

## NEWS AND NOTICES

*Readers are invited to submit to the Treasurer of the Institute items of interest*

### Personal Items

Norman R. Draper has been promoted from Associate Professor to Professor at the Department of Statistics, University of Wisconsin.

William A. Golomski has been elected President of the American Society for Quality Control for the year 1966–1967.

Irwin Guttman, Department of Statistics, University of Wisconsin, is on a year leave of absence 1966–67 at the London School of Economics (first semester) and the Mathematics Research Center, Madison, Wisconsin (second semester).

Irving J. Hall has won the George W. Snedecor Award for 1967 at Iowa State University. The Award is given annually to the most outstanding candidate for the Ph.D. degree in statistics at Iowa State.

William G. Hunter has been promoted from Assistant Professor to Associate Professor at the University of Wisconsin, Department of Statistics.

Dr. V. S. Huzurbazar, Professor and Head of the Department of Mathematics and Statistics, University of Poona, India, has been elected President of the Statistics Section of the Indian Science Congress Association for the year 1966-67.

Dr. G. P. Patil, Professor of Mathematical Statistics at the Pennsylvania State University, University Park, Pennsylvania has been elected an ordinary member of the International Statistical Institute.

Dr. Vidya S. Taneja has joined the faculty of the Department of Mathematical Sciences as an Assistant Professor at New Mexico State University, Las Cruces, in September, 1966.

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### New Members

**Andersson, Hannes**, Fil. Kand., (University of Uppsala); Teacher, Department of Mathematics and Statistics, University of Umeå.

**Andrus, Gary F.**, B.S., (Lawrence Institute of Technology); Graduate Student, Department of Statistics and Probability, Michigan State University.

**Ash, Robert**, Ph.D., (Columbia University); Associate Professor, Department of Mathematics, University of Illinois.

**Berk, Kenneth N.**, Ph.D., (University of Minnesota); Assistant Professor, Department of Mathematics, Northwestern University.

**Bogdanoff, David A.**, B.S., (University of Chicago); Graduate Student, Department of Statistics, Stanford University.

**Bond, Walter P., Jr.**, B.A., (Jacksonville University); Data Reduction Analyst B, RCA Service Co., Patrick Air Force Base; *1230 Yacht Club Blvd., Indian Harbour Beach, Florida.*

**Brown, Bruce M.**, B.Sc., (University of Melbourne); Graduate Student, Department of Statistics, Purdue University.

**Chilko, Daniel Milan**, M.S., (Rutgers-The State University); Graduate Student, Statistics Center, Rutgers-The State University.

- Davignon, Gilles Roland**, B.Sc., (University of Montreal); Graduate Student, Department of Mathematics, University of Montreal.
- Dockery, Howard L.**, Ph.D., (Oklahoma State University); Mathematical Statistician, Texas Instruments, Dallas; *5615 Southwestern Blvd., Dallas, Texas.*
- Frazer, William J., Jr.**, M.A., (Columbia University); Senior Economist, Federal Reserve Bank of Chicago.
- Friendly, Michael L.**, B.S., (Rensselaer Polytechnic Institute); Graduate Student, Education Testing Service and Princeton University.
- Fujikoshi, Yasunori**, M.S., (Hiroshima University); Research Assistant, Department of Mathematics, Faculty of Science, Hiroshima University.
- Fuller, George T.**, M.A., (New York University); Research Analyst, Prudential Insurance Company of America; *Drake Road, 108 Somerset, New Jersey.*
- Fuller, Wayne A.**, Ph.D., (Iowa State University); Professor, Department of Statistics, Iowa State University.
- Gessaman, Margaret Palmer**, Ph.D., (Montana State University); Instructor, Department of Mathematics, Montana State University.
- Gurley, Lawrence T.**, M.S., (California Institute of Technology); Graduate Student, Department of Electrical Engineering, University of California, Berkeley.
- Hachemeister, Charles A.**, A.B., (Wagner College); Senior Actuarial Assistant, Insurance Company of North America, Phila., Pennsylvania.
- Hamada, Noboru**, M.S., (Hiroshima University); Research Assistant, Department of Mathematics, Faculty of Science, Hiroshima University.
- Harris, Terrell J.**, M.S., (Northwestern University); Operations Research Consultant, Caywood-Schiller, Assoc., Chicago.
- Hill, Robert T.**, M.A., (State University of New York at Buffalo); Graduate Student, Department of Mathematical Statistics, State University of New York at Buffalo.
- Houston, Samuel Robert**, M.S., (University of Oregon); Graduate Student, Department of Statistics, Colorado State University; Program Associate, Charles F. Kerring Foundation, Denver.
- Janssen, Jacques A. M.**, Lic. Sci. Actuar., (University of Bruxelles); Assistant, University of Bruxelles.
- Knott, Martin**, Ph.D., (London University); Research Associate, Princeton University.
- Kroy, Walter H., Jr.**, Ph.D., (University of California, Los Angeles); Senior Engineer Scientist, Douglas Aircraft Co., Inc., Missiles and Space Systems Division, Santa Monica.
- Kyriakopoulos, Adrian A.**, M.D., (National University of Athens Medical School); Instructor in Medicine, University of Oklahoma School of Medicine.
- Lampkin, Harold**, M.S., (University of London); Associate Professor, University of Calgary.
- Lepage, Yves**, B.Sc., (University of Montreal); Graduate Student, Department of Mathematics, University of Montreal.
- Lin, Pi-Erh**, B.Sc., (Taiwan Normal University); Graduate Student, Department of Mathematical Statistics, Columbia University.
- Matusha, John L.**, M.A., (San Francisco State College); Graduate Student, Department of Mathematics, University of California, Davis.
- Maxwell, Philip H.**, B.S.E.E., (U. S. Naval Postgraduate School); Reliability Engineer, Pan American World Airways, Inc., Patrick Air Force Base.
- McDonald, Gary C.**, M.S., (Purdue University); Graduate Student, Department of Statistics, Purdue University.
- Meelis, Evert**, M.S., (University of Leiden); Statistician, Instituut voor Theoretische Biologie, Leiden.
- Ninomija, Satoki**, Statistics Degree, (University of Tokyo); Professor, Department of Technology, University of Aoyama Gakuin, Tokyo.

