Ilenna Jones, PhD

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Education

June 1, 2017 – Sept 8, 2023
University of Pennsylvania,
Neuroscience, Biomedical Graduate Studies, PhD.
Advisor: Konrad Kording
○ Thesis: *"Quantifying the Impact of Dendritic Properties on Neuronal Computation"*

2011–2015
Dartmouth College,
Neuroscience, Bachelor of Arts.

Current Employment

Nov 2023 - Present
Kempner Research Fellow, Harvard University - Kempner Institute for the study of natural and artificial intelligence.
Directors: Bernardo Sabatini and Sham Kakade

Past Employment

2022
Intern, Johns Hopkins University: Applied Physics Laboratory.
Supervisors: Erik Johnson and William Gray-Roncal
○ Developed an novel data pipeline for using dendritic morphologies in EM connectomics analysis

2015–2017
Laboratory Research Technician, Johns Hopkins University.
Supervisor: Zachary Kaminsky
○ Epigenetic methylation analysis of blood biomarkers for predicting risk of developing neuropsychiatric illnesses

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Publications

Theoretical/Computational

May 2022 **Ilenna Jones** and Konrad Kording, *"Do Biological Constraints Impair Dendritic Computation?"*, Neuroscience.

March 2022 Bernard Hart... **Ilenna Jones** (et. al)..., *"Neuromatch Academy: a 3-week, online summer school in computational neuroscience"*, Journal of Open Source Education.

May 2021 **Ilenna Jones** and Konrad Kording, *"Might a Single Neuron Solve Interesting Machine Learning Problems Through Successive Computations on Its Dendritic Tree?"*, Neural Computation.
○ Previously entitled: "Can single neurons solve MNIST? The computational power of biological dendritic trees" in ArXiv 2020.

Nov 2019 **Ilenna Jones**, Konrad Kording, *"Quantifying the role of neurons for behavior is a mediation question"*, Behavioral and Brain Sciences.

Sept 2019 Roozbeh Farhoodi, Kashayar Filom, **Ilenna Jones**, and Konrad Kording, *"On functions computed on trees"*, Neural Computation.

Cellular/Molecular

March 2021 Jennifer Payne, LM Osbourne, O Cox, ... **Ilenna Jones**, (et. al.), Zachary Kaminsky, *"DNA methylation biomarkers prospectively predict both antenatal and postpartum depression"*, Psychiatry Research.

July 2020 Zachary Kaminsky, LM Osbourne, V Guglielmi, **Ilenna Jones**, (et. al.), *"Postpartum depression biomarkers predict exacerbation of OCD symptoms during pregnancy"*, Psychiatry Research.

Nov 2019 JL Payne, LM Osborne, O Cox, J Kelly, S Meilman, **Ilenna Jones**, (et. al.), and Zachary Kaminsky, *"DNA Methylation Biomarkers Prospectively Predict Both Antenatal and Postpartum Depression"*, Psychiatry Research.

Aug 2017 Falk Lohoff, Jill Sorcher, Allison Rosen, ..., **Ilenna Jones**, (et. al.), and Zachary Kaminsky, *"Methylomic profiling and replication implicates deregulation of PCSK9 in alcohol use disorder"*, Molecular Psychiatry.

May 2017 Zachary Kaminsky, **Ilenna Jones**, Arnold Bakker, (et. al.), and Jennifer Payne, *"Discovery, Replication, and Application of an Epigenetic Biomarker Model to the Prediction of Postpartum Depression and Neuroimaging Endophenotypes"*, Biological Psychiatry.

May 2017 Makena Clive, **Ilenna Jones**, Holly Wilcox, William Eaton, (et al) and Zachary Kaminsky, *"Stress Vulnerability and Epigenetic Variation of a Suicide Biomarker Gene, Molecular Regulation and Neuroimaging Consequences of SKA2"*, Biological Psychiatry.

July 2014 Zachary Kaminsky, **Ilenna Jones**, Ranjana Verma, Lena Saleh, Hersh Trivedi, Jerry Guintivano, Ryan Akman, Peter Zandi, Richard S Lee and James Potash, *"DNA methylation and expression of KCNQ3 in bipolar disorder"*, Bipolar Disorders.

