Sunmee Kim

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Current Research Interests

(Last Updated July 2020)

• Interpretable data reduction in prediction modeling:

    extended redundancy analysis (ERA; component-based regression with dimension reduction) and its extensions/applications

• Dealing with heterogeneity in data by unsupervised/supervised learning:

    fuzzy clustering, model-based recursive partitioning

• Two domains of structural equation modeling:

    factor-based (covariance structure analysis) and component- based (generalized structured component analysis)

• Analysis of clustered or correlated data using generalized estimating equations and multilevel models

• Machine learning applications: bootstrap smoothing, ensemble methods, regularization techniques

• Interpretability and reproducibility in quantitative methods

• Missing data: generalized estimating equations, multiple imputation

• Parallel processing in R

• Meta-analysis

Professional Experience

2020-Present	**Assistant Professor**, Quantitative Psychology Department of Psychology, University of Manitoba, MB, Canada
Fall 2018	**Adjunct Professor** Department of Applied Mathematics and Statistics, The State University of New York–Korea, Incheon Global Campus Town, South Korea
2013-2014	**Instructor** Department of Applied Mathematics and Statistics, Hoseo University, Asan-si, South Korea
2013	**Research Assistant** The Lifelong Vocational Education Research Division, Korea Research Institute for Vocational Education and Training (KRIVET), Sejong-si, South Korea

Education

2014-2020	**Ph.D. in Quantitative Psychology and Modeling** McGill University, Montreal, Canada • Dissertation Title: *Extensions and Applications of [Extended Redundancy Analysis](#) for Research in Psychology and Related Fields*
2011-2012	**Master of Mathematical Statistics** Korea University, Seoul, South Korea • Thesis Title: *A Comparison Study for Correcting Publication Bias in Meta-Analysis*
2007-2010	**Bachelor of Science in Statistics** (Major), **Bachelor of Arts in Psychology** (Double Major) Korea University, Seoul, South Korea

Publications

Peer-Reviewed Publications	**Kim, S.***, Lee, S., Cardwell, R, Kim, Y., Park, T., & Hwang, H. (2020). An application of regularized extended redundancy analysis via generalized estimating equations to the study of co-occurring substance use among US Adults. *Quantitative Psychology. IMPS 2019.* Springer Proceedings in Mathematics & Statistics. **Co-first, corresponding author*
	Lee, S., **Kim, S.***, Kim, Y., Oh, B., Hwang, H., & Park, T. (2019). Pathway analysis of rare variants for the clustered phenotypes by using hierarchical structured components analysis. *BMC Medical Genomics, 12* (Suppl 5):100. **Co-first author*
	Kim, S.*, Choi, J. Y., & Hwang, H. (2017). Two-way regularized fuzzy clustering of multiple correspondence analysis. *Multivariate Behavioral Research, 52*, 31-46. **Corresponding author*
	Kim, S.*, Cardwell, R., & Hwang, H. (2017). Using R package gesca for generalized structured component analysis. *Behaviormetrika, 44*, 3-23. **Corresponding author*
	Kim S. Y., **Kim S.**, Kim B., & Yang E. (2015). The Meta-analytic approach to the relationships between coping strategies and post-traumatic psychological maladjustment. *The Korean Journal of Human Development, 22*(1), 195-223.
	Kim S., Ko H., Park S., & Yang E. (2012). Factors Related to Depression of Children and Adolescents in South Korea: A Meta-Analysis. *Korean Journal of Psychological and Social Issues, 18*(4), 435-457.
Statistical Software	Hwang, H., **Kim, S.***, Lee, S., & Park, T. (2017). *gesca: Generalized Structured Component Analysis (GSCA)*. R package available from https://CRAN.R-project.org/package=gesca. **Maintainer*
Manuscripts	**Kim, S.** & Hwang, H (in revision). Model-based recursive partitioning of extended redundancy analysis with an application to nicotine dependence among US adults. *British Journal of Mathematical and Statistical Psychology*.
	Cho, G., **Kim, S.**, Lee J., Sarstedt, M., Ringle, C., & Hwang, H (Submitted). A comparative study of the predictive power of componentbased approaches to structural equation modeling. European Journal of Marketing.

