Ke-Hai Yuan
Curriculum Vitae
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Education

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

Positions

2008-	Professor, Department of Psychology University of Notre Dame
2016 Fall	Visiting Professor, Graduate School of Engineering Science Osaka University
2016 Summer	Visiting Professor, School of Statistics Renmin University of China
2015 Spring	Visiting Professor, Department of Psychology The Chinese University of Hong Kong
2005-2008	O'Neill III Associate Professor, Department 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
1995-1998	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, Journal of Educational and Behavioral Statistics (2011-).
- Member of Editorial Board, Educational Researcher (2013-).
- Member of Editorial Board, JSM Mathematics and Statistics (2014-).

- Member of Advisory Board, Behaviormetrika (2016-).
- Consulting Editor, Psychological Methods (2016-).
- Associate Editor, Journal of Multivariate Analysis (2008-2016).
- Associate Editor, Psychological Methods (2013-2015).
- Member of Editorial Board, Sociological Methodology (2007-2009).
- Reviewed grant proposals for NSF, Institute of Education Sciences, Spencer Foundation, Research Council of Canada, The Research Grant Council of Hong Kong, books for Lawrence Erlbaum Associates, Taylor and Francis Group, Guilford Press, and manuscripts for over twenty 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-).

Topics worked on

Mean comparison; regression; factor analysis; structural equation modeling; multilevel modeling; growth curve model; mixture model; item response model; mediation and moderation analysis; post-hoc power; meta analysis/combining mean differences; asymptotics; statistical computation; estimating equations; bootstrap and cross-validation; nonnormal distribution; robust methods; missing data; data with many variables but limited sample size; and software development.

Courses taught

Experimental psychology I: Statistics; Psychometric theory; Multivariate statistics; Factor analysis; Structural equation modeling; Multilevel modeling; Computational statistics; Statistical methods; Exploratory data analysis; Missing data analysis.

Doctoral dissertations directed

- Richard Herrington, University of North Texas (2001): *Simulating statistical power curves with the bootstrap and robust estimation.*
- Ken Kelley, University of Notre Dame (2005, 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.*
- Summer Zu, University of Notre Dame (2009): *Robust procedures for mediation analysis.*
- Wei Zhang, University of Notre Dame (2010): *Estimating latent variable interactions with missing data.*

- Xiaoling Zhong, University of Notre Dame (2010): *Model selection, evaluation and tests of invariance in finite factor mixture modeling using a two stage approach.*
- Laura Lu, University of Notre Dame (2011, codirected with Zhiyong Zhang): *Bayesian inference of robust growth mixture models with non-ignorable missing data.*

PUBLICATIONS/IN PRESS PAPERS (TOTAL 143): *(publications are classified by topics, each article appears only in one category although it may touch more than one topic)*

Measurement

Yuan, K.-H., & Bentler, P. M. (2002). On robustness of the normal-theory based asymptotic distributions of three reliability coefficient estimates. *Psychometrika, 67*, 251–259.

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., 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.

Cheng, Y., & Yuan, K.-H. (2010). The impact of fallible item parameter estimates on latent trait recovery. *Psychometrika, 75*, 280–291.

Schuster, C., & Yuan, K.-H. (2011). Robust estimation of latent ability in item response models. *Journal of Educational and Behavioral Statistics, 36*, 720–735.

Cheng, Y., Yuan, K.-H., & Liu, C. (2012). Comparison of reliability measures under factor analysis and item response theory. *Educational and Psychological Measurement, 72*, 52–67.

Patton, J., Cheng, Y., Yuan, K.-H., & Diao, Q. (2012). Capitalization on chance in variable-length classification tests employing the sequential probability ratio test. *Psychological Test and Assessment Modeling, 54*, 432–449.

Zu, J., & Yuan, K.-H. (2012). Standard error of linear observed-score equating for the NEAT design with nonnormally distributed data. *Journal of Educational Measurement, 49*, 190–213.

Patton, J., Cheng, Y., Yuan, K.-H., & Diao, Q. (2013). The influence of item calibration error on variable-length computerized adaptive testing. *Applied Psychological Measurement, 37*, 24–40.

Yuan, K.-H., Cheng, Y., & Patton, J. (2014). Information matrices and standard errors for MLEs of item parameters in IRT. *Psychometrika, 79*, 232–254.

Patton, J., Cheng, Y., Yuan, K.-H., & Diao, Q. (2014). Bootstrap standard errors for maximum likelihood ability estimates when item parameters are unknown. *Educational and Psychological Measurement, 74*, 697–712.

