

33. Measures of Association for Cross-Classifications. L. A. GOODMAN AND W. H. KRUSKAL, University of Chicago.

If a population is cross-classified by two classifications, one often desires a single number which describes the degree of association between the two classifications. Given such a measure of association based upon the population proportions, one may wish to estimate it or make tests about it on the basis of a sample drawn from the population in a specified way. Standard measures of association are described and criticized. A number of other measures are suggested and motivated in the frameworks of models for predictive behavior which seem typical of the uses to which cross-classifications are put. For example, one measure is based on the relative improvement in the prediction of one classification as the other is or is not known. Also discussed are measures of partial and multiple association if there are more than two classifications. The asymptotic sampling theory for certain measures and methods of sampling is discussed.

34. Calculating Longevities from Sample Composition. LEO A. GOODMAN, University of Chicago.

Sometimes it is desired to compare the longevity of two or more types of equipment under operational conditions where it is not convenient to identify or keep records of individual items. Such a comparison can be made by adopting certain replacement rules and observing their effect on the composition of the population. For example, when only two types are being compared, the replacement rule might be that when an item fails, its replacement will be of the opposite type. Then the composition of the population at any time (i.e., the proportions of the different types among all the items in use) will depend upon the original composition of the population, the time elapsed, and the longevities of the different types. Since the original composition and the elapsed time are known, by determining the new composition of the population (either by total inspection or by drawing a sample from the new composition) we would expect to obtain information concerning the longevities of the different types of equipment. Replacement policies are studied which satisfy certain logistics requirements as well as the requirement that a given number of items be in operation at all times. For certain given logistics requirements, optimum replacement rules are developed. The problem of estimating and testing hypotheses concerning the relative longevities of $K \geq 2$ types of equipment is studied for the case where the equipment is subject to a constant risk. It is then shown that if the replacement rules are used for a long period of time, the results obtained under the assumption of constant risk remain valid even when the risk is not constant as long as the equipment has a finite life span. When information about the stock is also available (i.e., how many items have been replaced), estimates and tests of hypotheses concerning the longevities of the K types of equipment are obtained. A numerical illustration is given.

NEWS AND NOTICES

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

Personal Items

Dr. M. H. Belz has now returned to the University of Melbourne after spending the first semester at Princeton. During the period of his sabbatical leave he

attended the Conferences of the International Statistical Institute and the Biometric Society in India, in December, 1951, and later spent some months in England, mainly in the Universities of Cambridge and London. In April, 1952, he made an extensive investigation of industrial applications of statistics in Britain, in the company of Professor W. Allen Wallis. In August, 1952, he was a participant in the annual International Harvester Program for University Personnel in Chicago.

Mr. Willard H. Clatworthy has joined the staff of the Statistical Engineering Laboratory, National Bureau of Standards, Washington, D. C.

Mr. George G. den Broeder, Jr. has accepted a position as Mathematical Statistician with the National Bureau of Standards at Corona, California with the Missile Evaluation Section of the Guided Missile Division.

Mr. John B. Ellery has been appointed to the faculty of the Department of Speech and Dramatic Arts at the State University of Iowa to assist Professor E. C. Mabie in Experimental Aesthetics in the Theatre Program.

Dr. H. A. Freeman of the Massachusetts Institute of Technology is spending the year 1952-53 at Princeton University.

Mr. Harry H. Goode, formerly Supervisor of the Aerophysics Group and Chief Project Engineer, is now Director of the Willow Run Research Center, University of Michigan.

Dr. Robert E. Greenwood has been released of his active duties as Lieutenant Commander in the United States Naval Reserve and has rejoined the faculty of the University of Texas as Associate Professor of Applied Mathematics.

Dr. E. J. Gumbel has been appointed Visiting Professor for Mathematical Statistics by the Free (West) University, Berlin for the summer term of 1953.

Dr. Carl Hammer, formerly Research Associate at the Bureau of Applied Social Research, Columbia University, has accepted the position of Senior Research Engineer at the Franklin Institute of the State of Pennsylvania.

Mr. Robert G. Hoffman, formerly of the Department of Biostatistics at the School of Public Health, University of North Carolina, is now at the School of Public Health, University of Michigan.

Mr. John F. Hofmann has transferred from Dugway Proving Grounds, Chemical Corps installation in Utah to the National Bureau of Standards Laboratory at Corona, California, where he is working in the Missile Evaluation Section of the Missile Development Division.

Dr. Leo Katz, who is on sabbatical leave from Michigan State College, is at the Statistical Laboratory, University of California, Berkeley, California.

Mr. Marvin M. Lavin, formerly of the Institute for Air Weapons Research, the University of Chicago, and of the Weapons Systems Evaluation Group, Office of the Secretary of Defense, is now a member of the Aircraft Division, the Rand Corporation, Santa Monica, California.

Mr. Harry D. Levine has accepted a position as Quality Control Engineer with Automatic Musical Instruments, Inc., Grand Rapids, Michigan.

Mr. Edward A. Lew, Associate Actuary of the Metropolitan Life Insurance

Company will assume the position of Associate Actuary and Statistician upon the retirement of Dr. Louis I. Dublin of the Metropolitan Life Insurance Company.

Dr. Joe J. Livers has resigned as Professor of Mathematics at Montana State College, Bozeman, and has accepted a position as Statistician in the Engineering Department of the Boeing Airplane Company at Seattle, Washington.

Mr. Duncan C. McCune has left Purdue University where he was Research Associate in the Statistical Laboratory and is now a Quality Control Engineer at Tubular Products Division of the Babcock and Wilcox Company, Beaver Falls, Pennsylvania.

Mr. Paul Meier has left the Forrestal Research Center, Princeton, New Jersey to accept a position as Research Associate in the Department of Biostatistics, School of Hygiene and Public Health, Johns Hopkins University.

Mr. William B. Michael, formerly of the Rand Corporation, is now with the Test Bureau of the University of Southern California at Los Angeles.

Mr. Raphael Miller is now a teaching assistant with the Department of Mathematics, Carnegie Institute of Technology, and is completing the requirements for his Ph.D. degree.

Mr. O. B. Moan, formerly with Julius Hyman and Company in Denver, Colorado, is now working with International Business Machines in Chicago.

Dr. Sigeiti Moriguti, who has spent the past two years at the Department of Mathematical Statistics, University of North Carolina on a leave of absence, has returned to his former position of Assistant Professor at the Department of Applied Mathematics, Faculty of Engineering, University of Tokyo.

Mr. A. Carl Nelson, Jr. who has been an instructor in Mathematics at Marshalltown, Delaware during the past academic year, is now working for a Ph.D. degree in Mathematical Statistics at the University of North Carolina.

