

YALE QUAN

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EDUCATION

UNIVERSITY OF WASHINGTON

Ph.D. Measurement & Statistics

Advisor: Chun Wang, Ph.D.

Dissertation Title: Culturally Responsive Measurement: Machine Learning and Artificial Intelligence Approaches to DIF Detection, Parameter Estimation, and Scoring

Seattle, WA

Expected May 2026

CSU, LONG BEACH

M.S. Applied Statistics

B.S. Criminal Justice

Long Beach, CA

2020

2013

FACULTY APPOINTMENTS

UNIVERSITY OF SOUTHERN MISSISSIPPI

Assistant Professor of Education; Tenure Track.

Research, Evaluation, Statistics, and Assessment

Hattiesburg, MS

2026 – Present

RESEARCH INTERESTS

My research is motivated by the need for fair and rigorous measurement in complex educational and psychological settings. Methodologically, I develop psychometric models that integrate modern machine learning approaches with item response theory and diagnostic classification models to support culturally responsive measurement. Much of my work focuses on intersectional differential item functioning, small-sample and high-dimensional inference, and many-group measurement invariance. I am particularly interested in using neural networks and graph-based methods to improve DIF detection, parameter estimation, and scoring, with the goal of producing more equitable, interpretable, and practically useful assessment tools.

In my applied work, I collaborate with K–12 schools and community partners to study barriers to student success, with a focus on student belonging and chronic absenteeism. I also apply psychometric and statistical methods to healthcare and psychological research settings, using real-world data to inform both substantive findings and ongoing methodological development.

AWARDS AND HONORS

UNIVERSITY OF WASHINGTON

Three Year Community Partner Fellowship Award

Seattle, WA

2022 - 2025

RESEARCH EXPERIENCE

CENTER FOR SOCIAL SCIENCE COMPUTATION AND RESEARCH

Statistical Research Consultant

Seattle, WA

2021; 2025 - Present

DATA SCIENCE 4 EVERYONE

Graduate Research Assistant

Supervisors: Zarek Drozda, Sarah Miller, Sean Sukol

Chicago, IL

Summer 2024

EQUAL OPPORTUNITY SCHOOLS
Community Partner Doctoral Fellow
Supervisor: Jessica Paulson Ph.D.

Seattle, WA
2022 - 2025

PEER-REVIEWED JOURNAL ARTICLES

1. **Quan, Y., & Wang, C.** (In Press) Using Multi-label Classification Neural Networks to Detect Intersectional DIF with Small Sample Sizes. *British Journal of Mathematical and Statistical Psychology*
2. Parker, M., Ciou, S.Y., **Quan, Y.**, Ren, H., Wang, C., & Li, M. (2026). Investigating Answer Choice Bias within a College-Level Introductory Computing Assessment. *SIGCSE 2026*. <https://doi.org/10.1145/3770762.3772622>
3. **Quan, Y., & Wang, C.** (2026). Calibrating Multidimensional Assessments with Structural Missingness, An Application of a Multiple-Group Higher-Order IRT Model. *Applied Psychological Methods*. <https://doi.org/10.1177/01466216251415011>
4. **Quan, Y., & Wang, C.** (2025). Collapsing or Not? A Practical Guide to Handling Sparse Responses for Polytomous Items. *Methodology*, 21(1), 46-73. <https://doi.org/10.5964/meth.14303>

WORKING PAPERS & PREPRINTS

1. **Quan, Y., & Ren, H.** (2025). Sample Size and Assessment Length Recommendations for the Diagnostic Status Facet Model. *PsyArXiv*. https://doi.org/10.31234/osf.io/zr3je_v1

CONFERENCE PRESENTATIONS

1. **Quan, Y., & Wang, C.** (2026, April 8-11). *Beyond DIF Detection: A Downstream Clustering Framework for Small Sample Parameter Estimation* [Paper Presentation]. National Council on Measurement in Education 2026 Annual Meeting, Los Angeles, CA, United States
2. **Quan, Y., & Wang, C.** (2026, April 8-11). *Advancing Diagnostic Models for Fair and Insightful Educational Action* [Paper Presentation]. National Council on Measurement in Education 2026 Annual Meeting, Los Angeles, CA, United States
3. **Quan, Y., & Wang, C.** (2025, July 15-18) *A Neural Network Approach to Small Sample Intersectional DIF Detection* [Paper Presentation]. Annual International Meeting of the Psychometric Society (IMPS), Minneapolis, MN, USA.
4. **Quan, Y.** (2025, May 9). *Using Categorical Structural Equation Models to Identify Facets of Student Belonging* [Paper Presentation]. Community Partner Doctoral Fellowship Research Presentation, Seattle, WA, United States

