Curriculum Vitae: Hans Friedrich Köhn

Education

M.S. Statistics 2000, University of Illinois at Urbana-Champaign

Ph.D. Quantitative Psychology 2007, University of Illinois at Urbana-Champaign
(Thesis Advisor: Professor Lawrence J. Hubert)

Academic Positions

Department of Psychological Sciences, University of Missouri-Columbia;

Assistant Professor of Quantitative Psychology, 2007–2010

Department of Psychology, University of Illinois at Urbana-Champaign;

Assistant Professor of Quantitative Psychology, 2010–2018
Associate Professor of Quantitative Psychology, 2018–present

Area Coordinator "Quantitative Psychology", 2020–present

Member of the Advisory Board, 2020–present

Mentor of Dr. Susu Zhang, Assistant Professor Quantitative Psychology and Statistics, 2020–present

University of Illinois at Urbana-Champaign

Member of the Senate, 2023–present

Member of the Senate Committee on Faculty and Academic Staff Benefits, 2023–present

Offices Held in Professional Societies

Classification Society of North America; Member of the Board of Directors; Newsletter Editor, 2008–2020

Editorships of Journals or Other Learned Publications

Associate Editor, ***Journal of Classification***, 2017–present

Guest Editor, ***Behaviormetrika***, Special Issue on "Methodological Innovations in Cognitive Diagnosis Arising from Research Challenges in Practice," 2023–2025

Review Panels

2018-2019: Distinguished Dissertation Award, Classification Society of North America

2020-2021: Member of the Dean's Illini Success Initiative Review Task Force

2023: Member of the Program Organizing Committee of the 2023 Annual Meeting of The Classification Society in Rochester, NY, June 2023

2024: Member of the Program Organizing Committee of the 2024 Annual Meeting of The Classification Society in Kelowna, BC, Canada, June 2024

Honors, Recognitions, and Outstanding Achievements

Department of Psychology, University of Illinois at Urbana-Champaign: Nancy Hirschberg Memorial Award for Outstanding Research, 2005

Department of Statistics, University of Illinois at Urbana-Champaign: Invited Speaker, Robert Bohrer Memorial Workshop in Recognition of Excellence in Statistical Research, 2005

Department of Statistics, University of Illinois at Urbana-Champaign: Invited Speaker, Robert Bohrer Memorial Workshop in Recognition of Excellence in Statistical Research, 2006

Department of Statistics, University of Illinois at Urbana-Champaign: Invited Speaker, Robert Bohrer Memorial Workshop in Recognition of Excellence in Statistical Research, 2007

Department of Psychological Sciences, University of Missouri-Columbia: Max Meyer Junior Faculty Outstanding Research Award, 2010

List of Teachers Ranked as Excellent by Their Students for teaching PSYC 506 in Fall 2016
List of Teachers Ranked as Excellent by Their Students for teaching PSYC 507 in Spring 2017

Psychometric Society: Best Reviewer Award, 2017

List of Teachers Ranked as Excellent by Their Students for teaching PSYC 506 in Fall 2018

List of Teachers Ranked as Excellent by Their Students for teaching PSYC 507 in Spring 2019

List of Teachers Ranked as Excellent by Their Students for teaching PSYC 506 in Fall 2022

Arnold O. Beckman Research Award, 2022

Mabel Kirkpatrick Hohenboken Award for Excellence in Teaching, 2023

Publications: Articles in Journals

Beauchamp, J. W., Horner, A. B., **Köhn, H. F.**, & Bay, M. (2006). Abstract: Multidimensional scaling analysis of centroid- and attack/decay-normalized musical instrument sounds. *Journal of the Acoustical Society of America, 120*, 3276.

Köhn, H. F. (2006). Book review: *Branch-and-bound applications in combinatorial data analysis* by Michael J. Brusco and Stephanie Stahl (2005). *Psychometrika*, *71*, 411–413.

Köhn, H. F. (2006). Combinatorial individual differences scaling within the city-block metric. *Computational Statistics & Data Analysis, 51*, 931–946.

