Jiangang Hao, Ph.D.

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Highlights

- Over 13 years of experience leading research programs to define and measure complex skills, including collaboration, communication, and complex reasoning, through innovative, evidence-centered, technology-enabled virtual performance-based assessments. Led the development of a core research software infrastructure supporting projects funded by over **$10M** in federal grants.
- Deep technical and scientific expertise in AI, data science, and psychometrics, with a sustained focus on the responsible use of AI in assessment and learning. Authored or co-authored 100+ peer-reviewed publications (**10,000+ citations; h-index 46**) and holds **multiple U.S. patents** in AI-enabled learning analytics, writing evaluation, and test security. Recognized for research leadership and impact through national and institutional honors, including the **NCME Award for Exceptional Achievement in Educational Measurement** and the **ETS Presidential Award**.
- Proven track record of building, leading, and growing high-performing teams of senior PhD-level researchers. Experienced in recruiting talented scientists and mentoring them to align their expertise with strategic research priorities. Mentored **eight research interns and visiting scholars** and led enterprise R&D training initiative in data science, AI, and digital learning, upskilling more than **120 staff members**.
- Extensive experience providing strategic thought leadership in shaping and managing research portfolios, including defining research priorities, planning and managing budgets, and guiding portfolio execution to ensure research outcomes translate into actionable insights for product development, practice, and policy.
- Highly effective communicator with a strong record of translating complex technical concepts for non-technical audiences; Delivered **hundreds of presentations and invited talks** across national and international conferences, industry forums, and executive settings, effectively bridging research, product, and business perspectives.

Employment

- **Educational Testing Service, Princeton, NJ, USA**
  - *Director*, Assessment of Complex Skills Program, 9/2023 - now
    - Define research priorities and manage a portfolio of projects on complex skills assessment, securing over $4M in federal funding.
    - Lead the development of performance-based assessment prototypes for collaboration, communication, social-emotional learning, and other complex skills.
    - Lead research on LLMs and generative AI for assessment, including automated scoring and coding, development of AI-generated essay detectors, and evaluation of their accuracy, fairness, and responsible use.
  - *Director*, Psychometric and Data Science Modeling Group, 10/2020 - 9/2023

- Led the AI and analytics test security initiative, defining and prioritizing a portfolio of projects that delivered more than seven AI- and data-driven solutions accounting for over 60% of detected cheating incidents.
- Co-edited Computational Psychometrics, helping establish an emerging discipline; the volume received the NCME Annual Award for Exceptional Achievement in Educational Measurement.

◦ *Managing Senior Research Scientist*, Assessment Analytics and Data Science Group, 3/2020 - 10/2020

- Led the development of a classroom-based, computer-supported collaborative learning and assessment system enabling performance-based assessment of collaborative problem solving and supporting three federally funded research projects.
- Served on the ETS AI Strategy Committee contributing to the development of enterprise AI strategy.

◦ *Senior Research Scientist*, Psychometrics, Statistics and Data Science Division, 8/2016 - 3/2020

- Co-chaired the Research Advisory Council to develop and implement the Measurement Frontier Research Initiative, defining research priorities, selecting proposals and monitoring their implementations.
- Led the development of the ETS Platform for Collaborative Assessment and Learning (EPCAL), a pivotal software infrastructure for assessing interpersonal skills, supporting over 13 research projects, and being recognized by the ETS Presidential Award.
- Introduced the Evidence Trace File for virtual performance-based assessment as an open standard data model.

◦ *Research Scientist*, Center for Computational Psychometrics, 5/2013 - 8/2016

- Led the ETS Collaborative Science project, creating innovative assessment tools showcased at the White House by the NCES commissioner.
- Innovated data science methods to enhance evidence extraction from game based assessments, resulting in highly cited research publications.

- **University of Pennsylvania, Philadelphia, PA, USA**
  Visiting Scientist, Department of Physics, 1/2012 - 5/2013
  Developed machine learning algorithms for astronomical image quality assurance
- **Fermi National Accelerator Laboratory, Batavia, IL, USA**
  Postdoc, Center for Particle Astrophysics, 5/2009 - 5/2013
  Conducted research to support the dark energy survey project and developed the largest catalog of galaxy clusters as of 2014
- **University of Michigan, Ann Arbor, MI, USA**
  Research Assistant, Department of Physics, 6/2006 - 5/2009
  Develped unsupervised machine learning methods for detecting clustered galaxies.

