who suggested my name. There was no interview procedure.

- PDT: When did you begin research work in Statistics and how was your initial experience?
- YSS: Around 1957, I registered as a Ph.D. student under Prof. A. R. Kamat. We published a paper titled "Approximation to the distribution of measures of dispersion based on successive differences" in Biometrika in 1958.
- KDP: Was A R Kamat registered as a guide in Fergusson college, I think he is from Mathematics.
- YSS: Yes, he is from Mathematics, but did his Ph.D. in statistics.
- KDP: Was it during this time that you were planning to pursue research in the USA ?
- YSS: My going abroad was unplanned. All the other people in my field were applying abroad. So, I too ended up going to University of Alberta, Canada for M.S. in 1958. Thereafter, I moved to University of North Carolina- Chapel Hill and under the guidance of Prof. S. N. Roy, I was awarded PhD in 1962.
- PDT: What after Ph.D.?
- YSS: I returned to Pune, India and rejoined Fergusson college. After my marriage with Vijaya, I joined National Institute of Health, Washington DC, USA for post doctoral research work.
- KDP: In 1965, you joined Mumbai University as a reader. What persuaded you to come back to India?
- YSS: I wanted my children to receive their school education in India and my wife also wanted to settle in India, so we made a choice of moving back. On coming back, I was offered a place at the department of Statistics, University of Mumbai, by Prof. Chakrabarti.
- KDP: Had you applied to Mumbai University before leaving job of U.S.A.?
- YSS: No, I left everything and came back to India and after two or three months I got job in Mumbai University.
- PDT: How was the department then?
- YSS: When I joined, the department was situated at Jamnalal Bajaj Institute and the faculty consisted of three professors. I taught a batch of around twenty four students, of which only one student was a girl for the first year. The

strength was later increased to forty when the department shifted to Kalina campus in 1971. At that time, we did not have too many administrative duties. Hence we had the time to teach multiple classes and a series of topics. Also, we could guide more students towards a Ph.D.

- PDT: What difference did you observe between University of North Carolina and Mumbai University?
- YSS: At Chapel Hill, students from different countries would come to study on scholarships. Teaching faculty was good. I would have liked to stay there. The syllabus at Mumbai University was not very different from Chapel Hill. At Chapel Hill, I studied more about Inference whereas I worked on Designs of Experiments here.
- PDT: Design of Experiments was your interest from beginning?
- YSS: No, I was liking design of experiments but developed it in Mumbai.
- KDP: How was your experience working with Prof. Chakrabarti?
- YSS: He was a man of few words, and it was while working with him, that I developed a strong interest in designs of experiment.
- KDP: How would you compare the students of the past to those in the present?
- YSS: In those days, students would usually come from a Mathematics background, and their basics were very strong. Only those who were really interested in the subject pursued M.Sc., and they would usually enter the teaching profession.
- KDP: Tell us about your students.
- YSS: My first student whom I guided for Ph.D. was S. D. Varde, who is one of my favorites. Initially he joined department thereafter he joined industry. Also he is my only student who writes articles in Marathi. Some of my other Ph.D. students are Satam, Joshi, Salpekar, Nabar, Shenoy and Dixit etc.
- PDT: What were the challenges that the department faced?
- YSS: The major challenge of the department was that the number of staff members were very less, which unfortunately still has not changed. There were more people in Economics department which was then called as 'School of Economics'. There was in fact, a suggestion to merge Statistics department
with the School of Economics which was rightly opposed by Prof. Chakrabarti and others.

- PDT: In your tenure as Head of the department what changes did you make?
- YSS: I was head of the department from 1972 to 1990. During this time, I introduced Operations research in the syllabus and also omitted econometrics
- KDP: What is your opinion of the other universities in India?
- YSS: I have always had a high opinion of the Indian Statistical Institute. Apart from that, Pune University is also good. By virtue of having more staff, they can concentrate on their research and academic activities. Also a few of the professors from Pune have moved to Kolhapur University, which is now emerging as a good university.
- PDT: What would you like to say about this generation of students?
- YSS: There are good students who take up Statistics, but very few of them enter into research. This might be because of the increasing demand for statisticians in the industry.
- KDP: What advice would you like to give to the next generation of students and teachers?
- YSS: The atmosphere and interaction in the classroom should be such that students grasp the concepts in the classroom itself. For this, the cooperation and effort of both teachers and students is required. The university should encourage professors to undertake more research by lessening their administrative responsibilities.

Conversation of Prof. (Ms.) Suneeta M. Joshi

With Dr. (Mrs.) V. U. Dixit and Prof. Raju K. Lohot



- VUD: Prof. Joshi we are indeed happy to talk to you about your professional career. Please tell us about your school and college education.
- SMJ: I was a student of Chikitsak Samuha Shirolkar high school (1948-1955). My favorite teacher there was Nabar Sir, who was also our class teacher. The other teachers were namely Devashali Sir and Pandit Sir.I am still in contact with Nabar Sir. In school, me, Usha Pradhan, Sham and Raja were a group of friends and we had recently been at Prof. Nabar's residence to meet him.

I further pursued my education in Mathematics from Wilson college. I had great passion in Mathematics, Sanskrit and Music. But Prof. Wagh, the Head of the department insisted me that I should pursue further in Mathematics instead of Sanskrit. Even though I possessed a number of scholarships in Sanskrit at SSC & Intermediate level, (One of them being the N.R. Bedekar scholarship in Sanskrit). He was keen that selecting Mathematics would be a better decision due to difference in the study disciplines of Mathematics and Sanskrit, where the former needs to be learnt with a pen & paper while the latter can also be learnt lying down in a relaxing way. And I decided to select subjects Mathematics and Statistics in my B.A. Thus, I completed B.A. in Mathematics in 1959.I developed a passion for the subject, also I had learnt great things about Prof. Chakrabarti that inspired me to join Bombay University to pursue M.A in Statistics.

When I had taken the admission for M.A in Statistics in the year 1959, the department was located in Fort on the 2nd floor. It was an exclusive department possessing classrooms, demonstrator's rooms and laboratory. The Statistics faculty then had Prof. Chakrabarti as H.O.D. Also K. C. Chanda,

Dr. A. M. Kshirsagar., Dr. M. N. Vartak, M. N. Murthy and Rao were demonstrators in the department. The syllabus at that time consisted of probability theory, multivariate analysis, design of experiments, statistical inference. While the application papers consisted of subjects such as industrial statistics and operations research. The practical had 2 papers as well. Our college timings were 12-4 consisting of 4 lectures each of one hour. In case of practicals, we would have one lecture from 12 to 1 followed by a 3 hour long practical. The demonstrator used to be present at the time of practicals.

We would use the facit machines for calculations.

