

KE-HAI YUAN
CURRICULUM VITAE
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ADDRESS

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EDUCATION

1992-1995 Ph.D. in Mathematics with Concentration in Statistics, UCLA
1985-1988 M.A. in Statistics, Beijing Institute of Technology
1981-1985 B.S. in Mathematics, Beijing Institute of Technology

EMPLOYMENT

2005- William J. and Dorothy K. O'Neill III Associate Professor of Psychology
University of Notre Dame
2001-2005 Associate Professor, Department of Psychology & Lab for Social Research
University of Notre Dame
1998-2001 Assistant Professor, Department of Psychology
University of North Texas
1996-1998 Visiting Assistant Professor, Department of Psychology, UCLA
1995-1996 Statistician, Department of Psychology, UCLA
1992-1995 Graduate Student Researcher, Department of Psychology, UCLA
1988-1992 Assistant Professor, Department of Applied Mathematics
Beijing Institute of Technology

PROFESSIONAL SERVICES

- Member of Editorial Board, Educational and Psychological Measurement (2000-).
- Member of Editorial Board, Structural Equation Modeling (2006-).
- Consulting Editor, Multivariate Behavioral Research (2006-).
- Member of Editorial Board, Sociological Methodology (2007-).
- Member of the International Program Advisory Board/International Meeting of the Psychometric Society 2007, Tokyo, Japan.
- Reviewed grant proposals for NSF, Spencer Foundation, The Research Grant Council of Hong Kong, books for Lawrence Erlbaum Associates and Guilford Press, and manuscripts for over fifteen journals.

PROFESSIONAL HONORS

- The James McKeen Cattell Sabbatical Award (2005).
- The Raymond B. Cattell Award for Early-Career Outstanding Multivariate Research (2002) from the Society of Multivariate Experimental Psychology.
- Elected member of the Society of Multivariate Experimental Psychology (2002-).

GRANTS AND SPONSORED PROGRAMS

- The James McKeen Cattell Sabbatical Award (\$32,000), 8/1/05-5/31/06.
- NSF Grant: (Ke-Hai Yuan, PI) Development of statistical modeling methods for analysis of social and behavioral science data with nonignorable nonresponse (\$168,459), 12/01/04-11/30/07.
- NIH Conference Grant: (Michael J. Wenger, PI) Neuroscience, models, and methods in cognitive aging (\$15,000), 5/01/03-4/30/04.
- NIH Conference Grant: (Steven M. Boker, PI) Dynamical systems data analysis (\$18,650), 9/30/02-8/31/03.

RESEARCH INTERESTS

- Factor analysis
- Structural equation modeling
- Repeated measures and multilevel modeling
- Meta analysis
- Item response theory
- Statistical computation
- Bayes methods for multivariate analysis
- Estimating equations
- Bootstrap and cross-validation
- Robust methods in multivariate analysis
- Missing data problems in multivariate analysis

COURSES TAUGHT

- Experimental psychology I: Statistics
- Psychometric theory
- Multivariate statistics
- Factor analysis
- Structural equation modeling
- Multilevel modeling
- Computational statistics
- Statistical methods

DOCTORAL DISERTATIONS DIRECTED

- Ken Kelley, University of Notre Dame (codirected with Scott Maxwell): *Estimating nonlinear change models in heterogeneous populations when class membership is unknown: Defining and developing the latent classification differential change model.*
- Richard Herrington, University of North Texas: *Simulating statistical power curves with the bootstrap and robust estimation.*
- Current Ph.D students: Wei Zhang, Xiaoling Zhong, Laura Lu, Chun-Ting Lee.

PAPERS IN PRESS

Yuan, K.-H. (in press). Noncentral chi-square versus normal distributions in describing the likelihood ratio statistic: The univariate case and its multivariate implication.

Multivariate Behavioral Research.

Yuan, K.-H., Kouros, C. D., & Kelley, K. (in press). Diagnosis for covariance structure models by analyzing the path. *Structural Equation Modeling.*

PUBLICATIONS

Hayashi, K., Bentler, P. M., & Yuan, K.-H. (2008). Structural equation modeling. In C. R. Rao, J. P. Miller, & D. C. Rao (Eds.), *Handbook of statistics 28: Epidemiology and medical statistics*(pp. 395–428). Amsterdam: North-Holland.

Hayashi, K., Bentler, P. M., & Yuan, K.-H. (2007). On the likelihood ratio test for the number of factors in exploratory factor analysis. *Structural Equation Modeling, 14*, 505-C526.