Dr. Bernard Ostle, formerly of the Statistical Laboratory at Iowa State College, has accepted a position as Associate Professor of Mathematics at Montana State College.

Mr. Frank Proschan, formerly in the Statistical Engineering Laboratory of the National Bureau of Standards, is now supervisor of Quality Control in the Atomic Energy Division of Sylvania Electric Products, Inc.

Mr. I. M. Sahni, who received his M. Com. degree at Leeds University, England, is a Research Officer in the Office of the Economic Adviser to the Government of India.

Mr. Franklin E. Satterthwaite has joined the Operations Research Group of Arthur D. Little, Inc.

Dr. Herbert Solomon has left the Office of Naval Research to assume the position of Associate Professor at Teachers' College, Columbia University, New York City.

Mr. Mortimer Spiegelman, formerly Assistant Statistician at the Metropolitan Life Insurance Company, was appointed Associate Statistician on the retirement of Dr. Louis I. Dublin, January 1, 1953.

Dr. L. L. Thurstone, formerly at the University of Chicago, is now Research Professor and Director of New Psychometric Laboratory at the University of North Carolina, Chapel Hill.

Dr. Howard G. Tucker has been appointed to an instructorship in the Department of Mathematics of Rutgers University.

Dr. W. R. VanVoorhis of Fenn College has been appointed Visiting Professor of Engineering Administration at Case Institute of Technology and is also a member of the Case Operations Research Group.

Dr. Mason E. Wescott, formerly Assistant Professor in the Mathematics Department at Northwestern University, Evanston, is now Professor of Applied Statistics in the Mathematics Department of the University College at Rutgers University, New Brunswick. Dr. Wescott is on leave of absence until February 1, 1953 to serve on a team to India by the Technical Assistance Administration of the United Nations at the request of the Indian Government.

Dr. Ruric E. Wheeler has accepted a position as Assistant Professor in the Department of Mathematics at the Florida State University, Tallahassee.

Professor Jacob Wolfowitz of Cornell University is on leave of absence and will be at the Institute for Numerical Analysis, Los Angeles, California, until January 31 and at the University of Illinois until June 5.

Dr. Max A. Woodbury has accepted a position as Associate Professor in the Department of Statistics at the University of Pennsylvania.

Mr. R. K. Zeigler, formerly employed by the Atomic Energy Commission, Oak Ridge, Tennessee, has accepted a position as Statistician, Los Alamos Scientific Laboratory, Los Alamos, New Mexico.

Mr. Marvin Zelen has resigned his position with the Experimental Towing Tank, Stevens Institute of Technology, and accepted a position as Mathematical Statistician at the Statistical Engineering Laboratory, National Bureau of Standards.

The Department of Statistics, University of Melbourne

This Department, created by subdivision from the Department of Mathematics in 1948, has three main objectives: (i) to provide a wide range of training courses to undergraduates in various Faculties as well as extra-curricular courses to research workers, (ii) to conduct research in Statistics, and (iii) to advise and assist other University Departments in the laying out of experiments and their analysis.

Elementary courses are offered regularly to students in Science, Engineering and Forestry while short courses have been given to specialist students in Optometry, Bacteriology and Biochemistry. A post-graduate non-credit course on "Statistical Methods for Research Workers," extending throughout the academic year, has been a teaching feature of long standing and, in 1953, a second post-graduate course on "Advanced Techniques" will be introduced. The mathematical courses in Statistics are taken in the Faculty of Arts through

the subjects "Theory of Statistics, Parts I and II," and "Advanced Statistics." Students working towards a pass degree take these for two years while honour students take them over three years, in each case after one year's experience with Calculus and with continuing mathematical studies throughout their course. Practical work, both in the laboratory and in the field, is required of all students, involving computations and the collection and analysis of data relative to the student's special field of interest. The first degree of Bachelor of Arts with Honours in the School of Mathematical Statistics is obtained after four years of undergraduate work consisting mainly of Pure Mathematics and Statistics. The higher degrees of Master of Arts and Doctor of Philosophy may be obtained by carrying out research, essentially within the Department, although a limited amount of research performed elsewhere may be approved.

Much of the Department's activity is concerned with the advisory service mentioned. This is offered freely to experimenters in other University Departments where statistical features are encountered. It consists in advising on problems of design and analysis and, in certain cases, of carrying through the computations in consultation with the research worker concerned. Almost every experimental department within the University has been assisted in some form or other during the last few years and the demand for help is steadily increasing. Assistance is also given to outside institutions conducting research, including governmental departments, and to industrial firms, the latter usually on a contractual basis.

The Department is fortunate in having close contact with many "outside" professional statisticians, especially those of the Division of Mathematical Statistics, C. S. I. R. O. It provides a focal point for discussions on special problems, seminars, and meetings of the local branch of the Biometric Society, and in the future it will endeavour to arrange visits and exchange lectureships with statisticians overseas.

Summer Sessions at Berkeley, California

This year's summer program at the Statistical Laboratory of the University of California, Berkeley, California, consists of two sessions: June 22–August 1 and August 3–September 12. The faculty of the summer sessions will include Professor David Kendall of Magdalen College, Oxford University; Professor J. Neyman, Dr. T. A. Jeeves, and Mr. A. Shapiro of the Statistical Laboratory, University of California.

The program includes two of the usual undergraduate courses in each session. In addition, Professor Kendall will give a new course in the first session, "Stochastic processes associated with population growth and with the theory of queues." This course is designed to acquaint students with the probabilistic treatment of growth of populations subject to birth, death, immigration, mutation and aging. Professor Neyman will be available for consultations on work leading to higher degrees.

