

Yanli Sage Zhou

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Cognitive scientist and machine learning researcher with deep expertise in human-AI alignment, compositional learning, and behavioral experimentation. 8+ years of experience designing interdisciplinary experiments and training models that learn and reason in human-like ways.

Education

2018-2024

New York University
Ph.D. Data Science

Dissertation: *Compositional Visual Learning and Reasoning in Humans and Machines*

Advisor: [Brenden Lake](#)

Committee: Kyunghyun Cho, Todd Gureckis, Liina Pytkäinen, Mengye Ren

2016-2018

New York University
M.S. Data Science

2012-2016

New York University
B.A. Mathematics & B.A. Psychology

Minored in studio arts

Research Positions

2022-
Oct 2024

Visiting Researcher @ Meta (FAIR Labs)

Advisor: Adina Williams

Project title: *Compositional Learning of functions in Humans and Machines*

- Design novel learning paradigm to explore the extent to which humans and AI models can learn and reason with interactive functions in the visual domain.
- Develop developmentally inspired learning experiments that allow people and models to be directly compared on their abilities to perform few-shot function learning and compositions.
- Train meta-learning transformer models to solve the same learning tasks and evaluate whether AI models can perform functional compositions in the complete and complex way humans are.
- Evaluate large language models on their abilities to learn and reason about compositional and ad-hoc concepts in human-like ways.

2018-
May 2024

Doctoral Researcher @ Human and Machine Learning Lab
Center for Data Science, New York University

Advisor: Brenden Lake

Project title: *Compositional Visual Learning and Reasoning in Humans and Machines*

- By studying human learning alongside machine learning models on an array of concept learning tasks, I try to construct or enhance computational models to learn and reason in compositional, human-like ways.

- Design new paradigms to systematically test compositional learning of visual concepts that can be evaluated directly on both humans and computational models such as neural networks and Bayesian program induction models.
- Devise online experiments to collect crowdsourced behavioral data.
- Investigate how humans efficiently generalize when learning new concepts and develop computational accounts of behavioral patterns.

2015-2018

Researcher @ Wei Ji Ma Lab

Center for Neural Science & Department of Psychology, New York University

Advisor: Wei Ji Ma

Project title: *Bayesian Modeling of Visual Decision-making in Perpetual Organizations*

- Designed, coded and tested psychophysics experiments to investigate the role sensory uncertainty in decision-making in perceptual tasks.
 - Built Bayesian and other observer models to predict the distribution of human perceptual decision-making behaviors.
 - Cleaned, processed and analyzed data to perform model-fitting and model comparisons using machine learning methods.
 - Used unsupervised neural network models to draw comparisons between behavioral data and network performance.
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Publications

Zhou, Y., Lake, B. M., and Williams, A. (2024). Compositional learning of functions in humans and machines. In *Proceedings of the 46th Annual Conference of the Cognitive Science Society*. [\[link\]](#)

Zhou, Y., Feinman R., and Lake, B. M. (2024). Compositional diversity in visual concept learning. *Cognition*, 244, 105711. [\[link\]](#)

Zhou, Y. and Lake, B. M. (2021). Flexible Compositional Learning of Structured Visual Concepts. In *proceedings of the 43rd annual conference of the cognitive science society*. [\[link\]](#)

Zhou, Y., Acerbi L., and Ma, W.J. (2020). The Role of Sensory Uncertainty in Simple Contour Integration. *PLOS Computational Biology* 16(11): e1006308. [\[link\]](#)

Presentations

Zhou, Y., Lake, B. M., and Williams, A. (2024). Compositional learning of functions in humans and machines. Poster presented at *46th Annual Conference of The Cognitive Science Society*.

Zhou, Y. (2024). Compositional Learning of Function Interactions in Humans and Machines. Invited talk at CCC Colloquium, Central European University

Zhou, Y. (2023). Compositional learning of functions in humans and machines. Invited talk at ConCats, New York University

Zhou, Y. and Lake, B. M. (2021). Flexible Compositional Learning of Structured Visual Concepts. Poster presented at *43rd Annual Conference of The Cognitive Science Society*.

Zhou, Y., Acerbi L., and Ma, W.J. (2017, September). The Role of Uncertainty in Perceptual Organization. Poster presented at the Cognitive Computational Neuroscience Meeting, New York, NY.

Zhou, Y., Acerbi L., and Ma, W.J. (2017, May). The Role of Uncertainty in Perceptual Organization. Talk presented at the Vision Sciences Society Meeting, St. Pete Beach, FL.

Teaching

Spring 2019 –
Spring 2021

Computational Cognitive Modeling

Center for Data Science, New York University
Instructor: Brenden Lake

Fall 2019

Data Science for Business Analytics

Stern School of Business, New York University
Instructor: Puneet Batra

Spring 2017 –
Fall 2018

Advanced Psychological Statistics

Department of Psychology, New York University
Instructor: Pascal Wallisch

Spring 2016

From Illusions to Inference: Adventures in Human Perception

Department of Psychology, New York University
Instructor: Wei Ji Ma

Languages & Skills

Programming languages:

Python (extensive), MATLAB (intermediate), R (intermediate),
JavaScript (Intermediate), HTML (basic)

Frameworks and Libraries:

PyTorch, TensorFlow, Hugging Face, Scikit-learn, Pandas, etc.

Data acquisition skills:

Crowd Sourcing with Amazon Mechanical Turk (extensive), Human psychophysics (extensive), Eye-tracking (basic)

Natural languages:

English (fluent), Mandarin Chinese (native)

Additional Research Projects

2017-2018

Angular Momentum Estimation with ML Methods

Advisor: Shy Genel (Center for Computational Astrophysics, Flatiron Institute)

- Estimated angular momentum contents of simulated galaxies based on luminosity and velocity maps generated from cosmological hydro-dynamical simulations using deep learning models.

2015-2016

Acoustic Signatures of Psychopathy

Advisor: Pascal Wallisch (Department of Psychology, New York University)

- Designed and implemented an independent research project on acoustical analysis of the speech of psychopathic individuals.
- Developed algorithms for vocal data processing and feature extractions.