Rajvi Agravat

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Education and Training

The University of Texas at Austin, Austin, TX **Expected 2027**
Institute for Neuroscience, College of Natural Sciences; Moody College of Communication
Doctor of Philosophy, Major: Neuroscience

New York Institute of Technology, New York City, NY **May 2016 to 2020**
*Bachelor of Sciences, Major: Biological Science*s

Research Experience

Hamilton Lab, The University of Texas at Austin, Austin, TX
Graduate Research Assistant; Advisor: Dr. Liberty Hamilton May 2023 – Present

- Project 1: Auditory Attention and Neural Processes:
  - Investigating selective auditory attention using a multimodal approach combining game-based behavioral paradigms and electrophysiological recordings (scalp EEG or intracranial sEEG).
  - Examining neural mechanisms underlying the "cocktail party effect" - focusing on relevant sounds in complex acoustic environments.
  - Utilizing an auditory attention game to study attentional, perceptual, executive, and neural processes involved in selectively tracking target auditory information.
  - Exploring how degrading signal-to-noise ratio of target speech impacts neural tracking as EEG measures.
  - Aim to improve epilepsy surgery outcomes by inducing neuroplasticity in the auditory cortex through auditory attention training and EEG data analysis using MNE-Python.
- Project 2: Neural Representation of Speech and Music in the Human Brain:
  - Recording neural activity from epilepsy patients while they perceived naturalistic speech and music stimuli (movie trailers).
  - Applying speech and music encoding models to map acoustic features (spectrogram, pitch) to brain regions across developmental stages.
  - Visualizing and analyzing the relationship between neural encoding of spectral and pitch cues from speech versus music.
  - Identifying shared mechanisms and potential regional specializations in how the auditory cortex processes different acoustic properties of speech and music.
- Acquiring sEEG and ECoG data in intractable epilepsy patients pre- and post-surgery.
- Conducted a literature review on selective auditory attention in epilepsy and Tuberous Sclerosis Complex (TSC) patients.

Church Lab, The University of Texas at Austin, Austin, TX
Rotation Student; Advisor: Dr. Jessica Church-Lang Jan – May 2023

- Aimed to develop models for analyses for data collected for understanding brain changes in academic tasks and executive functioning task processing in children.
- Collected fMRI data to understand factors influencing summer learning change and doing gender gap comparisons.

Hamilton Lab, The University of Texas at Austin, Austin, TX
Rotation Student; Advisor: Dr. Liberty Hamilton Aug – Dec 2022

- Aimed at improving epilepsy surgery outcomes via neuroplasticity in the auditory circuit of the brain. Accomplished this by acquiring EEG data and preprocessing it with MNE-python.
- Acquired sEEG and ECoG data in epilepsy patients pre- and post-surgery.
- Conducted a literature review for mTRFs, auditory attention, and natural stimuli to better understand the ongoing research in the field.

Laboratory of Neurogenetics of Language, The Rockefeller University, New York, NY
Research Assistant; Advisor: Dr. Erich Jarvis Aug 2020 – Jun 2022

- Tested for intracortical connectivity between the laryngeal motor cortex and orofacial motor cortex. Both regions are associated with vocal communication in mice.
- Used retrograde and anterograde viral tracing to map out the connectivity between these areas. I used immunohistochemistry to label proteins of interest and imaged sections with light and confocal microscopy. I used Nanoject II for stereotaxic injections, and data were analyzed in FIJI, Python, and Excel.
- Tissue clearing techniques, iDISCO and AdipoClear, were used to generate 3D visualizations of the cortico-brainstem and cortico-cortical connectivity of the mouse vocal communication circuits.
- Maintained and performed routine genotyping on important mouse lines used for my experiments and others in the lab.

Department of Psychiatry Irving Medical Center, Columbia University, New York City, NY
Research Intern; Advisor: Dr. Kristina Denisova Nov 2019 – Feb 2020

- Conducted a literature review through PubMed to understand the neurobiology and side effects of drugs used to manage autism symptoms in infants. Used this data to understand which drugs enter the blood-brain barrier and what side effects each drug has in infants.

