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., Tarr, M.J., & Wehbe, L. (2022). Low-level tuning biases in higher visual cortex reflect the semantic informativeness of visual features. *bioRxiv.*

Jinsi, O.*, **Henderson, M.M.***, & Tarr, M.J. (2022). Why is human vision so poor in early development? The impact of initial sensitivity to low spatial frequencies on visual category learning. *bioRxiv.*

Jain, N., Wang, A., **Henderson, M.M.**, Lin, R., Prince, J.S., Tarr, M.J., & Wehbe, L. (2022). Food for thought: selectivity for food in human ventral visual cortex. *bioRxiv.*

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). Informative associations between feature, spatial, and category selectivity in human visual cortex. Poster at Conference on Cognitive Computational Neuroscience, San Francisco, CA. https://doi.org/10.32470/CCN.2022.1043-0

Luo, A., Wehbe, L., Tarr, M.J., & **Henderson, M.M.** (2022). The Neural Representation of Real-World Object Size in Natural Images. Poster at Conference on Cognitive Computational Neuroscience, San Francisco, CA. https://doi.org/10.32470/CCN.2022.1136-0

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)
Alpha Xi Delta Slaymaker-Kinsey Award for Academic Achievement (2012)

TEACHING, MENTORSHIP & SERVICE

Mentoring/Supervising students, Carnegie Mellon (2021 - ongoing).
Co-supervised the Honors Thesis project of a student in CMU Cognitive Science program (Omisa Jinsi), who was awarded a competitive prize for her work.

Organizing Carnegie Mellon brAIn 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, eye-tracking, 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 the Honors Thesis project of one student.
Mentees include: Kelvin Lam (Honors Program; went on to a PhD program at UC Santa Barbara), Yonghoon Chun (received a Psychology Department Undergraduate Research Fellowship; currently a PhD student at Dartmouth), Vanessa Cancio, Ben Carfano, Shruti Nishith, Julie Eitzen.

Career Development Committee, UCSD Neurosciences Graduate Program (2017–2020).
Facilitate career-building opportunities for 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.

Bootcamp Special Project Advisor, UCSD Neurosciences Graduate Program (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, guided students through data analysis and presentation of results.

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.

Study group leader for Biology Scholars Program, Cornell University (2014)
Led weekly study groups for students in the Cornell Biology Scholars Program, an initiative aimed at improving the experience of under-represented students in biology. Prepared review lectures, hands-on educational activities, quizzed, exam prep materials.

OTHER ACADEMIC TRAINING / PROFESSIONAL ACTIVITIES

Computational Neuroscience: Vision, Cold Spring Harbor Laboratory summer course (2018).
Academic Memberships: Vision Sciences Society (2016–present), Society for Neuroscience (2015–2019)
Ad-hoc reviewer: Conference on Cognitive Computational Neuroscience, eNeuro, Nature Neuroscience, Nature Communications Biology

OTHER 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 ostriniae 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.