November 4, 2019

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EDUCATION

Princeton University
    Ph.D., Department of Statistics, 1979
    M.A., Department of Statistics, 1976
University of Massachusetts, Amherst
    M.A., Department of Mathematics and Statistics, 1974
Indiana University of Pennsylvania
    B.A., Department of Mathematics, 1972
    Distinguished Alumni Award, 2015
Rankin High School, Rankin, PA, 1968

EMPLOYMENT

1983-present	Department of Statistics, Rutgers University

    Distinguished Professor: 2004-present   Professor: 1993-2004
    Associate Professor: 1986-1993   Assistant Professor: 1983-1986
    Chair: 1993-1996   Undergraduate Director: 2000-2001

1983-2000	Statistical Consultant, New Jersey Agricultural Experiment Station and Cook College, Rutgers University
1979-1983	Assistant Professor, Department of Mathematical Sciences Old Dominion University (Promoted to Associate Professor)
1978-1979	Assistant Professor, Department of Statistics University of Florida

FELLOW: Institute of Mathematical Statistics, Elected 1994.

PH.D. DISSERTATION: Redundancy analysis and associated distribution theory, 1979. Department of Statistics, Princeton University Adviser: Lawrence Mayer

RESEARCH PAPERS

1. Asymptotic inference for eigenvectors, *Annals of Statistics*, 1981, Vol. 9 No. 4, 725-736

2. Radial estimates and the test for sphericity, *Biometrika*, 1982, Vol. 69, No. 2, 429-436.

3. A counterexample to Miller and Farr's algorithm for the index of redundancy, *Multivariate Behavior Research*, 1982, Vol. 17, No. 1, 131-135.

4. On the optimality of the simultaneous redundancy transformations, *Psychometrika*, 1982, Vol. 47, No. 1, 77-85.

5. Robustness and efficiency properties of scatter matrices, *Biometrika*, 1983, Vol. 70, No. 2, 411-420.

6. The asymptotic distribution of principal component roots under local alternatives to multiple roots, *Annals of Statistics*, 1983, Vol. 11, No. 4, 1232-1242.

7. A class of asymptotic tests for principal component vectors, *Annals of Statistics*, 1983, Vol. 11, No. 4, 1243-1250.

8. Magnitudinal effects in the normal multivariate model (with I. Guttman and V. Mensifricke), *Annals of Statistics*, 1986, Vol. 14, No. 4, 1544-1554.

9. Breakdown properties of the M-estimators of multivariate scatter. Rutgers University Technical Report, 1986. (30 citation listed in Google.) Abstract in: Inst. Math. Stat. Bull., 1986, Vol. 15, 116. Arxiv version: http://arxiv.org/pdf/1406.4904.pdf

10. A distribution-free M-estimate of multivariate scatter, *Annals of Statistics*, 1987, Vol. 15, No. 1, 234-251.

11. Statistical analysis for the angular central Gaussian distribution, *Biometrika*, 1987, Vol. 74, No. 3, 579-590.

12. Some results on the existence and computation of the M-estimates of multivariate location and scatter, *SIAM J. Sci. Stat. Comput.*, 1988, Vol. 9, No. 2, 354-362.

13. Maximum likelihood estimation for the wrapped Cauchy distribution (with John Kent), *Journal of Applied Statistics*, 1988, Vol. 15, No. 2, 247-254.

14. On Wielandt's inequality and its application to the asymptotic distribution of the eigenvalues of a random symmetric matrix (with Morris Eaton), *Annals of Statistics*, 1991, Vol. 19, 260-271.

15. Some issues in the robust estimation of multivariate location and scatter, in *Directions in Robust Statistics and Diagnostics* Part II, Stahel, W. and Weisberg, S. (eds.), The IMA Volumes in Mathematics and its Applications, Springer-Verlag: New York, 1991, Vol. 34, 327-336.

16. Redescending M-estimates of multivariate location and scatter (with John Kent) *Annals of Statistics*, 1991, Vol. 19, 2102-2119.

17. Spectral analysis of DNA sequences, (with David Stoffer, Andrew McDougall, and Gabriel Schachtel), *Bulletin of the International Statistical Institute*, 1993, Vol. 49, Book 1, 345-361.

18. Spectral analysis for categorical time series: scaling and the spectral envelop (with David Stoffer and Andrew McDougall). *Biometrika*, 1993, Vol. 80, 611-622.

19. Finite sample breakdown points of projection based multivariate location and scatter statistics. *Annals of Statistics*, 1994, Vol. 22, 1024-1044.

20. Asymptotic distributions of singular values with applications to canonical correlations and correspondence analysis (with Morris Eaton). *Journal of Multivariate Analysis*, 1994, Vol. 50, 238-264.

21. A curious likelihood identity for the multivariate t-distribution (with John Kent and Yehuda Vardi.) *Communications in Statistics: Simulations and Computations*, 1994, Vol. 23, 441-453.

