Ann Kennedy

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Education

2009 – 2014   **Columbia University**
Ph.D. in Neurobiology and Behavior
Advisor: Larry Abbott
Thesis: "Representation and learning in cerebellum-like structures"
received the Kavli Award for Distinguished Research in Neuroscience, presented once a year for outstanding thesis work in neurobiology and behavior.

2005 – 2008   **Johns Hopkins University**
B.S. in Biomedical Engineering, Computational Biology focus
B.A. in Biology
Minor in Applied Math

Positions and Employment

2014 –   **California Institute of Technology**   Pasadena, CA
The David Anderson Research Group
Postdoctoral Scholar

I collaborate with experimental lab members to analyze, model, and design experiments investigating neural dynamics in hypothalamic nuclei that govern social behaviors and fear in mice.

2009 – 2014   **Columbia University**   New York, NY
Center for Theoretical Neuroscience
Graduate Student

Studied sensory representations and biological learning rules in two cerebellum-like structures, the mushroom body of the fly olfactory system and the electrosensory lobe of the mormyrid electric fish. The focus of my thesis was how representation and learning interact to determine the way in which these circuits generalize during learning.

2009   **Noblis Inc**   Falls Church, VA
Center for Health Innovation
Student Intern

Technical intern for consulting projects in computational biology. Statistical analysis and simulation of next-gen DNA sequencing technology as a method for detection of harmful

biological agents, research of tools and databases for computational drug development, and exploratory data mining on a biomarker dataset for indicators of disease progression.

| 2008 | **Johns Hopkins University** | Baltimore, MD |

Zanvyl Krieger Mind/Brain Institute

Undergraduate Researcher

Modeled spectrotemporal receptive field formation in a feedforward network model of primary auditory cortex. Implemented cellular models of synaptic depression and subthreshold oscillations & studied their effects on temporal structure of receptive fields.

| 2007 – 2008 | **Johns Hopkins University** | Baltimore, MD |

Center for Imaging Science

Undergraduate Researcher

Fluid dynamic modeling of high-frequency motion damping in outer hair cells of the mammalian cochlea. Applied asymptotic approximations to simplify an existing OHC model and compare its performance to experimental data.

| 2004 – 2005 | **Children's National Medical Center** | Washington, DC |

Center for Neuroscience Research

Research Assistant

Biochemical research studying interaction of transcription factors involved in oligodendrocyte stem cell differentiation. Found a mechanism by which factors released during the immune response suppress OSC differentiation, a phenomenon that inhibits repair of white matter in multiple sclerosis.

Awards and Honors

2019	NIMH Pathway to Independence Award (K99/R00)
2015	Helen Hay Whitney Postdoctoral Research Fellowship
2014	Kavli Award for Distinguished Research in Neuroscience, Columbia University
2014	Swartz Foundation Postdoctoral Research Fellowship, Caltech
2008	Undergraduate Technology Fellowship, Johns Hopkins University
2007	Raj and Neera Singh Summer Undergrad Res. Fellowship, Johns Hopkins University
2005	International Finalist, Intel International Science and Engineering Fair

Publications

Kennedy, A. (2018). Seeing order and disorder in the behaving brain. *Neuron, 100*(3), 519-520.

Remedios, R.*, **Kennedy, A.***, Zelikowsky, M., Grewe, B. F., Schnitzer, M. J., & Anderson, D. J. (2017). Social behaviour shapes hypothalamic neural ensemble representations of conspecific sex. *Nature*, *550* (7676), 388. (* = equal contribution)

Hong, W., **Kennedy, A.**, Burgos-Artizzu, X. P., Zelikowsky, M., Navonne, S. G., Perona, P., & Anderson, D. J. (2015). Automated measurement of mouse social behaviors using depth sensing, video tracking, and machine learning. *Proceedings of the National Academy of Sciences*, *112*(38), E5351-E5360.

Kennedy, A., Asahina, K., Hoopfer, E., Inagaki, H., Jung, Y., Lee, H., ... & Anderson, D. J. (2014, January). Internal states and behavioral decision-making: toward an integration of emotion and cognition. In *Cold Spring Harbor symposia on quantitative biology* (Vol. 79, pp. 199-210). Cold Spring Harbor Laboratory Press.

Kennedy, A., Wayne, G., Kaifosh, P., Alviña, K., Abbott, L. F., & Sawtell, N. B. (2014). A temporal basis for predicting the sensory consequences of motor commands in an electric fish. *Nature neuroscience*, *17*(3), 416.

Chew, L. J., King, W. C., **Kennedy, A.**, & Gallo, V. (2005). Interferon-γ inhibits cell cycle exit in differentiating oligodendrocyte progenitor cells. *Glia*, *52*(2), 127-143.

