

and mass, tire and leather testing, radioactivity standards, spectrochemistry, and chemical thermometric standards. On Saturday a demonstration of the National Bureau of Standards Eastern Automatic Computer—the SEAC—was held. The generation and testing of random numbers and a solution of Laplace's equation by the Monte Carlo method were demonstrated.

CHURCHILL EISENHART  
*Assistant Secretary*

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## REPORT OF THE BOSTON MEETING OF THE INSTITUTE

The fourteenth Annual Meeting of the Institute of Mathematical Statistics was held in Boston, Massachusetts on December 26–29, 1951. Headquarters were at the Copley Plaza Hotel where all the sessions were held. Joint sessions were held with the American Statistical Association and the Econometric Society. The following 225 members of the Institute attended:

Adam Abruzzi, F. S. Acton, Beatrice Aitchison, J. E. Alman, R. L. Anderson, T. W. Anderson, F. W. Appel, H. E. Arnold, K. J. Arnold, Max Astrachan, J. C. Bain, T. A. Bancroft, G. E. Bates, H. P. Beard, R. E. Bechhofer, Joseph Berkson, C. A. Bicking, C. I. Bliss, Isadore Blumen, C. A. Bodwell, Paul Boschan, R. C. Bose, R. A. Bradley, A. E. Brandt, M. F. Bresnahan, (Mrs.) Jean Bronfenbrenner, (Mrs.) Bernice Brown, T. H. Brown, M. A. Brumbaugh, T. A. Budne, R. W. Burgess, I. W. Burr, L. D. Calvin, B. H. Camp, G. A. Carlton, P. C. Clifford, W. G. Cochran, F. G. Cornell, Jerome Cornfield, L. M. Court, David Cowan, C. C. Craig, S. L. Crump, J. F. Daly, G. B. Dantzig, B. B. Day, F. R. DelPriore, Lucile Derrick, Philip Desind, W. J. Dixon, J. L. Dolby, Robert Dorfman, H. F. Dorn, J. A. Dudman, A. J. Duncan, D. B. Duncan, C. W. Dunnett, David Durand, Solomon Dutka, A. M. Dutton, P. S. Dwyer, J. S. Elston, Benjamin Epstein, W. T. Federer, Robert Ferber, J. W. Fertig, C. H. Fischer, Evelyn Fix, L. R. Frankel, D. A. S. Fraser, H. A. Freeman, Milton Friedman, Edward Fritz, M. A. Girshick, Abraham Golub, L. A. Goodman, G. E. Gourrich, E. L. Green, B. G. Greenberg, S. W. Greenhouse, T. N. E. Greville, A. A. Grometstein, Frank Gross, H. O. Gulliksen, E. J. Gumbel, L. S. Gunlogson, John Gurland, Margaret Gurney, R. K. Haddad, K. W. Halbert, Max Halperin, J. F. Hannan, M. H. Hansen, H. H. Harman, G. M. Harrington, Boyd Harshbarger, J. L. Hodges, Jr., R. G. Hoffman, W. C. Hood, H. B. Horton, D. G. Horvitz, R. H. Hoskins, E. E. Houseman, H. S. Houthakker, W. G. Howe, C. H. Hubbell, H. M. Humes, Leonid Hurwicz, E. R. Immel, S. L. Isaacson, J. E. Jackson, T. A. Jeeves, P. O. Johnson, H. L. Jones, A. E. Karp, Leo Katz, H. J. Kelly, J. C. Kiefer, E. P. King, Jr., T. C. Koopmans, R. L. Kozelka, K. H. Kramer, William Kruskal, Jack Laderman, D. H. Leavens, G. J. Lieberman, J. E. Lieberman, R. E. Link, S. B. Littauer, G. F. Lunger, W. G. Madow, E. S. Marks, Jacob Marschak, P. J. McCarthy, G. E. McCreary, F. E. McIntyre, Paul Meier, Margaret Merrell, C. A. Metzner, M. F. Millikan, Albert Mindlin, Robert Mirsky, E. B. Mode, J. E. Morton, L. E. Moses, Jack Moshman, Frederick Mosteller, Hugo Muench, R. B. Murphy, N. R. Neifeld, C. J. Nesbitt, R. T. Nichols, H. Nisselson, G. E. Noether, M. L. Norden, H. W. Norton, E. G. Olds, Ingram Olkin, P. S. Olmstead, Toby Oxtoby, W. R. Pabst, Jr., R. E. Patton, B. E. Phillips, Aditya Prakash, D. A. Probst, Frank Proschan, Howard Raiffa, L. J. Reed, P. R. Rider, H. M. Roberts, C. F. Roos, J. H. Roseboom, Irving Roshwalb, S. N. Roy, Herman Rubin, Rose Sachs, M. M. Sandomire, M. A. Schneiderman, E. L. Scott, Esther Seiden, Jack Sherman, S. S. Shrikhande, Elizabeth Shuhany, I. H. Siegel, W. R. Simmons, W. B. Simpson, Rosedith Sitgreaves, F. H. Smith, J. H. Smith, Milton Sobel,