- Yuan, K.-H., & Bentler, P. M. (2007). Multilevel covariance structure analysis by fitting multiple single-level models. *Sociological Methodology*, *37*, 53–82.
- Yuan, K.-H., & Bentler, P. M. (2007). Robust procedures in structural equation modeling. In S.-Y. Lee (Ed.), *Handbook of latent variable and related models* (pp. 367–397). Neitherland: Elsevier.
- Yuan, K.-H., & Bentler, P. M. (2007). Structural equation modeling. In C. R. Rao & S. Sinharay (Eds.), *Handbook of statistics 26: Psychometrics* (pp. 297–358). Amsterdam: North-Holland.
- Yuan, K.-H., Hayashi, K., & Bentler, P. M. (2007). Normal theory likelihood ratio statistic for mean and covariance structure analysis under alternative hypotheses. *Journal of Multivariate Analysis*, *98*, 1262–1282.
- Yuan, K.-H., Hayashi, K., & Yanagihara, H. (2007). A class of population covariance matrices in the bootstrap approach to covariance structure analysis. *Multivariate Behavioral Research*, *42*, 261–281.
- Zhao, C., Elishaev, E., Yuan, K.-H., Yu, J., & Austin, R. M. (2007). Very low human papillomavirus DNA prevalence in mature women with negative computer-imaged liquid-based pap tests. *Cancer Cytopathology*, *111*, 292–297.
- Yuan, K.-H., & Bentler, P. M. (2006). Asymptotic robustness of standard errors in multilevel structural equation models. *Journal of Multivariate Analysis*, *97*, 1121–1141.
- Yuan, K.-H., & Bentler, P. M. (2006). Mean comparison: Manifest variable versus latent variable. *Psychometrika*, *71*, 139–159.
- Yuan, K.-H., & Hayashi, K. (2006). Standard errors in covariance structure models: Asymptotics versus bootstrap. *British Journal of Mathematical and Statistical Psychology*, *59*, 397–417.
- Bentler, P. M., Liang, J., & Yuan, K.-H. (2005). Some recent advances in two-level structural equation models: Estimation, testing and robustness. In J. Fan & G. Li (Eds.), *Contemporary multivariate analysis and design of experiments: In celebration of Prof. Kai-Tai Fang's 65th birthday* (pp. 99–120). NJ: World Scientific.
- Schuster, C., & Yuan, K.-H. (2005). Factor analysis. In K. Kempf-Leonard (Ed.), *Encyclopedia of social measurement, Volume 2* (pp. 1–8). NY: Elsevier.
- Yanagihara, H., & Yuan, K.-H. (2005a). Four improved statistics for contrasting means by correcting skewness and kurtosis. *British Journal of Mathematical and Statistical Psychology*, *58*, 209–237.
- Yanagihara, H., & Yuan, K.-H. (2005b). Three approximate solutions to the multivariate Behrens-Fisher problem. *Communications in Statistics: Simulation and Computation*,

34, 975–988.

- Yuan, K.-H. (2005). Fit indices versus test statistics. *Multivariate Behavioral Research*, 40, 115–148.
- Yuan, K.-H., & Bentler, P. M. (2005). Asymptotic robustness of the normal theory likelihood ratio statistic for two-level covariance structure models. *Journal of Multivariate Analysis*, 94, 328–343.
- Yuan, K.-H., Bentler, P. M., & Zhang, W. (2005). The effect of skewness and kurtosis on mean and covariance structure analysis: The univariate case and its multivariate implication. *Sociological Methods & Research*, 34, 249–258.
- Yuan, K.-H., & Chan, W. (2005). On nonequivalence of several procedures of structural equation modeling¹. *Psychometrika*, 70, 791–798.
- Yuan, K.-H., & Hayashi, K. (2005). On Muthén’s maximum likelihood for two-level covariance structure models. *Psychometrika*, 70, 147–167.
- Yuan, K.-H., & Maxwell, S. (2005). On the post hoc power in testing mean difference. *Journal of Educational and Behavioral Statistics*, 30, 141–167.
- Yuan, K.-H., & Bentler, P. M. (2004a). On the asymptotic distributions of two statistics for two-level covariance structure models within the class of elliptical distributions. *Psychometrika*, 69, 437–457.
- Yuan, K.-H., & Bentler, P. M. (2004b). On chi-square difference and z tests in mean and covariance structure analysis when the base model is misspecified. *Educational and Psychological Measurement*, 64, 737–757.
- Yuan, K.-H., Bentler, P. M., & Chan, W. (2004). Structural equation modeling with heavy tailed distributions. *Psychometrika*, 69, 421–436.
- Yuan, K.-H., Fung, W. K., & Reise, S. (2004). Three Mahalanobis-distances and their role in assessing unidimensionality. *British Journal of Mathematical and Statistical Psychology*, 57, 151–165.
- Yuan, K.-H., Lambert, P. L., & Fouladi, R. T. (2004). Mardia’s multivariate kurtosis with missing data. *Multivariate Behavioral Research*, 39, 413–437.
- Yuan, K.-H., & Marshall, L. L. (2004). A new measure of misfit for covariance structure models. *Behaviormetrika*, 31, 67–90.
- Hayashi, K., & Yuan, K.-H. (2003). Robust Bayesian factor analysis. *Structural Equation Modeling*, 10, 525–533.
- Yuan, K.-H., & Bentler, P. M. (2003). Eight test statistics for multilevel structural