- Norris, Awbrey G.**, M.S., (University of Alabama); Lieutenant Colonel, U. S. Army, Fort McPherson, Georgia.
- Pokropp, Fritz**, Dr.Rer.Nat., (University of Hamburg); Assistant Professor, Department of Mathematics, University of Cincinnati.
- Rao, J. S.**, Ph.D., (Indian Statistical Institute, Calcutta); Research Associate, The Ahmedabad Textile Industry's Research Association.
- Robertson, James B.**, Ph.D., (Indiana University); Assistant Professor, Department of Mathematics, University of California, Santa Barbara.
- Roy, Roch**, M.Sc., (University of Montreal); Graduate Student, Department of Mathematics, University of Montreal.
- Sagara, Nobuko**, Statistics Degree, (University of Tokyo); Assistant Professor, Department of Technology, University of Aoyama Gakuin, Tokyo.
- Staudte, Robert G., Jr.**, M.S., (University of Illinois); Graduate Student, Department of Mathematics, University of Illinois.
- Stefansky, Wilhelmine von Türk**, B.A., (Wellesley College); Graduate Student, Department of Statistics, University of California, Berkeley.
- Stone, Lawrence D.**, M.S., (Purdue University); Graduate Student, Department of Mathematical Sciences, Purdue University.
- Stroud, Thomas W. F.**, M.A., (University of Toronto); Graduate Student, Department of Statistics, Stanford University.
- Teugels, Jozef Lodewijk**, M.S., (Purdue University); Graduate Student, Department of Mathematics, Purdue University.
- Tryon, Peter V.**, M.S.E.E., (New York University); Graduate Student, Pennsylvania State University.
- Wilcox, Roberta A.**, M.Sc., (The Johns Hopkins University); Biostatistician, CIBA Pharmaceutical Company, Summit, New Jersey.

## MARKOV PROCESSES AND POTENTIAL THEORY

MAY 1-3, 1967

During recent years it has been shown that certain areas of potential theory and of probability theory are really different aspects of the same theory. As a consequence, both fields have been enriched. The purpose of this symposium is to bring together some of the people who have contributed to the development of this theory and its applications for a series of formal talks and informal discussions. The former will be published as the proceedings of the symposium.

The meeting will be held in Madison, Wisconsin. The following is a tentative list of invited participants: HEINZ BAUER, Universität Erlangen-Nürnberg; ROBERT M. BLUMENTHAL, University of Washington; KAI LAI CHUNG, Stanford University; JOSEPH L. DOOB, University of Illinois; WILLIAM FELLER, Princeton University; RONALD K. GETTOOR, University of California, San Diego; GILBERT A. HUNT, Princeton University; KIYOSI ITO, Kyoto University and Aarhus Universitet; MARK KAC, Rockefeller University; SAMUEL KARLIN, Stanford University; HARRY KESTEN, Cornell University; JOHN W. LAMPERTI, Dartmouth College and Cambridge University; PAUL ANDRÉ MEYER, Université de Strasbourg; J. NEVEU, Université de Paris; STEVEN OREY, University of Minnesota; DONALD ORNSTEIN, Stanford University; SIDNEY PORT, University of California, Los Angeles; DANIEL B. RAY, Massachusetts Institute of Technology; J. LAURIE SNELL, Dartmouth College; FRANK L. SPITZER, Cornell University;

CHARLES STONE, University of California, Los Angeles; SHINZO WATANABE, Kyoto University and University of Washington.

A detailed program of the symposium and information on registration and accommodations will be available about March 1, 1967. Requests for the program and all related inquiries should be directed to Professor J. Chover, Symposium Chairman Mathematics Research Center, U. S. Army, The University of Wisconsin, Madison, Wisconsin 53706.

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### NATO ADVANCED STUDY INSTITUTE

A NATO Advanced Study Institute of "Engineering Applications of Statistical Extremes" will be held in Portugal, September 18 to September 27, 1967.

The lecturers of the Institute will be: H. CRAMÉR, retired Professor of the Stockholm University; JÚLIO FERRY BORGES, Portuguese Laboratory of Civil Engineering; A. M. FREUDENTHAL, Columbia University; SEBASTIAN LITTAUER, Columbia University; LOUIS MOSTERTMAN, Delft Technological University; H. C. S. THOM, U. S. Weather Bureau; J. TIAGO DE OLIVEIRA, Lisbon University; F. VASCO COSTA, Technical University of Lisbon; W. WEIBULL, retired Professor of the Stockholm University; H. WOLD, University of Uppsala.

For further details write to:

CURSO NATO, MATEMATICAS APLICADAS  
Faculdade de Ciencias  
58, Rua da Escola Politecnica  
Lisbon 2, Portugal.