Brusco, M. J., **Köhn, H. F.**, & Stahl, S. (2008). Heuristic implementation of dynamic programming for matrix permutation problems in combinatorial data analysis. *Psychometrika, 73*, 503–522.

Brusco, M. J. & **Köhn, H. F.** (2008a). Optimal partitioning of a data set based on the *p*-median model. *Psychometrika, 73*, 89–105.

Brusco, M. J. & **Köhn, H. F.** (2008b). Comment on "Clustering by passing messages between data points". *Science, 319*, 726c.

Brusco, M. J. & **Köhn, H. F.** (2009a). Clustering qualitative data based on binary equivalence relations: A variable neighborhood search procedure for the clique partitioning problem. *Psychometrika, 74*, 685–703.

Brusco, M. J. & **Köhn, H. F.** (2009b). Exemplar-based clustering via simulated annealing: A comparison to affinity propagation and vertex substitution. *Psychometrika, 74*, 457–475.

Köhn, H. F. (2010). Representation of individual differences in rectangular proximity data through anti-Q matrix decomposition. *Computational Statistics & Data Analysis, 54*, 2343–2357.

Köhn, H. F., Steinley, D., & Brusco, M. J. (2010). The *p*-median model as a tool for clustering psychological data. *Psychological Methods, 15*, 87–95.

Köhn, H. F. (2011). A review of multiobjective programming and its application in quantitative psychology. *Journal of Mathematical Psychology, 55*, 386–396.

Brusco, M. J., **Köhn, H. F.,** & Steinley, D. (2013). Exact and approximate methods for a one-dimensional minimax bin-packing problem. *Annals of Operations Research, 206,* 611–626.

Köhn, H. F. (2014). Anti-Robinson structures for analyzing three-way two-mode proximity data. *Applied Mathematics, 5,* 983–1003.

Brusco, M. J., **Köhn, H. F.**, & Steinley, D. (2015). An exact method for partitioning dichotomous items within the framework of the monotone homogeneity model (Mokken scale analysis). *Psychometrika, 80,* 949–967.

Chiu, C.-Y., & **Köhn, H. F.** (2015a). Consistency of cluster analysis for cognitive diagnosis: The DINO Model and the DINA Model revisited. *Applied Psychological Measurement. 39,* 465–479.

Chiu, C.-Y., & **Köhn, H. F.** (2015b). A general proof of consistency of heuristic classification for cognitive diagnosis models. *British Journal of Mathematical and Statistical Psychology, 68,* 387–409.

Köhn, H. F., & Chiu, C.-Y. (2015). Assessing the completeness of the Q-matrix in cognitively diagnostic modeling. In *JSM Proceedings, Social Statistics Section* (pp. 481–487). Alexandria, VA: American Statistical Association.

Köhn, H. F., & Hubert, L. J. (2015). Hierarchical cluster analysis. *Wiley StatsRef: Statistics Reference Online (WSR).*

Köhn, H. F., Chiu, C.-Y., & Brusco, M. J. (2015). Heuristic cognitive diagnosis when the Q-matrix is unknown. *British Journal of Mathematical and Statistical Psychology. 68,* 268–291.

Brusco, M. J., **Köhn, H. F.**, & Steinley, D. (2016). An evaluation of exact methods for the multiple subset maximum cardinality selection problem. *British Journal of Mathematical and Statistical Psychology, 69,* 194–213.

Chiu, C.-Y., & **Köhn, H. F.** (2016a). The Reduced RUM as a logit model: Parameterization and constraints. *Psychometrika, 81,* 350–370.

Chiu, C.-Y., & **Köhn, H. F.** (2016b). Consistency of cluster analysis for cognitive diagnosis: The Reduced Reparameterized Unified Model and the General Diagnostic Model. *Psychometrika, 81,* 585–610.

Chiu, C.-Y., **Köhn, H. F.**, & Wu, H. M. (2016). Fitting the Reduced RUM using Mplus: A tutorial. *International Journal of Testing, 16,* 331–351.

