

YICHI ZHANG

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WORK EXPERIENCE

Postdoctoral Scholar

Aug 2025 - Present

Georgia Institute of Technology

Atlanta, Georgia

- Develop complex multilevel model to handle cross-classified and multiple membership data structure
- Build robust covariance-based outlier detection methods to enhance estimation accuracy and stability of latent variable models

Researcher

Sep 2024 - May 2025

American Institutes for Research

Arlington, Virginia

- First-authored research reports examining validity and reliability of large-scale educational assessments
- Presented research findings at national and international conferences
- Collaborated with software engineers and data scientists to build tools that train external researchers in statistical analysis of complex survey data

EDUCATION

University of Southern California

2019 - 2024

Ph.D. in Quantitative Methods and Computational Psychology (GPA: 3.97)

Dissertation: Bayesian Region of Measurement Equivalence (ROME) for establishing measurement invariance

Chair: Hok Chio (Mark) Lai, Ph.D.

University of Southern California

2019 - 2021

Master of Arts in Quantitative Methods and Computational Psychology (GPA: 4.00)

Thesis: Evaluating two small sample corrections for fixed-effects standard errors and inferences in multilevel models with heteroscedastic, unbalanced, clustered Data

Chair: Hok Chio (Mark) Lai, Ph.D.

Dickinson College

2015 - 2019

Bachelor of Science in Mathematics and Psychology (GPA: 3.79)

PUBLICATIONS

Published Manuscript

Lai, M. H. C., **Zhang, Y.**, Ozcan, M., Tse, W. W.-Y., Miles, A. (2025). fMACS: Generalizing dMACS effect size for measurement noninvariance with multiple groups and multiple grouping variables. *Structural Equation Modeling: A Multidisciplinary Journal*. Advance online publication. <https://doi.org/10.1080/10705511.2025.2484812>

Lai, M. H. C., **Zhang, Y.**, & Ji, F. (2024). Adjusting for measurement error in cluster means in multi-level modeling: Two numerically stable alternatives to latent-mean centering. *Multivariate Behavioral Research*. Advance online publication. <https://doi.org/10.1080/00273171.2024.2307034>

Zhang, Y., & Lai, M. H. C. (2024). Evaluating two small-sample corrections for fixed-effects standard errors and inferences in multilevel models with heteroscedastic, unbalanced, clustered data. *Behavior Research Methods*. Advance online publication. <https://doi.org/10.3758/s13428-023-02325-9>

Ozturk, E. D., **Zhang, Y.**, Lai, M. H. C., Sakamoto, M. S., Chanfreau-Coffinier, C., & Merritt, V.C. (2023). Measurement invariance of the Neurobehavioral Symptom Inventory (NSI) in male and female

Million Veteran Program (MVP) enrollees completing the Comprehensive Traumatic Brain Injury Evaluation (CTBIE). *Assessment*. Advance online publication. <https://doi.org/10.1177/10731911231198214>

Tse, W. W., Lai, M. H. C., & **Zhang, Y.** (2023). Does strict invariance matter? Valid group mean comparisons with ordered-categorical items. *Behavior Research Methods*. Advance online publication. <https://doi.org/10.3758/s13428-023-02247-6>

Zhang, Y., Kim, Y., & Zheng, X. (2023). Investigating measurement invariance in NAEP student questionnaire index items. [AIR-NAEP Working Paper]. Washington, DC: American Institutes for Research.

Zhang, Y., Lai, M. H. C., & Palardy, G. J. (2023). A Bayesian region of measurement equivalence (ROME) approach for establishing measurement invariance. *Psychological Methods*, 28(4), 993–1004. <https://doi.org/10.1037/met0000455>

Lai, M. H. C., & **Zhang, Y.** (2022). Classification accuracy of multidimensional tests: Quantifying the impact of noninvariance. *Structural Equation Modeling*, 29(4), 620–629. <https://doi.org/10.1080/10705511.2021.1977936>

Manuscript Under Review

Zhang, Y., Xu, L., & Lai, M. H. C. (2025). Robust alignment optimization for approximate invariance.

Zhang, Y., & Lai, M. H. C. (2024). Bayesian region of measurement equivalence (ROME) approach with alignment.

Manuscript In Preparation

Zhang, Y., & Wolfe, E. W. (2024). Evaluating subgroup analysis indices and guidelines for automated scoring algorithm.

