

# Matthew Shinkle

I am a PhD candidate in neuroscience, studying the relationship between neural networks and the brain, as well as a power systems researcher at Pacific Northwest National Laboratory. As I am finishing up my PhD, I am now transitioning to full-time work on AI safety—how to make sense of immensely complex AI models and ensure that they are both safe and effective.

 Website  MShinkle  ResearchGate  Scholar  LinkedIn  matthewshinkle@gmail.com

## MACHINE/DEEP LEARNING

Most of my research involves deep neural network models, including model training, application, and interpretation. This ranges from simple single-layer DNNs to massive, state-of-the-art LLMs. I have extensive research experience with a wide range of machine learning techniques. I've expanded these skills through graduate and external courses on deep learning, AI safety, data science, statistics, and other topics.

- **Graduate coursework in ML, DL, data science, and statistics**  
Machine Learning • Deep Learning • Interdisciplinary Data Science  
Intermediate Statistics • Bayesian Statistics • Research Computing
- **External training**  
Alignment Research Engineer Accelerator (ARENA 4.0)  
AI Safety Fundamentals: AI Alignment  
Neuromatch Deep Learning 2021  
Neuromatch Computational Neuroscience 2020

## DATA SCIENCE

I've been programming with Python almost daily since starting graduate research in 2019 and have proficiency in a wide range of data science and machine learning tools. Beyond extensive experience with standard tools like Scikit-Learn, PyTorch, and Plotly, I have also developed various packages on my own, and have contributed to large-scale data science projects.

- **Python – 7 years of experience**  
Deep Learning • Big Data Science  
Data Visualization • Software Development
- **Development on both Linux and Windows**  
BASH • Remote computing  
Parallel Computing • High-Performance Computing
- **Contributions to major collaborative projects**  
PyCortex • Visual Experience Database

## TEACHING AND MENTORING

I have worked as a teaching assistant for wide range of courses and workshops on topics ranging from AI safety and data science to cognitive psychology and perception. I've also served in a variety of mentoring roles with junior researchers in my labs at UNR and PNNL and with aspiring scientists from disadvantaged background through Project SHORT.

- **Teaching Assistantships**  
AI Safety Upskilling Workshop (FAR.Labs) • Big Data Summer School •  
Statistics • Cognitive Psych. • General Psych. • Perception
- **Mentoring and Tutoring**  
Statistics Tutor • General Psych. Tutor • Project SHORT Mentor (3x)

## DATA SCIENCE SKILLS

### LIBRARIES/Frameworks

PyTorch / TorchVision • Numpy  
Matplotlib • Plotly • Dash • Scipy  
Scikit-Learn • Pandas • OpenCV

### TOOLS/PLATFORMS

Anaconda • Git  
Command Line / PowerShell  
VS Code • Weights & Biases

## EDUCATION

### UNIVERSITY OF NEVADA, RENO

July 2019 - May 2025  
Ph.D + Masters Program  
Cognitive and Brain Sciences  
Cum. GPA: 4.0 / 4.0

### CEDARVILLE UNIVERSITY

July 2015 - May 2019  
Bachelor's in Psychology  
Emphases: Neurosci., Research  
Major GPA: 3.98 / 4.0

## RESEARCH POSITIONS

### PACIFIC NORTHWEST NATIONAL LAB

June 2023 - February 2025  
Graduate Research Intern  
ML and Power Systems

### UNIVERSITY OF NEVADA, RENO

July 2019 - May 2025  
Graduate Research Assistant  
Computational Neuroscience

## REFERENCES

### Mark Lescroart

Cognitive & Brain Sciences, UNR  
✉ mlescroart@unr.edu

### Kaveri Mahapatra

Power System Re-  
search Engineer, PNNL  
✉ Kaveri.Mahapatra@pnnl.gov

### Emily Hand

Computer Science & Engineering,  
UNR ✉ emhand@unr.edu

## RESEARCH

My central research focus is the interpretation of complex computational systems. In my early graduate research I used body-segmentation DNNs and regression to examine the representations of bodies and body parts in the human visual system. In my dissertation work, I've developed methods for creating direct mappings between human brain data (fMRI) to internal DNN units. This mapping not only reveals interesting parities and differences between DNN models and the brain, but also enables me to apply DNN interpretation techniques to the brain.