Deng, L., Marcoulides, G., & Yuan, K.-H. (2015). Psychometric properties of measures of team diversity with Likert data. *Educational and Psychological Measurement, 75*, 512–534.

Zhang, Z., & Yuan, K.-H. (2016). Robust coefficients alpha and omega and confidence intervals with outlying observations and missing data: Methods and software.

Educational and Psychological Measurement, 76(3), 387–411.

Yuan, K.-H., & Chan, W. (2016). Measurement invariance via multi-group SEM: Issues and solutions with chi-square-difference tests. *Psychological Methods, 21*(3), 405–426.

Mean comparison and power

Yanagihara, H., & Yuan, K.-H. (2005). 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. (2005). Three approximate solutions to the multivariate Behrens-Fisher problem. *Communications in Statistics: Simulation and Computation, 34*, 975–988.

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. (2006). Mean comparison: Manifest variable versus latent variable. *Psychometrika, 71*, 139–159.

Lu, Z., & Yuan, K.-H. (2010). Welch's t test. In N. J. Salkind (Ed.), *Encyclopedia of research design* (pp. 1620–1623). Thousand Oaks, CA: Sage.

Deng, L., & Yuan, K.-H. (2016). Comparing latent means without mean structure models: A projection-based approach. *Psychometrika, 81*, 802–829.

Du, H., Zhang, Z., & Yuan, K.-H. (2017). Power analysis for t-test with non-normal data and unequal variances. In A. van der Ark, D.M., M.Wiberg, S.A.Culpepper, J. A.Douglas, & W.-C.Wang (Eds.), *Quantitative psychology: The 81th Annual Meeting of the Psychometric Society* (pp. 373–380). Switzerland: Springer.

Yuan, K.-H., Zhang, Z., & Zhao, Y. (2017). Reliable and more powerful methods for power analysis in structural equation modeling. *Structural Equation Modeling, 24*, 315–330.

Correlation, regression, mediation, moderation, meta analysis, and mixture models

Yuan, K.-H., & Bentler, P. M. (2000). Inferences on correlation coefficients in some classes of nonnormal distributions. *Journal of Multivariate Analysis*, *72*, 230–248.

Yuan, K.-H., & Bushman, B. J. (2002). Combining standardized mean differences using the method of maximum likelihood. *Psychometrika, 67*, 589–607.

Zu, J., & Yuan, K.-H. (2008). Abstract: Local influence and robust methods for mediation models. *Multivariate Behavioral Research, 43*, 661.

Yuan, K.-H., & Bentler, P. M. (2010). Finite normal mixture SEM analysis by fitting multiple conventional SEM models. *Sociological Methodology, 40*, 191–245.

Zu, J., & Yuan, K.-H. (2010). Local influence and robust procedures for mediation analysis. *Multivariate Behavioral Research, 45*, 1–44.

Zu, J., & Yuan, K.-H. (2010). Serial correlation. In N. J. Salkind (Ed.), *Encyclopedia of research design* (pp. 1352–1358). Thousand Oaks, CA: Sage.

Yuan, K.-H., & Chan, W. (2011). Biases and standard errors of standardized regression coefficients. *Psychometrika, 76*, 670–690.

Yuan, K.-H., Cheng, Y., & Maxwell, S. (2014). Moderation analysis using a two-level

regression model. *Psychometrika, 79*(4), 701–732.

Yuan, K.-H. (2016). Meta analytical structural equation modeling: Comments on issues with current methods and viable alternatives. *Research Synthesis Methods, 7*, 215–231.

Yang, M., & Yuan, K.-H. (2016). Robust methods for moderation analysis with a two-level regression model. *Multivariate Behavioral Research, 51*, 757–771.

Cain, M., Zhang Z., & Yuan, K.-H. (in press). Univariate and multivariate skewness and kurtosis for measuring nonnormality: Prevalence, influence and estimation. *Behavior Research Methods*.

Missing data methodology

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. (2000). Three likelihood-based methods for mean and covariance structure analysis with nonnormal missing data. *Sociological Methodology, 30*, 167–202.

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., Lambert, P. L., & Fouladi, R. T. (2004). Mardia's multivariate kurtosis with missing data. *Multivariate Behavioral Research, 39*, 413–437.

