

Denote by \bar{y}_i the mean of the m units which happen to be sampled in the i th stratum. (c) Estimate the population total by $\hat{Y} = \sum_{i=1}^L M_i \bar{y}'_i$ where $\bar{y}'_i = \bar{y}_i$ if $m > 0$ and $\bar{y}'_i = 0$ if $m = 0$. The approximate variance formula for this estimator can be found in the literature. Here a new approach is used to derive these formulas. This method, which uses the ratio estimator \hat{Y} of the strata mean \bar{Y} can be generalized to cover post stratification in any sampling design however complex. The result is as follows: Let $\hat{Y}(y_i)$ denote the estimate of the total for the particular sampling scheme which has been used and $V(y_i)$ denote its variance. Then the estimate of the population total is $\sum_{i=1}^L M_i \hat{y}'_i$ and its variance is $V(y'_i)$ where $y'_i = y_i - \bar{Y}$ if y_i is in the i th stratum.

This approach permits consideration of different systems of post stratification with regard to precision. (Received April 20, 1956).

NEWS AND NOTICES

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

Personal Items

The Degree of Doctor of Laws was conferred on Harold Hotelling by the University of Chicago on 11 November, 1955, at the convocation in celebration of the twenty-fifth anniversary of the University's Social Science Research Building. Dr. Hotelling was cited as the "foremost contemporary contributor of quantitative methods to the social sciences, who by mathematical analysis has notably advanced our understanding of fundamental problems in economics and in statistics."

George E. Auman has been appointed Assistant Chief of the National Bureau of Standards Management Planning Division, where he will assist in Bureau's management program.

Paul M. Blunk has left Operations Research Group, Convair, Fort Worth, Texas, to become Chief, Reliability Group, Aerojet General Corp., Sacramento, Calif. He will apply principles of probability and mathematical statistics to the field of rocket reliability.

Derrill J. Bordelon received an M.A. in Mathematics from the University of Maryland, February 1, 1956.

William Fuller Brown, Jr., formerly of the Physical Laboratory of the Sun Oil Company, Newtown Square, Pa., has accepted a position as a Senior Physicist in the Central Research Department of Minnesota Mining and Manufacturing Company, St. Paul, Minnesota.

Jack Chassan has accepted the position of Chief Statistician at Saint Elizabeth's Hospital in Washington, D. C.

Dr. Willard H. Clatworthy has accepted a position as Staff Statistician with Westinghouse Electric Corporation, Atomic Power Division, Bettis Plant, Pittsburgh 30, Pa.

Mr. John L. Dalke has been appointed chief of the High Frequency Imped-

ance Standards Section, Radio Standards Division, Boulder Laboratories, National Bureau of Standards.

Miss Lila Elveback has been appointed Associate Professor of Biostatistics in the Dept. of Tropical Medicine and Public Health at the School of Medicine, Tulane University in New Orleans, Louisiana.

The Royal Society has announced the award of the Copley Medal to Sir Ronald Fisher, F.R.S., Arthur Balfour Professor of Genetics, Cambridge University, for contributions to developing the theory and application of statistics for making quantitative a vast field of biology.

David W. Gaylor has accepted a position with the Nuclear Research and Development Department, Convair Aircraft Co., Ft. Worth, Texas.

Walter M. Gilbert is now Assistant Professor of Mathematics, Iowa State College, Ames, Iowa.

Mr. Robert Gran, formerly of Evanston, Illinois, recently moved to Palatine, Illinois. He is currently employed as statistician at the Cook County Highway Department in Chicago.

Georges Th. Guilbaud, formerly Deputy Director of I.S.E.A., has been appointed as Directeur d'Etudes à l'Ecole pratique de Haute Etude (Paris, Sorbonne)—methodes mathematique dans le science sociale.

Clifford Hildreth resigned his position as Professor of Agricultural Economics at North Carolina State College in August, 1955, to accept a similar job at Michigan State University.

W. Robert Hydeman, formerly of the Electronic Computer Department of Remington Rand has joined The Ramo-Wooldridge Corporation as member of the Technical Staff. Mr. Hydeman is situated in the Cleveland office and is associated with the Management Science Group of the Computer System Division.

Dr. H. S. Konijn has resigned his Lectureship at the University of California in Berkeley to become Lecturer in Economic Statistics in the University of Sydney, Australia.

Roy R. Kuebler, Jr., formerly Associate Professor of Mathematics at Dickinson College, has been in the Office of the Chief of Ordnance, Department of the Army, Washington 25, since July. He holds a position of Mathematician in the Design of Experiment Unit, Research and Development Division.

Robert J. Kurland has begun postdoctoral research in microwave spectroscopy at the National Bureau of Standards. He is one of seven young scientists to be selected for the Postdoctoral Research Associateship program sponsored by the National Academy of Sciences-National Research Council and the Bureau.

Andre G. Laurent, formerly Head of Prices and Quantitative Economic Analysis Sections, Department of Economics, National Institute of Statistics and Economics, Paris, France, and Professor at the S.Q.C. Center of the Institute of Statistics of the University of Paris, after spending the academic year 1953-1954 as a Post-Doctoral Fellow at the Committee on Statistics of

the University of Chicago, has joined the staff of the Department of Statistics, Michigan State University.

