

VALERIE TSAI

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5440 Marinelli Rd, 428
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EDUCATION

BS University of Washington, Seattle, WA September 2018-June 2022
Major in Neuroscience, Minor in English
Departmental Honors
Cumulative GPA: 3.84; *Cum Laude*

RESEARCH EXPERIENCE

Unit on Neuromodulation and Synaptic Integration 2022-Present

National Institute of Mental Health

Role: IRTA Post-Baccalaureate Fellow

Advisor: **Hugo A. Tejada, Ph.D.**, Stadtman Principal Investigator

- Elucidating the role of neuropeptides in modulating motivational and emotional neural circuits to process information and orchestrate behavior.
- Skills acquired in this position include:
 - Whole cell patch-clamp slice electrophysiology (mouse, non-human primates, human)
 - Stereotactic injections
 - One and two-photon microscopy
 - Use and validation of novel genetic and viral tools including but not limited to neuropeptide biosensors (deltaLight, U-MASS), caged compounds (caged glutamate), targeted pharmacological tools (DART)
 - Operant behavioral testing and scoring: platform-mediated avoidance, two-way active avoidance, looming disc, head-fixed behavior
 - Exploratory data analysis (Python):
 - Dimensionality reduction (PCA, t-SNE, UMAP)
 - Unsupervised clustering (hierarchical clustering, HDBSCAN)
 - Computational modeling (Hidden Markov)
 - Machine vision (OpenCV motion detection, optical flow)

Neural Mechanisms and Circuits Guiding Motivated Social Behavior 2020-2022

Role: Undergraduate Researcher

Advisor: **Sam A. Golden, Ph.D.**, Department of Biological Structure, University of Washington

- Understanding the neural mechanisms and circuits guiding motivated social behavior, with a focus on aggression reward, addiction, and depression.
- Skills acquired in this position include:
 - Mouse colony management
 - Fiber photometry calcium imaging
 - Histology: perfusion and brain extraction, tissue preparation and microtome sectioning, immunohistochemistry, mounting/slide preparation, fluorescence microscopy, automated brain atlas registration and cell segmentation (SMART, ABBA, QuPath)
 - Operant behavioral testing and scoring: aggression, sociality, self-administration, palatable food-seeking
 - Data analysis: Python (scikit-learn, matplotlib, seaborn, numpy, pandas, etc.) and R for data cleaning, processing, and visualization

- Familiarity with deep and machine learning-based pose estimation and behavioral classification software (DeepLabCut, SimBA, MARS/BENTO, B-SOID, SLEAP)

Neural Regeneration in Corticospinal Pathways Following Spinal Cord Injury 2019-2021

Role: Undergraduate Researcher

Advisor: **Steve I. Perlmutter, Ph.D.**, Department of Biophysics, University of Washington

- Exploring targeted activity-dependent spinal stimulation (TADSS) as a therapy for spinal cord injury in rats.
- Skills acquired in this position include:
 - Rodent motor function testing and scoring: ladderwalk, pellet reach, lever press
 - Electron microscopy image analysis and quantification in ImageJ

PEER-REVIEWED PUBLICATIONS

1. A Aubry, CJ Burnet, N Goodwin, L Li, J Navarrete, Y Zhang, **V Tsai**, R Durand-de Cuttoli, S Golden, S Russo. *Sex Differences in Reactive and Appetitive Aggression*. **Neuropsychopharmacology**, **June 25 2022**.
2. HE Yarur, **VS Tsai***, SM Casello*, J Enriquez-Traba, R Kore, H Wang, M Arevinar, HA Tejada. *Dynorphin / kappa-opioid receptor regulation of excitation-inhibition balance toggles afferent control of prefrontal cortical circuits in a pathway-specific manner*. **Molecular Psychiatry**, **August 29 2023**.
3. J Navarrete, KN Schneider, BM Smith, NL Goodwin, YY Zhang, AS Salazar, YE Gonzalez, P Anumolu, E Gross, **VS Tsai**, M Heshmati, SA Golden. *Individual differences in volitional social self-administration and motivation in male and female mice following social stress*. **Biological Psychiatry**, **Jan 18 2024**.