Yuan, K.-H. (2008). Effect sizes for testing not missing at random mechanism. In K. Shigemasu, A. Okada, T. Imaizumi, & T. Hoshino (Eds.), *New trends in psychometrics* (pp. 559–583). Tokyo: Universal Academy Press.

Yuan, K.-H., & Lu, L. (2008). SEM with missing data and unknown population using two-stage ML: Theory and its application. *Multivariate Behavioral Research, 62*, 621–652.

Savalei, V., & Yuan, K.-H. (2009). On the model-based bootstrap with missing data: Obtaining a p-value for a test of exact fit. *Multivariate Behavioral Research, 44*, 741–763.

Yuan, K.-H. (2009). Identifying variables responsible for data not missing at random. *Psychometrika, 74*, 233–256.

Yuan, K.-H. (2009). Normal distribution based pseudo ML for missing data: With applications to mean and covariance structure analysis. *Journal of Multivariate Analysis, 100*, 1900–1918.

Yuan, K.-H., & Bentler, P. M. (2010). Consistency of normal distribution based pseudo maximum likelihood estimates when data are missing at random. *American Statistician, 64*, 263–267.

Yuan, K.-H., & Bentler, P. M. (2011). Response to Letter to the Editor by S. K. Sapra. *American Statistician, 65*, 69.

Yuan, K.-H., Yang-Wallentin, F., & Bentler, P. M. (2012). ML versus MI for missing data with violation of distribution conditions. *Sociological Methods & Research, 41*, 598–629.

Yuan, K.-H., & Zhang, Z. (2012). Robust structural equation modeling with missing data and auxiliary variables. *Psychometrika, 77*, 803–826.

Jamshidian, M., & Yuan, K.-H. (2013). Data-driven sensitivity analysis to detect missing data mechanism with applications to structural equation modeling. *Journal of Statistical Computation and Simulation, 83*, 1344–1362.

Jamshidian, M., & Yuan, K.-H. (2014). Examining missing data mechanisms via homogeneity of parameters, homogeneity of distributions, and multivariate normality. *Wiley Interdisciplinary Reviews: Computational Statistics, 6*, 56–73.

Tong, X., Zhang, Z., & Yuan, K.-H. (2014). Evaluation of test statistics for robust structural equation modeling with nonnormal missing data. *Structural Equation Modeling, 21*, 553–565.

Yuan, K.-H., & Savalei, V. (2014). Consistency, bias and efficiency of the normal-distribution-based MLE: The role of auxiliary variables. *Journal of Multivariate Analysis, 124*, 353–370.

Yuan, K.-H., Tong, X., & Zhang, Z. (2015). Bias and efficiency for SEM with missing data and auxiliary variables: Two-stage robust method versus two-stage ML. *Structural Equation Modeling, 22*, 178–192.

Multilevel/hierarchical linear models

Yuan, K.-H., & Bentler, P. M. (2002). On normal theory based inference for multilevel models with distributional violations. *Psychometrika, 67*, 539–561.

Yuan, K.-H., & Bentler, P. M. (2003). Eight test statistics for multilevel structural equation models. *Computational Statistics and Data Analysis, 44*, 89–107.

Yuan, K.-H., & Bentler, P. M. (2004). On the asymptotic distributions of two statistics for two-level covariance structure models within the class of elliptical distributions. *Psychometrika, 69*, 437–457.

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.

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., & Hayashi, K. (2005). On Muthén's maximum likelihood for two-level covariance structure models. *Psychometrika, 70*, 147–167.

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. (2007). Multilevel covariance structure analysis by fitting multiple single-level models. *Sociological Methodology, 37*, 53–82.

Bentler, P. M., Liang, J., Tang, M.-L., & Yuan, K.-H. (2011). Constrained ML estimation for two-level mean and covariance structure models. *Educational and Psychological Measurement, 71*, 325–345.

Factor analysis and structural equation modeling

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., & Bentler, P. M. (1997). Mean and covariance structure analysis: Theoretical and practical improvements. *Journal of the American Statistical Association*, *92*, 767–774.

Yuan, K.-H., & Bentler, P. M. (1997). Finite sample distribution-free test statistics for nested structural models. *Behaviormetrika, 24*, 19–26.

Yuan, K.-H., & Bentler, P. M. (1997). Improving parameter tests in covariance structure analysis. *Computational Statistics and Data Analysis*, *26*, 177–198.

Yuan, K.-H., Bentler, P. M., & Kano, Y. (1997). On averaging variables in a confirmatory factor analysis model. *Behaviormetrika*, *24*, 71–83.