22. M-estimates, S-estimates and CM-estimates: A Review. In IEEE Proceedings of NSF/AFPA Workshop: *Performance versus Methodology in Computer Vision*, Seattle, June 24-25, 1994, 1-6.

23. Constrained M-estimation for Regression (with Beatriz Mendes) in *Robust Statistics, Data Analysis, and Computer Intensive Methods*: In Honor of Peter Huber's 60th Birthday, H. Rieder(ed.), Lecture Notes in Statistics, Springer-Verlang: New York, 1996, Vol. 109, 299-320.

24. Constrained M-estimates of multivariate location and scatter (with John Kent). *Annals of Statistics*, 1996, Vol. 24, 1346-1370.

25. A more general framework for the EM algorithm?. Discussion of the paper "The EM algorithm - an old folk-song sung to a new fast tune" by X. Ming and D. van Dyk. *J. R. Statist. Soc. B*, 1997, Vol. 59, No. 3, 511-567. Discussion: 550-551.

26. Robust statistics and data analysis (with R. J. Carroll and L. Fernholz). *J. Statist. Plan. Inference*, 1997, Vol. 57, No. 2, i-iii.

27. The spectral envelop for continuous-valued and multivariate time series (with Andrew McDougall and David Stoffer). *J. Statistical Planning and Inference*, 1996, Vol. 57, No. 2, 195-214.

28. Matching sequences: Cross spectral analysis of categorical time series (with David Stoffer). *Biometrika*, 1998, Vol. 85, No. 1, 201-203.

29. Smoothing the gap between statistics and image understanding (with Peter Meer). Comments on the paper "Edge preserving smoother for image processing" by C.K. Chu, I.K. Glad, F. Godtliebsen and J.S. Marron. *J. Amer. Statist. Assoc.*, Vol. 93, 548-553.

30. Performance assessment by resampling: Rigid motion estimators (with Bogdan Matei and Peter Meer). *Empirical Evaluation Techniques in Computer Vision*, K.W. Bowyer, P.J. Phillips (Eds.), IEEE CS Press, Los Alamitos, CA, 1998, 72-95.

31. Illustrating the behavior of CM-estimates of location and scale (with Beatriz Mendes). *Brazilian Journal of Probability and Statistics*, 1998, Vol. 12, 41-53.

32. S-estimators. *Encyclopedia of Statistic Science*, S. Kotz, C. B. Read, D. L. Banks(eds.), Wiley, New York, 1999, 659-662.

33. Retrieval performance improvement through low rank corrections (with Dorin Comaniciu, Peter Meer and Kun Xu). IEEE Workshop on: *Content-based Access of Image and Video Libraries* (CBAIVL-99), Fort Collins, CO, June 1999, 50-54.

34. Robust computer vision: An interdisciplinary challenge (with Peter Meer and Charles Stewart). *Computer Vision and Image Understanding*, 2000, Vol. 78, 1-7.

35. The spectral envelope and its applications (with David S. Stoffer and David A. Wendt). *Statistical Science*, 2000, Vol. 15, 224-253.

36. The uniqueness of S and M-functionals under non-elliptical distributions (with Kay Tatsuoka). *Annals of Statistics*, 2000, Vol. 28, 1219-1243.

37. Robust estimation for chemical concentration data subject to detection limits (with Leo Korn). *Statistics in Genetics and in the Environmental Sciences*. L. T. Fernholz, S. Morgenthaler, W. Stahel (eds.), Birkhäuser-Verlag, 2001, 41-64.

38. Regularity and uniqueness for constrained M-estimates and redescending M-estimates (with John Kent). *Annals of Statistics*, 2001, Vol. 29, 252-265.

39. Robust regression for data with multiple structures (with Haifeng Chen and Peter Meer). *2001 IEEE Conference on Computer Vision and Pattern Recognition*, Vol. I, 1069-1075.

40. Local spectral envelope: An approach using dyadic tree-based adaptive segmentation (with David S. Stoffer and Hernando C. Ombao). *Annals of the Institute of Statistical Mathematics*, 2002, Vol. 54, 201-223.

41. The influence function of Tukey's deepest depth median (with Zhiqiang Chen). *Annals of Statistics*, 2002, Vol. 30, 1737-1759.

42. High breakdown point multivariate M-estimation. *Estadística*, 2002, Vol. 54, 213-247.

43. Dissimilarity Computation through Low Rank Corrections (with Dorin Cominciu and Peter Meer). *Pattern Recognition Letters*, 2003, Vol. 24, 227-236.

44. Preface to "Contemporary data analysis: Theory and methods" (with Luisa Fernholz and Victor Yohai). *J. Statist. Plan. Inference*, 2004, Vol. 122, 1-2.

45. On the behavior of Tukey's depth and median under symmetric stable distributions (with Zhiqiang Chen). *J. Statist. Plan. Inference*, 2004, Vol. 122, 111-124.

46. On the finite sample breakdown point of redescending M-estimator of location (with Zhiqiang Chen). *Statist. Prob. Letters*, 2004, Vol. 69, 233-242.

