

Keiland W. Cooper

Graduate Scholar
Department of Neurobiology and Behavior
University of California, Irvine
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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 |
| | UC Irvine Recruitment Fellowship | <i>UC Irvine</i> | 2019 |
| | Cognitive Science Outstanding Research | <i>Indiana University</i> | 2019 |
| | GRFP (Honorable Mention) | <i>National Science Foundation</i> | 2018 |
| | Ewing Prize in Philosophy | <i>Indiana University</i> | 2018 |
| | Outstanding Contribution in Cognitive Science | <i>Indiana University</i> | 2018 |
| | Cognitive Science Research Project Award | <i>Indiana University</i> | 2018 |
| | Cognitive Science Research Project Award | <i>Indiana University</i> | 2017 |

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
- [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 smell COVID-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):

 Google Scholar: **410** |  Semantic Scholar: **312**

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

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

MENTORED STUDENTS

Chelsea Pan *now Zendesk*
Troy Good *now Amazon*

NETWORKS

Present:

Cognitive Science Society
Continual AI (co-founder)
Psi Chi
Sigma Alpha Pi
AI for People

Society for Neuroscience
Indiana Academy of Science
Sigma Xi
Carboncopies Foundation
Internet Society

Past:

IU Student Org. for Cog Sci (President)

ADAPT Consulting (VP)

SCI COMM + OUTREACH

AskANeuroscientist

Founder; Live Q/A via in class video-chat (>400 students)

Hoosier STARS

Co-founder; K-12 neuro demos reaching >300 students

Quora Writer

Answers to neuroscience and AI questions (800k+ views)

CNLM Ambassadors

Co-chair; SoCal Learning and memory outreach

The Boys and Girls Club

Taught primary school aged students about the brain

IU Science Fest

Led a booth with hands on sheep brain interaction

Celebrate Science Indiana

Led an EEG and brain booth > 500 people

Observatory Guide

Volunteer astronomical guide at the Kirkwood Observatory

UNIVERSITY SERVICE

End Racism Initiative

University of California, Irvine

2020 -

Education Policy Committee

Indiana University

2016 - 2017

Faculty Council

Indiana University

2016 - 2017

Office of First Year Experience

Indiana University

2015 - 2016

REFeree SERVICE

Physiological Reviews

CLVision @ CVPR

TRAININGS + WORKSHOPS

FFASt Workshop on Scientific Leadership

UC Irvine

2021

Certified Peer Reviewer

Elsevier

2020

Computational Psychiatry Course

University of Zurich

2020

The Meaning and History of the Constitution

Hillsdale College

2020

Estes Cognitive Electrophysiology Workshop

University of Pennsylvania

2020

NIH Grant Writing Workshop

UC Irvine

2020

HHMI Productivity Workshop

UC Irvine

2020

Nonlinear Dynamics: Math. and Comp. Approaches

Santa Fe Institute

2019

Complexity Science

Santa Fe Institute

2018

Science Communication Workshop

Indiana University

2017

High Performance / Supercomputing Workshop

Indiana University

2017

Aseptic Surgery: Proper Practice Training

Indiana University

2016

Animal Handling and Animal Care Training

Indiana University

2016

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|----------------------------------|--------------------|------|
| IUNI Network Science Workshop | Indiana University | 2016 |
| First Aid and CPR Certified | American Red Cross | 2014 |
| Pediatric Neurosurgery Shadowing | Riley Hospital | 2014 |

OPEN DATASETS

- [2] GCCR COVID-19 Questionnaire (2020) OSF
- [1] Extracellular recordings from across the dorsoventral axis of the medial entorhinal cortex of the rat. hc-27 (2020) CRCNS

