

**THEODORE W. ANDERSON**  
Professor of Statistics and of Economics, Emeritus

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### Education

1937 North Park College A.A. (Valedictorian)  
1939 Northwestern University B.S. with Highest Distinction, Mathematics  
1942 Princeton University M.A., Mathematics  
1945 Princeton University Ph.D., Mathematics

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### Professional Experience

1939–1940 Assistant in Mathematics, Northwestern University  
1941–1943 Instructor in Mathematics, Princeton University  
1943–1945 Research Associate, National Defense Research Committee, Princeton University  
1945–1946 Research Associate, Cowles Commission for Research in Economics, University of Chicago  
1946–1947 Instructor in Mathematical Statistics, Columbia University  
1947–1950 Assistant Professor of Mathematical Statistics, Columbia University  
1950–1951,  
1963 Acting Chairman, Department of Mathematical Statistics, Columbia University  
1950–1956 Associate Professor of Mathematical Statistics, Columbia University  
1956–1967 Professor of Mathematical Statistics, Columbia University  
1956–1960,  
1964–1965 Chairman, Department of Mathematical Statistics, Columbia University  
1967–1988 Professor of Statistics and of Economics, Stanford University  
1988– Professor Emeritus of Statistics and of Economics, Stanford University

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### Professional Activities

1947–1948 Guggenheim Fellow, University of Stockholm and University of Cambridge  
1954 Visiting Associate Professor of Statistics, Stanford University  
1957–1958 Fellow, Center for Advanced Study in the Behavioral Sciences  
1967–1968 Academic Visitor, Imperial College of Science and Technology, University of London;  
Visiting Professor of Mathematics, University of Moscow;  
Visiting Professor of Statistics, University of Paris  
1972–1973,  
1980 Visiting Scholar, Center for Advanced Study in the Behavioral Sciences (CASBS), Stanford University  
1974–1975 Academic Visitor, London School of Economics and Political Science  
1977 Research Visitor, Tokyo Institute of Technology (Japanese Society for the Promotion of Science)  
1980 Sherman Fairchild Distinguished Scholar, California Institute of Technology  
1983–1984 Wesley C. Mitchell Visiting Professor of Economics, Columbia University  
1983–1984 Visiting Research Professor of Economics, New York University  
1984 Sabbaticant, IBM Systems Research Institute  
1986–1987 Research Associate, Naval Postgraduate School  
1989 Academic Visitor, University of Southern California  
1989 Visiting Distinguished Professor of the Norwegian Council for Scientific and Industrial Research,  
University of Oslo

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1946–1960 Research Consultant, Cowles Foundation for Research in Economics  
1947 Consultant, Bureau of Applied Social Research  
1949–1966 Consultant, Rand Corporation

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1950–1968 Director, Office of Naval Research Project, Department of Mathematical Statistics, Columbia University  
1968–1982 Director, Office of Naval Research Project, Department of Statistics, Stanford University  
1969–1983 Principal Investigator, National Science Foundation Project, Department of Economics, Stanford University  
1983–1992 Principal Investigator, National Science Foundation Project, Department of Statistics, Stanford University  
1982–1992 Principal Investigator, Army Research Office Project, Department of Statistics, Stanford University

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1950–1952 Editor, *Annals of Mathematical Statistics*  
1963 President, Institute of Mathematical Statistics  
1971–1973 Vice President, American Statistical Association  
1972 Scientific Director, NATO Advanced Study Institute on Discriminant Analysis and Its Applications, Kifissia, Greece  
1980–1988 Associate Editor, *Journal of Time Series Analysis*  
1990–1991 Chair, Section U (Statistics), American Association for the Advancement of Science (Chair-elect 1989–90; Retiring Chair, 1991–92)

