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William Mau, PhD

Postdoctoral fellow

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I am a neuroscience PhD with 9+ years of experience in data analysis and visualization of high-dimensional data. In my graduate and postdoctoral work, I used machine learning and statistical approaches to identify patterns in complex neural data and related these patterns to how animals encoded long-term memories. These neural data would typically span thousands of predictors and tens of thousands of observations. I would then effectively communicate findings in conference presentations and scientific publications. My career objective is to transfer my analytical skills and my proficiency in communication to a data scientist role that helps to advance company business goals.

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, SQL, MATLAB, Git, LaTeX, Arduino, Autodesk
Quantitative Skills	Machine learning, inferential and descriptive statistics, data visualization, dimensionality reduction
Python Libraries	numpy, pandas, scikit-learn, scipy, matplotlib, xarray, tensorflow, holoviews

Technical Experience

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

- Built a SQLite database for querying metadata from experiments encompassing 100 mouse subjects.
- Automated data cleansing pipelines for imaging and timestamp data for immediate analysis as they were collected.
- Used constrained non-negative matrix factorization (CNMF) to segment neurons and analyze time series in imaging movies.
- Identified neural activity patterns using principal components analysis (PCA) and independent components analysis (ICA).
- Mentored and managed a research technician running animal behavior experiments.

Graduate researcher **2014 — 2019**
Boston University *Boston, MA*

- Attended courses related to computational neuroscience (probability theory, advanced statistical methods, network theory, etc).
- Identified a neural code for elapsed time in mice by training and testing a naive Bayes classifier on neural data.
- Utilized bootstrapping and Monte Carlo methods to verify the statistical significance of the identified neural code.
- Used regression discontinuity analysis to identify state space deviations in neural activity patterns over time.
- Formulated and tested hypotheses related to long-term memory using inferential statistics.

Undergraduate researcher **2012 — 2014**
Cornell University *Ithaca, NY*

- 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 dissertation, graduating magna cum laude.
- Learned principles of the scientific method and experimental design.

Publications

Sweis B.M., **Mau W.**, Rabinowitz S., & Cai D.J. 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

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.

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*, under revision.

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

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

F32 Individual postdoctoral fellowship	**2020**
Henry I. Russek Day student achievement award, 1st place	**2019**
F1000Prime featured article, Mau et al. 2018	**2018**
NSF Neurophotonics Research Traineeship travel award	**2018**
Henry I. Russek Day student achievement award, 3rd place	**2018**
Magna cum laude in Psychology	**2014**
Halpern & Rosevear undergraduate research award	**2014**
Dean's list	**2011-2014**

Activities

Mount Sinai Neuroscience (MSN) seminar review board **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.