Book Chapters

Zhang, Y., Tse, W. W., & Lai, M. H. C.(2024). Bootstrap Methods for Robust Multilevel Analysis. In M. Stemmler, W. Wiedermann, & F. L. Huang (Eds.), *Dependent Data in Social Sciences Research: Forms, Issues, and Methods of Analysis* (2nd ed.). Springer. https://doi.org/10.1007/978-3-031-56318-8_13

RESEARCH INTERNSHIPS

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| Psychometrics Research Intern | May 2023 - Jul 2023 |
| <i>Pearson</i> | Iowa city, Iowa |
| - Designed and implemented a simulation study to examine the performance of reliability indices for automated scoring algorithm using a Monte Carlo simulation - Presented research findings of algorithm validity at the 2024 National Council on Measurement in Education (NCME) conference | |
| Doctoral Research Intern | Jun 2022 - Aug 2022 |
| <i>American Institutes for Research</i> | Arlington, Virginia |
| - Applied a Bayesian methodology to validate survey items from a large-scale national educational assessment data set with Balanced Incomplete Block design (NAEP) - Presented findings at the 2023 National Council on Measurement in Education (NCME) conference | |

RESEARCH EXPERIENCE

Research Assistant

University of Southern California

Grant: *Evaluation of "Identity-Based Motivation Journey to Academic Success" (Department of Education/i3; Supervisor: Lai, M. H. C.)*

Aug 2020 - Aug 2021

Los Angeles, California

- Evaluated longitudinal measurement invariance of early assessments of college readiness across intersectional groups and cohorts using two national datasets (ELS:2002; HSL:2009)

Grant: *Developing and Validating Early Assessments of College Readiness: Differential Effects for Underrepresented Groups, Optimal Timing of Assessments, and STEM-specific Indicators (National Science Foundation, Research on Learning in Formal and Informal Settings; Supervisor: Palardy, G. J.)*

- Conducted attrition analysis and reliability analysis for a large-scale longitudinal dataset that assessed the efficacy of a digital program developed to improve academic outcomes by changing identity-based motivation

CONFERENCE PRESENTATIONS

14. **Zhang, Y.**, & Lai, M. H. C. (2025, April 23-26). *Bayesian Region of Measurement Equivalence (ROME) Framework With Multilevel Confirmatory Factor Analysis* [Poster Session]. The National Council on Measurement in Education (NCME), Dever, Colorado.

13. **Zhang, Y.**, & Wolfe, E. W. (2024, April 11-14). *Evaluating subgroup analysis indices and guidelines for automated scoring algorithm* [Poster session]. The National Council on Measurement in Education (NCME), Philadelphia, Pennsylvania.

12. **Zhang, Y.**, & Lai, M. H. C. (2023, July 25-28). *Alignment with Bayesian Region of Measurement Equivalence (ABROME) approach for multiple groups comparisons* [Oral Presentation]. Annual Meeting of the Psychometric Society (IMPS), College Park, Maryland.

11. **Zhang, Y.**, Kim, Y., & Zheng, X. (2023, April 12-15). *Investigating measurement invariance in NAEP student questionnaire index items* [Oral Presentation]. The National Council on Measurement in Education (NCME), Chicago, Illinois.

10. Lai, M. H. C., **Zhang, Y.**, & Ji, F. (2023, April 13-16). *An empirical Bayes cluster-mean approach to correct for sampling error in between-cluster effects* [Poster session]. American Educational Research Association Annual Meeting (AERA), Chicago, Illinois.

9. **Zhang, Y.**, & Lai, M. H. C. (2022, July 11-15). *Bayesian Region of Measurement Equivalence approach with Alignment* [Oral Presentation]. Annual Meeting of the Psychometric Society (IMPS), Bologna, Italy.

8. **Zhang, Y.**, & Lai, M. H. C. (2022, July 11-15). *Evaluating standard error estimators on small clustered samples with heteroscedasticity* [Poster session]. Annual Meeting of the Psychometric Society (IMPS), Bologna, Italy.

7. **Zhang, Y.**, & Lai, M. H. C. (2022, April 21-26). *Evaluating standard error estimators on small clustered samples with heteroscedasticity and unbalanced cluster sizes* [Poster session]. American Educational Research Association Annual Meeting, San Diego, CA, United States.

6. Palardy, G. J., **Zhang, Y.**, & Lai, M. H. C. (2022, April 21-26). *Measurement invariance testing via the Alignment method: Intersectional grouping and multiple cohorts* [Oral Presentation]. American Educational Research Association Annual Meeting, San Diego, CA, United States.

5. **Zhang, Y.**, & Lai, M. H. C. (2021, July 20-23). *Classification accuracy of multidimensional tests: Quantifying the impact of noninvariance* [Oral Presentation]. Virtual conference of the Psychometric Society (IMPS) due to covid-19.