PRE-PRINTS

1. J Enriquez-Traba, HE Yarur-Castillo, RJ Flores, T Weil, S Roy, TB Usdin, CT LaGamma, M Arenivar, H Wang, **VS Tsai**, AE Moritz, DR Sibley, R Moratalla, ZZ Freyberg, HA Tejada. *Dissociable control of motivation and goal-directed behavior by distinct ventral striatal dopamine receptors*. **In review at Nature Neuroscience**, **June 26 2023**.
2. MR Alkaslasi, EYH Lloyd, AS Gable, H Silberberg, HE Yarur, **VS Tsai**, HA Tejada, CE Le Pichon. *The transcriptional response of cortical neurons to concussion reveals divergent fates after injury*. **In review at Nature Communications**, **Feb 28, 2024**.

MANUSCRIPTS IN PREPARATION

1. YY Zhang, J Navarrete, KN Schneider, NL Goodwin, **VS Tsai**, SA Golden. *An assessment of sensory and physical interaction during trial based social self-administration procedures*. **Psychopharmacology invited manuscript, in preparation**.
2. ER Szelenyi, R Madangopal, **VS Tsai**, R Chen, Y Shaham, SA Golden. *Sensitization of a claustrum-amygdalar-accumbens neural system precedes incubation to palatable food craving*. **Manuscript in preparation**.
3. NL Goodwin, L Bloom, K Pitts, **VS Tsai**, Y Zhang, SA Golden. *Dissociable neural mechanisms of reactive and appetitive aggression*. **Manuscript in preparation**.
4. **VS Tsai***, HE Yarur*, H Wang, CY Noh, A Graham, JJ Choong, SRO Nilsson, BC Shields, MR Tadross, A Berndt, HA Tejada. *Endogenous opioid receptor-mediated regulation of prefrontal cortex microcircuitry and valence processing*.

LECTURES AND TALKS

1. **VS Tsai**, HE Yarur, H Wang, CY Noh, A Graham, JJ Choong, SRO Nilsson, BC Shields, MR Tadross, A Berndt, HA Tejada (2024). *Endogenous opioid receptor-mediated regulation of prefrontal cortex microcircuitry and valence processing*. Lightning Talk at 15th Annual Julius Axelrod Symposium.
2. **VS Tsai** (2023). *Simple Behavioral Analysis (SimBA) – an open source toolkit for computer classification of complex social behaviors in experimental animals*. Presentation for NIMH-wide Synapses and Networks Journal Club Learning Lecture Series.
3. **V Tsai**, E Szelenyi, SA Golden (2022) *Visualizing and Interpreting Brain-wide Cellular Activation Dynamics*. Talk at NAPE Summer Research Symposium.
4. **V Tsai**, S Molu, L Murphy, S Perlmutter (2021) *Exploring the Effects of Sex on Reaching Performance Before and After a Cervical Spinal Cord Injury in Rats*. Lightning Talk at University of Washington Undergraduate Research Symposium. (Virtual)

ABSTRACTS AND POSTERS

5. **VS Tsai**, HE Yarur, H Wang, CY Noh, A Graham, JJ Choong, SRO Nilsson, BC Shields, MR Tadross, A Berndt, HA Tejada (2024). *Endogenous opioid receptor-mediated regulation of prefrontal cortex inhibitory microcircuits and valence processing*. Poster session at Optogenetics Gordon Research Conference.
6. **VS Tsai**, HE Yarur, H Wang, A Graham, JJ Choong, BC Shields, MR Tadross, A Berndt, HA Tejada (2023). *Regulation of Prefrontal Cortex Interneuron Function by Mu- and Delta-Opioid Receptors*. Poster session at Society for Neuroscience 2023.
7. **VS Tsai**, HE Yarur, H Wang, A Graham, HA Tejada (2023). *Regulation of Prefrontal Cortex Interneuron Function by Mu- and Delta-Opioid Receptors*. Poster session at NIH Meyerhoff Scholars Symposium.
8. **VS Tsai**, HE Yarur, H Wang, A Graham, HA Tejada (2023). *Regulation of Prefrontal Cortex Interneuron Function by Mu- and Delta-Opioid Receptors*. Poster session at NIMH Training Day.
9. **VS Tsai**, HE Yarur, H Wang, HA Tejada (2023). *Regulation of Prefrontal Cortex Interneuron Function by Mu- and Delta-Opioid Receptors*. Poster session at NIH Post-Bac Poster Day. **Received Outstanding Poster Award.**
10. **VS Tsai**, HE Yarur, H Wang, HA Tejada (2023). *Regulation of Prefrontal Cortex Interneurons by Mu- and Delta-Opioid Receptors*. Poster session at 14th Annual Julius Axelrod Symposium.
11. **VS Tsai**, NL Goodwin, SA Golden (2022). *Distinctive neuronal ensembles characterizing reactive and appetitive aggression*. Poster session at Society for Neuroscience 2022.
12. **V Tsai**, E Szelenyi, SA Golden (2022) *Visualizing and Interpreting Brain-wide Cellular Activation Dynamics*. Poster session at University of Washington Undergraduate Research Symposium.
13. **V Tsai**, E Szelenyi, SA Golden (2022) *Visualizing and Interpreting Brain-wide Cellular Activation Dynamics*. Presentation at Stanford Undergraduate Research Conference. (Virtual)
14. **VSC Tsai**, J Bhateja, C Dahleen, S Mar, H Han, V Wang, SA Golden (2021) *Grey Matters Journal: supporting undergraduate and community accessibility and inclusion through the arts*. Poster session at Society for Neuroscience 2021. (Virtual)
15. J Choong, S Nilsson, N Goodwin, **V Tsai**, SA Golden (2021) *Accessible and explainable machine learning for behavioral neuroscientists*. Poster session at Society for Neuroscience 2021. (Virtual)