After 4 p.m. when the lecture used to get over, the classroom was used for the Library course by more than 40 students. It made me feel that the country is more in need of librarians than Statisticians. I clearly remember the statement Prof. M. C. Chakrabarti made, when I went to him for admission of M.A. "Statistics is a grave of many reputations. Think twice before you take the admission". To which I politely replied that "No sir, I have decided & I will keep up with my decision".

RKL: Tell us about your friends at the undergraduate level?

- SMJ: One of my school friends was Usha Pradhan who was there with me in masters. She joined Bank of India after completing the masters and later on she became DGM. Another friend of mine was Bharti Mehta who was a student of BA mathematics and MA mathematics. Radhakrishnan Iyer was also my friend who was a Prof. at the San Fransisco state college. Kanta Chawla was my friend. After her marriage with Mr. Jaichandran , who was an employee at the nautical department of science studies , she decided to join a school in vicinity of her home and she continued as a teacher there. Vidyadhar Mandrekar who later joined as a professor at the Michigan state university, was a great personality. Hiralal Agarwal was one of my classmates, he had a good knowledge of design of experiments and did Ph.D. in that with Prof. Chakrabarti.
- VUD: How was your experience with Prof. Chakrabarti?
- SMI: It was really a good experience. I respect him very much and look upto him for his hardwork and determination. I had taken leave from work to do Ph.D. in the department of Statistics, University of Mumbai. At that time Prof. Chakrabarti had told me that I can accompany him in taxi from the Santacruz station, so that I could save my time and energy in travelling for the coming two years and thereby offering me a helping hand. I am extremely grateful to him for this. But I was shocked due to his sudden death. I had started my PhD on 16th June and Prof. Chakrabarti passed away on 22nd June. That day his sister was going to Nagpur so he had taken a leave from college for the day. The next morning unaware of his death, I was waiting for him at Santacruz station but he didn't come. So, I reached the department and as soon as I reached there, the peon from the Geography department came upstairs to tell me about a phone call at their department informing about Prof. Chakrabarti's death. At that time we were not having telephone in the department. I wouldn't believe that. I was alone in the department at that time since I used to go early to read books. I waited for others and then we went to Prof. Chakrabarti's home. I still cannot believe that something like this could happen to such a great personality like him.

- VUD: Would you like to say anything else about Prof. Chakrabarti?
- SMJ: Prof. Chakrabarti had a very good handwriting. He would also tell us to write in a neat manner so that it can be presentable wherever required. He was extremely focused towards his work. Prof. Chakrabarti's lectures were quite knowledgeable since he preferred to write thoroughly on the board instead of speaking too much. At the end of every year, Prof. Chakrabarti would take the entire batch for dinner to Bristol Grill hotel.
- VUD: How would you like to describe Dr. Kshirsagar?
- SMJ: Dr. Kshirsagar was an excellent teacher. He had this good habit of writing the concepts on the board, so that we can understand them in a better way. He is an extremely talented person; he passed SSC examination at the age of twelve. He also completed his Bachelors at a very early age. Overall, he was an outstanding teacher.
- RKL: Which books you have referred while pursuing M.Sc.?
- SMJ: For the topic of probability and inference I had referred books written by great authors such as Feller, Anderson and Lehman. I discovered that book written by Lehman was quite tedious to understand. Other books which I referred were Kendall and Stuart's volume 1, 2 & 3, Prof. Chakrabarti's book for Design of experiments, book by N. U. Prabhu for Operations Research. But there were no books available for the topic of Quality Control. There were less number of reference books at that time as compared to the number of reference books available today.
- VUD: Was library facility available at that time?
- SMJ: The statistics library was there in the Department itself, where Mrs. Tulpule was the librarian. She had a good knowledge of the names of the authors of the reference books. We had many journals and books in our library.
- RKL: Where exactly the department of Statistics was located when the Mumbai university was started at Kalina?
- SMJ: The Statistics department was on the 2nd floor and the laboratory was on the 3rd floor. There were staffrooms, research rooms, seminar room, Prof. Chakrabarti's cabin and one classroom were on the 2nd floor where we have a lab at present.

- RKL: How you chose the teaching field?
- SMJ: I was at home in the year 1962-1963.I was expecting my first child. I was also waiting for the allotment of quarters in Colaba. I was also selected in Bank Of India and was waiting for the joining date/ letter from there but I gave up that opportunity since the duty timing was not matching with my husband's schedule. In 1962-1963 I was at home taking care of my son. In 1964-1966, I joined the Mathematics department of Wilson college. But there, the Maths course had only two Statistics papers. Hence I wasn't too much satisfied with it, since there was a concept of topology, modern algebra which did not impress me due to its complexity. Hence as soon as I got the opportunity to teach at K.C. college, I considered joining the Statistics and two separate practicals. K.C. college was a well known and reputed college at that time. Ruia college was the first college to introduce Statistics followed by Elphinstone and K.C. college.

I was always passionate about teaching and it was something that I enjoyed. I applied for the Bank of India job just to prove to my father that I have a practical knowledge of Statistics and I can apply Statistics, since he would always tell me that I don't possess the practical knowledge. But I couldn't join bank due to the discrepancies in the timings of my duty and husband's schedule. I never considered the salary constraint while deciding to be a teacher. Even though the salary of a teacher was comparatively less I wanted to go further with my passion for teaching. This is also why I loved my students just like my own children.

- RKL: What made your mind to do Ph.D.?
- SMJ: Prof. Chakrabarti was a great inspiration to me. I was very much keen on doing PhD. But Prof Chakrabarti insisted that once my children start with their full time school education only then I should join the department for Ph.D. He was always so considerate and he even understood such difficulties despite he himself being a bachelor. He never told me to leave my job for doing Ph.D, so that I should have job even if something goes wrong due to

which I would unable to complete my Ph.D. But on the contrary, I decided to take a leave without pay from my job for the period of 2 years. But sadly just one week within joining the department for PhD he left for his heavenly abode.

During this time, principal of K.C.College Shri. Kundadani called me up asking me to join my lectureship at K.C. college. Since my guide Prof. Chakrabarti was no more, he thought that I should postpone my plan of doing Ph.D to the next year and even promised me to give me a leave for the same. But I was still in shock due to the sudden death of Prof. Chakrabarti and I therefore asked principal Kundadani to give me some time to think about it.

- RKL: How you made your decision to stick to Ph.D .?
- SMJ: After the death of Prof. Chakrabarti, I was quite depressed and in a state of confusion if I should continue with my decision of doing Ph.D. or I should resume as a teacher at K.C college. One day I was reading books in the research room when Prof. Sathe came up to me and told me not to be depressed. He encouraged me saying that there was little difference in his and Prof.Chakrabarti's views regarding research topic due to which it would take time for him to get things in the right place but he will try his best and would also be my guide and help me to pursue with my dream of completing my research. I am extremely grateful to him for encouraging me and supporting me at every step.
- RKL: Tell us about your research topic at Ph.D. level.
- SMJ: I have done my research in "Statistical Inference". Prof. Sathe had advised me to choose this topic even though he knew that my interest was in "Design of experiments". Till date I am not aware about the reason behind this advice, but I am very much glad that I obeyed to him and selected inference as the topic for my research.
- VUD: According to you what made Prof.Chakrabarti and Prof. Sathe different from each other?