Yuan, K.-H., & Bentler, P. M. (1998). 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. (1998). Structural equation modeling with robust covariances. *Sociological Methodology, 28*, 363–396.

Yuan, K.-H., & Bentler, P. M. (1998). Robust mean and covariance structure analysis. *British Journal of Mathematical and Statistical Psychology*, *51*, 63–88.

Bentler, P. M., & Yuan, K.-H. (1999). Structural equation modeling with small samples: Test statistics.*Multivariate Behavioral Research*, *34*, 181–197.

Bentler, P. M., & Yuan, K.-H. (1999). 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. (1999). 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. (1999). 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. (1999). F-tests for mean and covariance structure analysis. *Journal of Educational and Behavioral Statistics*, *24*, 225–243.

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. (2000). Robust mean and covariance structure analysis through iteratively reweighted least squares. *Psychometrika*, *65*, 43–58.

Yuan, K.-H., & Bentler, P. M. (2000). On equivariance and invariance of standard errors in three exploratory factor models. *Psychometrika*, *65*, 121–133.

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., & Bentler, P. M. (2001). 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. (2001). 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.

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., & Weston, R. (2002). Cross-validation through downweighting influential cases in structural equation modeling. *British Journal of Mathematical and Statistical Psychology, 55*, 125–143.

Hayashi, K., & Yuan, K.-H. (2003). Robust Bayesian factor analysis. *Structural Equation Modeling, 10*, 525–533.

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. (2004). 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., & Marshall, L. L. (2004). A new measure of misfit for covariance structure models. *Behaviormetrika, 31*, 67–90.

Schuster, C., & Yuan, K.-H. (2005). Factor analysis. In K. Kempf-Leonard (Ed.), *Encyclopedia of social measurement, Volume 2* (pp. 1–8). NY: Elsevier.

Yuan, K.-H. (2005). Fit indices versus test statistics. *Multivariate Behavioral Research, 40*, 115–148.

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 modeling. *Psychometrika, 70*, 791–798.

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.

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*, 505–526.

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.

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.

Yuan, K.-H., & Chan, W. (2008). Structural equation modeling with near singular covariance matrices. *Computational Statistics & Data Analysis, 52*, 4842–4858.

Yuan, K.-H., Kouros, C. D., & Kelley, K. (2008). Diagnosis for covariance structure models by analyzing the path. *Structural Equational Modeling, 15*, 564–602.

Yuan, K.-H., & Zhong, X. (2008). Outliers, leverage observations and influential cases in factor analysis: Minimizing their effect using robust procedures. *Sociological Methodology, 38*, 329–368.

Bentler, P. M., Satorra, A., & Yuan, K.-H. (2009). Smoking and cancers: Case-robust analysis of a classic data set. *Structural Equational Modeling, 16*, 382–390.

Hayashi, K., & Yuan, K.-H. (2010). Exploratory factor analysis. In N. J. Salkind (Ed.), *Encyclopedia of research design* (pp. 458–465). Thousand Oaks, CA: Sage.

Yanagihara, H., Himeno, T., & Yuan, K.-H. (2010). GLS discrepancy based information criteria for selecting covariance structure models. *Behaviormetrika, 37*, 71–86.

Yuan, K.-H., Cheng, Y., & Zhang, W. (2010). Determinants of standard errors of MLEs in confirmatory factor analysis. *Psychometrika, 75*, 633–648.

Yuan, K.-H., & Hayashi, K. (2010). Fitting data to model: Structural equation modeling diagnosis using two scatter plots. *Psychological Methods, 15*, 335–351.

Yuan, K.-H., Wu, R., & Bentler, P. M. (2011). Ridge structural equation modeling with correlation matrices for ordinal and continuous data. *British Journal of Mathematical and Statistical Psychology, 64*, 107–133.

Zhong, X., & Yuan, K.-H. (2011). Bias and efficiency in structural equation modeling: Maximum likelihood versus robust methods. *Multivariate Behavioral Research, 46*, 229–265.

Yuan, K.-H., & Zhang, Z. (2012). Structural equation modeling diagnostics using R package semdiag and EQS. *Structural Equation Modeling, 19*, 683–702.

Yuan, K.-H., & Zhong, X. (2013). Robustness of fit indices to outliers and leverage observations in structural equation modeling. *Psychological Methods, 18*, 121–136.