Herbert Solomon, F. A. Sorenson, Mortimer Spiegelman, M. D. Springer, J. P. Stanley, C. M. Stein, Joseph Steinberg, H. W. Steinhaus, F. F. Stephan, S. A. Stouffer, W. F. Taylor, Henry Teicher, Dan Teichroew, B. J. Tepping, J. R. Terrell, M. E. Terry, W. R. Thompson, R. M. Thrall, D. V. Tiedeman, J. W. Tukey, D. F. Votaw, Jr., J. E. Walsh, E. S. Weiss, Samuel Weiss, E. L. Welker, Phillips Whidden, A. G. Whitney, S. S. Wilks, Gerald Winston, Jacob Wolfowitz, M. A. Woodbury, C. A. Wright, Jacob Yerushalmy, William Youden, W. B. Zacharias.

The meeting opened on Wednesday, December 26, 1:30 P.M. with the first session of contributed papers, Professor S. B. Littauer, Columbia University, presiding. The following papers were presented:

1. *Two Rank Order Tests Which Are Most Powerful against Specific Parametric Alternatives*. Milton E. Terry, Jr., Virginia Polytechnic Institute.
2. *Partially Balanced Designs with  $k > r = 3, \lambda_1 = 1, \lambda_2 = 0$* . R. C. Bose and W. H. Clatworthy, University of North Carolina.
3. *Some Observations on the F-test in Analysis of Variance*. S. N. Roy, University of North Carolina.
4. *The Neyman-Pearson Lemma Factor Functions*. L. M. Court, American Power Jet Company, New York.
5. *The Probability of a Correct Ranking. Preliminary Report*. Robert E. Bechhofer, Columbia University.
6. *A Nonparametric Analogue Based upon Ranks of One-way Analysis of Variance*. William Kruskal, University of Chicago.
7. *A Series of Group Divisible Designs for Two-way Elimination of Heterogeneity*. S. S. Shrikhande, University of Kansas.
8. *A Test of the Uniformity of the Circular Distribution. Preliminary Report*. J. A. Greenwood, Manhattan Life Insurance Company, and David Durand, National Bureau of Economic Research.
9. *A Method for Limit Theorems in Markov Chains*. (By title.) T. E. Harris, The Rand Corporation.
10. *On Tests of Certain Hypotheses About Multivariate Normal Populations*. (By title.) S. N. Roy, University of North Carolina.
11. *An Inequality for Orthogonal Arrays of Strength 2*. (By title.) S. S. Shrikhande, University of Kansas.

At the second session, at 3:30 on the opening day, on *Monte Carlo Methods*, the following papers were given:

1. *Some Experiments on Monte Carlo Methods*. John Todd, National Bureau of Standards.
2. *Empirical Sampling Distributions*. Dan Teichroew, University of North Carolina.

Discussion was by Professor R. L. Anderson, University of North Carolina. Professor Paul S. Dwyer, University of Michigan, was chairman of the session.

A session on *Problems of Identifiability* was held jointly with the American Statistical Association and the Econometric Society at 9:30 A.M. on Thursday, December 27, with Professor Robert Solow, Massachusetts Institute of Technology, as chairman. The following three papers were presented:

1. *Identifiability and Consistent Estimability of Structural Relations*. Jerzy Neyman, University of California, Berkeley.
2. *Systems of Nonlinear Stochastic Difference Equations*. Herman Rubin, Stanford University.

