Zhenan Shao

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EDUCATION BACKGROUNDS

University of Illinois Urbana-Champaign August 2020 - expected August 2025
PhD, Psychology, Advisor: *Diane M. Beck* GPA: 4.0/4.0
Area: Cognitive Neuroscience

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.

Health and Emotions in Adolescent Trajectories laboratory, UMN May 2018 - May 2020
Advisor: Karina Quevedo

- Ran data analysis using SPM, Matlab and FSL: extracting, denoising, and reconstructing both anatomical and functional neuroimaging data obtained from adolescents with major depression disorder.
- Co-developed a Python-based pipeline to streamline the usage of the AFNI neuroimaging analysis package, enhancing accessibility by wrapping complex shell commands for easier application.

PROFESSIONAL EXPERIENCES AND ACTIVITIES

The Aurora Center for Advocacy and Education, UMN February 2017-May 2020
Office Assistant Student Staff / Direct Service Advocate

- Completed 40-hour sexual assault and domestic violence prevention advocacy certification training as required by the state of Minnesota.
- Served on 24/7 hotline for victims and survivors of sexual assault, stalking, and domestic violence and responded to medical advocacy for the three hospitals on campus when patients are in need of a sexual violence exam.

- Coordinated outreach events and collaborated with student organizations on campus to promote awareness of women's rights.

DreamNovation (NGO), Guangzhou March 2017-August 2017
Program Coordinator / Volunteer

- Organized and promoted the recruitment of 30 volunteers from universities in both North America and China for summer camps held in 5 different provinces each year.
- Worked with two local schools to Investigate the dynamics and atmosphere of local communities to be incorporated in future education of the students.

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, *In Press.*

[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]

[6] Castro, M., **Shao, Z.**, Engstrom, M., Teoh, J. Y., Quevedo, K. (2019). Neural correlates of maltreatment timing during self-processing in depressed adolescents. Poster presented at *Minnesota Supercomputing Institute (MSI) Research Exhibition*, Minneapolis, MN.

SERVICES

Teaching Assistant	*Instructor* for PSYC 100, UIUC: Intro to Psychology (Fall 2022) PSYC 489, UIUC: Neural Network Modeling Lab (Spring 2022) PSYC 403, UIUC: Memory and Amnesia (Fall 2024) NSCI 2100, UMN: Human Neuroanatomy (Spring 2020)
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