Chiu, C.-Y., **Köhn, H. F.**, Zheng, Y., & Henson, R. (2016). Joint maximum likelihood estimation for cognitive diagnostic models. *Psychometrika, 81,* 1069-1092.

Köhn, H. F., & Chiu, C.-Y. (2016b). A proof of the duality of the DINA model and the DINO model. *Journal of Classification, 33,* 171–184.

Köhn, H. F. (2017). Citation classics commentary on Greenhouse and Geisser (1959): On methods in the analysis of profile data. *Psychometrika, 82,* 1209–1211.

Köhn, H. F. & Chiu, C.-Y. (2017). A procedure for assessing the completeness of the Q-matrices of cognitively diagnostic tests. *Psychometrika, 82,* 112–132.

Köhn, H. F., & Chiu, C.-Y. (2018b). How to build a complete Q-matrix for a cognitively diagnostic test. *Journal of Classification, 35,* 273–299.

Brusco, M. J., Steinley, D., & **Köhn, H. F.** (2019). Residual analysis for unidimensional scaling in the L_2-norm. *Communications in Statistics—Simulation and Computation, 48,* 2210–2221.

Chiu, C.-Y., & **Köhn, H. F.** (2019b). Consistency theory for the general nonparametric classification Method. *Psychometrika, 84,* 830–845.

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Köhn, H. F., & Chiu, C.-Y. (2019). Attribute hierarchy models in cognitive diagnosis: Identifiability of the latent attribute space and conditions for completeness of the Q-matrix. *Journal of Classification, 36,* 541–565.

Köhn, H. F., & Chiu, C.-Y. (2021). A unified theory of the completeness of Q-matrices for the DINA model. *Journal of Classification,* 38, 500–518.

Chiu, C.-Y., **Köhn, H. F.**, & Ma, W. (2023). Commentary on "Extending the basic local independence model to polytomous data" by Stefanutti, de Chiusole, Anselmi, and Spoto. *Psychometrika, 88*(2), 656-671.

Wang, Y., Chiu, C. Y., & **Köhn, H. F.** (2023). Nonparametric Classification Method for Multiple-Choice Items in Cognitive Diagnosis. *Journal of Educational and Behavioral Statistics, 48,*189–219.

Publications: Chapters in Books

Hubert, L. J. & **Köhn, H. F.** (2007). Lower (anti-) Robinson rank representations for symmetric proximity matrices. In P. Brito, P. Bertrand, G. Cucumel & F. De Carvalho (Eds.), *Selected Contributions in Data Analysis and Classification* (pp. 495–504). Berlin: Springer.

Hubert, L. J., **Köhn, H. F.**, & Steinley, D. (2009). Cluster analysis. In R. Milsap & A. Maydeu Olivares (Eds.), *Handbook of quantitative methods in psychology* (pp. 444–513). Thousand Oaks, CA: Sage.

Hubert, L. J., **Köhn, H. F.**, & Steinley, D. (2010). Order-constrained proximity matrix representations. In S. Kolenikov, L.A. Thombs & D. Steinley (Eds.), *Statistics in the social sciences: Current methodological developments* (pp. 81–112). Hoboken, NJ: Wiley.

Köhn, H. F, Chiu, C.-Y., & Brusco, M. J. (2013). The comparison of two input statistics for heuristic cognitive diagnosis. In R. E. Millsap, L. A. van der Ark, D. M. Bolt, & C. M. Woods (Eds.), *New Developments in Quantitative Psychology* (pp. 335–344). New York: Springer.

Chiu, C.-Y., **Köhn, H. F.**, Zheng, Y., & Henson, R. (2015). Exploring joint maximum likelihood estimation for cognitive diagnosis models. In L. A. van der Ark, D. M. Bolt, W.-C. Wang, J. A. Douglas, & S.-M. Chow (Eds.), *Quantitative Psychology Research* (pp. 263–278*)*. New York: Springer.

