CHAEWON LEE

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RESEARCH SUMMARY

My research develops and disseminates advanced statistical and computational methods to address the complex demands of psychological, behavioral, and neural sciences. Drawing on five core methodological frameworks — machine learning, time-series modeling, dynamic network methods, structural equation modeling, and fuzzy statistics — I build integrative solutions that enhance traditional methods, enable robust inference from sparse and heterogeneous data, and reconceptualize measurement imprecision as meaningful signal. Through these developments, I aim to advance precision science in brain and mental health research through individualized brain mapping, biomarker discovery, adaptive intervention and treatment, and predictive modeling of disease trajectories.

EDUCATION

Ph.D. in Quantitative Psychology — University of North Carolina, Chapel Hill, US — (Exp. May) 2026
M.A. in Quantitative Psychology — 2023

- Advisor: Kathleen Gates
- Dissertation: Adaptive and robust structural equation modeling with deep learning approaches (in progress)
- Thesis: An integrative machine learning approach for small samples and high-dimensional imbalanced data in psychological experiment (2023)

M.S. in Applied Statistics — University of Michigan, Ann Arbor, US — 2020

- Advisor: Robert Keener

M.A. in Economics — Yonsei University, Seoul, Korea — 2017

- Advisor: Hak Bae Lee
- Thesis: Impacts of Intellectual Property Rights on the Expansion of Korean Pharmaceutical Industry

B.S. in Biology — Yonsei University, Seoul, Korea — 2009

- Advisor: Woo Taek Kim

RESEARCH EXPERIENCE

Research Collaborator — Tinnitus Disorder Research — Oct 2023 – present

- Department of Psychology and Neuroscience, UNC Chapel Hill (PI: Thomas Rodebaugh)
- Conducted network modeling analyses using group iterative multiple model estimation (GIMME) to examine dynamic symptom relationships in tinnitus disorders, serving as second author on the publication

Research Collaborator — Fuzzy Chaos Modeling Research — Jun 2024 – present

- Department of Mathematics and Statistics, Sejong University (PI: Jin Hee Yoon)
- Applied fuzzy statistics and chaos theory to identify chaotic dynamics in social opinion formation, serving as co–first author on a peer-reviewed publication and conference proceedings

Research Assistant — NSF Student Success Project — May 2021 – Jun 2022

- School of Education, UNC Chapel Hill (PI: Jeffrey Greene, Co-PI: Kathleen Gates)
- Developed sequence-based Markov Machine Learning (seqMAC), a predictive analytics framework that forecasts outcomes in online education using Markov modeling, machine learning, and explainable AI

Graduate Researcher Suicide Prediction Project Apr 2019 – May 2020

- Department of Psychology, University of Michigan (PI: Patricia Deldin)
- Analyzed event-related potentials to classify psychiatric patients and predict suicidality in individuals with bipolar disorder using supervised machine learning

Statistician PROACTIVE Data Project Oct 2019 – Mar 2020

- Harvard Commonwealth Research Center, Beth Israel Deaconess Medical Center (PI: Theo Manschreck)
- In collaboration with clinical researchers, analyzed metabolic profiles related to schizophrenia treatment effectiveness (injectable risperidone vs. oral second-generation antipsychotics).

PUBLICATIONS

Lee, C.* & Gates, K.M. (accepted). Group-iterative multiple model estimation in clinical science. *Annual Review of Clinical Psychology.*

Yoon, J. H.*, **Lee, C.***, Kwon, S., & Bae, Y. C. (co-first author, accepted, November 2025). *Nonlinear and chaotic dynamics in generalized fuzzy opinion model.* Conference paper presented at the *International Conference on Fuzzy Theory and Its Applications (iFUZZY)*, Hsinchu City, Taiwan.

Lee, C.* & Gates, K.M. (2025). Automated machine learning for classification and regression: A tutorial for psychologists. *Behavior Research Methods*, 57, 262. [DOI]

Lee, C.*, Luo, L., Kuhlmann, S. L., Plumley, R. D., Panter, A. T., Bernacki, M. L., Greene, J. A., & Gates, K. M. (2025). Interpretable predictive analytics for online learning: A Markov-based machine learning approach. *Journal of Learning Analytics*, *12*(2), 259-278. [DOI]

Lee, C.*, Gates, K. M., Chun, J., Al Kontar, R., Kamali, M., McInnis, M. G., & Deldin, P. (2025). Suicide risk estimation in bipolar disorder using N200 and P300 event-related potentials and machine learning: A pilot study. *Journal of Affective Disorders Reports*, 20, 100875. [DOI]

Lee, C.* (2025). *flex* [R package]*: Fuzzy least squares estimation with explicit formula* (Version 0.1.0). Comprehensive R Archive Network (CRAN). [DOI]

Lee, C.*, Yoon, J. H., & Bae, Y. C. (November 2024). *Chaotic behaviors in opinion dynamics models influenced by external forces.* Abstract published in the *Proceedings of the 25th International Symposium on Advanced Intelligent Systems (ISIS),* Himeji, Japan.