Invited Talks

Oct 2023 **"Quantifying the Impact of Dendritic Properties on Neuronal Computation"**, Wellesley College.
- Neuroscience Seminar
- In Person, Wellesley, Massachusetts

Mar 2023 **"Neural computation of machine learning tasks emerges from the interaction of dendritic properties"**, COSYNE.
- COSYNE Workshop: "Dendritic computations and neuro-inspired AI"
- In Person, Montreal, Canada

Dec 2022 **"Can a single neuron solve MNIST? Neural computation of machine learning tasks emerges from the interaction of dendritic properties"**, World Wide Neuro.
- SNUFA (Spiking neural networks as universal function approximators) Talk Series
- Virtual

May 2022 **"Do Biological Constraints Impair Dendritic Computation?"**, Segev Lab.
- Virtual, Hebrew University of Jerusalem, Israel

Feb 2021 **"Solving MNIST with biological dendritic trees"**, Cosyne.
- Virtual

Aug 2020 **"Can single neurons solve MNIST? The computational power of biological dendritic trees"**, Project Encephalon.
- Virtual, India

Aug 2020 **"Can single neurons solve MNIST? The computational power of biological dendritic trees"**, Numenta.
- Brains@Bay
- Virtual, Numenta, California

Posters and Presentations

Nov 2023 **"Optimization of fully differentiable ODE neurons using the backpropagation of error algorithm"**, Poster.
- Society for Neuroscience Conference 2023
- Washington D.C., USA

May 2022 **"Single Neurons Can Still Perform Machine Learning Tasks Despite the Addition of Biological Constraints"**, Poster.
- Dendrites 2022: Dendritic anatomy, molecules and function (EMBO Workshop)
- Heraklion, Greece

Dec 2022 **"Do Biological Constraints Impair Dendritic Computation?"**, Presentation.
- NeuroMatch Conference 4.0
- Virtual

Dec 2020 **"Can single neurons solve MNIST? The computational capabilities of biological dendritic trees"**, Poster.
- Cognitive and Systems Neuroscience HHMI Science meeting
- Virtual, Howard Hughes Medical Institute, Washington DC

Oct 2020	**"Can single neurons solve MNIST? The computational power of biological dendritic trees"**, PRESENTATION.
	○ NeuroMatch Conference 3.0
	○ Virtual
April 2020	**"Which computational problems could a single neuron potentially solve in its dendritic tree?"**, PRESENTATION.
	○ Year of Brain Science Technology Conference
	○ Virtual, Mahoney Institute of Neurosciences, University of Pennsylvania, Pennsylvania
June 2014	**"Investigating Mechanisms Mediating Apolipoprotein E4 Induced Synaptogenesis in Human Embryonic Stem Cell Derived Induced Neurons"**, POSTER.
	○ Stanford Summer Research Program Research Symposium
	○ Beckman Center For Molecular and Genetic Medicine, Stanford School of Medicine, California
June 2013	**"Spatial progression of perceptual learning in visual feature conjunction search"**, POSTER.
	○ Karen E. Wetterhahn Science Symposium
	○ Class of 1978 Life Sciences Center, Dartmouth College, New Hampshire
May 2012	**"The Role of Gene-Gene Interactions in Determining Alzheimer's Disease"**, POSTER.
	○ Karen E. Wetterhahn Science Symposium
	○ Class of 1978 Life Sciences Center, Dartmouth College, New Hampshire

Funding and Awards

Aug 2020	**Howard Hughes Medical Institute Gilliam Fellowship Grant** , *Funding*.
	○ 3-Year fellowship for underrepresented minorities in STEM with potential to be leaders in science
	○ University of Pennsylvania
Oct 2016	**Center for Talented Youth Distinguished Alumni Award**, *Award*.
	○ Recognition of CTY's most accomplished alumni
	○ Johns Hopkins University
2013-2014	**Sophomore Science Scholar**, *Funding*.
	○ Internship working with Dr. Peter Tse on "Influences of Brain Structure and Function on Cognitive Abilities"
	○ Dartmouth College
2013	**Dean of Faculty Undergraduate Research Grant** , *Funding*.
	○ Funded Research Assistantship with Dr. Mark Israel on "Investigating the Regulation of Anti-Invasive Transcription Factor Id4 in Brain Tumors"
	○ Dartmouth College
2012	**Women In Science Project Internship**, *Funding*.
	○ Internship working with Dr. Jason Moore on "Genetic Analysis of Complex Human Diseases"
	○ Dartmouth College