Köhn, H. F., & Chiu, C.-Y. (2015). Assessing the completeness of the Q-matrix in cognitively diagnostic modeling. In *JSM Proceedings, Social Statistics Section* (pp. 481–487). Alexandria, VA: American Statistical Association.

Köhn, H. F., & Chiu, C.-Y. (2016a). Conditions of completeness of the Q-Matrix of tests for cognitive diagnosis. In A. L. van der Ark, D. M. Bolt, W.-C. Wang, J. A. Douglas, & M. Wiberg (Eds.), *Quantitative Psychology Research* (pp. 255–264). New York: Springer.

Köhn, H. F. (2017). Parameter constraints of the logit form of the Reduced RUM. In A. L. van der Ark, M. Wiberg, S. A. Culpepper, J. A. Douglas, & W.-C. Wang (Eds.), *Quantitative Psychology Research* (pp. 207–213*)*. New York: Springer.

Köhn, H. F. & Chiu, C.-Y. (2018a). Identifiability of the latent attribute space and conditions of Q-matrix completeness for attribute hierarchy models. In M. Wiberg, S., R. Janssen, J. González, & D. Molenaar (Eds.), *Quantitative Psychology Research* (pp. 363–375). New York: Springer.

Chiu, C.-Y. & **Köhn, H. F.** (2019a). Nonparametric diagnostic classification methods. In M. von Davier, & Y.-S. Li (Eds.) *Handbook of Diagnostic Classification Models–Models and Model Extensions, Applications, Software Packages* (pp. 107–132). New York: Springer.

Köhn, H. F. & Kern, J. (2019). Additive trees for fitting three-way (multiple source) proximity data. In M. Wiberg, S. Culpepper, R. Janssen, J. González, & D. Molenaar (Eds.), *Quantitative Psychology Research*. (pp. 403–413). New York: Springer.

Köhn, H. F., Chiu, C.-Y., & Wang, Y. (2022). Proper and useful distractors in multiple-choice diagnostic classification models. In M. Wiberg, D. Molenaar, J. González, J. S. Kim, & H. Hwang (Eds.), *Quantitative Psychology Research*. (pp. 97–106). Cham, CH: Springer.

Kim, H., **Köhn, H. F.**, & Chiu, C.-Y. (in press). Identifiability Conditions in Cognitive Diagnosis: Implications for Q-matrix Estimation Algorithms. In M. Wiberg, D. Molenaar, J. González, J. S. Kim, & H. Hwang (Eds.), *Quantitative Psychology Research*. Cham, CH: Springer.

Statistical Software

Brusco, M. J., **Köhn, H. F.**, & Steinley, D. PMCLUSTER: A collection of MATLAB programs for *p*-median clustering.

Hornik, K., Murtagh, F., Brusco, M., **Köhn, H. F.**, & Stahl, S. R Package 'seriation'.

Hubert, L. J., **Köhn, H. F.**, & Steinley, D. Unidimensional Scaling: A Toolbox for MATLAB.

Hubert, L. J., **Köhn, H. F.**, & Steinley, D. Cluster Analysis: A Toolbox for MATLAB.

Hubert, L. J., **Köhn, H. F.**, & Steinley, D. Combinatorial Data Analysis—Miscellany: A Toolbox for MATLAB.

Hubert, L. J., **Köhn, H.-F.**, & Steinley, D. Multistructural Analysis: A Toolbox for MATLAB.

Professional Workshops

Chiu, C-Y., & **Köhn, H. F.** (2019, April). *Nonparametric cognitive diagnosis and computerized adaptive testing for small samples*. Workshop given at the annual meeting of the National Council on Measurement in Education, Toronto, Canada.

Chiu, C-Y., **Köhn, H. F.** , Sorrel, M. A., & Nájera, P. (2022, April). *Next-generation cognitive diagnosis for small educational testing settings: Innovations and implementation*. Workshop given at the annual meeting of the National Council on Measurement in Education, San Diego, CA.

