February 2009

CURRICULUM VITAE

Name:	**EMANUEL PARZEN**
Address:	Department of Statistics Texas A&M University College Station, Texas 77843-3143 (979) 845-3188 email: eparzen@stat.tamu.edu

DATE AND PLACE OF BIRTH: April 21, 1929, New York, New York

MAJOR RESEARCH INTERESTS:

Statistical methods mining, practice of all statistical methods;
Change Analysis;
Time Series Analysis (time, space, and spectral domain; reproducing kernels);
Nonparametric, Quantile, Information, Functional Statistical Inference;
Statistical Interdisciplinary Research, Data Modeling;
Statistical Education (reform of Introductory Statistics).

EDUCATION:

1949	A.B., (magna cum laude) Mathematics, Harvard
1951	M.A., Mathematics, University of California, Berkeley
1953	Ph.D., Mathematics and Statistics, University of California, Berkeley Professor M. Loève, Thesis Advisor

ACADEMIC APPOINTMENTS:

1978-	Distinguished Professor, Statistics, Texas A&M University
1970-78	Leading Professor and Director, Statistical Science, State University of New York at Buffalo; Chairman, Statistics, SUNY, Buffalo.
1964-70	Professor, Statistics, Stanford University
1959-64	Associate Professor, Statistics, Stanford University
1956-59	Assistant Professor, Statistics, Stanford University
1955-56	Assistant Professor, Mathematical Statistics, Columbia University
1953-56	Research Scientist, Hudson Labs, Physics, Columbia University
1951-52	Research Assistant, Mathematics, University of California, Berkeley
1949-51	Teaching Assistant, Mathematics, University of California, Berkeley

VISITING APPOINTMENTS:

1998	Visiting Professor, Statistics, Hebrew University
1988	Visiting Professor of Biostatistics, Harvard School of Public Health
1983-84	Fellow, Center for Advanced Study in Behavioral Sciences, Stanford
1976	Visiting Professor, Statistics, Harvard University
1969-70	Fellow, I.B.M. Systems Research Institute, New York City
1964-65	Visiting Professor, Statistics, M.I.T. (Sloan School)
1961-62	Fellow, Statistics, Imperial College London

AWARDS AND HONORS:

2005 American Statistical Association Noether Senior Award for Research in Nonparametric Statistics

2004 Texas A&M Distinguished Achievement Award in Teaching

1994 American Statistical Association Samuel S. Wilks Memorial Medal

1990 Conference of Texas Statisticians Medal (Statistician of the Year)

1990 Texas A&M University Faculty Lecturer of the Year Award

1985 Samuel S. Wilks Medal (for Outstanding Statistical Research/U.S. Army)

1983-84 Fellow, Center for Advanced Study in the Behavioral Sciences, Stanford

1983 Distinguished Achievement in Research Award, Texas A&M University

1952-53 Fellow, National Science Foundation.

1951-96 Research support Office of Naval Research, Army Research Office, National Science Foundation, State of Texas Advanced Research Program.

BIBLIOGRAPHY:

Books

[1] *New Directions in Time Series Analysis*, *Editor*, IMA Volumes in Mathematics and its Applications, Vol. 45, Springer-Verlag: New York 1992.

[2] *Time Series Analysis of Irregularly Observed Data*, *Editor*, Lecture Notes in Statistics, 25, Springer-Verlag: New York, 1984, 363 pages.

[3] *Time Series Analysis Papers*, Holden-Day: San Francisco, CA, 1967, 565 pages.

[4] *Stochastic Processes*, Holden-Day: San Francisco, CA, 1962, 324 pages. Reprinted by SIAM Classic.

[5] *Modern Probability Theory and Its Applications*, Wiley: New York, 1960. Reprinted as Wiley Classic 1992, 464 pages.

[6] *On Uniform Convergence of Families of Sequences of Random Variables*, California Publications in Statistics, University of California Press: Berkeley, 1954, 42 pages.

Papers: (Dates with * denote papers reprinted in *Time Series Analysis Papers*)

[1] 1954 'Some conditions for uniform convergence of integrals' *Proceedings American Mathematical Society*, Vol. 5, 55-58.

[2] 1956* 'On consistent estimates of the spectral density of a stationary time series' *Proc. Nat. Acad. Sci.* (U.S.A.), 42, 1954-1957.

[3] 1956* 'Analysis of a general system for the detection of amplitude-modulated noise' *J. Math. Phys. 35*, 278-288 (with N. Shiren).

[4] 1957* 'A central limit theorem for multilinear stochastic processes' *Ann. Math. Statist., 28*, 252-256.

[5] 1957* 'On consistent estimates of the spectrum of a stationary time series' *Ann. Math. Statist., 28*, 329-348.

[6] 1957* 'On choosing an estimate of the spectral density function of a stationary time series' *Ann. Math. Statist, 28*, 921-932.

[7] 1958* 'Conditions that stochastic processes be ergodic' *Ann. Math. Statist., 29*, 299-301.

