VALERIE TSAI

vtsai881.github.io
vsctsai@stanford.edu

EDUCATION

Ph.D. Stanford University, Palo Alto, CA — September 2024-Present
Neurosciences Graduate Program

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

RESEARCH EXPERIENCE

Shah Lab and Druckmann Lab — September 2024-Present
Stanford University
Role: Rotation Student
Advisors: **Nirao M. Shah, Ph.D & Shaul Druckmann, Ph.D.**,
Department of Neurobiology & Department of Psychiatry and Behavioral Sciences

- Investigating the neural representations of the shared visual and motor features that are mirrored in observing and enacting aggression using fiber photometry and miniscope recordings.

Unit on Neuromodulation and Synaptic Integration — 2022-2024
National Institute of Mental Health
Role: IRTA Post-Baccalaureate Fellow
Advisor: **Hugo A. Tejeda, Ph.D.,** Laboratory on Neurobiology of Compulsive Behaviors

- Characterized the role of endogenous opioids and their receptors in shaping prefrontocortical microcircuits involved in motivated behavior using interspecies electrophysiological slice recordings, *in vivo* fiber photometry, and two-photon imaging.
    - Validated novel neuropeptide biosensors (deltaLight, uMASS) and pharmacological tools (naloxone-DART)
    - Set up hardware and software for video acquisition and wrote simple computer vision-based tools for video processing, behavioral tracking, feature extraction
- Provided cross-lab support for setting up and implementing automated behavioral analysis methods

Golden Lab — 2020-2022
University of Washington
Role: Undergraduate Researcher
Advisor: **Sam A. Golden, Ph.D.**, Department of Neurobiology and Biophysics

- Developed computational pipeline integrating multi-dimensional reduction of single cell whole-brain cfos data, hierarchical clustering revealing activity motifs, graph theoretical analysis identifying hub regions.
- Worked on computational analyses of complex behavior in mice (aggression, social interaction, craving) using deep- and machine-learning based methods for pose estimation and behavioral quantification (DeepLabCut, SLEAP, SimBA, MoSeq)

Perlmutter Lab 2019-2021
University of Washington
Role: Undergraduate Researcher
Advisor: **Steve I. Perlmutter, Ph.D.**, Department of Neurobiology and Biophysics

- Assessed the therapeutic effect of targeted activity-dependent spinal stimulation (TADSS) on motor function and axonal regeneration following spinal cord injury in rats

PEER-REVIEWED PUBLICATIONS

1. MR Alkaslasi, EYH Lloyd, AS Gable, H Silberberg, HE Yarur, **VS Tsai**, HA Tejeda, CE Le Pichon. *The transcriptional response of cortical neurons to concussion reveals divergent fates after injury.* **Accepted with revisions at Nature Communications, Oct 28, 2024.**
2. 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 Tejeda. *Dissociable control of motivation and goal-directed behavior by distinct ventral striatal dopamine receptors.* **Accepted at Nature Neuroscience, June 18 2024.**
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.**
4. HE Yarur, SM Casello*, **VS Tsai***, J Enriquez-Traba, R Kore, H Wang, M Arevinar, HA Tejeda. *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.**
5. 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.**

MANUSCRIPTS IN PREPARATION

1. **VS Tsai***, HE Yarur*, H Wang, CY Noh, A Graham, JJ Choong, SRO Nilsson, BC Shields, MR Tadross, A Berndt, HA Tejeda. *Endogenous opioid receptor-mediated regulation of prefrontal cortex microcircuitry and valence processing*.
2. S Silverstein, M Deshpande, E Vaughan, T Clarity, C Aloimonos, M Hsiang, HE Yarur, **VS Tsai**, HA Tejeda, J Gordon, D Kupferschmidt. *Optical reshaping of hippocampal input-prefrontal interneuron interactions to influence mouse spatial cognition*.