Plumley, R.D.*, Bernacki, M.L., Greene, J.A., …, **Lee, C.**, Panter, A.T., and Gates, K.M. (2024). Co-designing enduring learning analytics prediction and support tools in undergraduate biology courses. *British Journal of Educational Technology*, 55(5), pp.1860-1883. [DOI]

MANUSCRIPTS IN REVISION / UNDER REVIEW

Yoon, J.H.*, **Lee, C.***, Kwon, S., & Bae, Y.C. (co-first author, in revision). Nonlinear and chaotic dynamics in generalized fuzzy opinion model. *International Journal of Fuzzy Systems*.

Rodebaugh, T.L.*, **Lee, C.**, Gates, K.M., Frumkin, M.R., … , & Piccirillo, J. (under review). Modeling psychological processes in Tinnitus disorder. *Clinical Psychological Science.*

MANUSCRIPTS IN PREPARATION

Lee. C.* & Gates, K.M. (pending submission). No single approach fits all: Testing two generations of structural equation modeling estimation. (target journal: *Multivariate Behavioral Research*)

Lee, C.* & Yoon, J.H. (pending submission). Modeling imprecision in psychological data: Least squares estimation with fuzzy numbers. (target journal: *Psychometrika*)

Lee, C.* & Yoon, J.H. (pending submission). FLEX: An R package for least squares estimation with fuzzy numbers. (target journal: *Multivariate Behavioral Research*)

Lee, C.* et al. (in preparation). From one-off estimation to shared learning: A primer on meta-learning and multi-task learning in psychology (target journal: *Psychological Methods*).

Lee, C.* et al. (in preparation). Learning across individuals in time-series structural equation modeling: A multi-task and meta-learning Approach (target journal: *Psychometrika*).

Lee, C.* & Yoon, J.H. (in preparation). A fuzzy least squares approach to mediation and moderation. (target journal: *Psychometrika*)

Rodebaugh, T.*, **Lee, C.,** et al. (in preparation; author order & target journal TBD). Evaluating novel predictors of response of Tinnitus distress to cognitive behavioral therapy.

TEACHING EXPERIENCE

PSYC 210: Statistical Principles of Psychological Research **UNC Chapel Hill**

Instructional Assistant — May 2025 – present, May 2022 – May 2024

Teaching Assistant — Aug 2020 – Apr 2021

- Supported instruction for an undergraduate Introduction to Statistics course across multiple semesters. Led weekly recitation sessions, provided hands-on guidance for data analysis in SPSS and Jamovi, and offered individualized guidance to help students develop statistical reasoning

RESEARCH TALKS

Society of Multivariate Experimental Psychology (SMEP) Annual Conference (Oct 22-25, 2025)
University of Notre Dame, Indiana, US

- Selected to present a graduate student poster
- "*No single approach fits all: Testing two generations of structural equation modeling estimation*"

International Symposium on Advanced Intelligent Systems (ISIS) Annual Conference (Nov 9-12, 2024)
Himeji, Japan

- First author, *"Chaotic behaviors in opinion dynamics models influenced by external forces"* **Lee, C.***, Yoon, J.H., & Bae, Y.C. (presented by Yoon, J.H.)

American Educational Research Association (AERA) Annual Meeting (Apr 11-14, 2024)
Philadelphia, Pennsylvania, US

Co-author, "*Improving the Prediction of Undergraduate STEM Outcomes via Curricular Temporality-Based Feature Design*" Plumley, R.D.*, Bernacki, M.L., …, **Lee, C.**, …, & Gates, K.M. (presented by Plumley, R.D.)

Quant Forum University of North Carolina, Chapel Hill, US

- *"Integrative classification framework in machine learning for small samples and high-dimensional imbalanced data*" (April 2023)
- *"Sequence analysis for classification: A hybrid Markov–machine learning approach"* (April 2022)
- *"Predicting suicide attempt in bipolar disorder with machine learning"* (May 2021)

AWARDS AND HONORS

Graduate Student Travel Award Society of Multivariate Experimental Psychology (SMEP) 2025
- Supported travel to present a graduate student poster at the Annual SMEP Conference.