Department of Molecular, Cellular, and Developmental Biology, Yale University, New Haven, CT
Research Intern; Advisor: Dr. Haig Keshishian Jul – Aug 2019

- Performed ablations using a microbeam laser confocal microscope to access individual motoneurons in Drosophila embryo to understand the development of synapses.
- Maintained Drosophila (adult and larvae) lines used for my experiments.

Department of Biological and Chemical Sciences, New York Institute of Technology, New York, NY
Senior Research Assistant; Advisor: Dr. Niharika Nath Oct – May 2020

- Studied organosulfur compounds for potential anti-bacterial activity using the disc diffusion and growth curve assay. Bacterial strains of *Klebsiella pneumoniae*, *Escherichia coli*, and *Pseudomonas aeruginosa* were examined using Chloramphenicol as a positive control and DMSO as a negative control.
- Tested if the organosulfur compounds release hydrogen sulfide and if there is a relationship between hydrogen sulfide and antibacterial effects.

Kokilaben Dhirubhai Ambani Hospital, Mumbai, India
Researcher; Advisor: Dr. Hrishikesh Sarkar, Dr. Yuvika Kamdar Jun – Jul 2019

- Observed inpatient sessions concerning epilepsy and stroke cases; studied pre-ops and post-ops of brain tumor patients.
- Assessed patients' cognitive functionality: memory (verbal, visual, working, long-term), attention and concentration, phonemic fluency, and response inhibition through the NIMHANS battery of neuropsychological examinations.

New York University, New York City, NY
Research Assistant; Advisor: Dr. Eleni Nikitopoulos Jan – Jul 2019

- Performed a literature review on social cues among paternal sisters in wild monkeys like migration decisions, grooming patterns, parental care, vocal and gestural communication skills. Used this data to compare and study the behavioral differences in kin and the effect on rank in a group of wild monkeys.
- Extracted DNA from fecal samples, performed PCR of microsatellite loci, and sequenced DNA.

Publications

Vargas, C. D. M., **Agravat, R. K.**, Waidmann, E. N., Bochalis, C., Bermudez, H., Giannakopoulos, T., & Jarvis, E. D. (2024). A Functional and Non-Homuncular Representation of the Larynx in the Primary Motor Cortex of Mice, a Vocal Non-Learner. In bioRxiv (p. 2024.02.05.579004). https://doi.org/10.1101/2024.02.05.579004

Presentations

UT Austin CARE Research Day, 2024

R. Agravat, M. Desai, G. Foox, A. Field, A. Anderson, D. Clarke, E. T. Kabara, H. Weiner, L. Hamilton. Comparing Speech and Music Encoding Models. 2024 Research Day: UT Austin Cellular and Clinical Applied Rehabilitation Research and Engineering.

Society for Neuroscience, Neuroscience 2022

C.D.M. Vargas, **R. Agravat**, E. Jarvis. Mouse Motor Cortex Can Influence Vocal Musculature. 2022 Neuroscience. San Diego, CA: Society for Neuroscience, 2022.

Society for Neuroscience, Neuroscience 2021

R. Agravat, C.D.M. Vargas, E. Jarvis. Connectivity and Neuroanatomy of the Orofacial Motor Cortex and Laryngeal Motor Cortex for Vocal Modulation in Mice. 2021 Neuroscience. Chicago, IL: Society for Neuroscience, 2021.

Sigma XI Virtual Science Scholars' Symposium 2020

"Anti-bacterial effects of organosulfur compounds against gram-negative bacteria" **R. Agravat**

Symposium of University Research and Creative Expression 2019

"Chiral Sensing of Natural Products via Chiroptical Spectroscopy" **R. Agravat**

Leadership and Activities

UT Cellular to Clinical Applied Rehabilitation Research and Engineering (CARE), The University of Texas at Austin, TX

Student Board Member Nov 2023 – Present

- Hosting various events like the UT CARE annual research day and seminar series.
- Networking and collaborating with various neurorehabilitation research scientists, professors, postdocs, and graduate students.