Duncan C. McCune, formerly quality control statistician for the Tubular Products Div. of The Babcock and Wilcox Co., has accepted the position of Staff Statistician with Jones and Laughlin Steel Corporation in Pittsburgh, Pa.

Ralph A. Maggio, formerly Lecturer at Rutgers University, New Brunswick, New Jersey, has accepted the position of Quality Control Engineer, Red Bank Division, Bendix Aviation Corporation, Eatontown, New Jersey.

Miss Margaret Pearl Martin is on leave from her position at Vanderbilt University and is spending the academic year at the University of Chicago, Committee on Statistics.

John Winston Mayne, who for the last two years has been Senior Operations Research Officer of the Joint Services Operational Research Team at Tactical Air Command Headquarters in Edmonton, Alberta, has recently been appointed Director of Operational Research, Navy, at National Defense Headquarters, Ottawa.

Harold Glazer has recently been appointed Senior Engineer in the Analysis Department of the Waltham Laboratories, Sylvania Electric Products, Inc. His assignment covers the application of methods of mathematical statistics to the design of programs of machine calculations.

Mrs. Mary G. Natrella has rejoined the Applied Mathematics Division of the National Bureau of Standards where she will serve on the staff of the Statistical Engineering Laboratory.

Ingram Olkin, Associate Professor of Statistics, Michigan State University, is on leave during 1955-1956, and has been appointed to a visiting associate professorship in the Committee on Statistics, University of Chicago for this period.

Dr. K. C. Sreedharan Pillai has been deputed for a year by the United Nations Technical Assistance Administration to the Philippines.

John W. Pratt has completed his Ph.D. in Statistics at Stanford University and is now a Research Associate on a Navy Contract at the University of Chicago.

Bruce P. Price, formerly of Southwest Research Institute, San Antonio, Texas, is now statistician in an Operations Research Group at the Phillip Petroleum Research and Development, Bartlesville, Oklahoma.

Professor Henry Quastler has left the University of Illinois and accepted a position as Senior Radiobiologist at the Brookhaven National Laboratory.

Dr. Bernard J. Ransil has begun postdoctoral research at the National Bureau of Standards. He is one of seven young graduate scientists to be selected for the Postdoctoral Research Associateship program sponsored by the National Academy of Sciences-National Research Council and the Bureau. Dr. Ransil is interested in the quantum statistical treatment of isotope effects.

Mrs. Joan Raup Rosenblatt, a mathematical statistician, has joined the Statistical Engineering Section of the National Bureau of Standards' Applied

Mathematics Division. She will be primarily concerned with the theory and application of nonparametric techniques of statistical inference.

Murray Rosenblatt has been appointed to an Associate Professorship in Mathematics at Indiana University, Bloomington, Indiana.

Melvin E. Salvesson has transferred from Manager-Business Research, General Electric Co., Louisville, Kentucky, to Consultant-Operations Research, General Electric, New York City.

George W. Snedecor is now on a five-month assignment in Campinas, State of Sao Paulo, Brazil, supported in part by the Rockefeller Foundation. He will return to Iowa State College in June. His objectives are to consult with research workers on the design and analysis of agricultural experiments, mainly at the Institute of Agronomy in Campinas, and to confer on the organization of a Center for teaching and research in experimental statistics. The latter is a joint project of the Ministries of Education and Agriculture, State of Sao Paulo, with the Institute of Agronomy, the University of Sao Paulo and the College of Agriculture at Piracicaba cooperating.

Major General Leslie E. Simon, for the past six years Assistant Chief of Army Ordnance for Research and Development, has retired from the Army and is now Director of Research and Development, The Carborundum Company, Niagara Falls, New York; Member of the Board of Directors, the Gruen Precision Laboratories, Cincinnati, Ohio; and Member of the Board of Trustees, the Illinois Institute of Technology, Chicago, Illinois.

Arthur Stein, a U. S. Army Ordnance specialist in ballistic quality control for ten years, has joined Cornell Aeronautical Laboratory, Inc. as principal research engineer in the Systems Research Department.

Dr. Balkrishna V. Sukhatme has obtained his Ph.D. degree in Mathematical Statistics, University of California, Berkeley in June, 1955, and is presently employed as Senior Research Statistician by the Indian Council of Agricultural Research, New Delhi.

Dr. Daniel Teichroew is now with the National Cash Register Company, Dayton, Ohio, as Senior Electronic Applications Specialist in the Electronic Sales Department.

Dr. John G. Thompson, Chief of the Metallurgy Division of the National Bureau of Standards, has retired after more than 35 years of government service.

Ronald E. Walpole is now doing graduate work at the Virginia Polytechnic Institute, Blacksburg, Virginia. He was formerly with the Defense Research Board in Ottawa, Canada.

SOCIOMETRY

The American Sociological Society, publisher of the *American Sociological Review*, announces the publication of *Sociometry: A Journal of Research in Social Psychology*. Founded in 1937 by Dr. J. L. Moreno, this quarterly journal will become an official publication of the Society with the March 1956 issue.

