

SHUHAO FU

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EDUCATION

University of California, Los Angeles

Ph.D. in Computational Cognition, Advisor: Dr. Hongjing Lu

M.A. in Psychology

The Hong Kong University of Science and Technology

B.S. in Computer Science and Mathematics, Advisor: Dr. Qifeng Chen

Los Angeles, CA

Sept 2020 - Present

Sept 2020 - Dec 2021

Hong Kong

Sept 2014 - Jun 2019

AWARDS

Graduate Summer Research Mentorship Fellowship (\$6,000)	2021
HKUST University Scholarship (HK\$ 10,000 / year)	2014 - 2019
Dean's List Student (GPA above 3.7/4.3, top 5%)	2014-17
Lee Hysan Foundation Exchange Scholarship (HK\$13,000)	2017
HKSAR Government Scholarship Fund – Reaching Out Award (HK\$ 10,000)	2017

PUBLICATIONS

1. Webb, T. W.*, **Fu, S.***, Bihl, T., Holyoak, K. J., & Lu, H. (2023). Zero-shot visual reasoning through probabilistic analogical mapping. *Nature Communication* 14, 5144. * equal first-author.
2. Ichien, N., Liu, Q., **Fu, S.**, Holyoak, K. J., Yuille, A. L., & Lu, H. (2023). Two Computational Approaches to Visual Analogy: Task-Specific Models Versus Domain-General Mapping. *Cognitive Science*, 47(9), e13347.
3. Sneffjella, B., Yun, Y., **Fu, S.**, & Lu, H. (2023). Human similarity judgments of emojis support alignment of conceptual systems across modalities. *Proc. 45th Annual Meeting of the Cognitive Science Society*.
4. Zhang, I., **Fu, S.**, Xu, A., & Lu, H. (2022). Causal versus Associative Relations: Do Humans Perceive and Represent Them Differently? *Proc. 44th Annual Meeting of the Cognitive Science Society*.
5. **Fu, S.**, Holyoak, K. J., & Lu, H. (2021). From vision to reasoning: Probabilistic analogical mapping between 3D objects. *Proc. 44th Annual Meeting of the Cognitive Science Society*.
6. Ichien, N. T., Liu, Q., **Fu, S.**, Holyoak, K. J., Yuille, A. L., & Lu, H. (2021). Visual analogy: Deep learning versus **compositional models**. *Proc. 43rd Annual Meeting of the Cognitive Science Society*.
7. **Fu, S.**, Lu, Y., Wang, Y., Zhou, Y., Shen, W., Fishman, E., & Yuille, A. (2020). **Domain adaptive relational reasoning** for 3d multi-organ **segmentation**. *MICCAI*.
8. **Fu, S.**, Xie, C., Li, B., & Chen, Q. (2020). Attack-resistant **federated learning** with residual-based reweighting. *AAAI Workshops: Towards Robust, Secure and Efficient Machine Learning (oral)*.
9. Dreizin, D., Zhou, Y., **Fu, S.**, Wang, Y., Li, G., Champ, K., ... Yuille, A. L. (2020). A multiscale deep learning method for quantitative visualization of traumatic hemoperitoneum at ct: Assessment of feasibility and comparison with subjective categorical estimation. *Radiology: Artificial Intelligence*, 2(6).

PRESENTATIONS

1. **Fu, S.**, Tjan, D., Kellman, P., & Lu, H. (2024, May 17-22). *3D shape recognition in humans and deep neural networks*. Poster will be presented at the Vision Sciences Society, St. Pete Beach, FL.
2. **Fu, S.**, Chen Y.-C., Colombatto, C., & Lu, H. (2022, May 13-18). *Visual impressions of social avoidance from moving shapes*. Poster presented at the Vision Sciences Society, St. Pete Beach, FL.
3. **Fu, S.**, Holyoak, K. J., & Lu, H. (2021). *From vision to reasoning: Probabilistic analogical mapping between 3D objects*. Talk presented at the 44th Annual Conference of the Cognitive Science Society. Toronto, Canada.

TEACHING EXPERIENCE

1. PSYCH 20A: MATLAB Programming for Behavioral Sciences (Winter 2024)
 - Instructor: Andrew Frane
 - Served as the teaching assistant with 58 students. Led two lab sessions each week, Graded weekly homework. Held weekly office hours.
2. PSYCH 186A: Cognitive Science Laboratory: Introduction to Theory and Simulation (Spring 2023)
 - Instructor: Hongjing Lu
 - Served as the teaching assistant with 28 students. Led some tutorial sessions. Graded weekly homework. Held weekly office hours.
3. PSYCH 186B: Cognitive Science Laboratory: Neural Networks (Winter 2023)
 - Instructor: Zili Liu
 - Served as the teaching assistant with 16 students. Led weekly lab sessions. Graded weekly homework, quizzes, and mentored group projects. Held weekly office hours.
4. PSYCH 186A: Cognitive Science Laboratory: Introduction to Theory and Simulation (Spring 2022)
 - Instructor: Hongjing Lu
 - Served as the teaching assistant with 26 students. Led some tutorial sessions. Graded weekly homework. Held weekly office hours.

RESEARCH EXPERIENCE

Google X - Mineral Mountain View, CA
Research Intern Jun 2022 - Oct 2022 & Jun 2023 - Ongoing

- Developed a machine learning model that detects 3D object topology from multi-view 2D images and reconstructs the 3D shape in a simulation world.
- Investigating in the relational representation in the self-attention mechanism in Transformer models.

Visual Analogy Jun 2020 - Ongoing
Research Assistant, Supervisor: Hongjing Lu

- Developed the VisiPAM model that can achieve a similar level of visual analogical mapping with humans.
- Implemented two computational models to evaluate their ability in visual analogy tasks.
- Performed a behavioral experiment to test how people would make analogical inferences among various objects.

Social Avoidance July 2020 - Ongoing
Research Assistant, Supervisor: Hongjing Lu

- Investigated the factors in the perception of social avoidance.
- Implemented a social force model to account for the perception of social avoidance

Johns Hopkins University Jun 2019 - Sep 2020
Research Assistant, Supervisor: Alan Yuille

- Designed a domain adaptation framework with an auxiliary self-supervised learning task with relational reasoning ability.

Attack Resistant Federated Learning Sept 2018 - Sept 2019
Final Year Thesis, Supervisor: Qifeng Chen

- Proposed an [algorithm](#) with residual-based reweighting that robustly aggregate hundreds of models in federated learning.
- Our approach maintained robust under model poisoning attacks and noisy attacks in variant tasks including NLP and Image Classification.
- Theoretically proved the robustness of our aggregation algorithm.

Momenta.ai

Nov 2017 - May 2018

Research Intern, Supervisor: Shaoqing Ren

- Developed different Alignment Networks for car detection, which regresses bounding boxes proposed by Faster R-CNN in a more stable and efficient manner.
- Systematized the evaluation process of Alignment Networks' performances with new criteria based on stability and efficiency.

Microsoft Research Asia

Jun 2017 - Nov 2017

Research Intern, Supervisor: Jifeng Dai

- Reimplemented Flow-Guided Feature Aggregation in MXNet platform and officially released [it](#).
- Designed an algorithm leveraging color, texture and optical flow to tackle instance segmentation problem in videos with semi-supervised annotation.

SKILLS

Programming Languages: Python, C/C++, R, Matlab, Java, JavaScript, HTML
Frameworks & Tools: Pytorch, Caffe, MXNet, TensorFlow, L^AT_EX, Git, Linux, Adobe Illustrator
Languages: Chinese (Native), English (Professional working proficiency)