Ongoing Research	• Predictive performance evaluation for ERA using various resampling methods
	 : Prediction-oriented model selection metrics (by cross-validation, bootstrapped .632 and .632+ indices)
	
	• Generalized multi-level ERA for Health and Retirement Study (HRS)
	 : HRS - National longitudinal study for investigating the socio-psychological characteristics and physiological states of older Americans in relation to their cognitive decline over time
	 : How to capture important between-person differences (individual specific effects) while controlling for potential predictors in high-dimension
	
	 • Unbiased GEE estimates in ERA for monotone and intermittent dropout
	
	 • Collaborative Work
	 1) A comparison study of machine learning methods to Implicit Association Task (IAT) data
	    : Mark Baldwin (Social Cognition and Social intelligence Lab, McGill University)
	    : Examining the effect of different training interventions on reducing IAT implicit racial bias scores
	    : Overfitting vs. generalizability of ridge, lasso, and neural networks
	 2) An application study of handling missing data in full information maximum likelihood-based structural equation models to Maternal Adversity Vulnerability and Neurodevelopmental Project data
	    : Cathryn Gordon Green, Ashley Wazana (Jewish General Hospital, Montreal).
	    : Studying negative emotionality as a candidate mediating mechanism linking prenatal maternal mood problems and offspring internalizing behavior

Conference Presentations

Kim, S. & Hwang, H. (July 2020). *Prediction-Oriented Model Selection Metrics for Extended Redundancy Analysis*. Presented at the annual conference of International Meeting of the Psychometric Society. Virtual Conference.

Kim, S. & Hwang, H. (May 2020). *Prediction-Oriented Model Selection Metrics for Extended Redundancy Analysis*. Presented at

the meeting of International Society for Data Science and Analytics. Virtual Conference.

Kim, S. & Hwang, H. (July 2019). *Extended Redundancy Analysis via Generalized Estimating Equations*. Presented at the annual conference of International Meeting of the Psychometric Society, Santiago, Chile.

Lee, S., **Kim, S.**, Kim, Y., Oh, B., Hwang, H., & Park, T. (October 2018). *Pathway Analysis of Rare Variants for the Clustered Phenotypes by Using Hierarchical Structured Components Analysis*. Presented at the 8th Annual Translational Bioinformatics Conference (TBC)/BIOINFO, Seoul, South Korea.

Kim, S. & Hwang, H. (July 2017). *Recursive Partitioning of Extended Redundancy Analysis.* Presented at the annual conference of International Meeting of the Psychometric Society, Zurich, Switzerland.

Kim, S. & Hwang, H. (May 2016). *gesca: An R Package for Generalized Structured Component Analysis.* Presented at the annual Modern Modeling Methods (M3) conference, University of Connecticut, Storrs, Connecticut, United States.

Kim, S. & Hwang, H (May 2015). *Simultaneous Two-Way Fuzzy Clustering of Multiple Correspondence Analysis.* Presented at the M3 conference, University of Connecticut, Storrs, Connecticut, United States.

Ko H., **Kim S.**, & Park S. (August 2012). *A Meta-analytic Review of the Variables Related to Depression in Child and Adolescent.* Poster session presented at the annual conference of the Korean Psychology Association, Gangwon-do, South Korea.

Invited Research Talks

Feb 2020	Quantitative Psychology & Modelling Brownbag Talk Series, McGill University, Canada
Nov 2018	Applied Mathematics and Statistics (AMS) Seminar Series, Department of Applied Mathematics and Statistics, The State University of New York–Korea, South Korea
Sep 2017	Graduate Student Colloquium, Department of Psychology, McGill University, Canada
Jan 2017	Cognitive Research at McGill (CRAM) Brownbag Talk Series, McGill University, Canada
Apr 2015	Quantitative Psychology & Modelling Brownbag Talk Series, McGill University, Canada
Oct 2015	Quantitative Psychology & Modelling Brownbag Talk Series, McGill University, Canada

Awards & Fellowships

2020	Travel stipend awarded for the selected research statement, the University of Michigan's Genomics for Social Scientists Summer Workshop, the National Institutes of Health (NIH) - National Institute on Aging (NIA)
2014-2019	Graduate Excellence Fellowship Awards, McGill University
2019	M.J. Mendelson Travel Award, Department of Psychology, McGill University
2015, 2017	Great Travel Award, Department of Psychology, McGill University
2014	Wolfe Fellowships in Scientific and Technological Literacy, McGill University
2011-2012	Academic Excellence Awards, Department of Statistics, Korea University
2008-2010	Academic Excellence Awards, College of Political Science and Economics, Korea University
2010	Venture Internship Program Scholarships, Korea University

