

NEWS AND NOTICES

Readers are invited to submit to the Secretary of the Institute news items of interest

Personal Items

Professor Frances E. Baker is returning to Vassar College (as of September, 1961) after a year's leave of absence spent at the University of North Carolina.

Dr. Freidhelm Eicker has accepted a position at the Institut für Angewandte Mathematik, Freiburg, Germany, beginning in the Fall of 1961. During the past academic year he has been visiting at the Department of Statistics, University of North Carolina, and spent the summer at Stanford University.

Henry W. Gould has received a promotion from instructor to assistant professor of mathematics at West Virginia University.

Dr. C. W. J. Granger has returned to his post as Lecturer in Statistics at the University of Nottingham, England after a year at the Econometric Research Program, Princeton University.

W. J. Hall has been appointed Associate Professor in the Department of Statistics at The University of North Carolina in Chapel Hill. He will continue part-time teaching in the Department of Experimental Statistics at North Carolina State College in Raleigh.

Bruce M. Hill has received his Ph.D. Degree in Statistics from Stanford University. The topic of his dissertation was "A Test of Linearity Versus Convexity of a Median Regression Curve."

Eugene H. Lehman, Jr., Instructor at Purdue Statistical Laboratory, completed his Ph.D. in Experimental Statistics with a Mathematics minor at North Carolina State College, March 28, 1961. His dissertation was in the area of reliability, life testing and the Weibull distribution. Upon passage of his final examination, he was elevated to Assistant Professor.

Leone Y. Low received her Ph.D. in statistics from Oklahoma State University in May, 1961 and has been an instructor at the University of Illinois for the past year.

V. E. Palmour has accepted a position as Operations Analyst with the Operations Evaluation Group, Massachusetts Institute of Technology.

New Members

The following persons have been elected to membership in the Institute

Allen, Terrence M., Ph.D. Psychology (Purdue University); Assistant Professor, Psychology Department and Traffic Safety Center, Michigan State University; 700 W. Grand River Ave., East Lansing, Mich.

Atiqullah, A. M., Ph.D. (University of Dacca, Pakistan); Lecturer, Department of Statistics, University of Dacca, Pakistan; *Department of Mathematics, Birkbeck College, University of London, Malet Street, London, W. C. 1, England.*

- Bartko, John J.**, M.S. Statistics (Virginia Polytechnic Institute); Student, *Department of Statistics, Virginia Polytechnic Institute, Blacksburg, Virginia.*
- Becker, Oliver G.**, B.S. Military Engineering (U.S. Military Academy); Communication System Engineer, *ITT Communication Systems, Inc., Garden State Plaza, Paramus, N. J.*
- Bhattacharya, Prodyot K.**, D.Phil. Sc. (University of Calcutta); Research Associate, *Department of Statistics, University of North Carolina, Chapel Hill, N. C.*
- Bhuchongkul, Subha**, M.A. (University of California, Berkeley); Student, University of California; *Department of Statistics, University of California, Berkeley 4, California.*
- Billimoria, Adi R.**, B. S. (University of Bombay); Actuarial Clerk, The U. S. Life Insurance Co. in the City of New York, 125 Maiden Lane, New York 38, N. Y.; *740 West End Avenue, New York 25, N. Y.*
- Blowney, David P.**, M.S. Physics (University of Wisconsin); Engineer, Sperry Gyroscope Company, Great Neck, N. Y.; *14 Matthews Street, Huntington Station, N. Y.*
- Bjork, Lawrence A.**, B.A. (Northwestern University); Graduate Student, University of Chicago, Department of Statistics; *1739 E. 67 St., Chicago 49, Ill.*
- Borgman, Leon E.**, M.S. (University of Houston); Graduate Student, *Statistics Department, University of California, Berkeley 4, California.*
- Bruger, Richard Michael**, B.S. (University of Illinois); Graduate Student, University of Illinois, Urbana, Illinois; *4615 N. Claremont Ave., Chicago 25, Ill.*
- Burr, Edmund John**, M.S. (University of Queensland); Lecturer, *University of New England, Armidale, N. S. W., Australia.*
- Chan, Carl C. Y.**, B.A. (Oklahoma Baptist University); Graduate Student, University of California, Berkeley 4, California; *2731 Durant Ave., Berkeley 4, California.*
- Chang, I-Chen**, Ph.D. Civil Engineering (Illinois Institute of Technology); Stress Analyst, Scientific Design Company, 2 Park Ave., New York, N. Y.; *Apt. 6-A, 434 W. 120th Street, New York, 27, N. Y.*
- Cohn, Jacob L.**, A.B. Mathematics (Hunter College); Associate Analyst, Analytic Services, Inc., 5202 Leesburg Pike, Alexandria, Va.; *415 Orleans Circle, SW Vienna, Va.*
- Comer, John P., Jr.**, M.S. Electrical Engineering (M.I.T.); Statistical Consultant, The Procter and Gamble Co., Ivorydale Technical Center, Cincinnati 17, Ohio; *88 Morning-side Dr., New York 27, N. Y.*
- Cote, Roger William**, M.S. (Michigan State University); Graduate Student, *Department of Statistics, Michigan State University, East Lansing, Michigan.*
- Creech, F. Reid**, B.S. (University of Wyoming); Research Assistant, Department of Statistics, University of Wyoming, Laramie, Wyoming; *866½ North Fifth St., Laramie, Wyoming.*
- Daniel, Klaus H.**, Diploma-Mathematiker (University of Goettingen) Research Assistant, Teaching Assistant, *University of California, Berkeley, California.*
- Davis, Stephen A.**, B.A. (University of Chicago); Student, University of Chicago, 5801 S. Ellis Ave., Chicago, Ill.; *5517 S. Everett Ave., Chicago 37, Ill.*
- Denzell, George E.**, B.S. Physics (University of Washington); Teaching Assistant, Math Department, University of Washington; *3968 Union By Circle, Seattle 5, Washington.*
- Eaton, John Henry**, B.S. (University of Alabama); Student, New York University, Washington Square, N. Y.; *155 Ridge St., New York 2, N. Y.*
- Eaton, Morris L.**, Undergraduate Student, University of Washington; *133 Collins Road, Kelso, Washington.*
- Eisenberg, Herbert B.**, M.S. (Iowa State University); Member, Mathematics Research Staff, *System Development Corp., 2500 Colorado Ave., Santa Monica, Calif.*
- Flehinger, Betty J.**, Ph.D. (Columbia); Research Mathematician, *International Business Machines Corp., Watson Laboratory, 612 West 116 St., New York 27, N. Y.*
- Fox, Bennett L.**, A.B. (University of Michigan); Graduate Student, University of Chicago; *7823 S. Luella, Chicago 49, Ill.*
- Fridshal, Donald**, M.S. (New York University); Graduate Assistant, Department of In-

- dustrial Engineering and Operations Research, College of Engineering, New York University, University Heights, Bronx, N. Y.; *67-32 Juno St., Forest Hills 75, N. Y.*
- Friedman, Robert**, B.A. (Hunter College); Student, New York University, Graduate School of Arts and Sciences, New York, N. Y.; *147-26 68 Avenue, Flushing 67, N. Y.*
- Ghosh, Sakti Pada**, M.Sc. (Calcutta University); Student, *Department of Statistics, University of California, Berkeley, California.*
- Grandillo, Anthony D.**, M.A. Arts and Sciences (Western Reserve University); Staff Statistician, Industrial Rayon Corp., West 98th and Walford, Cleveland, Ohio; *899 Clarence Road, Cleveland Hts. 21, Ohio.*
- Hall, Robert P.**, B.S. Mathematics (St. John's University); Student, New York University, School of Arts and Science, 5 Washington Square North, New York; *115-02 Suttler Ave., Ozone Park 20, N. Y.*
- Hammond, Abdul H. Yahya**, B.Sc. Mathematics (Baghdad University); Student, *University of North Carolina, Department of Statistics, Chapel Hill, N. C.*
- Hedding, Richard W.**, Student, University of Pennsylvania; *231 Prospect Ave., Clifton Heights, Penna.*
- Hedetniemi, Charles J., Jr.**, A.B. (University of Michigan); Pvt. E-1, U.S. Army; *307 Chestnut Street, Falls Church, Virginia.*
- Heinzelmann, Waldemar Emil**, B.S. (Roanoke College); Graduate Student, *Department of Statistics, Virginia Polytechnic Institute, Blacksburg, Virginia.*
- Henry, Neil W.**, M.A. (Dartmouth College); Student, Columbia University; *Bureau of Applied Social Research, 605 W. 115 St., New York 25, N. Y.*
- Hickman, James C.**, Ph.D. (University of Iowa); Instructor, *Dept. of Mathematics, State University of Iowa, Iowa City, Iowa.*
- Hinkelmann, Klaus**, Diplom-Mathematiker (Universitat Hamburg); *Graduate Assistant, Dept. of Statistics, Iowa State University, Ames, Iowa.*
- Holgate, Philip**, B.Sc. (University of London); Statistician, Rothamsted Experimental Station, Harpenden, Herts, England; *"High Canons", Well End, Barnet, Herts, England.*
- Hucke, Dorothy M.**, M.S. (Columbia University); Statistician, Biological Control Laboratories, Charles Pfizer and Co. Inc., 630 Flushing Ave., Brooklyn 5, New York; *82-44 63rd Ave., Regas Park 79, New York.*
- Hurd, Guthbert C.**, Ph.D. Mathematics (University of Illinois); Director, Control Systems, International Business Machines Corp., 590 Madison Ave., New York, N. Y.; *Monterey and Cottle Roads, San Jose, California.*
- Kailath, Thomas**, S.M. (M.I.T.); Research and Graduate Student, *Room 26-344, M.I.T., Cambridge, 29, Mass.*
- Keilin, Joseph E.**, B.A. (George Washington University); Associate Mathematician, *Johns Hopkins Applied Physics Laboratory, Johns Hopkins Road, Howard County, Md.*
- Keilson, Julian**, Ph.D., (Harvard); Staff Consultant, *Applied Research Laboratory, Sylvania Electronic Systems Division, Waltham, Mass.*
- Khatri, Chinubhai Ghelabhai**, Ph.D. Statistics (University of Baroda); Lecturer in Statistics, Faculty of Science, M.S. University of Baroda (India); *Haribhakti Building, Salatwada, Baroda, India.*
- Kim, Dong Hyun**, B.S. Mathematics (Washburn University of Topeka); Graduate Research Assistant, *Department of Statistics, Calvin Hall, Kansas State University, Manhattan, Kansas.*
- Kinias, Plato D.**, B.A. Mathematics (Ripon College); Student, Department of Mathematics, University of Illinois; *507 Bash St., Champaign, Ill.*
- Koo, Delia Wei**, Ph.D. (Radcliffe College); Graduate Assistant, Department of Statistics, Michigan State University; *4473 Maumee Drive, Okemos, Michigan.*
- Kraft, Gerald**, M.A. (Harvard University); Senior Associate, *United Research Inc., 808 Memorial Drive, Cambridge 39, Mass.*