- SMJ: Prof .Chakrabarti was a very straight forward person. He would speak only when required and speak to the point. He had great respect for all the women around him, he would always look down while speaking to women which showed his respect towards women. Prof. Sathe was a very hardworking person, an excellent guide and mentor. He would write all the required steps on the board which made it easier for us to understand. I still remember one statement said by Prof. Sathe ,"Truth is always simple".
- VUD: What can you tell us about Sathe Sir?
- SMJ: I have known Prof. Sathe since I started my research work. My mother and Prof. Sathe's sister were friends. I have completed my Ph.D. under the guidance of Prof. Sathe. Prof. Sathe always supported me when I used to work at K.C. college along with my research work.
- RKL: Tell us something about your research papers?
- SMJ: I published my first research paper in 1969 based on confidence interval for mean. After the death of Prof. Chakrabarti, the condolence meeting was held, where Prof.Huzurbazar had suggested shifting "Journal of Indian Statistical Association (JISA)" to Pune university due to less number of professors at Mumbai university and lack of the required facilities.
- VUD: Tell us about your experience with the department and what were the difficulties you faced?
- SMJ: I remember Vijaya Salpekar who had a sudden death, she was a good research student of Prof. Sathe .Mr.Varde was Prof.Sathe's first research student.

I have achieved the position of lecturer in 1979 followed by reader in 1981 and then professor in 1994 in this dept. At that time our department was lacking in the availability of professors since good salary amount was offered to students in private firms such as Hindustan Lever, Bajaj and so on. Prof. Chakrabarti used to tell us that, "After pursuing such a great subject like statistics you shouldn't go to Hindustan Lever for selling soaps"

RKL: Which are the topics which you like the most in statistics?

- SMJ: As a student I had a deep liking for Probability and Design of experiments. Initially I wasn't interested in Inference but Prof. Sathe created interest in this topic.
- VUD: What were the new things that you introduced to the department due to which the department has benefited?
- SMJ: We planned to buy computers and we later set up the computer lab. We also started using the computer software and gradually learnt to work on computers.
- RKL: During that period which were the companies where the students were placed?
- SMJ: Private companies like Tata Mills, Hindustan Lever or the students would join government firms or at banks etc. There used to be education trips arranged for the students where the students would understand the processing of the plants and the statistical applications relating to it. This reminds me that, I had been selected in the Tata Mills, during the education trip.
- VUD: Are there any things that you wanted to do for the department but due to some unavoidable reasons it is not possible for you to complete that?
- SMJ: I used to always think that clerks in banks have computers available to them to make their work easier but our talented students who are going to make the future of our country don't get this facility. I told this to the administrator of the university to which he apologized saying, "I will personally look into that matter and ensure that the students can avail this facility as soon as possible". This dream of mine finally was realised when we got the computers.

Conversation of Prof. (Mrs.) Meena R. Satam

With Dr. (Mrs.) V. U. Dixit and Prof. Raju K. Lohot



- VUD: Where did you go to school and college?
- MRS: I went to Government Girls' high school in Thane and went on to Ramnarain Ruia College for my Bachelors degree. We had the older matric pattern of 11 plus 4 years of education.
- VUD: How is it that you decided to pursue Statistics over the more popular choice of engineering?
- MRS: I always had an affinity for Mathematics and Statistics, which is why I chose to do B.Sc. Statistics, rather than engineering in spite of it being the obvious choice. Initially, I did not know what it was that I wanted to study. An uncle of mine, who worked at a bank, was the one who suggested, that I could try Statistics as it had a good scope. This led to me and my few friends to take up the Statistics.
- RKL: Who were your professors at Ruia?
- MRS: During our B.Sc. Prof. Raosaheb was the head of the department of Statistics.

Also, we had Dalaya madam, A. K. Iyer and Borvankar sir, who encouraged me to pursue Statistics further. I took up the combination of Mathematics, Statistics and Economics in my first year, and eventually majored in Statistics.

- VUD: What were the different papers or topics that you studied in your undergraduate years?
- MRS: We had basics of various statistical and mathematical concepts like Sampling, Probability, Co-ordinate Geometry, Algebra, Real Analysis, etc. This provided us with a strong base for our Masters.
- RKL: Coming to that, who were your professors at Mumbai University for M.Sc.?
- MRS: I studied under Prof. Chakrabarti, Prof. Sathe, Prof. Nair, and Prof. Tharthare as I graduated in 1967. I was fortunate to be guided by these esteemed professors.
- RKL: Are you still in contact with any of your college classmates who went on to pursue similar careers in Statistics?
- MRS: I am still in contact with Varde sir, and our group of 5 girls from among a total of 25 students. I have known three of them since my school days.
- VUD: In which year did you join the Mumbai University and how was your experience?
- MRS: At first, the department was situated at fort, then it was moved to Jamnalal Bajaj Institute and eventually in 1972, it was shifted to its current location. In those days, it was very difficult to get into M.Sc. Also a new course, Masters of Management Studies, was introduced, which a classmate of mine joined. In those times, there were around four rooms in the department, one of which was the computer room. These computers were not compact like the present ones, and one had to punch in cards for each computer program that we wanted to run, and the procedures were very complicated.
- RKL: What led you to choose this profession?
- MRS: I was also interested in the banking profession but eventually I joined teaching. After my M.Sc., Prof. Chakrabarti suggested me to register as Ph.D. student under him, and also recruited me as a demonstrator. One of the

things I remember about him is that, one should write on the board in such a way that it can be printed without any proof reading. Under his guidance, I started my research and also published 2 papers, of which one is based on SPRT. But then, the sudden demise of Prof. Chakrabarti left us grieved. During that time, Prof. Sathe consoled us and took the responsibility of Chakrabarti sir's Ph.D. students. With Sathe sir, I have papers in Biometrika, JASA and Communications in Statistics. Working with Prof. Sathe was a very enjoyable experience. I thus completed my Ph.D. in 1975.