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1955–1958 Member, NAS-NRC Committee on Basic Research, Advisory to the Office of Ordinance Research  
1960–1963 Member, NRC Committee on Statistics (Chairman, 1961–63)  
1964–1965 Member, NAS-NRC Panel on Applied Mathematics, Advisory to the National Bureau of Standards  
1965–1968 Member, NAS Committee on Support of Research in Mathematical Sciences  
1962–1964 Member, Committee of Presidents of Statistical Societies (COPSS)  
1963–1964 Member, Executive Committee, Conference Board of the Mathematical Sciences  
1954–1972 Member, Editorial Board, *Psychometrika*  
1985– Member, Advisory Board, *Econometric Theory*  
1988– Member, Advisory Board, *Journal of Multivariate Analysis*  
1980,  
1988, 1989 Member, Class Membership Committee, National Academy of Sciences

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## Memberships

Fellow, American Academy of Arts and Sciences (elected 1974)  
American Association for the Advancement of Science  
Institute of Mathematical Statistics (Member of Council)  
American Statistical Association  
Royal Statistical Society  
Econometric Society

Member, National Academy of Sciences (elected 1976)  
American Mathematical Society  
Bernoulli Society for Mathematical Statistics and Probability  
Psychometric Society (Council of Directors)  
International Statistical Institute  
Phi Beta Kappa

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## Honors and Awards

1980 Lecturer, Workshop on Econometrics of the Chinese Academy of Social Sciences, Beijing  
1982 Abraham Wald Memorial Lecturer, Institute of Mathematical Statistics  
1983 S.S. Wilks Memorial Lecturer, Princeton University  
1985 R.A. Fisher Lecturer, American Statistical Association  
1985 P.C. Mahalanobis Memorial Lecturer, Indian Statistical Institute  
1985 S.N. Roy Memorial Lecturer, Calcutta University

1985	R.A. Fisher Award of Committee of Presidents of Statistical Societies
1987	Distinguished Alumnus Award, North Park College and Theological Seminary
1988	Doctor of Letters, North Park College and Theological Seminary
1988	Samuel S. Wilks Memorial Medal, American Statistical Association
1989	Award of Merit, Northwestern University Alumni Association
1989	Doctor of Science, Northwestern University
1991	Allen T. Craig Lecturer, University of Iowa
1992	C.G. Khatri Visiting Scholar and Memorial Lecturer, Pennsylvania State University
1992	Distinguished Alumnus Award, Minnehaha Academy, Minneapolis
1994	Foreign Member of the Norwegian Academy of Science and Letters
1995	George Zyskind Memorial Lecture, Iowa State University
1995	Thirteenth Pfizer Colloquium Lecture, University of Connecticut
1997	Doctor of Philosophy Honoris Causa, University of Oslo
1999	Doctor Honoris Causa, University of Athens

## Interviews

1. A Conversation with T.W. Anderson: An interview with Morris De Groot (1986). *Statist. Sci.* **1**, 97–105.
2. The ET Interview with Peter C.B. Phillips (1986). *Economet. Theory* **2**, 249–287.
3. A Conversation with Ted Anderson: A videotaped interview with Wayne Fuller and Michael Perlman (1995). The American Statistical Association Filming of Distinguished Statisticians.