HONORS AND AWARDS

Carl Storm Underrepresented Minority Fellowship 2024
Awarded to URM graduate students, postdocs, faculty and scientists to receive funding assistance to attend their first GRC. *\$1,000 awarded in support of attending a Gordon Research Conference of their choosing.*

NIMH Scientific Training Day Travel Award 2023
Awarded to high-achieving trainees of all levels to encourage them to share their research and accomplishments by giving presentations at scientific conferences. *\$1,000 awarded to assist in defraying the cost of attending conferences outside of NIMH.*

NIH Post-Bac Poster Day Outstanding Poster Award 2023
Awarded to presenters who scored in the top 20% of all posters presented at the NIH Post-Baccalaureate Poster Day.

Levinson Emerging Scholars Award 2021-2022
Award funded by Art and Rita providing flexible support to undergraduates who have shown promise as dedicated, creative, and highly independent researchers to further their work in the life sciences and related fields. *\$5,526 awarded for educational and related expenses in 3 installments; \$750 awarded as a project budget in 3 installments.*

NAPE Undergraduate Research Award June-August 2021
Award issued by the University of Washington Center of Excellence in Neurobiology of Addiction, Pain, and Emotion funded by the NIH through a NIDA P30 Award providing training and financial support to motivated undergraduates interested in pursuing a career in research. *\$4,000 awarded in support of an independent research project and career development.*

Dean's List, University of Washington 2018-2022
Awarded to students maintaining above a 3.5 cumulative GPA.

LEADERSHIP

1. **Grey Matters Journal** 2019-2022
 - Positions Held: **Editor-in-Chief**, previously Editing Coordinator
 - During tenure as officer and EiC, coordinated the production of the university's only neuroscience journal, produced by and for undergrads, with the mission of accessible and understandable neuroscience for all. Oversaw the expansion of the organization to a national level (Grey Matters chapters started in over 5 other universities). Oversaw outreach efforts bringing hands-on neuroscience to local high schools. (<https://greymattersjournal.org/>)
2. **Undergraduate Research Leader** 2020-2022
 - Led outreach events intended to foster interest in research in underclassmen and helped them in their journey in becoming undergraduate researchers, from connecting them with the necessary resources to reflecting on and sharing relevant experiences.

COMMUNITY SERVICE

1. **Basic Science Research Program Mentor** 2021-2022
 - Mentoring high school students in their first hands-on experience in biomedical research.
2. **Tribeta Lead Tutor** 2020-2021

- Tutoring introductory biology students, leading exam review sessions and providing mentorship and guidance to underclassmen in one of their first college-level courses.
- 3. **Mentor Power for Success Mentor** August-December 2020
 - Helping community college transfer students navigate their first quarter at the University of Washington during the peak of the pandemic.
- 4. **Red Cross Volunteer** June-August 2020
 - Volunteering remotely to build COVID-19 resource webpages for counties across Washington state.
- 5. **Pike Market Food Bank Volunteer** 2018-2019
 - Providing healthy meals and groceries to socioeconomically disadvantaged minorities of the Seattle community.

PROFESSIONAL MEMBERSHIP

Phi Beta Kappa, 2022-Present
Society for Neuroscience, 2021-Present

ADDITIONAL SKILLS

Familiarity with the following software: MATLAB, Arduino, MedPC, Cytoscape, CytoMAP, JMP, GraphPad Prism, Clampfit, MiniAnalysis, LabChart, MS Word, MS Excel, MS Powerpoint.