- Kumar, Satindar**, M.A. (Punjab University); Research Assistant, *Department of Statistics, University of California, Berkeley 4, Calif.*
- Kutner, Michael H.**, B.S. (Central Connecticut State College); Graduate Assistant, Virginia Polytechnic Institute; *Dept. of Statistics, V. P. I., Blacksburg, Va.*
- Maitra, Ashok Prasad**, M.Sc. (University of Bombay); Research Teaching Assistant, *Department of Statistics, 501 Campbell Hall, University of California, Berkeley 4, Calif.*
- Mazuy, Kay Knight**, A.B. (Univ. of North Carolina); Jr. Statistician, Research Triangle, Institute, Box 490, Durham, N. C.
- Mehra, Krishen L.**, M.A. (Punjab University); Research Assistant, *Department of Statistics, University of California, Berkeley 4, Calif.*; (note: on leave from the position of Lecturer, Punjab University, Chandigarh, India).
- Moore, Felix E.**, B.A. Mathematics (University of Washington); Professor and Chairman, *Department of Biostatistics, School of Public Health, University of Michigan, Ann Arbor, Michigan.*
- Murphy, Robert E.**, M.S. Mathematics (Texas Technological College); Mathematician, *El Paso Natural Gas Company, Research and Development, P.O. Box 1492, El Paso, Texas.*
- Murty, P. V. R.**, M.Sc. (Andhra University, Waltair, India); Research Asst., *Dept. of Statistics, University of California, Berkeley 4, California.*
- O'Brien, Thomas D.**, B.E.E. (The City College of N. Y.); Instructor in Electrical Engineering, Manhattan College of N. Y., Riverdale, N. Y.; *345 Walton Av., Bronx 51, N. Y.*
- Pisani, José Furtado**, Licenciado (Universidade de Sao Paulo); Professor de Estatística, Faculdade de Filosofia, Ciências e Letras de Rio Claro, Departamento de Estatística, *Caixa Postal, 178, Rio Claro, São Paulo, Brasil.*
- Pollak, Edward**, M.S. (North Carolina State College); Graduate Assistant, Department of Mathematical Statistics, Columbia University, New York 27, N. Y.; *1878 Harrison Avenue, Bronx 53, N. Y.*
- Preston, Lester W., Jr.**, B.S. (M.I.T.); Research Fellow, Department of Biostatistics, School of Public Health, University of North Carolina, Chapel Hill, N. C.; *2933 Claremont Road, Raleigh, N. C.*
- Raghavarao, Damaraju**, M.A. (University of Magpur); Govt. of India Research Training Fellow, *Department of Statistics, University of Bombay, Bombay 1, India.*
- Raghunadanan, Kunhunni**, M.S. (University of Kerala); Graduate Student, University of Wyoming, Laramie, Wyoming; *Department of Statistics, University of Wyoming, Laramie, Wyoming.*
- Ramakumar, R.**, M.Sc. (Gujarat University, Ahmedabad, India); Student, *Department of Statistics, Stanford University, Stanford, California.*
- Ringer, Larry J.**, B.S. (Iowa State University); Graduate Assistant, *Statistics Department Iowa State University, Ames, Iowa.*
- Rosenberg, Lloyd H.**, M.S. (Iowa State University); Research Assistant, Columbia University, New York, 27, N. Y.; *98-20 62 Drive, Rego Park 74, N. Y.*
- Sampford, Michael R.**, D.Phil. (Oxford); Principal Scientific Officer, *Agricultural Research Council of G. B., Unit of Statistics, University of Aberdeen, Meston Walk, Old Aberdeen, Scotland.*
- Samuel, Ester**, M.A. (Columbia University); Research Assistant, Columbia University, New York 27, N. Y.; *290 West End Ave., Apt. 1 D, New York 23, N. Y.*
- Schwartz, Richard E.**, B.A. (University of Chicago); Student, *Department of Mathematics, Cornell University, Ithaca, N. Y.*; Mathematician, General Electric Corp., Ithaca, N. Y.
- Seo, Kenzo**, M., M.S. (Purdue University); Graduate Student, Department of Mathematics and Statistics, Purdue University, West Lafayette, Indiana; *27-12 Ross Ade Drive, West Lafayette, Indiana.*
- Shapiro, Samuel S.**, M.S. (Columbia University); Graduate Student, Rutgers Univ.; *212 Phillips Road, New Brunswick, N. J.*

- Sheehan, Daniel M.**, B.S. Mathematics (College of William and Mary); Graduate Assistant, Virginia Polytechnic Institute; *405 Marlinton St., Blacksburg, Va.*
- Sherman, Robert E.**, B.A. (University of Minnesota); Student, University of Minnesota, Minneapolis 14, Minn.; *4143 Blaisdell Ave., Minneapolis 9, Minn.*
- Shimi, Ismail N.**, B.Sc. (A'in-Shams University, Cairo, Egypt); Instructor, Department of Applied Math., Faculty of Science, A'in-Shams University, Cairo, Egypt, U.A.R.; *Department of Statistics, University of North Carolina, Chapel Hill, N. C.*
- Snyder, Mitchell**, A.B. (Yeshiva University); Fellow, Institute of Mathematical Sciences, New York University, 25 Waverly Place, N. Y. 3, N. Y.; *2501 Amsterdam Ave., New York 23, N. Y.*
- Spencer, Gary S.**, B.S. (Kansas State University); Graduate Research Assistant, *Department of Statistics, Kansas State University, Manhattan, Kansas.*
- Subrahmaniam, K.**, M.Sc. (Banaras Hindu University); Graduate Student and University Fellow, Columbia University; *Department of Mathematical Statistics, Columbia University, New York 27, N. Y.*
- Toller, Louis**, Ph.D. (Duke University); Head, *Dept. of Mathematics and Physics, Alma College, Alma, Michigan.*
- Usher, William M.**, M.S. (Oklahoma State University); Operations Research Manager, Texas Instruments Incorporated, Semiconductor Division, P.O. Box 5012, Dallas 22, Texas; *332 Polk St., Apt. D., Richardson, Texas.*
- Wolock, Fred W.**, M.S. (Catholic University); Graduate Assistant, Department of Statistics, Michigan State University, East Lansing, Mich.; *18 Lake Terrace, Whitinsville, Mass.*
- Yahav, Aharon Joseph**, M.Sc. (Stanford University); Student, University of California; *Department of Statistics, University of California, Berkeley 4, California.*

DOCTORAL DISSERTATIONS IN STATISTICS, 1960

Listed below are doctorates conferred during the year 1960 in the United States for which the dissertations were written on topics in statistics or 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.

- Sidney, Adelman**, Iowa State University, major in statistics, "Fractional Factorial Plans."
- Anita K. Bahn**, Johns Hopkins University, major in biostatistics, "Psychiatric Clinic Outpatients."
- Stuart A. Bessler**, Stanford University, major in statistics, "Theory and Applications of the Sequential Design of Experiments, k -Actions and Infinitely Many Experiments."
- John Joseph Birch**, University of California, Berkeley, major in statistics, "Approximations for the Entropy for Functions of Markov Chains."
- Neeti Ranjan Bohidar**, Iowa State University, major in statistics, "Role of Sexlinked Genes in Quantitative Inheritance."
- Roshan L. Chaddha**, Virginia Polytechnic Institute, major in statistics, "Some Problems in Inventory Control."
- Shrishti Dhar Chatterji**, Michigan State University, major in statistics, "Martingales of Banach-Valued Random Variables."
- Charles Christenson**, Harvard University, major in business administration, "Strategic aspects of competitive bidding for corporate debt security."

