KAUSTUBH KULKARNI

Phone: (732) 688-4990
kaustubh.kulkarni@icahn.mssm.edu
50 E 98th St, New York, NY 10029

github.com/krkulkarni
krkulkarni.github.io

EDUCATION

Icahn School of Medicine at Mount Sinai — New York, NY
Medical Scientist Training Program (MD/PhD) — 2017 – Present
- Graduate School of Biomedical Sciences – Neuroscience Core
- Center for Computational Psychiatry, Dept. of Neuroscience
- PhD completed, April 2023
- Currently in MS3 year

Rutgers University, New Brunswick — New Brunswick, NJ
Bachelor of Arts (BA) – Cell Biology and Neuroscience — 2011 –2015
- Minor in Computer Science, Minor in Philosophy
- Magna Cum Laude – GPA 3.76

RESEARCH EXPERIENCE

Icahn School of Medicine at Mount Sinai — New York, NY
Graduate Student at Center for Computational Psychiatry — 2017 – 2023
Advisors
- **Xiaosi Gu, Ph.D.** – Director of Center for Computational Psychiatry
- **Daniela Schiller, Ph.D.** – Professor of Psychiatry and Neuroscience

Experience
- Utilized linear and non-linear machine learning to classify chronic users of cannabis, and graph theoretical methods to investigate neural patterns underlying chronic cannabis use
- Conceived and implemented novel computational models to investigate decision-making and craving in populations with addiction
- Revised and improved lab-standard maximum likelihood models of reinforcement learning to utilize Bayesian parameter estimation
- Implemented dynamical systems models to probe latent states underlying verbal free recall of traumatic memories in veterans with post-traumatic stress disorder
- Collected behavioral data using online platforms such as Prolific, as well as neural data such as functional MRI and intracranial EEG

Alena – Industry Experience — Remote
Internship – Computational Psychiatry Group — London, UK
Advisors — 2022
- **Quentin Huys, M.D., Ph.D.** – Professor in Computational Psychiatry, UCL
- **Mona Garvert, Ph.D.** – External Researcher, Max Planck Institute

Experience
- Performed model-agnostic behavioral analysis of social interactions between artificial agents and participants with social anxiety
- Developed a reversal learning paradigm to investigate responsiveness to social learning
- Constructed customized computational models to extract learning parameters from task behaviors and related them to clinical questionnaires
- Gained experience in mobile and desktop app development and game design

Rutgers University – Newark — Newark, NJ
Lab Manager/Research Assistant – Center for Molecular and Behavioral Neuroscience — 2015 – 2017
Advisor
- **Michael W. Cole, Ph.D.** – Associate Professor of Neuroscience

Experience
- Developed tasks designed to determine of mechanisms underlying rapid instructed task learning (RITL)
- Led a project to identify and decode prototypical mental states, their dynamics, and characteristic graph theoretical measures during resting state using community detection, clustering algorithms, and other machine learning methods
- Collected functional MRI/EEG/neurophysiological data for three protocols from cohorts of healthy college-aged young adults and aging populations

Rutgers University – New Brunswick — New Brunswick, NJ
Research Assistant – Center for Advanced Biotechnology and Medicine — 2011 – 2015
Advisor
- **Gaetano Montelione, Ph.D.** – Professor of Chemistry and Chemical Biology

Experience
- Engineered a software platform for the identification of novel targets for NMR structure determination using BLAST/HMMER similarity scores in conjunction with dimensionality reduction algorithms to embed protein sets into 2D/3D visualization space
- Developed a novel method for sequence-based structure determination and surface feature characterization based on the Rosetta platform
- Collected protein NMR data through an end-to-end protein imaging pipeline, including protein design, production, purification, and NMR data acquisition

TEACHING EXPERIENCE

Icahn School of Medicine at Mount Sinai — New York, NY
Director – Summer Program in Computational Psychiatry Education (SPICE) — 2021 – 2023
- Instituted and led a summer program for high school and early college-aged students for foundations in computational psychiatry
- Instructed the 'Computational Fundamentals' core in the program
- Individually mentored two high school student and supervised their project submission to the Regeneron competition

