Jiahao Zhu

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Summary

Research Master's student specialising in computational cognitive modelling, risky decision-making, and decision-making dynamics. Expert in hierarchical Bayesian statistics, state-space modelling, and experiment design and engineering. My primary research interest lies in elucidating how decision-makers adapt to stochastic environments through continuous interaction. Committed to a robust scientific cycle: deriving statistical regularities from data-driven analysis, constructing formal theories to generate falsifiable predictions via simulation, and iteratively refining mechanistic explanations through targeted experimentation.

Education

Radboud University   *Nijmegen, Netherlands*
M.Sc. in Behavioural Science (Research Master)   *Sept 2024 – present*
- **GPA:** 9.1/10 (Summa Cum Laude candidate)
- **Thesis**: Dynamic Modelling of Latent Risk-Taking using Particle Filters
- **Focus:** Computational Cognitive Modelling, Risky Decision-Making, Dynamic System
- **Key Coursework:** Behavioural Decision Making, Programming Skills (Python), Advanced Statistics in R, Mixed-Effects Models, Structural Equation Modelling, Complexity Methods

Sun Yat-sen University   *Guangzhou, China*
M.Sc. in Management Science and Engineering (Research Master)   *Sept 2022 – Mar 2024*
- **GPA**: 3.8/4.0 (Top 5%), National Scholarship (Top 1%, 2023)
- **Focus:** Affective Decision-Making, Network Analysis, Natural Language Processing

Sun Yat-sen University   *Guangzhou, China*
B.A. in Business Administration   *Sept 2018 – June 2022*
- **GPA**: 3.9/4.0 (Top 5%), Outstanding Undergraduate Scholarship (2019-2022)
- **Thesis:** Emotional Expression and Market Performance: A Network Perspective (Outstanding Thesis)

Selected Research Experience

Graduate Researcher (Master's Thesis)   *Radboud University*
Supervised by Dr. Bernd Figner and Dr. Zhang Chen   *Sept 2025 – present*
Project: Dynamic Modelling of Latent Risk-Taking using Particle Filters
- Challenged the prevailing psychometric assumption of risk-taking as a static trait. Proposed a dynamic framework where risk-taking is conceptualised as a non-stationary latent state that evolves through tasks.
- Investigated the convergence gap between behavioural and self-reported measures using the Basel-Berlin Risk Study dataset (N=1,507). Implemented incremental Hierarchical Bayesian estimation (Cumulative Prospect Theory) to test the hypothesis that convergent validity follows an inverted-U relationship with data accumulation, providing empirical evidence to optimise risk elicitation protocols
- Developed a computational pipeline using Auxiliary Particle Filters to recover individual trial-by-trial trajectories of latent risk sensitivity while simultaneously estimating fixed parameters. This approach resolved the issue of averaging out meaningful cognitive fluctuations inherent in static model fits.
- Applied Generalised Additive Mixed Models to the estimated trajectories to statistically test the existence of dynamics, distinguishing non-stationary changes in risk-taking from random measurement noise.

Research Project Co-Lead   *Radboud University*
Supervised by Prof. Mike Rinck and Konrad Schweizer   *Nov 2024 – June 2025*
Project: Investigating Automatic and Motivational Avoidance in Academic Worry

- Investigated the cognitive mechanisms underlying academic anxiety, specifically testing the hypothesis that trait worry elicits automatic approach-avoidance biases in motor control systems.
- Engineered a continuous joystick-based Approach-Avoidance Task in PsychoPy with millisecond precision. Implemented a real-time visual feedback loop (dynamic zooming) that operationalises avoidance as a continuous motion trajectory, capturing subtle motor biases beyond simple binary choices.
- Conducted a simulation-based power analysis in R to determine the sample size for the repeated-measures design with interaction effects, ensuring the study was sufficiently powered to detect subtle cognitive biases.
- Applied Generalised Linear Mixed Models to analyse over 3,000 behavioural data points. Modelled reaction times and key-press counts using Poisson distributions to strictly handle the right-skewed properties of the data, providing reliable estimates of experimental effects.

Research Project Lead *Sun Yat-sen University*
Supervised by Prof. Zengxiang Chen *Sept 2022 – May 2024*

Project: Unveiling the Effect of Emotional Co-Expressions: A Network Perspective

- Applied Natural Language Processing to extract sentiment features from a massive corpus of crowdfunding project descriptions (Indiegogo & Kickstarter; 53,000+ texts, >10 million words) in Python, transforming unstructured naturalistic text into structured variables for quantitative analysis.
- Constructed a novel Emotional Co-expression Network framework to quantify the structural properties of emotional information. Transformed textual sentiment into quantifiable network topology metrics (e.g., density, clustering coefficients) to capture the complexity of emotion expression.
- Using econometric models (Stata), identified a robust inverted-U relationship between information density and funding outcomes, highlighting the trade-off between information richness and cognitive overload.
- As a master's student, selected to present this work at two Doctoral Consortia (Annual Conference of JMS China & CMAU Annual Conference, 2022).

Research Assistant *University of International*
Worked with Dr. Chenming Peng and Prof. Zengxiang Chen *Business and Economics*
Jan 2023 – Jan 2024

Project: The Effect of Brand Warmth and Competence: A Meta-Analysis

- Using PRISMA guidelines to execute a massive-scale systematic review on social perception dimensions (Stereotype Content Model). Screened over 17,000+ articles and coded 1,201 effect sizes from 587 eligible studies, constructing one of the most comprehensive datasets in the field to date.
- Conducted meta-analysis in R, employing random-effects modelling to estimate global effect sizes and mixed-effects meta-regression to investigate key moderators.

Technical Skills

Computational Modelling & Statistics: Hierarchical Bayesian Modelling (Stan), State-Space Modelling (Sequential Monte Carlo), Mixed-Effects Models, Causal Inference, Structual Equation Models, Network Analysis

Programming & Data Science: R (Advanced), Python (NumPy, Pandas), NLP, Machine Learning, Git

Experimental Engineering: PsychoPy, Adaptive Experiment, Joystick-based Input

Language: English (IELTS 7.5, C1 equivalent), Mandarin (Native)

Academic Activities

Selected Participant (Complexity Interactive Workshop) *Santa Fe, USA (online)*
Santa Fe Institute *Oct 2023*

- Engaged in advanced lectures on complexity science (e.g., collective intelligence, belief dynamics). During Hackthon, co-developed an Agent-Based Model simulating the formation of group identity.

Teaching Assistant (Econometrics, Consumer Behaviour) *Guangzhou, China*
Sun Yat-sen University *Sept 2020 – June 2022*

- Facilitated laboratory sessions on statistical programming (Stata/R) and quantitative methods.