Invited Lectures and Invited Conference Presentations

Köhn, H. F. (1994). Strategic research in marketing. Talk presented at Kongress des Berufsverbandes Deutscher Markt- und Sozialforscher e.V. [Annual Council of the Federal Association of German Market and Social Researchers], Bremen, Germany.

Köhn, H. F. (1995). Advertising effectiveness—a practical appraisal. Talk presented at WDR radio broadcast show from Photokina, Cologne, Germany.

Köhn, H. F. (2005). Combinatorial optimization and its application to individual differences scaling. Talk presented at the Nancy Hirschberg Memorial Award for Outstanding Research ceremony, Department of Psychology, University of Illinois at Urbana-Champaign, Champaign, IL.

Köhn, H. F. (2005). Additive tree structures for three-way two-mode data through combinatorial optimization. Talk presented at the Joint Annual Meeting of the Interface and the Classification Society of North America, St. Louis, MO.

Köhn, H. F. (2005). Individual differences scaling through combinatorial optimization. Talk presented at the Robert Bohrer Memorial Workshop in Recognition of Excellence in Statistical Research, Department of Statistics, University of Illinois at Urbana-Champaign, Champaign, IL.

Köhn, H. F. (2006). Anti-Robinson structures for analyzing three-way two-mode data. Talk presented at the Robert Bohrer Memorial Workshop in Recognition of Excellence in Statistical Research, Department of Statistics, University of Illinois at Urbana-Champaign, Champaign, IL.

Köhn, H. F. (2006). Combinatorial data analysis for representing the structure of proximity matrices.

Talk presented to the Department of Psychological Sciences, University of Missouri-Columbia, Columbia, MO.

Talk presented to the Department of Psychology, California State University Northridge, Northridge, CA.

Talk presented to the Center for Biostatistics and Clinical Science, The University of Texas Southwestern Medical Center at Dallas, Dallas, TX.

Talk presented to the Department of Psychology, University of Maastricht, The Netherlands.

Beauchamp, J. W., Horner, A. B., **Köhn, H. F.**, & Bay, M. (2006). Multidimensional scaling analysis of centroid- and attack/decay-normalized musical instrument sounds.
Talk presented at the Joint Meeting of the Acoustical Society of America and the Acoustic Society of Japan, Honolulu, Hawaii.

Hubert, L. J., **Köhn, H. F.**, & Steinley, D. (2006). Order-constrained proximity matrix representations: ultrametric generalizations and constructions with MATLAB. Talk presented at the 6th annual Winemiller Conference on Methodological Developments of Statistics in the Social Sciences, Columbia, MO.

Köhn, H. F. (2007). Avoiding degeneracy in multidimensional unfolding by combinatorial optimization. Talk presented at the Robert Bohrer Memorial Workshop in Recognition of Excellence in Statistical Research, Department of Statistics, University of Illinois at Urbana-Champaign, Champaign, IL.

Köhn, H. F. (2007). Combinatorial data analysis for representing the structure of proximity matrices.

Talk presented to the Department of Educational Psychology, Texas A & M University, College Station, TX.

Talk presented to the Department of Psychological Sciences, University of Missouri-Columbia, Columbia, MO.
Talk presented to the Department of Psychology, McGill University, Montreal, Quebec, Canada.

Talk presented to the Department of Educational Psychology, University of Wisconsin-Milwaukee, Milwaukee, WI.

Talk presented to the Department of Psychology, Texas A & M University, College Station, TX.

Talk presented to the School of Education, Indiana University, Bloomington, IN.

Talk presented to the Department of Psychology, The University of Western Ontario, London, Ontario, Canada.

Talk presented to the Department of Psychology, University of Notre Dame, Notre Dame, IN.

Talk presented to the Program in Educational Psychology, The Graduate Center, City University of New York, New York, NY.

Köhn, H. F. (2008). Combinatorial data analysis for representing the structure of proximity matrices. Talk presented to the Department of Educational Psychology, University of Illinois, Urbana-Champaign, Champaign, IL.

