Zhenan Shao

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EDUCATION BACKGROUNDS

University of Illinois Urbana-Champaign August 2020 - expected December 2025
PhD, Psychology, Advisor: *Diane M. Beck* GPA: 4.0/4.0
Area: Computational Neuroscience
Thesis: Improving Deep Neural Network Robustness via Human-Inspired Visual Processing Principles

University of Illinois Urbana-Champaign January 2024 - expected May 2025
Master of Computer Science GPA: 4.0/4.0

University of Minnesota, Twin-Cities August 2016 - May 2020
Bachelor of Science, Psychology, Advisor: *Sheng He* GPA: 4.0/4.0
Minor: Statistics, Neuroscience

RESEARCH EXPERIENCES

Stanford Trustworthy AI Research (STAIR), Stanford June 2024 - August 2024
Advisor: Sanmi Koyejo

- Led human-inspired AI projects, including designing ViT and CNN architectures augmented with feedback connections from human neural activity to enhance their adversarial robustness.
- Developed generative models for simulating human brain activity while leveraging large-scale datasets, thus contributing to tools available to the neuroscience community.

Attention and Perception Lab, UIUC August 2020 - Present
Advisor: Diane M. Beck

- Led interdisciplinary projects combining deep learning with vision neuroscience to uncover mechanisms behind human object recognition invariance.
- Applied multivariate pattern analysis (MVPA) techniques, including RSA, SVM, and ICA, to neuroimaging data, advancing the theoretical framework of the human visual system as a generative model.

Vision and Attention Lab, UMN January 2019 - May 2020
Advisor: Sheng He

- Developed and coded the experimental procedure in Matlab while configuring the necessary experimental equipment for optimal performance.
- Conducted comprehensive statistical analysis using R and Python on human behavioral data and designed advanced visualization of experimental results.

HONORS AND AWARDS

Winner of Bio-informed AI Research Competition 2023
Beckman Institute, UIUC

Elsevier/Vision Research Travel Award 2023
The 23th Annual Meeting of the Vision Sciences Society (VSS2023)

Graduate College Conference Presentation Awards 2023, 2024
Department of Psychology, UIUC

Illinois Distinguished Fellowship 2020-2023
Graduate College, UIUC

Graduate with high distinction 2020
University of Minnesota, Twin-Cities

Dean's List 2016-2020
University of Minnesota, Twin-Cities

Maroon Global Excellence Scholarship 2016-2020
University of Minnesota, Twin-Cities

PUBLICATIONS

[1] Beck, D. M., Center, E., **Shao, Z.** (2024). The Role of Real-world Statistical Regularities in Visual Perception. *Current Directions in Psychological Science, online first*, https://doi.org/10.1177/09637214241268083.

[2] **Shao, Z.**, Ma, L., Li, B., Beck, D. M. (2024). *Leveraging the Human Ventral Visual Stream to Improve Neural Network Robustness.* arXiv, https://arxiv.org/abs/2405.02564

[3] **Shao, Z.**, Beck, D. M. (2024). Is Attention Necessary for the Representational Advantage of Good Exemplars over Bad Exemplars? *European Journal of Neuroscience, 59*(9), 2129-2415. https://doi.org/10.1111/ejn.16291

CONFERENCE PRESENTATIONS

[1] **Shao, Z.**, Ma, L., Li, B., Beck, D. M., Neural-guidance by the Human Ventral Visual Stream Improves Neural Network Robustness (2024). Oral Presentation at *Sandia National Laboratories Annual Machine Learning/Deep Learning (MLDL) Workshop*, Virtual. [LINK]

[2] **Shao, Z.**, Ma, L., Li, B., Beck, D. M., Increasing robustness of ventral visual cortex revealed by neurally-guided deep neural networks (2024). Poster presented at *Society for Neuroscience (SfN)*, Chicago, IL. [LINK]

[3] **Shao, Z.**, Ma, L., Li, B., Beck, D. M., Does Leveraging the Human Ventral Visual Stream Improve Neural Network Robustness? (2024). Oral Presentation at *Vision Science Society (VSS)*, St. Pete Beach, FL. [LINK]

[4] **Shao, Z.**, Beck, D. M. (2023). Is Attention Necessary for the Representational Advantage of Good Exemplars over Bad Exemplars? Poster presented at *Vision Science Society (VSS)*, St. Pete Beach, FL. [LINK]

[5] Yang, P-L., **Shao, Z.**, Beck, D. M. (2023). The similarity of CNN, behavioral, and PPA feature spaces. Poster presented at *Vision Science Society (VSS)*, St. Pete Beach, FL. [LINK]

SERVICES

Teaching Assistant	Instructor for PSYC 100: Intro to Psychology (Fall 2022) PSYC 489: Neural Network Modeling Lab (Spring 2022) PSYC 403: Memory and Amnesia (Fall 2024)
Reviewer	Imaging Neuroscience

SELECTED COURSEWORK

UIUC	*Computer Science:* GPU Parallel Programming, Data Structures, Database Systems, Cloud Networking *Machine Learning:* Computer Vision, Deep Learning for Computer Vision, Artificial Intelligence, Advanced Topics in Natural Language Processing, Neural Network Modeling Lab *Statistics:* Statistical Methods I & II
UMN	*Computer Science:* Intro to Programming Concepts, Intro to Algorithms and Data Structure *Statistics:* Theory of Statistics I & II, Regression and Correlated Data

SKILLS

Programming Languages	Python, C/C++, CUDA, R, Matlab, Java, SPSS
ML Frameworks	Pytorch, TensorFlow
Database	MySQL, MongoDB, Neo4j