5. **Quan, Y., Ren, H., & Wang, C.** (2025, March 29). *Constructing A Machine Learning Model For Binary Predictions with Incomplete, Imbalanced Data and Non-Linear Effects* [Paper Presentation]. A Meeting of Methodologists.
6. **Quan, Y., Sager, M.** (2025, February 17-20) *Identifying Core Formal Assessment Competencies and Informal Learning Outcomes of Data Science and Data Literacy* [Paper Presentation]. Data Science Education K-12: Research to Practice Annual Conference
7. **Quan, Y., & Ren, H.** (2024, December 4) *Sample Size and Test Length Recommendations for the Diagnostic Facet Status Model* [Paper Presentation]. Center for Statistics and The Social Sciences Student Research Presentation, Seattle, WA, United States.
8. **Quan, Y., & Wang, C.** (2024, November 17-18) *A New Item Fit Test for the Diagnostic Facet Test Model (DFSM)* [Paper Presentation]. Annual Pacific Northwest Research on Psychometrics and Applied Statistics Conference, Pullman, WA, United States.
9. **Quan, Y.** (2024, June 4) *Introduction to Bayesian Item Response Theory*, [Paper Presentation]. Center for Statistics and The Social Sciences Student Research Presentation, Seattle, WA, United States.
10. **Quan, Y.** (2024, October 18) *Item Response Theory (IRT) Model Selection and Applications* [Invited Talk]. University of Washington Behavioral Research Center for HIV. Seattle, WA, United States.
11. **Quan, Y., & Wang, C.** (2024, April 11-14) *Parameter Recovery from Higher Order Item Response Theory Models with Structural Missingness* [Paper Presentation]. National Council on Measurement in Education 2024 Annual Meeting, Philadelphia, PA, United States
12. **Quan, Y., & Wang, C.** (2024, April 11-14) *Collapsing or not? A Practical Guide to Handling Sparse Responses for Polytomous Items*, [Paper Presentation], American Educational Research Association Annual Meeting, Philadelphia, PA, United States.
<https://doi.org/10.3102/2102869>
13. **Quan, Y., & Xiao, T.** (2024, March 11) *The Effects of Measurement Error on Multilevel Linear Growth Model Parameter Estimates*, [Paper Presentation]. Center for Statistics and The Social Sciences Student Research Presentation, Seattle, WA, United States.
14. **Quan, Y., & Wang, C.** (2022, April 12-15) *The Effects of Sample Size and Collapse Direction on Parameter Recovery* [Poster Presentation]. National Council on Measurement in Education 2023 Annual Meeting, Chicago, IL, United States
15. **Quan, Y.** (2021, December 3). *Clustering Education Data Using K-Medoids with Partitioning Around the Medoids Algorithm* [Seminar Presentation]. Measurement & Statistics Seminar, University of Washington. Seattle, WA, United States

MANUSCRIPTS UNDER REVIEW

1. Wang, C., **Quan, Y.**, Arthur, D. (Under Review) Review of Cognitive Diagnostic Models (CDMs): Recent Methodological Advancements for Addressing Challenges in Applications. *British Journal of Mathematical and Statistical Psychology*
2. **Quan, Y.**, & Wang, C. (Under Review) Transitive Differential Item Functioning Clustering: A Graph-Theoretic Approach to Identifying Many-Group Partial Measurement Invariance. *Psychological Methods*

TEACHING EXPERIENCE

TEACHING ASSISTANT; UNIVERSITY OF WASHINGTON 2021-2022
College of Education
Basic Educational Statistics
Department of Psychology
Fundamentals of Psychological Research

LECTURER; CSU, LONG BEACH 2020-2021
Department of Mathematics and Statistics
Statistics for Everyday Life

TEACHING ASSOCIATE; CSU, LONG BEACH 2018-2021
Department of Mathematics and Statistics
Statistics for Everyday Life
Essential Algebra A/B
The Power of Mathematics

SUPPLEMENTAL INSTRUCTOR; CSU, LONG BEACH 2017-2018
Department of Mathematics and Statistics
Business Calculus
Calculus I

PROFESSIONAL TRAININGS AND CERTIFICATIONS

UNIVERSITY OF PENNSYLVANIA Philadelphia, PA
Data Science Methods for Digital Learning Platforms Certification 2025
Certificate ID: 149359454

AMERICAN INSTITUTES FOR RESEARCH Arlington, VA
The National Assessment of Educational Progress Winter Data Training 2023
National Assessment of Educational Progress Process Data Training Series 2021

PROFESSIONAL SERVICE

METHODOLOGY; EUROPEAN JOURNAL OF RESEARCH METHODS FOR THE
BEHAVIORAL AND SOCIAL SCIENCES

Reviewer 2025 – Present

JOURNAL OF BEHAVIORAL DATA SCIENCE

Reviewer 2025 – Present

JOURNAL OF EDUCATIONAL MEASUREMENT

Reviewer 2023 – Present

AMERICAN EDUCATIONAL RESEARCH ASSOCIATION

Reviewer 2023 – Present

NATIONAL COUNCIL ON MEASUREMENT IN EDUCATION

Reviewer and Session Chair 2022 – Present

MEMBERSHIPS

National Council on Measurement in Education 2022 - Present

American Educational Research Association Division D 2022 – Present