¹According to Brian Junker (the editor of *Psychometrika*), this paper is one of the most-viewed articles on line in 2006.

- equation models. *Computational Statistics and Data Analysis*, 44, 89–107.
- Yuan, K.-H., Guarnaccia, C. A., & Hayslip, B. J. (2003). A study of the distribution of sample coefficient alpha with the Hopkins Symptom Checklist: Bootstrap versus asymptotics. *Educational and Psychological Measurement*, 63, 5–23.
- Yuan, K.-H., & Hayashi, K. (2003). Bootstrap approach to inference and power analysis based on three statistics for covariance structure models. *British Journal of Mathematical and Statistical Psychology*, 56, 93–110.
- Yuan, K.-H., Marshall, L. L., & Bentler, P. M. (2003). Assessing the effect of model misspecifications on parameter estimates in structural equation models. *Sociological Methodology*, 33, 241–265.
- Yuan, K.-H., & Bentler, P. M. (2002a). On robustness of the normal-theory based asymptotic distributions of three reliability coefficient estimates. *Psychometrika*, 67, 251–259.
- Yuan, K.-H., & Bentler, P. M. (2002b). On normal theory based inference for multilevel models with distributional violations. *Psychometrika*, 67, 539–561.
- Yuan, K.-H., & Bushman, B. J. (2002). Combining standardized mean differences using the method of maximum likelihood. *Psychometrika*, 67, 589–607.
- Yuan, K.-H., & Chan, W. (2002). Fitting structural equation models using estimating equations: A model segregation approach. *British Journal of Mathematical and Statistical Psychology*, 55, 41–62.
- Yuan, K.-H., Marshall, L. L., & Bentler, P. M. (2002). A unified approach to exploratory factor analysis with missing data, nonnormal data, and in the presence of outliers. *Psychometrika*, 67, 95–122.
- Yuan, K.-H., Marshall, L. L., & Weston, R. (2002). Cross-validation through downweighting influential cases in structural equation modeling. *British Journal of Mathematical and Statistical Psychology*, 55, 125–143.
- Yuan, K.-H., & Bentler, P. M. (2001a). Effect of outliers on estimators and tests in covariance structure analysis. *British Journal of Mathematical and Statistical Psychology*, 54, 161–175.
- Yuan, K.-H., & Bentler, P. M. (2001b). A unified approach to multigroup structural equation modeling with nonstandard samples. In G. A. Marcoulides & R. E. Schumacker (Eds.), *Advanced structural equation modeling: New developments and techniques* (pp. 35–56). Mahwah, NJ: Lawrence Erlbaum Associates.
- Bentler, P. M., & Yuan, K.-H. (2000). On adding a mean structure to a covariance structure model. *Educational and Psychological Measurement*, 60, 326–339.

