

Keiland W. Cooper

Graduate Scholar
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EDUCATION

University of California, Irvine

Ph.D., Neuroscience

Advisors: Dr. Norbert Fortin

In progress

Indiana University, Bloomington

B.S., Cognitive Science *with Honors*;

Computation specialization

Certificate in Neuroscience; Minor in Psychology

Advisors: Dr. Ehren Newman, Dr. Mike Jones

May the Fourth, 2019

RESEARCH EXPERIENCE

- 2019-now with Dr. Norbert Fortin | Neuroscience
 - *Non-spatial theta sequences and precession*
 - *11 brain region electrophysiology*
- 2020-now with the GCCR | Neuroscience
 - *COVID-19 and the chemical senses*
- 2020-now with ContinualAI Research | Artificial Intelligence
 - *Building tools to aid AI research*
- 2019-2020 with Dr. Bruce McNaughton | Neuroscience
 - *Hippocampal and cortical replay during sleep*
- 2016-2019 with Dr. Ehren Newman | Neuroscience / Cognitive Science
 - *Computational modeling of ACh + brain oscillations*
 - *Entorhinal region electrophysiology*
 - *Hippocampal imaging with Miniscopes*
 - *Theta + optic flow rodent behavior*
- 2018-2019 with Dr. Mike Jones | Cognitive Science
 - *Catastrophic Forgetting in connectionist language models*
- 2017-2018 with Dr. Amit Hagar | Philosophy + Physics
 - *The natural computation of the brain*
- 2015-2016 with Dr. Susane Ressler | Microbiology
 - *Structural biochemistry of synaptic proteins*

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|--------|---|------------------------------------|------|
| AWARDS | Norman Weinberger Award | <i>UC Irvine CNLM</i> | 2021 |
| | Graduate Research Fellowship (GRFP) | <i>National Science Foundation</i> | 2021 |
| | Best International AI Research Organization | <i>Wealth & Finance</i> | 2020 |
| | DTEI Pedagogical Fellowship | <i>UC Irvine</i> | 2020 |
| | Cognitive Science Outstanding Research | <i>Indiana University</i> | 2019 |
| | GRFP (Honorable Mention) | <i>National Science Foundation</i> | 2018 |
| | Outstanding Contribution in Cognitive Science | <i>Indiana University</i> | 2018 |

PREPRINTS **stars** = mentee; **bold** = me

- [10] Hippocampal ensembles represent sequential relationships among discrete nonspatial events
 Shahbaba, B., Li, L., Agostinelli, F., Saraf, M., Elias, G. A., **Cooper, K. W.**, Baldi, P., Fortin, N. J.. (2021) Under Review

PEER
 REVIEWED

- [9] Avalanche: an End-to-End Library for Continual Learning
 Vincenzo Lomonaco, Lorenzo Pellegrini, Andrea Cossu, Antonio Carta, Gabriele Graffieti, ... **Keiland Cooper**, ... Davide Bacciu, Davide Maltoni. (2021) Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition
 ↳ *Won CLVision WB Best Library Award*
- [8] Recent smell loss is the best predictor of COVID-19 among individuals with recent respiratory symptoms.
 Gerkin, R. C., Ohla, K., Veldhuizen, M. G., Joseph, P. V., Kelly, C. E., Bakke, A. J., ... **Cooper, K.W.** ... and Baguma, M. . (2020) Chemical senses
- [7] Smell and taste changes are early indicators of the COVID-19 pandemic and political decision effectiveness.
 Pierron, D., Pereda-Loth, V., Mantel, M., Moranges, M., Bignon, E., Alva, O., **Cooper, K. W.**, ... Dinnella, C. . (2020) Nature Communications
 ↳ *#4 of Top 100 Nature Communications papers of 2020*
- [6] COVID-19 and the chemical senses: supporting players take center stage.
Cooper, K. W., Brann, D.H., Farruggia, M.C., Bhutani, S., Pellegrino, R., Tsukahara, T., Weinreb, C., Joseph, P.V., Larson, E.D., Parma, V. and Albers, M.W., (2020) Neuron
 ↳ *Top ten Neuron papers of 2020*
- [5] More than smellCOVID-19 is associated with severe impairment of smell, taste, and chemesthesis.
 Parma, V., Ohla, K., Veldhuizen, M. G., Niv, M. Y., Kelly, C. E., Bakke, A. J., **Cooper. K. W.**, ..., Hayes, J. E.. (2020) Chemical Senses
- [4] Coronaviruses and the chemical senses: past, present, and future
 Pellegrino, R., **Cooper, K. W.**, Di Pizio, A., Joseph, P. V., Bhutani, S., and Parma, V. . (2020) Chemical senses
- [3] Medial entorhinal cortex activates in a traveling wave in the rat
 Hernandez-Perez, J. J., **Cooper, K. W.**, Newman, E. L.. (2020) eLife