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### DOCTORAL DISSERTATIONS IN STATISTICS, 1966

Listed below are doctorates conferred during 1966 (excepted where otherwise indicated) in statistics and related fields. The university, major subject, and the title of the dissertation are given in each case. Readers are invited to notify the Editor of any omissions from the list.

- Abul-Ela, Abdel-Latif Abdel-Fattah**, University of North Carolina, major in biostatistics, "Randomized response models for sample surveys on human populations."
- Adichie, James N.**, University of California, Berkeley, major in statistics, "Nonparametric inference in linear regression."
- Aitken, M. A.**, University of Sydney, major in statistics, "Examination results and the bivariate normal distribution."
- Anderson, Mary R.**, State University of Iowa, major in mathematics, "Characterizations of certain distributions of the exponential class."
- Armstrong, William W.**, University of British Columbia, major in mathematics, "Topological diffuse semigroups (systems with a stochastic product)."
- Arnold, Barry C.**, Stanford University, major in statistics, "A correlated urn-scheme for a continuum of responses."
- Assakul, Kwanchai**, University of North Carolina, major in experimental statistics, "Testing hypotheses with categorical data subject to misclassification."
- Baños, Alfredo**, University of California, Los Angeles, major in mathematics, "On Pseudo-games."

- Barbosa-Dantas, Carlos A.**, University of California, Berkeley, major in statistics, "The existence of stationary optimal plans."
- Basu, Asit P.**, University of Minnesota, major in statistics, "On some two-sample and  $k$ -sample rank tests with applications to life testing."
- Beatty, Richard L.**, University of Toronto, major in mathematics, "Structural probability and biological assay."
- Beauchamp, John J.**, Florida State University, major in statistics, "Simultaneous nonlinear estimation."
- Bennett, G. W.**, University of Adelaide, major in statistics, "The fiducial argument in statistical inference."
- Bensaid, Jean-Pierre**, University of Paris, major in industrial engineering, "Etude de la maintenance de matériaux nouveaux regroupés en sous-ensembles."
- Berman, Jeremy S.**, University of California, Berkeley, major in mathematics, "Marginal distributions and product densities."
- Bhattacharyya, Gouri K.**, University of California, Berkeley, major in statistics "Multivariate two-sample normal scores test for shift."
- Blomquist, Mary**, University of Minnesota, major in statistics, "Rank analysis of complete block factorial design."
- Boes, Ardel J.**, Purdue University, major in statistics, "Conditional probability on a  $\sigma$ -complete Boolean algebra."
- Bohrer, Robert E.**, University of North Carolina, major in mathematical statistics, "On Bayes sequential design of experiments."
- Borgard, Françoise**, University of Paris, major in theory of games, "Sur une définition de l'équilibre dans un jeu à deux joueurs déterministe."
- Bowman, Raymond**, University of Missouri, major in statistics, "A study of the sampling distributions of several ratio estimators for small sample sizes."
- Briese, Franklin W.**, University of Minnesota (1965), major in biostatistics, "Estimation of relative volumes of component tissues of an organ from studies of histologic cross-sections."
- Bühler, Wolfgang J.**, University of California, Berkeley, major in statistics, "Limit theorems for branching processes."
- Burke, Paul J.**, Columbia University, major in statistics, "The output process of a queuing system."
- Butler, Calvin C.**, Colorado State University, major in statistics, "Estimation of the bivariate distribution function at quantile points."
- Caldwell, Joseph G.**, University of North Carolina, major in mathematical statistics, "Construction of variable-length error-correcting codes."
- Canner, Paul L.**, University of Minnesota (1965), major in statistics, "Some minimax and Bayes procedures for selecting one of two medical treatments."
- Casamitjana, Ramon**, University of Paris, major in probability, "Etude de la fonction matricielle  $P^t$ . Theorie et applications économiques."
- Chambers, John**, Harvard University, major in statistics, "Some methods of asymptotic approximations in multivariate statistics analysis."
- Chan, Yick-Kwong**, University of Minnesota, major in biostatistics, "A competing risks model: normal death, cancer development and cancer death."
- Chase, Gerald R.**, Stanford University, major in statistics, "An empirical Bayes approach in routine bioassay."
- Choi, S.**, University of California, Los Angeles, major in biostatistics, "Sequential clinical trials with delayed observations."
- Connell, Terrence L.**, Colorado State University, major in statistics, "Sample sizes for specified precision."
- Crusco, F. A.**, University of Paris, major in operations research, "La programmation dynamique et le choix des investissements. Lois de probabilité sur un demigroupe compact."