- RKL: Your Ph.D. research was related to Inference, but you also have some great work in Design of Experiments. So, what prompted you to work in that area?
- MRS: Yes, my Ph.D. research was in Inference, but I also used to teach Design of Experiments to the M.Sc. class. I used to enjoy that topic as well and also Sathe sir gave me a problem to solve in that area. It was a challenging problem in continuation to research by Prof. R. C. Bose. Thus, with Prof. Sathe I have research in this area as well.
- RKL: What are some of your favorite topics in Statistics? Also what books do you suggest for the same?
- MRS: I have always liked Design of Experiments and Probability. I think for Design of Experiments there is no replacement for the book by our own Prof. Chakrabarti and for probability I have always liked the book by W. G. Feller.
- VUD: A general decline has been observed in the number of students opting for teaching and research profession. What are your suggestions to improve this number?
- MRS: Actually, it is surprising that nowadays students are not inclined towards the academic profession. It could be because of the lure of corporate or maybe even lower levels of patience in today's generation. As I see it, our profession not only pays well but is also flexible. One can give equal amount of time and attention to both professional and personal life by being in academia.
- VUD: As someone affiliated to Mumbai University, how much was your interaction with faculties or students from other universities, and what did you learn from it?

- MRS: I did have some interaction with certain universities, for example, there was a student from Nagpur University who would come to our campus to borrow books pertaining to Statistics. My interactions with most other universities left me feeling that the students of our department have a slight edge over those from other universities, even Pune university students are equally competent, but in comparison to others our students have better opportunities.
- RKL: What would you like to say about your overall experience of being associated with the department of Statistics at Mumbai University, both as a student and as a faculty?
- MRS: I have always felt that all our colleagues were very cooperative, and nobody would harshly criticize anybody else. We are truly like one big family. Even our families are close, which has resulted in our bonds remaining strong even today.
- VUD: Do tell us about your M.Phil. and Ph.D. students.
- MRS: I had about 15 to 16 M.Phil. students and Mangala Deshpande did Ph.D. under me. I remember Mangala as a talented, prompt and sincere student.

Conversation of Prof. (Mrs.) Smita P. Nabar

With Dr. (Mrs.) Shipa N. Khare and Prof. Raju K. Lohot



- SNK: Professor Nabar, we are indeed very happy to talk to you about your professional career. Please tell us about your school and college education.
- SPN: I did my pre-primary education from Shishu Vihar, Dadar near Hindu colony, my Primary school was Indian Education Society. After that I joined the girls' school of the same institution, which is also known as King George school. I completed my graduation from Ruia College. I was a B.Sc. graduate in 1971 and completed my post-graduation in 1973.
- RKL: Why did you select Statistics as one of the subjects at undergraduate level?
- SPN: I had to make a choice, which was either to take up Biology or drop it. I chose the latter because I didn't like the dissection part and blood related studies, so I took Mathematics. I did get admission to an engineering college, but as a girl child, I thought it wouldn't be a suitable option for me. So I started looking for other options. I didn't like Chemistry much although I used to

understand Physics but then again I used to find the Physics practical difficult. So the only Choice I was left with was Mathematics. Then one of my uncles suggested that instead of Mathematics I should take Statistics, and one of my elder cousin sister was studying Statistics. I had also heard that one would get a job in the Reserve Bank of India (RBI) in this field.

- RKL: Who were your teachers at the under-graduate level?
- SPN: We had only two teachers in B.Sc., Iyer Sir and Raosaheb Sir. Iyer sir mostly taught us Mathematics and Raosaheb Sir used to teach us Statistics. At that time there was no such thing called as "spoon-feeding". Our professors used to just provide us with vague information about the related topic, but the entire derivation part was left for us to do. This was actually better for us since we got a better understanding of the topics.
- SNK: Tell us about your syllabus at the under-graduate level and also which books did you refer?
- SPN: At that time, the format of B.Sc. was to choose a Principal subject and a subsidiary subject, so I took Statistics and Economics respectively. In Statistics we mostly had Mathematics related topics like Matrix theory etc. We had a total of six papers. There were Sampling theory, Distribution theory, Design of Experiments (DOE). In DOE we had topics like BIBD, CRD and practicals on Latin Square Design as well. In B.Sc. I used to refer different books for different topics. We referred Cochran for Sampling, Kapoor & Saxena, Hogg & Craig, Kendall etc. Actually, my classmate had a friend who was a year senior to us; he didn't want to pursue further studies so he gave all his books to me.
- SNK: Were there other departments available for post-graduation studies?
- SPN: There were but I wasn't willing to go outside and study. In Mumbai there was no other colleges had post graduation program in Statistics other than Mumbai University. Initially there were only 30 seats available for the course, but in our batch there were at least 47-49 students who wanted to do the course. Then luckily, in that year the department increased the capacity to 50 seats.

- SNK: How was the department at that time? Who were your teachers?
- SPN: The entire faculty was very nice and helpful. When I joined the course, Chakrabarti Sir was the head of the department. We had Sathe Sir, Sanghvi madam, Ghangurde Sir had just joined in that year, Patel sir etc. Pradhan madam (now Satam) was the demonstrator. The department had many professors at that time, all the positions were filled. During that time we didn't have the capacity to think much, time was also a constraint because we were taught many topics. In the first semester, whatever we were taught like Matrix theory was pre-requisites for actual syllabus. In second term, we had Multivariate analysis, Linear models, Design of experiments, Sampling theory etc.
- RKL: Tell us about your friends at post graduation level. Are you still in touch with them?
- SPN: Yes, our batch had many students and they were very mischievous, especially the boys. The department used to provide us with table sets which were supposed to be returned at the end of the year. Our batch mates used to hide the table sets and we would spend so much time searching for them. I am in touch with some of the classmates, like Nimkar, who comes here often. Also, Barpande, retired from Sathaye College, Saraf, retired from Dahanukar College, Nerulkar madam.
- RKL: Which books did you refer at the post-graduation level?
- SPN: In that time, there weren't many books available. There was a claiming pattern for lending books, so we had to wait for our turn. There was a book by Kempthorne that I referred for Design of Experiments.
- RKL: What were you planning to do after completing Masters? Did you always want to be a professor?
- SPN: I always had an interest in the teaching field. When I completed my postgraduation, the Demonstrator post was vacant. Sathe Sir knew that I was interested in teaching, so he suggested me to join the department as a Demonstrator.

- SNK: Tell us about your early days in the department as a Demonstrator. Did you face any difficulties?
- SPN: In our time, the Demonstrator used to write the method of solving the practicals and then the students used to start solving them. I think my first practical as a Demonstrator was very elementary, just on Tally marks. We solved about 19-20 practicals, but the funny thing is none of them were asked in the examination. Later on, Shenoy Sir joined as a Demonstrator and then both of us used to solve the practicals. The problems were indeed difficult, but eventually we got the hang of it. It was then that I actually started understanding the subject.
- RKL: Tell us about your research paper and your overall Ph.D. experience.
- SPN: I always wanted to do research, but at that time there was only one guide available which was Sathe sir. But he had many students under him, so he couldn't make much time for me. So I had to start my research under another research guide Sanghvi madam. With her I started reading on Statistical Quality Control (SQC). But she left the department in 1977 to go to America. So I was a bit frustrated because most of my classmates had become professors in various colleges and I was still just a Demonstrator. I had even started to apply for jobs in other colleges, but Sathe Sir told me to wait. Then as time passed, sir was available to guide me.
- RKL: How did you start the process of your research? Did you face any difficulties?
- SPN: Under Sanghvi madam my topic of research was Statistical Quality Control and under Sathe sir it was Inference. I always wanted to study Inference but due to Sathe sir's busy schedule I had to study SQC. Then later, sir handed me a Paper on Bounds and asked me to study it. I used to go to the library to refer various books. I had also prepared several cards on which I wrote the names of various Papers and Journals and the contents. Once sir started to guide me and I didn't face any problem, everything went on smoothly. Also there is a funny story, Sathe sir used to live near my house but I had no idea that he lived so close to me. Then one day he spotted me at the bus stop. So

from then onwards I started visiting him frequently. That is the reason my research was completed in a short amount of time since he used to make me work at home also.

