

# Margaret Henderson, Ph.D

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## EDUCATION

- 2021 – present      **Postdoctoral Research Associate**  
Machine Learning Department and Neuroscience Institute  
Carnegie Mellon University, Pittsburgh, PA  
Supervisors: Dr. Leila Wehbe and Dr. Michael Tarr
- 2015–2021      **Ph.D in Neurosciences with a Specialization in Computational Neurosciences**  
University of California, San Diego, La Jolla, CA  
Supervisor: Dr. John Serences
- 2011–2015      **B.S. in Biological Sciences**  
Concentration in Neurobiology and Behavior  
Cornell University, College of Agriculture and Life Sciences, Ithaca, NY  
Summa Cum Laude with Distinction in Research

## PUBLICATIONS

**Henderson, M.M.**, Rademaker, R.L., & Serences, J.T. (2022). Flexible utilization of spatial- and motor-based codes for the storage of visuo-spatial information. *eLife*.

**Henderson, M.M.**, & Serences, J.T. (2021). Biased orientation representations can be explained by experience with non-uniform training set statistics. *Journal of Vision*.

**Henderson, M.M.\***, Vo, V.A.\*, Chunharas, C., Sprague, T.C., & Serences, J.T. (2019). Multivariate analysis of BOLD activation patterns recovers graded depth representations in human visual and parietal cortex. *eNeuro*.

**Henderson, M.M.** & Serences, J.T. (2019). Human frontoparietal cortex represents behaviorally relevant target status based on abstract object features. *Journal of Neurophysiology*.

**Henderson, M.M.**, Gardner, J., Raguso, R.A., & Hoffman, M.P. (2017). Trichogramma ostriniae (Hymenoptera: Trichogrammatidae) response to relative humidity with and without host cues. *Biocontrol Science and Technology*.

**Henderson, M.M.**, Pinskiy, V., Tolpygo, A., Savoia, S., Grange, P., & Mitra, P. (2014). Automated placement of stereotactic injections using a laser scan of the skull. *arXiv*.

\* These authors made equal contributions.

## SELECTED PRESENTATIONS

**Henderson, M.M.**, Tarr, M.J., & Wehbe, L. (2022). Interpretable mid-level encoding models of human visual cortex reveal associations between feature and semantic tuning for natural scene images. Poster at Vision Sciences Society meeting, St. Pete Beach, FL.

**Henderson, M.M.**, & Serences, J.T. (2020). Anisotropic representation of orientation by convolutional neural networks. Talk at Vision Sciences Society meeting, held virtually.

**Henderson, M.M.**, Rademaker, R.L., & Serences, J.T. (2019). Complementary strategies for encoding information in working memory. Nanosymposium talk at Society for Neuroscience meeting, Chicago, IL.

**Henderson, M.M.** & Serences, J.T. (2019). Orientation representations in convolutional neural networks are more discriminable around the cardinal axes. Poster at Conference on Cognitive Computational Neuroscience, Berlin, Germany. <https://doi.org/10.32470/CCN.2019.1122-0>

**Henderson, M.M.**, Rademaker, R.L., & Serences, J.T. (2019). Complementary visual and motor-based strategies for encoding information in working memory. Talk at Vision Sciences Society meeting, St. Pete Beach, FL.

**Henderson, M.M.**, Serences, J.T. (2017). Occipital and parietal cortex encode representations of match between a viewed and sought object during visual target search. Poster at Vision Sciences Society meeting, St. Pete Beach, FL.

**Henderson, M.M.**, Vo, V.A., Chunharas, C., Sprague, T.C., & Serences, J.T. (2016). Reconstructing 3D stimuli using BOLD activation patterns recovers hierarchical depth processing in human visual and parietal cortex. Poster at Vision Sciences Society meeting, St. Pete Beach, FL.

**Henderson, M.M.**, Gardner, J., & Raguso, R.A. (2015). Determining the optimal relative humidity conditions for release of the pest control agent *Trichogramma ostriniae*. Poster at Cornell Biology Honors Program Final Symposium, Ithaca, NY.

## AWARDS AND HONORS

Distinguished Postdoctoral Fellowship from CMU Neuroscience Institute (2021-2023)

NIMH Predoctoral Fellowship in Cognitive Neuroscience (2018-2019)

NSF GRFP honorable mention (2016)

Cornell University Academic Excellence Award (2015)

Cornell Hatch Supplement Grant (2012)

## TEACHING & OTHER ACTIVITIES

**Mentoring/Supervising students, Carnegie Mellon** (2021 - ongoing).

Co-supervised the Honors Thesis project of a student in CMU Cognitive Science program, who was awarded a competitive prize for her work.