- Cryer, Jonathan D.**, University of North Carolina, major in mathematical statistics, "Normal stochastic processes."
- Davidson, Roger R.**, Florida State University, major in statistics, "Multivariate paired comparisons."
- Dolby, James L.**, Stanford University, major in statistics, "Some statistical aspects of character recognition."
- Dooley, James E.**, University of Toronto, major in industrial engineering, "The application of structural probability theory to a class of linear prediction problems."
- Dronarmraju, K. R.**, Indian Statistical Institute, major in statistics, "Genetic studies of the Andhra Pradesh population."
- Du Bois, N.**, University of California, Los Angeles, major in biostatistics, "On the multivariate document linkage problem with missing and inaccurately recorded items."
- Dufieux, Andre**, University of Paris, major in probability, "Lois de probabilitié sur un demigroupe compact."
- Duran, Benjamin S.**, Colorado State University, major in statistics, "Some non-parametric power comparisons."
- Eaton, Morris**, Stanford University, major in statistics, "Some optimal properties of ranking procedures with applications in multivariate analysis."
- Edge, Orlyn P.**, State University of Iowa, major in mathematics, "On hypotheses about restricted parameters of several exponential distributions."
- Eichhorn, Benjamin H.**, University of California, Berkeley, major in statistics, "Sequential search problems."
- Elashoff, Janet D.**, Harvard University, major in statistics, "Optimal choice of rater teams."
- El-Sayyad, G. M.**, University College of Wales, major in statistics, "Fixed sample and sequential sampling schemes."
- Eytan, Moshe**, University of Paris, major in logic, "Sur une algèbre monadique associée à certaines logiques modales."
- Fischer, Francois**, University of Paris, major in economic statistics, "Résolution de certaines catégories de programmes linéaires en nombres entiers: problème d'affectation et méthode hongroise."
- Francis, Ivor S.**, Harvard University, major in statistics, "Inference in the classification problem."
- Friant, Jean**, University of Paris, major in mathematical linguistics, "Les langages C S."
- Gentleman, William M.**, Princeton University, major in mathematics, "Robust estimation of multivariate location by minimizing  $P$ th power deviations."
- Gilliland, Dennis**, Michigan State University, major in statistics, "Approximation to Bayes risk in sequences of non-finite decision problems."
- Girgis, Nadia M.**, University of California, Berkeley, major in statistics, "Optimal cash balance levels."
- Gnanadesikan, Mrudulla**, Purdue University, major in statistics, "Some selection and ranking procedures for multivariate normal populations."
- Gokhale, Dattaprabhakar V.**, University of California, Berkeley, major in statistics, "Some problems in independence and dependence."
- Goldman, Jay R.**, Princeton University (1965), major in mathematics, "Stochastic point processes: limit theorems and infinite divisibility."
- Goode, Jamie J.**, University of North Carolina, major in mathematical statistics, "Asymptotically efficient competitors to the maximum likelihood estimators."
- Gross, Shulamith**, University of California, Berkeley, major in statistics, "Nonparametric tests when nuisance parameters are present."
- Guedj, Raymond D.**, University of Paris, major in mathematical linguistics, "Grammaire des constituants généraux."
- Gundy, Richard F.**, University of Chicago, major in statistics, "Some applications of probability in the theory of orthogonal functions."

- Hall, Elmer C.**, University of North Carolina, major in biostatistics, "Analysis and decomposition of the distribution of blood pressure level in a population by age, race and sex."
- Hall, Irving J.**, Iowa State University, major in statistics, "Contributions to the theory of symmetric multiple decisions."
- Haq, M. Safiul**, University of Toronto, major in statistics, "Structural analysis for prediction."
- Harris, Carl M.**, Polytechnic Institute of Brooklyn, major in mathematics, "Queues with state-dependent stochastic service rates."
- Heichelheim, Peter C. A.**, University of Toronto, major in mathematics, "Comparison between sufficiency and structural methods."
- Herr, David G.**, University of North Carolina, major in mathematical statistics, "Asymptotically optimal tests for an exponential family of distributions."
- Hext, George R.**, Stanford University, major in statistics, "A new approach to time series with mixed spectra."
- Hill, William J.**, University of Wisconsin, major in statistics, "Statistical techniques for model-building."
- Hoadley, Arthur B.**, University of California, Berkeley, major in statistics, "The theory of large deviations with statistical applications."
- Hodson, Thornber E.**, University of Chicago, major in economics, "Applications of decision theory in econometrics."
- Hoel, David G.**, University of North Carolina, major in mathematical statistics, "Properties of sequential tests when the conditions for standard approximate formulae are not satisfied."
- Holland, Paul W.**, Stanford University, major in statistics, "A variation on the minimum chi-square test."
- Hollander, Myles**, Stanford University, major in statistics, "Rank tests for randomized blocks when the alternatives have an *a priori* ordering."
- Holloway, L.**, University of California, Los Angeles, major in biostatistics, "The robustness of Hotelling's  $T^2$ ."
- Holmes, Paul T.**, Stanford University, major in statistics, "Semi-regular functions in Markov chains."
- Hussain, Ashiq**, University of North Carolina, major in experimental statistics, "Combining time series and cross-section data in simultaneous linear equations."
- Ignall, Edward J.**, Cornell University, major in operations research, "Optimum policies for 2-product inventory systems with and without setup costs."
- Johnson, Richard A.**, University of Minnesota, major in statistics, "Asymptotic expansions associated with the power of a density."
- Kadane, Joseph B.**, Stanford University, major in statistics, "Comparison of estimators in simultaneous equation econometric models when the residuals are small."
- Kumar, Satindar**, University of Minnesota, major in statistics, "A generalization of the group testing problem."
- Kussmaul, Keith Lee**, University of North Carolina, major in experimental statistics, "Estimation of the mean and variance components in a two-stage nested design with composited samples."
- Lorden, Gary A.**, Cornell University, major in mathematics, "Integrated risk of asymptotically Bayes sequential tests and some essentially complete class results."
- McDonald, Bruce J.**, Florida State University, major in statistics, "Probabilities for rank sum multiple comparisons."
- McGilchrist, C. A.**, University of New South Wales, major in statistics, "Plant competition experiments."
- Macky, David W.**, Michigan State University, major in statistics, "Some decision procedures in exponential families."
- Mahamunulu, Desu M.**, University of Minnesota, major in statistics, "On a generalized goal in fixed-sample ranking and selection problems."