Icahn School of Medicine at Mount Sinai — New York, NY
Teaching Assistant – Fundamentals of Computational Psychiatry — 2022

Icahn School of Medicine at Mount Sinai — New York, NY
Teaching Assistant – Brain and Behavior (MD program) — 2020 – 2022

Rutgers University – New Brunswick — New Brunswick, NJ
Lecturer – Introduction to Sciences for First Years — 2013 – 2014
- Independently developed a curriculum for a brief introduction of scientific majors to advanced first year students in STEM programs

Rutgers University – New Brunswick — New Brunswick, NJ
Teaching Assistant – Chemistry and Organic Chemistry — 2014 – 2015

Rutgers University – New Brunswick — New Brunswick, NJ
Supplemental Instructor – Organic Chemistry, ODASIS at Rutgers University — 2012 – 2015

CLINICAL EXPERIENCE

Icahn School of Medicine at Mount Sinai — New York, NY
MD Program — 2017 – 2019, 2023 – 2024

Princeton First Aid and Rescue Squad — Princeton, NJ
Emergency Medical Technician — 2015 – 2017

COMPUTER SKILLS

Programming
- Proficient in Python, Matlab, R, Javascript, shell scripting
- Relevant data analysis libraries: scikit-learn, tensorflow, brainiak, tidyverse
- Bayesian statistical modeling: Stan, pymc

Applications
- Relevant data analysis methods: reinforcement learning, general linear modeling, multivariate pattern analysis, network analysis, hyperalignment, custom interpretable machine learning algorithms
- Proficient in use of neuroimaging software: nilearn, SPM, fmriprep, AFNI, freesurfer

Platforms
- Basic experience with full-stack web development
- Deployed a small personal application using Flask backend, React frontend, and AWS for hosting

Relevant graduate coursework
- Drug Addiction: Mechanisms and Therapeutic Approaches – 2022
- Addiction Seminar – 2022
- Statistical Rethinking, A Bayesian Course – 2021
- Probability and Inference – 2021
- Machine Learning for Biomedical Data Science – 2020
- Biomedical Software Engineering – 2020

PUBLICATIONS

Perl, O., Duek, O., **Kulkarni, K.R.**, Gordon, C., Krystal, J.H., Levy, I., Harpaz-Rotem, I. and Schiller, D., 2023. Neural patterns differentiate traumatic from sad autobiographical memories in PTSD. *Nature neuroscience*, *26*(12), pp.2226-2236.

Kulkarni, K.R., O'Brien, M. and Gu, X., 2023. Longing to act: Bayesian inference as a framework for craving in behavioral addiction. *Addictive Behaviors*, p.107752.

Kulkarni, K.R., Schafer, M., Berner, L.A., Fiore, V.G., Heflin, M., Hutchison, K., Calhoun, V., Filbey, F., Pandey, G., Schiller, D. and Gu, X., 2023. An interpretable and predictive connectivity-based neural signature for chronic cannabis use. *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging*, *8*(3), pp.320-330.

Shuster, A., O'Brien, M., Luo, Y., Berner, L.A., Perl, O., Heflin, M., **Kulkarni, K.,** Chung, D., Na, S., Fiore, V.G. and Gu, X., 2021. Emotional adaptation during a crisis: decline in anxiety and depression after the initial weeks of COVID-19 in the United States. *Translational psychiatry*, *11*(1), pp.1-7.

Fiore, V.G., DeFelice, N., Glicksberg, B.S., Perl, O., Shuster, A., **Kulkarni, K.,** O'Brien, M., Pisauro, M.A., Chung, D. and Gu, X., 2021. Containment of COVID-19: Simulating the impact of different policies and testing capacities for contact tracing, testing, and isolation. *PloS one*, *16*(3), p.e0247614.