- Robert Francis Cogburn**, University of California, Berkeley, major in statistics, "Asymptotic Properties of Stationary Sequences."
- Theodore Colton**, Johns Hopkins University, major in biostatistics, "Optimum Multi-Stage Screening Plans."
- Martin Robert Dorff**, Iowa State University, major in statistics, "Large and Small Sample Properties of Estimators for a Linear Functional Relation."
- Satya Deva Dubey**, Michigan State University, major in statistics, "Contributions to Statistical Theory of Life Testing and Reliability."
- James R. Duffett**, Virginia Polytechnic Institute, major in statistics, "System Reliability from Component Reliabilities."
- Bob E. Ellison**, University of Chicago, major in statistics, "A Multivariate k -Population Classification Problem."
- Raymond I. Fields**, Virginia Polytechnic Institute, major in statistics, "Estimation with Samples Drawn from Different but Parametrically Related Distributions."
- Myron B. Fiering**, Harvard University, major in engineering, "Statistical Analysis of Stream Flow Data."
- Franklin Marvin Fisher**, Harvard University, major in economics, "A Priori Information and Time Series Analysis."
- David Freedman**, Princeton University, major in statistics, "Mixtures of Stochastic Processes."
- Marshall Leonard Freimer**, Harvard University, major in mathematics, "Truncated Policies in Dynamic Programming."
- David William Gaylor**, North Carolina State College, major in experimental statistics, "The Construction and Evaluation of Some Designs for the Estimation of Parameters in Random Models."
- (Mrs.) Ruth Z. Gold**, Columbia University, major in mathematical statistics, "Inference about Markov chains with non-stationary transition probabilities."
- C. Jackson Grayson, Jr.**, Harvard University, major in business, "Decisions under Uncertainty: Drilling Decisions by Oil and Gas Operators."
- James Ennis Grizzle**, North Carolina State College, major in experimental statistics, "Application of the Logistic Model to Analyzing Categorical Data."
- William Leroy Hafley**, North Carolina State College, major in experimental statistics, "Some Comparisons of Sensitivities for Two Methods of Measurement."
- William Leonard Harkness**, Michigan State University, major in statistics, "An Investigation of the Power Function for the Test of Independence in 2×2 Contingency Tables."
- James E. Jackson**, Virginia Polytechnic Institute, major in statistics, "Multivariate Sequential Procedures for Testing Means."
- Shrinivas Keshavarao Katti**, Iowa State University, major in statistics, "Some Aspects of Statistical Inference for Contagious Distributions."
- Jerome Hamilton Klotz**, University of California, Berkeley, major in statistics, "Non-parametric Tests for Scale."
- Samuel Kotz**, Cornell University, major in mathematics, "Exponential Bounds for the Probability of Error in Discrete Memoryless Channels."
- Joseph H. Kullback**, Stanford University, major in statistics, "A Quality Control Model for Complex Items."
- Harold Joseph Larson**, Iowa State University, major in statistics, "Sequential Model Building for Prediction in Regression Analysis."
- Paul R. Lohnes**, Harvard University, major in education, "A Comparison of Test Space and Discriminant Space Classification Models."
- Theodore K. Matthes**, Columbia University, major in mathematical statistics, "Two-stage Sampling Procedures."
- Edmund B. McCue**, Carnegie Institute of Technology, major in mathematics, "Power Characteristics of the Control Chart for Number of Defects, No Standard Given."

- Donald F. Morrison**, Virginia Polytechnic Institute, major in statistics, "Life Distribution and Reliability of a System with Spare Components."
- Burton Torres Onate**, Iowa State University, major in statistics, "Development of Multi-stage Designs for Statistical Surveys in the Philippines."
- S. Parameswaran**, University of Illinois, major in analysis, "Some Theorems on the Growth of Partition Functions."
- E. M. Paul**, University of Illinois, major in analysis, "Density in the Light of Probability Theory."
- Edward B. Perrin**, Stanford University, major in statistics, "Estimation of Parameters in Systems Related to the Observation by an Unknown Monotone Transformation."
- William E. Pruitt**, Stanford University, major in statistics, "Bilateral Birth and Death Processes."
- Dana Edward Anthony Quade**, University of North Carolina, major in statistics, "The Asymptotic Power of the Kolmogorov Tests of Goodness of Fit."
- Wyman Richardson**, University of North Carolina, major in statistics, "Asymptotic Methods of Evaluating $\int_0^{\infty} f(x)dx$."
- Harry Myer Rosenblatt**, George Washington University, major in statistics, "Multivariate Experimental Designs."
- Alan Ross**, Iowa State University, major in statistics, "On Two Problems in Sampling Theory: Unbiased Ratio Estimators and Variance Estimates in Optimum Sampling Designs."
- Arthur Schleifer**, Harvard University, major in business administration, "Use of Bayes' Decision Theory in Quality Control."
- Lorraine Schwartz**, University of California, Berkeley, major in statistics, "Consistency of Bayes' Procedures."
- Edney Webb Stacy**, University of North Carolina, major in statistics, "An Estimate of Correlation Corrected for Attenuation and its Distribution."
- (Mrs.) Charlotte T. Striebel**, University of California, Berkeley, major in statistics, "Efficient Estimation of Regression Parameters for Certain Second Order Stationary Processes."
- Shashikala B. Sukhatme**, Michigan State University, major in statistics, "Asymptotic Theory of Some Nonparametric Tests."
- M. Sudigdomarto**, University of Illinois, major in analysis, "A Representation Theory for the Laplace Transform of Vector-Valued Functions."
- Thomas Neil Throckmorton**, Iowa State University, major in statistics, "Structures of Classification Data."
- Leo J. Tick**, Columbia University, major in mathematical statistics, "Contributions to the Theory and Applications of Stationary Random Processes in Fluid Mechanics."
- M. T. Wasan**, University of Illinois, major in statistics, "Sequential Inference."
- John Thomas Webster**, North Carolina State College, major in experimental statistics, "A Decision Procedure for the Inclusion of an Independent Variate in a Linear Estimator."
- Thomas A. Willke**, Ohio State University, major in statistics, "A Class of Multivariate Rank Statistics."
- David M. G. Wishart**, Princeton University, major in statistics, "Augmentation Techniques in the Theory of Queues."
- William Max Woods**, Stanford University, major in statistics, "Variables Sampling Inspection Procedures which Guarantee Acceptance of Perfectly Screened Lots."
- Joe Curtis Woolsley**, University of Michigan, major in public health statistics, "A Study of Repeated Hospital Admissions among Michigan Blue Cross Members."
- Nils Donald Ylvisaker**, Stanford University, major in statistics, "On Time Series Analysis and Reproducing Kernel Spaces."

Note: Reports of the President and the Editor for 1961 will appear in the December issue.

REPORT OF THE SECRETARY FOR 1961

During the year the Institute has held its 86th and 87th meetings at Cornell University in Ithaca, N. Y. and at the University of Washington, in Seattle, Washington, respectively. A Business Meeting was held during the 87th (24th Annual) meeting to make the necessary decisions for carrying on the work of the Institute for the coming year.

The Institute is grateful for the efforts of Mrs. Dorothy M. Gilford, Program Coordinator. Her help and guidance in this capacity has been invaluable in setting up meaningful programs for the 1961 meetings. She was ably assisted by the local Program Chairmen, Robert Bechhofer and David L. Wallace and their committees. Joan Rosenblatt and Fred C. Andrews performed their duties as Associate Secretaries meticulously and competently. The Assistant Secretaries, Isadore Blumen and Robert Tate should be mentioned for their part in making satisfactory arrangements for their meetings.

G. E. NICHOLSON, JR.

REPORT OF THE TREASURER FOR 1961

This is my first report as Treasurer. Unfortunately the Annual Meeting this year comes before we are even half-way through the fiscal year so that we have little experience with the new financial policies upon which to forecast the financial outcome for 1961. Last year's activities have been certified by our auditors—Stebbins, Dillon, Curry and Harrington—and the Balance Sheet of December 31, 1960 is included in this report.

The Revenue and Expenditure statement for the year ending December 31, 1960 is attached, and I have also included statements of 1958 and 1959 for comparative purposes. Dues revenue, subscription revenue and income from our investments all continued the same gentle rise. The sharp drop in net income from the sale of back issues is a continuation of the trend resulting from the later issues being sold at practically cost.

The large increase in expense for 1960 occurred in the catchall category of miscellaneous printing, etc., in the editorial expense and in travel. The miscellaneous category consists chiefly of expenses incurred by the Secretary's Office in communications with the membership. The miscellaneous office expense was also larger than usual because of audit expense. In the past the Institute had been employing the services of a faculty colleague to conduct a minimum audit; but it is now felt worthwhile to have a more thorough audit performed by an outside firm. The audit also covered an eighteen months period from January 1, 1959 to June 30, 1960. The editorial expense for 1960 is inflated because we follow a cash system of accounting and part of 1959 expenses were not reimbursed until early in 1960. The travel expense was higher than usual because it was necessary for two of the officers to have their expenses paid to the Annual Meeting, and the past Treasurer made a trip in connection with the financial innovations.

