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William Mau, PhD

Postdoctoral researcher

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I am an aspiring data scientist with a PhD in neuroscience and 9+ years of experience in data collection, data cleaning, analysis, visualization, and interpretation of high-dimensional data using Python. I use machine learning and statistical approaches to identify patterns in the neuroimaging data that I collect and tell rich stories with these patterns. I have used random forest classification, graph theory, hierarchical clustering, and mixed linear models, among many others. My goal is to translate these skills to make tangible impacts on a data science team.

EDUCATION

PhD in Neuroscience, *Boston University*. Cumulative GPA: 3.97 MAY 2019
BA in Biological Sciences and Psychology, *Cornell University*. Cumulative GPA: 3.79 MAY 2014
Graduated magna cum laude
Dean's list 2011-2014

SKILLS

Tools and Languages	Python, Jupyter notebooks, Git, SQL, MATLAB, TeX , Arduino, Autodesk
Quantitative Skills	Machine learning, inferential and descriptive statistics, data visualization, dimensionality reduction
Python Libraries	numpy, pandas, scikit-learn, scipy, dask, matplotlib, xarray, holoviews

TECHNICAL EXPERIENCE

Postdoctoral fellow 2019 — Present
Icahn School of Medicine at Mount Sinai
New York, NY

- To date, received a >\$190k federal award, produced 1 first-author review article, 2 middle-author review articles, and 1 middle-author preprint. Currently preparing 2 first-author research articles.
- Built a SQLite database for querying metadata from experiments encompassing 100 mouse subjects.
- Built and contributed to Python-based data cleaning and analysis pipelines for imaging and video data: see <https://github.com/denisecailab/minian> and <https://github.com/wmau>.
- Used linear and mixed linear models to find differences in neuronal cell types.
- Mentored and managed a research technician running animal behavior experiments.

Consultant 2021 — Present
MetaCell
Virtual

- Currently advising 2 newly-established labs on how to use Miniscope technology, conduct data collection, and perform analysis.
- Built 5+ Jupyter notebooks for analyzing other labs' neural data and presented findings to principal investigators.
- Used a cloud workspace to analyze high-dimensional imaging data.

Graduate researcher 2014 — 2019
Boston University
Boston, MA

- Resulted in 1 first-author publication, 1 co-first-author preprint, 4 middle author publications, and 4 research awards.
- Completed courses related to computational neuroscience (probability theory, advanced statistical methods, network theory).
- Led experimental design, data collection, analysis, visualization, and presentation of results.
- Used a naive Bayes classifier and bootstrapping to decode neural activity that encoded the animal's sense of elapsed time.
- Used regression discontinuity analysis to identify state space deviations in neural activity patterns.
- Applied spatial analyses to neural activity by plotting spatial heatmaps.

Undergraduate researcher 2012 — 2014
Cornell University
Ithaca, NY

- Resulted in 1 second-author publication, a \$1000 research award, and magna cum laude honors.
- Learned basic statistical methods for analyzing high-dimensional neural data, such as multiple linear regression for my undergraduate honors thesis.
- Self-taught MATLAB for plotting and analyzing neural data.
- Learned principles of the scientific method and experimental design.

PUBLICATIONS

Sweis B.M., **Mau W.**, Rabinowitz S., & Cai D.J. (2021). Dynamic and heterogeneous neural ensembles contribute to a memory engram. *Current Opinion in Neurobiology* 67, 199-206. <https://doi.org/10.1016/j.conb.2020.11.017>

Levy S.J., Kinsky N.R., **Mau W.**, Sullivan D.W., & Hasselmo M.E. (2021). Hippocampal spatial memory representations in mice are heterogeneously stable. *Hippocampus* 31(3):244-260. <https://doi.org/10.1002/hipo.23272>

Liu Y., Levy S.J., **Mau W.**, Geva N., Rubin A., Ziv Y., Hasselmo M.E., & Howard M.W. (2021). Consistent population activity on the scale of minutes in the mouse hippocampus. *Hippocampus*, <https://doi.org/10.1002/hipo.23409>.