Summer Offerings in Statistics at Iowa State College

The 1956 summer offerings of the Department of Statistics at Iowa State College will be given in two sessions: June 11–July 18 and July 18–August 24. Students may register for either six-week session or for the full 12-week summer quarter. The offerings include six courses at the advanced undergraduate and graduate minor level and are designed to satisfy background requirements for graduate major work in statistics. Senior members of the staff will be available during most of the summer for consultation on graduate research and special problems courses. The complete program consists of Stat. 401 and 402, "Statistical Methods for Research Workers," offered in sequence; Stat. 447 and 448, "Statistical Theory for Research Workers," offered in sequence; Stat. 411, "Experimental Designs for Research Workers," and Stat. 421, "Survey Designs for Research Workers," both given in the second session; Stat. 599, "Special Problems," and Stat. 699, "Research," both elective either session. Additional information may be obtained from T. A. Bancroft, Director, Statistical Laboratory, Iowa State College.

Civil Service Examinations

There is an urgent need for Chemists, Mathematicians, Metallurgists, Physicists, and Electronic Scientists in the Washington, D. C., area, the United States Civil Service Commission has announced. Vacancies are in various Federal agencies and pay salaries ranging from \$4,345 to \$11,610 a year. Further information and application forms may be obtained at many post offices throughout the country, or by writing to the U. S. Civil Service Commission, Washington 25, D. C. Applicants should ask for Announcement No. 46(B). Applications will be accepted by the Board of U. S. Civil Service Examiners, National Bureau of Standards, Washington 25, D. C., until further notice.

Doctoral Dissertations in Statistics, 1955

Listed below are the doctorates conferred during the year 1955 in the United States and Canada 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 this list.

Gordon C. Ashton, North Carolina State College, major in statistics and animal industry, "The Utility of Certain Concomitant Observations in Reducing the Variation in the Rate of Gain in Body Weight of Swine."

J. Y. Barry, Yale, "Generation of Abstract Markov Processes."

Patrick Paul Billingsley, Princeton, major in probability, "The Invariance Principle for Dependent Random Variables."

Charles Boll, Stanford, major in statistics, "Comparison of Experiments in the Infinite Case and the Use of Invariance in Establishing Sufficiency."

Helen Bozivich, Iowa State College, major in statistics, "Power of Test Procedures for Certain Incompletely Specified Random and Mixed Models."

Donald L. Brakensiek, Iowa State College, major in statistics and agricultural engineering, "Estimation of Surface Run-off Volumes from an Agricultural Watershed by Infiltration Theory."

Samuel H. Brooks, Johns Hopkins, major in biostatistics, "Comparison of Methods for Estimating the Optimal Factor Combination."

Edward Clark Bryant, Iowa State College, major in statistics, "An Analysis of Some Two-way Stratifications."

Donald L. Burkholder, North Carolina, major in statistics, "On a Certain Class of Stochastic Approximation Processes."

Raymond Collier, Minnesota, major in statistics, "Experimental Designs in Which the Observations are Assumed to be Correlated."

John W. Coy, Michigan, major in mathematical statistics, "A Differential Calculus in a Matrix Algebra."

L. E. Dubins, Chicago, "Generalized Random Variables."

Frances E. Dunn, Harvard, major in education, "Guiding College Students in the Selection of a Field of Concentration."

Lillian Elveback, Minnesota, major in statistics, "Some Aspects of Estimation Problems in Follow-Up Studies in Chronic Disease."

Jay Ernest Folkert, Michigan State University, major in mathematical statistics, "The Distribution of the Number of Components of a Random Mapping Function."

Rudolf J. Fruend, North Carolina State College, major in statistics, "Introduction of Risk into a Linear Programming Model."

Charles E. Gates, North Carolina State College, major in statistics, "The Constitution of Genetic Variances and Covariances in Self-Fertilized Crops Assuming Linkage."

Seymour Geisser, North Carolina, major in statistics, "On the Exact Distribution of Certain Statistics Related to Mean Square Successive Difference."

William J. Hall, North Carolina, major in statistics, "Most Economical Multiple-Decision Rules."

Irwin Guttman, Toronto, "Characterization of Tolerance Regions."

John Hamblen, Purdue, major in mathematical statistics, "Distribution of Roots of Algebraic Equations with Variable Coefficients."

William C. Healy, Jr., Illinois, major in statistics, "Optimum Invariant Estimation."

John Frederick Hofmann, Iowa State College, major in statistics, "Life Testing in Controlled Environmental Conditions."

Robert Wakely Kennard, Carnegie Institute of Technology, major in mathematics, "On the Determination of Significance Levels of Control Charts for Continuous Variates."

Ernest G. Kimme, Minnesota, major in mathematics, "On the Convergence of Sequences of Stochastic Processes with Independent Increments."

William H. Kruskal, Columbia, major in mathematical statistics, "On the Problem of Non-Normality in Relation to Hypothesis Testing."

J. J. J. Lavalley, McGill, "Asymptotic Theorems in the Theory of Normal Correlation."

Fred W. Lott, Jr., Michigan, major in mathematical statistics, "The Use of a Certain Linear Order Statistic Related to the Mean Difference, as an Unbiased Estimate of the Standard Deviation in Finite and Infinite Population."

Franklin S. McFeely, Virginia Polytechnic Institute, major in statistics, "Decision Procedures for the Comparison of Exponential and Geometric Populations."

Henry Pratt McKean, Jr., Princeton, major in probability, "Sample Functions of Stable Processes."

Joseph Navarro, Purdue, major in mathematical statistics, "The Theory of Transect Sampling."