INSTITUTE OF MATHEMATICAL STATISTICS
Revenue and Expense Summary

	<u>1958</u>	<u>1959</u>	<u>1960</u>	<u>Tentative*</u> <u>1961</u>	<u>Revised</u> <u>1961</u>
Revenue					
Dues, Individual (US & Canada)	\$14,076.00	\$15,199.00	\$15,549.90	\$16,800.00	\$16,800.00
Dues, Individual, Other	1,550.00	1,810.00	1,952.93	2,100.00	2,100.00
Dues, Institutional	1,800.00	2,900.00	4,800.00	4,800.00	4,800.00
Subscriptions	12,702.62	13,712.35	14,324.80	17,000.00	17,000.00
Investment Income	2,602.09	3,250.72	3,729.31	4,000.00	4,000.00
Sale of Back Issues	3,936.29	4,746.61	1,968.58	4,000.00	3,000.00
Other	140.41	132.22	612.64	500.00	500.00
Page Charges	—	—	—	—	5,250.00
Total Revenue	<u>\$36,807.41</u>	<u>\$41,750.90</u>	<u>\$42,938.16</u>	<u>\$49,200.00</u>	<u>\$53,450.00</u>
Expenses					
Annals (Current)	30,451.65	31,347.69	32,833.89	35,438.00	35,438.00
Misc. Printing, St'ry, Post.	1,981.88	1,853.76	4,276.98	2,400.00	2,400.00
Salaries	4,111.96	5,839.15	5,018.90	5,200.00	5,500.00
Misc. Office Expense	1,116.69	2,327.21	1,622.40	2,500.00	2,500.00
Contributions	185.03	129.89	157.03	150.00	150.00
Capital Expenditure	—	376.95	—	—	—
Editorial Expense	3,212.25	1,765.00	5,610.00	4,800.00	5,200.00
Travel	397.00	174.31	1,579.57	900.00	900.00
F.I.C.A. Tax	82.19	69.56	89.12	90.00	90.00
Binding Expense	51.00	66.00	141.08	300.00	300.00
Total Expense	<u>\$41,589.65</u>	<u>\$43,949.52</u>	<u>\$51,328.97</u>	<u>\$51,778.00</u>	<u>\$52,478.00</u>
Excess Expense Over Revenue	(4,782.24)	(2,198.62)	(8,390.81)	(2,578.00)	(972.00)
Reserve for Addition to Annals	737.33†				
Inventory	2,802.00	2,670.00	2,727.00	2,637.00	2,976.00
Deficit	(8,319.57)	(4,868.62)	(11,117.81)	(5,215.00)	(2,004.00)

* Budget presented at the twenty-third Annual Meeting held at Stanford, August 23-26, 1960.

† Correction of physical inventory on hand at Waverly Press.

The 1961 budget suggested here varies only to a small degree from the one presented at the last Annual Meeting. It is too early in the year to make refined predictions on revenue from membership and subscription. Even though the subscription rate was raised, cancellations were not unusually heavy. Based on last year's experience with the sale of back issues the estimate of revenue from this source was lowered by \$1,000.

As this is written, we are receiving the first returns from the inauguration of page charges in the *Annals*. The page charges are \$15. per page, which is less than half the cost. Dr. Bowker, in his last Treasurer's Report, estimated that the Institute might realize \$7,000. revenue the first year of page charges. In the absence of any evidence to the contrary, 75% of this amount is being projected since we will bill for only the first three numbers of the current volume (billing for the December 1961 issue of the *Annals* will take place in 1962).

In a reappraisal of expenses for 1961 the original estimate for the *Annals* has been left standing even though the first issue this year cost over \$9,000. The estimates for salaries and editorial expenses have been raised slightly; the latter increase was to compensate for an additional \$400. (over approved \$4,800.) incurred in 1960. Dr. Kruskal, the outgoing editor, has proposed an overlap of editorial assistance with the incoming editor, Dr. Hodges, but my budget makes no provision for this pending Council decision.

We may reverse the indicated trend this year and come out in the black—or almost so. In 1961 we have raised subscription rates, the charge for the later back issues, and instituted page charges. It is too early in the year to forecast the results, but I shall submit a revised budget in the Fall.

GERALD J. LIEBERMAN

INSTITUTE OF MATHEMATICAL STATISTICS

Balance Sheet

December 31, 1960

Assets

Current Assets:

Cash in bank—checking account		\$3,953.43	
Cash in banks—savings accounts		86,055.66	
Investments:			
U. S. Gov't bonds—at cost	\$8,857.25		
Savings certificate	<u>5,000.00</u>		
Total investments		13,857.25	
Accounts receivable:			
Dues	228.00		
Subscriptions	52.50		
Back issues of <i>Annals</i>	<u>473.70</u>		
Total receivables		754.20	
Inventory of <i>Annals</i>		<u>24,445.96</u>	
Total assets			<u>\$129,066.50</u>

*Liabilities and Surplus**Liabilities*

Accounts payable	\$11,780.13	
Payroll taxes payable	179.02	
Dues advanced by members	3,679.00	
Advanced subscriptions	10,000.50	
Wald royalties payable	96.40	
Grant from National Science Foundation to subsidize operations—Note 1	4,058.14	
Grant from National Science Foundation to subsidize publication of Index—Note 2	<u>22,536.31</u>	
Total liabilities		52,329.50

Surplus

Reserve for life members	2,757.50	
Available for maintaining supply of <i>Annals</i> issued	35,585.52	
Available for general purposes	38,393.98	
Total surplus		76,737.00
Total liabilities and surplus		<u>\$129,066.50</u>

INSTITUTE OF MATHEMATICAL STATISTICS

*Statement of Changes in Surplus
For the Year Ended December 31, 1960*

Surplus, January 1, 1960		\$41,120.98
Additions:		
Grant received from National Science Foundation to subsidize adjusted operating loss for the year ended December 31, 1960		8,390.81
Total		49,511.79
Reductions:		
Operating loss for the year ended December 31, 1960	\$8,390.81	
Provision for cost of reprinting <i>Annals</i> issued in 1960	<u>2,727.00</u>	
Total reductions		11,117.81
Surplus, December 31, 1960		<u>\$38,393.98</u>

Note 1. The National Science Foundation advanced \$18,000.00 to subsidize publications and to investigate cost reduction for the three-year period beginning 1958. Operating losses for the years 1958, 1959 and 1960 totaled \$13,955.55. The provision for the cost of reprinting *Annals* for the same period totaled \$8,199.00.

Note 2. In 1960 the National Science Foundation granted the Institute \$22,550.00 to cover the cost of compiling an index for the *Annals* volumes one through thirty. Under the terms of the grant, all receipts from sales of indexes during the three year period beginning with the date of publication, in excess of \$6,000.00 must be returned to the Foundation until the advance has been repaid.

REPORT OF THE ITHACA, NEW YORK MEETING OF THE INSTITUTE OF MATHEMATICAL STATISTICS

The eighty-sixth meeting of the Institute of Mathematical Statistics was held at Cornell University on April 20–22, 1961, in conjunction with the Biometric Society (ENAR), and the Biometric Section, the Section on Physical and Engineering Sciences, and the Section on Social Statistics of the American Statistical Association.

These meetings were held at this time to honor Walter F. Willcox on his hundredth birthday. Professor Emeritus Willcox is a past Chief Statistician of the Bureau of the Census, a past President of the American Statistical Association, and is an Honorary President of the International Statistical Institute. A special session in recognition of his interests, arranged by the Social Statistics Section of the ASA, was held Friday evening, April 21. A reception and party in honor of Professor Willcox were held on Thursday evening, April 20.

By invitation of the Committee on Special Invited Papers, the Institute was addressed by Professor D. Dugué of the Sorbonne and Catholic University, on "Random Integration: Results and Problems," Thursday, April 20, at 1:20 p.m.

There were 260 persons present at the meetings, including 167 members of the Institute of Mathematical Statistics. The program of the meeting was as follows: Some sessions were held under joint sponsorship with other societies; where this is indicated, the session was arranged by the society listed first.

THURSDAY, April 20, 1961

9:00–10:30 a.m.—Limit Theorems

Chairman: JACK KIEFFER, Cornell University

1. "*Limit Theorems*," HAROLD BERGSTRÖM, Chalmers University of Technology, Göteborg, and Catholic University.
2. "*Properties of the Ergodic Limit Function*," RAFAEL V. CHACON, Cornell University.
3. "*Limit Theorems of Stochastic Processes*," GISIRO MARUYAMA, Kyusyu University and Columbia University.