## BIBLIOGRAPHY

### Books

1. *An Introduction to Multivariate Statistical Analysis* (1958). John Wiley & Sons, New York, xii+374pp.
  - (1963) Russian translation: Vvedenie v Mnogomernyy Statističeskii Analiz, Gosudarstvennec Izdatel'stvo Fizikomatematičeskoi Literatury, Moscow, 500pp.
  - (1972) Reprinted: Wiley Eastern Private Limited, New Delhi.
  - (1984) Second edition: John Wiley & Sons, New York, xvii+675pp.
  - (2003) Third edition: John Wiley & Sons, New York, xx+721pp.
2. *The Statistical Analysis of Time Series* (1971). John Wiley & Sons, New York, xiv+704pp.
  - (1976) Russian translation: Statističeskii Analiz Vremennykh Rjadov, Izdatelstvo "MIR," Moscow, 755pp.
  - (1994) Wiley Classics Library edition: Volume 50, Wiley-Interscience, 704pp.
3. *A Bibliography of Multivariate Statistical Analysis* (with Somesh Das Gupta and George P.H. Styan) (1972). Oliver & Boyd, Edinburgh, and Halsted Press, New York, x+642pp.
  - (1977) Reprinted: Robert E. Krieger Publishing Co., Malibar, Florida.
4. *Introductory Statistical Analysis* (with Stanley L. Sclove) (1974). Houghton Mifflin Co., Boston, xv+499pp.
5. *An Introduction to the Statistical Analysis of Data* (with Stanley L. Sclove) (1978). Houghton Mifflin Co., Boston, xvi+704pp.
  - (1986) Second edition: The Scientific Press, Palo Alto, xii+628pp.
6. *MINITAB Guide to the Statistical Analysis of Data* (with Barrett P. Eynon) (1986). The Scientific Press, Palo Alto, viii+203pp.
7. *The New Statistical Analysis of Data* (with Jeremy D. Finn) (1996). Springer-Verlag, New York, xxi+712pp.
  - (1996) Chinese translation: xv+627pp.

## Books Edited

1. *Selected Papers in Statistics and Probability by Abraham Wald* (1955). McGraw-Hill Book Co., New York, and Stanford University Press, Stanford, California, v+702pp.
2. *S.S. Wilks: Collected Papers, Contributions to Mathematical Statistics* (1967). John Wiley & Sons, New York, xxxii+693pp.
3. *Probability, Statistics, and Mathematics: Papers in Honor of Samuel Karlin* (with Krishna B. Athreya and Donald L. Iglehart) (1989). Academic Press, Boston, xl+371pp.
4. *Statistical Inference in Elliptically Contoured and Related Distributions* (with Kai-Tai Fang) (1990). Allerton Press, New York, vii+498pp.
5. *Multivariate Analysis and Its Applications* (with K.T. Fang and I. Olkin) (1994). Institute of Mathematical Statistics, Hayward, California, xiv+471pp.

## Books Reviewed

1. *Contributions to the Study of Oscillatory Time-Series* by M.G. Kendall (1947). *J. Amer. Statist. Assoc.* **42**, 187–188.
2. *Metoder att Uppskata Noggranheten vid Linje-och Provytetaxering (Methods of Estimating the Accuracy of Line and Sample Plots Surveys)* by Bertil Matérn (1949). *J. Amer. Statist. Assoc.* **44**, 323–325.
3. *The Analysis of Multiple Time Series* by M.H. Quenouille (1961). *J. Amer. Statist. Assoc.* **56**, 419–421.
4. *Some Aspects of Multivariate Analysis* by S.N. Roy (1962). *Econometrica* **30**, 385–387.
5. *Measurement Error Models* by Wayne A. Fuller (1990). *Metrika* **37**, 316–319.