**Organizing Carnegie Mellon brAln Seminars** (2021 - ongoing).

Co-organized a multi-university weekly seminar series on topics at the intersection of neuroscience and artificial intelligence. Responsibilities included selecting and inviting speakers, hosting and introducing presentations.

**Mentoring/Supervising students, UCSD** (2016 – 2021).

Trained undergraduate students to collect behavioral and EEG data for ongoing projects, as well as basic programming and data analysis skills. Hold journal-club style meetings to discuss relevant papers and involve students in the research process. Supervised several Honors students as they perform independent research projects. Mentees include Kelvin Lam (currently a PhD student at UC Santa Barbara), Yonghoon Chun (currently a PhD student at Dartmouth), Vanessa Cancio, Ben Carfano, Shruti Nishith.

**Career Development Committee, UCSD Neurosciences Graduate Program** (2017–2020).

Facilitate career-building opportunities for UCSD Neurosciences graduate students, including networking workshops and Q&A panels with speakers from academic and non-academic career paths.

**Paths to PhDs Panelist, UCSD Psychology Department** (2019).

Served as a panelist at event for psychology undergraduates, answered questions about graduate school applications, gave advice for choosing programs and advisors.

**Special Project Advisor, Neurosciences Graduate Program Boot Camp** (2018).

Led a week-long project for incoming Ph.D. students, in which they collected fMRI data and carried out a multivariate encoding model analysis in MATLAB. Presented lectures covering the basics of fMRI physics, experimental design, and analysis.

**Neurosciences Seminar Series Committee, UCSD Neurosciences Graduate Program** (2017–2018)

Organize weekly Neuroscience Seminar Series – includes selecting list of invited speakers (28/year), inviting speakers, arranging travel, assigning student hosts.

**Teaching assistant for Data Analysis in MATLAB, UCSD** (2016)

Teaching assistant for graduate level course taught by John Serences. Reviewed student code & algorithmic solutions to weekly problem sets on advanced topics in data analysis, such as bootstrapping & permutation statistics, time-frequency analysis, pattern classification, and nonlinear curve & surface fitting.

**OTHER ACADEMIC TRAINING**

Computational Neuroscience: Vision, Cold Spring Harbor Laboratory summer course (2018).

**PROFESSIONAL ACTIVITIES**

Academic Memberships: Vision Sciences Society (2016–present), Society for Neuroscience (2015–2019)

Ad-hoc reviewer: Conference on Cognitive Computational Neuroscience, eNeuro, Nature Neuroscience, Communications Biology

**PAST RESEARCH EXPERIENCE**

**UC San Diego, La Jolla, CA** (2016).

Rotation in the lab of Dr. Takaki Komiyama.

Collected GCaMP calcium imaging data from premotor cortex of awake, behaving mice during learning of a lever press task. Performed surgeries to implant cranial windows.

**UC San Diego**, La Jolla, CA (2016).

Rotation in the lab of Dr. Tatyana Sharpee.

Applied dimensionality reduction techniques (maximum noise entropy, maximally informative dimensions) to various data sets, including floral scent profiles and calcium imaging data.

**Cornell University**, Ithaca, NY (2012–2015).

Undergraduate thesis research, advised by Dr. Robert Raguso and Jeffrey Gardner.

Designed and carried out behavioral experiments investigating the use of the parasitic wasp species *Trichogramma ostrinae* as a biological pest control agent, and influence of environmental conditions such as humidity on parasitism efficacy. Awarded an internal Cornell grant to fund this project.

**Cold Spring Harbor Laboratory**, Cold Spring Harbor, NY (2014).

Undergraduate summer research program, advised by Dr. Partha Mitra.

Worked on developing a graphical software interface in MATLAB to automate the placement of stereotactic tracer injections, for use in the Mouse Brain Architecture Project. Tested the interface and described findings in a pre-print publication.

**Uppsala University**, Uppsala, Sweden (2013)

Research assistant for Dr. Magne Friberg.

Used GC/MS analysis to identify compounds present in floral and leaf emissions of the flower *Primula farinose*. Compared scent emissions between geographic locations and phenotypic morphs.