- Majone, Gian Domenico**, University of California, Berkeley, major in statistics, "Asymptotic behavior of Bayes' estimates in Borel sets."
- Mathew, N. T.**, Indian Statistical Institute, major in statistics, "Variation of human stature in India-Army recruits."
- Mazumdar, Mainak**, Cornell University, major in applied probability and statistics, "Optimal sequential plans based on prior distributions and costs."
- Metzler, Carl M.**, University of North Carolina, major in experimental statistics, "Estimation of transport rates by radioisotope studies of non-steady-state systems."
- Milch, Paul R.**, Stanford University, major in statistics, "A multidimensional linear growth, birth and death process."
- Mitchell, Toby J.**, University of Wisconsin, major in statistics, "Constructions of saturated  $2^k$ - $p$  designs of resolutions V, VI."
- Mizuki, Mikiso**, Harvard University, major in statistics, "The number of generalized runs in a Markov chain sequence of a fixed length."
- Monjardet, Bernard**, University of Paris, major in theory of games, "Parties finissantes-jeux simples."
- Mullooly, John P.**, The Catholic University of America, major in mathematics, "A random space-filling problem in the crystallization of polymers."
- Nettheim, Nigel F.**, Stanford University, major in statistics, "The estimation of coherence."
- Odoroff, Charles L.**, Harvard University, major in statistics, "Comparison of minimum logit chi-square and minimum likelihood estimation."
- Olshene, Richard A.**, Yale University, major in statistics, "Asymptotic properties of the periodogram of a discrete stationary process."
- Owen, Joel**, Harvard University, major in statistics, "An investor in the stock market."
- Pain, Thomas B.**, University of Oregon, major in mathematics, "Asymptotic properties of permutation tests."
- Patil, S. A.**, Colorado State University, major in statistics, "The compound distributions and their applications to stochastic processes."
- Petelaud Jean-Francois**, University of Paris, major in statistics, "Sur l'hétérogénéité des écartstype des variables parentes en analyse de variance."
- Phillips, Lawrence D.**, University of Michigan, major in psychology, "Some components of probabilistic inference."
- Pogue, Richard E.**, University of Minnesota, major in biostatistics, "Some investigations of multivariate discrimination procedures with applications to diagnosis in clinical electrocardiography."
- Poupard, Odile**, University of Paris, major in economic statistics, "Etude de cheminements aléatoires généralisés avec une barrière absorbante. Application à la gestion des stocks monétaires."
- Prakash, Vijaya**, Vikram University (1965), major in statistics, "On power function of a sometimes pool test procedure in linear hypothesis model."
- Purakam, Niyom**, University of North Carolina, major in experimental statistics, "Multi-stage sampling on successive occasions where first-stage units are drawn with unequal probabilities and with replacement."
- Raghunandan, K.**, Colorado State University, major in statistics, "Part 1—"Distribution of occupation time in a Markov chain", Part 2—"Robustness properties of location parameters."
- Rao, B. L. S. Prakasa**, Michigan State University, major in statistics, "Asymptotic distributions in some non-regular statistical problems."
- Rastogi, Suresh C.**, State University of Iowa, major in statistics, "Indecomposable two-way channels in information theory."
- Reboul, Claude J.**, University of Paris, major in probability, "Sur quelques processus stochastiques ponctuels unidimensionnels."



- Robertson, Timothy J.**, University of Missouri, major in statistics, "Conditional expectation given a  $\sigma$ -lattice and estimation of restricted densities."
- Rolph, John E.**, University of California, Berkeley, major in statistics, "Bayesian estimation of mixing distributions."
- Rosengard, Alex**, University of Paris, major in statistics, "Contribution à l'étude des liaisons limites entre différentes statistiques d'un échantillon."
- Salembien, Elisabeth**, University of Paris, major in economics, "Les conditions du marché du logement et le comportement des menages."
- Sarangi, J.**, University of Alberta, major in statistics, "Contributions to the theory of rank tests."
- Sayn-Wittgenstein, Leo**, Yale University, major in forestry, "A statistical test of systematic sampling in forest surveys."
- Schaefer, Ethel L.**, University of Michigan, major in biostatistics, "On discrimination using qualitative variables: an evaluation of several procedures assuming the logit model."
- Schrage, Linus E.**, Cornell University, major in operations research, "Some queueing models for a time-shared facility."
- Schreuder, Hans T.**, Iowa State University, major in statistics, "Unequal probability and double sampling in forestry."
- Schwartz, Richard E.**, Cornell University, major in mathematics, "Properties of invariant multivariate tests."
- Sehgal, V.**, Wayne State University, major in mathematics, "Some fixed point theorems in functional analysis and probability."
- Shah, K. R.**, Indian Statistical Institute, major in statistics, "On the recovery of intergroup information in one- and two-way designs."
- Shaman, Paul**, Columbia University, major in statistics, "Large-sample approximations to the first- and second-order moments of bispectral estimates."
- Shapiro, Saul**, Columbia University, major in statistics, "Multi-server queueing theory."
- Shih, Chang S.**, Iowa State University, major in statistics, "Interval estimation for the exponential model and the analysis of rotation experiments."
- Shorack, Galen R.**, Stanford University, major in statistics, "Nonparametric tests and estimation of scale in the two sample problem."
- Siegmund, David O.**, Columbia University, major in statistics, "Some problems in the theory of optimal stopping rules."
- Simons, Gordon**, University of Minnesota, major in statistics, "Multi-hypothesis testing."
- Smiriga, Nora S.**, University of California, Berkeley, major in statistics, "Stochastic processes with independent pieces."
- Smith, Dennis**, University of Wisconsin, major in statistics, "Investigation of rejection rules for outliers in small samples from the normal distribution."
- Snowbarger, Marvin R.**, University of Michigan, major in economics, "An interaction analysis of consumer durable expenditures."
- Snyder, Mitchell**, University of Chicago, major in statistics, "Winsorizing with a covariate to improve efficiency."
- Sobel, Eugene L.**, The Johns Hopkins University, major in statistics, "Extraction of slowly changing signals and of sums of accumulating sequences."
- Sprent, P.**, University of London, major in statistics, "Some aspects of the statistical analysis of growth curves."
- Srinath, K.**, University of California, Los Angeles, major in biostatistics, "Multiphase sampling in non response problems."
- Srinivasan, R.**, Wayne State University, major in mathematics, "Topics in abstract probability."
- Stephens, Kenneth S.**, Rutgers-The State University, major in statistics, "A class of cumulative-results sampling inspection plans and their evaluation."