Mau W., Hasselmo M.E., & Cai D.J. (2020). The brain in motion: how ensemble fluidity drives memory-updating and flexibility. *eLife* 9:e63550. <https://doi.org/10.7554/eLife.63550>

Dong Z., **Mau W.**, Feng Y., Pennington Z.T., Chen L., Zaki Y., Rajan K., Shuman T., Aharoni D., & Cai D.J. (2021). Minian: An open-source Miniscope analysis pipeline. *eLife*, under revision.

Chen L., Cummings K.A., **Mau W.**, Zaki Y., Dong Z., Clem R.L., Shuman T., & Cai D.J. (2020). The role of intrinsic excitability in the evolution of memory: significance in memory allocation, stabilization, and updating. *Neurobiol. Learn. Mem.* 73:107266. <https://doi.org/10.1016/j.nlm.2020.107266>.

Kinsky N.R., **Mau W.**, Sullivan D.W., Levy S.J., Ruesch E.A., & Hasselmo M.E. (2020). Trajectory-modulated hippocampal neurons persist throughout memory-guided navigation. *Nat. Commun.* 11, 2443. doi.org/10.1038/s41467-020-16226-4.

Alexander A.S., Robinson J.C., Dannenberg H., Kinsky N.R., Levy S.J., **Mau W.**, Chapman G.W., Sullivan D.W., & Hasselmo M.E. (2020). Neurophysiological coding of space and time in cortical circuits. *Brain Neurosci. Adv.* 4:2398212820972871. <https://doi.org/10.1177/2398212820972871>.

Zaki Y.*, **Mau W.***, Cincotta C.*, Doucette E., Grella S.L., Murawski N.J., Merfeld E., Shpokayte M., & Ramirez S. Hippocampal and amygdalar engrams are necessary for contextual fear reinstatement, *Curr. Biol.*, under revision. *equal contributions.

Miller A.M.P., **Mau W.**, & Smith D.M. (2019). Retrosplenial cortical representations of space and future goal locations develop with learning. *Curr. Biol.* 29, 2083-2090.e4. <https://doi.org/10.1016/j.cub.2019.05.034>

Mau W., Sullivan D.W., Kinsky N.R., Hasselmo M.E., Howard M.W., & Eichenbaum H. (2018). The same hippocampal CA1 population simultaneously codes temporal information over multiple timescales. *Curr. Biol.* 28, 1499-1508. <https://doi.org/10.1016/j.cub.2018.03.051>

Kinsky N.R., Sullivan D.W., **Mau W.**, Hasselmo M., & Eichenbaum H. (2018). Hippocampal place field maintain a coherent and flexible map across long time scales. *Curr. Biol.* 28, 1-11. <https://doi.org/10.1016/j.cub.2018.09.037>

AWARDS

Ruth L. Kirschstein individual postdoctoral fellowship: \$194,790 over 3 years	2020-2023
Henry I. Russek Day student achievement award, 1st place: \$1000	2019
F1000Prime featured article, Mau et al. 2018	2018
NSF Neurophotonics Research Traineeship travel award: \$1000	2018
Henry I. Russek Day student achievement award, 3rd place: \$300	2018
<i>Magna cum laude</i> in Psychology	2014
Halpern & Rosevear undergraduate research award: \$1000	2014
Dean's list	2011-2014

ACTIVITIES

Mount Sinai Neuroscience (MSN) seminar board member	2021 — present
• Invited, reviewed, and hosted guest speakers for our institutional neuroscience seminar series.	
Miniscope workshop instructor	2020 — present
• Assisted and lectured at hands-on workshops aimed at introducing imaging technology to new labs internationally.	
Python for neuroscience instructor	2019 — present
• Wrote and taught jupyter notebook exercises introducing new programmers to Python with applications in neuroscience research. Link to exercises: https://github.com/wmau/PythonForNeuro	
Guest lecturer	2020 — present
• Lectured at various Mount Sinai graduate-level neuroscience courses.	
Peer reviewer	2019 — present
• Peer reviewed manuscripts to assess readiness for publication at scientific journals.	
Research presenter	2014 — present
• Presented scientific results to audiences of all backgrounds, ranging from layman to field expert.	