[8] 1958* 'On asymptotically efficient consistent estimates of the spectral density function of a stationary time series' *J. Roy. Statist. Soc., Ser. B., 20*, 303-322.

[9] 1959* 'On Models for the Probability of Fatigue Failure of a Structure' North Atlantic Treaty Organization Advisory Group for Aeronautical Research and Development, Report 245, Presented at the Ninth Meeting of the Structures and Materials Panel, held 20-25 April, 1959, in Paris, France. Reprinted in *Time Series Analysis Papers.*

[10] 1959* 'Statistical Inference on Time Series by Hilbert Space Methods, I' Technical Report 23, January 2, 1959, Statistics Department, Stanford University. Reprinted in *Time Series Analysis Papers.*

[11] 1961* 'Mathematical considerations in the estimation of spectra' *Technometrics, 3*, 167-190.

[12] 1961* 'An approach to time series analysis' *Ann. Math. Statist., 32*, 951-989.

[13] 1961* 'Regression analysis of continuous parameter time series' *Proc. Fourth Berkeley Sympos. Math. Statist. and Prob.*, Vol. 1, University of California Press: Berkeley, CA, 1963, 75-108.

[14] 1962* 'Spectral analysis of asymptotically stationary time series' *Bull. Inst. Internat. Statist., 39* (1962), 2, 87-103.

[15] 1962* 'Extraction and detection problems and reproducing kernel Hilbert spaces' *J. SIAM Control, Ser. A, 1*, 35-62.

[16] 1962* 'On Estimation of a probability density function and mode' *Ann. Math. Statis., 32*, 1065-1076.

[17] 1963* 'On spectral analysis with missing observations and amplitude modulation' *Sankhya, Ser. A., 25*, 383-392.

[18] 1963* 'A new approach to the synthesis of optimal smoothing and prediction systems' *Mathematical Optimization Techniques*, edited by R. Bellman, University of California Press: Berkeley, CA, 1963, 75-108.

[19] 1963* 'Probability density functional and reproducing kernel Hilbert spaces" *Proc. Sympos. Time Series Analysis,* Edited by M. Rosenblatt, Wiley: New York, 155-169.

[20] 1963* 'Notes on Fourier Analysis and Spectral Windows' Technical Report No. 48, May 15, 1963, Statistics Department, Stanford University. Reprinted in *Time Series Analysis Papers.*

[21] 1964* 'An approach to empirical time series analysis' *J. Res. Nat. Bur. Standards, Ser. D, 68D*, 937-951.

[22] 1964 'On statistical spectral analysis' *Proc. of Symposium in Applied Mathematics*, Vol. XVII, 221-246. American Mathematical Society Providence, R.I., 1964.

[23] 1966 'Analysis and synthesis of linear models for time series' *Proceedings of U.S.-Japan Cooperative Joint Seminar on Applications of Stochastic Processes to Engineering*, Tokyo, Japan, 1966.

[24] 1967 'Empirical multiple time series analysis' *Proc. of the Fifth Berkeley Symposium on Mathematical Statistics and Probability*, edited by L. LeCam and J. Neyman, University of California Press, 1967, Vol. I, pp. 305-340.

[25] 1967 'The role of spectral analysis in time series analysis' *Review of the International Statistical Institute, Vol. 35*, 125-141.

[26] 1967 'Time series analysis for models of signal plus white noise' in *Spectral Analysis of Time Series*, edited by Bernard Harris, Wiley: New York, 233-257.

[27] 1967 'Comments on spectral analysis' *Transactions of IEEE Audio and Electroacoustic Group*, June, 1967, Vol. AU-15, 75-76.

[28] 1969 'Multiple time series modeling' *Multivariate Analysis - II*, edited by P. Krishnaiah, Academic Press: New York, 289-409.

[29] 1969 'Statistical spectral analysis (single channel case) in 1968' *Proceedings of NATO Advanced Study Institute on Signal Processing, Vol. 1*, 14. 1-14. 20. Twente Institute of Technology: Enschede, Netherlands.

[30] 1970 'Statistical inference on time series by RKHS methods, II' *Proceedings of the 12th Bienniel Seminar of the Canadian Mathematical Congress*, edited by R. Pyke, Canadian Mathematical Congress, Montreal, 1-37.

[31] 1970 'Efficient estimation of stationary time series mixed schemes' *Bulletin of the International Statistical Institute, 44*, 315-319.

[32] 1971 'On the equivalence among time series parameter estimation, approximation theory and control theory' *Proceedings of the Fifth Princeton Conference on Information Science*, Princeton, 1-5.

[33] 1972 'Some recent advances in time series analysis' *Proceedings of the Symposium on Statistical Turbulence*, edited by M. Rosenblatt, Springer Verlag: New York, 470-492.

[34] 1972 'On the role of inverse auto-correlations' *Technometrics, 14*, 295-298.