Fan, Z., Chiu, C., **Köhn, H. F.**, & Douglas, J. (2009). Performance of several distance measures for clustering data arising from some common models in educational testing. Talk presented at the Joint Annual Meeting of the Interface and the Classification Society of North America, St. Louis, MO.

Köhn, H. F. (2010). Combinatorial data analysis for representing the structure of proximity matrices. Talk presented to the Department of Psychology, University of Illinois, Urbana-Champaign, Champaign, IL.

Köhn, H. F. (2012). Heuristic cognitive diagnosis when the Q-Matrix is unknown. Talk presented to the Department of Statistics, City University of New York, New York City.

Chiu, C.-Y., & **Köhn, H. F.** (2014). The Reduced RUM as a logit model: Parameterization and constraints. Talk presented to the Graduate Institute of Educational Measurement and Statistics at the National Taichung University of Education, Taichung, Taiwan.

Chiu, C.-Y., & **Köhn, H. F.** (2014). The Reduced RUM as a logit model: Parameterization and constraints. Talk presented at the Cross-Strait Psychometric Conference, Taichung, Taiwan.

Chiu, C.-Y., & **Köhn, H. F.** (2015). A Procedure for assessing the completeness of the Q-matrices of cognitively diagnostic tests. Talk presented at the session on cognitive diagnosis and item response theory at the Joint Statistical Meeting of the American Statistical Association, Seattle, WA.

Chiu, C.-Y., & **Köhn, H. F.** (2015). The Reduced RUM as a logit model: A demonstration via Mplus. Talk presented at the annual meeting of the National Council on Measurement in Education, Chicago, IL.

Köhn, H. F. (2015). The Reduced RUM as a logit model: Parameterization and constraints. Talk presented at the Lawrence J. Hubert Symposium, Champaign, IL.

Köhn, H. F. (2016). Citation Classics: Greenhouse and Geisser (1959)—On methods in the analysis of profile data. Talk presented at the 81st International Meeting of the Psychometric Society, Asheville, NC.

Chiu, C.-Y., **Köhn, H. F.**, Zheng, Y., & Henson, R. (2016). Joint maximum likelihood estimation for general cognitive diagnostic models. Talk presented to the Graduate Institute of Educational Measurement and Statistics at National Taichung University of Education, Taichung, Taiwan.

Köhn, H. F. (2017). Q-Matrix Completeness in Cognitive Diagnosis: Conditions and Theorems. Talk presented to the Department of Psychology, Fordham University, New York City.

Köhn, H. F. (2017). Q-Matrix completeness in cognitive diagnosis modeling: Known facts and recent insights. Talk presented to the Department of Psychological Sciences, University of Missouri-Columbia, Columbia, MO.

Chiu, C.-Y., & **Köhn, H. F.** (2018). A Procedure for Assessing the Completeness of the Q-Matrices of Cognitively Diagnostic Tests. Talk presented at the 2nd International Conference on Econometrics and Statistics, Hong Kong, China.

Köhn, H. F. (2019, June). Nonparametric Methods in Cognitively Diagnostic Assessment. **Key Note Address** presented at the 48th Annual Meeting of The Classification Society at MacEwan University, Edmonton, Alberta, Canada.

Köhn, H. F. (2019, June). Attribute hierarchy models in cognitive diagnosis: Identifiability of the latent attribute space and the Q-matrix. Talk presented to the 3rd International Conference on Econometrics and Statistics (EcoSta 2019), Taichung, Taiwan.

Köhn, H. F. (2022, June). Q-Matrix Theory in Cognitive Diagnosis: Known Facts and New Insights. **Invited Address** presented at the 51st Annual Meeting of The Classification Society at Wilfrid Laurier University, Waterloo, Ontario, Canada.

Köhn, H. F. (2023, June). Proper and useful distractors in multiple-choice diagnostic classification models. Talk presented to the 2023 Meeting of the International Chinese Statistical Association (ICSA 2023), Ann Arbor, MI.