

RILEY D. DEHAAN

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PROFILE

PhD candidate studying human memory, the cognitive effects of electrical brain stimulation, and the statistical limits of neuroscience. Versatile designer with experience in machine learning, software engineering, business software apps, and eCommerce.

EDUCATION

UNIVERSITY OF PENNSYLVANIA - Philadelphia, PA

Ph.D., May 2026

Psychology. Advisors: Michael J. Kahana, Konrad Kording

STANFORD UNIVERSITY - Palo Alto, CA

Master of Science, April 2020 - GPA: 3.923/4.0

Electrical Engineering

BAYLOR UNIVERSITY - Waco, TX

Bachelor of Science, May 2018 - GPA: 4.0/4.0

Electrical and Computer Engineering - Honors Program

RELEVANT SKILLS

Coursework

Causal Inference, Statistical Modeling, Human Visual System (Yamins), Computational Models of Cognition (McClelland), Computer Vision, ML, RL, Information Theory, Convex Optimization, Linear Dynamical Systems, Probabilistic Graphical Models, Meta-learning

Technical Skills

Python, PyTorch, C, C++, MATLAB, Linux

EXPERIENCE

Assistant Specialist

November 2020 - August 2021

Computational Cognitive Neuroscience Lab (Randy O'Reilly). University of California, Davis - Davis, CA

- Modeled, redesigned, and partly managed piloting of reward-modulated change detection task in ongoing study of reward and effort integration in schizophrenia as part of a collaboration between Randy O'Reilly's and Cam Carter's labs.
- Took part in developing Leabra neural network models of saccade control and predictive learning in schizophrenia

ML Engineer

April 2020 - July 2020

EigenX.AI - Fremont, CA

- First employee at stealth startup using cloud and deep learning technologies to advance network security
- Implemented deep meta-learning methods, data preprocessing and visualization pipelines
- Identified model overfitting conditions and led company toward scaled validation with real world data

Undergraduate Research Assistant

October 2016 - May 2018

Baylor University - Waco, TX

- Researched Wi-Fi signal propagation and channel properties of airplane fuselages with FEKO under Dr. Yang Li
- Tested in-house MATLAB ray-tracing software for modeling signal propagation
- Honors thesis: baylor-ir.tdl.org/handle/2104/10291

Intern

June 2019 - September 2019

ViZiV Technologies - Italy, TX - vizivtechnologies.com

- Validation tested 3-axis electric/magnetic field/phase transducer prototype for wireless utility power transfer (project over \$2M)
- Programmed with Siemens industrial control system and made initial research database design
- Testing and construction of additional measuring devices (current transducers, antenna positioning devices)

Chief Operating Officer

December 2017 - August 2018

TourTorch LLC - Fort Worth, TX

- As second company founder, helped guide vacation tour eCommerce startup through early stages of business model formation, website layout design, personnel onboarding, contractual negotiation, culture development with remote team members
- Under my leadership, TourTorch was accepted into TECH Fort Worth and won \$5K in startup competition grants

PUBLICATIONS

1. Neural components underlying successful free recall are specific to episodic memory (2025). DeHaan, R. D., Ezzyat, Y., Randazzo, M. J., Rao, A. M., Papanastassiou, A. M., Geller, A. S., Lega, B. C., Aronson, J. P., Gross, R. E., Jobst, B. C., Zaghloul, K. A., Worrell, G. A., Sheth, S. A., Sperling, M. R., and Kahana, M. J. bioRxiv. doi: 10.1101/2025.07.25.666835. In review.

2. Synchronous Theta Networks Characterize Successful Memory Retrieval (2025). Rao, A. M., DeHaan, R. D., and Kahana, M. J. The Journal of Neuroscience, 45(16):e1332242025. Doi: 10.1523/JNEUROSCI.1332-24.2025.
<https://www.jneurosci.org/lookup/doi/10.1523/JNEUROSCI.1332-24.2025>

Personal Projects - github.com/Riley16

- **Curious Object-Based seaRch Agent (COBRA) Reimplementation - McClelland Lab**
 - Reimplemented exploration phase of COBRA architecture (arxiv.org/pdf/1905.09275v2.pdf) for project on fundamental geometrical reasoning as part of lab research program on mathematical cognition
 - Exploration model successfully learned to predict shape motions from agent actions
- **Error-Driven Hebbian Learning - https://github.com/Riley16/hebbian_pretraining**
 - Explored possibility of a Hebbian learning phase prior to the arrival of the error signal accelerating SGD methods
 - Small increases in SGD learning speed after Hebbian phase observed on mathematical function approximation tasks
- **Neural Signal Decoding:** Developed predictive RNN model of monkey reach motions from motor cortex electrode recordings
 - Algorithm exhibited non-linear feedback dynamics not observed with simpler Kalman filter models
- **Memory-PlaNet:** Combination of DNC ([nature.com/articles/nature20101](https://www.nature.com/articles/nature20101)) and PlaNet (arxiv.org/abs/1811.04551) architectures to handle POMDPs as part of course project (github.com/rmrafailov/Memory-PlaNet)
 - Model applied to partially observable variant of Atari game *Ms. PacMan* with agent vision limited to a small window
 - Contributed to model formulation and implemented discrete cross-entropy method for planning optimization