

Mingyu Song

mingyussong@gmail.com | 609-608-5534 | Palo Alto, CA

PROFESSIONAL EXPERIENCE

Facebook App Commerce Core Recommendation Team, Meta Feb 2022 – Present
Research Scientist

I use machine learning tools to understand human behavior in e-commerce settings and improve user experience through personalized recommendations.

Instagram Feed Recommendations Relevance Team, Facebook May – Aug 2021
Machine Learning Engineer Intern

I worked on improving the diversity of recommendations in Instagram, by identifying potential user interest and expanding the breadth of recommendation topics. This workstream improved diversity by 3.2%.

EDUCATION

Princeton University, Princeton, NJ Sep 2016 – Jan 2022
Ph.D. in Neuroscience

Dissertation: Learning to Discover Structure in Animal and Human Decision Tasks

Certificate in Statistics and Machine Learning

Relevant courses: Modern Statistics, Fundamentals of Machine Learning, Neural Networks: Theory and Application, GPA: 3.9/4.0

Peking University, Beijing, China Sep 2012 – June 2016
B.S in Physics and Psychology, GPA: 3.8/4.0

RESEARCH EXPERIENCE

Princeton University, Princeton Neuroscience Institute Sep 2016 – Jan 2022
Graduate Researcher, Advisor: Yael Niv

I studied how people learn from trial-and-error and make inference about underlying task structures during decision-making. My studies combined behavioral experiments and machine learning approaches.

New York University, Center for Neural Science July 2015 – Oct 2015
Research Assistant, Advisor: Wei Ji Ma

I studied the explore-exploit tradeoff in human sequential decision making, specifically how humans deviate from optimality in such decisions.

Peking University, Department of Psychology Sep 2014 – July 2016
Research Assistant, Advisors: Hang Zhang and Jian Li

I studied proactive information sampling in value-based decision making, by analyzing human eye fixation data and constructing a computational model to explain eye movements.

PUBLICATIONS (* denotes equally contributing authors)

Song, M., Baah, P. A., Cai, M. B., & Niv, Y. (2022). Humans combine value learning and hypothesis testing strategically in multi-dimensional probabilistic reward learning. *PLoS computational biology*, 18(11), e1010699.

Song, M., Jones, C. E., Monfils, M. H., & Niv, Y. (2022). Explaining the effectiveness of fear extinction through latent-cause inference. *Neurons, Behavior, Data analysis, and Theory*, <https://doi.org/10.51628/001c.35660>

Song, M., Takahashi, Y. K., Burton, A. C., Roesch, M. R., Schoenbaum, G., Niv, Y., & Langdon, A. J. (2022). Minimal cross-trial generalization in learning the representation of an odor-guided choice task. *PLoS Computational Biology*, *18*(3), e1009897.

Langdon A.J., **Song M.**, Niv Y. (2019) Uncovering the “state”: tracing the hidden state representations that structure learning and decision-making. *Behavioural Processes*, 103891

Song M.*, Bnaya Z.*, Ma W. J. (2019) Sources of suboptimality in a minimalistic explore-exploit task. *Nature Human Behaviour* **3**, 361–368.

Song M.*, Wang X.*, Zhang H., Li J. (2019) Proactive information sampling in value-based decision-making: deciding when and where to saccade. *Frontiers in Human Neuroscience*, *13*, 35.

CONFERENCE PRESENTATIONS

Song M., Niv Y., Cai M. B. (2021) Using Recurrent Neural Networks to Understand Human Reward Learning. [paper] *Annual Meeting of the Cognitive Science Society*

Song M., Niv Y., Cai M. B. (2020) Learning multi-dimensional rules with probabilistic feedback via value-based serial hypothesis testing. [talk] *Workshop on Biological and Artificial Reinforcement Learning, Conference on Neural Information Processing Systems*

Song M., Niv Y., Cai M. B. (2020) Learning what is relevant for rewards via value-based serial hypothesis testing. [paper & talk] *Annual Meeting of the Cognitive Science Society*

Song M., Cai M. B., Niv Y. (2019) Learning what is relevant for rewards via value learning and hypothesis testing. [poster] *Computational and Cognitive Neuroscience Conference*, Berlin, Germany

Song M., Langdon A., Takahashi Y., Schoenbaum G., Niv Y. (2019) Not smart enough: most rats fail to learn a parsimonious task representation. [poster & spotlight presentation] *The Multi-disciplinary Conference on Reinforcement Learning and Decision Making*, Montreal, QC, Canada

Song M., Bnaya Z., Ma W. J. (2017) History effects in a minimalistic explore-exploit task. [talk] *Computational and Cognitive Neuroscience Conference*, New York, NY

INVITED TALKS

Cognitive Seminar Series, Brown University, Virtual	March 2021
PDP meeting, Princeton University, Virtual	Nov 2020
Northeast Reinforcement Learning and Decision Making Symposium, Virtual	Nov 2020
Concepts and Categories Seminar, New York University, Virtual	May 2020
Decision Making Joint Lab Meeting, Institute for Study of Decision Making, New York University, New York, NY	Sep 2015

AD HOC REVIEWER

Nature Reviews Psychology, Cognition, Cognitive Science, Conference on Cognitive Computational Neuroscience

TEACHING EXPERIENCE

Lead Teaching Assistant, Neuromatch Academy Online Summer School July 2020

- Assisted students with computational neuroscience tutorials and small-group projects

- Managed a team of teaching assistants, and provided course content assistance

Assistant Instructor, Princeton University Sep 2017 – May 2018

- Courses: Introduction to Cognitive Neuroscience, Mathematical Tools for Neuroscience

AWARDS AND SCHOLARSHIPS

Student Travel Fellowship, The Multi-disciplinary Conference on Reinforcement Learning and Decision Making July 2019

Travel Award, Computational and Cognitive Neuroscience Conference Sep 2017

Centennial Fellowship in the Natural Sciences and Engineering, Princeton University
2016 – 2021

First Honor Prize, Peking University (1% of class) 2012 – 2016

TECHNICAL SKILLS

Python, PyTorch, SQL, MATLAB, JavaScript, HTML/CSS, Git, LaTeX
Machine Learning, Reinforcement Learning, Probabilistic Models, Deep Learning,
Applied Statistics, Experimental Design, Hypothesis Testing