Education

- **University of Michigan, Ann Arbor, USA**
  PhD, Physics (2009); MA, Statistics (2006)
- **East China University of Science and Technology, Shanghai, China**
  DSc, Applied Mathematics (2004); MS, Physics (2001); BS, Physics (1998)

Technical Expertise

- LLMs, Generative AI, Context Engineering, Agentic Coding
- Evidence-Centered Design | Game/simulation-based Assessments
- Psychometrics & Statistics | Data Science
- Machine Learning & Natural Language Processing | Automated Scoring and Coding
- Dynamical Systems and Differential Equations

Programming Skills

- Python | R | C++
- Cloud Computing: Amazon Web Services (AWS), Azure, Google Cloud.
- GitHub: https://github.com/jgbrainstorm | https://github.com/jianganghao
- Software Package: https://sites.google.com/site/jiangangecgmm)

Service

Corporate Service

- Enterprise Test Security Leadership Team [2022 – 2023]: Oversaw development and implementation of enterprise-wide test security initiatives.
- AI and Data Analytics Initiative for Test Security [2021 – 2023]: Defined research agenda and budget to develop AI- and data-driven solutions for test security.
- Research Upskilling Initiative [2021 – 2022]: Led the design and implementation of training courses in AI, data science, and digital learning.
- Remote Proctoring Strategy Committee [2020–2021]: Helped to define and plan the remote proctoring strategy and implementation.
- R&D Technology Steering Committee [2019–present]: Provided technical oversight and strategic guidance for R&D computing infrastructure and cloud strategy.
- Research Advisory Council, PSDS Division (Co-Chair) [2019 – 2020]: Co-led research agenda setting, proposal review, and portfolio oversight.
- AI Strategy Committee [2019–2020]: Contributed to the development of enterprise AI strategy.
- Computational Psychometrics Initiative [2016 – 2017]: Led agenda setting and execution of research initiatives defining computational psychometrics.
- Software and Data Infrastructure Sub-Initiative [2014 – 2016]: Led research agenda development and implementation for software and data infrastructure.

Professional Service

- **Associate Editor**
  Frontiers in Psychology: Quantitative Psychology and Measurement
- **Editorial Board**

Journal of Educational Measurement

- **Reviewer (active)**
  Psychometrika | *Journal of Educational Measurement* | *Educational and Psychological Measurement* | *Journal of Educational and Behavioral Statistics* | *International Journal of Testing* | *Learning and Instruction* | *Computers & Education* | *PLOS One* | *Journal of Learning Analytics* | *Computers in Human Behavior* | *Journal of Educational Data Mining* | *Educational Assessment* | *IEEE Transactions on Learning Technologies* | *Quality Assurance in Education* | *ETS Research Report*
- **Conference Program/Organizing Committee**
  - International Conference on Educational Data Mining (EDM): 2017–now
  - International Conference on Artificial Intelligence in Education (AIED): 2024 - now
  - Workshop on Innovative Use of NLP for Building Educational Applications (BEA): 2017–now
  - International Conference on Computer Supported Education: 2023 - now
  - EdTech and Computational Psychometrics Summit (ECPS): 2024
  - NeurIPS workshop: 2024
  - AAAI Conference on Artificial Intelligence: 2021–2024
  - Association for Computational Linguistics: 2018–2023
  - International Conference on Learning Sciences (ICLS): 2018
  - IEEE International Conference on Systems, Man, and Cybernetics: 2015
- **Organized Workshop/Symposium/Panel** (Please visit my personal site for a complete list)
  - *National Council on Measurement in Education (NCME) (2017–2025)*
    Chaired/organized 12+ workshops, symposia, and panels across NCME annual meetings, with recurring themes on AI for assessment, assessment of collaborative and social-emotional skills, process data analytics, test security, and data science upskilling for psychometricians.
  - *Conference on Test Security (2022)*
    Organized a symposium on AI- and data analytics–driven approaches to test security for remotely proctored assessments.
  - *EdTech & Computational Psychometrics Summit / MARC Conference (2022)*
    Led professional training workshops on computational psychometrics, machine learning, and natural language processing for next-generation assessments.
  - *International Conference on Computer-Supported Collaborative Learning (CSCL) (2017–2019)*
    Organized multiple workshops on large-scale computer-supported collaboration, EPCAL, and performance-based assessment of collaborative problem solving.