[35] 1974 'Some Recent Advances in Time Series Modeling' *IEEE Transactions on Automatic Control*, AC-19, 723-730.

[36] 1975 'Some Solutions of the Time Series Modeling and Prediction Problem' *The Search for Oil: Proceedings of a Symposium on Time Series Analysis*, edited by D. Owen, Marcel Dekker: New York, 1-6.

[37] 1975 'The Estimation of Coherence, Frequency Response, and Envelope Delay' *Technometrics, 17*, 167-172. Joint with William S. Cleveland.

[38] 1976 'An Approach to Time Series Modeling and Forecasting Illustrated by Hourly Electricity Demands,' Technical Report.

[39] 1977 'Nonparametric Statistical Data Science: A Unified Approach Based on Density Estimation and Testing for White Noise' Technical Report, Statistical Science Division, SUNY at Buffalo, January 1977.

[40] 1977 'Multiple Time Series: Determining the Order of Approximating Autoregressive Schemes' *Multivariate Analysis - IV*, Edited by P. Krishnaiah, North Holland: Amsterdam, 283-295.

[41] 1977 'New Nonparametric Approach to the Two Sample Problem.' Technical Report. With Jean-Pierre Carmichael.

[42] 1978 'Time Series Modeling of Total Ozone Measurements' and 'Statistical Time Series Analysis of Worldwide Total Ozone for Trends.' Technical Reports joint with M. Pagano.

[43] 1979 'An Approach to Modeling Seasonally Stationary Time Series' *Journal of Econometrics, 9*, 137-153. Joint with M. Pagano.

[44] 1979 'Nonparametric Statistical Data Modeling' *Journal of the American Statistical Association*, (with discussion), 74. 105-131.

[45] 1979 'Forecasting and Whitening Filter Estimation' *TIMS Studies in the Management Sciences, 12*, 149-165.

[46] 1979 'Nonparametric Regression and Bayes Theorem Using Quantile Functions.' Technical Report.

[47] 1979 'A Density-Quantile Function Perspective on Robust Estimation' *Robustness in Statistics*, ed. R. Launer and G. Wilkinson, New York: Academic Press, 237-258.

[48] 1979 'Multiple Time Series Modeling, II' *Multivariate Analysis - V*, edited by P. Krishnaiah, North Holland: Amsterdam, 181-197. Joint with H. J. Newton.

[49] 1979 'Density Quantile Estimation Approach to Statistical Data Modeling,' *Smoothing Techniques for Curve Estimation*, ed. T. Gasser and M. Rosenblatt, Heidelberg: Springer, Lecture Series in Mathematics, 757, 155-180.

[50] 1980 'Time Series Modeling, Spectral Analysis, and Forecasting' *Directions in Time Series Analysis*, ed. D. R. Brillinger and G. C. Tiao, Institute of Mathematical Statistics, 80-111.

[51] 1980 'Comments on Good and Gaskins 'Density Estimation and Bump Hunting", *Journal of the American Statistical Association*, 75, 56-59.

[52] 1980 'Quantile Functions, Convergence in Quantile and Extreme Value Distribution Theory,' Technical Report.

[53] 1981 Comments on 'Nonparametric standard errors and confidence intervals' by Bradley Efron, *Canadian J. Statistics, 9*, 164-165.

[54] 1981 'Time Series Model Identification and Prediction Variance Horizon,' *Proceedings of Second Tulsa Symposium on Applied Time Series Analysis*. Academic Press: New York. 415-447.

[55] 1981 'Modern Empirical Statistical Spectral Analysis,' *Underwater Acoustics and Signal Processing*. Proceedings of NATO Advanced Study Institute, Ed. by L. Bjorno, Reidel: Dordrecht, Netherlands. 471-497.

[56] 1981 'Autoregressive Spectral Estimation, Log Spectral Smoothing, and Entropy.' *IEEE ASSP Workshop on Spectral Estimation*, I, ed. S. W. Haykin.

[57] 1982 'Data Modeling Using Quantile and Density-Quantile Functions,' *Some Recent Advances in Statistics*, ed. J. Tiago de Oliveira and B. Epstein, Academic Press: New York. 23-52.

[58] 1982 'ARARMA Models for Time Series Analysis and Forecasting,' *Journal of Forecasting*, 1, 67-82.

[59] 1982 'The Accuracy of Extrapolation (Time Series) Methods: Results of a Forecasting Competition,' *Journal of Forecasting*, 1, 111-153, with S. Makridakis et al.

[60] 1982 'Cycles,' *Encyclopedia of Statistical Sciences*, ed. S. Kotz and N. L. Johnson, Vol. 2, 253-257, Wiley: New York.

[61] 1982 'Maximum Entropy Interpretation of Autoregressive Spectral Densities,' *Statistics and Probability Letters*, 1, 2-6.

[62] 1983 'Autoregressive Spectral Estimation,' *Handbook of Statistics, III*, ed. D. Brillinger and P. Krishnaiah, Amsterdam: North Holland, 221-247.