47. Discussion of "Breakdown and Groups" by L. Davies and U. Gathers. *Ann. Statist.*, 2005, Vol. 33, 1009-1015.

48. On the breakdown properties of some multivariate M-functionals (with Lutz Dümbgen). *Scand. J. Statist.*, 2005, Vol. 32, 247-264.

49. On the efficiency of invariant multivariate sign and rank tests (with Klaus Nordhausen and Hannu Oja). In *Festschrift for Tarmo Pukkila on His 60th Birthday*, J. Isotalo, E.P. Liski, S. Puntanen, and G.P.H. Styan (eds.), University of Tampere, Finland, 2006, 217-232.

50. On the maximum bias functions of MM-estimates and constrained M-estimates of regression (with Josè R. Berrendero and Beatriz V.M. Mendes). *Ann. Statist.*, 2007, Vol. 35, 13-40.

51. Book review for "Robust Statistical Methods with R" by J. Jurečková and J. Picek. *J. Amer. Statist. Assoc.*, 2007. Vol. 102, 759-760.

52. Discussion on "Robustness and Data Analysis" (with Anne Ruiz-Gazen). *Bull. Internat. Statist. Inst.*, 2007. Vol. 56.

53. A graphical method for detecting asymmetry (with Jue Wang), *Transactions of 63rd Deming Conference*, December, 2007.

54. $\mathcal{R}$-package ICS: Tools for Exploring Multivariate Data via ICS/ICA, 2007
http://cran.r-project.org/web/packages/ICS/index.html
(with Klaus Nordhausen and Hannu Oja).

55. $\mathcal{R}$-package ICSNP: Tools for Multivariate Nonparametrics, 2007.
http://cran.r-project.org/web/packages/ICSNP/index.html
(with Klaus Nordhausen, Seiji Sirkiä and Hannu Oja).

56. Book review for "Robust Statistics: Theory and Methods" by R.A. Maronna, R.D. Martin, and V.J. Yohai. *J. Amer. Statist. Assoc.*, 2008. Vol. 103, 888-889.

57. Tools for exploring multivariate data: The package ICS. (with Klaus Nordhausen and Hannu Oja). *J. Statist. Software*, 2008. Vol. 28, Issue 6.

58. Quantile scale curves. (with Kesar Singh, Jingshan Zhang and Sommath Mukherjee). *J. Comput. Graph. Statist.*, 2009. Vol. 18, 92-105.

59. Tests and estimates of shape based on spatial signs and ranks. (with Seija Sirkiä, Sara Taskinen, and Hannu Oja). *J. Nonparametr. Stat.*, 2009. Vol. 21, 155-176.

60. Invariant co-ordinate selection. (with Frank Critchley, Lutz Dümbgen, and Hannu Oja). Read Paper with discussion: *J. Roy. Statist. Soc. Ser. B*, 2009, Vol. 71, 549 - 592.

61. A note on affine equivariant location and scatter statistics for sparse data. *Statist. and Prob. Letters*, 2010, Vol. 80, 1409-1413

62. Robust functional principal components: A projection-pursuit approach. (with Lucas Bali, Graciela Boente, and Jane-Ling Wang). *Ann. Statist.*, 2011, Vol. 39, No. 6, 2852-2882.

63. On the inefficiency of the spatial median for elliptically symmetric distributions, with discussion. (with Andrew Magyar). *Sanhkya B*, 2011, Vol. 73, Issue 2, 165-192.

64. Compound-Gaussian clutter modelling with an inverse Gaussian texture distribution. (with Esa Ollila, Visa Koivunen and H. Vincent Poor). *IEEE Signal Processing Letters*, 2012, Vol. 19, No. 12, 876 - 879.

65. Complex elliptically symmetric distributions: survey, new results and applications. (with Esa Ollila, Visa Koivunen and H. Vincent Poor). *IEEE Trans. on Signal Processing*, 2012, Vol. 60, No. 11, 5597 - 5625.

66. Distribution-free detection under complex elliptically symmetric clutter distribution. (with Esa Ollila). *The 7th IEEE Sensor Array and Multi-channel Signal Processing Workshop* (SAM'12), pp. 413 - 416, Hoboken, NJ, USA , June 17-20, 2012.

67. The asymptotic inadmissibility of the spatial sign covariance matrix under elliptically symmetric distributions. (with Andrew F. Magyar). *Biometrika*, 2014, Vol. 101, No. 3, 673-688.

68. The spatial sign covariance matrix with unknown location. (with Alexander Dürrea, Daniel Vogel). *Journal of Multivariate Analysis*, 2014, Vol. 130, 107-117. Corrigendum: 2015, Vol. 131, page 163.

69. Robust estimators for non-decomposable elliptical graphical models. (with Daniel Vogel). *Biometrika*, 2014, Vol. 101, No. 4, 865-882.

70. A characterization of elliptical distributions and some optimality properties of principal components for functional data. (with Graciela Boente and Matías Salibián). *Journal of Multivariate Analysis*, 2014, Vol. 131, 254-264.