Awards and Recognition

- *Annual Award for Exceptional Achievement in Educational Measurement*, 2024, National Council on Measurement in Education (NCME), USA
- *Presidential Award*, 2016, Educational Testing Service, USA

- *SPOT Awards*,2013-2015, Educational Testing Service, USA
- *Most Valued Reviewer*, 2011, Astroparticle Physics, Elsevier
- *Builder*, 2011, Dark Energy Survey Collaboration
- *GROCS Award*,2009, University of Michigan, USA
- *First Prize for the Advancement of Science and Technology in Shanghai*, 2005, Shanghai, China

Mentorship

- Nurseit Baizhanov, ETS Visiting Scholar (National Testing Center of Kazakhstan)
- Kehinde Elelu, 2024 ETS Summer Intern (Civil Engineering Ph.D. Student of Clemson University)
- Yang Zhong, 2023 ETS Summer Intern (Computer Science Ph.D. Student of the University of Pittsburgh)
- Daniel Adams, 2018 ETS Summer Intern (Psychometrics Ph.D. Student of the University of Wisconsin - Madison), Now ETS Psychometrician
- Yang Jiang, 2017 ETS Summer Intern (Cognitive Science Ph.D. Student of Columbia University), Now ETS Research Scientist
- Lu Ou, 2016 ETS Summer Intern (Statistics Ph.D. Student of Penn State University), Now at Netflix
- Thales Ricarte, 2015 ETS Exchange Student (Psychometrics Ph.D. student of the University of São Paulo)
- Zuowei Wang, 2014 ETS Summer Intern (Psychology Ph.D. student of the University of Michigan), Now ETS Research Scientist

Selected Research Projects

(Please visit my personal site for a complete list)

- **Large Language Model and Responsible Use of AI** [2023 - Present]
  Since the release of ChatGPT in November 2022, I initiated and led a team of scientists to explore its impact on assessment and learning. The projects include:
  - *Characterizing LLM-Assisted Writing and Automated Scoring*: Led research to identify distinguishing features of LLM-assisted essays and develop automated scoring and detecting methods based on LLMs. *Selected publication*: https://onlinelibrary.wiley.com/doi/abs/10.1111/emip.70013
  - *Automated Coding of Communication Data Using LLM*: Led a series of projects to investigate the accuracy and bias of LLM-based automated coding of communication data for assessing complex skills. *Selected publication*: https://onlinelibrary.wiley.com/doi/abs/10.1111/jedm.70014
  - *Responsible Detection of AI-generated Texts*: Led the development of a suite of machine learning-powered detectors to identify AI-generated essays and investigate its responsible use across subgroups. *Selected publication*: https://www.sciencedirect.com/science/article/abs/pii/S0360131524000848
  - *Impacts and implications of LLMs and GenAI on Assessment*: Led a community-wide effort with researchers from leading assessment organizations (ETS, Duolingo, NBME, Cambium, Boston College, and the University of Iowa) to develop a collaborative paper discussing the implications of LLMs and Generative AI in assessment and introducing guidelines for their responsible and ethical use. *Selected publication*: https://onlinelibrary.wiley.com/doi/abs/10.1111/emip.12602

- *Generative AI-powered Tools and Assessment Prototypes*: Led the development a series of AI-powered assessment prototypes for complex skills and tools for enhancing efficiency and accessibility.