[63] 1983 'Quantiles, Parametric-Select Density Estimation, and Bi-Information Parameter Estimators,' *Proceedings of the 14th Annual Symposium on the Interface of Computer Science and Statistics*, New York: Springer Verlag, 241-245.

[64] 1983 'Time Series Model Identification by Estimating Information,' *Studies in Econometrics, Time Series, and Multivariate Statistics in Honor of T. W. Anderson*, ed. S. Karlin, T. Amemiya, L. Goodman, Academic Press: New York, 279-298.

[65] 1983 'Entropy Interpretation of Goodness of Fit Tests,' *Proceedings of the 28th Army Conference on the Design of Experiments*, 1-11. Army Research Office: Durham, N.C.

[66] 1983 'Time Series ARMA Model Identification by Estimating Information' *Proceedings of the 15th Annual Symposium on the Interface of Computer Science and Statistics*, Amsterdam: North Holland.

[67] 1983 'FUN.STAT Quantile Approach to Two Sample Statistical Data Analysis' Technical Report.

[68] 1983 'Time Series Model Identification by Estimating Information, Memory, and Quantiles,' *Questo, 7*, 531-562.

[69] 1983 'Informative Quantile Functions and Identification of Probability Distribution Types,' *Proceedings of the 29th Army Conference on the Design of Experiments*, 97-107.

[70] 1983 'How to Learn from the M-Competition,' *Journal of Forecasting*, 2, 292-293. With H. J. Newton

[71] 1984 'Time Series Model Identification, Spectral Estimation and Functional Inference,' *Statistical Signal Processing* ed. E. J. Wegman and J. G. Smith, Marcel Dekker: New York, 3-17.

[72] 1984 'Forecasting and Time Series Model Types of 111 Economic Time Series,' with H. J. Newton, in *The Forecasting Accuracy of Major Time Series Methods*, by S. Makridakis et al., Wiley: London, 267-287.

[73] 1984 'Cascade model of monthly municipal water use,' *Water Resources Research* 20(1), 15-23. Joint with D. R. Maidment

[74] 1984 'Time patterns of water use in six Texas cities,' *Jour. of Water Resources Planning and Management, Am. Soc. Civ. Engrs.*, 110(1). Joint with D. R. Maidment.

[75] 1985 'Multiple Time Series,' *Encyclopedia of Statistical Sciences*, Vol. 5, ed. S. Kotz and N. L. Johnson, Wiley: New York.

[76] 1985 'Quantile-Information-Functional Statistical Inference and Unification of Discrete and Continuous Data Analysis,' *Proceedings of the 30th Army Conference on the Design of Experiments*, 213-226.

[77] 1986 'Quantile Spectral Analysis and Long Memory Time Series,' *Journal of Applied Probability*, Vol. 23A, 41-55.

[78] 1986 'Distribution under Dependence of Nonparametric Two-Sample Tests,' *Proceedings of the 31st Army Conference on the Design of Experiments*, 19-27.

[79] 1986 'Behavior of Sample Means and Nonparametric Time Series Estimation', *Proc. of 1986 Winter Simulation Conference*, 337–342, Association for Computing Machinery: New York.

[80] 1987 'Quantile Statistical Data Analysis,' *Proceedings of the 32th Army Conference on the Design of Experiments*, 281–292.

[81] 1989 'Multi-Sample Functional Statistical Data Analysis,' *Statistical Data Analysis and Inference Conference in Honor of C. R. Rao*, ed. Y. Dodge, Amsterdam: Elsevier, 71-84.

[82] 1990 'Statistical Culture: Improving the Practice of Statistics'. *Texas A&M University Faculty Lecture.*

Papers since 1991:

[83] 1991 ‘Goodness of Fit Tests and Entropy,’ *Journal of Combinatorics, Information, and System Science*, 16, 129-136.

[84] 1991 ‘Probability with Statistical Applications,’ a book review *A Statistical Model: Frederick Mosteller*, edited by S. E. Fienberg and D. C. Hoaglin. Springer Verlag: New York.

[85] 1991 ‘Unification of Statistical Methods for Continuous and Discrete Data,’ *Proceedings Computer Science–Statistics INTERFACE ’90*, (ed. C. Page and R. LePage), Springer Verlag: New York: 235-242.

[86] 1992 ‘Time Series, Statistics, and Information,’ *New Directions in Time Series Analysis* (ed. E. Parzen et al). Springer Verlag: New York, 265–286.

[87] 1992 ‘Comparison Change Analysis’. *Nonparametric Statistics and Related Topics* (ed. A. K. Saleh), Elsevier: Amsterdam, 3-15.

[88] 1993 ‘Change Analysis’ *Proceedings of the 36th Army Conference on the Design of Experiments*, 225–232.

[89] 1993 ‘History of Statistics in Real Time: Hammers and Nails’, *Computer Science-Statistics, Interface Foundation*, Vol. 24, 602–608.