71. Regularized M-estimators of scatter. (with Esa Ollila). *IEEE Transactions on Signal Processing*, 2014, Vol. 62, No. 22, 6059-6070.

72. A cautionary note on robust covariance plug-in methods. (with Klaus Nordhausen). *Biometrika*, 2015, Vol. 102, No. 3, 573-588.

73. Generalized MM-tests for asymmetry. (with Jue Wang). In *Modern Nonparametric, Robust and Multivariate Methods*, K. Nordhausen and S. Taskinen (eds.), Springer, New York, 2015, Chapter 8, 133 – 148.

74. On the computation of symmetrized M-estimators of scatter. (with Jari Miettinen, Klaus Nordhausen and Sara Taskinen). In: *Recent Advances in Robust Statistics: Theory and Applications*, Springer, 2016, 151 – 167.

75. On the eigenvalues of the spatial sign covariance matrix in more than two dimensions. (with Alexander Dürre and Daniel Vogel). *Statistics & Probability Letters*, 2016, Vol. 111, 80 – 85.

76. Simultaneous penalized M-estimation of covariance matrices using geodesically convex optimization. (with Esa Ollila, Ilya Soloveychikand and Ami Wiesel) 2016. https://arxiv.org/abs/1608.08126

77. Monograph: Geodesic convexity and regularized scatter estimators. (with Lutz Dümbgen), 2016. https://arxiv.org/abs/1607.05455, (under revision).

78. Asymptotic and bootstrap tests for the dimension of the non-Gaussian subspace. (with Hannu Oja, Klaus Nordhausen and Joni Virta). *IEEE Signal Processing Letters*, 2017, Vol. 24, No. 6, 887 – 891.

79. Lassoing eigenvalues. (with Mengxi Yi), 2019. To appear: *Biometrika.*

80. Shrinking the covariance matrix using convex penalties on the matrix-log transformation. (with Mengxi Yi), 2019. Tentatively accepted: *J. Statist. Comp. Graphics.*

81. Hybrid M-estimators of multivariate scatter and the spatial sign covariance matrix. (with Mengxi Yi). Originally scheduled to appear in: *IEEE Computational Advances in Multi-Sensor Adaptive Processing, 2019.* Withdrawn by authors, due to inability to attend conference. To be submitted elsewhere.

82. Volar cortical integrity in non-operatively treated adult distal radius fractures. (with John Erickson, Wylie Lopez, Owolabi Shonuga, Anthony Azzolini and James Monica), 2019. To appear: *Journal of Hand Surgery (Asian-Pacific Volume).*

83. Validation of the shin pain scoring system: a novel approach for determining tibial bony stress injuries. (with Eric D. Nussbaum, Charles J. Gatt, Robert Epstein, Jeffrey R. Bechler, Kenneth G. Swan and Jaynie Bjornaraa). *The Orthopaedic Journal of Sports Medicine*, 2019, Vol. 7, Issue 10. Online journal: https://doi.org/10.117/2F2325967119877803.

84. Monograph: Robust covariance matrix estimators for sparse data: regularized estimation and robust random matrix theory and their applications in data mining and signal processing. (with Esa Ollila, Frederic Pascal and Lutz Dümbgen). In preparation.

85. New algorithms for constrained and penalized M-estimators of scatter. (with Mengxi Yi). In preparation.

86. Blind source separation based on robust auto-covariance matrices. (with Sara Taskinen, Jari Miettinen and Klaus Nordhausen). In preparation.

87. Linear pooling of sample covariance matrices. (with Elias Raninen and Esa Ollila). In preparation.

GRANTS, FELLOWSHIPS AND CONTRACTS

- NSF GRANT DMS-0305858, 2003-2006, $211,155. "Robust Methods for Exploring Multivariate Data".

- NSF GRANT IRI-9987695, 2000-2003 (with Peter Meer), $379,514. "Modern Statistical Techniques for Computer Vision".

- Great Britain NSERC travel grant, June - July 2000. Sponsor: John Kent, University of Leeds. Topic: Robust Statistics, Computer Vision and Shape Theory.

- NSF GRANT IRI-9530546, 1996-1999 (with Peter Meer and Javier Cabrera), $359,997. Statistical Problems in 3D structure recovery.

- New Jersey Department of Environmental Protection, July 1992-December 1996, Contract: Development of robust statistical methods for the estimation of pollution concentrations with observations below detection limits.

- NSF Grant DMS-9106706, 1991-93, $75,000. Robust multivariate analysis: Theory, methodology and algorithms.

- Great Britain NSERC travel grant, May - June 1992. Sponsor: John Kent, University of Leeds. Topic: Constrained M-estimation.

- NSF SCREMS DMS Computer Equipment Grant, 1991 (with J. Cabrera, J. Kemperman, A. McDougall, W. Strawderman, Y. Vardi.)

- NSF Grant DMS-87-01198, 1987-91, $75,000. Topics in robust multivariate analysis and directional data.

- Henry Rutgers Research Fellow, 1985-87.

