Mingyu Song

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EDUCATION

Princeton University, Princeton, NJ Sep 2016 – Present
Ph.D. in Neuroscience
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 – Present
Graduate Researcher
I work with Professor Yael Niv on representation learning, using a combination of behavioral experiments and computational modeling. My current project studies how humans learn about multi-dimensional rules with probabilistic feedback.

New York University, Center for Neural Science July 2015 – Oct 2015
Research Assistant
I worked with Professor Wei Ji Ma on the explore-exploit tradeoff in human sequential decision making. We investigated how humans deviate from optimality in such decisions, by designing and conducting a novel experiment on Mturk, and fitting and comparing computational models.

Peking University, Department of Psychology Sep 2014 – July 2016
Research Assistant
I worked with Professors Hang Zhang and Jian Li on proactive information sampling in value-based decision making, by analyzing eye movement duration data in a two-alternative forced choice task and constructing a saccade-switch model based on information gain.

PUBLICATIONS (* denotes equally contributing authors)

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.

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

CONFERENCE PRESENTATIONS

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, Thirty-fourth 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. [talk] *42nd Annual Virtual 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

PDP meeting, Princeton University, Princeton, NJ Nov 2020

Northeast Reinforcement Learning and Decision Making Symposium, Virtual Nov 2020

Concepts and Categories Seminar, New York University, New York, NY May 2020

Decision Making Joint Lab Meeting, Institute for Study of Decision Making, New York University, New York, NY Sep 2015

AD HOC REVIEWER

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, MATLAB, JavaScript, HTML/CSS, Git, LaTeX

Machine Learning, Reinforcement Learning, Probabilistic Models, Deep Learning, Applied Statistics, Experimental Design, Hypothesis Testing