3. *Necessary and Sufficient Conditions for Consistent Estimability*. J. L. Hodges, University of Chicago.

Discussion was by Professor C. M. Stein, University of Chicago, Professor L. Hurwicz, University of Minnesota, and Professor T. A. Jeeves, University of California, Berkeley.

The second session of contributed papers was held at 9:30 A.M. on Thursday, December 27, with Marion M. Sandomire, Atomic Energy Commission, New York, presiding. The following papers were presented:

1. *The Distribution of the Range in Samples from a Compound Normal Population*. Kenneth H. Kramer, Youngstown Sheet and Tube Company.
2. *On the Operating Characteristics of Certain Quality Control Tests*. John E. Walsh, U. S. Naval Ordnance Test Station, Pasadena.
3. *Operating Characteristic of the Control Chart for Sample Means. Preliminary Report*. Edgar P. King, Carnegie Institute of Technology.
4. *Joint Sampling Distribution of the Mean and Standard Deviation for Frequency Functions of the Second Kind*. Melvin D. Springer, U. S. Naval Ordnance, Indianapolis.
5. *Statistical Theory of Droughts*. E. J. Gumbel, Consultant, Stanford University.
6. *Some Tests based on the First  $r$  Ordered Observations Drawn from an Exponential Distribution*. Benjamin Epstein and Milton Sobel, Wayne University.
7. *Some Theorems Relevant to Life Testing*. Milton Sobel and Benjamin Epstein, Wayne University.
8. *A Method of Reducing the Time Required to Complete Certain Fatigue Tests*. Leonard G. Johnson, General Motors Corporation, Detroit.
9. *On the Multivariate Poisson Distribution*. Henry Teicher, Purdue University.
10. *Formulas for Approximating the Hypergeometric and Binomial by the Poisson Distribution*. Irving W. Burr, Purdue University.
11. *Distribution of Ranges from an Arbitrary Discrete Universe*. (By title.) Irving W. Burr, Purdue University.

At 1:30 P.M., Thursday, December 27, a session on *Statistical Models in Learning Theory* was held, with Professor Harold Gulliksen, Educational Testing Service, Princeton, N. J., as chairman. The following papers were presented:

1. *A Linear-operator Model for Learning*. Robert H. Bush and Frederick Mosteller, Harvard University.
2. *A Statistical Description for Verbal Learning*. George A. Miller and William J. McGill, Massachusetts Institute of Technology.
3. *Application of a Set-theoretical Model to Learning Phenomena*. Cletus J. Burke and W. K. Estes, Indiana University.

Discussion was by Professor Max A. Woodbury, Princeton University, Professor J. C. R. Licklider, Massachusetts Institute of Technology and Professor Leo Goodman, University of Chicago.

An invited address on *The Spectrum View of the Analysis of Time Series* was presented by Professor John W. Tukey, Bell Telephone Laboratories, at 3:30 P.M., Thursday, December 27. Discussion was given by Professor Guy H. Orcutt, Harvard University, and Professor T. W. Anderson, Columbia University. Professor M. A. Girshick, Stanford University, was chairman of the session.

A session on *Statistical Inference* was held at 9:30 A.M., Friday, December 28, Professor S. S. Wilks, Princeton University, serving as chairman. The following two papers were given:

1. *The Chi-square Test of Goodness of Fit*. W. G. Cochran, Johns Hopkins University.
2. *Analyzing Straight Line Data*. Forman S. Acton, National Bureau of Standards, Institute of Numerical Analysis.

Discussion was by Dr. William F. Taylor, School of Aviation Medicine, Randolph Field, and Dr. W. J. Youden, National Bureau of Standards.

The session, *Sampling in the 1950 Census*, was held jointly with the American Statistical Association at 1:30 P.M., Friday, December 28, with Morris H. Hansen, Bureau of the Census, presiding. The following two papers were given:

1. *Sampling in the 1950 Census of Population and Housing*. Joseph Steinberg and Joseph Waksberg, with A. Mindlin, T. Jabine, N. Lieder and H. Hess, Bureau of the Census.
2. *Sampling in the 1950 Census of Agriculture*. Harold Nisselson and Floyd Berger, Bureau of the Census.