[90] 1993 ‘Stationary Time Series Analysis Using Information and Spectral Analysis,’ *Developments in Time Series Analysis (in Honor of Maurice Priestley)*. Ed. T. Subba Rao. Chapman Hall, 139–148.

[91] 1993 ‘Change *PP* Plot and Continuous Sample Quantile Function,’ *Communications in Statistics*, 22, 3287–3304.

[92] 1994 ‘From Comparison Density to Two Sample Data Analysis,’ *The Frontiers of Statistical Modeling: An Informational Approach*, ed. H. Bozdogan, Kluwers: Amsterdam. 39–56.

[93] 1994 ‘Hirotugu Akaike, Statistical Scientist,’ *The Frontiers of Statistical Modeling: An Informational Approach*, ed. H. Bozdogan, Kluwers: Amsterdam.

[94] 1994 ‘Limit Theorems for Fisher-Score Change Processes,’ *Change-point Problems Lecture Notes in Statistics*, 23, 157–169. Institute of Mathematical Statistics. (Joint with Lajos Horváth).

[95] 1994 ‘Comparison Change Analysis Approach to Changepoint Estimation,’ *Applied Changepoint Analysis Symposium, Proceedings. Journal of Applied Statistical Science*, 1, 379–401.

[96] 1994 ‘Simultaneous estimators of smooth quantile and quantile density functions.’ Joint with Cheng Cheng.

[97] 1994 ‘Beyond Classical Statistical Methods: Why and How,’ Keynote address 1993 U.S. Army Design of Experiments Conference Proceedings, 1994

[98] 1994 'Correlation Unification of Statistical Methods and Introductory Statistical Education', Technical Report, Texas A&M University, Department of Statistics.

[99] 1995 'A Conversation with Hirotugu Akaike,' *Statistical Science*, 10, 104–117. Joint with David Findley.

[100] 1995 'Concrete Statistics Education in the Computer Age', *Computer Science-Statistics, Interface Foundation*, Vol. 26.

[101] 1996 'Comparison Change Analysis and Change Empirical Processes'. *Israel Mathematical Conference Proceedings.*

[102] 1996 'Changepoint Approach to Data Analytic Wavelet Thresholding', *Statistics and Computing*, 6, 93–99. Joint with Todd Ogden.

[103] 1996 'Data Dependent Wavelet Thresholding in Nonparametric Regression with Change Point Applications', *Computational Statistics and Data Analysis*, Joint with Todd Ogden.

[104] 1996 'Concrete Statistics', in *Statistics in Quality*, S. Ghosh, W. Schucany, W. Smith, Marcel Dekker: New York, 309–332.

[105] 1996 'Concrete Statistics, Change Analysis and Goodness of fit', Technical Report, Department of Statistics, Texas A&M University.

[106] 1997 'Comparison Density and Quantile Statistical Methods and Massive Data Sets Analysis', San Diego Workshop on Massive Data Sets Analysis. *Proceedings.*

[107] 1997 'Comparison Distributions and Quantile Limit Theorems', *International Statistical Institute Proceedings*, Istanbul.

[108] 1998 'Data Mining, Statistical Methods Mining, and History of Statistics', *Interface Symposium on Computing Science and Statistics*, *Proceedings*, ed. D. Scott.

[109] 1998 'Contributions of Jaroslav Hájek to Statistical Inference on Stochastic Processes', *Collected papers of J. Hajek*, Czech Academy of Science.

[110] 1998 'Introduction', *Selected Papers of Hirotugu Akaike*, Springer: New York. Emanuel Parzen, Kunio Tanabe, Genshiro Kitagawa, *Editors.*

[111] 1999 'Statistical Methods Mining, Two Sample Data Analysis, Comparison Distributions, and Quantile Limit Theorems', *Asymptotic Methods in Probability and Statistics*, ed. B. Szyszkowicz, Elsevier: Amsterdam, 611–617.

[112] 2002 Comment on L. Breiman "Statistical Modeling: The Two Cultures," *Statistical Science.*

[113] 2004 Statistical Methods Learning and Conditional Quantiles, *Asymptotic Methods in Statistics, Fields Institute Communications*, 44, 337–349.

[114] 2004 Quantile Probability and Statistical Data Modeling, *Statistical Science*, 19, 652–662.

[115] 2004 Input Modeling Using Quantile Statistical Modeling. Joint with Abhishek Gupta, *Proceedings of the 2004 Winter Simulation Conferencce*, 728–736.

[116] 2005 All Statistical Methods, Paramater Confidence Quantiles. *Noether Award Lecture at Joint Statistical Meetings.*

[117] 2008 United Statistics, Confidence Quantiles, Bayesian Statistics. *Journal Statistical Planning and Inference*, 138: 2777-2785.

[118] 2009 Quantiles, Conditional Quantiles, Confidence Quantiles for p, Logodds(p). *Communications in Statistics*, to appear.