Teaching Experience

Fall 2018	**Adjunct Professor**
	Department of Applied Mathematics and Statistics, The State University of New York–Korea, Incheon Global Campus Town, South Korea
	• AMS597, Statistical Computing and Applied Machine Learning Using R
	• Curriculum and assessment development, lecture preparation and delivery
	• Textbook: Friedman, Hastie, & Tibshirani, 2001, *The elements of statistical learning*. NY: Springers.
Jul 2018	**Guest Lecturer**
	Myung-Duk Foreign Language High School, Seoul, South Korea
	• A four-week workshop presented on "The Role of the Humanities and Social Sciences in the Big Data Era"
	• Curriculum design, teaching material preparation and delivery, reading suggestions
2013-2014	**Instructor**
	Department of Applied Mathematics and Statistics, Hoseo University, Asan-si, South Korea
	• Taught 9-12 credits per semester for three semesters (Language of instruction: Korean)

- Undergraduate-level: Introduction to Statistics, Regression Analysis (using SAS and R), Time-Series Analysis (using SAS), Six-sigma Quality Management (using Minitab)
- Graduate-level: Linear Models in Statistics (text: Rencher and Schaalje (2008), *Linear Models in Statistics*, 2nd Ed, Wiley), Mathematical Statistics (Casella and Berger (2002), *Statistical Inference*, 2nd Ed, Duxbury)

Teaching Assistantships

2014-2017, 2019   Department of Psychology, McGill University, Canada
- Introduction to Psychological Statistics (PSYC204), Statistics for Experimental Design (PSYC305)
- Led tutorial sessions on the use of SPSS/R and the review of lecture content, 3-4 sessions every week
- Graded and provided feedback on assignments and midterm/final exams

Jul 2016   Department of Psychology, Chung-Ang University, South Korea
- A three-day workshop on Structural Equation Modeling
- Guided exercise on the use of {lavaan} package in R (Language of instruction: Korean)

2012-2013   Department of Statistics, Korea University, South Korea
- Categorical Data Analysis (STAT514)
- SAS and R labs for lecture content (Language of instruction: Korean)

2008-2009   Center for Teaching and Learning, Korea University, South Korea
- Regression Analysis (STAT342), Non-Parametric Statistics (STAT332)
- Led tutorial sessions for reviewing lecture content, 3 hours every week (Language of instruction: Korean)

Professional Experience & Internships

2012-2014   **Data Analyst**

Department of Statistics, Korea University, Seoul, South Korea
- Provided consultation to researchers in Education, Nursing, Economics, and the Social Sciences
- Regressions, log-linear models, chi-squared Tests, time-series analysis, and structural equation models

Mar 2013 – Aug 2013   **Research Assistant**

The Lifelong Vocational Education Research Division, Korea Research Institute for Vocational Education and Training (KRIVET), Sejong-si, South Korea
- Applied structural equation models to work interruption data among Korean women
- Designed and analyzed a panel survey to examine women's SES change in relation to low birth rates/aging population

Summer 2010   **Research Assistant Intern**

International Statistical Institute (ISI), The Hague, The Netherlands
- ISI projects:
  - Completed Korean addition as a project member for 'ISI Multilingual Glossary of Statistical Terms'
  - Analyzed the ISI's membership data to demonstrate how various statistical societies connected with the ISI
- Statistics Netherlands—Centraal Bureau voor de Statistiek (CBS) project:
  - Implemented representativity indicators for survey quality (RISQ) using R and applied them to a panel data, LISS-panel (about 5,000 households)

Service Activities

2020   **Reviewer**, Psychometrica

2017-2019   **Student Host**, Hebb Lecture Series: Dr. Patrick J. Curran, Dr. David Kaplan
Department of Psychology, McGill University, Canada

2016-2017   **Student Organizer**, Faculty search committee: Quantitative Position
Department of Psychology, McGill University, Canada

2017   **Hebb Lecture Series Committee Member**
Department of Psychology, McGill University, Canada

2008-2010   **Campus Culture/Climate Working Group Staff**
The Center for Gender and Sexual Health Equity, Korea University, South Korea