Relevant Courses

Jul–Aug 2022	**Methods in Computational Neuroscience** , *Summer Course*.
	○ An in-depth summer course on the broad field of computational neuroscience
	○ Marine Biological Laboratory, Woods Hole, Massachusetts
Jan–May 2021	**Advanced Philosophy of Science** , *University Course*.
	○ Professor Quayshawn Spencer
	○ A seminar of history and philosophy of science
	○ University of Pennsylvania, Philadelphia, PA
Aug 2019	**Cajal Course in Computational Neuroscience** , *Summer Course*.
	○ A hands-on summer course in the ideas, methods, and practice of modern computational neuroscience
	○ Champalimaud Center for the Unknown, Lisbon, Portugal
Jan–May 2019	**Deep Learning**, *University Course*.
	○ Professor Konrad Kording
	○ An introductory course on Deep Learning
	○ University of Pennsylvania, Philadelphia, PA

Jan–May 2018	**Theoretical and Computational Neuroscience**, *University Course.*
	○ Professor Vijay Balasubramanian
	○ A course developing theoretical and computational approaches to structural and functional organization in the brain
	○ University of Pennsylvania, Philadelphia, PA

Teaching

Jan 2024	**Simons Computational Neuroscience Imbizo**, *Teaching Assistant and Mentor.*
	○ An 3-week opportunity for African and international students to learn about cutting edge research techniques in computational neuroscience
	○ Responsible for writing and teaching tutorials, guiding student projects, and supporting a diverse group of students from the African continent and around the world
	○ Noordhoek, Cape Town, South Africa
April–May 2023	**IBRO-Simons Computational Neuroscience Imbizo**, *Teaching Assistant and Mentor.*
	○ An 3-week opportunity for African and international students to learn about cutting edge research techniques in computational neuroscience
	○ Responsible for writing and teaching tutorials, guiding student projects, and supporting a diverse group of students from the African continent and around the world
	○ Noordhoek, Cape Town, South Africa
Jan–May 2022	**ENGR 344: Answering Questions with Data**, *Teaching Assistant.*
	○ Professor Konrad Kording
	○ A question- and project-oriented data science course taught at the undergraduate level
	○ University of Pennsylvania, Philadelphia, PA
Aug 2021	**NeuroMatch Academy: Deep Learning**, *Teaching Assistant.*
	○ A deep learning online, synchronous summer school focused on projects and coding tutorials
	○ Responsible for teaching 10-12 students including undergraduates, graduates, and postdocs
	○ University of Pennsylvania, Philadelphia, PA
July 2020	**NeuroMatch Academy**, *Teaching Assistant.*
	○ The first international computational neuroscience online, synchronous summer school with over 1700 interactive students
	○ Responsible for teaching 10-12 students including undergraduates, graduates, and postdocs
	○ University of Pennsylvania, Philadelphia, PA
Jan–May 2020	**BBB 109: Introduction to Brain and Behavior**, *Teaching Assistant.*
	○ Introductory neuroscience course taught at the undergraduate level
	○ University of Pennsylvania, Philadelphia, PA