- [2] Can the Machine Understand: An Evidence Based Approach to the Chinese Room
Cooper, K. W. (2018) IU Journal of Undergraduate Research

THESIS

- [1] Cholinergic modulation may explain hippocampal encoding and retrieval mode switching
Cooper, K. W. (2019) Indiana University, Bloomington Undergraduate Thesis

Total citations (as of last update):

⁸ Google Scholar: **472** |  Semantic Scholar: **358**

SELECTED ABSTRACTS + TALKS

****stars**** = mentee; **bold** = me

- [17] Deep neural network models learn distinguishable features from hippocampal local field potential and ensemble data
****Pan, C. J., Cooper, K. W., Li, L., Agostinelli, F., Saraf, M., Elias, G. A., Baldi, P., Shahbaba, B., Fortin, N. J.** (2021) UROP Symposium.
- [16] Avalanche: an End-to-End Library for Continual Learning
Cooper K. W., Lomonaco, V., Pellegrini, L., Carta, A., Cossu, A., Graffieti, G.. (2021) ContinualAI Meetup.
- [15] Hippocampal theta oscillations support nonspatial sequence coding in hippocampal neurons
Cooper, K. W., Shahbaba, B., Li, L., Agostinelli, F., Saraf, M., Elias, G. A., Bornstein, A., Baldi, P., Fortin, N. J.. (2021) SFN Global Connectome.
- [14] The neuroscience and AI feedback loop: Catastrophic Forgetting and Sequences
Cooper, K. W. (2020) UCI AGS Symposium.
- [13] The Art of Email
Cooper K. W. (2020) UCI GPS-STEM.
- [12] Dual processes of hippocampal mode switching
Cooper, K. W. (2020) Neuromatch online Conference.
- [11] Continual Learning: neuroscience + AI.
Cooper, K. W. (2020) Continual AI Meetup.
- [10] Cholinergic abolition disrupts encoding and retrieval mode switching
Cooper, K. W. (2020) 11th Annual Emerging Scientists Symposium.
- [9] The neuroscience and AI feedback loop
Cooper, K. W. (2019) UCI Brain.
- [8] On neuroscience and AI
Cooper, K. W. (2019) IUJUR Research Slam.
- [7] Is theta a traveling wave in the medial entorhinal cortex?
Hernández J, **Cooper, K. W.**, Newman E.L.. (2018) Program No. 330.10. Society for Neuroscience.
- [6] Consequences of Catastrophic Forgetting on Semantic Representations Learned by Deep Neural Embedding Models
Cooper, K. W., Dachapally P.R, Jones M.N. (2018) Midwest CogSci.

↳ *Best poster award*

- [5] Is theta in the Medial Entorhinal Cortex a Traveling Wave?
Cooper, K. W., Hernández, J., Newman, E.L.. (2018) Society for Neuroscience, Greater Indiana Chapter.
- [4] 3D Brain Model Extraction and Virtual Applications
Cooper, K. W. (2018) (Panelist) Media School Graduate Association Conference.
- [3] FlapAI: Genetically Evolved Neural Networks
Cooper, K. W. (2018) Midwest Undergraduate Cognitive Science Conference.
- [2] Bridging the Gap: Natural Computation and Neural Systems
Cooper, K. W. (2017) Indiana University Undergraduate Research Conference.
- [1] Downstream Hippocampal Activity Prediction with Neural Networks
Cooper, K. W., Osborn, Z.. (2016) Midwest Undergraduate Cognitive Science Conference.