9:00–10:30 a.m.—Contributed Papers I

Chairman: ACHESON J. DUNCAN, The Johns Hopkins University

1. "*On the Higher Moments of Linear Estimates Based on Multistage Samples from a Finite Population*," J. C. KOOP, North Carolina State College.
2. "*The Moments of the Non-Central t -Distribution*," D. HOGBEN, R. S. PINKHAM, AND M. B. WILK; Rutgers, The State University.
3. "*Tables of Minimum Functions for Generating Galois Fields $GF(p^n)$* ," J. D. ALANEN, Case Institute of Technology (Introduced by I. M. Chakravarti).
4. "*On Simultaneous Tests in Nested Designs*" (Preliminary Report), P. R. KRISHNAIAH, Remington Rand UNIVAC.
5. "*Some Notes on the Investigation of Heterogeneity in Interactions*," N. L. JOHNSON, Case Institute of Technology.
6. "*Fractional Factorial 2^n and 3^n Designs With and Without Blocks, Preserving the Main Effects and the Two Factor Interactions*," M. S. PATEL, University of North Carolina and Research Triangle Institute.

10:35–12:00 noon—Sampling (BS and IMS)

Chairman: PHILIP J. McCARTHY, Cornell University

1. "*Analytic Studies of Sample Surveys*," H. O. HARTLEY, Iowa State University.
2. "*Sampling with Unequal Probabilities*," J. N. K. RAO, Iowa State University.
3. "*Measurement Errors in Censuses and Surveys*," MORRIS H. HANSEN, WILLIAM N. HURWITZ AND MAX A. BERSHAD, Bureau of the Census. (Read by Leon Pritzker, Bureau of the Census)

11:00–12:00 noon—Time Series

Chairman: JEROME SACKS, Cornell University

1. "*Regression in Stationary Time Series*," MADHAV P. HEBLE, Columbia University.
2. "*Series Representations of Gaussian Processes*," N. DONALD YLVIKAKER, New York University.

1:20–2:10 p.m.—Special Invited Paper

Chairman: LEO KATZ, Michigan State University

- "*Random Integration: Results and Problems*," DANIEL DUGUÉ, The Sorbonne and Catholic University.

2:20–4:00 p.m.—Ranking and Selection Procedures I (IMS and BS)

Chairman: ROBERT BECHHOFFER, Cornell University

1. "*Selecting the Largest of k Normal Population Means*," CHARLES W. DUNNETT, Lederle Laboratories.
2. "*A Sequential Procedure for Comparing Several Experimental Categories with a Control*," EDWARD PAULSON, Cornell University.
3. "*Bayes Selection Procedures with Linear Loss Structure*," HOWARD RAIFFA, Harvard University.

2:20–4:00 p.m.—Contributed Papers II

Chairman: MAX HALPERIN, General Electric—Schenectady

1. "*Use of a Priori Knowledge in the Estimation of Means from Double Samples*," S. K. KATTI, Florida State University.
2. "*A Posteriori Distributions in the Translation Parameter Case*" (Preliminary Report), MARTIN FOX AND HERMAN RUBIN, Michigan State University.
3. "*Some Theory and Techniques for Robust Estimation*" (Preliminary Report), ALLAN BIRNBAUM, New York University.
4. "*Central Limit Theorem for Sums over Sets of Random Variables*," FRIEDHELM EICKER, University of North Carolina.
5. "*On the Limiting Distribution of $-2 \log \lambda$ in the Non-regular Case*," DONALD A. JONES, University of Michigan.
6. "*A Double-Ended Queuing Process*," SAMUEL M. GIVEEN, Northeastern University (Introduced by Lionel Weiss).

4:10–5:50 p.m.—Ranking and Selection Procedures II (IMS and BS)

Chairman: MILTON SOBEL, University of Minnesota

1. "*Bayes Rules for the Problem of Choosing the Largest Mean*," RICHARD P. BLAND, University of North Carolina, AND DAVID B. DUNCAN, John-Hopkins University.
2. "*On Selecting a Subset Containing the Population with the Smallest Variance*," SHANTI S. GUPTA, Bell Telephone Laboratories, Allentown, Pa.
3. "*Some Sequential Tests for Symmetric Problems*," WM. JACKSON HALL, University of North Carolina.

FRIDAY, April 21, 1961

8:15–10:00 a.m.—Probability (General)

Chairman: DOUGLAS ROBSON, Cornell University

1. "*Finite Cascades*," PETER NEY, Cornell University.
2. "*Properties of a Transient Queue*," WARREN M. HIRSCH, New York University.
3. "*Amalgamation of Ordered Weighted Means*," COLIN L. MALLOWS, Columbia University.
4. "*Absorption Time in a Markov Chain*," GEOFFREY A. WATTERSON, Australian National University and Virginia Polytechnic Institute.

9:00–10:00 a.m.—Sequential Procedures in Medicine (BS and IMS)

Chairman: S. GEISSER, National Institutes of Health

1. "*Sequential Allocation of Patients in Clinical Trials*," ROBERT J. TAYLOR AND HERBERT A. DAVID, Virginia Polytechnic Institute.
2. "*An Infinity of Closed Sequential Plans*," MARVIN A. SCHNEIDERMAN, National Institutes of Health.

10:30–12:00 noon—Probability (General)

Chairman: LOUIS J. COTE, Purdue University

1. "*Some Remarks on the Renewal Theorem*," V. E. BENES, Bell Telephone Laboratories, Murray Hill, N. J.
2. "*The Renewal Density Theorem*," WALTER L. SMITH, University of North Carolina.
3. "*The Two-Sided Absorption Problem for Stable Processes*," HAROLD WIDOM, Cornell University.

10:30–12:00 noon—Contributed Papers III

Chairman: INGRAM OLKIN, University of Minnesota

1. "*Null Distribution and Bahadur Efficiency of the Hodges Bivariate Sign Test*" (Preliminary Report), A. JOFFE AND JEROME KLOTZ, McGill University.
2. "*Power of Mood's and Massey's Tests against Exponential and Rectangular Alternatives*," F. C. LEONE, I. M. CHAKRAVARTI, AND J. D. ALANEN, Case Institute of Technology.
3. "*Asymptotic Relative Efficiency of Mood's and Massey's Tests Against Some Parametric Alternatives*," I. M. CHAKRAVARTI, F. C. LEONE, AND J. D. ALANEN, Case Institute of Technology.
4. "*Power of a Non-Parametric Test of Independence*," REGINA C. ELANDT, Case Institute of Technology (introduced by N. L. Johnson).
5. "*Selection of the Best Treatment in a Paired-Comparison Experiment*," B. J. TRAWINSKI AND H. A. DAVID, Virginia Polytechnic Institute.
6. "*A Multivariate Analogue of One-Sided Test*" (Preliminary Report), AKIO KUDO, University of Michigan.
7. "*On Some Properties of Compositions of an Integer and Their Application to Probability Theory*," T. V. NARAYANA AND S. G. MOHANTY, University of Alberta.

1:20–2:10 p.m.—Invited Paper

Chairman: JOHN TUKEY, Princeton University

- "*Some Thoughts on Statistical Inference*," EGON S. PEARSON, University College, London, and Princeton University.

2:20–4:10 p.m.—Statistics (General) (IMS and BS)

Chairman: ISADORE BLUMEN, Cornell University

1. "*Power of the Likelihood-Ratio Test of the General Linear Hypothesis in Multivariate*

- Analysis*," HARRY O. POSTEN, IBM Research Center, AND ROLF BARGMANN, Virginia Polytechnic Institute.
2. "Asymptotic Means and Variances in k Dimensions," DAVID R. BRILLINGER, Princeton University.
 3. "Inference on Treatment Effects and Design of Experiments in Relation to Such Inference," S. N. ROY AND J. N. SRIVASTAVA, University of North Carolina.
 4. "A Sequential Test of Fit," LIONEL WEISS, Cornell University.

2:20-4:00 p.m.—Contributed Papers IV

Chairman: WALTER T. FEDERER, Cornell University

1. "A Generalization of a Simple Test Function for Guarantee Time Associated with the Exponential Failure Law," SATYA D. DUBEY, Proctor and Gamble Co.
2. "Probability Plots for the Gamma Distribution," M. B. WILK, R. GNANADESIKAN, AND M. J. HUYETT, Bell Telephone Laboratories, Murray Hill, N. J.
3. "The Use of Sample Ranges in Setting Exact Confidence Bounds for the Standard Deviation of a Rectangular Population," H. LEON HARTER, Wright-Patterson Air Force Base.
4. "Iterated Steepest Ascent on Ellipsoidal Contours," R. J. BUEHLER, B. V. SHAH, AND O. KEMPTHORNE, Iowa State University.
5. "The Method of Parallel Tangents (PARTAN) for Finding an Optimum," B. V. SHAH, R. J. BUEHLER, AND O. KEMPTHORNE, Iowa State University.
6. "Steepest Ascent PARTAN on Ellipsoidal Contours," R. J. BUEHLER, B. V. SHAH, AND O. KEMPTHORNE, Iowa State University.

4:20-5:40 p.m.—Statistics (General) (IMS and BS)

Chairman: LEON HERBACH, New York University

1. "Foundations of Statistics," ALLAN BIRNBAUM, New York University.
2. "Admissible and Inadmissible Minimax Estimates," ROGER H. FARRELL, Cornell University.
3. "Bayesian Robustness," MERVYN STONE, Princeton University.