- **Assessment of Complex Skills**
  Since 2013, I have led and co-led a sustained portfolio of research projects focused on assessing complex skills using technology-enabled, performance-based approaches. Key projects include:

  - *ETS Platform for Collaborative Assessment and Learning (EPCAL)* [2015–Present]
    Led the design and development of EPCAL, an online research platform for assessing collaboration, communication, and social-emotional learning in human–human interaction. EPCAL functions as a core infrastructure for interpersonal-skills research and has been supported by five major external grants (NSF, IES, ARI, EIR; >$10M total)
    Selected publication: https://onlinelibrary.wiley.com/doi/full/10.1002/ets2.12181

  - *AI-enabled Assessment of Communication Skills* [2025–Present]
    Technology lead for the development of an AI-enabled assessment prototype targeting communication skills.

  - *Assessment of Self-Regulated Learning in AI-Assisted Environments* [2025–Present]
    Provide oversight for the development of an assessment prototype for self-regulated learning in AI-assisted environments.

  - *Developing Middle Grade Students' Social-Emotional Learning Skills through Technology-Enhanced Collaborative Learning* [2024–2028]
    Co-Principal Investigator on this U.S. Department of Education – funded Education Innovation and Research (EIR) project focused on technology-enhanced assessment and instruction of SEL skills. *Selected publication*: https://osf.io/preprints/edarxiv/9cbe2_v1

  - *Collaborative Problem Solving Skills: Estimating an Individual's Contribution to Small Group Performance* [2019–2022]
    Co-Principal Investigator on an Army Research Institute – funded project developing methods to measure individual contributions within team-based problem-solving contexts.

  - *Collaborative Science Assessment Prototype (ECSAP)* [2013–2017]
    Led the development of an assessment prototype for collaborative problem solving in science. The prototype was highlighted by NCES Commissioner Peggy Carr as an example of next-generation assessments in a 2014 White House presentation.
    Selected publication: https://onlinelibrary.wiley.com/doi/full/10.1002/ets2.12276

- **Innovations Supporting Test Integrity** [2020 - 2024]
  Since 2020, I have led multiple AI and data analytics-driven projects funded by the ETS Test Security Initiative to advance analytics and AI methods supporting test security, particularly for remotely administered tests. These projects have resulted in several impactful systems that contribute to over 60% of cheating detection at peak time. Listed below are some of the key tools:

  - *AutoESD - Automated Essay Similarity Detection*: A system that identifies highly similar essays and presents them to human experts through an AI-assisted analytics dashboard for final adjudication. *Selected publication*: https://onlinelibrary.wiley.com/doi/10.1002/ets2.12383

  - *AutoSSD - Automated Speech Similarity Detection*: A system that detects similar speech responses and presents them to human experts via an AI-assisted dashboard for review and decision-making. *Selected publication*: https://osf.io/preprints/edarxiv/kvejq_v1

- *Keystroke Analytics and Biometrics*: A suite of tools designed to identify imposters, copywriting incidents, and AI-generated essays through typing behavior and biometric patterns.
  Selected publication: https://onlinelibrary.wiley.com/doi/abs/10.1111/jedm.12431
- *Clickstream Data-Based Suspicious Behavior Detection*: A set of analytics tools that detect anomalous behaviors during test-taking to flag potentially suspicious activity. *Selected publication*: https://arxiv.org/abs/2411.13699
- *Overall Summary*: https://www.linkedin.com/feed/update/urn:li:activity:7315022792930865152/.

- **Data and Software Infrastructure for Game/Simulation-Based Assessments** [2014 - 2021]
  I led a series of projects dedicated to developing data analytics solutions for telemetry logs from game-based assessments and digital learning environments. Key projects include:
  - *GlassPy: Game Log Analysis in Python* [2014 - 2019]. Led the development of a Python package for the analysis of log data from game-based assessments. An early publication from this project is available at https://onlinelibrary.wiley.com/doi/full/10.1002/ets2.12096, and a more recent presentation can be viewed at https://youtu.be/pcWXjS830fo.
  - *Evidence Trace File* [2014 - 2018]. Led the development of ETS's data model for virtual performance assessments, introducing the *Evidence Trace File (ETF)* as a replacement for traditional log files.
  - *Evidence Identification-Centered Data Design (EICDD)*. Introduced this design layer to bridge evidence-centered design (ECD) and data engineering.
    Selected publication: https://onlinelibrary.wiley.com/doi/full/10.1002/ets2.12215.