Publications submitted

Jung, Y., **Kennedy, A.**, Chiu, V., & Anderson, D.J. Parallel pathways mediate rapid vs persistent responses to female cues during male social behavior in Drosophila. *Nature, in revision.*

Teaching Experience

2019 **Lecturer,** Bi 23-6: Methods in Neural Data Analysis, Caltech
Course webpage: https://annkennedy.github.io/bi23_2019.html
- Early-graduate-level course on concepts underlying analysis of vertebrate neural activity (population coding, dimensionality expansion, mixed selectivity), including coding workshops covering analysis methods such as neural encoding and decoding, generalized linear models, and dimensionality reduction/latent variable models.

2018 **Guest Lecturer**, BE 203: Intro. Programming for the Biol. Sciences Boot camp, Caltech
- Gave an invited talk on calcium imaging and methods for analyzing neural recordings, including tuning analysis, decoding, distance measures, and dimensionality reduction.

2016, 2018 **Guest Lecturer**, CNS 200: Genetic Dissection of Neural Circuit Function, Caltech
- Prepared questions and organized class discussions of recent papers in circuits neuroscience (once per semester).

2017 **Guest Lecturer**, EE 148: Selected Topics in Computational Vision, Caltech
- Gave an invited talk on work tracking jellyfish swimming behaviors (unpublished Anderson lab project).

2015, 2016 **Guest Lecturer**, CNS 187: Neural Computation, Caltech

- Lectured on synaptic learning rules, STDP, associative learning, and Oja's rule.

2014   **Teaching Assistant**, Methods in Computational Neuroscience, Marine Biological Laboratory, Woods Hole, MA
- Worked with student groups on problem sets (neural dynamics, stability analysis, encoding/decoding); worked one-on-one with each of seven students on two-week long student-designed course projects in computational neuroscience.

2014   **Teaching Assistant**, Advanced Topics in Theoretical Neurosci., Columbia University
- Ran study sessions, worked with students, and graded problem sets on random matrix theory and neural dynamics.

2010   **Teaching Assistant**, Introduction to Theoretical Neurosci., Columbia University
- Ran study sections on information theory and coding, integrate-and-fire models, plasticity; worked with students and graded coding problem sets.

Special Lectures

2019   **Cosyne Conference**, Cascais, Portugal
Organized one-day workshop: *Quantifying social behaviors: Computational challenges and experimental pitfalls*

2018   **Banbury meeting on Quantitative Approaches to Naturalistic Behaviors**, Cold Spring Harbor Laboratory, Huntington, NY
Quantifying social interactions in pairs of freely behaving mice

2018   **Simons Collab. Global Brain Postdoc Meetup**, Caltech, Pasadena, CA
Hypothalamic representations of internal state and behavior

2018   **Tianqiao and Chrissy Chen Institute Annual Retreat**, San Diego, CA
Hypothalamic representations of internal state and behavior

2018   **Cosyne Conference**, Denver, CO
Social behavior shapes hypothalamic neural ensemble representations of conspecific sex

2017   **Chen Institute Workshop on Computational Neuroscience**, Caltech, Pasadena, CA
Making sense of high-dimensional neural activity during complex behavior

2017   **Pavlovian Society Annual Meeting**, Philadelphia, PA
Social behavior shapes hypothalamic neural ensemble representations of conspecific sex

2017   **Swartz Foundation Annual Meeting**, Janelia Research Campus, Ashburn, VA
Odor representation and associative learning in the Drosophila olfactory system

2016   **Swartz Found. Annual Meeting**, Caltech, CA
Population coding of social interactions by VMHvl

2015   **Theoretical Neuroscience Workshop**, Janelia Research Campus, Ashburn, VA

Dissecting population dynamics during social behaviors

2015 **Swartz Found. Annual Meeting**, Janelia Research Campus, Ashburn, VA
Population dynamics during appetitive and consummatory behaviors

2013 **Gatsby Tri-Center Meeting**, UCL, London
A temporal basis for predicting sensory consequences of motor commands in a cerebellum-like structure

2013 **Cosyne Conference**, Salt Lake City, UT
A temporal basis for predicting sensory consequences of motor commands in a cerebellum-like structure

Poster Presentations

2018 Kennedy A., Kunwar P., Li L., and Anderson D.J. *Models of fear-related persistent activity*. 25th Joint Symposium on Neural Computation, Caltech.

2018 Kennedy A., Segalin C., Williams J., Perona P., and Anderson D.J. *Searching for neural correlates of social behavior in high dimensional data*. Tianqiao and Chrissy Chen Institute for Neuroscience Annual Retreat.

2014 Kennedy A., Requarth, T., Abbot, L.F., and Sawtell, N.B., *Mechanisms of internal model learning in an electric fish*. Cold Spring Harbor Annual Symposium: Cognition.

2014 Kennedy A., Wang P., Hattori D., Axel R., and Abbott L.F. *Representation and generalization in* Drosophila *olfactory learning*. Cosyne.

2012 Kennedy A., Sompolinsky H., and Abbott L.F. *Spectral properties of short-term memory in linear and nonlinear network models*. Society for Neuroscience.

2012 Kennedy A., Sompolinsky H., and Abbott L.F. *Frequency analysis of short-term memory in nonlinear network models*. Cosyne.