- NSF Grant DMS-84-05325, 1984-86, $60,000. A study of the affine equivariant M-estimates of multivariate scatter.

- NSF Grant MCS-83-01354, 1983-84, $20,000. Reducing the bias of robust estimates of principal component roots.

- Old Dominion University Summer Research Grant, 1981. Statistical inference in reduced discriminant spaces.

CONFERENCES (since 1986)

- Oberwolfach Workshop: Statistics meet Machine Learning, Oberwolfach, Germany, January, 2020. Invited participant.

- International Conference on Robust Statistics (ICORS-2017), Leuven, Belgium. July, 2017. Invited Speaker. "Lassoing eignevalues".

- International Conference on Robust Statistics (ICORS-2016), Geneva, Switzerland. July, 2016. Invited Speaker. "Simultaneous penalized M-estimation of covariance matrices".

- Current and Future Challenges in Robust Statistics (workshop), Banff International Research Station for Mathematical Innovation and Discovery, Banff,

BC, Canada, November, 2015. Invited participant and speaker .

• International Symposium in Statistics (ISS-2015), Memorial University, Newfoundland, Canada, July, 2015. Special Invited Speaker. "Robust covariance estimation: Structured models and regularization".

• Swiss Statistic Seminar (Half-day Workshop), Bern, Switzerland, November, 2014. Invited Speaker. "Robust covariance estimation: Structured models and regularization".

• Mini-workshop on Signal Processing and Big Data, Aalto University, Helsinki, Finland, August 2014. Invited Speaker. "Regularized M-estimators of multivariate scatter/covariance matrices."

• International Conference on Robust Statistics (ICORS-2014), Halle, Germany, August, 2014. Contributed paper. "Robust covariance estimation: Structured models and regularization".

• Mini-workshop on Robust Statistics, Aalto University, Helsinki, Finland, June 2013. Invited Speaker. "Robust estimation for graphical models".

• 4th International Conference of the ERCIM (European Research Consortium for Informatics and Mathematics) Working Group on Computing & Statistics. London, UK. December, 2011. Invited Speaker. "Testing for the equality of the roots in ICS".

• 2nd Princeton Day of Statistics. Princeton University, NJ. October, 2010. Invited Speaker. "On the inefficiency of the spatial median and spatial covariance matrix"

• International Conference on Robust Statistics (ICORS-2010), Prague, Czech Republic. June, 2010. Session Organizer and Invited Speaker. "Robust Multivariate Analysis".

• Interface 2010: Computational Statistics and Human Behavior (41st Symposium on the Interface), Seattle, WA, June, 2010. Invited Speaker. "Invariant co-ordninate selection".

• International Conference on Robust Statistics (ICORS-2009), Parma, Italy. June, 2009. Invited Speaker. "A note on multivariate location and scatter statistics for sparse data."

• Meeting of the Research Section of the Royal Statistical Society, London, England. December, 2008. Read paper with discussion: "Invariant Coordinate selection," (with F. Critchley, L. and H. Oja).

• International Conference on Robust Statistics (ICORS-2008), Antayla, Turkey. September, 2008. Keynote Speaker. "Robust multivariate statistics: Beyond ellipticity and affine equivariance."

• Second International Workshop on Robust Statistics and R, Banff International Research Station, October, 2007. Invited participant and speaker. "The R-package *ICS*"

- Meeting of the Bernoulli Society, Lisbon, Portugal, August, 2007. Invited discussant for session on "Robustness and Data Analysis."

- Canadian Statistical Society Annual Meeting, St. John's, Newfoundland, Canada June, 2007. Invited speaker. "Invariant Coordinate Selection: A method for exploring multivariate data."

- First joint Statistical Meeting, Deutsche Arbeitsgemeinschaft Statistik, *Statistics under one umbrella*, Bielefeld, Germany, March 2007. Keynote Speaker. "Invariant Coordinate Selection: A method for exploring multivariate data."

- Data Analysis and Robust Statistics: a workshop in honor of Frank Hampel, Dortmund, Germany, March, 2007. Invited Speaker. "Invariant Coordinate Selection: A method for exploring multivariate data."

- Tenth International Meeting of Escola de Modelos de Regressão, Salvador, Bahia, Brazil, February, 2007. Invited Speaker. "Invariant Coordinate Selection: A method for exploring multivariate data."

- Workshop on Robustness and Statistical Inference, in honor of Victor Yohai. Madrid, Spain, October, 2006. Invited Speaker. "Maximum bias functions for MM and CM estimates."

- International Conference on Robust Statistics (ICORS-2006), Lisbon, Portugal, July, 2006. Member of scientific committee.

- Workshop on Frontiers of Statistics, Princeton, NJ, May, 2006. Invited speaker: "Invariant coordinate selection (ICS): A robust perspective on independent component analysis (ICA)."

- International Conference on Robust Statistics (ICORS-2005), Jyväskylä, Finland, June, 2005. Member of scientific committee and invited speaker: "Invariant coordinate selection (ICS): A robust perspective on independent component analysis (ICA)."

