

Hau-Hung Yang , Ph.D. Candidate

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 <https://hardy1yang.github.io>

Education

- Sep. 2022 - Jul. 2026  **Ph.D. program in Psychology, National Taiwan University, Taipei, Taiwan (R.O.C.).**
Overall GPA: 4.19/4.3
- Sep. 2020 - Jun. 2022  **M.S. Psychology, National Taiwan University, Taipei, Taiwan (R.O.C.).**
Overall GPA: 4.13/4.3
- Sep. 2016 - Jun. 2020  **B.S. Psychology, National Taiwan University, Taipei, Taiwan (R.O.C.).**
Overall GPA: 4.12/4.3
Awards: ranked 3rd in the sixth semester

Dissertation

Title	Precision and Robustness in Adaptive Testing: An Item Response Theory Analysis within an Online Convex Optimization Framework
Advisor	Prof. Yung-Fong Hsu
Abstract	Computerized adaptive testing (CAT) is a central topic in item response theory (IRT). Its objective is to assign items adaptively so as to obtain accurate ability estimates with as few items as possible. Despite extensive research on the asymptotic properties of CAT algorithms, a comprehensive framework for understanding their behavior in finite samples is still absent. This dissertation addresses this gap by incorporating the online convex optimization (OCO) framework into the CAT setting, with the goal of bridging the divide between finite-sample guarantees and asymptotic results. The research is organized around two complementary themes. The <i>Precision</i> theme focuses on developing theoretical tools to assess the finite-sample performance of CAT, with particular emphasis on showing that the classical information-maximization method constitutes a no-regret algorithm under the OCO framework and on constructing anytime-valid confidence intervals via martingale concentration inequalities and confidence sequences. The <i>Robustness</i> theme builds on these foundations to design stability-oriented adaptive testing algorithms—adapting Upper Confidence Bound (UCB) methods from the multi-armed bandit literature—that explicitly account for early-stage estimation error, premature commitment bias, and item-parameter uncertainty arising in online calibration scenarios.

Awards

- 2026  **Professor Chao-ming Cheng Memorial Scholarship**, Department of Psychology, National Taiwan University
The top prize of graduate psychology students for outstanding research at the academic year 2025-2026
-  **Dean's Award**, College of Science, National Taiwan University
The top class graduating for outstanding research achievement at the academic year 2025-2026

Employment

Jul 2023 –Feb 2025

■ **Full-time Research Assistant (R&D Substitute Military Service)**, Department of Economics, National Taiwan University, Taipei, Taiwan

Research

Journal Articles

- 1 Chen, K.-M., Chen, Y.-C., Hung, C.-C., & **Yang, H.-H.** (2026). Institution or major? understanding student preferences in college admissions. *Economic Inquiry* (Conditionally accepted).
- 2 Chen, K.-M., Tsai, L.-T., & **Yang, H.-H.** (2026). Labor market sorting in taiwan. *Taiwan Economic Review* (In press).
- 3 Cheng, C., **Yang, H.-H.**, & Hsu, Y.-F. (2025). Identifiability of polychoric models with latent elliptical distributions. *Psychometrika*, 90(2), 757–778. <https://doi.org/10.1017/psy.2024.25>
- 4 **Yang, H.-H.**, & Hsu, Y.-F. (2024a). The generalized robbins–monro process and its application to psychophysical experiments for threshold estimation. *Journal of Mathematical Psychology*, 120–121, 102855. <https://doi.org/10.1016/j.jmp.2024.102855>
- 5 **Yang, H.-H.**, & Hsu, Y.-F. (2024b). A note on the application of stochastic approximation to computerized adaptive testing. *Behaviormetrika*, 51(1), 259–276. <https://doi.org/10.1007/s41237-023-00215-0>

Submitted Papers

- 1 Chang, W.-C., **Yang, H.-H.**, Lin, T.-Y., Tong, J. C. H., & Hsu, Y.-F. (2025). *Comparison of bisection-based and adaptive psychophysical methods for eliciting indifference points in loss aversion research*.
- 2 **Yang, H.-H.**, Cheng, C., & Hsu, Y.-F. (2025). *Parametric bootstrapping of standard errors for ability parameters in dichotomous IRT models: Asymptotic and small-sample analyses* [PsyArXiv preprint]. https://doi.org/10.31234/osf.io/697yj_v3
- 3 **Yang, H.-H.**, Ho, T.-Y., & Hsu, Y.-F. (2025). *Enhancing Random Forest performance on imbalanced data using the General Condorcet Model* [Under revision].
- 4 **Yang, H.-H.**, Wei, C.-M., & Chen, Y.-C. (2025). *On the consistency of Bayesian adaptive testing under the Rasch model* [Under revision]. <https://arxiv.org/abs/2412.07170>