New Members

The following persons have been elected to membership in the Institute

September 1, 1952 to November 30, 1952

- Allen, William R.**, M.S. (Northwestern Univ.), Mathematician, Advisory Board on Simulation, The University of Chicago, *5822 S. Blackstone, Chicago 37, Illinois.*
- Bastenaire, François**, Statisticien diplômé, Univ. de Paris), Statistician, Institut de Recherches de la Siderurgie, *26 Boulevard Rov—Pavillons-sous-Bois (Seine) France.*
- Black, Harold W.**, M.S. (Univ. of Michigan), Statistician, U. S. Public Health Service, Communicable Disease Center, *169 Eighth Street, N.E., Atlanta, Georgia.*
- Dawson, Reed B. Jr.**, A.M. (Harvard Univ.), Graduate Student, Statistics, Harvard, *47 Inman Street, Cambridge 39, Massachusetts.*
- Descloux, Alfred**, Mathématicien diplômé, (Ecole Polytechnique Fédérale Switzerland), Fellow in Mathematical Statistics, Institute of Statistics, University of North Carolina, Chapel Hill, North Carolina.
- Fagot, Robert F.**, S. B. Meteorology (Mass. Inst. of Tech.), Graduate Student, Department of Psychology, Stanford University, Stanford, California.
- Flatow, Paul**, B.S. (Columbia Univ.), Associate, Department of Industrial Engineering, *c/o Weeks, 456 Riverside Drive, New York 27, New York.*
- Gilbert, Edgar J.**, M.A. (Harvard Univ.), Graduate Student, Harvard University, *201 B Holden Green, Cambridge, Massachusetts.*
- Gorman, William Moore**, B.A. (Trinity College, Dublin), Lecturer in Econometrics and Statistics, University of Birmingham, *Highfield, 128 Selly Park Road, Birmingham 29, England.*
- Guenther, William C.**, Ph.D. (Univ. of Wash.), Mathematician, Bureau of Standards, Corona, California.
- Hays, David G.**, B.A. (Harvard Univ.), Graduate Student, Harvard University, *9 Bow Street, Cambridge 38, Massachusetts.*
- Hooke, Robert**, Ph.D. (Princeton Univ.), Research Associate, Princeton University, *28 Dorann Avenue, Princeton, New Jersey.*
- Jebe, Emil H.**, Ph.D. (North Carolina State College), Associate Professor of Statistics, Iowa State College, Statistical Laboratory, Iowa State College, Ames, Iowa.
- Johnson, Norman Lloyd**, Ph.D. (London), Visiting Associate Professor and Research Associate, University of North Carolina, *106, Richmond Road, Ilford, Essex, England*, Institute of Statistics, University of North Carolina, Chapel Hill, North Carolina (until June, 1953).
- Kane, William E.**, M.A. (Univ. of Calif. at L. A.), Research Engineer, Northrop Aircraft Inc., Hawthorne, California, *18011 Martha Street, Encino, California.*
- Kulldorff, Gunnar K. O.**, Fil. Kand. (Univ. of Lund, Sweden), *Malmgatan 16, Malmö, Sweden, International House, Berkeley 4, California* (until January, 1953).
- McLaughlin, George**, B.S. (Univ. of Montreal), Graduate Student, University of Toronto, *60 Sussex Avenue, Toronto, Ontario, Canada.*
- Magidson, Jack**, B.S. (Mass. Inst. of Tech.), Quality Control Manager, Metallizing Engineering Company, Inc., *24 Nathan Hale Drive, Huntington, New York.*
- Nesbeda, Paul**, Ph.D. (Univ. of Pisa, Italy), Engineer, RCA Victor Division, *108-A Wallworth Park, Haddonfield, New Jersey.*
- Preston, Glenn W.**, M.S. (Yale Univ.), Consulting Engineer, Philco Corporation, *1000 Pleasant Lane, Oreland, Pennsylvania.*
- Schäffer, Karl-August**, Diplom-Mathematiker (Göttingen), Wirtschaftsmathematiker, *Bielefeld, Hammerschmidtstr. 11, Germany.*
- Schmidt, Howard O.**, B.S. (Duke Univ.), Metallurgist, Statistical Quality Control, *Sprague Road at Bryant, Columbia Station, Ohio.*

- Silver, Jack, B.A. (George Washington Univ.), Statistician, Department of the Air Force, 4634 N. 23rd Street, Arlington, Virginia.
- Smuk, Walter, B.A. (Univ. of Toronto), Graduate Student, University of Toronto, 274 Sixth Street, New Toronto, Toronto 14, Ontario, Canada.
- Sugihara, Seiji, M.A. (Columbia Univ.), Graduate Student, Columbia University, 423 W. 118th Street, Apartment 53, New York 27, New York.
- Sutermaster, Charles R., M.S. (Carnegie Inst. of Tech.), Graduate Student, Project Mathematician, Department of Mathematics, Carnegie Institute of Technology, Pittsburgh 13, Pennsylvania.
- Thomasian, Aram John, M.A. (Harvard Univ.), Mathematical Statistician, Arthur D. Little, Inc., 63 John Mooney Road, Revere 51, Massachusetts.

REPORT OF THE CHICAGO MEETING OF THE INSTITUTE

The fifty-fourth meeting and the fifteenth Annual meeting of the Institute of Mathematical Statistics was held in Chicago, Illinois, on December 27-30, 1952. The meeting was held in conjunction with meetings of the American Statistical Association, the Econometric Society, the Biometric Society, and of the other members of the Allied Social Sciences Association. One session was co-sponsored by the American Statistical Association, and four were co-sponsored by the Econometric Society. A Special Invited Address was given by Professor Jacob Wolfowitz on *Asymptotic Estimation Theory*. The following 222 members of the Institute attended:

Helen Abbey, N. S. Acton, Beatrice Aitchison, R. L. Anderson, T. W. Anderson, F. C. Andrews, E. E. Ard, H. E. Arnold, K. J. Arnold, L. A. Aroian, G. J. Auner, T. A. Bancroft, E. W. Barankin, Walter Bartky, W. D. Baten, Helen Beard, R. E. Bechhofer, Richard Berger, Joseph Berkson, A. J. Berman, Allan Birnbaum, Z. W. Birnbaum, David Blackwell, C. I. Bliss, Isidore Blumen, R. C. Bose, A. H. Bowker, R. A. Bradley, Dorothy Brady, A. E. Brandt, Bernice Brown, K. A. Brownlee, I. W. Burr, L. D. Calvin, S. D. Canter, Osmer Carpenter, Herman Chernoff, C. W. Churchman, W. G. Cochran, C. H. Coombs, L. M. Court, D. J. Cowden, E. L. Cox, P. C. Cox, C. C. Craig, J. F. Daly, Cuthbert Daniel, G. B. Dantzig, D. A. Darling, Besse Day, W. E. Deming, Alfred Descoux, Philip Desind, W. J. Dixon, J. L. Dolby, J. L. Doob, A. J. Duncan, D. B. Duncan, C. W. Dunnett, David Durand, A. M. Dutton, Meyer Dwass, W. F. Elkin, Lillian Elveback, Benjamin Epstein, A. V. Fend, Robert Ferber, David Frazier, John Freund, H. C. Fryer, H. H. Germond, C. P. Gershenson, M. A. Girshick, L. A. Goodman, Roe Goodman, Franklin Graybill, B. G. Greenberg, S. W. Greenhouse, F. A. Gross, W. C. Guenther, Lee Gunlogson, John Gurland, Paul Gutt, R. K. Haddad, J. S. Hagan, K. W. Halbert, K. D. C. Haley, Max Halperin, M. H. Hansen, Boyd Harshbarger, H. L. Harter, H. O. Hartley, Mina Haskind, P. M. Hauser, W. C. Healy, Jr., F. M. Hemphill, L. H. Herbach, G. R. Herd, J. F. Hofmann, P. G. Homeyer, Harold Hotelling, W. G. Howard, C. H. Hubbell, E. R. Immel, P. E. Irick, J. E. Jackson, T. J. Jaramillo, T. A. Jeeves, R. J. Jessen, N. L. Johnson, P. O. Johnson, H. L. Jones, E. L. Kaplan, A. E. Karp, Harriet Kelly, D. G. Kendall, J. C. Kiefer, E. P. King, Jr., Tjalling Koopmans, C. F. Kossack, C. H. Kraft, William Kruskal, Solomon Kullback, G. K. O. Kulldorf, T. E. Kurtz, G. M. Kuznets, H. G. Landau, L. M. LeCam, Erich Lehmann, G. J. Lieberman, Rensis Likert, R. F. Link, S. B. Littauer, G. F. Lunger, P. J. McCarthy, Brockway McMillan, W. G. Madow, E. S. Marks, Jacob Marschak, Margaret Martin, Paul Meier, P. L. Meyer, M. R. Mickey, Jr., Robert Mirsky, O. B. Moan, Marjorie Moore, J. E. Morton, Jack Moshman, F. C. Mosteller, L. E. Moses, W. V. Neisius, Jerzy Neyman, W. L. Nicholson, H. W. Norton, J. A. Norton, Jr., E. G. Olds, Paul Olmstead, Roby Oxtoby, W. R. Pabst, Jr., B. Z. Palmer, R. E. Patton, A. E. Paull, Edward