I also recently finished up an almost 2-year stint as a graduate research intern at Pacific Northwest National Lab, where I applied my facility with scientific research, programming, statistics, and deep learning to univariate and multivariate power systems data. This includes the development of techniques to interpret, classify, and predict synchrophasor signals.

I am presently transitioning into full-time AI safety research, drawing on the computational and scientific skills I've developed in my prior work. My safety-focused research thus far has focused on understanding the internal representations of vision and language models through vector steering, clustering, and activation maximization. Beyond independent research, I'm involved in collaborative projects focusing on interpreting multimodal models and evaluating agentic systems. I am actively seeking additional opportunities to collaborate with other researchers and groups to maximize the development and impact of safe AI systems.

## RESEARCH PAPERS AND CONFERENCE PRESENTATIONS

**Shinkle, Matthew** and Mark Lescroart (Jan. 2024). "Voxelwise Modeling Reveals Selectivity for Body Part Identity and Location in BOLD fMRI Responses to Complex Naturalistic Stimuli". PsyArXiv Preprints. Available at <https://osf.io/preprints/psyarxiv/8ery6>.

**Shinkle, Matthew** and Kaveri Mahapatra (2024). "Online Detection of Power Grid Anomalies via Federated Learning". 2024 IEEE Power Energy Society General Meeting.

**Shinkle, Matthew** and Mark Lescroart (2023). "Control of BOLD fMRI Responses Via Stimuli Generated with Voxel-Weighted Neural Network Activation Maximization". Poster presented at the Vision Sciences Society Annual Conference.

**Shinkle, Matthew** and Mark Lescroart (2022). "Whole-Network Activation Maximization: A Flexible Method for Exploring Visual Selectivity in the Brain". Poster presented at the Vision Sciences Society Annual Conference and published in Journal of Vision 22.14. doi: <https://doi.org/10.1167/jov.22.14.4462>.

Zhao, Yu, **Matthew Shinkle**, Arnab Biswas, and Mark Lescroart (2022). "PCA Reveals Common Spatial Patterns of Motion Energy in Diverse Stimulus Sets and in Scene-Selective Area Voxel Tuning". Poster presented at the Vision Sciences Society Annual Conference and published in Journal of Vision 22.14. doi: <https://doi.org/10.1167/jov.22.14.4486>.

**Shinkle, Matthew** and Mark Lescroart (2020a). "Body Part- and Location-Selectivity Surrounding hMT in BOLD Responses to Naturalistic Stimuli". Poster presented at the Neuromatch 3.0 Conference.

**Shinkle, Matthew** and Mark Lescroart (2020b). "Voxelwise Modeling Reveals Selectivity for Body Part Identity and Location in BOLD fMRI Responses to Complex Naturalistic Stimuli". Poster presented at the Vision Sciences Society Annual Conference and published in Journal of Vision 20.11. doi: <https://doi.org/10.1167/jov.20.11.1675>.

Firmin, Michael, **Matthew Shinkle**, Samantha Kohli, Sydney Dosier, and Ying-Ruey Chung (2020). "Advice from Former Department Chairs: Qualitative Perspectives." Educational Research: Theory and Practice 31.2, pp. 29–40.

Hansford, Elizabeth, Nicholas Tremitedi, Theresa Jones, **Matthew Shinkle**, and Felicia Younkin (2019). "Perceptions of Relationships with Individuals Possessing Disabilities". Annual American Association of Behavioral and Social Sciences Conference.

Firmin, Michael and **Matthew Shinkle** (2019). "Potential Psychological Implications of the Inclusion of 6C72 Compulsive Sexual Behavior Disorder in the ICD-11". Talk given at the National Social Science Association Conference.

Tremitedi, Nicholas, **Matthew Shinkle**, and Theresa Jones (2019). "Underlying Pathology and Pharmacological Interventions for Schizophrenia". Poster presented at the Annual American Association of Behavioral and Social Sciences Conference.

Paulding, Michelle, **Matthew Shinkle**, Isabelle Bendorf, Nicholas Tremiteidi, Chao Liu, and Felisha Younkin (2019). "Residential Mobility and Adolescent Achievement: The Mediating Effect of Parental Involvement". Annual Convention of the Ohio Psychological Association.