4:20-5:40 p.m.—Bioassay (BS and IMS)

Chairman: IRWIN D. J. BROSS, Roswell Park Memorial Institute

1. "Asymptotic Power of Tests of Linear Hypotheses Using the Probit and Logistic Models," JAMES E. GRIZZLE, University of North Carolina.
2. "Some Bioassay Techniques for the Determination of Minute Residues," JOHN GURLAND, University of Wisconsin.
3. "Some Characteristics of the Spearman-Kärber Estimator in Bioassay," BYRON W. BROWN, University of Minnesota.

8:00 p.m.—The First 60 Years of the Census Bureau (ASA, IMS, and BS)

Chairman: ROBERT W. BURGESS, Director, Bureau of the Census

SESSION IN HONOR OF WALTER F. WILLCOX

1. "Impact of Research and Development on Census Methods in the 20th Century," MORRIS H. HANSEN, WILLIAM N. HURWITZ, AND JOSEPH F. DALY, Bureau of the Census.
2. "Developments in the Analysis and Use of Census Data: 1900-1960," CONRAD TAEUBER, Bureau of the Census. Remarks: WALTER F. WILLCOX, Cornell University.

9:00-9:50 a.m.—Invited Paper

Chairman: ROSEDITH SITGREAVES, Columbia University

"Optimal Experimental Designs," JACK KIEFER, Cornell University.

10:00-10:50 a.m.—Reliability (IMS and BS)

Chairman: CLYDE KRAMER, Virginia Polytechnic Institute

1. "*Testing to Establish a High Degree of Safety or Reliability*," FRANCIS J. ANSCOMBE, Princeton University and Bell Telephone Laboratories.
2. "*Improving Mean Life by Eliminating Items with Short Lives*," WILLIAM T. WELLS AND GEOFFREY S. WATSON, University of Toronto and Research Triangle Institute.

10:00-10:50 a.m.—Information Theory (IMS and BS)

Chairman: ESTHER SEIDEN, Michigan State University

1. "*On the Construction of Bose-Chaudhuri Matrices with the Help of Abelian Group Characters*," DOMINIQUE C. FOATA, University of North Carolina.
2. "*Algorithms for Zero-Error Optimum Codes*," D. K. RAY-CHAUDHURI, University of North Carolina.

11:00-12:00 noon—Group Screening (IMS and BS)

Chairman: ROBERT J. HADER, University of North Carolina

1. "*Group Testing to Eliminate Efficiently all Defectives in a Binomial Sample*," MILTON SOBEL, University of Minnesota.
2. "*Group Screening Designs*," GEOFFREY S. WATSON, University of Toronto and Research Triangle Institute.

Contributed Papers Presented by Title

1. "*Extreme Values in Gaussian Sequences*," SIMON BERMAN, Columbia University.
2. "*On the Foundations of Statistical Inference, II*" (Preliminary Report), ALLAN BIRNBAUM, New York University.
3. "*On the Foundations of Statistical Inference, III*," ALLAN BIRNBAUM, New York University.
4. "*Several-sided Kolmogoroff-Smirnoff Procedures*," HERBERT T. DAVID, Iowa State University.
5. "*A Simple Test Function for Guarantee Time Associated with the Exponential Failure Law*" (Preliminary Report), SATYA D. DUBEY, Proctor and Gamble Co.
6. "*Asymptotically Most Efficient Single Observation Estimator of Expected Life for Exponential Failure Law*" (Preliminary Report), SATYA D. DUBEY, Proctor and Gamble Co.
7. "*Location and Scale Parameters in Exponential Families of Distributions*" (Preliminary Report), T. S. FERGUSON, University of California, Los Angeles.
8. "*Nonparametric Methods for Additive Effects*," J. L. HODGES, JR. AND E. L. LEHMANN, University of California, Berkeley.
9. "*On the Expected Value and Variance of a Ratio Estimate*," J. C. KOOP, North Carolina State College.
10. "*A Bayes Surveillance Procedure*," JOHN E. NYLANDER, Boeing Airplane Company.
11. "*On the Performance of the Group-Screening Method*," M. S. PATEL, Research Triangle Institute.
12. "*On the Distribution of First Significant Digits*," ROGER S. PINKHAM, Rutgers—The State University.
13. "*On the Theory of Univariate Successive Sampling*," S. G. PRABHU AJGAONKAR AND B. D. TIKKIWAL, Karnatak University, Dharwar, India.
14. "*Asymptotic Relative Efficiency of Mood's Test for Two-Way Classification*," Y. S. SATHE, University of North Carolina.
15. "*Estimation of Parameters of the Gamma Distribution Using Order Statistics*," M. B. WILK, R. GNANADESIKAN, AND M. S. HUYETT, Bell Telephone Laboratories, Murray Hill, N. J.

REPORT OF THE SEATTLE, WASHINGTON MEETING OF THE INSTITUTE OF MATHEMATICAL STATISTICS

The eighty-seventh meeting of the Institute of Mathematical Statistics and the twenty-fourth annual meeting was held at the University of Washington, Seattle, Washington, on June 14-17, in conjunction with the meetings of the American Statistical Association (Section on Physical and Engineering Sciences), the Biometric Society (WNAS), the Institute of Management Sciences, the American Mathematical Society, and the Mathematical Association of America.

By invitation of the Committee on Special Invited Papers, the Institute was addressed by Professor Tore Dalenius of the University of Stockholm and Catholic University on "Recent Developments in Sample Theory and Method," and by Professor Marek Fisz of the University of Warsaw and the University of Washington on "Infinitely Divisible Distributions: Recent Results and Applications." The Wald Lecture was delivered by Professor Charles Stein of Stanford University in three parts: Estimation of Many Parameters, I, II, and III, "Estimation of Many Means," "Approximation of Prior Measures by Probability Measures," and "Some Remarks on the Foundations of Statistics," respectively. The Rietz Lecture was delivered by Professor David Blackwell of the University of California on "Dynamic Programming."

There were 200 members of the Institute registered for the meeting. The program of the meeting was as follows:

WEDNESDAY, JUNE 14, 1961

8:30 a.m.—Invited Papers on Problems of Design

Chairman: D. L. WALLACE, University of Chicago and Center for Advanced Study in the Behavioral Sciences.

1. "*The Method of Parallel Tangents for Finding an Optimum*," ROBERT J. BUEHLER, B. V. SHAH, AND O. KEMPTHORNE, Iowa State University.
2. "*Optimal Accelerated Life Designs for Estimation and Testing*," HERMAN CHERNOFF, Stanford University.
3. "*Minimal Designs*," JACK KIEFER, Cornell University.

8:30 a.m.—Invited Papers on Reliability Theory (ASA-SPES and IMS)

Chairman: LARRY HUNTER, General Telephone and Electronics Laboratories

1. "*Redundancy Models*," FRANK PROSCHAN, Boeing Scientific Research Laboratories.
2. "*Semi-Markov Processes and Their Applications to Multi-State Time-Dependent Phenomena*," GEORGE WEISS, Institute for Fluid Dynamics and Applied Mathematics, University of Maryland.
3. "*Estimating Mean Life from Grouped Data Under the Exponential Assumption*," JACK NADLER, Bell Telephone Laboratories.

10:20 a.m.—Contributed Papers I

Chairman: HERMAN RUBIN, Michigan State University

1. "*The Role of the Multivariate Edgeworth Series in the Random Walk Problem*," J. F. PRICE, Boeing Airplane Co.; W. M. STONE, Boeing Airplane Co.; AND J. D. WHEELLOCK, Oregon State University.

2. "Determining Bounds on Expected Values of Certain Functions," BERNARD HARRIS, University of Nebraska.
3. "Evaluation and Design of Multiple Choice Questionnaires," (Preliminary Report), H. CHERNOFF, Stanford University.
4. "Some Tests for Outliers," C. P. QUESENBERRY, Montana State College AND H. A. DAVID, Virginia Polytechnic Institute.
5. "On a Mathematical Model for Poliomyelitis Vaccine Effectiveness," (Preliminary Report), DANA QUADE, Communicable Disease Center, Atlanta, Georgia.
6. "A Probability Model for Couple Fertility," S. N. SINGH, University of California.

10:20 a.m.—Invited Papers on Nonparametric Statistics (ASA-SPES and IMS)

Chairman: RONALD PYKE, University of Washington

1. "On the Use of a Distribution-Free Property in Determining a Transformation of One Variate so that it Will Exceed Another with a Given Probability," SAM C. SAUNDERS, Mathematics Research Center, U. S. Army, University of Wisconsin and Boeing Airplane Co.
2. "Non-Parametric Methods for the Detection of Signals in Noise," JACK CAPON, Federal Scientific Corporation.
3. "A Comprehensive Coverage of the Non-Parametric Field," JOHN E. WALSH, System Development Corporation.

2:10 p.m.—Invited Papers on Stochastic Processes

Chairman: EMANUEL PARZEN, Stanford University

1. "Branching Processes and Semigroups of Operators," A. T. BHARUCHA-REID, University of Oregon.
2. "Inference in Stochastic Processes," HERMAN RUBIN, Michigan State University.