Joseph Edward Nelson, Chicago, major in mathematics, "On the Operator Theory of Markoff Processes."

Wesley L. Nicholson, Illinois, major in statistics, "Uniform Admissibility and Its Application to Classification Problems."

John Pratt, Stanford, major in statistics, "Some Results in the Decision Theory of One-Parameter Multivariate Polya Type Distributions."

K. V. Ramachandran, North Carolina, major in statistics, "On Certain Tests and the Monotonicity of Their Powers."

Paul Randolph, Minnesota, major in statistics, "Multivariate Acceptance Sampling."

Bayard Rankin, California (Berkeley), major in statistics, "The Concept of Sets Enchained by a Stochastic Process and its Use in Cascade Shower Theory."

Elmer Remmenga, Purdue, major in statistics, "The Nature in Magnitude of Experimental Errors in Grazing Trials."

George Resnikoff, Stanford, major in statistics, "Contributions to Sampling Inspection by Variables."

Douglas Sherman Robson, Cornell, major in statistics, "Admissible and Minimax Integer-valued Estimators."

Albert Rohloff, Purdue, major in mathematical statistics, "Sequential Tests of Composite Hypotheses."

Elmahdy E. Said, North Carolina State College, major in statistics, "A Comparison between Alternate Techniques Using Supplementary Information in Sample Survey Design."

Norman Carmen Severo, Carnegie Institute of Technology, major in mathematics, "A Comparison of Tests on the Mean of a Logarithmico-Normal Distribution with Known Variance."

D. A. Sprott, Toronto, "Balanced Incomplete Block Designs."

Robert L. Stearman, Johns Hopkins, major in biostatistics, "A Statistical Estimation of Variation Encountered in Studying Dispersion of Radioactive Phosphorus in Embryonated Chicken Eggs."

George Powell Steck, California (Berkeley), major in statistics, "Limit Theorems for Conditional Distributions."

Balkrishna V. Sukhatme, California (Berkeley), major in statistics, "Testing the Hypothesis That Two Populations Differ Only in Location."

B. D. Tikkiwal, North Carolina State College, major in statistics, "Multi-phase Sampling on Successive Occasions."

John Tischendorf, Purdue, major in mathematical statistics, "Linear Estimation Techniques Using Order Statistics."

Donald Truax, Stanford, major in statistics, "Multi-Decision Problems for the Multivariate Exponential Family."

Howard Gregory Tucker, California (Berkeley), major in mathematics, "Contributions to the Mathematical Theory of Accident Proneness with Particular Reference to Multiple Exposure."

Elizabeth Vaughan, Stanford, major in statistics, "Estimation of a Biological Population which is Subject to a Biased Mortality."

Eleanor Weiss, Harvard, major in education, "Factor Analysis of Mathematical Ability."

Irving Weiss, Stanford, major in statistics, "Limiting Distributions in Some Occupancy Problems."

Oscar Wesler, Stanford, major in statistics, "A Modified Minimax Principle."

John S. White, Minnesota, major in statistics, "Some Problems of Point Estimation in Stochastic Difference Equations."

Martin Bradbury Wilk, Iowa State College, major in statistics, "Linear Models and Randomized Experiments."

R. Lowell Wine, Virginia Polytechnic Institute, major in statistics, "A Power Study of Multiple Range and Multiple F Tests."

Ralph Wormleighton, Princeton, major in statistics, "Some Extensions of the Sign Test."

New Members

The following persons have been elected to membership in the Institute

November 10, 1955 to February 10, 1956

Adams, John W., B.S. (Univ. of Nebraska), Associate Engineer Process Development, Westinghouse Atomic Power Division, Westinghouse Electric Corporation, Bettis Plant, P. P. Box 1468, Pittsburgh 30, Pennsylvania.

Blachman, Nelson M., Ph.D. (Harvard), Specialist, Communication Theory and Computers, Electronic Defense Laboratory, Sylvania Electric Products, Inc., Box 205, Mountain View, California.

Bradley, James V., M.A. (Univ. of Virginia), Research Psychologist, Controls Section, Psychology Branch, Aeromedical Laboratory WCRDP-1, Wright Air Development Center, Wright-Patterson AFB, Ohio, *Apt. 7, 215 Dayton St., Yellow Springs, Ohio.*

Choi, Yun Shick, Ph.D. (Seoul National Univ.), Head of Dept. of Mathematics, Seoul National University, Seoul, Korea, *6127 S. Greenwood Ave., Chicago 37, Illinois* (until May 1956 and thereafter Seoul National University).