Departmental Undergraduate Teaching Commendation UNC Chapel Hill Dec 2020, May 2021
- Awarded twice for excellent teaching in PSYC 210: Statistical Principles of Psychological Research

Graduate Funding Package Graduate School, UNC Chapel Hill 2020-present
- Full tuition and stipend support for PhD training via teaching and research assistantships

Merit-Based Scholarship Graduate School of Economics, Yonsei university Mar 2013
- Awarded for outstanding academic performance.

National Science and Engineering Scholarship Korea Student Aid Foundation 2004-2009
- Awarded full undergraduate tuition and stipend for top national performance on the Korean SAT.

COURSEWORK

M.A. & Ph.D. in Quantitative Psychology

Machine Learning; Test Theory; Multilevel Modeling;
Factor Analysis; Structural Equation Modeling;
Intra-Individual Analysis; Computational Biology;
Attention; Biomedical Imaging Science;
Social Affective Neuroscience

M.S. in Applied Statistics

Probability Theory; Statistical Inference;
Regression Analysis; Financial Statistics;
Machine Learning; Data Analysis in Python;
Design of Experiment; Database App Design;
Practice and Communication in Applied Statistics

M.A. in Economics

Econometrics; Statistics; Game Theory;
Mathematical Statistics; Real Analysis & Measure theory;
Linear Algebra; Economic Research (SPSS);
Macroeconomics; Microeconomics; Copyright Law
Monetary and Financial Economics; Financial Law

B.S. in Biology

Cell Biology; Genetics; Cell Physiology;
Molecular Biology; Animal Histology & Physiology;
Embryology; Microbiology; Virology
Plant Molecular Physiology; Biochemistry
General Biology & Experiments; Plant Cell Morphology

PROFESSIONAL SERVICE

Ad Hoc Reviewer

Journals	Behavior Research Methods; Data Mining and Knowledge Discovery; Cluster Computing; Research Methods in Applied Linguistics
Textbook	Deep learning textbook proposal (Bentham Science Publishers)

Departmental Service

- Faculty Search Committee Member, Quantitative Psychology, UNC Chapel Hill (2025)
- Ph.D. program recruitment meetings with prospective students (2022-2024)

Mentoring

- Research mentor to Srinithi Gali, an undergraduate student double-majoring in Psychology and Statistics at the University of North Carolina at Chapel Hill

Contribution to NIH R21 Grant Proposal

- Assisted in preparing and reviewing a proposal led by Dr. Kathleen Gates, focusing on methodological sections and manuscript editing.

PROFESSIONAL TRAINING AND CERTIFICATES

Functional MRI Visiting Fellowship Oct 26-30, 2019

Athinoula A. Martinos Center for Biomedical Imaging, Massachusetts, US

- Training in fMRI research: magnetic resonance physics, hemodynamic responses, statistical analysis, stimulus presentation and response recording, and the design of perceptual and cognitive experiments.

Certified Research Analyst 2010

- Awarded by the Korea Financial Investment Association for expertise in financial analysis, investment research, and valuation.

Certified Securities Investment Consultant 2009

- Awarded by the Korea Financial Investment Association for qualification to advise investors on securities investment and portfolio management.

PROFESSIONAL EXPERIENCE

Economist Korea Investment & Securities, Seoul, Korea Dec 2010 – Aug 2013

- Research Center
- Published more than 100 economic reports on macroeconomic and financial markets; projected key indicators such as GDP, consumer prices, crude oil prices, exchange rates, and policy rates.
- Representative economic articles include:
  "May industrial activities: Economic woes continue" (Jun 28, 2013)
  "European Economy: Leading economic index to foretell positive cycle" (May 23, 2013)
  "Fluctuations in raw material prices by the uncertainty of US presidential election" (Nov 7, 2012)

Investment Banker Korea Investment & Securities, Seoul, Korea Dec 2009 – Dec 2010

- Department of Equity Capital Markets
- Managed initial public offerings on Korean stock indices (KOSPI and KOSDAQ), including financial due diligence, accounting analysis, and listing documentation.

REFEREES

Dr. Kathleen Gates

- Advisor
- Affiliation: Department of Psychology and Neuroscience, UNC Chapel Hill
- Email: kmgates@unc.edu
- Phone: (919) 962-4947

Dr. Daniel Bauer

- Thesis & Dissertation Committee
- Affiliation: Department of Psychology and Neuroscience, UNC Chapel Hill
- Email: dbauer@email.unc.edu
- Phone: (919) 962-4020

Dr. Patrick Curran

- Prior program director
- Affiliation: Department of Psychology and Neuroscience, UNC Chapel Hill
- Email: curran@unc.edu
- Phone: (919) 962-5235

Dr. Jeffrey Greene

- Collaborator
- Affiliation: School of Education, UNC Chapel Hill
- Email: jagreene@email.unc.edu
- Phone: (919) 966-6188