4. Zhang, R., **Zhang, Y.**, & Lalonde, R. (2021, July 27-31). *Examining multiculturalism-creativity link from the perspective of challenge and threat appraisals* [Oral Presentation]. International Association of Cross-Cultural Psychology (IACCP), online.
3. **Zhang, Y.**, & Lai, M. H. C. (2021, August 12-14). *Classification accuracy of multidimensional tests: Quantifying the impact of noninvariance* [Poster Session]. American Psychological Association Annual Convention (APA), Online.
2. **Zhang, Y.**, & Lai, M. H. C. (2020, July 14-17). *A Bayesian Region of Measurement Equivalence (ROME) approach for establishing measurement invariance* [Poster Session]. Annual Meeting of the Psychometric Society (IMPS), College Park, MD, United States.
1. **Zhang, Y.**, & Lai, M. H. C. (2020, June 2-3). *A Bayesian Region of Measurement Equivalence (ROME) approach for establishing measurement invariance* [Poster Session]. Modern Modeling Methods Conference (MMM), Storrs, CT, United States. (Conference canceled)

INVITED PRESENTATIONS

- How Accurate are the Decisions Suggested by Score Agreement Guidelines for Automated Scores?** July 2023
Pearson
- Multilevel Regression and Poststratification on Social Media Data** July 2023
Pearson
- Dealing with Missing Data in R** March 2023
University of Southern California
- Measurement Invariance Testing in R** Nov 2023
University of Southern California
- Investigating Measurement Invariance in NAEP Student Questionnaire Index Items** July 2022
American Institutes for Research
- A Bayesian Region of Measurement Equivalence (ROME) Approach for Establishing Measurement Invariance** July 2022
American Institutes for research

TEACHING EXPERIENCE

- Statistical Consultant** Aug 2022 - May 2023
McArdle Graduate Consultation and Computer Center (USC) Los Angeles, CA
 - Translated graduate students' needs into appropriate statistical solutions using both frequentist and Bayesian frameworks
 - Hosted workshop sessions on multilevel models and structural equation models
 - Mentored graduate students in statistical analysis
 - Provided software support for using R, Mplus, Stata
 - Contributed to the development of a website that gathers learning resources and manages appointment requests
- Teaching assistant** Aug 2020 - May 2023
University of Southern California Los Angeles, CA
 - PSYC 274 Lg: Statistics (Evaluation: 3.48) and PSYC 100 Lg: Introduction to Psychology (Evaluation: 3.45)
 - Led lab sections of 50 students, planned lessons and activities
 - Taught inferential statistics with SPSS and R
- Co-instructor of Workshop "Advancing Quantitative Carlo Simulation"** Aug 2020
Science with Monte Simulation Summer School, Psychology Postgraduate Affairs Group, the British Psychological Society Online

SOFTWARE DEVELOPMENT

2022 NISS Data Visualization Contest

<https://uncover-data-stories.shinyapps.io/NAEP-Reading-Scores/>

- Shiny App that visualizes the trend of the National Assessment of Educational Progress (NAEP) reading scale scores from 1998 to 2019

Unbiasr Shinyapp

<https://mmmlabusc.shinyapps.io/partinvshinyui/>

- Shiny App that implements the multidimensional classification accuracy analysis (MCAA) framework that quantifies the impact of item bias on selection accuracy

PROFESSIONAL SERVICE

Ad Hoc Reviewer

Jan 2020 - Present

- Psychological Methods

- Multivariate Behavioral Research

- Asian American Journal of Psychology

- American Educational Research Association Annual Meeting (AERA)

PROFESSIONAL DEVELOPMENT WORKSHOPS AND COURSES

Advanced Process Data Analytics using NAEP

Introduction to flexMIRT by Li Cai, Michael Edwards and Carrie R. Houts

Longitudinal Data Analysis Using SEM by Paul D. Allison

Introduction to Social Network Analysis by Tracy Sweet

SKILLS

Tools and Languages

R(mirt, ltm, lavaan, brms, lme4), Mplus, Python, Julia, Stata, Stan, SPSS, Tensorflow, Git, LaTeX, Markdown, Rsweave

Psychometrics

Calibration, Linking, Equating, Computer adaptive testing, Reliability and validity analysis, Classical Test Theory, Generalizability theory, Item Response Theory, Sampling and weighting, Causal inference, Bootstrap methods, Categorical data analysis, Robust statistics

Quantitative Research

Selection and assessment, Machine Learning, Natural Language Processing, Decision science and behavior change, Quantitative text analysis, Survey design, Experiment design

AWARDS AND SCHOLARSHIPS

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| Society for the Improvement of Psychological Science Diversity Travel Grant | 2024 |
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| Dornsife Ph.D. Academy Certificate in Communication, Leadership and Management | 2023 |
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| Graduate Student Government Professional Development Fund | 2022 - 2023 |
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| Dornsife PhD Academy Scholarship and Research Fund Award | 2019 - 2024 |
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| USC Psychology Department Travel Grant Award | 2019 - 2023 |
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