Yuan, K.-H., & Tian, Y. (2015). Structural equation modeling as a statistical method: An overview. *JSM Mathematics & Statistics 2*(1):1006.

Yuan, K.-H., Tian, Y., & Yanagihara, H. (2015). Empirical correction to the likelihood ratio statistic for structural equation modeling with many variables. *Psychometrika, 80*, 379–405.

Deng, L., & Yuan, K.-H. (2015). Multiple group analysis for structural equation modeling with dependent samples. *Structural Equation Modeling, 22*, 552–567.

Liang, L., Hayashi, K., & Yuan, K-H. (2015). On closeness between factor analysis and principal component analysis under high-dimensional conditions. In A. van der Ark, D.M. Bolt, W.-C. Wang, J.A. Douglas, & S.-M. Chow (Eds.), *Quantitative psychology research: The 79th Annual Meeting of the Psychometric Society* (pp. 209–221). New York: Springer.

Liang, L., Hayashi, K., & Yuan, K.-H. (2016). The goodness of sample loadings of principal component analysis in approximating to factor loadings with high dimensional data. In A. van der Ark, D.M. Bolt, W.-C. Wang, J.A. Douglas, & M. Wiberg (Eds.), *Quantitative psychology research: The 80th Annual Meeting of the Psychometric Society* (pp. 199–211). Switzerland: Springer.

Yuan, K.-H., & Chan, W. (2016). Structural equation modeling with unknown population distributions: Ridge generalized least squares. *Structural Equation Modeling, 23*(2), 163–179.

Yuan, K.-H., Chan, W., Marcoulides, G. A., & Bentler, P. M. (2016). Assessing structural equation models by equivalence testing with adjusted fit indices. *Structural Equation Modeling, 23*, 319–330.

Hayashi, K., Yuan, K.-H., & Liang, L. (2017). On the relationship between squared canonical correlation and matrix norm. In A. van der Ark, D.M., M.Wiberg, S.A.Culpepper, J. A.Douglas, & W.-C.Wang (Eds.), *Quantitative psychology: The 81th Annual Meeting of the Psychometric Society* (pp. 141–150). Switzerland: Springer.

Jiang, G., & Yuan, K.-H. (2017). Four new corrected statistics for SEM with small samples and nonnormally distributed data. *Structural Equation Modeling, 24*, 479–494.

Marcoulides, K. M., & Yuan, K.-H. (2017). New ways to evaluate goodness of fit: A note on using equivalence testing to assess structural equation models. *Structural Equation Modeling, 24*, 148–153.

Yuan, K.-H., Jiang, G., & Cheng, Y. (in press). More efficient parameter estimates for factor analysis of ordinal variables by ridge generalized least squares.

Yuan, K.-H., Yang, M., & Jiang, G. (in press). Empirically corrected rescaled statistics for SEM with small N and large p. *Multivariate Behavioral Research.*

Statistical theory and computation

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.

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. (1993). The limiting distributions of some subclasses of the generalized non-central t-distribution. *Acta Mathematicae Applicate Sinica, English*

Series, 9, 71–81.

Yuan, K.-H. (1997). A theorem on uniform convergence of stochastic functions with applications. *Journal of Multivariate Analysis*, *62*, 100–109.

Yuan, K.-H., & Jennrich, R. I. (1998). Asymptotics of estimating equations under natural conditions. *Journal of Multivariate Analysis*, *65*, 245–260.

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.

Yuan, K.-H. (2008). Noncentral chi-square versus normal distributions in describing the likelihood ratio statistic: The univariate case and its multivariate implication. *Multivariate Behavioral Research, 43*, 109–136.

Yuan, K.-H., & Bentler, P. M. (2010). Two simple approximations to the distributions of quadratic forms. *British Journal of Mathematical and Statistical Psychology, 63*, 273–291.

Yanagihara, H., Yuan, K.-H., Fujisawa, H., & Hayashi, K. (2013). A class of model selection criteria based on cross-validation method. *Hiroshima Mathematical Journal, 43*, 149–177.

Yuan, K.-H., & Schuster, C. (2013). Overview of statistical estimation methods. In T. D. Little (Ed.), *The Oxford handbook of quantitative methods, volume 1, foundation* (pp. 361–387). New York: Oxford University Press.

Yuan, K.-H., Chan, W., & Tian, Y. (2016). Expectation-robust algorithm and estimating equations for means and dispersion matrix with missing data. *Annals of the Institute of Statistical Mathematics, 68*, 329–351.

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Miscellaneous methodologies

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