Patents

- **Hao, J.**, and Fauss, M. Educational Testing Service (Pending). GPTCollider: Detecting AI-generated Texts from Mixed Human-written and AI-generated Essays in Writing Tests, Pending U.S. Patent (Registration No. 63/556,919)
- Deane, P., Choi, Ikkyu, **Hao, J.**, and Zhang, M. Educational Testing Service (2023). Behavior-based electronic essay assessment fraud detection. U.S. Patent 11,630,896. Washington, DC: U.S. Patent and Trademark Office.
- Zhang, M., **Hao, J.**, Deane, P. and Li, C., Educational Testing Service (2021). Defining personalized writing-burst translation measures using keystroke logs. U.S. Patent 11,195,431. Washington, DC: U.S. Patent and Trademark Office.
- Zhang, M., **Hao, J.** and Deane, P., Educational Testing Service (2021). Generating scores and feedback for writing assessment and instruction using electronic process logs. U.S. Patent 10,964,224. Washington, DC: U.S. Patent and Trademark Office.
- Deane, P., Feng, G., Zhang, M., **Hao, J.**, Bergner, Y., Flor, M., ⋯and Lederer, N. (2019). Generating Scores and Feedback for Writing Assessment and Instruction Using Electronic Process Logs, U.S. Patent No. 14/937,164, Washington, DC: U.S. Patent and Trademark Office.

Books

- von Davier, A. A., Mislevy, R. J., & **Hao, J.** (Eds.). (2022). *Computational psychometrics: New methodologies for a new generation of digital learning and assessment*. Springer.

- **Hao, J.**, Liu, D., & Li, X. (Trans.). (2001). *The meaning of relativity* (A. Einstein). Shanghai Science and Technological Education Press. (Original work published 1922)

Selected Recent Publications

I have authored/co-authored over 100 peer-reviewed publications, with over 10,000 citations and an h-index of 46. Please see my Google Scholar page: https://scholar.google.com/citations?user=_LKZ3nAAAAAJ&hl=en. Listed below are selected publications on assessment.

- Cui, W., **Hao, J.**, Jiang, Y., Kyllonen, P., & Kerzabi, E. (2026), Automated Coding of Communication Data With ChatGPT using Hierarchical Coding Framework, *Frontiers in Education*
- Zhong, Y., **Hao, J.**, Fauss, M., Li, C., & Wang, Y. (2026). AI-generated essays: Characteristics and implications on automated scoring and academic integrity. *Educational Measurement: Issues and Practice*, *45*(1), e70013.
- **Hao, J.**, Cui, W., Kyllonen, P., Kerzabi, E., Liu, L., & Flor, M. (2025). Automated Coding of Communications in Collaborative Problem-Solving Tasks Using ChatGPT. *Journal of Educational Measurement*, 62(4), 809-837.
- **Hao, J.** (2025). Mentor, collaborator, and role model. In M. E. Oliveri, E. M. Tucker, S. L. Gómez, D. Slomp, & N. Elliot (Eds.), *Reminiscences: Reflections on the life of Robert J. Mislevy* (*The Journal of Writing Analytics*, Vol. 8, pp. 34–36). https://doi.org/10.37514/JWA-J.2025.8.1.06
- Baizhanov, N., Abdrasilov, B., **Hao, J.**, & Makhmutova, A. (2025). Harnessing the potential of AI technologies in the national educational assessments in Kazakhstan. *Pedagogy and Psychology*, *65*(4), 5–13.
- **Hao, J.** (2025). *AI for educational assessment: Opportunities and challenges through the lens of evidence-centered design and measurement values*. EdArXiv: https://osf.io/preprints/edarxiv/dacxj_v2
- Jiang, Y., **Hao, J.**, Cui, W., Kerzabi, E., & Kyllonen, P. (2025). Uncovering transferable collaboration patterns across tasks using large language models. In *Artificial Intelligence in Education* (pp. 320–335). Springer Nature Switzerland.
- Jiang, Y., Klebanov, B. B., **Hao, J.**, Deane, P., & Livne, O. E. (2025). Unveiling patterns of interaction with automated feedback in Writing Mentor and their relationships with use goals and writing outcomes. *Journal of Computer Assisted Learning*, *41*(2), e70014.
- Deane, P., Zhang, M., **Hao, J.**, & Li, C. (2025). Using keystroke dynamics to detect nonoriginal text. *Journal of Educational Measurement*, *63*(1), e12431. https://doi.org/10.1111/jedm.12431
- **Hao, J.**, Cui, W., Kyllonen, P., & Kerzabi, E. (2025). Can ChatGPT code communication data fairly?: Empirical evidence from multiple collaborative tasks. *arXiv preprint arXiv:2510.20584*.
- **Hao, J.**, Kyllonen, P., Kerzabi, E., Cui, W., Guo, E., Andrews-Todd, J., Jiang, Y., & Elliott, S. (2025). *Leveraging CSCL for social emotional learning: Early insights from a large-scale classroom study*. EdArXiv: https://osf.io/preprints/edarxiv/9cbe2_v1
- **Hao, J.**, von Davier, A. A., Yaneva, V., Lottridge, S., von Davier, M., & Harris, D. J. (2024). Transforming assessment: The impacts and implications of large language models and generative AI. *Educational Measurement: Issues and Practice*, *43*(2), 16–29.
- Jiang, Y., **Hao, J.**, Fauss, M., & Li, C. (2024). Detecting ChatGPT-generated essays in a large-scale writing assessment: Is there a bias against non-native English speakers? *Computers & Education*, *217*, 105070.