Manuscripts

- 1 Cheng, C., **Yang, H.-H.**, & Hsu, Y.-F. (2024). *On the existence and uniqueness of MLE of the latent trait under log-concave distributional assumptions in IRT* [PsyArXiv preprint]. <https://doi.org/10.31234/osf.io/j25zw>
- 2 **Yang, H.-H.**, & Hsu, Y.-F. (2024). *An alternative modeling proposal to conjoint survey experiments: Re-evaluating data from Duch et al. (2021)* [PsyArXiv preprint]. <https://doi.org/10.31234/osf.io/ytfx2>
- 3 Tong, J. C. H., **Yang, H.-H.**, & Chen, Y.-P. (2022). *Decision-making process of retail investors during a financial bubble: An fMRI study*.

Conference Presentations

- 1 Cheng, C., **Yang, H.-H.**, & Hsu, Y.-F. (2025). *When the test information curve misleads: Exact bias, se, and rmse curves in item response theory* (Conference Presentation) [Oral presentation]. The 53rd Annual Meeting of the Behaviormetric Society, Kanagawa, Japan.
<https://conference.wdc-jp.com/bms/2025/index.html/>
- 2 Cheng, C., **Yang, H.-H.**, Hsu, Y.-F., & Lay, K.-L. (2025a). *A methodology for addressing the biases caused by ipsative placement of Q-sort items* [Poster presentation]. SRCD 2025 Biennial Meeting, Minneapolis, MN, USA. <https://www.srcd.org/event/srcd-2025-biennial-meeting/>
- 3 Cheng, C., **Yang, H.-H.**, Hsu, Y.-F., & Lay, K.-L. (2025b). *Paradigmatic decisions for measuring choices and preferences: Likert scales, comparative judgments, or combined models? Using academic attribution as an example* (Conference Presentation) [Poster presentation]. The 89th Annual Convention of the Japanese Psychological Association, Sendai, Japan. <https://pub.conf.it.atlas.jp/ja/event/jpa2025/>
- 4 **Yang, H.-H.**, Wei, C.-M., & Chen, Y.-C. (2025). *On the consistency of Bayesian adaptive testing under the Rasch model* [Oral presentation]. 8th International Conference on Econometrics and Statistics (EcoSta) 2025, Tokyo, Japan. <https://www.cmstatistics.org/EcoSta2025/>
- 5 Chen, K.-M., Chen, Y.-C., Hung, C.-C., & **Yang, H.-H.** (2024a). *Estimating preferences for college programs using Taiwanese college-admission data* [Oral presentation]. Annual Conference of the Population Association of Taiwan, Taipei, Taiwan.
- 6 Chen, K.-M., Chen, Y.-C., Hung, C.-C., & **Yang, H.-H.** (2024b). *Estimating preferences for college programs using Taiwanese college-admission data* [Oral presentation]. 18th International Symposium on Econometric Theory and Applications (SETA), Taipei, Taiwan.
<https://www.econ.sinica.edu.tw/seta2024>
- 7 Cheng, C., **Yang, H.-H.**, & Hsu, Y.-F. (2024a). *Existence and uniqueness of the MLE of ability in IRT* [Poster presentation]. International Meeting of the Psychometric Society (IMPS) 2024, Prague, Czech Republic. <https://www.psychometricsociety.org/annual-meeting/>
- 8 Cheng, C., **Yang, H.-H.**, & Hsu, Y.-F. (2024b). *On the existence and uniqueness of polychoric correlations* [Poster presentation]. 88th Annual Convention of the Japanese Psychological Association, Kumamoto, Japan. <https://pub.conf.it.atlas.jp/ja/event/jpa2024/>
- 9 Cheng, C., **Yang, H.-H.**, & Hsu, Y.-F. (2024c). *Predetermined R^2 : An index of later development determined by the past* [Poster presentation]. 27th Biennial Meeting of the International Society for the Study of Behavioural Development (ISSBD), Lisbon, Portugal.
<https://issbd.org/events/27th-biennial-meeting/>
- 10 Cheng, C., **Yang, H.-H.**, Hsu, Y.-F., & Lay, K.-L. (2024). *Two are better than one: Incorporating Likert-scale and comparative-judgment data in a joint Thurstonian IRT model* [Oral presentation]. 63rd Annual Meeting of the Taiwanese Psychological Association, Taipei, Taiwan.
<https://www.tpa-tw.org/2024main/>
- 11 Chen, K.-M., Chen, Y.-C., Hung, C.-C., & **Yang, H.-H.** (2023). *College and major preference estimation using Taiwanese college-admission data* [Oral presentation]. Asian and Australasian Society of Labour Economics Conference (AASLE) 2023, Taipei, Taiwan.
<https://www.aasle.org/taipei-conference-info>
- 12 Cheng, C., **Yang, H.-H.**, & Hsu, Y.-F. (2023). *Identifiability of Polychoric Models with latent elliptical distributions* [Oral presentation]. International Meeting of the Psychometric Society (IMPS) 2023, College Park, MD, USA. <https://www.psychometricsociety.org/annual-meeting/>
- 13 **Yang, H.-H.**, Cheng, C., & Hsu, Y.-F. (2023). *Evaluating standard errors of parameter estimates in the 2PL model with exact parametric bootstrap* [Poster presentation]. International Meeting of the Psychometric Society (IMPS) 2023, College Park, MD, USA.
<https://www.psychometricsociety.org/annual-meeting/>