The only difficulty faced was the calculation part as there were no computers at that time. All the calculations were either done manually or a simple calculator. We used to write each and every value on the paper, it was beneficial since we could pinpoint the exact location of a mistake if it occurred. Then later programmable calculators by Televista were available which were used by all of us.

- SNK: Tell us something about your colleagues in the department
- SPN: I will list a few names that were there in the department when I was a Faculty member. Ravi sir, Aaras sir, Bapat Sir, Sushma Bendre and Tushar was a Junior research fellow and later become lecturer. I did a lot of research with Joshi madam as well as Dixit madam. I had done many projects with Dixit sir like Ranking of Stage, Survey on participation of Women in Politics. Also we had conducted 3 day training at ERTL and Fractal. When Sathe sir was there, there was a paper on Stein's estimator. All of us including Joshi madam, Sathe sir had worked really hard on it, but unfortunately the paper couldn't get published. Then again there was a paper on the Nile river problem which both Joshi madam and I were reading. Then later the problem of Circular Error Probability on which myself, Sathe sir, Joshi Madam and Tushar sir had worked on.
- SNK: Tell us about your association with the students of the department.
- SPN: All of my students for both M.Phil. and Ph.D. were very nice. Our Khandeparker, from SIES college used to study under me. Also Bilgi, from MVLU college had worked very well on her M.Phil thesis on Inverse Gaussian Distribution, so I asked her to work on a paper on SPRT in Quality Control. But due to her health issues she was not able to complete the paper, so I completed the paper on her behalf and gave both of our names to it. I had also asked Leela Subramanian to work on Two-piece distribution. Initially I was working on one problem, but I had made a mistake somewhere and I

couldn't make out where exactly the mistake was. Then later she found the mistake. But by that time I was getting retired. Due to which students can't register under my guidance. So she went to Dr. (Mrs.) V. U. Dixit madam and both of them continued it from there.

- RKL: What were the new things that you introduced in the department because of which the department was benefited?
- SPN: The Power point presentations which our students are doing now, was introduced for the first time by me when I was the Head. It might be around 1997 or 98 when they were first introduced. We had got invited by Hinduja Hospital to attend their presentations. It was there, when I saw that their students presenting on Power point slides. At that time our presentations were conducted on the blackboard. The students had to explain their project by writing the formulas etc on the board. This would take a long time since only 3-4 presentations could be conducted in one day. So that is why I asked our students to present on Power point as it is fast and precise.

Also in the year 2000, a company called Novartis had recruited many students from our department. So as a thankful gesture they wanted to give something to the department in return. So I asked for the SAS software which is now used by our students. They also made a copy of a book "Multivariate analysis" by Johnson and Wichern available to us which was very costly at that time.

- SNK: Were there any things that you wanted to do for the department but due to some unavoidable reasons you were not able to complete them?
- SPN: We wanted to start new courses in Statistics but unfortunately there weren't many people who were interested. We also started a course on Actuaries but due to lack of students we were not able to continue with that course. Also, there was a journal called Journal of Quality Technology which had the interviews of various statisticians. So, I used to ask students to read the journal and then share the information to the class in the form of a presentation. But then the students didn't seem much interested so we weren't able to continue the practice for long.

- SNK: What are your expectations from the current faculty member of the department?
- SPN: My only expectation is that they should teach everything properly, since our syllabus changes over time, teachers should try to teach the entire contents of the topic including the new topics. Also during our time, once in a month students used to present any topic that they were currently reading. I think it would be helpful if the students start such activities again. Earlier, Sathe sir used to take such lectures and because of him we came to know about Information theory which was relatively a new topic for us. We also used to call professors from other Universities to give lectures. Dr. Mohan M. Kale, Dr. U. V. Naik-Nimbalkar from Pune department delivered the lectures. Dr. Sharad D. Gore from Pune had introduced us to the Minitab, SPSS softwares and also MS-Excel.
- RKL: Tell us about your experience in the abroad universities. What differences did you find between our department and the one in abroad?
- SPN: Well, I did not study in any foreign university. But, I had a chance to visit the Statistics Department of the University in Wisconsin. There I met Professor Johnson who has co-authored the book Multivariate Analysis. All the analysis in that book is taken from that university. However, in India I had come across the departments mainly in Baroda, Ahmedabad and Anand. I used to go to Baroda quite often as an examiner. I also visited the universities in Pune and Kolhapur.

Conversation of Prof. Ramakrishna G. Shenoy

With Prof. (Mrs.) P. P. Khandeparkar and Prof. (Mrs.) Leela Subramanian



- LS: School and college days
- RGS: Basically I am from Karnataka. I was born in Shirva in Udupi district. It was a small village. I had completed my schooling at the same place, Shirva. My father firmly believed that "Every child can do well and to do well, every child should learn ". That motivated me to pursue for further studies. I stood 1st in Pre-University course (PUC) in Shirva centre and went for my

B.Sc. in Mathematics, Physics and Statistics at Mahatma Gandhi Memorial College, Udupi, affiliated to University of Mysore during 1968-71. As I am good in study and stood first in PUC, my father, older brother and also some reputed persons from village suggested me to go for further study. So I came to Mumbai for post graduation.

- PPK: Why you came to Mumbai only? Why not any other department?
- RGS: My older brother was working in LIC, Mumbai that is why I came to

Mumbai. Actually at that time I was not aware about education system and that there are some institutes which offer post graduation in Statistics.

In fact, when I came to Mumbai I inquired about the course but admissions for that year was over and I had to wait for next year.

- PPK: What you had done in that year?
- RGS: Actually not to say but still I would like to say because now a days students want things immediately. But reality is different. You have to work hard to become a good person.

When I came to Mumbai (then Bombay) I had to wait for one year to get admission.

I returned back but came again in the month of October after rainy season. At that year, it was raining heavily. I registered in employment exchange, worked for some months but was not happy. My brother told me, if you are not happy leave it and join study. So I applied for next year and finally got admission for post graduation in 1972.