## Publications

1. Some significance tests for normal bivariate distributions (with D.S. Villars) (1943). *Ann. Math. Statist.* **14**, 141–148.
2. On card matching (1943). *Ann. Math. Statist.* **14**, 426–435.
3. Some extensions of the Wishart distribution (with M.A. Girshick) (1944). *Ann. Math. Statist.* **15**, 345–357. [Correction (1964). **35**, 923–924.]
4. The non-central Wishart distribution and certain problems of multivariate statistics (1946). *Ann. Math. Statist.* **17**, 409–431. [Correction (1964). **35**, 923–924.]
5. A note on a maximum-likelihood estimate (1947). *Econometrica* **15**, 241–244.
6. On the theory of testing serial correlation (1948). *Skandinavisk Aktuarietidskrift* **31**, 88–116.
7. The asymptotic distributions of the roots of certain determinantal equations (1948). *J. Roy. Statist. Soc. Ser. B* **10**, 132–139.
8. Estimation of the parameters of a single equation in a complete system of stochastic equations (with Herman Rubin) (1949). *Ann. Math. Statist.* **20**, 46–63. [Reprinted (1970) in *Readings in Econometric Theory* (J. Malcolm Dowling and Fred R. Glahe, eds.), 358–375. Colorado Associated University Press.]
9. Distribution of the circular serial correlation coefficient for residuals from a fitted Fourier series (with R.L. Anderson) (1950). *Ann. Math. Statist.* **21**, 59–81.
10. Estimation of the parameters of a single equation by the limited-information maximum-likelihood method (1950). In *Statistical Inference in Dynamic Economic Models* (Tjalling C. Koopmans, ed.), 311–322. John Wiley & Sons, New York.
11. The asymptotic properties of estimates of the parameters of a single equation in a complete system of stochastic equations (with Herman Rubin) (1950). *Ann. Math. Statist.* **21**, 570–582. [Reprinted in *Readings in Econometric Theory* (J. Malcolm Dowling and Fred R. Glahe, eds.), 376–388. Colorado Associated University Press.]
12. Classification by multivariate analysis (1951). *Psychometrika* **16**, 31–50.

13. The asymptotic distribution of certain characteristic roots and vectors (1951). *Proceedings of the Second Berkeley Symposium on Mathematical Statistics and Probability* (Jerzy Neyman, ed.), 103–130. University of California Press, Berkeley.
14. Estimating linear restrictions on regression coefficients for multivariate normal distributions (1951). *Ann. Math. Statist.* **22**, 327–351. [Correction (1980). *Ann. Statist.* **8**, 1400.]
15. Asymptotic theory of certain ‘goodness of fit’ criteria based on stochastic processes (with D.A. Darling) (1952). *Ann. Math. Statist.* **23**, 193–212.
16. Probability models for analyzing time changes in attitudes (1954). In *Mathematical Thinking in the Social Sciences* (Paul F. Lazarsfeld, ed.), 17–66, 418–419. The Free Press, Glencoe, Illinois.
17. On estimation of parameters in latent structure analysis (1954). *Psychometrika* **19**, 1–10.
18. A test of goodness of fit (with D.A. Darling) (1954). *J. Amer. Statist. Assoc.* **49**, 765–769.