3. 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.
4. 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*.
5. NL Goodwin, L Bloom, K Pitts, **VS Tsai**, Y Zhang, SA Golden. *Dissociable neural mechanisms of reactive and appetitive aggression.*

TALKS

1. **VS Tsai**, HE Yarur, H Wang, CY Noh, A Graham, JJ Choong, SRO Nilsson, BC Shields, MR Tadross, A Berndt, HA Tejeda (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 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)

CONFERENCE ABSTRACTS

1. **VS Tsai**, HE Yarur, H Wang, CY Noh, A Graham, K Zhaghoul, BC Shields, MR Tadross, A Berndt, JJ Choong, SRO Nilsson, HA Tejeda (2024). *Endogenous opioid receptor-mediated regulation of prefrontal cortex inhibitory microcircuits and valence processing.* Poster session at 2024 Optogenetics Gordon Research Seminar & Conference.
2. **VS Tsai**, HE Yarur, H Wang, A Graham, JJ Choong, BC Shields, MR Tadross, A Berndt, HA Tejeda (2023). *Regulation of Prefrontal Cortex Interneuron Function by Mu- and Delta-Opioid Receptors.* Poster session at Society for Neuroscience 2023.
3. **VS Tsai**, HE Yarur, H Wang, A Graham, HA Tejeda (2023). *Regulation of Prefrontal Cortex Interneuron Function by Mu- and Delta-Opioid Receptors.* Poster session at NIH Meyerhoff Scholars Symposium.
4. **VS Tsai**, HE Yarur, H Wang, A Graham, HA Tejeda (2023). *Regulation of Prefrontal Cortex Interneuron Function by Mu- and Delta-Opioid Receptors.* Poster session at NIMH Training Day.
5. **VS Tsai**, HE Yarur, H Wang, HA Tejeda (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.
6. **VS Tsai**, HE Yarur, H Wang, HA Tejeda (2023). *Regulation of Prefrontal Cortex Interneurons by Mu- and Delta-Opioid Receptors*. Poster session at 14th Annual Julius Axelrod Symposium.
7. **VS Tsai**, NL Goodwin, SA Golden (2022). *Distinctive neuronal ensembles characterizing reactive and appetitive aggression.* Poster session at Society for Neuroscience 2022.

8. V Tsai, E Szelenyi, SA Golden (2022) *Visualizing and Interpreting Brain-wide Cellular Activation Dynamics*. Poster session at University of Washington Undergraduate Research Symposium.
9. V Tsai, E Szelenyi, SA Golden (2022) *Visualizing and Interpreting Brain-wide Cellular Activation Dynamics*. Presentation at Stanford Undergraduate Research Conference. (Virtual)
10. 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)
11. 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

NSF Graduate Research Fellowship	2024
Carl Storm Underrepresented Minority Fellowship	2024
NIMH Scientific Training Day Travel Award	2023
NIH Post-Bac Poster Day Outstanding Poster Award	2023
Levinson Emerging Scholars Award	2021-2022
NAPE Undergraduate Research Award	2021
Dean's List, University of Washington	2018-2022

OUTREACH

Intersect Journal Reviewer 2024-
Reviewing undergraduate-led research articles for the Stanford Journal of Science, Technology, and Society. https://ojs.stanford.edu/ojs/index.php/intersect

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/

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.

MENTORSHIP

Academic:

Stanford Graduate Application Mentorship Program Mentor	2024-
Simply Neuroscience Action Potential Advising Program Mentor	2024-
Tribeta Lead Tutor	2020-2021

Research:

Stanford Biosciences Student Association NSF GRFP Peer Mentor 2024-
Basic Science Research Program Mentor 2021-2022

PROFESSIONAL MEMBERSHIP

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

TECHNICAL SKILLS

Laboratory:

Physiology: whole-cell patch clamp slice electrophysiology, IHC, RNAscope, viral tracing
Imaging: one- and two-photon imaging, fiber photometry
Surgery: stereotactic injections, miniature endoscope implantation
Behavior: aggression, mating, sociality, operant conditioning, head-fixation

Computational:

Programming: Python, MATLAB, R, PyTorch
Analysis: machine learning, deep learning, dimensionality reduction
Automated behavioral tracking: DeepLabCut, SLEAP, SimBA, keypoint-MoSeq
Data acquisition & hardware control: Bonsai, Arduino