- Workshop on nonparametrical statistical methods (NONP2005), Finland, June, 2005. Invited speaker: "Invariant coordinate selection (ICS): A nonparametric view of independent component analysis (ICA)."

- International Conference on Robust Statistics (ICORS-2004), Bejing, China, July, 2004. Invited lecturer for 3-hour short course: "A Short Course on Robust Statistics".

- Focused Research Group on "Robust Analysis of Large Data Sets", Banff International Research Station, Banff, Canada, June, 2004. Invited researcher and speaker: "Redescending M-estimates: Concepts and applications."

- 20th Nordic Conference on Mathematical Statistics (NORDSTAT 2004), Jyväskylä, Finland, June, 2004. Invited speaker: "Breakdown properties of some multivariate M-estimates."

- Workshop on "Robustness for High-dimensional Data 2004" (RobHD 2004), Vorau, Austria, May, 2004. Invited speaker: "On the breakdown point of re-

descending M-estimates of location." Invited discussant: "Open problems in robust statistics."

- American Mathematical Society , Fall Eastern Sectional Meeting Binghamton, NY, October, 2003, invited speaker. "Max-bias curves for M-estimates of regression with general scale."

- International Conference on Robust Statistics (ICORS-2003), Antwerp, Belgium, July, 2003, invited speaker. "Max-bias curves for M-estimates of regression with general scale."

- Annual Meeting of the Canadian Statistical Society, Halifax, June, 2003, invited speaker. "Multivariate M-estimation: Concepts and applications."

- Eight International Meeting of Escola de Modelos de Regressäo, Rio de Janiero, Brazil, February, 2003, invited speaker. "Robust observational regression."

- Fourth International Conference on Statistical Data Analysis based on the L1-norm and related methods, Neuchatel, Switzerland, August, 2002, invited speaker. "High breakdown point multivariate M-estimation."

- International Conference on Robust Statistics (ICORS-2002), Vancouver, Canada, May, 2002, invited speaker. "High breakdown point multivariate M-estimation."

- Conference in honor of Professor Muni Srivastava, Toronto, Canada July, 2001, invited speaker. "The influence function and bias of Tukey's median."

- Canadian Statistical Society Annual Meeting, Vancouver, Canada June, 2001, invited speaker. "The role of redescending M-estimates in computer vision and other areas."

- Contemporary Data Analysis: Theory and Practice, Buenos Aires, Argentina, March, 2001, invited speaker. "The influence function and bias of Tukey's median."
- Analysis of Complex Data Structure, the German Oberwolfach Institute, September, 2000, invited speaker. "On the role of redescending M-estimates in computer vision and other areas."

- Conference on "The Statistics of Direction, Shapes and Images", Leeds, England, July 2000. "The role of redescending M-estimates in computer vision."

- The VIII Time Series Meeting (VVIIESTE), Frigurgo, Brazil, July 1999, invited speaker. "The spectral envelope and its applications."

- Statistics in the Sciences: Environmetrics, Genetics, and Related Topics, Ascona, Switzerland, May 1999, invited speaker. "Robust estimates for concentrations with non-detects."

- The VII Latin American Congress on Probability and Statistics, Cordoba, Argentina, September, 1998, invited speaker. "On the uniqueness of

S-functionals and M-functionals of general scale under non-elliptical distributions."

• Schloss Dagstuhl Workshop, Wadern, Germany, March 1998, invited paper (joint with Peter Meer and Bogdam Matei). "Evaluation and validation of computer vision algorithms."

• Annual Joint Statistics Meetings, Anaheim CA, August 1997. Invited discussant on "Edge preserving smoother for image processing" by J.S. Marron.

• Statistics seminar of the 3e cycle romand de statistique et de probablite appliquee, (Annual statistics seminar for French speaking Swiss universities), Villars, Switzerland, March, 1996. Five special invited lectures on multivariate statistical theory and on robust statistics.

• ASA Winter Conference, Raleigh, January, 1995, invited speaker. "Robust statistics and computer visions."

• NSF/ARPA Workshop: Performance versus Methodology in Computer Vision, Seattle, June 1994, special invited speaker. "M-estimates, S-estimate, and CM-estimates: A review."

• FestKolloquium and Workshop in honor of Peter Huber's 60th birthday, Bayreuth, Germany, June, 1994, invited speaker. "Constrained M-estimation."

• 96th Session of the International Statistical Institute, Florence, Italy, August 1993, invited paper (joint with David Stoffer, Andrew McDougall and Gabriel Schachtel). "Spectral analysis of DNA sequences."

• IMS Eastern Regional Meetings, Philadelphia, March 1993, invited speaker. "The spectral envelop for continuous-valued time series."

• 5th International Meeting on Statistical Climatology, Toronto, June 1992, invited speaker. "Spectral analysis of categorical time series."

• IMA Summer Workshop on Robust Statistics and Diagnostics, University of Minnesota, July 1989, invited speaker and co-organizer for day on robust multivariate analysis. "Some issues in the robust estimation of multivariate location and scatter."