Paulson, Stefan Peters, B. E. Phillips, K. C. S. Pillai, A. T. Reid, G. J. Resnikoff, Robert Roeloffs, J. H. Roseboom, H. M. Rosenblatt, Murray Rosenblatt, Irving Roshwalb, S. N. Roy, L. J. Savage, E. D. Schell, M. A. Schneiderman, E. L. Scott, Esther Seiden, Jack Sherman, L. D. Simmons, W. R. Simmons, W. B. Simpson, Rosedith Sitgreaves, J. H. Smith, R. T. Smith, III, Milton Sobel, Herbert Solomon, P. N. Somerville, D. E. South, Mortimer Spiegelman, M. D. Springer, Arthur Stein, C. M. Stein, G. T. Steinberg, F. F. Stephan, H. L. Stubbs, J. V. Sturtevant, J. V. Talacko, J. G. C. Templeton, M. E. Terry, D. J. Thompson, R. M. Thrall, L. J. Tick, Leo Tornqvist, C. K. Tsao, J. W. Tukey, S. A. Tyler, D. L. Wallace, W. A. Wallis, Samuel Weiss, A. G. Whitney, D. G. Whitney, J. R. B. Whittlesey, Frank Wilcoxon, S. S. Wilks, M. J. Willis, Gerald Winston, Jacob Wolfowitz, L. A. Woodbury, W. J. Youden, R. K. Zeigler.

The Program of the meeting was as follows:

SATURDAY, DECEMBER 27, 1952

1952 Council Meeting. 8:30 A.M.–9:50 A.M.

Invited Addresses. 10:00 A.M.–11:50 A.M.

Chairman: J. Wolfowitz, Cornell University and the University of California at Los Angeles.

Applications of Martingale Theory to Statistics. J. L. Doob, University of Illinois.

Information Theory. B. McMillan, Bell Telephone Laboratories.

Combined Survey and Experimental Investigations. 12:00 noon–1:50 P.M.

Chairman: T. A. Bancroft, Iowa State College.

General Principles and Some Examples. R. J. Jessen, Iowa State College.

Uses by the U. S. Census. J. F. Daley, Bureau of the Census.

Some Aspects of Theory. W. G. Cochran, Johns Hopkins University.

Discussion: Donovan Thompson, Iowa State College and B. G. Greenberg, University of North Carolina.

Application of Statistics to Astronomy. 2:00 P.M.–5:50 P.M.

Co-Sponsor: American Statistical Association.

Chairman: Walter Bartky, University of Chicago:

The Structure of the Universe. B. Strömgren, University of Chicago.

Analysis of Counts of the Extra-Galactic Nebulae in Terms of a Fluctuating Density Field.

D. N. Limber, University of Chicago.

Theory of Clustering of Galaxies in a Static and in an Expanding Universe. J. Neyman

and E. L. Scott, University of California, Berkeley.

Discussion: J. W. Tukey, Princeton University and S. Chandrasekhar, University of Chicago.

SUNDAY, DECEMBER 28, 1952

Business Meeting. 8:30 A.M.–9:50 A.M.

Probability and Behavior. 10:00 A.M.–11:50 A.M.

Chairman: Herman Chernoff, Stanford University.

Foundations of a Theory of Behavior. E. W. Barankin, University of California, Berkeley, and the National Bureau of Standards, Los Angeles.

Personal Probability. L. J. Savage, University of Chicago.

CONTRIBUTED PAPERS I. 12:00 noon–1:50 P.M.

Chairwoman: E. L. Scott, University of California, Berkeley.

Papers: (1) *A Two-sample Multiple Decision Procedure for Ranking Means of Normal*

- Populations with Unknown Variances. (Preliminary Report.)* R. E. Bechhofer, C. W. Dunnnett and M. Sobel, Cornell University.
- (2) *A Sequential Multiple Decision Procedure for Ranking Means of Normal Populations with Known Variances. (Preliminary Report.)* R. E. Bechhofer and M. Sobel, Cornell University.
- (3) *On Quadratic Estimates of Variance Components.* F. Graybill, Oklahoma A. and M. College and Iowa State College.
- (4) *Topics in Analysis of Variance: A. Optimum Properties of Tests for Model II, B. Generalizations of Model II. (Preliminary Report.)* L. Herbach, Brooklyn College and Columbia University.
- (5) *Further Examples for which the Likelihood Ratio Test is Poor.* L. M. Court, Brooklyn College.
- (6) *An Empirical Sampling Method.* E. L. Cox, Dugway Proving Ground.
- (7) *Distribution of Semi-definite and of Indefinite Quadratic Forms.* J. Gurland, Iowa State College.
- (8) *Asymptotic Properties of Ideal Linear Estimators.* (By title.) Carl A. Bennett, General Electric Company.
- (9) *Bias in Estimation by Interval.* (By title.) M. C. K. Tweedie, Virginia Polytechnic Institute. Introduced by B. Harshbarger, Virginia Polytechnic Institute.
- (10) *Completeness of the Order Statistics in the Nonparametric Case.* (By title.) D. A. S. Fraser, University of Toronto.
- (11) *Parameter-free and Nonparameteric Tolerance Limits: The Exponential Case.* (By title.) L. A. Goodman, University of Chicago.
- (12) *On Estimates Whose Distributions Have a Weak Invariance Property.* (By title.) L. A. Goodman, University of Chicago.