Feinstein, Anita J., M.S. (Univ. of Miami), Statistician Research Aide, The Marine Labo-

- ratory of the University of Miami, Coral Gables, Florida, *439 Anastasia Avenue, Coral Gables, Florida.*
- Frishman, Fred**, B.B.A. (College of the City of New York), Statistician, Research and Development Department, Naval Powder Factory, Indian Head, Maryland.
- John, P. W. M.**, Ph.D. (Univ. of Oklahoma), Asst. Prof. of Math., University of New Mexico, Albuquerque, New Mexico.
- Mandelbrot, Benoit**, B.S. (University of Paris), Visiting Ass't. Professor, Charge de Cours a la Faculte des Sciences, University of Geneva, Geneva, Switzerland.
- Mathis, Harold F.**, Ph.D. (Northwestern), Research Engineer, Dept. 453C, Goodyear Aircraft Corporation, Akron 15, Ohio.
- Mattson, Thomas B.**, B.S. (Carnegie Institute of Technology), Graduate Student and Research Assistant, Carnegie Institute of Technology, Schenley Park, Pittsburgh 13, Pa., *1694 Dormont Ave., Pittsburgh 16, Pa.*
- McLemore, B. H.**, M.A. (University of Illinois), Student, Stanford University, Stanford, California, *Sequoia Hall, Stanford University, Stanford, California.*
- Nadler, Jack**, A.M. (Univ. of Chicago), Student, University of Chicago, Chicago, Illinois, *1368 East 57th St., Chicago 37, Illinois.*
- Narayana, T. V.**, Ph.D. (Univ. of N. C.), Lecturer, Department of Mathematics, McGill University, Montreal, Canada.
- Neff, John D.**, M.S. (Kansas State College), Student, University of Florida, Gainesville, Florida, *1105 N. W. Third Avenue, Gainesville, Florida.*
- Pasternack, Bernard S.**, B.A. (Brooklyn College), Graduate Assistant, Dept. of Experimental Statistics, N. C. State College, Raleigh, North Carolina, *Box 5457, State College Station, Raleigh, North Carolina.*
- Pitt, Hyman**, M.S. (University of Wisconsin), Statistician, Instructor in Math., University of Wisconsin, Madison, Wisconsin, *37 Merlham Drive, Madison 5, Wisconsin.*
- Riffenburgh, R. H.**, M.S. (College of William and Mary), Instructor in Math., Research Fellow, Virginia Polytechnic Institute, Blacksburg, Virginia, *1005 Draper Road, Blacksburg, Virginia.*
- Saunders, David R.**, Ph.D. (Univ. of Ill.), Research Associate, Educational Testing Service, 20 Nassau Street, Princeton, New Jersey.
- Sawrey, William L.**, Ph.D. (Univ. of Nebraska), Asst. Prof., Department of Psychiatry, University of Colorado School of Medicine, 4200 E. 9th Avenue, Denver, Colorado.
- Sherman, Bernard**, Ph.D. (Princeton), Assistant Research Mathematician, Numerical Analysis Research, University of California, Los Angeles 24, Calif.
- Shuford, D. B.**, A.B. (Univ. of Ill), Teaching Assistant, Department of Economics, University of Illinois, Urbana, Illinois.
- Slimak, Romuald**, B.Sc. (University of London), Statistician, Electronic Computer Department, Univac Division, Sperry-Rand Corporation, *315 4th Ave., New York, N. Y.*
- Tikkiwal, B. D.**, Ph.D. (N. C. State Univ.), Assistant Statistician, Institute of Statistics, N. C. State Univ., Raleigh, North Carolina.
- Titchen, Robert S.**, D.S. (University of Paris), Operations Analyst, Operations Evaluation Group, Office of the Chief of Naval Operations, Washington 25, D. C., *1516 Commonwealth Ave., Alexandria, Virginia.*
- Tuck, R. E.**, M.A. (Univ. of Calif. at Los Angeles), Ground Systems, Hughes Aircraft Company, Airport Site, 5440 W. Century, Los Angeles 45, California, *3426 Kelton Ave., Los Angeles 34, California.*
- Van Tijn, David E.**, Ph.D. (Indiana University), Mathematics Specialist, General Electric, HMEE Dept., Syracuse, New York.
- Woodward, George F.**, BSEE (Univ. of Colorado), Specialist Systems Analyst, Special Radar Project, Heavy Military Electronic Equipment Dept., General Electric Co., Industrial Park, Syracuse, New York, *311 Dawley Road, Fayetteville, New York.*
- Ylvisaker, N. Donald**, B.A. (Concordia College), Grad. Asst., Math. Dept., University of Nebraska, Lincoln, Nebraska.

REPORT OF THE PRINCETON MEETING OF THE INSTITUTE OF MATHEMATICAL STATISTICS

The sixty-ninth meeting of the Institute of Mathematical Statistics, an Eastern Regional meeting, was held at Princeton University on April 20–21, 1956. All sessions were joint with the Biometric Society (ENAR). An invited address on *Some Problems Connected with Statistical Inference* was given by D. R. Cox of the Universities of Cambridge and North Carolina.

The following members of the Institute attended:

Frank Akutowicz, W. R. Allen, T. W. Anderson, Beverly E. Arens, Harvey J. Arnold, Allan Birnbaum, C. I. Bliss, Albert H. Bowker, R. A. Bradley, Bradley Bucher, Mrs. M. B. Carroll, Jerome Cornfield, D. R. Cox, E. L. Cox, C. Daniel, Besse B. Day, A. P. Dempster, C. Derman, C. W. Dunnett, A. R. Eckler, C. Eisenhart, W. Feller, S. M. Free, D. P. Gaver, Seymour Geisser, D. M. Gilford, M. H. Gourary, B. G. Greenberg, S. W. Greenhouse, Max Halperin, W. C. Healy, Jr., Gerald C. Helmstodter, Robert Hooke, J. S. Hunter, J. Edward Jackson, M. V. Johns, Jr., G. H. Kennedy, A. W. Kimball, Clyde Kramer, T. E. Kurtz, F. Loro, E. Lukacs, M. D. Lum, Paul Meier, Sutton Monro, M. Morrison, J. Moshman, R. B. Murphy, L. F. Nanni, W. L. Nicholson, L. M. Noel, G. E. Noether, M. L. Norden, Emanuel Parzan, Henry Polowy, Mrs. L. K. Randolph, Bayard Rankin, W. Richardson, W. L. Roach, Jr., Harry M. Rosenblatt, J. R. Rosenblatt, D. E. Sands, A. E. Sarhan, F. E. Satterthwaite, R. Sitgreaves, W. L. Smith, M. Sobel, Herbert Solomon, P. N. Somerville, Frederick F. Stephan, H. C. Sweeny, Z. Szatrowski, F. B. Taylor, J. G. C. Templeton, Milton E. Terry, L. J. Tick, L. R. Tucker, J. W. Tukey, M. C. K. Tweedie, D. L. Wallace, Irving Weiss, Frank Wilcoxon, M. B. Wilk, R. Lowell Wine, W. J. Youden, Marvin Zelen.

The program follows:

FRIDAY, APRIL 20, 1956

8:30 a.m. Confidence Techniques in Multiple Regression

Chairman: MARTIN B. WILK, Princeton University

1. *Understanding Regression Analysis (Use of Characteristic Roots)*, M. A. EFROYMSON, Esso Research and Engineering Company.
 2. *Some Approximate Confidence Procedures*, DAVID L. WALLACE, University of Chicago.
- Discussant: JOHN W. TUKEY, Princeton University.

10:00 a.m. Paired Comparisons

Chairman: MILTON E. TERRY, Bell Telephone Laboratories

1. *The Discriminal Dispersion in Thurstone's Paired Comparisons Model*, ROBERT P. ABELSON, Yale University.
2. *Methods for the Rank Analysis of Paired Comparisons*, RALPH A. BRADLEY, Virginia Polytechnic Institute.
3. *Use of Scheffé's Analysis of Variance for Paired Comparisons in Factorial Experiments*, OTTO DYKSTRA, JR., General Foods Corporation.
4. *An Evaluation of Some Statistical Techniques Used in the Analysis of Paired Comparisons Data*, J. EDWARD JACKSON, Eastman Kodak Company.

2:00 p.m. Statistical Problems in Poliomyelitis

Chairman: S. M. FREE, Smith, Kline and French Laboratories.

1. *A Rapid Approximate Statistical Procedure for Estimating Potency in Experimental Poliomyelitis Vaccine*, JOSEPH L. CIMINERA, Sharpe and Dohme.

2. *Quality Control Aspects of Safety Testing*, PAUL MEIER, Johns Hopkins University.
 3. *Observations on the Effectiveness of the Poliomyelitis Vaccine in North Carolina in 1955*, BERNARD G. GREENBERG, University of North Carolina.
- Discussants: MAX HALPERIN, National Heart Institute, and W. J. HALL, U. S. Public Health Service.

4:00 p.m. Contributed Papers I

Chairman: GOTTFRIED E. NOETHER, Boston University.

1. *On Certain Stabilities of Sample Survey Response, (Preliminary Report)*, DAVID ROSENBLATT, American University.
2. *Some Multi-Level Continuous Sampling Plans*, C. DERMAN, S. LITTAUER, and H. SOLOMON, Columbia University.
3. *Applications of Vector-Valued Risk Functionals, (Preliminary Report)*, ALLAN BIRNBAUM, Columbia University.
4. *On the Use of Randomization in the Investigation of an Unknown Function*, ROBERT HOOKE, Westinghouse Electric Corporation.
5. *An Extension of a Method of Making Multiple Comparisons*, THOMAS E. KURTZ, Princeton University.
6. *On the Power of Some Rank Order Two-sample Tests*, JOAN RAUP ROSENBLATT, National Bureau of Standards.

8:00 p.m. Invited Address

Chairman: B. GREENBERG, University of North Carolina.

Some Problems Connected with Statistical Inference, D. R. COX, University of Cambridge and University of North Carolina.

SATURDAY, APRIL 21, 1956

8:30 a.m. Analysis of Variance and Experimental Design

Chairman: MAVIS CARROLL, General Foods Corporation.

1. *Use of a Concomitant Variable in the Selection of An Experimental Design*, D. R. COX, University of North Carolina.
2. *The Combination of Tests of Significance for Incomplete Block Design*, MARVIN ZELEN, National Bureau of Standards.
3. *Estimation of Individual Variations in an Unreplicated Two-Way Classification*, THOMAS RUSSELL, Virginia Polytechnic Institute.

10:30 a.m. Some Problems in Estimation

Chairman: W. H. OTT, Merck Institute.

1. *Some Statistical Properties of Inverse Gaussian Distributions*, M. C. K. TWEEDIE, Virginia Polytechnic Institute.
2. *Composite Estimation in Repetitive Surveys*, JOSEPH STEINBERG, Bureau of the Census.
3. *Maximum Likelihood Estimation of a Mean in the Case of Unequal Variances*, NATHANIEL MANTEL, National Cancer Institute.

2:00 p.m. Contributed Papers II

Chairman: A. BIRNBAUM, Columbia University.