Discussion was by Professor Frederick F. Stephan, Princeton University, and Earl N. Houseman, Bureau of Agricultural Economics.

At 3:30 P.M., Friday, December 28, there was a Round Table on *Goals for the Study of Mathematics by Social Scientists* held jointly with the American Statistical Association and the Econometric Society, Professor William G. Madow, University of Illinois, serving as moderator. The five speakers were Professors George A. Miller, Massachusetts Institute of Technology, Jacob Marschak, University of Chicago, Paul F. Lazarsfeld, Columbia University, Frederick F. Stephan, Princeton University, Rutledge Vining, University of Virginia; and discussants were members of the Committee on the Mathematical Training of Social Scientists.

At 9:30 A.M., Saturday, December 29, the Institute joined with the American Statistical Association, the American Society of Actuaries, the Biometric Society, and the American Association of University Teachers of Insurance in a session on *Discrete Random Processes and Actuarial Theory*, at which H. L. Seal of Morss and Seal gave an invited address on *Probability Theory of Decrements from Population*. There was discussion by Professor H. W. Alexander, Adrian College (represented by C. J. Nesbitt), Dr. T. N. E. Greville, National Office of Vital Statistics, and Dr. John E. Walsh, U. S. Naval Ordnance Test Station, Pasadena. Dr. Mortimer Spiegelman, Metropolitan Life Insurance Company, served as chairman.

A session on *Efficiency and Superefficiency of Estimates* was held at 1:30 P.M., Saturday, December 29, with Dr. J. F. Daly, Bureau of the Census, presiding. The following four papers were presented:

1. *On the Problem of Asymptotic Efficiency of Estimates*. Jerzy Neyman, University of California, Berkeley.
2. *Local Superefficiency*. J. L. Hodges, University of Chicago.

3. *On Sets of Parameter Points where It Is Possible to Achieve Superefficiency of Estimates.* Lucien M. Le Cam, University of California, Berkeley.
4. *Relative Precision of Least Squares and Maximum Likelihood Estimates of Regression Coefficients.* Joseph Berkson, Mayo Clinic.

The third session of contributed papers was the closing session of the meeting, held at 3:30 P.M., Saturday, December 29. Professor Elmer B. Mode of Boston University served as chairman and the following papers were presented:

1. *Sufficient Statistics and Selection Depending on the Parameter.* D. A. S. Fraser, University of Toronto.
2. *On a Problem Suggested by Blackwell. Preliminary Report.* Charles Stein, University of Chicago.
3. *On a Class of Infinitely Divisible Distributions.* Gopinath Kallianpur, University of California, Berkeley, and Herbert Robbins, University of North Carolina.
4. *Almost Sure Estimability of Linear Structures in  $n$  Dimensions.* T. A. Jeeves, University of California, Berkeley.
5. *Completeness of the Class of Admissible Decision Procedures.* Herman Rubin, Stanford University.
6. *Moment-Problem Solutions with Continuous Derivatives.* Lionel Weiss, University of Virginia.
7. *Significance Consistency of the Basic Neyman-Pearson Test.* (By title.) L. M. Court, American Power Jet Company, New York.

Meetings of the Council were held on Thursday, December 27, and Friday, December 28, both at 5:40 P.M., with Professor Paul S. Dwyer and Professor M. A. Girshick, respectively, presiding. The Business Meeting was held on Friday, December 28, at 8:30 A.M., with Professor Dwyer presiding. The report of this meeting appears elsewhere in this issue.

S. B. LITTAUER,  
Associate Secretary  
ELMER B. MODE,  
Assistant Secretary

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## MINUTES OF THE ANNUAL MEMBERSHIP MEETING,

BOSTON, DECEMBER 28, 1951

The meeting was called to order at 8:35 A.M. in the Foyer of the Hotel Copley Plaza by President P. S. Dwyer. There were thirty-five members present.

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

A report of the Committee on the Editorship was given by S. S. Wilks with the information that the Council had approved the report and elected E. L. Lehmann as Editor for 1953-1955.

\* The report of the Committee on Fellows was given. The names of the newly elected fellows are included in the report of the President.