Controlled Stochastic Processes. 2:00 P.M.-3:50 P.M.

Co-sponsor: Econometric Society.

Chairman: J. Marschak, University of Chicago and Cowles Commission for Research in Economics.

On Controlled Stochastic Processes. J. Kiefer, Cornell University.

On Some Problems in the Theory of Dynamic Programming. R. Bellman, Rand Corporation.

Discussion: L. Törnqvist, University of Helsinki and Cowles Commission for Research in Economics.

Individual Preference Functions. 4:00 P.M.-5:50 P.M.

Co-sponsor: Econometric Society.

Chairman: Abba P. Lerner, Roosevelt College.

The Intransitivity of Individual Preferences. K. O. May, Carleton College.

Experimental Testing of a Postulate in the Theory of Choice. A. G. Papandreou, University of Minnesota.

Discussion: H. S. Houthakker, Cowles Commission for Research in Economics, Ward Edwards, Johns Hopkins University, and Milton Friedman, University of Chicago.

MONDAY, DECEMBER 29, 1952

CONTRIBUTED PAPERS II. 8:00 A.M.-9:50 A.M.

Chairman: J. Kiefer, Cornell University.

Papers: (13) *Admissibility of Certain Statistical Tests.* E. L. Lehmann, University of California, Berkeley, and C. M. Stein, University of Chicago.

- (14) *Some Experimental Designs for Comparative Life-testing*. Allan Birnbaum, Columbia University.
- (15) *Existence of Invariant Minimax Procedures*. (By title.) Herman Rubin, Stanford University.
- (16) *A Simple Sequential Procedure for Testing Statistical Hypotheses*. (Preliminary Report.) C. K. Tsao, Wayne University.
- (17) *Asymptotic Properties of the Robbins-Monro Process*. J. L. Hodges, Jr. and E. L. Lehmann, University of California, Berkeley.
- (18) *Some Notes on the Application of Sequential Methods in the Analysis of Variance*. N. L. Johnson, University of North Carolina.
- (19) *The Covariances of Frequencies from a Multinomial Distribution under a Sequential Sampling Rule*. M. C. K. Tweedie, Virginia Polytechnic Institute. Introduced by B. Harshbarger, Virginia Polytechnic Institute.
- (20) *The Group of Transformations Leaving a Set of Normal Distributions Invariant*. (By title.) E. L. Lehmann, University of California, Berkeley, and C. M. Stein, University of Chicago.
- (21) *A Nonparametric Two Sample Life Test*. (By title.) Benjamin Epstein, Wayne University.
- (22) *The Large Sample Power of a Test Based on Dichotomization*. (By title.) C. K. Tsao, Wayne University.
- (23) *An Epsilon-complete Class of Nonsequential Decision Procedures in the Finite Case*. (By title.) Lionel Weiss, University of Virginia.
- (24) *Approximate Distribution of Extreme Values of the Range*. M. H. Belz, University of Melbourne and Princeton University, and R. H. Hooke, Princeton University.

Social Choice Functions. 10:00 A.M.–11:50 A.M.

Co-sponsor: Econometric Society.

Chairman: Howard R. Bowen, Williams College.

A Suggested Approach to Problems of Group Choice. C. Hildreth, University of Chicago and Cowles Commission for Research in Economics.

Some Sociological Observations on Decision Making. E. A. Shils and E. C. Banfield, University of Chicago.

Discussion: Abba P. Lerner, Roosevelt College and Alexander Henderson, Carnegie Institute of Technology.

Special Invited Address. 12:00 noon–1:00 P.M.

Chairman: Herbert Solomon, Columbia University.

Asymptotic Estimation Theory. Jacob Wolfowitz, Cornell University and the University of California at Los Angeles.

Organized Decision Making. 2:00 P.M.–3:50 P.M.

Co-sponsor: Econometric Society.

Chairman: S. B. Lippman, Columbia University.

Basic Problems in the Economic Theory of Teams. J. Marschak, University of Chicago and Cowles Commission for Research in Economics.

The Study of an Information Processing Center. A. Newell, Rand Corporation.

Discussion: Daniel Grey, Massachusetts Institute of Technology and N. Rashevsky, University of Chicago.

Multiple Comparison Methods in the Analysis of Variance. 4:00 P.M.–5:50 P.M.

Chairman: W. G. Madow, University of Illinois.

Various Methods from a Unified Point of View. J. W. Tukey, Princeton University.

Discussion: J. Neyman, University of California, Berkeley and J. Cornfield, National Institute of Health.

Contributed Papers (26) and (27), by R. C. Bose and S. N. Roy, were presented at this session.

1953 Council Meeting. 6:00 P.M.

TUESDAY, DECEMBER 30, 1952

CONTRIBUTED PAPERS III. 10:00 A.M.–11:50 A.M.

Chairman: C. I. Bliss, The Connecticut Agricultural Experiment Station.

Papers: (25) *Estimate of the Interval Rate for Actuarial Calculation.* (Preliminary Report.) J. Berkson, Mayo Clinic.

(26) *Simultaneous Confidence Interval Estimation.** R. C. Bose and S. N. Roy, University of North Carolina.

(27) *On a Set of Simultaneous Confidence Interval Statements in Multivariate Analysis of Variance.** S. N. Roy and R. C. Bose, University of North Carolina.

(28) *On a Relevant Set of Simultaneous Confidence Interval Statements in Discriminant Analysis.* (By title.) S. N. Roy and R. C. Bose, University of North Carolina.

(29) *The Separation of Product Error and Inspection Error in Sampling by Attributes.* C. C. Craig, University of Michigan.

(30) *The Relation Between Fisher's Discriminant Function and Wald's Classification Statistic.* H. L. Harter, Wright-Patterson Air Force Base.

(31) *On the Distribution of the Ratio of the i th Observation in an Ordered Sample from a Normal Population to an Independent Estimate of the Standard Deviation.* K. C. S. Pillai and K. V. Ramachandran, University of North Carolina.

(32) *Cyclic Solutions of Symmetrical Group Divisible Designs.* S. S. Shrikhande, University of Kansas.

(33) *Measures of Association in Contingency Tables.* (By title.) L. A. Goodman and W. H. Kruskal, University of Chicago.

(34) *Estimating Longevities from Sample Composition.* (By title.) L. A. Goodman, University of Chicago.