19. Some statistical problems in relating experimental data to predicting performance of a production process (1955). *J. Amer. Statist. Assoc.* **50**, 163–177.
20. The integral of a symmetric unimodal function over a symmetric convex set and some probability inequalities (1955). *Proc. Amer. Math. Soc.* **6**, 170–176.
21. Some recent results in latent structure analysis (1955). In *Proceedings of the Invitational Conference on Testing Problems, October 30, 1954*, 49–53. Educational Testing Service, Princeton, New Jersey.
22. Statistical inference in factor analysis (with Herman Rubin) (1956). *Proceedings of the Third Berkeley Symposium on Mathematical Statistics and Probability* (Jerzy Neyman, ed.) **5**, 111–150. University of California Press.
23. Statistical inference about Markov chains (with Leo A. Goodman) (1957). *Ann. Math. Statist.* **28**, 89–110. [Reprinted (1963) in *Readings in Mathematical Psychology* (R. Duncan Luce, Robert R. Bush, and Eugene Galanter, eds.) **1**, 241–262. John Wiley & Sons, New York.]
24. Maximum likelihood estimates for a multivariate normal distribution when some observations are missing (1957). *J. Amer. Statist. Assoc.* **52**, 200–203.
25. On asymptotic distributions of estimates of parameters of stochastic difference equations (1959). *Ann. Math. Statist.* **30**, 676–687.
26. Some scaling models and estimation procedures in the latent class model (1959). In *Probability and Statistics: The Harald Cramér Volume* (Ulf Grenander, ed.), 9–38. Almqvist and Wiksell, Stockholm.
27. A modification of the sequential probability ratio test to reduce the sample size (1960). *Ann. Math. Statist.* **31**, 165–197.
28. A limitation of the optimum property of the sequential probability ratio test (with Milton Friedman) (1960). In *Contributions to Probability and Statistics: Essays in Honor of Harold Hotelling* (Ingram Olkin, Sudhish G. Ghurye, Wassily Hoeffding, William G. Madow, and Henry B. Mann, eds.), 57–69. Stanford University Press, Stanford.
29. Some stochastic process models for intelligence test scores (1960). *Mathematical Methods in the Social Sciences* (Kenneth J. Arrow, Samuel Karlin, and Patrick Suppes, eds.), 205–220. Stanford University Press, Stanford, California.
30. The choice of the degree of a polynomial regression as a multiple decision problem (1962). *Ann. Math. Statist.* **33**, 255–265.
31. Least squares and best unbiased estimates (1962). *Ann. Math. Statist.* **33**, 266–272.
32. Classification into two multivariate normal distributions with different covariance matrices (with R.R. Bahadur) (1962). *Ann. Math. Statist.* **33**, 420–431.
33. On the distribution of the two-sample Cramér–von Mises criterion (1962). *Ann. Math. Statist.* **33**, 1148–1159.
34. The use of factor analysis in the statistical analysis of multiple time series (1963). *Psychometrika* **28**, 1–25.
35. Asymptotic theory for principal component analysis (1963). *Ann. Math. Statist.* **34**, 122–148.
36. A test for equality of means when covariance matrices are unequal (1963). *Ann. Math. Statist.* **34**, 671–672.