Academic Service

Aug 2021 – May 2023	**Academic Review Committee**.
	○ A committee to provide guidance and feedback for 1st and 2nd year students in the Neuroscience Graduate Group
	○ University of Pennsylvania, Philadelphia, PA
July 2021 – July 2023	**Computational Neuroscience Initiative (CNI) Seminar Committee**.
	○ A committee to determine the speakers and other logistics for the CNI seminars
	○ University of Pennsylvania, Philadelphia, PA
Nov 2020 – Aug 2021	**Cognitive Computational Neuroscience (CCN) Programming Committee**.
	○ A committee to decide the programming of the CCN conference
	○ Virtual Conference
July 2020 – April 2021	**Combatting Racial Inequities Committee**.
	○ A committee formed to address diversity and inclusion issues in BGS (Biomedical Graduate Studies) and BPP (Biomedical Postdoctoral Programs) at the Penn School of Medicine
	○ Collect survey and interview data to advise the ACT (Action for Cultural Transformation) initiative
	○ University of Pennsylvania, Philadelphia, PA

Community Activities

July 2020 –
June 2022

Co-chair of the E.E. Just Seminar and Workshop.
- A committee to organize workshops, discussions, seminars, and reading groups for the Black student community in Biomedical Graduate Studies (BGS) as well as the wider BGS community
- Actively invited students and professors from the Philosophy, History and Sociology of Science, and Africana Studies departments to discuss race ontology, race science, and scientific racism.
- University of Pennsylvania, Philadelphia, PA

2017–2020

Elementary School Outreach.
- Neuroscience Graduate Group GLIA (Graduate Led Initiatives and Activities)
- Developed and taught lessons activities for grades 1 through 6
- University of Pennsylvania, Philadelphia, PA

2014–2019

Questbridge Ambassador.
- Informing high-school educators and students about the Questbridge college scholarship program targeting low-income, first-generation students

2011–2015

Dartmouth Quest Scholars.
- Founder, Student Mentor, Treasurer, Network Liaison, and Co-Director (at different times)
- Dartmouth Chapter of Quest Scholars Network guiding First-Generation Low-Income students
- Dartmouth College, Hanover, NH

Research Experiences

2015

"Optimization of Neuralbasal A Neuronal Cell Growth Medium", STANFORD UNIVERSITY.
- Dr. Thomas Sudhof, Nobel Laureate
- Howard Hughes Medical Institute Exceptional Research Opportunities Program Capstone Project

2014–2015

"Id4 Suppresses the Expression of Other Id Genes by Antagonistically Binding to Twist1", DARTMOUTH COLLEGE.
- Dr. Mark Israel
- Senior Honors Research Thesis

2014

"Investigating Mechanisms Mediating Apolipoprotein E4 Induced Synaptogenesis in Human Embryonic Stem Cell Derived Induced Neurons", STANFORD UNIVERSITY.
- Dr. Thomas Sudhof, Nobel Laureate
- Stanford Summer Research Program and Howard Hughes Medical Institute Exceptional Research Opportunities Program

2013–2014

"Investigating the Regulation Anti-Invasive Transcription Factor Id4 in Brain Tumors", DARTMOUTH COLLEGE.
- Dr. Mark Israel
- Presidential Scholars Program and Undergraduate Research Grant/Norris Cotton Cancer Center

2012–2013

"Spatial progression of perceptual learning in visual feature conjunction search", DARTMOUTH COLLEGE.
- Dr. Peter Tse
- Sophomore Science Scholars/Department of Psychological and Brain Sciences

2012

"The Role of Gene-Gene Interactions in Determining Alzheimer's Disease", DARTMOUTH COLLEGE.
- Dr. Jason Moore
- Women in Science Program/Institute for Quantitative Biomedical Science

2012

"DNA Methylation in the Mitochondrial Genome", JOHNS HOPKINS UNIVERSITY.
- Dr. Sarven Sabunciyan and Dr. Robert Yolken
- Stanley Summer Scholars Program / Stanley Division of Developmental Neurovirology

2011

"Developing a Protocol Investigating mRNA Methylation Using High Throughput Sequencing", JOHNS HOPKINS UNIVERSITY.
- Dr. Sarven Sabunciyan and Dr. Robert Yolken
- Center Scholars Program/Stanley Division of Developmental Neurovirology

2010–2011

"Gene Expression and DNA Methylation of KCNQ2 and KCNQ3 in Bipolar Disorder", JOHNS HOPKINS UNIVERSITY.
- Dr. Zachary Kaminsky and Dr. James Potash
- Center Scholars Program/Mood Disorders Center