2:10 p.m.—Invited Papers on Sequential Analysis (ASA-SPES and IMS)

Chairman: HERMAN CHERNOFF, Stanford University

1. "Uncertainty, Information, and Sequential Experiments," M. H. DEGROOT, Carnegie Institute of Technology and University of California, Los Angeles.
2. "Asymptotic Shapes: Sequential Testing of Composite Hypotheses," GIDEON SCHWARZ, Stanford University.
3. "Bayes Procedures," JAMES A. LECHNER, Westinghouse Electric Corp.

4:00 p.m.—1961 Council Meeting

7:30 p.m.—Invited Papers on Informal Inferential Procedures (IMS and ASA-SPES and BS-WNAR)

Chairman: A. M. MOOD, C-E-I-R, Inc., Los Angeles, California

1. "The Future of Data Analysis," J. W. TUKEY, Princeton University and Bell Telephone Laboratories, Murray Hill, N. J.
2. "Some Sequences of Fractional Replicates," C. DANIEL, N.Y.
3. "Graphical Methods for Internal Comparisons in Multi-Response Experiments," M. B. WILK AND R. GNANADESIKAN, Bell Telephone Laboratories, Murray Hill, N.J.

Discussants: ALLAN BIRNBAUM, New York University
A. P. DEMPSTER, Harvard University

THURSDAY, JUNE 15, 1961

8:30 a.m.—Contributed Papers II

Chairman: BOB ELLISON, Lockheed Aircraft Research Laboratories

1. "Tables for the Reliability of Repairable Systems with Time Constraints," (Preliminary

- Report), ROQUEZ BEJARANO AND RONALD S. DICK, International Electric Corporation, Paramus, N. J.
2. "*Length of the Longest Run of Consecutive Successes*," E. J. BURR, University of New England, Armidale, N.S.W., Australia, and Stanford University.
 3. "*Oddities in Estimating the Scale Parameter of the Weibull Distribution*," EUGENE H. LEHMAN, JR., Purdue University.
 4. "*On the Jirina Sequential Tolerance Limits Procedure*," SAM C. SAUNDERS, Army Research Center, University of Wisconsin and Boeing Airplane Co.
 5. "*Estimation of Failure Rates of Systems in Development*," DAVID RUBINSTEIN, General Electric Company, Ithaca, N. Y.
 6. "*An Optimal Sequential Accelerated Life Test*," STUART A. BESSLER, General Telephone and Electronic Laboratories, Inc., Menlo Park, California; HERMAN CHERNOFF, Stanford University; AND ALBERT W. MARSHALL, Stanford University and Institute for Defense Analysis, Princeton, N. J.
 7. "*An Optimal Sequential Accelerated Life Test with Exponential Dependence on Stress*," GIDEON SCHWARZ, Stanford University.

8:30 a.m.—Invited Papers on Queueing (ASA-SPES and IMS)

Chairman: RICHARD BARLOW, Institute for Defense Analysis, Princeton, N. J.

1. "*A Generalization of the Ballot Problem and its Application in the Theory of Queues*," LAJOS TAKÁCS, Columbia University.
2. "*Application of Cohen's Derived Markov Chains*," R. SYSKI, University of Maryland.
3. "*Queues Subject to Service Interruptions*," JULIAN KEILSON, Sylvania Electric Products.

10:20 a.m.—Invited Papers on Miscellaneous Topics

Chairman: PAUL SOMMERVILLE, C-E-I-R, Inc., Los Angeles, California

1. "*Tchebycheff Inequalities in a Generalized Moment-Problem*," C. L. MALLOWS, Bell Telephone Laboratories, Murray Hill, N. J.
2. "*The Measurement of Coherence*," N. R. GOODMAN, Space Technology Laboratories, Inc.
3. "*Classification without Known-Class Data*," DAVID WALLACE, University of Chicago and Center for Advanced Study in the Behavioral Sciences.

10:20 a.m.—Invited Papers on Planning and Analysis of Experiments (ASA-SPES, IMS and BS-WNAR)

Chairman: MARVIN ZELEN, University of Maryland and National Bureau of Standards

1. "*The Consideration of Variance and Bias Errors in the Selection of a Response Surface Design*," G.E.P. BOX, University of Wisconsin AND NORMAN R. DRAPER, Army Research Center, University of Wisconsin.
2. "*Orthogonal Main-Effect Plans*," SIDNEY ADDELMAN, Research Triangle Institute.
3. "*Asymmetric Factorial Designs and the Direct Product*," B. KURKJIAN, Diamond Ordnance Fuze Laboratories AND M. ZELEN, University of Maryland and National Bureau of Standards.

1:00 p.m.—Wald Lecture I

Chairman: LEO KATZ, Michigan State University

"*Estimation of Many Parameters I: Estimation of Many Means*" CHARLES STEIN, Stanford University

2:10 p.m.—Invited Papers on Stochastic Models

Chairman: D. A. S. FRASER, University of Toronto

1. "On a Stochastic Genetics Model of Moran," SAMUEL KARLIN, Stanford University
2. "Stochastic Models for Certain Pattern Recognition Schemes," G. P. STECK, Sandia Corporation.

2:10 p.m.—Invited Papers on Industrial Statistics (ASA-SPES and IMS)

Chairman: GERALD J. LIEBERMAN, Columbia University and Stanford University

1. "Bayes Sequential Rectification Sampling," M. V. JOHNS, JR., Stanford University.
2. "Bayes Test of ' $p \leq \frac{1}{2}$ ' versus ' $p \geq \frac{1}{2}$,'" SIGEITI MORIGUTI AND HERBERT ROBBINS, Columbia University.
3. "Stationary Sources and Information Rates," N. DONALD YLVIKAKER, New York University.

3:40 p.m.—Special Invited Paper

Chairman: J. L. HODGES, JR., University of California, Berkeley

"Recent Developments in Sample Survey Theory and Method," TORE DALENIUS, University of Stockholm and Catholic University.

4:50 p.m.—1961 Business Meeting

9:00 p.m.—Party with American Mathematical Society, Sandpoint Naval Air Station—Officers' Club

FRIDAY, JUNE 16, 1961**8:30 a.m.—Invited Papers on Estimation (IMS and BS-WNAR)**

Chairman: LEROY FOLKS, Oklahoma State University

1. "Combining Information in Incomplete Blocks," FRANKLIN A. GRAYBILL, Colorado State University.
2. "Estimation with Minimum Mean Square Error," H. O. HARTLEY, Iowa State University.
3. "Remarks on the Efficiency of Unbiased Estimation with Auxiliary Variates," W. H. WILLIAMS, Bell Telephone Laboratories, Murray Hill, N. J.

8:30 a.m.—Information Theory (ASA-SPES and IMS)

Chairman: ARAM THOMASIAN, University of California

1. "Two Output-One Input Zero Memory Channels," D. BLACKWELL, University of California, Berkeley; L. BREIMAN, University of California, Los Angeles; AND A. THOMASIAN, University of California, Berkeley.
2. "Random Coding of a Continuous Source," JOHN L. KELLY, JR., Bell Telephone Laboratories, Murray Hill, N. J.
3. "The Ergodic Theorem of Information Theory," SHU-TEH C. MOY, Syracuse University.

11:00 a.m.—Wald Lectures II

Chairman: A. H. BOWKER, Stanford University

"Estimation of Many Parameters, II: Approximation of Prior Measures by Probability Measures," CHARLES STEIN, Stanford University.

1:00 p.m.—Institute of Mathematical Statistics—1962 Council Meeting**1:00 p.m.—Contributed Papers III**

Chairman: B. J. FARLIE, Bell Telephone Laboratories, Murray Hill, N. J.

1. "*A Monte Carlo Analysis of the Serial Correlation Coefficient*," JOHN S. WHITE, General Motors Research Laboratories, Warren, Michigan.
2. "*Linear Hypotheses with Linear Restrictions*," ANDRÉ G. LAURENT, Wayne State University, Detroit, Michigan.
3. "*Mutual Information and Maximal Correlation as Measures of Dependence*," C. B. BELL, San Diego State College.
4. "*An Application of the Sequential Probability Ratio Test to Finite Populations*," PAUL GUNTHER, Armour Research Foundation Technology Center, Chicago, Illinois.
5. "*Subsamples and Order Statistics*," (Preliminary Report), J. T. CHU AND KAMAL YA'COUB, University of Pennsylvania.
6. "*Minimum Risk Estimation: A Nonparametric Case Involving Percentiles*," HERBERT B. EISENBERG AND JOHN E. WALSH, System Development Corp., Santa Monica, California.
7. "*Estimation of Location and Scale Parameters by Optimally Selected Observations*," CARL-ERIK SARNDAL, University of North Carolina.
8. "*The Distribution of the Ratio of the Variances of Variate Differences in the Circular Case*," J. N. K. RAO AND G. TINTNER, Iowa State University.
9. "*On Pairwise Independence*," SEYMOUR GEISSER AND NATHAN MANTLE, National Institutes of Health, Bethesda, Maryland.
10. "*On Some Methods of Estimation for the Logarithmic Series Distribution*," G. P. PATIL, University of Michigan.
11. "*On a Necessary and Sufficient Condition for a Set of Jointly Normal Variables to have a Common Variance and a Common Covariance*," B. R. BHAT, University of California, Berkeley.

