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# William Mau, PhD

Postdoctoral fellow

GitHub: wmau  
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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. I use a wearable miniature fluorescence microscope, called a "Miniscope", to image brain activity in live, behaving animals. Then I use machine learning techniques and statistical approaches to identify patterns in my high-dimensional data. My goal is to translate these skills to make tangible impacts on a data science team.

## EDUCATION

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

## SKILLS

<b>Tools and Languages</b>	Python, Jupyter notebooks, Git, SQL, MATLAB, $\text{\LaTeX}$ , Arduino, Autodesk
<b>Quantitative Skills</b>	Machine learning, inferential and descriptive statistics, data visualization, dimensionality reduction
<b>Python Libraries</b>	numpy, pandas, scikit-learn, scipy, dask, matplotlib, xarray, holoviews

## TECHNICAL EXPERIENCE

<b>Postdoctoral fellow</b> <i>Icahn School of Medicine at Mount Sinai</i>	<b>2019 — Present</b> <i>New York, NY</i>
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- Built a SQLite database for querying metadata from experiments encompassing 100 mouse subjects.
- Automated Python-based data cleaning pipelines for imaging and video data.
- Used constrained non-negative matrix factorization (CNMF) to segment neurons and analyze time series in imaging movies.
- Clustered neural activity patterns using principal components analysis (PCA) and independent components analysis (ICA).
- Mentored and managed a research technician running animal behavior experiments.
- To date, produced 1 first-author review article, 2 middle-author review articles, and 1 middle-author preprint, and received a >\$190k federal award. Currently preparing 2 first-author research articles.

<b>Consultant</b> <i>MetaCell</i>	<b>2021 — Present</b> <i>Virtual</i>
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- Advised new labs on how to use Miniscope technology and conduct data collection.
- Built Jupyter notebooks for analyzing other labs' neural data and presented findings to principal investigators.
- Used a cloud workspace to analyze high-dimensional imaging data.

<b>Graduate researcher</b> <i>Boston University</i>	<b>2014 — 2019</b> <i>Boston, MA</i>
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- 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.
- Resulted in 1 first-author publication, 1 co-first-author preprint, 4 middle author publications, and 4 research awards.

<b>Undergraduate researcher</b> <i>Cornell University</i>	<b>2012 — 2014</b> <i>Ithaca, NY</i>
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- Learned basic statistical methods for analyzing high-dimensional neural data, such as multiple linear regression.
- Self-taught MATLAB for plotting and analyzing neural data.
- Conducted and wrote an undergraduate honors thesis, received magna cum laude honors.
- Learned principles of the scientific method and experimental design.
- Resulted in 1 second-author publication, a \$1000 research award, and magna cum laude honors.

## 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](https://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

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