- Jiang, Y., Zhang, M., **Hao, J.**, Deane, P., & Li, C. (2024). Using keystroke behavior patterns to detect nonauthentic texts in writing assessments: Evaluating the fairness of predictive models. *Journal of Educational Measurement*, *61*(4), 571−594.
- Zhu, M., Su, C., **Hao, J.**, Liu, L., Kyllonen, P., & von Davier, A. (2024). Who benefits from virtual collaboration? The interplay of team member expertness and Big Five personality traits. *Humanities and Social Sciences Communications*, *11*(1), 1−15.
- Choi, I., **Hao, J.**, Li, C., Fauss, M., & Novák, J. (2024). *AutoESD: An automated system for detecting nonauthentic texts for high-stakes writing tests* (Research Report No. RR-24-11). Educational Testing Service.
- Jiang, Y., **Hao, J.**, Fauss, M., & Li, C. (2024). Towards fair detection of AI-generated essays in large-scale writing assessments. In *International Conference on Artificial Intelligence in Education* (pp. 317 − 324). Springer.
- **Hao, J.**, & Fauss, M. (2024). Test security in remote testing age: Perspectives from process data analytics and AI. In *Machine Learning, Natural Language Processing, and Psychometrics*. Information Age Publishing.
- Castellano, K. E., Sinharay, S., **Hao, J.**, & Li, C. (2023). An investigation into the impact of test session disruptions for at-home test administrations. *Applied Psychological Measurement*, *47*(1), 76−82.
- Jiang, Y., Martín-Raugh, M., Yang, Z., **Hao, J.**, Liu, L., & Kyllonen, P. C. (2023). Do you know your partner's personality through virtual collaboration or negotiation? Investigating perceptions of personality and their impacts on performance. *Computers in Human Behavior*, *141*, 107608.
- Yan, D., Fauss, M., **Hao, J.**, & Cui, W. (2023). Detection of AI-generated essays in writing assessments. *Psychological Test and Assessment Modeling*, *65*(1), 125−144.
- Zu, J., Choi, I., & **Hao, J.** (2023). Automated distractor generation for fill-in-the-blank items using a prompt-based learning approach. *Psychological Test and Assessment Modeling*, *65*(2), 55−75.
- **Hao, J.**, & Mislevy, R. J. (2022). A data science perspective on computational psychometrics. In A. A. von Davier, R. J. Mislevy, & **J. Hao** (Eds.), *Computational Psychometrics* (pp. 133−158). Springer.
- **Hao, J.** (2022). Supervised machine learning. In A. A. von Davier, R. J. Mislevy, & **J. Hao** (Eds.), *Computational Psychometrics* (pp. 159−171). Springer.
- Flor, M., & **Hao, J.** (2022). Text mining and automated scoring. In A. A. von Davier, R. J. Mislevy, & **J. Hao** (Eds.), *Computational Psychometrics* (pp. 245−262). Springer.
- Choi, I., **Hao, J.**, Deane, P., & Zhang, M. (2021). *Benchmark keystroke biometrics accuracy from high-stakes writing tasks* (Research Report No. RR-21-06). Educational Testing Service.
- Lee, Y. H., **Hao, J.**, Man, K., & Ou, L. (2021). How do test takers interact with simulation-based tasks? *Frontiers in Psychology*, *12*, 660203.
- Martin-Raugh, M. P., Kyllonen, P. C., **Hao, J.**, et al. (2020). Negotiation as an interpersonal skill: Generalizability of negotiation outcomes and tactics across contexts. *Computers in Human Behavior*, *104*, 105966.
- **Hao, J.**, & Ho, T. K. (2019). Machine learning made easy: A review of scikit-learn package in Python programming language. *Journal of Educational and Behavioral Statistics*, *44*(3), 348−361.
- **Hao, J.**, & Mislevy, R. J. (2019). Characterizing interactive communications in computer-supported collaborative problem-solving tasks: A conditional transition profile approach. *Frontiers in Psychology*, *10*, 1011.
- **Hao, J.**, Liu, L., Kyllonen, P., Flor, M., & von Davier, A. A. (2019). *Psychometric considerations and a gen-*