- LS: Why select Statistics?
- RGS: Really speaking, there is no reason for it but main thing was I didn't like Biology, Chemistry, so the only combination left was MSP (Mathematics, Statistics, Physics). Basically, I had love for Mathematics from the very beginning and when I started learning Statistics, I felt it is related to Mathematics so somehow I pursued my further study in statistics.
- LS: How was the department then?
- RGS: When I joined, everything was new to me as I came from village. I faced some problems but somehow tacked it and I am here today.
 Department was also recently shifted to Kalina campus so there was not good facilities available to us. Library was not there, transportation was also a problem. Mosquitoes were there in the campus and also snake bites.

Another problem was the Mumbai university students never mixed up with non Mumbai students. There were groups of different colleges when I was doing M.Sc. like, KC group, Ruia group, Elphinston group etc. We were three or four out of Bombay students and helping each other for solving problems, sharing books from library etc. Actually, I was one year junior to Prof. (Mrs.) S. P. Nabar.

- PPK: Who were your friends at M.Sc.?
- RGS: M. C. Dwiwedi and Dilip Kurtadkar. Dwiwedi, Kurtadkar and myself joined the department after completion of M.Sc. as lecturer, Research investigator and demonstrator respectively. And some others were Miss. Vidya Moghe, Subba Rao. Now I remember only these names.
- PPK: Who were the teachers for M.Sc.?
- RGS: Prof. Y. S. Sathe was Head of the Department at that time and others were Prof. (Mrs.) M. R. Satam, Prof. C. A. Patel, Dr. (Mrs.) B. I. Sanghvi, Dr. P. D. Ghangurde and there were two demonstrators whose names I don't remember now but they were helping us for practical.
- LS: Which teacher from the Department inspired you?
- RGS: Definitely Prof. Y. S. Sathe made an impression on me.
- PPK: How was the course?
- RGS: Difficult. I studied in regional language so English was a problem. Numbers of lectures were less comparable to content of syllabus. I think now days students are facing same problem. Reference books was not many more.
- PPK: Which reference books you had used at M.Sc.?
- RGS: Feller for Probability. Rao's book was there. Searle S. R. for Linear Models and mainly Lecture notes.
- LS: Why did you choose teaching as a profession?
- RGS: Actually speaking I was not at all interested in teaching and didn't want to do Ph.D. also. My main interest was in Actuarial Science. I plan was to appear for Actuarial examinations. Meanwhile, to stay in Mumbai I have to do something so I joined as a Demonstrator in the department after completion of my M.Sc. I registered as student for Acturial Society. Nabar madam also did same thing.

I don't remember exact year but I think in 1980, government demolished Demonstrators posts in colleges and all the demonstrators were upgraded automatically as Lecturer. In university this was not the situation. We were seven to eight persons in university who were working as demonstrators. We fought for it and won but the condition was put on us. If we are working as a demonstrator and want to continue then we will be upgraded as Lecturer and will be eligible to get arrears from 1975. They didn't forget to put the condition that we have to complete Ph.D. within eight years.

So to get arrears, I continued with department and joined for Ph.D. under the guidance of Prof. Y. S. Sathe.

One thing I definitely would like to say, that when I thought to continue with the department, I also got opportunity to join LIC, but destiny leads and I am here.

- LS: Just now said you were interested in Actuarial examinations. Had you continued with it? How many papers of Actuaries have you cleared?
- RGS: I cleared 3 papers, but then discontinued it because I couldn't manage it along with teaching and research.
- PPK: Who were working with you for Ph.D.?
- RGS: Mr. R. J. Shah joined with me but he left. Mrs. Nabar, was also working.
- LS: I think Dr. U. J. Dixit was also Ph.D. student at that time.
- RGS: Yes, but he joined after me.
- PPK: Tell us something about your experience while doing Ph.D.
- RGS: As I told, I was not at all interested in doing Ph.D. but I had to. So I asked to Prof. Y. S. Sathe. My Ph.D. thesis was in two parts, one is characterization and other is construction. We had constructed 700 designs and published two research papers on it.

In between I came to know that, there is an open problem on A- optimality and we started working on that. This is the turning point of my research as I was able to solve a 60 year old problem in A optimality. This work was published in Annals of Statistics in 1989 titled "A-optimum weighing design when N=3(mod 4)". Actually I had written two chapters and stopped writing till I got results in A-optimality. I got my Ph.D. in 1988 on the topic titled "On MV-optimality and A optimality of chemical balance weighing designs with special reference to number of weighings equal to 4k+3".

- LS: Had you decided to work in Design of Experiments?
- RGS: No, actually. Prof. Y. S. Sathe was interested in Inference but somehow he gave me paper on MV optimality from JSPI and I started working on it. We thought we can improve some bounds. Before that I was working with him on Hadamard Matrices. We had published a paper in 1977 in Combinatorics also. After some days he only said whatever we were working was not Statistics but Mathematics. So we stopped there and started reading on MV optimality. One thing I definitely would like to say here is that, I was feeling that I have to complete Ph.D. in eight years, as it was a requirement for lecturership. Due to this I started my PhD and then unfortunately I had to stop and change topic but whatever material I read on Hadamard matrices was very helpful for me in future due to which I could make contributions towards A optimality, Characterization of optimal designs. We had constructed over 700 weighing designs. So whatever you read will be definitely helpful in future.
- LS: Had you considered any other topic for research after Ph.D.?
- RGS: Yes, I liked Survival analysis also but for research I don't know why but stuck to Design only.
- PPK: I think you have done some course in computers.
- RGS: Yes, I have done Diploma in Computer Management from Jamanalal Bajaj in 1976.
- PPK: That is a very good course you should have got very good job then isn't it?
- RGS: Yes, but I was not interested. In the beginning I reluctant but gradually I developed love and passion for the profession so not thought about it at all. In fact, we also started one course. Title I don't remember, Dr. Dixit must be knowing. I taught numerical analysis. COBOL, FORTRAN was there in the syllabus. Prof. Sathe was there at that time.
- LS: What is your favorite topic for teaching?
- RGS: There is no such favorite topic but I started liking to teach design because it was my research subject. I now like teaching survival analysis too.
- PPK: Which are the good books on Design of Experiments?

RGS: M.C. Chakrabarti for theoretical part and Mongomery for applied part.

- LS: How did you find your colleagues?
- RGS: Everyone in the department is cordial. I can say that our whole community is 'vasudhaiva kutumbakam' in one word because we have been associated for so long with no tussle though we have healthy arguments and discussions.
- LS: Tell us something about Prof. Y. S. Sathe.
- RGS: He is very close to me. I have much respect and regards for him. We have a friendly relationship between us. He was not like that, I am a teacher you are a student. Any time he would walk to my room for discussion. In fact, we used to go together every day by same bus.
- PPK: What are the new things that you had introduced in the department?
- RGS: According to me the best thing that we have started is Placement activity. I think in 2000 NOVARTIES came to department and took almost all students of Part II. Then we decided to have placement activity and formed placement committee. I coordinated committee for some years I don't remember which years. Now it is running successfully. I think Alok is taking care of it now.