SAGES Women in STEM + STEM Muse Mentorship Program, The University of Texas at Austin, TX

Mentor (Undergraduate Mentee: Melis Demiralp) Feb – Jul 2023

- Representing women in STEM higher education via 1-1 mentorship to an undergraduate, networking, and professional development conversations in science.
- Conducted neuroscience literature readings with my mentee (Melis). Introduced her to graduate school life/culture and relevant upcoming conferences for her interests.

Neuroscience Undergraduate Reading Program (NURP), The University of Texas at Austin, Austin, TX

Graduate Student Mentor (Undergraduate Mentee: Ai-Vy Le) Jan – Apr 2023

- Conducting neuroscience research to facilitate an in-depth, independent study.
- Aim to help my mentee read scientific papers and gain presentation skills.
- Prepare my mentee (Ai-Vy) for a 15-minute talk at the end of the semester for the NURP symposium.

Letters to a Pre-scientist

STEM Pen Pal Aug 2022 – Jun 2023

- Writing letters to a high school student to humanize STEM (Science, Technology, Engineering, Mathematics) professionals, demystify STEM career pathways, and inspire the younger generation to explore a future in STEM.
- Answering questions a high schooler in LA has about a career in neuroscience; and graduate school life in the form of informal letters over the course of 1 year.
- Bringing STEM awareness to students who lack access to STEM role models.

Department of Neuroscience, The University of Texas at Austin, Austin, TX

Student Buddy Jan 2022

- Hosted potential incoming first-year neuroscience Ph.D. students for interviews on behalf of the Institute of Neuroscience at UT Austin.
- Took them for relevant neuroscience talks on campus and conducted Austin city tours.

Biology Academic Conference for Emerging Scholars (BioAcCES)

Volunteer Reviewer Oct 2021

- Reviewed abstracts and presentations from undergraduate biology students and provided relevant feedback for a successful virtual conference.

Graphic Design and Printing Shop, New York Institute of Technology, New York City, NY
Student Manager Sept 2017 – May 2020

- Supervised and managed the work of 40 student workers in the shop each semester.
- Oversaw budgeting, allotting hours to each student worker, and reporting my team's work to the Assistant Director of the Academic Computing department at NYIT.
- Assisted the AD in hiring a diverse and fully inclusive team.

Telangana Jagruthi International Youth Leadership Conference, Hyderabad, India
International Delegate Jan 18-21, 2019

- Participated in a program designed for young leaders worldwide to implement the United Nations Sustainable Development Goals and the Gandhian path to sustainability and innovation.

Teaching Experience

Department of Biological Sciences, New York Institute of Technology, New York City, NY
Undergraduate Teaching Assistant Sep 2019 – Dec 2019

- Taught a class on Bioethics to 30 students during Fall 2019. Guided students to do the class essay assignments and graded them.

Awards and Scholarships

Travel Award, Cold Spring Harbor Lab – Genetics and Neurobiology of Language *($2900)* Summer 2024
Travel Award, Cold Spring Harbor Lab – Genetics and Neurobiology of Language *($500)* Summer 2024
Travel Award, Advances and Perspectives in Auditory Neuroscience Fall 2024
Travel Award, Society for Neuroscience Fall 2024

Reimagining Professional Development Award, UT Austin Spring 2024
Texas SLH Foundation (TSHA) Elizabeth Wiig Research Award *($1000)* 2024
UT INS Graduate Fellowship *($40,000 per year)* 2022-2027
Dr. Barbu Kestanband Annual Scholarship *($5000)* 2018
The NYIT Scholarship *($16000 per year)* Sept 2016 – May 2020
NYIT Dean's List Spring 2017, Spring 2018, Spring 2019, Spring 2020
NYIT Presidential Honor's List Fall 2019

Languages, Community Service, and Other Skills

- Proficient in Python, MATLAB, Microsoft Excel, Word, and PowerPoint
- Fully trilingual in English, Hindi, and Gujarati
- Volunteer at **Austin Animal Shelter**, Austin, USA
- **Rotaract Club**, Mumbai, India
  Causes: Protecting the environment and supporting education
- **Interact Club**, Mumbai, India
  Causes: Cleanliness, fighting disease, and education
- **Children's Movement for Civic Awareness**, Mysore, India
  Causes: Children's education, civic awareness