1. *The Comparative Importance of the Order of an Observation in Determining Linear Estimates of the Mean and Standard Deviation of the Normal Distribution from Censored Samples, $N < 10$* , A. E. SARHAN and B. G. GREENBERG, University of North Carolina.

2. *Relations Between Stochastic Processes*, DR. BAYARD RANKIN, Massachusetts Institute of Technology.
3. *The Two Sample Multivariate Problem in the Degenerate Case, (Preliminary Report)*, A. P. DEMPSTER, Princeton University.
4. *A Test for Independence in Contingency Tables, (Preliminary Report)*, JAMES G. C. TEMPLETON, Princeton University.
5. *Incomplete Block Rank Analysis: 2^{p-q} Fractional Factorials Using a Method of Paired Comparisons*, OTTO DYKSTRA, JR., General Foods Corporation (introduced by Cuthbert Daniel, New York City).
6. *On Mixed Single-sample Tests*, LEONARD COHEN, Columbia University.

ALLAN BIRNBAUM,
Associate Secretary

REPORT OF THE CHICAGO MEETING OF THE INSTITUTE OF MATHEMATICAL STATISTICS

The seventieth meeting, a Central Regional meeting, of the Institute of Mathematical Statistics was held at the University of Chicago, Chicago, Illinois, on April 27-28, 1956. The meeting was in conjunction with a regional meeting of the Biometric Society.

The following 72 members of the Institute attended:

Om P. Aggarwal, Virgil L. Anderson, Kenneth J. Arnold, John L. Bagg, R. R. Bahadur, Theodore Alfonso Bancroft, Elizabeth K. Banks, Richard E. Beckwith, Joseph Berkson, Helen Bozovich, K. A. Brownlee, Edward C. Bryant, D. L. Burkholder, Irving W. Burr, Chin Long Chiang, Yun Shick Choi, Willard H. Clatworthy, Donald A. Darling, Allen T. Craig, Edwin L. Crow, Herbert T. David, Morris De Groot, Joseph A. Dubay, Charles E. Gates, John P. Gilbert, Edwin L. Godfrey, William A. Golomski, Gene H. Golub, Leo A. Goodman, Franklin A. Graybill, John Gurland, Robert Hogg, Paul G. Homeyer, W. H. Horton, Paul Irick, R. J. Jensen, Leo Katz, Morris Katz, Lloyd A. Knowler, Carl F. Kosack, Julius Lieblein, Albert Madansky, Margaret P. Martin, Harlley E. McKean, Jack Nadler, Monroe L. Norden, H. W. Norton, Junjiro Ogawa, Ingram Olkin, M. Vasudeva Pai, John W. Pratt, Paul H. Randolph, Paul R. Rider, W. C. Ross, Jagdish Rustagi, L. J. Savage, Esther Seiden, Gordon R. Sherman, Morris Skibinsky, James H. Stapleton, Stanley Stavropoulos, Charles R. Sutermeister, Z. Szatrowski, Joseph V. Talacko, Donovan J. Thompson, W. A. Thompson, Jr., G. Tintner, Sylvanus A. Tyler, M. E. Turner, Willem Vanderbyl, David L. Wallace, W. Allen Wallis.

The program of the meeting was as follows:

FRIDAY, APRIL 27, 1956

8:30 a.m. Informal Round Table Discussion on the Use of Experimental Design and Regression Analysis in Industrial Research Problems.

Chairman: CHARLES HICKS, Purdue University.

10:30 a.m. Sufficient Statistics in a First Course in Mathematical Statistics.

Chairman: LEO KATZ, Michigan State University.

Papers: 1. *Some Uses in the Theory of Sampling*, ALLEN T. CRAIG, State University of Iowa.

2. *Certain Extensions and Applications to Statistical Inference*, ROBERT V. HOGG, State University of Iowa.

1:30 p.m. Joint Session with Biometric Society I.

Chairman: THOMAS PARK, University of Chicago.

- Paper: 1. *Egg-laying—egg-eating Stochastic Processes for Flour Beetles*, CHIN LONG CHIANG, University of California, Berkeley.

2:00 p.m. Joint Session with Biometric Society II. United Nations—F.A.O International Statistical Training Centers.

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

- Papers: 1. *The New Delhi Center*, J. LUSH, Iowa State College.
 2. *The Buenos Aires Center*, R. J. JESSEN, Iowa State College; DONOVAN THOMPSON, University of Pittsburgh.
 3. *Plans for the Mexico City Center*, P. G. HOMEYER, Iowa State College.

3:30 p.m. Contributed Papers.

Chairman: K. J. ARNOLD, Michigan State University.