Spronk, M., Keane, B.P., Ito, T., **Kulkarni, K.,** Ji, J.L., Anticevic, A. and Cole, M.W., 2021. A whole-brain and cross-diagnostic perspective on functional brain network dysfunction. *Cerebral Cortex*, *31*(1), pp.547-561.

Luo, Y., Shuster, A., Chung, D., O'Brien, M., Heflin, M., Fiore, V., **Kulkarni, K.,** Na, S. and Gu, X., 2020, July. Dissociable social perception and altruistic choices during the first wave of COVID-19 in the United States. University of the Bundeswehr.

Ji, J.L., Spronk, M., **Kulkarni, K.,** Repovš, G., Anticevic, A. and Cole, M.W., 2019. Mapping the human brain's cortical-subcortical functional network organization. *Neuroimage*, *185*, pp.35-57.

Chen, R.H., Ito, T., **Kulkarni, K.R.** and Cole, M.W., 2018. The human brain traverses a common activation-pattern state space across task and rest. *Brain Connectivity*, *8*(7), pp.429-443.

Ito, T., **Kulkarni, K.R.,** Schultz, D.H., Mill, R.D., Chen, R.H., Solomyak, L.I. and Cole, M.W., 2017. Cognitive task information is transferred between brain regions via resting-state network topology. *Nature communications*, *8*(1), pp.1-14.

Preprints

Imtiaz, Z., Kato, A., Kopell, B.H., Qasim, S.E., Davis, A.N., Martinez, L.N., Heflin, M., **Kulkarni, K.R.**, Morsi, A., Gu, X. and Saez, I., 2024. Human Substantia Nigra Neurons Encode Reward Expectations. *bioRxiv*, pp.2024-05.

Kulkarni, K. R., Berner, L. A., Schiller, D., Fiore, V. G., & Gu, X., 2023. A generalizable computational mechanism underlying the interaction between momentary craving and decision-making. *bioRxiv*, 2023-04.

PRESENTATIONS

Data Blitz. "*Computational Mechanisms Underlying Multi-Domain Decision Making and Momentary Craving*." Icahn School of Medicine at Mount Sinai, Neuroscience Department Retreat.

Poster Presentation. "*Computational Mechanisms Underlying Drug-Based Decision Making and Momentary Craving in Chronic Cannabis Users*." Society of Biological Psychiatry, 2022.

Poster Presentation. "*Revealing Recurrent Latent Brain State Dynamics that Support Cue-Elicited Craving of Marijuana*." Society of Biological Psychiatry, 2021.

Poster Presentation. "*Backbone and Sidechain Resonance Assignments for Carboxy-Terminal Domain of Guanylyltransferase using Triple Resonance NMR Data*." Rutgers Aresty Research Colloquium.

WORKSHOPS

- Computational Psychiatry Course – Zurich, 2022.
- Neuromatch Academy – Computational Neuroscience, 2021.
- Computational Psychiatry Course, Bayesian Learning and Reinforcement Learning Workshop, New York, NY, 2019.
- Brainiak Inter-subject Correlation (ISC) and Shared Response Modeling (SRM) Workshop, Hasson Lab, Princeton, NJ, 2019.

HONORS AND AWARDS

2022	T32 Training Program in Substance Use Disorders
2015	Departmental Highest Honors, Cell Biology and Neuroscience, Rutgers University
2015	Bachelor of Arts Magna Cum Laude, Rutgers University
2014 – 2015	Phi Beta Kappa Honors Society, Rutgers University
2012 – 2013	CABM Undergraduate Program Scholar, Rutgers University
2011 – 2012	Presidential Scholarship (Full Tuition), Rutgers University
2011 – 2012	National Merit Scholarship, National Merit Scholarship Corporation

LANGUAGES

English: Native Language
Marathi: Advanced Listener, Intermediate Speaker, Novice Reading and Writing
Hindi: Intermediate Listener, Novice Speaker, Novice Reading and Writing

OTHER

US Citizen