Haoyang Lu

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Research interest

I am interested in computational psychiatry in general. My research involves using the methods of computational cognitive sciences to understand mental disorders. In my PhD thesis, I applied these methods to investigate the (non-)instrumental information sampling in autistic children. Currently, I am studying the cognitive processes involved in the formation and updating of superstitious beliefs. In the future, I hope to use AI and computational methods to further understand and help people with mental health issues.

Employment

School of Psychological and Cognitive Sciences, Peking University
Postdoctoral Resaerch Fellow (with Boya postdoctoral fellowship) *2022 – Present*
Advisor: Hang Zhang

Education

Peking University **Beijing, China**
PhD in Integrated Life Sciences (Psychology) *2016 – 2022*

Sun Yat-Sen University **Guangzhou, China**
BSc in Psychology *2012 – 2016*

Thesis

Title: *Inference and Decision-making in People with Autism Spectrum Disorder or Broader Autism Phenotype*

Advisors: Li Yi, Hang Zhang

Introduction: The core features of autism spectrum disorders (ASD) are believed to be pertinent to how individuals interact with and sample the world. Therefore, it is crucial to understand the outcome of atypical active inference in ASD. In this interdisciplinary project, I worked with two advisors, one specializing in child psychopathology (Prof. Li Yi) and the other in computational cognitive science (Prof. Hang Zhang). We conducted a series of studies on information sampling in both autistic children and adults with a broader autism phenotype. Through the clinical experience with autistic children and the use of Bayesian linear mixed models and hierarchical Bayesian modeling, we gained a deeper understanding of the behavioral, attentional, and cognitive processes that differ between autistic individuals and neurotypical people in both instrumental and non-instrumental information sampling.

Publications

Peer-reviewed journal articles

10. Ni, W., **Lu, H.**, Wang, Q., Song, C., Yi, L. (2023). Vigilance or avoidance: How do autistic traits and social anxiety modulate attention to the eyes? Frontiers in Neuroscience, 16, 1081769.
9. Hu, Y., Xiong, Q., Wang, Q., Song, C., Wang, D., **Lu, H.**, Shi, W., Han, Y., Liu, J., Li, X., & others. (2022). Early development of social attention in toddlers at high familial risk for autism spectrum disorder. Infant Behavior and Development, 66, 101662.
8. Wang, Q., **Lu, H.**, Feng, S., Song, C., Hu, Y., & Yi, L. (2021). Investigating intra-individual variability of face scanning in autistic children. Autism : The International Journal of Research and Practice, 13623613211064372.

7. Feng, S., **Lu, H.**, Wang, Q., Li, T., Fang, J., Chen, L., & Yi, L. (2021). Face-viewing patterns predict audiovisual speech integration in autistic children. Autism Research.

6. Feng, S., **Lu, H.**, Fang, J., Li, X., Yi, L., & Chen, L. (2021). Audiovisual speech perception and its relation with temporal processing in children with and without autism. Reading and Writing, 1–22.

5. **Lu, H.**, Yi, L., & Zhang, H. (2019). Autistic traits influence the strategic diversity of information sampling: Insights from two-stage decision models. PLoS Computational Biology, 15(12), e1006964.

4. **Lu, H.**, Li, P., Fang, J., & Yi, L. (2019). The perceived social context modulates rule learning in autism. Journal of Autism and Developmental Disorders, 49(11), 4698–4706.

3. Zhang, Y., Song, W., Tan, Z., Zhu, H., Wang, Y., Lam, C. M., Weng, Y., Hoi, S. P., **Lu, H.**, Chan, B. S. M., & others. (2019). Could social robots facilitate children with autism spectrum disorders in learning distrust and deception? Computers in Human Behavior, 98, 140–149.

2. Li, T., Hu, Y., Song, C., **Lu, H.**, & Yi, L. (2018). The measurements and mechanisms of restricted and repetitive behaviors in autism spectrum disorders. Chinese Science Bulletin, 63(15), 1438–1451.

1. Yang, Y., Tian, Y., Fang, J., **Lu, H.**, Wei, K., & Yi, L. (2017). Trust and deception in children with autism spectrum disorders: A social learning perspective. Journal of Autism and Developmental Disorders, 47(3), 615–625.

Conference abstracts

7. **Lu, H.**, Yi, L., & Zhang, H. (2024). Oversampling of Costly Non-Instrumental Information in Autistic Children. Panel presentation at the International Society for Autism Research 2024 Annual Meeting.

6. **Lu, H.**, Teng, T., & Zhang, H. (2023). The formation of superstitions in an uncontrollable environment. Proceedings of the Annual Meeting of the Cognitive Science Society, 45. Retrieved from https://escholarship.org/uc/item/5fx4t61x. Poster presentation.

5. **Lu, H.**, Yi, L., & Zhang, H. (2022). Adults with more autistic traits are more willing to pay for "useless" information. Poster presentation at International Society for Autism Research 2022 Annual Meeting.

4. **Lu, H.**, Yi, L., & Zhang, H. (2020). Inefficient information sampling under explicit costs in children with ASD. Poster presentation at International Society for Autism Research 2020 Virtual Meeting.

3. Song, C., Wang, Q., Xu, J., **Lu, H.**, Qin, S., & Yi, L. (2020). Baseline arousal modulates face scanning in autism spectrum disorder. Poster presentation at International Society for Autism Research 2020 Virtual Meeting.

2. **Lu, H.**, Zhang, H., Yi, L. (2018). Adults with high autistic traits are reluctant to trade accuracy for monetary reward: a probabilistic reasoning experiment. Poster presentation at International Society for Autism Research 2018 Annual Meeting.

1. **Lu, H.**, Li, P., Yi, L. (2017) Impaired Rule Learning in Social Context of Children with Autism. Poster presentation at Society for Research in Child Development 2017 Biennial Meeting.

Teaching

R for Eye-tracking data analysis — **Chongqing, Nanjing, Shanghai, Beijing**
Workshop lecturer — *2018 – 2023*
Design and deliver a 2-day workshop for learning to use R for data analysis, particularly eye-tracking data.

Effective writing and communication in science — **Peking University**
Teaching assistant — *2021 – 2023*
Design, tutorial delivery, and marking. Also deliver a 1~2 hr lecture on how to do scientific data visualization.

Introduction to Cognitive Modeling — **Peking University**
Guest lecturer — *2020*
Delivery a one-hour tutorial on Reproducibility and Literate Programming in R

Child psychopathology **Peking University**
Teaching assistant *2018*
Marking and organizing group projects.

Topics in Autism Research **Peking University**
Teaching assistant *2017*
Design, marking, and organizing class discussion.

Professional membership and service

Membership: Society for Research in Child Development; International Society for Autism Research; Cognitive Science Society; Society for Neuroeconomics

Reviewing: Autism Research; Journal of Autism and Developmental Disorders; eLife; OpenMind

Professional skills and languages

Research: Eye-tracking, computational modeling	*Expert*
fNIRS, fMRI, EEG	*Beginner*
Statistics: Bayesian statistics, Generalizaed linear mixed model	*Expert*
Generalized additive model, Survival analysis, Structural equation models	*Proficient*
Machine learning methods	*Intermediate*
Programming: R, MATLAB, Psychotoolbox	*Expert*
Stan, SPSS, PsychoPy/PsychoJs, Git	*Proficient*
Python, JAGS, Mplus, E-Prime, Visual Basic, C++, LaTeX	*Intermediate*
Languages: English	*Advanced*
Chinese	*Native*