• Annual Meeting of IMS, Fort Collins, August 1988, invited paper (joint with Morris Eaton). "On Wielandt's inequality and its application to the asymptotic distribution of the eigenvalues of a random symmetric matrix."

• Annual Joint Statistical Meetings, Chicago, August 1986, invited speaker. " A distribution-free M-estimate of multivariate scatter."

SEMINARS (since 1986)

• Montclair State University, New Jersey, Novermber 2019.
• Aalto University, Helsinki, Finland, May 2018.
• Vienna Technical University, Austria, April 2018.

- University of Berne, Switzerland, June 2016, May 2018.
- University of Waterloo, Canada, May 2015.
- Katholic University of Lueven, Belgium, October 2014.
- Free University of Brussels, Belgium, October 2014.
- University of Dortmund, Germany, October 2014.
- Aalto University, Helsinki, Finland, June 2013. (Short course.)
- University of Pennsylvania, October 2012.
- University of Leeds, England, December 2011.
- University of Tampere, Finland, May 2011, June 2012.
- University of Ghent, Belgium, April 2011.
- University of Dortmund, Germany, July 2010, April 2011.
- Princeton University, March, 2011.
- Columbia University, student seminar, March 2011.
- Texas A&M University, January 2010.
- Rutgers University, Department of Statistics, October 2009.
- Pfizer-Rutgers Biostatistics Seminar, New York, October 2008.
- University of Toulouse I, France, June 2008.
- Portland State University, June 2008.
- University of Tampere, Finland, October 2007. Seminar and Short course.
- Columbia University, November 2006. IGERT Joint Program
    in Applied Mathematics and Earth & Environmental Sciences
- The Open University, England, January 2006.
- University of Jyvaskyla, Finland, May/June 2004. (Short course.)
- University of Tampere, Finland, May 2004.
- University of Buenos Aries, Argentina, March 2004.
- Michigan State University, April 2003.
- New York University, October 2002.
- University of California, Davis, June 2001.
- Arizona State University, February 2001. (Distinguished lecturer series)
- Wright State University, Ohio, January 2001.
- Johns Hopkins University, April 2000.
- E.F.L., Lausanne, Switzerland, December 1999.
- E.T.H., Zurich, Switzerland, October 1999.
- University of Montreal, September 1999.
- University of Luebeck, Germany, June 1999.
- William Patterson University, Wayne NJ, April 1998.
- University of Buenos Aires, Argentina, June 1996, September 1998.
- Federal Univ. of Rio de Janeiro, Brazil, June 1996, January 1998.
- University of Leeds, England, May 1992, November, 1996.
- Dalhousie University, Canada, August 1996.
- University of La Plata, Argentina, June 1996.
- State University of New York, Buffalo, December 1995.
- New Jersey Institute of Technology, November 1995.
- Temple University, October 1992, November 1995.
- Siemens Research, Princeton NJ, July 1995.
- University of Heidelberg, Germany, June 1994.

- Indiana University, November 1992.
- University of Montreal, Canada, March 1992 (2 lectures).
- University of Pittsburgh, March 1991.
- Columbia University, Biostatistics, April 1990.
- New York University, November 1989.
- Virginia Commonwealth University, October 1989.
- University of Waterloo, Canada, December 1988.
- University of Quebec, Canada, December 1988.
- Pennsylvania State University, July 1988.
- Columbia University, Statistics, November 1987.
- University of Pennsylvania, October 1987.
- University of Toronto, Canada, January 1987.
- University of Berne, Switzerland, April 1986, November 1986.
- Delft Technical Technical University, The Netherlands, November 1986.
- E.T.H., Zurich, Switzerland, April 1986.

LONG TERM VISITS (One month +)

Dept. of Statistics, Vienna Technical University, Vienna Austria, March 2018.
Dept. of Statistics, University of Berne, Switzerland, Nov. 1986, Nov. 2014.
Dept. of Signal Processing, Aalto University, Helsinki, Finland, June 2013.
Tampere School of Public Health, Finland, October 2007, March-June 2011,
    May-June 2012.
ORFE, Princeton University, January-March 2011, May 2016.
Toulouse School of Economics, France, June 2008, January 2009.
Dept. of Math. and Stat., University of Jyväskylä, Finland, May-June 2004.
Instituto de Cálculo, University of Buenos Aires, March 2004.
Statistics Groups, ETH-Zurich and EPF-Lausanne, Switzerland, Fall 1999.
Dept. of Statistics, University of Leeds, England, April/May 1992 and Fall 1996.
Inst. of Math., Federal Univ. of Rio de Janeiro, Brazil, June 1996, January 1998.
Dept. of Statistics, University of Montreal, Canada, March 1992.
Dept. of Math. and Statist., Univ. Pittsburgh, 1977-78, Jan-Feb 1992, Feb 2018.
Dept. of Statistics, University of Toronto, Canada, Fall 1988.
Dept. of Statistics, Columbia University, Fall 1987.

