DR. KEVIN L. MCKEE

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Website ◇ Google Scholar

Senior AI researcher with 10+ years of experience and leadership in developing novel algorithms for machine learning and scientific modeling. Dedicated to strong theoretical foundations, scientific rigor, and ethics in AI and cognitive science.

EXPERIENCE

Senior Research Scientist, Obelisk lab, Astera Institute *2024 - Present*

- Spearheaded AI agent prototype called *Fluid*, integrating neural networks with cellular automata and episodic memory.
- Recruited and led team of 5 engineers and 2 researchers for *Fluid*.
- Trained team in reinforcement learning, scientific methods, and theory.
- Published 3 research papers on exploration, memory, and thinking.

Machine Learning Engineer / Research Scientist, Obelisk lab, Astera Institute *2022 - 2024*

- Published 2 independent research manuscripts at intersection of neuroscience and ML
- Prototyped modules for spiking neural network agent *Axon*.

Postdoctoral Researcher, PI: Randall O'Reilly, UC Davis *2021 - 2022*

- Published collaborative research on mechanisms of Bayesian inference in spiking neural networks,
- Presented workshops on Bayesian state-space models for cognitive and psychiatric data analysis.

Postdoctoral Statistician, Virginia Tech, Department of Statistics *2020 - 2021*

- Translated research questions into mathematical models for neuroscience, psychiatry, behavioral economics, and biomedical engineering, resulting in 7 published peer-reviewed papers, and several awarded NIH grants.
- Reviewed NIH grant applications and manuscripts for peer-reviewed journals,
- Mentored undergraduate and graduate students and presented workshops and seminars to the broader research community.

Graduate Research Assistant, VCU, Primary Mentor: Dr. Michael Neale *2015 - 2020*

- Dissertation *Phenotype Extraction* demonstrates Bayesian multi-level state-space modeling for genetic and psychiatric research.
- Published peer-reviewed papers in statistical and psychometric methodology and theory.

Laboratory Technician, VCU, Multiple departments *2011 - 2015*

- Operated multiple laboratories spanning pharmacology, biopsychology, and neuroscience, supporting published research and conference presentations.

EDUCATION

Virginia Commonwealth University (VCU)
B.S., Psychology *2008 - 2012*
Department of Psychology
Ph.D., Psychiatric, Behavioral, and Statistical Genetics (Statistical Modeling *2015 - 2020*
Virginia Institute of Psychiatric and Behavioral Genetics (VIPBG)

SKILLS

Modeling: Any & all RL algorithms and ANN architectures, frequentist and Bayesian modeling strategies. Specialties: RNNs, state-space models, stochastic differential equations, spectral analysis.

Science: Independent research and literature review. Scientific illustration, preparation of manuscripts, grant applications, and educational materials. Reviewing manuscripts and grants applications. Mentoring early career researchers. Interviewing research candidates. Conducting educational workshops and technical seminars.

Code and Software:
Code: Python, R, MATLAB, Mathematica, Go, Java, C++, C#
Specialized: JAX, Pytorch, Stan, Rcpp, Unity
Presentation: LaTeX, Adobe Suite, Unity, R Markdown, R Shiny, Microsoft Office

MACHINE LEARNING AND AI PAPERS

- Miconi, T., McKee, K., Zheng, Y., & McCaleb, J. (2025). Thinking agents for zero-shot generalization to qualitatively novel tasks. arXiv preprint arXiv:2503.19815.
- Zheng, Y., Wolf, N., Ranganath, C., O'Reilly, R. C., & McKee, K. L. (2025). Flexible prefrontal control over hippocampal episodic memory for goal-directed generalization. arXiv preprint arXiv:2503.02303.
- McKee, K. L. (2025). Meta-Learning to Explore via Memory Density Feedback. arXiv preprint arXiv:2503.02831.
- McKee, K. (2025). A Method of Selective Attention for Reservoir Based Agents. arXiv preprint arXiv:2502.21229.
- McKee, K. (2024). Reservoir computing for fast, simplified reinforcement learning on memory tasks. arXiv preprint arXiv:2412.13093.
- McKee, K., Crandell, I., Chaudhuri, R., & O'Reilly, R. (2022). Adaptive Synaptic Failure Enables Sampling from Posterior Predictive Distributions in the Brain. arXiv preprint arXiv:2210.01691.
- McKee, K. L., Crandell, I. C., Chaudhuri, R., & O'Reilly, R. C. (2021). Locally Learned Synaptic Dropout for Complete Bayesian Inference. arXiv preprint arXiv:2111.09780.