eral scoring strategy for assessments of collaborative problem solving (Research Report No. RR-19-10). Educational Testing Service.

- **Hao, J.**, & Mislevy, R. J. (2018). *The evidence trace file: A data structure for virtual performance assessments informed by data analytics and evidence-centered design* (Research Report No. RR-18-12). Educational Testing Service.
- **Hao, J.**, Zapata-Rivera, D., Graesser, A. C., et al. (2018). Towards an intelligent tutor for teamwork: Responding to human sentiments. *Design Recommendations for Intelligent Tutoring Systems*, *6*, 151–160.
- von Davier, A. A., **Hao, J.**, Liu, L., & Kyllonen, P. (2017). Interdisciplinary research agenda in support of assessment of collaborative problem solving. *Computers in Human Behavior*, *76*, 631–640.
- Andrews, J. J., Kerr, D., Mislevy, R. J., von Davier, A., **Hao, J.**, & Liu, L. (2017). Modeling collaborative interaction patterns in a simulation-based task. *Journal of Educational Measurement*, *54*(1), 54–69.
- Halpin, P. F., von Davier, A. A., **Hao, J.**, & Liu, L. (2017). Measuring student engagement during collaboration. *Journal of Educational Measurement*, *54*(1), 70–84.
- **Hao, J.**, Liu, L., von Davier, A. A., et al. (2017). *EPCAL: ETS platform for collaborative assessment and learning* (Research Report No. RR-17-06). Educational Testing Service.
- **Hao, J.**, Chen, L., Flor, M., Liu, L., & von Davier, A. A. (2017). *CPS-Rater: Automated sequential annotation for conversations in collaborative problem-solving activities* (Research Report No. RR-17-07). Educational Testing Service.
- **Hao, J.**, Smith, L., Mislevy, R., von Davier, A., & Bauer, M. (2016). *Taming log files from game/simulation-based assessments: Data models and data analysis tools* (Research Report No. RR-16-10). Educational Testing Service.
- **Hao, J.**, Shu, Z., & von Davier, A. (2015). Analyzing process data from game/scenario-based tasks: An edit distance approach. *Journal of Educational Data Mining*, *7*(1), 33–50.
- Mislevy, R. J., Oranje, A., Bauer, M. I., von Davier, A. A., & **Hao, J.** (2014). *Psychometric considerations in game-based assessment*. GlassLabGames.