(* Contributed Papers (26) and (27) were presented at the Session on Multiple Comparison Methods in the Analysis of Variance.)

Invited Addresses. 12:00 noon–1:50 P.M.

Chairman: L. J. Savage, University of Chicago.

Stochastic Processes Occurring in the Theory of Queues and their Analysis by the Method of the Imbedded Markov Chain. David G. Kendall, University of Oxford and Princeton University.

Saddle-point Approximations in Statistics. H. E. Daniels, University of Cambridge and University of Chicago.

WILLIAM KRUSKAL
Associate Secretary

**MINUTES OF THE ANNUAL BUSINESS MEETING,
CHICAGO, DECEMBER 28, 1952**

The meeting was called to order at 8:45 A.M., Sunday, December 28, 1952 at the Palmer House Hotel, Chicago, Illinois.

The reports of the President, Secretary-Treasurer and Editor were read and accepted. These reports are printed elsewhere in this issue.

A motion that the Institute extend its thanks to the retiring Editor for the continued development of the *Annals* under his editorship was carried unanimously.

A motion that the Institute thank the retiring President for his sacrificial and devoted service was carried unanimously.

The tellers reported the election of E. G. Olds as President-Elect and of W. G. Cochran, Churchill Eisenhart, Henry Scheffé and J. W. Tukey as members of the Council 1953-55.

The chair was turned over to the new President, M. H. Hansen.

A discussion of Annual and Regional Meetings took place. There were expressions of interest in avoiding Sunday meetings and in avoiding meetings during the period between Christmas and New Years Day.

The meeting adjourned at 9:25 A.M.

K. J. ARNOLD
Secretary

REPORT OF THE PRESIDENT OF THE INSTITUTE FOR 1952

The affairs of the Institute this year continued to be in good shape both intellectually and financially. Substantial progress has been made in the development of statistical theory. This is evidenced by the scope of the topics presented at the regional meetings held at Blacksburg, Virginia, and Eugene, Oregon, and the national meetings held at East Lansing, Michigan, and Chicago, Illinois. The statistical progress is also evidenced by the volume and quality of the papers submitted to and published in the *Annals*. There has been a fair growth in membership and our financial situation is sound. You will hear more details about our progress from the Editor of the *Annals* and the Secretary-Treasurer.

On July 1 of this year, K. J. Arnold became the new Secretary-Treasurer of the Institute, replacing Carl H. Fischer whose term expired. I wish to take this occasion on behalf of the Institute to thank Professor Fischer for his devoted service while in office, Professor Edwin G. Olds and his Committee for finding such an excellent successor, and Michigan State College for making it possible for Professor Arnold to serve the Institute in this capacity.

The expiration of my term as president coincides with the expiration of the term of office of the entire Editorial Board of the *Annals*. I wish to welcome the new Editorial Board under the editorship of Erich L. Lehmann and express the

gratitude of the Institute to T. W. Anderson, for his tireless efforts on behalf of the *Annals* and the excellent job he and his editorial board have done.

As in the past, much of the work of the Institute this year has been carried on by committees. A list of the various committees of the Institute was sent you early in 1952, and is reproduced with a few changes at the end of this report. During the year it was found necessary to create the following additional committees.

(1) IMS Advisory Committee on Statistical Computations: This committee was set up at the request of the Office of Naval Research who needed assistance in organizing a program in statistical computations. It consists of Z. W. Birnbaum, Chairman, F. C. Mosteller, A. H. Bowker, and Churchill Eisenhart.

(2) Editorial Committee for the Publication of Wald's Selected Papers: This committee was set up to implement the recommendation of the Wald Memorial Committee and ensuing action of the Council which was that the IMS sponsor a volume of selected papers by Wald to be published by the McGraw-Hill Company. The members of this committee consist of: T. W. Anderson, Chairman, Harald Cramér, H. A. Freeman, E. L. Lehmann, Joseph L. Hodges, A. M. Mood, and C. M. Stein. A report of the work of this committee will be presented by its chairman.

(3) IMS Committee on Life Membership Rates: This is a committee of one. Carl H. Fischer, whom I appointed to look into the desirability of revising the IMS Life Membership Rates which appear to be out of date.

(4) West Coast Program Committee for the Joint Meeting with AAAS in San Francisco in 1954: This committee consists of the established West Coast Program Committee with the addition of Elizabeth Scott who has the responsibility of organizing joint IMS and AAAS sessions for the 1954 Christmas meetings of the AAAS in San Francisco.

I wish to express the appreciation of the Institute to all chairmen and members of the various committees, and the representatives of the Institute for carrying out the essential tasks of the Institute many of which are, unfortunately, time consuming and tedious. In particular, I would like to thank the chairmen of the program committees and the associate and assistant secretaries for the excellent job they did this year in organizing the regional and national meetings. Professor David Blackwell who was program coordinator for all the meetings and who is the chairman of the program committee for this meeting deserves particular commendation. I should also like to commend Herbert Solomon and his Committee for organizing such an excellent set of invited addresses.

I would like to appoint the following to the Nominating Committee next year:

Joseph L. Hodges, Jr., *Chairman*
Leonard J. Savage
Howard Levene
Solomon Kullback
Joseph F. Daly
Herbert Solomon

Committees of the Institute, 1952

1. The Council and Committees of the Council

(a) *Members of the Council*

Term expires 1952	Term expires 1953	Term expires 1954
David Blackwell	Harald Cramér	A. H. Bowker
W. G. Madow	A. M. Mood	T. C. Koopmans
F. C. Mosteller	Jerzy Neyman	H. E. Robbins
L. J. Savage	S. S. Wilks	H. G. Romig

(b) *Executive Committee*

M. A. Girshick, *Præsident*
 Morris Hansen, *Pres-Elect*
 C. H. Fischer, *Sec. and Treas.* (until July 1, 1952)
 K. J. Arnold, *Sec. and Treas.* (after July 1, 1952)
 T. W. Anderson, *Editor*

(c) *Committee on Fellows*

H. E. Robbins, *Chairman* (term expires 1952)
 E. L. Lehmann (term expires 1952)
 Jerzy Neyman (term expires 1953)
 Churchill Eisenhart (term expires 1953)
 Gerhard Tintner (term expires 1954)
 S. S. Wilks (term expires 1954)

2. Committees Related to Program

(a) *Annual Meeting—Chicago*

David Blackwell, *Chairman*
 J. F. Daly
 Michel Loève
 Paul G. Hoel
 W. H. Kruskal
 W. G. Cochran
 T. Bancroft
 Paul Gutt, *Asst.-Secretary*