DOCTORAL STUDENTS

- Mengxi Yi, "Penalized M-estimators of scatter: Theory, applications and computations", Ph.D., May, 2019. (First positions: Post-Doc, Vienna Technical University, Austria. Assistant Professor, University of International Business and Economics, Beijing, China.)

- Andrew Magyar, "On properties of non-affine equivariant multivariate location and scatter statistics," Ph.D., May 2012. (First position: Post-Doc, U.S. Census Bureau.)

• Jue Wang, "Some properties of robust statistics under asymmetric models", Ph.D., October, 2008. (First position: Post-doc, Texas A&M. Current: Statistician, Ernst and Young.)

• Howard Bondell, "Robust Logistic Regression via the Case-Control Formulation", Ph.D., October 2005. (First position: Assistant Professor, North Carolina State University. Current: Professor, University of Melbourne.)

• Kay Tatsuoka, "M-estimates, S-estimates, CM-estimates: Theory and Computation", Ph.D., October 1996. (Current: Director, Biostatistics, Bristol-Myers Squibb.)

• Leo Korn, "Robust Estimation for Left Censored Data", Ph.D., May 1996. (First position: Assistant professor, Biostatistics, RWJ Medical University. Current: Statistician, New Jersey Department of Environmental Protection.)

• Beatriz Mendes, "CM-estimation for Linear Regression Models," Ph.D., January 1995. (Current: Professor, Federal University of Rio de Janeiro.)

EXTERNAL DOCTORAL COMMITTEES (since 1996)

• Jiaxi Liang, Ph.D. 2016. Department of Statistics, University of Waterloo, Canada. Advisers: Christopher Small and Shoja'eddin Chenouri

• Haifeng Chen, Ph.D. 2004. Department of Electrical and Computer Engineering. Adviser: Peter Meer

• Bogdan Matei, Ph.D. 2001. Department of Electrical and Computer Engineering. Adviser: Peter Meer

• Luis Teixeira, Ph.D. 2001. Department of Entomology. Adviser: Sridhar Polavarapu.

• Dorin Comaniciu, Ph.D. 2000. Department of Electrical and Computer Engineering. Adviser: Peter Meer.

• Eileen Steiner, Ph.D. 1999. School of Social Work. Adviser: Elfriede Schlesinger.

• Frank Atuahene, Ph.D. 1998. Department of Civil and Environmental Engineering. Adviser: Yong Chae.

• Yoram Leedan, Ph.D. 1996. Department of Electrical and Computer Engineering. Adviser: Peter Meer.

PROFESSIONAL SERVICE

• Associate Editor, J. Multivariate Analysis, 2019-present.

• Co-Principal Organizer. International Conference on Robust Statistics (ICORS-2012), Burlington, Vermont, August, 2012.

• Associate Editor, J. Royal Statistical Society B, 2004-2009.

• Associate Editor, Sankhyā, 2004-2007.

- Associate Editor, J. Statist. Plan. Inference, 2001-2006.

- Associate Editor, Annals of Statistics, 1998-2004.

- Member of Steering Committee, "International Conferences on Robust Statistics" 2006-present.

- Member of Organizing Committee, "International Conference on Robust Statistics" (ICORS-2007), Buenos Aires, Argentina, September, 2007.

- Member of Organizing Committee, "International Conference on Robust Statistics" (ICORS-2004), Beijing, China, July, 2004.

- Guest Editor (with Luisa Fernholz and Victor Yohai), Journal of Statistical Planning and Inference. Special issue in memory of John W. Tukey. Vol. 122 , no. 1 and 2, 2004.

- Organizer, Invited Session on "Statistics and Image Understanding", IMS Annual Meeting, San Francisco, August, 2003.

- Member of Organizing Committee, Symposium on "Contemporary Data Analysis: Theory and Practice", Buenos Aires, Argentina, March 2001.

- Guest Editor (with Peter Meer and Charles Stewart), Computer Vision and Image Understanding. Special Issue: "Robust Statistical Techniques in Image Understanding", Vol. 78, no. 1, 2000.

- Guest Editor (with Luisa Fernholz and Chris Field), Canadian Journal of Statistics, Vol. 28, no.2, 1998. Special Issue: "Statistics and the Sciences".

- Guest Editor (with Ray Carroll and Luisa Fernholz). Journal of Statistical Planning and Inference, Vol. 57, no. 1 and 2, 1997. Special Issue: " Robust Statistical Methods and Data Analysis".

- Member of Organizing Committee, Symposium on "Statistics and the Sciences." Halifax, Nova Scotia, August 1996.

- Statistical Consultant for New Jersey Department of Environmental Protection, 1995 - 1997.

- Member of Organizing Committee, Symposium on "Future Directions in Robust Methods and Data Analysis," Princeton NJ, June 1994.

- Chairman, Program Committee, Northern NJ Chapter ASA, 1987-88.

- Reviewer and referee for various agencies and journals – too numerous to itemize.

- Department and University Committee service – too numerous to itemize.

- Departmental Ph.D. oral exam committees and dissertation defense committees – too numerous to itemize.