# Haoliang Wang

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## Education

2019- *PhD*, Experimental Psychology, UC San Diego
Advisors: Judith E. Fan, Nadia Polikarpova

2019-2021 *MA*, Experimental Psychology, UC San Diego
Advisor: Judith E. Fan

2015-2019 *BE*, Automation, 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

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.

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.

2017 **Chinese Academy of Sciences, Institute of Artificial Intelligence and Robotics**
*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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