- Stoneman, David M.**, University of Wisconsin, major in statistics, "Response surface designs for specified factor  $A$  levels."
- Swain, Donald D.** Stanford University, major in statistics, "Bounds and rates of convergence for the extended compound estimation problem in the sequence case."
- Sylwester, David L.**, Stanford University, major in statistics, "On maximum likelihood estimation for two-phase linear regression."
- Tainiter, Melvin**, The Johns Hopkins University, major in statistics, "Empirical Bayes and subminimax approach to sequential decision problems and applications."
- Taucci, Barbara**, Yale University, major in public health, "Methods to study aggregation of rare diseases in time and space."
- Thayer, Richard P.**, Virginia Polytechnic Institute, major in statistics, "A stochastic model for pollution and dissolved oxygen in streams."
- Valand, R.**, University of California, Los Angeles, major in biostatistics, "A decision theoretic approach to the problem of interval estimation."
- Wahba, Grace G.**, Stanford University, major in statistics, "Cross spectral distribution theory for mixed spectra and estimation of prediction filter coefficients."
- Walsh, John**, University of Illinois, major in mathematics, "Probability and a Dirichlet problem for multiple superharmonic functions."
- Wang, Peter**, Wayne State University, major in mathematics, "Totally positive functions and Markov processes."
- Weiss, Marie-Claude**, University of Paris, major in experimental statistics, "A propos d'une étude de l'information documentaire numérique ou non concernant les laboratoires scientifiques universitaires."
- Wey, Ing-Tzer**, Iowa State University, major in statistics, "Estimation of the mean using the rank statistics of an auxiliary variable."
- Will, Richard B.**, Columbia University, major in statistics, "System decisions from component testing."
- Winkler, Robert**, University of Chicago, major in business, "The quantification of judgment."
- Wood, Ross**, University of Minnesota (1965), major in biostatistics, "Uniformly most powerful similar tests for detecting radioactive decay."
- Woodworth, George G.**, University of Minnesota, major in statistics, "On the asymptotic theory of tests of independence based on bivariate layer ranks."
- Yandle, David O.**, University of North Carolina, major in experimental statistics, "A test of significance for comparing two different systems of stratifying the same population."
- Yang, Grace L.**, University of California, Berkeley, major in statistics, "Contagion in stochastic models for epidemics."

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## REPORT OF THE LOS ANGELES MEETING OF THE INSTITUTE OF MATHEMATICAL STATISTICS

The one-hundred-tenth (Western Regional) meeting of the Institute of Mathematical Statistics was held at the Biltmore Hotel in Los Angeles, August 15-17, 1966, in conjunction with the American Statistical Association, the Biometric Society (Eastern North American Region and Western North American Region), and the Western Farm Economic Association.

The Treasurer for the Joint Meetings reported a total registration of 1086. Of this number, 270 were members of IMS: 33 members of IMS alone, and 237 members of IMS and at least one other society.

## PROGRAM

Monday, August 15, 1966

## 8:30 A.M.—10:10 A.M.—Contributed Papers I

Chairman: ARNOLD F. GOODMAN, North American Aviation

1. *Factorization of Probability Measures on Locally Compact Groups*, HERBERT K. HEYER, University of Washington.
2. *Detection of an Unknown Waveform Which is Randomly Recurring in Gaussian Noise*, MELVIN J. HINICH, Hudson Laboratories, Columbia University.
3. *Linear Processes are Nearly Gaussian*, C. L. MALLOWS, Bell Telephone Laboratories.
4. *Coding Theorems for Two-Way Channels in Information Theory*, SURESH C. RASTOGI, University of Maryland.
5. *Strong Law of Large Numbers for Branching Processes*, M. M. SIDDIQUI, Colorado State University.

## 8:30 A.M.—10:20 A.M.—Topics in Multivariate Methods (ENAR-WNAR-IMS-ASA)

Chairman: SEYMOUR GEISSER, State University of New York, Buffalo

1. *On Some Properties of Discriminant Functions*, SAMUEL W. GREENHOUSE and KAREN E. PETTIGREW, National Institute of Mental Health.
2. *Nonparametric Partial Correlation*, DANA E. A. QUADE, University of North Carolina.
3. *Estimating a Multinomial Response Relation*, R. DARRELL BOCK, University of Chicago.