37. Determination of the order of dependence in normally distributed time series (1963). *Proceedings of the Symposium on Time Series Analysis* (M. Rosenblatt, ed.), 425–446. John Wiley & Sons, New York.
38. Some inequalities on characteristic roots of matrices (with S. Das Gupta) (1963). *Biometrika* **50**, 522–524. [Correction (1965): **52**, p.669.]
39. Monotonicity of the power functions of some tests of the multivariate linear hypothesis (with S. Das Gupta and G.S. Mudholkar) (1964). *Ann. Math. Statist.* **35**, 200–205.
40. Monotonicity of the power functions of some tests of independence between two sets of variates (with S. Das Gupta) (1964). *Ann. Math. Statist.* **35**, 206–208.
41. Some approaches to the statistical analysis of time series (1964). *Australian J. Statist.* **6**, 1–11.
42. A monotonicity property of the power functions of some tests of the equality of two covariance matrices (with S. Das Gupta) (1964). *Ann. Math. Statist.* **35**, 1059–1063.
43. On Bayes procedures for a problem with choice of observations (1964). *Ann. Math. Statist.* **35**, 1128–1135.
44. On the asymptotic distribution of the autocorrelations of a sample from a linear stochastic process (with A.M. Walker) (1964). *Ann. Math. Statist.* **35**, 1296–1303.
45. Sequential analysis with delayed observations (1964). *J. Amer. Statist. Assoc.* **59**, 1006–1015.
46. Samuel Stanley Wilks, 1906–1964 (1965). *Ann. Math. Statist.* **36**, 1–27. [Reprinted in *S.S. Wilks: Collected Papers, Contributions to Mathematical Statistics* (T.W. Anderson, ed.) (1967), vii–xxvi. John Wiley & Sons, New York.]
47. Some optimum confidence bounds for roots of determinantal equations (1965). *Ann. Math. Statist.* **36**, 468–488.
48. Some properties of confidence regions and tests of parameters in multivariate distributions (with discussion) (1965). In *Proceedings of the IBM Scientific Computing Symposium in Statistics, October 21–23, 1963*, 15–28. IBM Data Processing Division, White Plains, New York.
49. Some nonparametric multivariate procedures based on statistically equivalent blocks (1966). In *Multivariate Analysis* (P.R. Krishnaiah, ed.), 5–27. Academic Press, New York.
50. Some inequalities among binomial and Poisson probabilities (with Stephen M. Samuels) (1967). In *Proceedings of the Fifth Berkeley Symposium on Mathematical Statistics and Probability* (L. Le Cam and J. Neyman, eds.) **1**, 1–12. University of California Press, Berkeley.
51. Approximating the upper binomial confidence limit (with Herman Burstein) (1967). *J. Amer. Statist. Assoc.* **62**, 857–861.
52. Multivariate analysis: classification and discrimination (1968). In *International Encyclopedia of the Social Sciences* (D. Sills, ed.) **10**, 553–559. The Macmillan Co. and the Free Press, New York. [Updated (1978): In *International Encyclopedia of Statistics* (W.H. Kruskal and J.M. Tanur, eds.) **1**, 628–635. The Free Press, New York.]
53. Large-sample distribution theory for estimates of the parameters of a latent class model (1968). In *Latent Structure Analysis* (by P.F. Lazarsfeld and Neil Henry) Appendix B, 273–287. Houghton Mifflin, New York.
54. Approximating the lower binomial confidence limit (with Herman Burstein) (1968). *J. Amer. Statist. Assoc.* **63**, 1413–1415. [Editor’s correction (1969): **64**, p.669.]
55. Statistical inference for covariance matrices with linear structure (1969). In *Multivariate Analysis II* (P.R. Krishnaiah, ed.), 55–66. Academic Press, New York.
56. Confidence limits for the expected value of an arbitrary bounded random variable with a continuous distribution function (1969). *Bulletin of the International Statistical Institute* **43** Book 2, 249–251.
57. Estimation of covariance matrices which are linear combinations or whose inverses are linear combinations of given matrices (1970). In *Essays in Probability and Statistics* (R.C. Bose, I.M. Chakravarti, P.C. Mahalanobis, C.R. Rao, and K.J.C. Smith, eds.), 1–24. Statistical Publishing Society, Calcutta, and University of North Carolina Press, Chapel Hill.
58. Some notes on doing research in mathematical statistics (1970). In *Scientists at Work: Festschrift in Honour of Herman Wold* (T. Dalenius, G. Karlsson, and S. Malmquist, eds.), 21–27. Almqvist and Wiksell Book Co., Uppsala.