TEACHING

| | | | |
|--------------------------------------|----------------------|--------------------|----------------|
| <i>as Co-Instructor:</i> | | <i>enrollment:</i> | |
| Continual Learning | <i>Neuromatch</i> | 5000+ | <i>Su</i> 2021 |
| Autonomous Robotics | <i>Indiana Univ.</i> | 18 | <i>Sp</i> 2019 |
| Programming in Cognitive Sciences | <i>Indiana Univ.</i> | 27 | <i>Sp</i> 2018 |
| <i>as Teaching Assistant:</i> | | <i>enrollment:</i> | |
| Mind, Memory, and the Brain | <i>UC Irvine</i> | 142 | <i>Sp</i> 2021 |
| Neurobiology and Behavior Laboratory | <i>UC Irvine</i> | 196 | <i>Wt</i> 2020 |
| Neurobiology and Behavior Laboratory | <i>UC Irvine</i> | 93 | <i>Fa</i> 2020 |
| Brain and Behavior | <i>UC Irvine</i> | 366 | <i>Fa</i> 2020 |
| Cognitive Psychology | <i>Indiana Univ.</i> | 80 | <i>Fa</i> 2018 |
| Introduction to Neuroscience | <i>Indiana Univ.</i> | 106 | <i>Fa</i> 2017 |

MENTORED STUDENTS

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|------------------|---|
| Tien Lam | <i>now preparing for medical school</i> |
| Brandon McIntosh | <i>now preparing for medical school</i> |
| Chelsea Pan | <i>now Zendesk</i> |
| Troy Good | <i>now Amazon</i> |

NETWORKS

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|---|----------------------------|
| <i>Present:</i> | |
| Cognitive Science Society | Society for Neuroscience |
| Continual AI (co-founder) | Indiana Academy of Science |
| Psi Chi | Sigma Xi |
| Sigma Alpha Pi | Carboncopies Foundation |
| AI for People | Internet Society |
| <i>Past:</i> | |
| IU Student Org. for Cog Sci (President) | ADAPT Consulting (VP) |

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|------------------------|---------------------------|---|
| SCI COMM + OUTREACH | AskANeuroscientist | <i>Founder; Live Q/A via in class video-chat (>400 students)</i> |
| | Hoosier STARS | <i>Co-founder; K-12 neuro demos reaching >300 students</i> |
| | Quora Writer | <i>Answers to neuroscience and AI questions (800k+ views)</i> |
| | CNLM Ambassadors | <i>Co-chair; SoCal Learning and memory outreach</i> |
| | The Boys and Girls Club | <i>Taught primary school aged students about the brain</i> |
| | IU Science Fest | <i>Led a booth with hands on sheep brain interaction</i> |
| | Celebrate Science Indiana | <i>Led an EEG and brain booth > 500 people</i> |
| | Observatory Guide | <i>Volunteer astronomical guide at the Kirkwood Observatory</i> |

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| UNIVERSITY SERVICE | End Racism Initiative | <i>University of California, Irvine</i> | <i>2020 -</i> |
| | Education Policy Committee | <i>Indiana University</i> | <i>2016 - 2017</i> |
| | Faculty Council | <i>Indiana University</i> | <i>2016 - 2017</i> |
| | Office of First Year Experience | <i>Indiana University</i> | <i>2015 - 2016</i> |

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| ERDÖS N=4 | <i>as of 2021:</i> | | |
| | Paul Erdős → Noga Alon → Nicolò Cesa-Bianchi → Fabio Cuzzolin | | |
| | <i>as of 2019:</i> | | |
| | Paul Erdős → Ronald L. Graham → Feng Zhou → Michael J. Kahana → Ehren L. Newman | | |