## 10:30 A.M.—12:20 P.M.—Invited Papers I (IMS, ASA)

Chairman: BRADLEY EFRON, Stanford University

1. *Estimation by the Nearest Neighbor Rule*, THOMAS COVER, Stanford University.
2. *Tournaments and Paired Comparisons*, HERBERT A. DAVID, University of North Carolina.
3. *Testing Against Ordered Alternatives in Model I ANOVA, Normal Theory and Non-parametric*, GALEN SHORACK, University of Washington.

## 10:30 A.M.—12:20 P.M.—Reliability Theory (ASA, IMS)

Chairman: H. LEON HARTER, Wright-Patterson Air Force Base.

1. *Three-Order-Statistic Bounds for Reliability Life under Weibull Assumptions*, NANCY R. MANN, Rocketdyne Corporation.  
Discussion: M. VERON JOHNS, Stanford University, and SAM C. SAUNDERS, Boeing Scientific Research Laboratories.

## 2:00 P.M.—3:50 P.M.—Invited Papers II

Chairman: OLIVE JEAN DUNN, University of California, Los Angeles.

1. *Most Powerful Regions and Hölder's Inequality*, H. E. REINHARDT, University of Montana.
2. *Multivariate Two-Sample Tests with Discrete and Continuous Data*, A. A. AFIFI and R. M. ELASHOFF, University of California, Los Angeles and University of California, Berkeley.

3. *An Information-Theoretical Criterion for the Choice of Level of Significance in Tests of Hypotheses*, C. SWARUP, IBM Corporation.

#### 4:00 P.M.—5:40 P.M.—Contributed Papers II

Chairman: A. V. GASARIAN, Systems Development Corporation.

1. *Estimation in Mixtures of Two Normal Distributions*, A. CLIFFORD COHEN, University of Georgia.
2. *Maximum-Likelihood Estimation, from Doubly-Censored Samples, of the Parameters of the First Asymptotic Distribution of Extreme Values*, H. LEON HARTER and ALBERT H. MOORE, Wright-Patterson Air Force Base.
3. *One-Order-Statistic Conditional Estimators of the Shape Parameters of the Limited and Pareto Distributions and the Scale Parameter of the Type II Asymptotic Distribution of Smallest Values*, ALBERT H. MOORE and H. LEON HARTER, Wright-Patterson Air Force Base.
4. *On Nonparametric Simultaneous Confidence Regions and Tests for the One-Criterion ANOVA*, PRANAB KUMAR SEN, University of North Carolina.
5. *A Second-Order Exponential Model for Multidimensional Dichotomous Systems*, (Preliminary Report), RHETT F. TSAO, Harvard University and IBM Corporation.
6. *Comparison of the Powers of the L-R Test and Chi-Square Test for the Multinomial Distribution*, V. R. R. UPPULURI and K. O. BOWMAN, Oak Ridge National Laboratory.

#### 4:00 P.M.—5:50 P.M.—Factorial Experimentation (ASA, IMS, ENAR-WNAR)

Chairman: MARION R. BRYSON, Duke University.

1. *Non-Orthogonal Designs of Even Resolution*, STEVE WEBB, Rocketdyne Corporation.
2. *The Selection of Sequences of Two-Level Factorial Plans*, SIDNEY ADDELMAN, Research Triangle Institute.
3. *Fractional Replicates of  $2^p$  Factorial Experiments, with the Factors Applied Sequentially*, RICHARD R. PRAIRIE and WILLIAM J. ZIMMER, Sandia Corporation.

#### 8:30 P.M.—10:00 P.M.—General Methodology Lecture (ASA, IMS, ENAR-WNAR, WFEA)

Chairman: JOHN NETER, University of Minnesota

*An Introduction to Numerical Spectrum Analysis*, JOHN W. TUKEY, Princeton University.

**Tuesday, August 16, 1966**

#### 8:30 A.M.—10:10 A.M.—Contributed Papers III

Chairman: CHARLES STONE, University of California, Los Angeles

1. *On the Solution of Bechhofers General Goal in the Indifference-Zone Formation of the Ranking and Selection Problems* (Preliminary Report). DAVID R. BARR, Wright-Patterson Air Force Base.
2. *Some Selection and Ranking Procedures for Multivariate Normal Populations*, M. R. GNANADESIKAN, Bell Telephone Laboratories.
3. *Further Consideration of the Distribution of the Multiple Correlation Coefficient*, JOHN GURLAND, University of Wisconsin.
4. *Bayesian Confidence Limits for the Reliability of Cascaded Exponential Subsystems*, MELVIN D. SPRINGER and WILLIAM E. THOMPSON, General Motors Corporation and Defense Research Laboratories.

**10:30 A.M.—12:20 P.M.—Invited Papers III**

Chairman: DAVID BLACKWELL, University of California, Berkeley.

1. *Error Estimates in Renewal Theory*, CHARLES STONE, University of California, Los Angeles.
2. *Hitting Times for Stable Processes*, SIDNEY PORT, Rand Corporation.
3. *Asymptotic Distribution Theory for the Noncentral Poisson Index Statistic*, W. L. NICHOLSON, Battelle-Northwest Corporation.

**10:30 A.M.—12:20 P.M.—Times Series III: Data Analysis in Time Series and Multivariate Problems (ASA, IMS, ENAR-WNAR)**

Chairman: M. R. MICKEY, University of California, Los Angeles.

1. *Large-Sample Analysis of Linear Regression with Missing Values*, A. A. AFIFI, University of California, Los Angeles, and R. M. ELASHOFF, University of California, San Francisco.
2. *Discriminant Analyses when the Initial Samples are Misclassified*, PETER A. LACHENBRUCH, University of North Carolina.
3. *A Chi-Square Application to Continuous Patient Electrocardiographic Monitoring*, SIDNEY ABRAHAM, JEROME SACHIN, and CESAR CACERES, U. S. Public Health Service.
4. *Data Preparation for Time-Series Analysis*, CHRISTOPHER BINGHAM, Princeton University.