- 14 **Yang, H.-H., & Hsu, Y.-F.** (2023). *On the consistency and relative efficiency of a generalized Robbins–Monro process for threshold estimation* [Poster presentation]. Annual Meeting of the Society for Mathematical Psychology, Amsterdam, Netherlands. <https://mathpsych.org/conference/12/>
- 15 **Yang, H.-H., & Hsu, Y.-F.** (2021). *Modification of the estimation method of threshold: A new adaptive method taking response time and response confidence into account* [Oral presentation]. 2021 Annual Meeting of the Taiwanese Psychological Association, Taipei, Taiwan.

Grant

- 1 [National taiwan university doctoral scholarship (nstc selection/allocation)]. (2025, August 1–2026, July 31). Ministry of Science and Technology, Taiwan.
- 2 **Yang, H.-H., & Hsu, Y.-F.** (2019, July 1–2020, February 28). 資訊揭露成本對於不確定情境下選擇行為的影響 (MOST. No. 108-2813-C-002-115-H) [College student research scholarship]. Ministry of Science and Technology, Taiwan.

Project Experience

On the Estimation of Standard Errors for the Ability Estimate in Item Response Models

Prof. Yung-Fong Hsu

RESEARCH ASSISTANT

Aug. 2024 - Present

This project concerns the estimation of standard errors for the ability estimate in IRT models. It will contribute to the advancement of estimation methods for computerized adaptive testing, a long-standing interest in psychometrics. In this project, I am primarily involved in algorithm development and the implementation of simulation experiments, as well as conducting literature reviews and contributing to manuscript preparation.

Family, Health, and the Market

Prof. Kuan-Ming Chen

RESEARCH ASSISTANT

Jul. 2022 - Present

This project investigates the interactions among individuals, families, and the market under the impact of health shocks and long-term care demands. As the role of government in society expands, the interactions between individuals, families, and the state have become increasingly important in economic analysis. While previous research has primarily focused on financial and labor market activities, recent studies have begun to explore a broader range of influences. In this project, my main responsibility was to analyze government administrative data to examine trends in wage inequality in Taiwan over time, using the Abowd-Kramarz-Margolis (AKM) model framework.

Recently, our team has been analyzing comprehensive income tax records to investigate intra-household decision-making and cooperation in Taiwan. Specifically, we examine whether Taiwanese households behave in a manner consistent with the collective model—discussing and jointly optimizing their tax filing strategy to minimize tax liability—or whether individual incomes are passively subjected to taxation without coordination. In addition to analyzing historical government data, we also administer surveys to understand how individuals approach tax filing decisions. Furthermore, we conduct field experiments in which we provide participants with additional information, aiming to examine how their decision-making changes in response to receiving such information.

Project Experience (continued)

Evaluation of an Education Program Using Item Response Theory

Prof. Yu-Chang Chen

RESEARCH ASSISTANT

Jun. 2022 - Present

We are evaluating the treatment effect of the education program *PaGamO*, an online learning platform, on students' performance. To this end, we use the 2-PL model of item response theory to assess students' ability and item difficulty level. My main responsibilities included reviewing literature on Item Response Theory (IRT), conducting algorithmic research, and implementing the algorithms through programming.