- Yuan, K.-H., & Bentler, P. M. (2000a). Inferences on correlation coefficients in some classes of nonnormal distributions. *Journal of Multivariate Analysis*, *72*, 230–248.
- Yuan, K.-H., & Bentler, P. M. (2000b). Robust mean and covariance structure analysis through iteratively reweighted least squares. *Psychometrika*, *65*, 43–58.
- Yuan, K.-H., & Bentler, P. M. (2000c). On equivariance and invariance of standard errors in three exploratory factor models. *Psychometrika*, *65*, 121–133.
- Yuan, K.-H., & Bentler, P. M. (2000d). Three likelihood-based methods for mean and covariance structure analysis with nonnormal missing data. *Sociological Methodology* *2000*, *30*, 167–202.
- Yuan, K.-H., Chan, W., & Bentler, P. M. (2000). Robust transformation with applications to structural equation modeling. *British Journal of Mathematical and Statistical Psychology*, *53*, 31–50.
- Yuan, K.-H., & Jennrich, R. I. (2000). Estimating equations with nuisance parameters: Theory and applications. *Annals of the Institute of Statistical Mathematics*, *52*, 343–350.
- Bentler, P. M., & Yuan, K.-H. (1999a). Structural equation modeling with small samples: Test statistics. *Multivariate Behavioral Research*, *34*, 181–197.
- Bentler, P. M., & Yuan, K.-H. (1999b). Structural equation models. In S. Kotz, C. B. Read, & D. L. Banks (Eds.), *Encyclopedia of statistical sciences: Update volume 3* (pp. 716–721). NY: Wiley.
- Yuan, K.-H., & Bentler, P. M. (1999a). On normal theory and associated test statistics in covariance structure analysis under two classes of nonnormal distributions. *Statistica Sinica*, *9*, 831–853.
- Yuan, K.-H., & Bentler, P. M. (1999b). On asymptotic distributions of normal theory MLE in covariance structure analysis under some nonnormal distributions. *Statistics & Probability Letters*, *42*, 107–113.
- Yuan, K.-H., & Bentler, P. M. (1999c). F-tests for mean and covariance structure analysis. *Journal of Educational and Behavioral Statistics*, *24*, 225–243.
- Bentler, P. M., & Yuan, K.-H. (1998). Tests for linear trend in the smallest eigenvalues of the correlation matrix. *Psychometrika*, *63*, 131–144.
- Yuan, K.-H., & Bentler, P. M. (1998a). Robust mean and covariance structure analysis. *British Journal of Mathematical and Statistical Psychology*, *51*, 63–88.
- Yuan, K.-H., & Bentler, P. M. (1998b). Normal theory based test statistics in structural equation modeling. *British Journal of Mathematical and Statistical Psychology*, *51*, 289–309.
- Yuan, K.-H., & Bentler, P. M. (1998c). Structural equation modeling with robust

- covariances. *Sociological Methodology 1998*, 28, 363–396.
- Yuan, K.-H., & Jennrich, R. I. (1998). Asymptotics of estimating equations under natural conditions. *Journal of Multivariate Analysis*, 65, 245–260.
- Bentler, P. M., & Yuan, K.-H. (1997). Optimal unbiased equivariant factor score estimators. In M. Berkane (Ed.), *Latent variable modeling and applications to causality* (pp. 259–281). New York: Springer-Verlag.
- Yuan, K.-H. (1997). A theorem on uniform convergence of stochastic functions with applications. *Journal of Multivariate Analysis*, 62, 100–109.
- Yuan, K.-H., & Bentler, P. M. (1997a). Mean and covariance structure analysis: Theoretical and practical improvements. *Journal of the American Statistical Association*, 92, 767–774.
- Yuan, K.-H., & Bentler, P. M. (1997b). Improving parameter tests in covariance structure analysis. *Computational Statistics and Data Analysis*, 26, 177–198.
- Yuan, K.-H., & Bentler, P. M. (1997c). Finite sample distribution-free test statistics for nested structural models. *Behaviormetrika*, 24, 19–26.
- Yuan, K.-H., & Bentler, P. M. (1997d). Generating multivariate distributions with specified marginal skewness and kurtosis. In W. Bandilla & F. Faulbaum (Eds.), *SoftStat'97—Advances in statistical software 6* (pp. 385–391). Stuttgart, Germany: Lucius & Lucius.
- Yuan, K.-H., Bentler, P. M., & Kano, Y. (1997). On averaging variables in a confirmatory factor analysis model. *Behaviormetrika*, 24, 71–83.
- Bentler, P. M., & Yuan, K.-H. (1996). Test of linear trend in eigenvalues of a covariance matrix with application to data analysis. *British Journal of Mathematical and Statistical Psychology*, 49, 299–312.
- Yuan, K.-H., & Bentler, P. M. (1996). Mean and covariance structure analysis with missing data. In A. Gupta & V. Girko (Eds.), *Multidimensional statistical analysis and theory of random matrices: Proceedings of sixth Eugene Lukacs symposium* (pp. 307–326). Utrecht, Netherlands: VSP.
- Yuan, K.-H., & Bentler, P. M. (1994). Test of linear trend in eigenvalues of K covariance matrices with applications in common principal components analysis. *Communication in Statistics—Theory and Methods*, 23, 3141–3156.
- Fang, K.-T., Yuan, K.-H., & Bentler, P. M. (1994). Applications of number-theoretic methods to quantizers of elliptically contoured distributions. In T. W. Anderson, K. T. Fang, & Ingram Olkin (Eds.), *Multivariate analysis and its applications, IMS lecture notes-monograph series* (pp. 211–225). Hayward, CA: Institute of Mathematical

Statistics.

