

Haoliang Wang

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Education

- 2019- *PhD*, Experimental Psychology, UC San Diego
Advisors: Judith E. Fan
- 2019-2021 *MA*, Experimental Psychology, UC San Diego
Advisors: Judith E. Fan
- 2015-2019 *BS*, Computer Science, Xi'an Jiaotong University
Advisor: Pengju Ren
Thesis: Spiking neural network learning algorithms based on temporal modulation.

Selected Academic Honors

- 2018 PengKang Scholarship (top 1% students for academic excellence).
- 2017 Samsung Scholarship (top 2% students for academic excellence).
The First Prize of Alumni Scholarship of Xi'an Jiaotong University (top 2% student for academic excellence).
- 2016 Outstanding Students in Xi'an Jiaotong University (top 5% students for academic excellence).
The First Prize of Contemporary Undergraduate Mathematical Contest in Modeling (CUMCM).

Research Interests

Computational Cognitive Science: intuitive physics, theory acquisition, concept learning

Machine Learning: program synthesis, representation learning, neural-symbolic models

Publications

* indicates equal contribution

- 2022 **Wang, H.**, Allen, K., Vul, E., and Fan, J. (2022). Generalizing physical prediction by composing forces and objects. *Proceedings of the 44th Annual Meeting of the Cognitive Science Society*.
- 2022 **Wang, H.**, Yang, J., Tamari, R., and Fan, J. (2022). Communicating understanding of physical dynamics in natural language. *Proceedings of the 44th Annual Meeting of the Cognitive Science Society*.
- 2022 Brockbank*, E., **Wang*, H.**, Yang, J., Mirchandani, S., Bıyık, E., Sadigh, D., and Fan, J. (2022). How do people incorporate advice from artificial agents when making physical judgments? *Proceedings of the 44th Annual Meeting of the Cognitive Science Society*.

- 2021 **Wang, H.**, Polikarpova, N., and Fan, J. (2021). Learning part-based abstractions for visual object concepts. *Proceedings of the 43rd Annual Meeting of the Cognitive Science Society*.
- 2021 **Wang, H.**, Vul, E., Polikarpova, N., and Fan, J. (2021). Theory acquisition as constraint-based program synthesis. *Proceedings of the 43rd Annual Meeting of the Cognitive Science Society*.
- 2021 McCarthy*, W., Hawkins*, R., **Wang, H.**, Holdaway, C., and Fan, J. (2021). Learning to communicate about shared procedural abstractions. *Proceedings of the 43rd Annual Meeting of the Cognitive Science Society*.
- 2020 **Wang, H.**, and Fan, J. (2020). Library learning for structured object concepts. *ICML Workshop on Object-Oriented Learning: Perception, Representation, and Reasoning*.

Conference Presentations

- 2021 Learning to communicate about shared procedural abstractions: Talk presented at *43rd Annual Meeting of the Cognitive Science Society*.
- 2021 Learning part-based abstractions for visual object concepts: Poster presented at *43rd Annual Meeting of the Cognitive Science Society*.
- 2021 Theory acquisition as constraint-based program synthesis: Poster presented at *43rd Annual Meeting of the Cognitive Science Society*.
- 2020 Library learning for structured object concepts: Poster presented at *ICML Workshop on Object-Oriented Learning: Perception, Representation, and Reasoning*.

Teaching Experience

UC San Diego, Department of Psychology

- 2021 PSYCH 105 Cognitive Psychology
PSYCH 104 Social Psychology
- 2020 PSYCH 3 Foundations of Cognitive Psychology
- 2019 PSYCH 100 Clinical Psychology
- Responsibilities: Guest lecture a class session, assist with exam preparation and teaching, grade written assignments, and hold weekly office hours.*

Research Experience

2019- UC San Diego, Cognitive Tools Lab

Graduate Student (Principal Investigator: Judith E. Fan)

- Developed web-based experiments where participants infer alien physics dynamics.
- Developed an algorithm for learning part-based structures of visual concepts represented as graphics programs; designed an efficient algorithm for learning latent physics theories from observations by augmenting traditional program synthesis techniques with constraints.

2018

MIT, Computational Cognitive Science Group

Research Assistant (Principal Investigator: Josh Tenenbaum)

- Studied the impact of stimulus strength on the speed and accuracy of perceptual decisions.
- Adopted both drift-diffusion model (DDM) and POMDP to explain reaction time in human's decision making and planning behavior in mazes under uncertainty.

2018

UC Los Angeles, Center for Vision, Cognition, Learning, and Autonomy

Research Assistant (Principal Investigator: Song-Chun Zhu)

- Collected a large-scale dataset from Grand Theft Auto (GTA), annotated with rich information including 3D mesh for dynamic environment, human skeleton and pose.
- Developed an EM-like algorithm to learn both the structure and the parameters of a probabilistic context-free grammar (PCFG) that models human-object interaction in the dataset.
- Manuscript can be found [here](#).

2017

The Chinese University of Hong Kong, Multimedia Laboratory

Research Assistant (Principal Investigator: Dahua Lin)

- Collected a new sketch-photo dataset containing over 8k sketch-photo face pairs.
- Developed an ANN model for mapping examples in a weak modality (sketch) to examples in a stronger modality (photo) by inferring the conditional distribution of a semantic representation in the strong modality given an example from the weak modality using GANs.
- Manuscript can be found [here](#), and supplementary materials can be found [here](#).

2017

Chinese Academy of Sciences, National Laboratory of Pattern Recognition

Research Assistant (Principal Investigator: Ran He)

- Investigated the role of identity-preserving transformation in cross-modality face retrieval.
- Designed and implemented a human-like Artificial Neural Network (ANN) architecture where a global encoder-decoder network and four local patch networks work jointly to perceive both global structures and local details of faces.

Outreach

2021

Gave a talk on Bayesian reasoning and program synthesis to high school students in [Pathways2AI](#).

Skills

Modelling and Analysis: Python, PyTorch, Julia, Gen, R, MATLAB, C++

Experimental Design: JavaScript, HTML, CSS

Software and Tools: git, Adobe CC, \LaTeX

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