Currently, we are collaborating with the platform to develop a practically applicable algorithm. The goal is to estimate user ability based on response patterns, even when ability is initially unknown, and to account for potential non-linear improvements in ability over time as a function of practice or exposure. To achieve this, we explore Bayesian parameter estimation methods within a state space modeling framework.

Issue-Oriented Big Data Analyses on Social Inclusion and Smart Governance

Prof. Kuan-Ming Chen

RESEARCH ASSISTANT

Jul. 2023 - Jun. 2025

My primary responsibility in this project was to examine the substitutability or complementarity between infants and pets, using fertility decisions as a behavioral lens. To investigate this issue in a comprehensive and systematic manner, this study employs administrative data from Taiwan's Ministry of Finance (tax records) and Ministry of Agriculture (pet registration data).

Neural Correlates of Emotion as an Arbitrator to Reconcile the Conflicts within Dual Processing in the Context of Decision Making Under Risk

Prof. Yung-Fong Hsu

RESEARCH ASSISTANT

March. 2021 - Jan. 2023

We performed behavioral and fMRI experiments to probe the role of emotion when people face a dual-process induced cognitive conflict under a risky condition. I was engaged in the analysis of fMRI data. I was also involved in developing an estimation method for the parameters in the utility function.

Analysis of Cognitive Structures Underlying Financial Behavior

Prof. Tsung-Ren Huang

RESEARCH ASSISTANT

Jun. 2020 - Nov. 2021

This project aimed to find a common factor explaining financial behavioral biases. We reviewed bias-related literature and collected the questionnaires corresponding to biases. To find the common factor, we collected participants' responses on these questionnaires using exploratory factor analysis. I was responsible for reviewing the related literature and analyzing the behavioral data.

From Mind Reading to Mind Sharing: A Study on Neural Correlates of Cognitive and Affective Theory of Mind and Their Applications to Sales-force Enhancement

Prof. Heng-Chiang Huang

RESEARCH ASSISTANT

Sep. 2018 - Jun. 2020

I was involved in reviewing and reporting related literature, including synchronization, structural equation modeling, and theory of mind. I was also responsible for teaching and mentoring new team members about preprocessing and statistical analysis of behavioral and neuroimaging data.

Project Experience (continued)

Coalition without Trust: The Intra-Brain Connectivity and Inter-Brain Synchronization of Herd Behaviors in an Economic Bubble Game

Prof. Yu-Ping Chen

RESEARCH ASSISTANT

Sep. 2017 - Jun. 2020

We explored the role of the theory of mind when people competed with each other in a bubble stock market. In our fMRI hyperscanning experiment, participants played with their opponents, trying to maximize their outcomes at the end of the game. During this project, I reviewed the literature, including the diffusion model, reinforcement learning, prospect theory, and behavioral economics. I was also involved in analyzing the fMRI and behavioral data.

Graduate-Level Statistics or Modeling Courses

Fall 2024	CSIE5062: Online Convex Optimization	A+
Spring 2022	MATH6180: Multivariate Statistical Analysis	A+
Spring 2021	ECON5089/MATH7604: Advanced Statistical Inference II	A+
Fall 2020	Psy7001: Experimental Design	A+
Fall 2020	IES032: Introduction to Stochastic Modeling	A+
Fall 2020	Psy7277: Neural and Behavioral Modeling	A+
Spring 2020	Psy7163: Structural Equation Models	A+
Spring 2019	Psy6033: Applied Linear Regression	A+
Fall 2018	Psy5261: Psychoinformatics and Neuroinformatics	A+

Teaching Assistant

Fall 2024	PSY7001: Experimental Design
Spring 2023	PSY5033: Applied Linear Regression
Fall 2022	PSY7001: Experimental Design
Fall 2021	PSY3010: Intermediate Statistics
Spring 2021	PSY1004: Statistics in Psychology and Education II
Fall 2020	PSY1003: Statistics in Psychology and Education I
Spring 2020	PSY1004: Statistics in Psychology and Education II
Fall 2019	PSY1003: Statistics in Psychology and Education I

Skills

Coding	 R, Python, Matlab, SAS, L ^A T _E X, Stata
Analytical	 • Statistical modeling: Principal component analysis, Factor analysis, Generalized linear model • Psychometrics: Structural equation modeling, Item response theory • Mathematical Psychology: Adaptive method (Stochastic approximation), Drift diffusion model • Neuroimage analysis: fMRI