(b) *September Meeting—East Lansing*

Benjamin Epstein, *Chairman*
 Elizabeth Scott
 Joseph Steinberg
 Leonid Hurwicz
 Ted Harris
 Howard Levene
 R. G. D. Steel
 Leo A. Goodman
 Leo Katz, *Asst.-Secretary*

(c) *Eastern Region*

R. A. Bradley, *Chairman*
 D. F. Votaw
 H. E. Robbins
 I. D. J. Bross
 S. L. Crump
 W. N. Hurwitz
 M. A. Woodbury

(d) *Central Region*

Oscar Kempthorne, *Chairman*
 D. A. Darling
 Leonid Hurwicz
 W. H. Kruskal
 K. O. May
 O. R. Whitney

(e) *Western Region*

W. H. Dixon, *Chairman*
 Z. W. Birnbaum
 A. H. Bowker
 J. L. Hodges
 P. G. Hoel
 A. M. Mood

(f) *Program Coordinator*

David Blackwell
 (The Program Coordinator is ex-officio
 member of all program committees)

(g) *Special Invited Papers*

Herbert Solomon, *Chairman*
 T. W. Anderson
 David Blackwell
 Benjamin Epstein
 R. A. Bradley
 Oscar Kempthorne
 W. J. Dixon

3. Promotional Committees

(a) <i>Membership</i>	(b) <i>Institutional Members</i>	(c) <i>Subscription</i>
W. D. Baten, <i>Ch.</i>	<i>Academic</i>	Marion Sandomire, <i>Ch.</i>
C. R. Blyth	I. W. Burr, <i>Ch.</i>	Leo Goodman
D. B. DeLury	A. H. Bowker	F. C. Leone
T. N. E. Greville	L. A. Knowler	
D. E. South	A. E. Treloar	Jack Sherman
	<i>Non-Academic</i>	
	H. G. Romig, <i>Ch.</i>	
	C. C. Hurd	
	F. E. Grubbs	
	Jack Sherman	

4. Other Committees

(a) <i>Nominating Committee</i>	(b) <i>Rietz Lecture Committee</i>
Appointed by 1951 President P. S. Dwyer	J. Neyman— <i>Chairman</i>
W. E. Deming— <i>Chairman</i>	C. C. Craig
C. A. Bennett	Will Feller
H. W. Norton	
Elizabeth Scott	
P. R. Rider	
(c) <i>Standards for Statisticians in Government Service</i>	(d) <i>Wald Memorial</i>
W. E. Deming— <i>Chairman</i>	Howard Levene— <i>Chairman</i>
H. F. Dorn	T. W. Anderson
Churchill Eisenhart	E. L. Lehmann
B. J. Tepping	
Herbert Solomon	
(e) <i>Committee for Appointing a New Secretary-Treasurer</i>	(f) <i>Committee for Separating Office of Secretary from that of Treasurer</i>
E. G. Olds— <i>Chairman</i>	Carl H. Fischer— <i>Chairman</i>
W. D. Baten	Paul S. Dwyer— <i>Ex. Of.</i>
A. H. Bowker	K. J. Arnold— <i>New Secretary-Treasurer</i>
P. S. Olmstead	M. A. Girshick— <i>Ex. Of.</i>
D. F. Votaw	Morris Hansen— <i>Ex. Of.</i>
M. A. Girshick— <i>Ex. Of.</i>	
Morris Hansen— <i>Ex. Of.</i>	

5. Representatives of the Institute for 1952

- (a) *To the American Association for the Advancement of Science*
Harold Hotelling (Term expires 1954)
- (b) *To the National Research Council, Division of Mathematics*
S. S. Wilks (Term expires 1954)
- (c) *To the Mathematical Policy Committee*
Mina Rees (Term expires 1952)
- (d) *To the Joint Committee for Development of Statistical Applications in Engineering and Manufacturing*
Albert H. Bowker (Term expires 1954)
- (e) *To the American Academy of Political and Social Science*
Benjamin Tepping, Leonard Kent (Terms expire 1952)
- (f) *To the Committee on the Mathematical Training of Social Scientists*
W. G. Madow, T. W. Anderson

December 28, 1952

M. A. GIRSHICK
President

**REPORT OF THE SECRETARY-TREASURER OF
THE INSTITUTE FOR 1952**

At the beginning of 1952 the Institute had 1227 members. During 1952, 137 new members were added, 24 former members were reinstated, 30 members resigned, 76 were cancelled for non-payment of dues and 2 died, leaving a membership of 1280 at the end of 1952.

Meetings 51, 52, 53 (14th Summer) and 54 (15th Annual) were held during 1952. For the Blacksburg, Virginia meeting, March 19-21, R. A. Bradley was Program Chairman, Boyd Harshbarger was Assistant Secretary and also performed most of the duties of Associate Secretary. For the Eugene, Oregon meeting, June 19-21, W. J. Dixon was Program Chairman and also performed the duties of Assistant Secretary and Associate Secretary. For the East Lansing, Michigan meeting, September 2-5, Benjamin Epstein was Program Chairman, W. H. Kruskal was Associate Secretary and Leo Katz was Assistant Secretary. For the Chicago, Illinois meeting David Blackwell was Program Chairman, W. H. Kruskal was Associate Secretary and Paul Gutt was Assistant Secretary.

On behalf of the Institute the Secretary wishes to express appreciation to all of the members just named and to the other members of the program committees for making each of these meetings a success.

INSTITUTE OF MATHEMATICAL STATISTICS

Statement of Condition

December 31, 1952

ASSETS

Bank	\$23,526.18
Dues Receivable	144.00
Subscriptions Receivable	1,243.11
U. S. Government Bonds	4,888.00
	Total Assets
	29,801.29

LIABILITIES AND RESERVES

Amount Due Printer for December Issue (Estimate)	2,666.08
Withholding Tax Payable	151.20
Miscellaneous Liabilities	50.00
Reserve for Dues Advanced	3,094.00
Reserve for Subscriptions Advanced	3,278.55
Reserve for Life Members	2,872.50
Reserve for <i>Biometrika</i> Subscriptions	247.00
	Total Liabilities and Reserves
	\$12,359.33
* Surplus (Excess of Assets over Liabilities)	17,441.96

* Listed assets do not include back issues on hand. If these were valued at 67¢ per issue the estimated inventory would be \$18,700.37.