[119] 2009 Ma, M. Y., Genton, M. G., Parzen, E. Asymptotic properties of Sample Quantiles of Discrete Distributions. *Annals of the Institute of Statistical Mathematics*, to appear.

SERVICE AS CONFERENCE ORGANIZER:

2005 "Nonparametric Statistics: Frontier," Texas A&M University, January 14-15, 2005.

1996 'Modern Statistical Methods in Time Series Analysis and Their Applications to Analysis of Economic Data', Texas A&M University Workshop, March 23–24, 1996.

1993 'Statistical Time Series Analysis', U S.-Japan Joint Seminar sponsored by National Science Foundation, Hawaii, January 25-29, 1993.

1991-92 Summer Research Conferences in the Mathematical Sciences, (Joint AMS-IMS-SIAM).

1990 'Interdisciplinary Workshop on New Directions in Time Series Analysis,' Institute for Mathematics and Its Applications, University of Minnesota, July 2–27, 1990.

1986 'Time Series Analysis and Signal Processing,' Cutting Edge Advanced Seminar, sponsored by Committee on Applied and Theoretical Statistics of National Research Council, held in Austin and College Station, Texas, May 23-June 4, 1986.

1984 'Statistical Time Series Analysis,' U.S.-Japan Joint Seminar, sponsored by National Science Foundation, held in Tokyo, Japan, May 21-May 25, 1984.

1983 'Symposium on Time Series Analysis of Irregularly Observed Data,' sponsored by Office of Naval Research, held in College Station, Tx, February 9-February 12, 1983.

1981 'Quantile Processes and Their Applications to Goodness of Fit and Density, Regression and Parameter Estimation Problems,' sponsored by National Science Foundation, held in College Station, TX, July 6-10, 1981.

1977 'Short Course in Statistics,' American Mathematical Society Annual

Meeting, St. Louis, January 1977.

1972	'Goodness of Fit Tests for Distribution Functions,' sponsored by National Science Foundation, held in Amherst, NY, September 1972.

PROFESSIONAL SERVICE:

2003	Chair, Section on Nonparametric Statistics, American Statistical Association
2002	C. R. Rao Prize Committee
1999–2001	Board of Directors, National Institute of Statistical Sciences
1999–2003	Scientific Advisory Committee, IMA, University of Minnesota
1997–99	Wilks Medal Committee, American Statistical Association.
1996–97	President, SETCASA Chapter, American Statistical Association.
1995	Search Committee for Executive Director, American Statistical Association.
1990-93	Council Member, Institute of Mathematical Statistics
1990-91	Committee on Joint AMS–IMS–SIAM Summer Research Conferences in the Mathematical Sciences.
1986-89	Committee on Army Research, National Academy of Sciences
1986-89	Electorate Nominating Committee, AAAS Section U
1986-89	Wilks Medal Committee, American Statistical Association
1982	Chairman, Section on Statistical Education, American Statistical Association.
1981-84	Committee on Applied and Theoretical Statistics (CATS) of National Research Council
1979-82	Council Member-at-large, Conference Board of the Mathematical Sciences
1976	Chairman, AAAS Section U (Statistics)
1973-77	Committee for Conferences on Stochastic Processes, Bernoulli Society
1970-73	Council Member, Institute of Mathematical Statistics
1969-73	Council Member, Bernoulli Society

EDITORIAL BOARDS:

1964-75	*SIAM Journal of Control*
1973-	*Communications on Statistics*
1980-97	*Journal of Time Series Analysis*
	Reviewer and referee, diverse journals, agencies, review panels

PROFESSIONAL SOCIETY MEMBERSHIPS:

International Statistical Institute. Member.
Institute of Mathematical Statistics. **Fellow.**
American Statistical Association. **Fellow.**
American Association for Advancement of Science. **Fellow.**
Royal Statistical Society
Bernoulli Society
American Mathematical Society

Society of Industrial and Applied Mathematics (S.I.A.M.)
New York Academy of Science
Phi Beta Kappa
Sigma Xi

TEACHING:

Graduate courses: nonparametric statistical data modeling; time series analysis; large sample theory (advanced mathematical statistics for non-mathematical statisticians); history of statistics. *Undergraduate courses:* introductory statistics (Statistics My Way, A Way to United Statistics).