1. *A Note on Ranking Means*, W. A. THOMPSON, JR., Fort Bliss, Texas.
2. *Multivariate Ratio Estimation for Finite Populations*, INGRAM OLKIN, University of Chicago and Michigan State University, (By title).
3. *Runs Above the Sample Mean*, HERBERT T. DAVID, University of Chicago.
4. *Approximations to the Power of Rank Tests*, CHIA KUEI TSAO, Wayne University, (By title).
5. *On Maximizing and Minimizing a Certain Integral with Statistical Applications*, JAGDISH S. RUSTAGI, Carnegie Institute of Technology.
6. *Seasonal Forecast of Some Time Series*, JOSEPH V. TALACKO, Marquette University.
7. *Quadratic Time Homogeneous Birth and Death Processes*, PETER W. M. JOHN, University of New Mexico, (By title).
8. *A Method of Multiple Rank Correlation*, HANS THEIL, Netherlands School of Economics and University of Chicago, (introduced by D. L. Wallace).
9. *Post Stratification in Multistage Sampling*, W. H. WILLIAMS, Iowa State College, (introduced by T. A. Bancroft).
10. *Confidence Intervals for Variance Ratios Specifying Genetic Heritability*, F. A. GRAYBILL, F. MARTIN, and G. GODFREY, Oklahoma Agricultural and Mechanical College.
11. *Moments of a Test Criterion For Outliers*, P. A. KEYS, Iowa State College, (introduced by T. A. Bancroft).

SATURDAY, APRIL 28, 1956

8:30 a.m. Regression and Functional Relations.

Chairman: W. A. WALLIS, University of Chicago.

- Papers: 1. *Problems Involving the Interrelations of Stochastic Variables*, GERHARD TINTNER, Iowa State College.
 2. *Linear Functional Relations with Variables Subject to Error*, JOHN GURLAND, Iowa State College.
 3. *Some Remarks on Regression*, JOSEPH BERKSON, Mayo Clinic.

Discussion: L. J. SAVAGE, University of Chicago.

HANS THEIL, Netherlands School of Economics, Rotterdam, and University of Chicago.

1:30 p.m. Joint Session with Biometric Society III. Applications of Electronic Digital Computers in Statistical Analysis.

Chairman: HORACE NORTON, University of Illinois.

- Papers: 1. *Correlation, Regression and Miscellaneous Techniques*, G. H. GOLUB, University of Illinois.
 2. *Linear Programming*, E. R. SWANSON, University of Illinois.
 3. *Analysis of Variance and Related Techniques*, W. C. JACOB, University of Illinois.

I thank David L. Wallace, Assistant Secretary for the meeting, for providing the above information.

WILLIAM KRUSKAL
Associate Secretary

THE INSTITUTE OF MATHEMATICAL STATISTICS

Statement of Financial Condition

December 31, 1955

REPORT OF THE TREASURER FOR 1955

(This statement went to press before completion of the final audit and is subject to minor changes.)

ASSETS

Current Assets

Cash in Bank.....	\$6,997.22
Savings Bank Account.....	2,040.11
Investments (at cost).....	52,488.83
Dues Receivable.....	239.25
Due on Back Issue Sales.....	444.55
Miscellaneous Accounts Receivable.....	9.50
Inventory of Back Issues.....	19,235.62
Subscriptions Receivable.....	92.75
<i>Total Assets</i>	\$81,347.83

LIABILITIES AND MEMBERS EQUITY

Current Liabilities

Account Payable, Printing of Dec. <i>Annals</i>	\$4,764.27
Withholding and F.I.C.A. taxes payable.....	119.82
Accrued Expenses.....	40.93
Amount held for <i>Biometrika</i> subscriptions.....	84.50
National Science Foundation Grant.....	1,296.16
<i>Total Current Liabilities</i>	6,305.68

Liabilities to Members and Subscribers

Advances on Dues, 1956, 1957.....	\$657.22
Advances on Dues, Life Members.....	2,872.50
Advances on Subscriptions.....	5,825.15
<i>Total Liabilities to Members and Subscribers</i>	9,354.87

Members Equity

Reserve for Maintaining Supply of Back Issues.....	\$23,078.52	
Surplus.....	42,808.76	
		<hr/>
<i>Total Members Equity</i>		65,687.28
<i>Total Liabilities and Members Equity</i>		\$81,547.83

THE INSTITUTE OF MATHEMATICAL STATISTICS

Statement of Income and Expenses

for the period January 1, 1955 through December 31, 1955

Revenues

Membership Dues.....	\$14,258.00	
Subscriptions.....	10,599.05	
Sale of Back Issues		
Gross Income.....	\$4,586.57	
Cost of Sales.....	1,972.84	2,613.73
		<hr/>
Income from Investments.....	1,763.65	
		<hr/>
<i>Total Revenue</i>		\$29,234.43

*Expenses*Printing of Current *Annals*:

Cost of Current Issues Printed.....	\$14,508.29
Inventory, December 31, 1955 of 1955 <i>Annals</i>	2,270.20

	\$12,238.09	
Editorial Expense.....	268.53	
Miscellaneous Printing, Stationery, Postage.....	1,815.62	
Miscellaneous Office Expense.....	1,650.06	
Salary.....	2,784.48	
Contributions.....	151.73	
Meeting Expense.....	218.36	
President's Office Expenses.....	44.33	
Travel.....	206.00	
F.I.C.A. tax.....	54.79	
		<hr/>
<i>Total Expenses</i>		\$19,428.10
Excess of Revenues over Expenses.....		9,806.33
Minus Addition to Reserve for Maintaining Supply of Back Issues.....		1,326.00
		<hr/>
Increase in Surplus.....		8,480.33
Surplus, December 31, 1954.....	\$34,362.54	
Less adjustment for F.I.C.A. tax.....	34.11	34,328.43
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<i>Surplus, December 31, 1955</i>		\$42,808.76

A. H. BOWKER,
Treasurer