59. Efficient estimation of regression coefficients in time series (1972). In *Proceedings of the Sixth Berkeley Symposium on Mathematical Statistics and Probability* (L.M. Le Cam, J. Neyman, and E.L. Scott, eds.) **1**, 471–482. University of California Press, Berkeley.
60. Tests for randomness of directions against equatorial and bimodal alternatives (with M.A. Stephens) (1972). *Biometrika* **59**, 613–621.
61. Asymptotically efficient estimation of covariance matrices with linear structure (1973). *Ann. Statist.* **1**, 135–141.
62. Asymptotic evaluation of the probabilities of misclassification by linear discriminant functions (1973). In *Discriminant Analysis and Applications* (T. Cacoullos, ed.), 17–35. Academic Press, New York.
63. An asymptotic expansion of the distribution of the Studentized classification statistic  $W$  (1973). *Ann. Statist.* **1**, 964–972.
64. Distributions of estimates of coefficients of a single equation in a simultaneous system and their asymptotic expansions (with Takamitsu Sawa) (1973). *Econometrica* **41**, 683–714.
65. An asymptotic expansion of the distribution of the limited information maximum likelihood estimate of a coefficient in a simultaneous equation system (1974). *J. Amer. Statist. Assoc.* **69**, 565–573. [Correction (1976): **71**, p.1010.]
66. Maximum likelihood estimation of parameters of autoregressive processes with moving average residuals and other covariance matrices with linear structure (1975). *Ann. Statist.* **3**, 1283–1304.
67. Estimation of linear functional relationships: Approximate distributions and connections with simultaneous equations in econometrics (with discussion) (1976). *J. Roy. Statist. Soc. Ser. B* **38**, 1–36.
68. Strong consistency of least squares estimates in normal linear regression (with John B. Taylor) (1976). *Ann. Statist.* **4**, 788–790.
69. Some experimental results on the statistical properties of least squares estimates in control problems (with John B. Taylor) (1976). *Econometrica* **44**, 1289–1302.
70. Two-stage least squares: In which direction should the residuals be minimized? (with Takamitsu Sawa) (1977). *J. Amer. Statist. Assoc.* **72**, 187–191.
71. Asymptotic expansions of the distributions of estimates in simultaneous equations for alternative parameter sequences (1977). *Econometrica* **45**, 509–518.
72. A comment on the test of overidentifying restrictions (with Joseph B. Kadane) (1977). *Econometrica* **45**, 1027–1031.
73. Estimation for autoregressive moving average models in the time and frequency domains (1977). *Ann. Statist.* **5**, 842–865.
74. Identification of parameters by the distribution of a maximum random variable (with S.G. Ghurye) (1977). *J. Roy. Statist. Soc. Ser. B* **39**, 337–342.
75. On maximum likelihood estimation of parameters of autoregressive moving average processes (1977). In *Transactions of the Seventh Prague Conference on Information Theory, Statistical Decision Functions, Random Processes and of the 1974 European Meeting of Statisticians, A*, 37–45. Academia, Publishing House of the Czechoslovak Academy of Sciences, Prague, and D. Reidel, Dordrecht.
76. The generalized variance of a stationary autoregressive process (with Raúl P. Mentz) (1977). *J. Multivar. Anal.* **7**, 584–588.
77. A new development in multivariate statistical analysis (1978). *J. Japan Statist. Soc.* **8**, 9–13.
78. Unique factorization of products of bivariate normal cumulative distribution functions (with S.G. Ghurye) (1978). *Ann. Institute Statist. Math.* **30**, 63–69.
79. Repeated measurements on autoregressive processes (1978). *J. Amer. Statist. Assoc.* **73**, 371–378.
80. An extremal problem for positive definite matrices (with I. Olkin) (1978). *Linear and Multilinear Algebra* **6**, 257–262.
81. Evaluation of the distribution function of the two-stage least squares estimate (with Takamitsu Sawa) (1979). *Econometrica* **47**, 163–182.