Revenues and Expenses Statement
January 1, 1952 to December 31, 1952

Revenues

Dues Revenue	\$12,485.50
Subscriptions Revenue	8,333.92
Sale of Back Issues	7,751.10
Interest Earned on Bonds	100.00
Miscellaneous Revenue	330.79
	\$29,001.31

Expenses

Printing of <i>Annals</i> Current	\$10,325.44
Reprinting of Back Issues	8.80
Miscellaneous Printing, Stationery, Postage	1,356.79
Salary Expense	3,336.01
Miscellaneous Office Expense	618.97
Contributions to American Math. Society	242.20
Binding Expense	130.72
Editorial Expense	250.00
Meeting Expense	22.31
President's Fund	32.86
Travelling Expense	86.39
	\$16,410.49
Excess of Revenue over Expense	12,590.82
Excess of Assets over Liabilities Dec. 31, 1951	4,851.14
	17,441.96
Excess of Assets over Liabilities Dec. 31, 1952	17,441.96

Most of the excess of revenue over expenses for 1952 can be accounted for by the sale of back issues. Contrary to expectations, the sale of back issues increased markedly in 1952. Because the expense of reprinting back issues is entered as a current expense of the year in which the reprinting is done rather than of the year in which the copies are sold and because no reprinting was done during 1952, the sale of back issues during 1952 appears almost entirely as income with no associated expense. If the fund for reprinting back issues which appeared in the statement of condition for 1948 and 1949 had been continued it would now amount to \$15,290.55 and would offset a large share of our present surplus. A review of income from the sale of back issues and expense of reprinting during the five years, 1948 through 1952, follows:

	Income	Expense
1948	\$2,718.27	\$1,968.50
1949	3,314.41	2,910.53
1950	5,465.81	1,313.20
1951	4,628.12	2,386.11
1952	7,751.10	8.80
	\$23,877.71	\$8,587.16

Most of the remaining excess of revenues over expense is due to an increase in the subscription price of *Annals* and a simultaneous increase in number of subscribers.

K. J. ARNOLD
Secretary-Treasurer

REPORT OF THE EDITOR OF THE ANNALS FOR 1952

The 1952 volume of the *Annals* was respectfully dedicated to the memory of Professor Abraham Wald whose tragic death on December 13, 1950, brought to an untimely end his important and prolific contributions to these pages. In the March issue Professors J. Wolfowitz, Karl Menger and Gerhard Tintner reviewed Wald's work in statistics, pure mathematics and econometrics and paid personal tribute to our late colleague and friend.

In the 1952 volume, 58 papers were published including 14 notes. The publication of abstracts, reports of meetings, news and notices, and other reports brought the total number of pages of this volume to 655. During this year the rate of submission of papers rose considerably, reflecting the increasing activity and number of workers in mathematical statistics. It can be expected that these trends will continue.

The second Special Invited Paper, "The χ^2 Test of Goodness of Fit," by William G. Cochran, was published in this volume. These expository papers serve an important purpose in reviewing and interpreting developments in statistical theory and methodology and should be published more frequently.

On behalf of the Editorial Committee, the Editor wishes to acknowledge the invaluable refereeing assistance of the following: E. W. Barankin, Robert Bechhofer, J. R. Blum, C. R. Blyth, R. P. Boas, Jr., A. H. Bowker, R. A. Bradley, D. G. Chapman, Herman Chernoff, K. L. Chung, L. J. Cote, D. A. Darling, W. J. Dixon, Churchill Eisenhart, D. A. S. Fraser, L. A. Goodman, John Gurland, A. S. Householder, Eric Immel, S. L. Isaacson, A. T. James, Terry Jeeves, G. Kallianpur, E. L. Kaplan, Oscar Kempthorne, D. G. Kendall, Jack Kiefer, W. H. Kruskal, Lucien LeCam, Mrs. Emma Lehmer, Roy Leipnik, Roger Lyndon, F. J. Massey, Jr., M. R. Mickey, S. Moriguti, K. R. Nair, G. E. Noether, C. R. Ohman, Ingram Olkin, M. P. Peisakoff, Herman Rubin, H. Ryser, I. R. Savage, E. L. Scott, Milton Sobel, L. J. Snell, C. M. Stein, J. T. Tate, D. F. Votaw, Jr., D. L. Wallace, S. S. Wilks, and D. M. G. Wishart.

Thanks are also due Mr. Jacob Horowitz and Mr. Paul Burke for preparation of manuscripts and to Miss Mary Barsamian, Mrs. Clare F. Kozary, and Misses Gulnara Natirboff, Gerda Ubel and Maria Vecchione for secretarial and other office assistance in connection with the *Annals*.

The present Editorial Committee has held responsibility for editing the *Annals* during the past three years and is now turning over the responsibility to the incoming Editorial Committee, who have already been considering new

papers for future *Annals*. On behalf of the outgoing Committee the Editor takes pleasure in extending good wishes to the new Committee and particularly to the new Editor, Erich L. Lehman.

December 28, 1952

T. W. ANDERSON
Editor

PUBLICATIONS RECEIVED

- ANDERSON, R. L. AND BANCROFT, T. A., *Statistical Theory in Research*, McGraw Hill Book Co., New York, 1952, xix + 399 pp., \$7.00.
- CARLUCCI, GIANCARLO, *Le Svalutazioni Monetarie Inglesi del 1931 e del 1949*, (Istituto di Scienze Economiche e Statistiche, Quaderni XV), Milan, 1952, 27 pp.
- GOULDEN, C. H., *Methods of Statistical Analysis*, 2nd ed., John Wiley and Sons, Inc., New York, 1952, \$7.50.
- JAMBUNATHAN, M. V., *Linear Estimation*, The Seshadri Press, Mysore, 1951, vi + 84 pp.
- McKINSEY, J. C. C., *Introduction to the Theory of Games*, McGraw-Hill Book Co., New York, 1952, ii + 371 pp., \$6.50.
- RAO, C. R., *Advanced Statistical Methods in Biometrical Research*, John Wiley and Sons, Inc., New York, 1952, \$7.50.
- Recenseamento Geral do Brasil (1° de Setembro de 1940)* Censo Demografico and Censos Economicos, Servico Grafico de Instituto Brasileiro de Geografia e Estatistica, Rio de Janeiro, 1950. (5 volumes in addition to those listed in March and September 1952.)
- Tablas de Mortalidad de la Poblacion Española, Años 1900 a 1940*, Instituto Nacional de Estadística, Madrid 1952, 137 pp.
- TIPPETT, L. H. C., *The Methods of Statistics*, 4th ed., John Wiley and Sons, Inc., New York, 1952, 395 pp., \$6.00.
- VINCI, FELICE, *La Teoria Dell' Illusione Finanziaria di A. Puviani nel suo Cinquantésimo Anniversario*, (Nuove Analisi Economiche e Finanziarie), Milan, 1953, 35 pp.
- WAUGH, ALBERT E., *Statistical Tables and Problems*, McGraw-Hill Book Co., New York, 1952, xiv + 242 pp., \$3.00.