Another thing is, I can say we included 'group project work' as a part of the curriculum, to make statistical theory more relevant to real life and to develop the interest of students towards the subject. Definitely, this helped students in developing a team spirit and acquire soft skill knowledge.

In order to open up the study of statistics and its applications to all streams of the students we introduced two new courses "Post graduation diploma in applied statistics with software (PGDASS) and post graduation diploma in actuarial science (PGDAS). These courses have churned out over 600 students, to date who are well placed in the field of analytics and insurance.

- LS: Tell us something about these diploma courses.
- RGS: We had suffered a lot to frame these courses, framing the syllabus, forming the rules etc. and mainly fighting with university authority for almost everything. Myself, Prof. Dixit and Prof. (Mrs.) Nabar went to Fort campus almost every week to settle down the problems. But the good points are, department got the new courses due to which department was able to

generate financial assistance to university. Mainly Prof. Khole, VC at that time sanctioned grant for department for making laboratory, purchasing books etc. In fact, we had purchased all lecture notes of Actuarial society of London. We purchased books for almost one lakh.

- PPK: What are the suggestions for new students.
- RGS: There is a hardware and software. You have to understand hardware without which software can't be learned. Hardware means theory or fundamentals. We must do theory, one can't neglect it.

One thing I would like to say here, one day I read in Times of India, "Job for statistics students has received first position among 200 job opportunities". Rather I would like to say, Statistics is at the top of entire tree of streams, why? Because, it is taking care of in time and technology levels.

- LS: How would you want our dept to be in another few years?
- RGS: It should be a leading department both in academic and industrial field. Teacher's job is to see smile on student's face which makes teacher happy.

Conversation of Prof. Ulhas Jayram Dixit

With Prof. (Mrs.) Annapurna S. and Prof. Priyesh D. Tiwari



- AS: Please tell us about your school and college days.
- UJD: I was very fortunate to be born in a family where education was very important. My grandfather was a 'Bhatji'(Priest), so waking up around 4'oclock in the morning and reciting shlokas, learning mantras and performing religious rituals were a very important part of my daily chores in childhood. My father was the headmaster of our school. He was a very disciplined man, and used to give punishments of running around the school grounds for any mistake made. But at the same time he was also a very approachable person. Learning mathematics was very important to him to the extent that, for him if one didn't know mathematics he knew nothing. My village is near the border of Karnataka so we were taught both Marathi and Kannada. My father used to teach both these languages. I really enjoyed my school days. After finishing school, I shifted to Pune. There, I took up B.A. in Statistics at Abasaheb Garware College.
- AS: So, how did you decide on Statistics? Also, tell us about the books you used and your friends in college.

- UJD: My main interest was in Mathematics but my teacher asked me to take Statistics too. Thus I chose Statistics as my major. Initially I did not like it much as it did not have much Mathematics but once I was in P.G, I developed a great liking for the different statistical concepts. At undergraduate, I remember Prof.Sabne as a very good teacher. I did not refer much books other than Gupta & Kapoor as our teachers did not insist on referring other books. In Mathematics, I liked the book by Agashe & Kulkarni and learnt a lot from it. Prof. Darekar, Prof. Kapse, M.K.Mali, Dr. Karmarkar were some of my classmates and good friends from college.
- AS: Why did you choose Pune University for postgraduation?
- UJD: At that time I didn't really have a choice of University. After college, it was a natural progression into Pune University. Since I had good scores, I easily got admission. In those days, admissions were not very competitive as very few people applied. In fact the University sent us letters informing us of our admission.
- AS: How was the department and the teachers at that time?
- UJD: When I was doing my Masters in Pune, the department was very good. One of my teachers was Prof. Huzurbazar. He taught us Measure Theory & Probability Theory. He was a very strict person but a great teacher. He expected us to write exactly what he taught and gave us really good notes. He would come in coat and tie and was someone we were all scared of. He had studied at the Cambridge University. Prof.Kharshikar was another teacher, I fondly remember. He was a great teacher and also a really good person. His notes were excellent and he was very knowledgeable. Other professors like Prof.Kunte, Prof.Kale were all good teachers. Overall, academically the department was very good.
- PDT: Which books did you refer during your M.A.?
- UJD: I did refer some books at that time. We did not have too many books. I remember referring to Kendall and Stuart volumes and a book on Stochastic Processes by Karlin and Taylor. I would like to add here that, Prof Adke taught us this topic very well.

- AS: Tell us about your friends at post graduation.
- UJD: The same three Darekar, Kapse and Mali were with me in post graduate studies. I also remember Ameer Athavale. Over the years, we became very good friends and are still in touch with each other.
- AS: What difference did you observe between the teaching at Pune and Mumbai University?
- UJD: Teachers at Pune were very knowledgeable. Never did we feel that a teacher does not know some answer. Kharshikar was the best teacher. I remember that he could directly write the inverse of a 3x3 matrix without doing any calculations. University of Mumbai was more student friendly. Sathe sir was a great teacher who was not only brilliant but also approachable. He would always clear our doubts and queries.
- PDT: What was your next step after M.A.?
- UJD: While I was waiting for my M.A. results, I went to Kirloskar Company as we had been advised to work in industry to learn how Statistics is applied. I joined as a trainee. It was an eight to five job. I didn't enjoy it much so I left the job after 2 months. Then my brothers told me to try for a job in Mumbai. Frankly, at first I was scared of Mumbai city. When I first planned on coming to Mumbai I was so nervous that I didn't even catch the train and returned home. After a few days, my father told me to overcome my fear and bought me a return ticket to Mumbai.
- PDT: How did you decide on the teaching profession?
- UJD: In Mumbai, I joined as lecturer at Dr. Ambedkar College in Wadala. There I became sure that I wanted to be in teaching. I used to begin my lectures at 6:45 a.m. and hence was free by 11 a.m. Around that time, I met Prof. M. N. Vartak who told me to attend the lectures on Information Theory at IIT. He then suggested me to start Ph.D.
- AS: How did you decide to do Ph.D.?
- UJD: As I said earlier, Prof.Vartak encouraged me to take up Ph.D. He told me to read some books. I purchased the book by Zacks which was very expensive, but reading it was very useful as it improved my understanding of the

subject. I worked with Prof Vartak for 2 years but we were unable to get results. So, then he advised me to do M.Phil. I was given study leave by my college. I returned to Pune for a year and completed my M.Phil. with Prof.Kale. I then returned to Mumbai, back to my teaching. At that time, I met Prof. T. G. Kulkarni who was visiting professor at the same college. I often had interactions with him. I would go to his house and there I met Prof. Sathe.