- Fang, K.-T., & Yuan, K.-H. (1993). The limiting distributions of some subclasses of the generalized non-central t-distribution. *Acta Mathematicae Applicatae Sinica, English Series*, 9, 71–81.
- Fang, K.-T., Yuan, K.-H., & Bentler, P. M. (1992). Applications of sets of points uniformly distributed on a sphere to testing multinormality and robust estimation. In Z. P. Jiang, S. J. Yan, P. Cheng, & R. Wu (Eds.), *Probability and statistics* (pp. 56–73). Singapore: World Scientific.
- Fang, K.-T., & Yuan, K.-H. (1990). A unified approach to maximum likelihood estimation. *Chinese Journal of Applied Probability and Statistics, English Series*, 6, 412–418.

MANUSCRIPTS UNDER REVIEW

- Yuan, K.-H., & Lu, L. (2008). SEM with missing data and unknown population using two-stage ML: Theory and its application
- Jamshidian, M., Yuan, K.-H., & Le, P. (2007). Using confidence intervals to test for non-ignorable non-response.
- Yanagihara, H., Himeno, T., & Yuan, K.-H. (2007). GLS discrepancy based information criteria for selecting covariance structure models.
- Yanagihara, H., Yuan, K.-H., Fujisawa, H., & Hayashi, K. (2007). A class of cross-validatory model selection criteria.
- Yuan, K.-H. (2007). Effect sizes for testing not missing at random mechanism.
- Yuan, K.-H., & Bentler, P. M. (2007). Two simple approximations to the distributions of quadratic forms.
- Yuan, K.-H., & Zhong, X. (2007). Outliers, leverage observations and influential cases in factor analysis: Minimizing their effect using robust procedures.
- Yuan, K.-H. (2006). Identifying variables responsible for data not missing at random.
- Yuan, K.-H. (2006). Normal theory ML for missing data with violation of distribution assumptions.
- Yuan, K.-H., & Chan, W. (2006). Structural equation modeling with near singular covariance matrices.
- Bentler, P. M., Liang, J., & Yuan, K.-H. (2004). Constrained ML estimation for two-level mean and covariance structure models: An extension to Lee and Tsang's model and algorithm.

RECENT PRESENTATIONS

- Yuan, K.-H. (2007, September). Outliers, leverage observations and influential cases in structural equation models: Minimizing their effect using robust procedures. Invited talk at the Eighth Meeting of the Quantitative Psychology Section of the German Psychological Association. Giessen, Germany.
- Yuan, K.-H. (2007, July). Identifying variables responsible for data not missing at random. Invited talk at the International Meeting of the Psychometric Society. Tokyo, Japan.
- Yuan, K.-H., & Chan, W. (2007, July). Structural equation modeling with near singular covariance matrices. Invited talk at the International Meeting of the Psychometric Society. Tokyo, Japan.
- Yuan, K.-H., & Zhong, X. (2007, July). Outliers, leverage observations and influential cases in factor analysis: Minimizing their effect using robust procedures. Invited talk at the International Meeting of the Psychometric Society. Tokyo, Japan.
- Yuan, K.-H., & Chan, W. (2007, June). Structural equation modeling with near singular covariance matrices. Invited colloquium talk at Beijing Institute of Technology. Beijing, China.
- Hayashi, K., Bentler, P. M., & Yuan, K.-H. (2006, June). On the likelihood ratio test for the number of factors in exploratory factor analysis. The International Meeting of the Psychometric Society. Montreal, Canada.
- Hayashi, K., Bentler, P. M., & Yuan, K.-H. (2006, August). On the likelihood ratio test for the number of factors in exploratory factor analysis. The Joint Statistical Meetings. Seattle, Washington.
- Yuan, K.-H. (2006, June). Robust procedures in assessing psychological measurements. Invited colloquium talk at Guangzhou University. Guangzhou, China.
- Yuan, K.-H. (2006, June). Robust procedures in assessing psychological measurements. Invited colloquium talk at Guangxi Normal University. Guilin, China.
- Yuan, K.-H. (2006, July). Robust procedures in assessing psychological measurements. Invited colloquium talk at Chongqing University. Chongqing, China.
- Yuan, K.-H. (2006, July). Robust procedures in assessing psychological measurements. Invited colloquium talk at Beijing Institute of Technology. Beijing, China.
- Yuan, K.-H., & Bentler, P. M. (2006, July). Multilevel covariance structure analysis by fitting multiple single-level models. Invited colloquium talk at Beijing Normal University. Beijing, China.