1:00 p.m.—Invited Papers on Optimization Processes (TIMS and IMS)

Chairman: RICHARD SINGLETON, Stanford Research Institute

1. "*Optimum Monitoring Procedures*," FRANK PROSCHAN, Boeing Scientific Research Laboratory; RICHARD BARLOW, Institute for Defense Analysis; AND LARRY HUNTER, General Telephone and Electronic Laboratories.
2. "*On the Optimum Localization of Industries and Consumers*," EDMOND MALINVAUD, University of California.
3. "*Chance-Constrained Programming*," ABRAHAM CHARNES, Northwestern University AND WILLIAM W. COOPER, Carnegie Institute of Technology.
4. "*Relations Between Stationary and Dynamic Programming Analysis of Inventory Processes*," DONALD IGLEHART, Stanford University.

3:40 p.m.—Special Invited Paper

Chairman: JACK KIEFFER, Cornell University

"*Infinitely Divisible Distributions: Recent Results and Applications*," MAREK FISZ, University of Warsaw and University of Washington.

4:50 p.m.—Rietz Lecture

Chairman: ERICH LEHMANN, University of California

"*Dynamic Programming*," DAVID BLACKWELL, University of California

7:30 p.m.—American Mathematical Society Banquet—Tyee Yacht Club

SATURDAY, JUNE 17, 1961

8:30 a.m.—Invited Papers on Multivariate Normal Probabilities

Chairman: E. L. CROW, National Bureau of Standards, Boulder, Colorado

1. "*Probability Content of Regions under Spherical Normal Distributions*," HAROLD RUBEN, University of Sheffield, Sheffield, England.
2. "*Evaluation of Multivariate Normal Integrals*," S. S. GUPTA, Bell Telephone Laboratories, Allentown, Pennsylvania.

Discussion:

DONALD OWEN, Sandia Corporation
H. T. DAVID, Iowa State University

8:30 a.m.—Contributed Papers IV

Chairman: DAVID WALLACE, University of Chicago and Center for Advanced Study in the Behavioral Sciences

1. "*Distribution Functions for Randomized Factorial Experiments*," S. ZACKS AND S. EHRENFELD, The Technion, Israel Institute of Technology and New York University.
2. "*A Method for Computing the Cumulative Distribution Function of the Product of Two Dependent t -Variables*," ROSE DITH SITGREAVES, Teachers College, Columbia University.
3. "*Some Distribution-Free Multiple Comparison Procedures in the Asymptotic Case*," PETER NEMENYI, S.U.N.Y. College of Medicine at Brooklyn.
4. "*Three-Quarter Replicates of 2^n Designs*," PETER W. M. JOHN, California Research Corporation and University of California.
5. "*Non-Parametric Sequential Tests for the Two-Sample and Several-Sample Problems*," R. R. M. GEOGHAGEN AND JOHN E. WALSH, System Development Corp.

10:00 a.m.—Wald Lectures III

Chairman: A. T. JAMES, Yale University

"*Estimation of Many Parameters, III: Some Remarks on the Foundations of Statistics*," CHARLES STEIN, Stanford University

10:00 a.m.—Invited Papers on Inventory and Renewal Processes (TIMS and IMS)

Chairman: DONALD IGLEHART, Stanford University

1. "*Renewal Problems in Traffic*," WILLIAM JEWELL, University of California, Berkeley.
2. "*Superposition of Renewal Processes*," JOHN NYLANDER, Boeing Airplane Company.
3. "*Routine and Non-routine Shipment Policies*," RICHARD SINGLETON, Stanford Research Institute.

11:10 a.m.—Contributed Papers V

Chairman: CHARLES B. BELL, San Diego State College

1. "*Some Properties of a Large Set of Random Signals*," (Preliminary Report), NELSON M. BLACHMAN, Sylvania Electronic Defense Laboratories (Introduced by Emanuel Parzen).
2. "*Tests for Regression Coefficients When a Continuous Sample is Available*," M. M. SIDDIQUI, Boulder Laboratories, National Bureau of Standards, Boulder, Colorado.
3. "*Circular Probability Problems*," WILLIAM C. GUENTHER, The Martin Company and University of Wyoming.

4. "*Moments of the Radial Error*," ERNEST M. SCHEUER, Space Technology Laboratories, Inc.

1:30 p.m.—Invited Papers on Limit Theorems

Chairman: J. R. BLUM, Sandia Corporation

1. "*Some Limit Theorems for Stochastic Processes under Mixing Conditions*," DAVID L. HANSON, Sandia Corporation
2. "*Examples of Invariance Principles for Stochastic Processes*," JOHN LAMPERTI, Stanford University.

2:00 p.m.—Contributed Papers VI

CHAIRMAN: DONALD R. TRUAX, University of Oregon

1. "*On the Cumulants of a General Renewal Process*," V. K. MURTHY, Stanford University.
2. "*A Property of Least Squares Estimator in Regression Analysis when the Independent Variables are Stochastic*," P. K. BHATTACHARYA, University of North Carolina.
3. "*On Tests with Likelihood Ratio Criteria in Some Problems of Multivariate Analysis*," (Preliminary Report), N. C. GIRI, Stanford University, (Introduced by Charles Stein).

4:30 p.m.—Tea—Faculty Club

Contributed Papers Presented by Title:

1. "*On Separating a Deterministic Component from a Stochastic Sequence*," FRIEDHELM EICKER, University of North Carolina.
2. "*Some Properties of Compositions of an Integer and Their Application to Probability and Statistics*," T. V. NARAYANA AND S. G. MOHANTY, University of Alberta.
3. "*The Distribution of Probabilities in a Stochastic Learning Model*," (Preliminary Report), J. R. MCGREGOR AND T. V. NARAYANA, University of Alberta.
4. "*On Fitting a Linear Trend and Testing Independence when the Residuals Form a Markov Process*," V. K. MURTHY, Stanford University.
5. "*On the Asymptotic Normality and Independence of the Sample Partial Autocorrelations for an Autoregressive Process*," V. K. MURTHY, Stanford University.
6. "*On Horvitz and Thompson's T-Class Estimators*," S. G. PRABHU-AJGAONKAR AND B. D. TIKKIWAL, Karnatak University, Dharwar (India).
7. "*Comparing Distances between Multivariate Normal Populations, I*," (Preliminary Report), THEOPHILOS CACOULOS, Columbia University.
8. "*Formulations of a Model Containing a Chance Mechanism According to which Observations are Missed: The Randomized Block Design*," JUNJIRO OGAWA, Nihon University, Tokyo, Japan AND BERNARD S. PASTERNAK, Institute of Industrial Medicine, New York University Medical Center.
9. "*Approximation for the Entropy of Functions of Markov Chains*," JOHN J. BIRCH, University of Nebraska.
10. "*On a Problem in Hilbert Space with Applications*," J. R. BLUM AND D. L. HANSON, Sandia Corporation.
11. "*Some Asymptotic Properties of the Negative Binomial Distribution*," VIVIAN PESSIN, Children's Hospital, Buffalo (Introduced by Norman C. Severo.)
12. "*The Effect of Convergence to Normality on Tests of Hypothesis*," LLOYD J. MONTZINGO AND NORMAN C. SEVERO, University of Buffalo.
13. "*Convergence to Normality of Functions of a Normal Random Variable*," NORMAN C. SEVERO AND LLOYD J. MONTZINGO, University of Buffalo.

14. "Selecting the 'Best' t out of k populations," B. K. BHATTACHARYA, University of North Carolina (Introduced by S. N. Roy).
15. "Percentile Estimators for the Parameters of the Exponential Failure Law," SATYA D. DUBEY, Ivorydale Technical Center, Procter & Gamble Co., Cincinnati, Ohio.
16. "On Step-Down Procedures in Simultaneous Multivariate Analysis of Variance," (Preliminary Report), P. R. KRISHNAIAH, Remington Rand, UNIVAC.

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PUBLICATIONS RECEIVED

- BECKER, R. M. AND SCOTT, W. HAZEN, JR., *Particle Statistics of Infinite Populations as Applied to Mine Sampling*, Bureau of Mines, Washington D.C., 1961. 78 pp. 45¢.
- Censo de Clases Pasivas del Estado en 1.º de Enero de 1958*, Presidencia del Gobierno, Instituto Nacional de Estadística, Madrid, 1960. 35 pp.
- "Employment of Scientific and Technical Personnel in State Government Agencies: Report on a 1959 Survey," National Science Foundation, Washington D.C., 1961. 67 pp. 45¢.
- Nuclear Reactor Theory*, Proceedings of Symposia in Applied Mathematics, Vol. XI, American Mathematical Society, Providence, R.I., 1961. 339 pp.
- ORLEANS, LEO A., *Professional Manpower and Education in Communist China*, National Science Foundation, Washington D.C., 1961. 260 pp. \$2.00.
- SCHULTZ, VINCENT, *An Annotated Bibliography on the Uses of Statistics in Ecology—a Search of 31 Periodicals*, United States Atomic Energy Commission, Office of Technical Information, Washington D.C. 315 pp. \$3.00.
- SOLOMON, HERBERT, ed., *Studies in Item Analysis and Prediction*, Stanford University Press, Stanford, California, 1961. 310 pp. \$8.75.