ESSAYS

- [7] The Art of Email
Keiland Cooper. (February 18, 2020) GPS-STEM
- [6] The Psychology of Risky Business
Keiland Cooper. (July 23, 2018) Medium
- [5] Save Money, Close Deals, Clip Coupons: the Science of Decision Making
Keiland Cooper. (July 11, 2018) Medium
- [4] The <Art> of Biting your Tongue
Keiland Cooper. (October 19, 2017) LinkedIn Publishing
- [3] What Is Undergraduate Research And Why Is It Important?
Keiland Cooper. (September 7, 2017) We Are IU
- [2] The Silent Battle for the Web May Change Everything as We Know It.
Keiland Cooper. (December 5, 2016) Medium
- [1] The Whats and Whys of Schools App
Keiland Cooper. (August 5, 2015) We Are IU

PRESS

- [22] John Desmond (April 15, 2021) *Scientists Working on Continual Learning to Overcome Catastrophic Forgetting*. AI Trends
- [21] Kyle Wiggers (April 9, 2021) *AI Weekly: Continual learning offers a path toward more humanlike AI*. VentureBeat
- [20] Grace Hauck (January 31, 2021) *Millions of COVID-19 survivors have lost senses of smell and taste. Researchers don't know if they'll come back*. USA Today
- [19] Brooke Jarvis (January 28, 2021) *What Can Covid-19 Teach Us About the Mysteries of Smell?*. The New York Times Magazine
- [18] Misha Gajewski (December 9, 2020) *Is Losing Your Sense Of Smell And Taste The First Sign Of Covid-19? More Research Says Yes*. Forbs
- [17] Vincent Racaniello (October 18, 2020) *TWiV 673: Wake up and smell the pandemic. This Week In Virology*
- [16] Sara Harrison (August 5, 2020) *Many COVID-19 patients lost their sense of smell. Will they get it back?*. National Geographic

- [15] Bob Curley (July 7, 2020) *Lifestyle Changes You Can Make to Help Lower the 19 Risk Factors for Alzheimers*. Healthline
- [14] Salynn Boyles (July 6, 2020) *Majority of Patients with Mild Covid-19 Experience Altered Smell/Taste*. Physicians Weekly
- [13] Katie Boateng (June 15, 2020) *Episode 64 - An Interview with Some of the Authors*. The Smell Podcast
- [12] Leslie Kay (June 13, 2020) *Why COVID-19 Makes People Lose Their Sense of Smell*. Scientific American
- [11] John E Hayes, Valentina Parma (June 4, 2020) *COVID-19, smell and taste how is COVID-19 different from other respiratory diseases?* . The Conversation
- [10] Anthony Cusumano (February 2, 2020) *What a difference a decade makes..* Katalys Tech
- [9] Kevin Casey (September 30, 2019) *5 AI fears and how to address them..* The Enterprisers Project
- [8] Kevin Casey (September 17, 2019) *How to explain natural language processing (NLP) in plain English*. The Enterprisers Project
- [7] David Roe (August 27, 2019) *Is Augmented Artificial Intelligence Already Disrupting Artificial Intelligence?*. CMS Wire
- [6] Kristine Fellizar (August 7, 2019) *Why Is My Arm Asleep? 6 Reasons Your Limbs Go Numb When You're Sleeping*. Bustle
- [5] Lauren Wellbank (August 1, 2019) *Neuralink Update: How far off is Elon Musks high tech vision for our brains?*. Parentology
- [4] Tina Arnoldi (July 19, 2019) *Ready for Amazon to Read Human Emotions?*. Theravive
- [3] Ann Lewandowski (September 28th, 2018) *IU undergraduates practice science outreach at Indiana high schools*. IDS
- [2] Alexandra Moussa-Tooks (August 14, 2018) *The art of dissemination part 3: Care to share?*. SclU
- [1] Liz Rosdeitcher (2017) *Community Partnerships..* Psyugrad

ERDÖS N=4

as of 2021:

Paul Erdős → Noga Alon → Nicolò Cesa-Bianchi → Fabio Cuzzolin

as of 2019:

Paul Erdős → Ronald L. Graham → Feng Zhou → Michael J. Kahana → Ehren L. Newman