82. Pao-Lu Hsu 1909–1970 (with K.L. Chung and E.L. Lehmann) (1979). *Ann. Statist.* **7**, 467–470. [Correction (1980): **8**, p.456. Updated (1983): In *Pao-Lu Hsu Collected Papers* (K.L. Chung, ed.), 1–4. Springer-Verlag, New York. Chinese translation (1980): *Knowledge and Practice of Mathematics* **3**, 3–5.]
83. Hsu’s work in multivariate analysis (1979). *Ann. Statist.* **7**, 474–478. [Reprinted (1983): In *Pao-Lu Hsu Collected Papers* (K.L. Chung, ed.), 8–12. Springer-Verlag, New York. Chinese translation (1980): *Knowledge and Practice of Mathematics* **3**, 8–12.]
84. Strong consistency of least squares estimates in dynamic models (with John B. Taylor) (1979). *Ann. Statist.* **7**, 484–489.
85. Panels and time series analysis: Markov chains and autoregressive processes (1979). In *Qualitative and Quantitative Social Research: Papers in Honor of Paul F. Lazarsfeld* (R.K. Merton, J.S. Coleman, and P.H. Rossi, eds.), 82–97. The Free Press, New York.
86. Some relations between Markov chains and vector autoregressive processes (1979). In *International Statistical Institute: Contributed Papers, 42nd Session, December 4–14, 1979*, 25–28. International Statistical Institute, Manila.
87. An inequality for a sum of quadratic forms with applications to probability theory (with John B. Taylor) (1980). *Linear Algebra and Its Applications* **30**, 93–99.
88. Recent results on the estimation of a linear functional relationship (1980). In *Multivariate Analysis V* (P.R. Krishnaiah, ed.), 23–34. North-Holland Publishing Co., Amsterdam.
89. Maximum likelihood estimation for vector autoregressive moving average models (1980). In *Directions in Time Series* (D.R. Brillinger and G.C. Tiao, eds.), 49–59. Institute of Mathematical Statistics, Hayward, California.
90. Finite-state Markov chains and vector autoregressive processes (1980). In *Proceedings of the Conference on Recent Developments in Statistical Methods and Applications*, 1–12. Directorate-General of Budget, Accounting and Statistics, Executive Yuan, Taipei.
91. On the structure of the likelihood function of autoregressive and moving average models (with Raúl P. Mentz) (1980). *J. Time Series Anal.* **1**, 83–94.
92. Estimation of dynamic models with error components (with Cheng Hsiao) (1981). *J. Amer. Statist. Assoc.* **76**, 598–606.
93. Maximum likelihood estimation in autoregressive and moving average models (with Raúl P. Mentz) (1982). In *Time Series Analysis: Theory and Practice 1* (O.D. Anderson, ed.), 23–29. North-Holland Publishing Co., Amsterdam.
94. Cochran’s theorem, rank additivity and tripotent matrices (with George P.H. Styan) (1982). In *Statistics and Probability: Essays in Honor of C.R. Rao* (G. Kallianpur, P.R. Krishnaiah, and J.K. Ghosh, eds.), 1–23. North-Holland Publishing Co., Amsterdam.
95. Exact and approximate distributions of the maximum likelihood estimator of a slope coefficient (with Takamitsu Sawa) (1982). *J. Roy. Statist. Soc. Ser. B* **44**, 52–62.
96. Formulation and estimation of dynamic models using panel data (with Cheng Hsiao) (1982). *J. Economet.* **18**, 47–82. [Reprinted (1993): In *The Econometrics of Panel Data* (G.S. Maddala, ed.) **1**, Part III Chapter 14. Edward Elgar Publishing Ltd., Cheltenham.]
97. Sampling permutations for nonparametric methods (1982). In *Statistics in Theory and Practice: Essays in Honour of Bertil Matérn* (B. Ranneby, ed.), 43–52. Swedish University of Agricultural Sciences, Umeå.
98. Evaluation of the distribution function of the limited information maximum likelihood estimator (with Naoto Kunitomo and Takamitsu Sawa) (1982). *Econometrica* **50**, 1009–1027.
99. Some recent developments on the distributions of single-equation estimators (1982). In *Advances in Econometrics* (W. Hildenbrand, ed.), 109–122. Cambridge University Press, Cambridge.
100. A new proof of admissibility of tests in the multivariate analysis of variance (with Akimichi Takemura) (1982). *J. Multivar. Anal.* **12**, 457–468.
101. Notes on the estimation of parameters in vector autoregressive models (with Raúl P. Mentz) (1983). In *A Festschrift for Erich L. Lehmann in Honor of his Sixty-fifth Birthday* (P.J. Bickel, K.A. Doksum, and J.L. Hodges, Jr., eds.), 1–13. Wadsworth, Belmont, California.



102. The numerical values of some key parameters in econometric models (with Kimio Morimune and Takamitsu Sawa) (1983). *J. Economet.* **21**, 229–243.
103. Comparison of the densities of the TSLS and LIMLK estimators (with Naoto Kunitomo and Takamitsu Sawa). (1983). In *Global Econometrics: Essays in Honor of Lawrence R. Klein* (F.G. Adams and B.G. Hickman, eds.), 103–124. MIT Press, Cambridge, Massachusetts.
104. Estimating linear statistical relationships (1984). *Ann. Statist.* **12**, 1–45 (1982 Abraham Wald Memorial Lectures).
105. Best invariant estimation of a direction parameter (with Charles Stein and Asad Zaman) (1985). *Ann. Statist.* **13**, 526–533.
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