UNIVERSITY SERVICE

Phi Beta Kappa Committees
University Honorary Degrees Committee, Chair
Distinguished Professors' Executive Committee, Chair
Ad Hoc Committee to Review the University Statement on Academic Freedom, Responsibility, Tenure and Promotion
University Self-Study Committees
University Lectures Committee
Search Committees for Head of Various Departments

Ph.D. RESEARCH DIRECTED BY EMANUEL PARZEN

At Stanford University

1959	N. Ylvisaker, 'On Time Series Analysis and Reproducing Kernel Hilbert Spaces.'
1963	M. Schaerf, 'Estimation of the Covariance and Autoregression Structure of a Stationary Time Series.'
1966	G. Hext, 'A New Approach to Time Series with Mixed Spectra.'
1966	N. Nettheim, 'The Estimation of Coherence.'
1966	G. Wahba, 'Cross Spectral Distribution Theory for Mixed Spectra and Estimation of Prediction Fitler Coefficients.'
1968	M. Brown, 'Convergence in Distribution of Stochastic Integrals.'
1969	I. MacNeill, 'Limit Processes for Spectral Distribution Functions with Applications to Goodness-of-Fit Testing.'
1969	R. Kromer, 'Asmyptotic Properties of the Autoregressive Spectral Estimator.'
1970	L. Clevenson, 'Asymptotically Efficient Estimates of the Parameters of a Moving Average Time Series.'

At State University of New York at Buffalo

1974	J. Hubert, 'Analysis of Data by a Rank-Frequency Model.'

1974 H. Thaler, 'Non-parametric Probability Density Estimation and the Empirical Characteristic Function.'

1975 B. Hamer, 'Comparison of Estimation Procedures for First Order Moving Average Multiple Time Series.'

1975 H. J. Newton, 'Efficient Estimation of Stationary Multiple Time Series Mixed Models.'

1975 I. Koutrouvelis, 'Estimation of Asymptotic Pareto Laws and the Tail of a Distribution: Theory and Algorithms.'

1976 J.-P. Carmichael, 'The Autoregressive Method; A Method of Estimating Positive Functions.'

At Texas A&M University

1979 R. L. Eubank, 'A Density-Quantile Function Aproach to Choosing Order Statistics for the Estimation of Location and Scale Parameters.'

1980 James M. White, 'A Quantile Function Approach to the K-Sample Quantile Regression Problem.'

1981 Thomas J. Prihoda, 'A Generalized Approach to the Two Sample Problem: The Quantile Approach.'

1982 Terry J. Woodfield, 'Bivariate Modeling of Bivariate Data.'

1985 Avi Harpaz, 'Stationary Time Series, Quantile Functions, Nonparametric Inference and Rank Transform Spectrum.'

1989 William Pyle Alexander 'Boundary Kernel Estimation of the Two Sample Comparison Density Function.'

1989 Scott D. Grimshaw, 'A Unified Approach to Estimating Tail Behavior.'

1993 Cheng Cheng, 'On Estimation of Quantile and Quantile Density Functions.'

1994 R. Todd Ogden, 'Wavelets and Their Applications to Change-point Problems.'

1994 Ying-Sheng Hu, 'Wavelet Approach to Abrupt Change-point Problem and its Application to Density estimation.'

1997 John S. Crown, 'On the Theory and Practice of Fitting Distribution to Data.'

2001 Mark Inlow, 'On Techniques for Binary Response Modeling'

2004 Scott Holan, 'Time Series Exponential Models: Theory and Practice'

2005 SuJung Choi, 'On Two-Sample Sata Analysis by Exponential Model'

2006 Hyejin Shin, 'An RKHS Formulation of Discrimination and Classification for Stochastic Processes'

EMANUEL AND CAROL PARZEN PRIZE FOR STATISTICAL INNOVATION Awardees:

1994	Grace Wahba, University of Wisconsin
1996	Donald Rubin, Harvard University.
1998	Bradley Efron, Stanford University
2000	C. R. Rao, Pennsylvania State University
2002	David Brillinger, University of California, Berkeley
2004	Jerry Friedman, Stanford University
2006	Alan E. Gelfand, Duke University
2008	Nancy Reid, University of Toronto
2008	Marvin Zelen, Harvard University

Emanuel Parzen was awarded the Samuel S. Wilks Memorial Medal of the American Statistical Association in 1994 "for outstanding research in Time Series Analysis, especially for his innovative introduction of reproducing kernel spaces, spectral analysis and spectrum smoothing, for pioneering contributions in quantile and density quantile functions and estimation; for unusually successful and influential textbooks in Probability and Stochastic Processes; for excellent and enthusiastic teaching and dissemination of statistical knowledge; for a commitment to service on Society Councils, Government Advisory Committees, and Editorial Boards."

Nomination of Emanuel Parzen for Samuel S. Wilks Memorial Medal

A. Contributions to teaching

1. Innovative textbooks *Modern Probability* (1960) and *Stochastic Processes* (1962) are classics, have helped educate many statisticians and engineers over several decades, and are still in print.

2. Ph.D. students (supervised at 3 universities: Stanford, State University of New York at Buffalo, Texas A&M) number 30, and include outstanding leaders in research (Don Ylvisaker, Grace Wahba, H. Joseph Newton, Randy Eubank, Todd Ogden) and business (Will Alexander).

B. Contributions to theoretical research (the advancement of knowledge by pioneering research) described in "A Conversation with Emanuel Parzen," by H. J. Newton in *Statistical Science*, (2002), 357–378.

1. *probability limit theorems:* his Ph.D. thesis on convergence uniform in a parameter continues to be referenced.