- AS: Tell us about your research topics and Ph.D. experience.
- UID: Prof. Sathe told me to start my Ph.D. again. Hence, after college I would come to the university at 11 a.m. and work here till 7 in the evening. The work that I had done on inference with Dr. Vartak, helped me a lot in my Ph.D. Thus, it became easier for me to understand research papers. My first attempt at Ph.D was unsuccessful which had left me disappointed at that time, but it gave me much knowledge and better understanding of Statistics. Since the year 1983, I have come to department almost everyday. While I was doing PhD, Mr.Tushar Murdheshwar was also a Ph.D. student. Together, we would discuss with Sathe sir. My Ph.D. topic revolved around Outliers. At that time, I had read a paper by Prof. Kale on one outlier. So I wondered why only one outlier? I asked Sathe sir about this. He suggested that we should work with multiple outliers. This is the speciality of our Mumbai University department. The research in this department has never been on particular cases, but always on generalized cases. This is what Sathe sir has inculcated in us. When people were working with one or two outliers we worked with k-Outliers. Over the years, I have written many papers on k-outliers, thus being one of the few reviewers for this topic.

I remember that Prof. D. B. Wagh had encouraged me to write a paper which was then published in Bombay Bulletin in 1987. So I have great affection for Bombay Bulletin, as that was my first published paper. Before that, in 1986 my paper got accepted in the journal 'Communications in Statistics' but it got published after 3 years. It was not because of the books that I developed a liking for inference, but the people who taught me. Kale sir had taught us this topic and I had enjoyed it. Moreover Sathe sir taught me Inference which further clarified my concepts leading to my enhanced interest in this subject. Thus, I have strong concepts because I had good teachers.

- PDT: Tell us more about Sathe sir.
- UJD: Sathe sir has knowledge on many topics. He is a very intelligent and calm person who would never show off his knowledge. His speciality is that he can work on any topic. He came back from University of North Carolina after his Ph.D. as he wanted to be in Mumbai. He worked on Design of experiments with Dr. Shenoy and published papers in Annals of Statistics. He worked on Outliers with me and we published papers in Statistical Probability Letters. In one of these papers, we solved a problem by removing all assumptions. He is far superior to many people in the field of Statistics. Since 1983, I have had many academic discussions with him.
- PDT: So, how did you join the department as faculty?
- UJD: When I was about to complete Ph.D., Sathe sir asked me and Tushar to apply for teaching and so we applied. He asked both of us to give talks in seminars. In fact, Sathe sir himself used to give seminars and each one of us in the department would join. Tushar and I used to feel that the seminars were themselves a part of our selection process. When we joined the department as faculty, Joshi, Shenoy, Nabar, Satam and Bendre were the teaching staff.
- AS: What do you feel about our Statistics department?
- UJD: The Department has always been like a very happy home for me with Sathe sir, Shenoy, Nabar, Satam, etc. This has always been a very student friendly department. All my colleagues were very warm and friendly. We might have had differences of opinion but our friendship has always been very strong. When I came here I started teaching Measure Theory, Probability Theory, Statistical Inference and then moved on to Design of Experiments. Our department has a very good name in the universities across India as well as abroad. It is quite renowned for the research work done here. A professor from Iowa State University who had once visited our house said that the

department has a very high ranking abroad. If a student of this department with at least a First class applies abroad for the Ph.D. then the student will definitely be considered with fellowship.

- AS: Describe your experiences of working abroad.
- UJD: I met Prof. Vick Barnett when I had visited Delhi University for a conference. There I presented the k outlier model for the first time. It was later published in 'Metrika'. Vick Barnett liked it a lot and named it as 'Dixit Model'. He was very impressed and later recommended me for the Rothamsted Fellowship. Hence, I was selected as first fellow of Rothamsted in 1993. There I met Prof. Nedler, Gavin Ross, Roger Pain, Roger Newson and many others. I worked there for 6 months published 3 papers. All the people there were warm and friendly. Overall, it was a very good experience.

In 1998, we had worked on a project for our University. The objective was to use statistical methods to evaluate the performance of departments in our University. This project was published in the 'Times of India'. Due to this some enquiry committee was appointed by the university to question the publication of our project. We were really disappointed by this non-academic enquiry. Then I applied for the faculty position in The University of South Pacific. In 2000, I joined as faculty there. Here, I took lean of two years but after having stayed there I decided to return back because the mathematics syllabus in the schools was not very strong. I wanted my children to study in India. While in Fiji, I did a project for the United Nations. One thing I observed about USP (University of South Pacific) is that the students there would sit and listen quietly. For some courses I had 600 students in the lecture theater but there would be pin drop silence during the class. The students had high respect for teachers. I taught Probability Theory and Linear Models at under graduate as well as post graduate level. I attended conferences in England, Auckland, USA, and Singapore and also gave lectures there. After returning back to India, I came back to teach in Mumbai University.

- AS: Tell us about your interactions with the students.
- UJD: Students have always attended my class in large numbers. From the day I started teaching till today I have always had a full class. In the initial years, I would take students for hiking. We had a friendly rapport. We started project work in the department so that students would have a better understanding of applications in industry. These projects consisted of primary data collection, data cleaning and analysis. This idea proved to be very beneficial and is still going on very well. Also, because of these projects there has always been 100% placement of students in good companies. We also started two courses PGDAS and PGDASS in the department. The then Vice Chancellor Dr. Vijay Khole helped us a lot in setting up these courses.
- PDT: Sir, tell us about your book on Statistical Inference.
- UJD: Originally, this book grew out of my notes on Statistical Inference. In my experience, even really good students were not able to grasp the concepts from the available books on Inference. I always had this on my mind, so decided to write a book that puts forth the concepts in a simpler manner.
- AS: What improvements do you think can be done in the department?
- UJD: As we all know we have very less academic staff. Dr.Shenoy and I wanted to collect Rs. 50 cr for our department and build an entire building for the Statistics Department. With this financial assistance we could appoint new staff and ask senior teachers from other universities to come and teach here. However, we were unsuccessful in this endeavor and hope that others will be able to achieve this dream. Also, I think that focus on research activities seem to have reduced these days compared to our time. Hence, I think that research activities should be increased.
- AS: What are your expectations from the current faculty?
- UJD: My suggestions from the current staff are that they should spend more time in research work. Priority was always given to research activities in our time, owing to which I have been able to publish so many research papers. This department has always been a calm and quite place that nurtured academic interactions without any outward show. I hope this kind of serene research

oriented atmosphere continues here. The quality of our research should be maintained and papers shouldn't be published in paid journals. The other excellent aspect of this department is the deep friendship among the colleagues. Whenever any of us had any doubts in the subject we could very easily discuss them with each other. There was a very easy open door policy in this department not only among colleagues but also towards students. I hope this kind of simplicity and friendship among colleagues remains and grows.

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