Selected Recent Presentations

(I delivered over 130 presentations over the years, please visit my personal site for a complete list)

- **Hao, J.**, (Oct. 2025), Data Analytics and AI to Support Test Security in Remote Testing, Invited talk given at NCME Test Security SIGIMIE Webinar: Test Security Operation Challenges, Considerations and Tips. Virtual.
- **Hao, J.**, (Apr. 2025), Computer-Supported Collaborative Social Emotional Learning and Assessment in Classroom, Organized coordinated session, NCME 2025, Denver, CO.
- **Hao, J.**, Cui, W., Jiang, Y., Kyllonen, P., Kerzabi, E., & Andrews-Todd, J., (Apr. 2025), AI and Analytics to Support Computer-Supported SEL, Paper presentation, NCME 2025, Denver, CO.
- **Hao, J.**, Cui, W., Kyllonen, P., Kerzabi, E., & Liu, L., (Apr. 2025), Automated Coding with ChatGPT: Success and Challenges, Paper presentation, NCME 2025, Denver, CO.
- **Hao, J.**, (Nov. 2024), Transforming Assessment with LLM and Generative AI: Impacts and Challenges, Invited talk, AI for Education Conference, Singapore.

- **Hao, J.**, (Nov. 2024), Assessing Collaborative Problem Solving at Scale: Challenges, Opportunities, and the Path Forward, Invited talk, National Institute of Education, Singapore.
- **Hao, J.** & Palmer, M., (Aug. 2024), Data Analytics and AI to Support Test Security for English Lanugage Assessments, Invited talk at TOEFL Symposium, Princeton, NJ.
- **Hao, J.**, (April 2024), Characterizing individual collaborative problem solving through conditional transition profile: stability across tasks and teams. NCME 2024, Philadelphia, PA.
- Zhong, Y., **Hao, J.**, and Fauss, M. (April 2024), Comparison of essays generated by different LLMS, Presentation at NCME 2024, Philadelphia, PA.
- **Hao, J.**, (April 2024), One year after GPT-4: how AI changed Assessments, Organizer, Panel discussion at NCME 2024, Philadelphia, PA.
- **Hao, J.**, and Fauss, M. (April 2024), Practical considerations of using detectors of AI-generated essays: dos and don'ts, NCME 2024, Philadelphia, PA.
- Jiang, Y., **Hao, J.**, Fauss, M., and Li, C. (April 2024), Towards investigating the fairness of detecting LLM-generated essays, NCME 2024, Philadelphia, PA.
- **Hao, J.**, Fauss, M., and Li, C. (April 2024), Detecting AI-generated essays: what you should know before making important decisions, AERA 2024, Philadelphia, PA.
- Jiang, Y., **Hao, J.**, Fauss, M. and Li, C. (April 2024), Detecting AI-generated essays in a large-scale educational assessment: is there bias against non-native English speakers?, AERA 2024, Philadelphia, PA.
- **Hao, J.**, (June 2023), Generative AI: Challenges and opportunities for assessment, Invited talk at ATP-ECPS 2023.
- **Hao, J.**, (July 2023), Assessing collaborative problem solving at scale −psychometric challenges and strategies, Invited talk at IMPS 2023, College Park, MD.
- **Hao, J.**, (April 2023), ChatGPT, GPT4+ and the Future of Assessments, Organizer, Panel discussion, NCME 2023, Chicago, IL.
- **Hao, J.**, Kerzabi, E., and Kyllonen, P., (April 2023), Assessing CPS at Scale −EPCAL ecosystem and psychometric considerations, NCME 2023, Chicago, IL.
- **Hao, J.** and Li, C., (Nov. 2022), Detecting remote desktop access using AI and clickstream process data, 2022 Conference on Test Security, Princeton, NJ.
- Choi, I., **Hao, J.**, Deane, P., and Zhang, Mo., (Nov. 2022), Benchmark Keystroke Biometrics Accuracy from High-Stakes Writing Tasks, 2022 Conference on Test Security, Princeton, NJ.
- **Hao, J.**, (Nov. 2022), Using Data Analytics and AI to Support Test Security of Remotely Proctored Tests, Invited talk at 2022 MARC conference.
- **Hao, J.**, (March 2022), RMS research on test security, Presentation given to SBU at ETS.
- **Hao, J.**, (April 2021), Beyond a single score: scoring and reporting strategy for scalable assessments of collaborative problem solving, Invited talk given at 2021 conference of International Testing Commission (ITC).
- **Hao, J.**, (Dec. 4th, 2020), Characterizing the quality of simulation-based task: edit distance-based measures, Invited talk given at the virtual ATP EdTech summit.