2. *statistical spectral analysis by kernel windows:* [5], [6], [8], [11] provided the first framework for study of bias, rates of convergence, asymptotic efficiency, and introduced the Parzen window which is widely known and used.

3. *missing observations:* for spectral analysis of time series with missing values, [17] introduced the method of amplitude modulation, often cited in the seminal proceedings *Time Series Analysis of Irregularly Observed Data* (1984) edited by Parzen.

4. *reproducing kernel Hilbert spaces (RKHS):* many statisticians doing research in function estimation use extensively the Hilbert space framework for parameter estimation introduced into statistics by Parzen [10], [12], [13], [15], [18], [30], [32].

5. *probability density estimation:* first comprehensive mathematical theory of kernel (Parzen-Rosenblatt) estimators [16].

6. *multiple time series:* spectral and time domains, autoregressive spectral estimation [24],[28],[37],[40].

7. *seasonal stationary time series analysis:* many parameters that measure climatic variability depend strongly on the month of year and might be modelled by seasonal (periodic) stationary time series, a theory whose time may now be coming to be more widely known among applied researchers [38], [43].

8. *model selection for time series:* a criterion for selecting the order of approximating autoregressive schemes, alternative to AIC, is CAT (criterion autoregressive transfer function) [35],[40].

9. *memory and information criteria for empirical time series modeling:* identifying models for a time series Y by estimating the information about Y in other variables [54],[56],[64],[66],[68].

10. *quantile data analysis:* introduced [44] and applied [47] quantile domain methods for identifying (and testing goodness of fit of) probability distributions for data analysis [69],[83],[84].

11. *change analysis:* introduced [86] comparison density approach to developing methods for change problems such as changepoint estimation (these problems are becoming increasingly used by statisticians and econometricians for problems of quality control, economic modeling, and DNA sequence analysis) [91],[93].

12. *confidence quantiles, all statistical methods:* unification of statistical methods for teaching, practice, advanced research on modeling data.

C. Contributions to applied research

1. *Municipal water use modeling:* 1984 papers [73],[74] (joint with David Maidment who continues to apply the time series methods to water use forecasting) study time patterns of water use in six Texas cities by a "cascade" model (introduced to represent trend, monthly means, and correlated residuals).

2. *Forecasting of economic time series:* international forecasting methods competition, demonstrating successful use for longer range forecasting of our ARARMA models. [58], [70], [72],

3. *Ozone trend analysis:* 1978 reports on total ozone measurements [42].

4. *Climate Research Center* at Texas A&M, directed by Professor Gerald North: Parzen has been a catalyst for collaboration by Statistics faculty and graduate students. Other collaborations have been developed with Electrical Engineering and Time Series Econometrics [92].

D. Contributions to statistical cooperative scientific efforts

1. Parzen has been the principal organizer of 11 major conferences (6 on time series and 5 on statistics), including the NSF regional conferences which resulted in seminal monographs on distribution functions (Durbin) and quantile functions (Csörgő).

2. Parzen has served on many society councils, government advisory panels, and editorial boards.

3. Parzen worked with Marvin Zelen in Buffalo to help found in 1975 the Frontier Science and Technology Research Foundation which for more than 30 years has been engaged in important statistical cooperative scientific efforts.

4. Parzen, as a member of the faculty of the Statistics Department at Texas A&M University since 1978 (as Distinguished Professor), has contributed to the development of that department into a leading statistical center with an internation reputation.

IMPACT FOR THEORETICAL RESEARCH AND APPLICABLE METHODS OF WORK BY EMANUEL PARZEN

Introductory books (1960, 1962): used internationally as standard references.

Probability limit theorems: Ph.D. thesis [published as a book (1954) by U. California Press] on convergence uniform in a parameter.

Statistical spectral analysis by kernel methods: papers (1957), (1957), (1958), (1961) provide mathematical framework for study of bias and efficiency, introduce Parzen window.

Statistical spectral analysis with missing observations: Papers (1962), (1963) introduce method of amplitude modulation for study of time series with missing values.

Reproducing kernel Hilbert space (RKHS) formulation of time series parameter estimation: papers (1961), (1962), (1963), (1970) introduced a mathematical framework that is extensively used by many researchers.

Probability density estimation: paper (1962) provided first comprehensive mathematical theory of kernel estimators.

Multiple time series analysis: papers (1967), (1969), (1970) provide seminal contributions in spectral and time domains.

CAT: criteria to determine order of autoregressive schemes, introduced in papers (1974), (1977).

Empirical time series modeling: papers (1980), (1981), (1983) emphasize role in modeling of identification of memory.

Quantile data analysis and estimation of density-quantile functions: papers (1979), (1982), (1983) introduce mathematical framework for quantile domain approaches to identifying, and testing goodness of fit of, probability distributions.

Confidence quantiles: unification of parametric and nonparametric, and frequentist and Bayesian statistical inference is the goal of current research (2004, 2008, 2009).