

## 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

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

## **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**

**Köhn, H. F.** (1997). Strategische Marktforschung bei BBDO [Strategic marketing research at BBDO]. *Marktforschung & Management*, 41, 33–37.

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.

**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.

### **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.