**2:00 P.M.—3:50 P.M.—Invited Papers IV (IMS, ASA)**

Chairman: SIDNEY PORT, Rand Corporation

1. *New Techniques for Estimating Life Quality Parameters Based on Ad Hoc Procedures*, V. K. MURTHY, Douglas Aircraft.
2. *A New Method in Sequential Analysis*, LEO AROIAN, TRW Systems Corporation.
3. *Lower Tolerance Limit for Life Distributions*, SAM C. SAUNDERS, Boeing Scientific Research Laboratories.

**4:00 P.M.—5:50 P.M.—General Methodology Lecture: Multivariate Analysis (ENAR-WNAR, IMS, ASA, WFEA)**

Chairman: CARL A. BENNETT, Battelle-Northwest Corporation.

*Data Analytic Methods in Multivariate Statistical Analysis*, R. GNANADESIKAN, and M. B. WILK, Bell Telephone Laboratories.  
 Discussion: R. L. ANDERSON, North Carolina State University.

Wednesday, August 17, 1966

**8:30 A.M.—10:10 A.M.—Contributed Papers IV**

Chairman: D. E. ROBISON, TRW Systems Corporation.

1. *On Pseudo Games*, ALFREDO BAÑOS, University of California, Los Angeles.
2. *On Bias in Variance-Component Estimation*, DAVID A. HARVILLE, Wright-Patterson Air Force Base.
3. *On Degradation of Common Locks and the Maximum Trial Time to Open Them*, MARY D. LUM, Wright-Patterson Air Force Base.
4. *Some Rules for a Combinatorial Method for Multiple Products of Generalized  $k$ -Statistics*, DERRICK S. TRACY, University of Windsor.

5. *A Bayes Sequential Strategy for Crossing a Field Containing Absorption Points*, SHELEMYAHU ZACKS, Kansas State University.

**10:30 A.M.—12:20 P.M.—Invited Papers V (IMS, ASA)**

Chairman: THEODORE MATTHES, University of Oregon.

1. *Some Characterization Results*, M. L. EATON, Stanford University.
2. *On Further Properties of the Exponential-Type Families*, A. GOLDMAN, Gonzaga University, and R. K. ZIEGLER, Los Alamos Scientific Research Laboratories.
3. *Dynamic Programming in Borel Spaces*, RALPH STRAUCH, Rand Corporation.

**10:30 A.M.—12:20 P.M.—Time Series VI (ASA, IMS)**

Chairman: COLIN MALLOWS, Bell Telephone Laboratories.

1. *The Problem of Non-Linear Prediction of Stationary Time Series Arising in Some Engineering Applications*, ZORAN R. POP-STOJANOVIC, University of Florida.
2. *Time Series with Periodic Structure*, RICHARD H. JONES and WILLIAM M. BRELSFORD, Johns Hopkins University.
3. *Simultaneous Recursive Estimation of Trajectories and the Variances Involved*. DAVID B. DUNCAN, Johns Hopkins University.

**4:00 P.M.—5:50 P.M.—Problems in Regression (ASA, IMS)**

Chairman: RUDOLF J. FREUND, University of Texas.

1. *A Newton-Gradient Method for Non-Direct Problems in Hilbert Space*, DUANE A. MEETER, Florida State University.
2. *Augmenting Existing Data in Multiple Regression*, J. A. MERRILL and D. W. GAYLOR, Research Triangle Institute.
3. *Confidence Regions for Unknown Response Surface Ordinates*, LYLE D. BROEMELING, Texas A and M University.
4. *Multi-Response Multiple Regression*, S. E. MICHAELS, Proctor and Gamble Company.

**Papers Contributed by Title**

1. *Some Percentile Estimators for Weibull Parameters*, SATYA D. DUBEY, Ford Motor Company.
2. *Some Two-and-Three-Dimensional Systematic Designs in Factorial Experiments*, REGINA ELANDT-JOHNSON, University of North Carolina.
3. *Some Selection and Ranking Procedures, with Applications to Reliability Problems*, SHANTI S. GUPTA and WILLIAM STUDDEN, Purdue University.
4. *A Two-Sided Slippage Test for Poisson Variates*, R. B. HORA, Purdue University.
5. *Bias and Variance Criteria for Estimators and Designs for Fitting Polynomial Responses (Preliminary Report)*, M. J. KARSON, A. R. MANSON, and R. J. HADER, North Carolina State University.
6. *Asymptotic Efficiency of Certain Rank Tests for Comparative Experiments*, K. L. MEHRA and J. SARANGI, University of Alberta.
7. *Conditional Maximum-Likelihood Estimation, from Singly-Censored Samples, of the Shape Parameters of the Limited and Pareto Distributions and the Scale Parameter of the Type II Asymptotic Distribution of Smallest Values*, ALBERT H. MOORE and H. LEON HARTER, Wright-Patterson Air Force Base.
8. *Selection Procedures Based on Ranks: Scale-Parameter Case*, PREM S. PURI and MADAN L. PURI, University of California (Berkeley) and New York University.
9. *On Some Nonparametric Generalizations of Wilks' Tests for HM, HVC, and HMVC, Model I*, PRANAB KUMAR SEN, University of North Carolina.