Curriculum Vitae
Erin L. Rich, MD, PhD

tel. (212) 824-9304
erin.rich@mssm.edu
http://labs.neuroscience.mssm.edu/project/rich-lab/

Hess CMS Building
Room 10-115
1470 Madison Ave
New York, NY 10029

Positions

2021 – present Associate Professor, Department of Neuroscience and Friedman Brain Institute, Icahn School of Medicine at Mount Sinai
2017 – 2021 Assistant Professor (Tenure-track), Department of Neuroscience and Friedman Brain Institute, Icahn School of Medicine at Mount Sinai
2015 – 2017 Assistant Project Scientist, Helen Wills Neuroscience Institute, University of California, Berkeley
2014 – 2017 Affiliate Researcher, Department of Neurological Surgery, University of California, San Francisco
2010 – 2015 Post-doctoral Fellow, University of California, Berkeley
Mentor: Joni Wallis, PhD
2014 – 2017 Co-mentor: Edward Chang, MD, UC San Francisco

Education

MD 2010, Mount Sinai School of Medicine, New York, NY
Medical Scientist Training Program (MSTP), 2002 – 2010
PhD 2008, Mount Sinai School of Medicine, New York, NY
Department of Neuroscience
BS 2002, Tufts University, Medford, MA
Majors in Biology and Classical Studies

Awards & Grants

Federal Research Grants

2024 – 2029 R01 *Neural Mechanisms of Social Information Processing* (MH136228) Role: Co-I NIH/NIMH (PI: Wu)
2023 – 2028 R01 *Mechanisms of multi-attribute decision-making* (MH134845) NIH/NIMH (PI: Rich, Co-Is: Rangel, Rudebeck)
2022 – 2024 R21 *Mesoscale dynamics underlying expectation bias in the orbitofrontal cortex* (MH131900) NIH/NIMH (PI: Rich, Co-I: Rudebeck)
2020 – 2025 R01 *Circuit mechanisms of self-organized cognitive strategies* (MH121480) NIH/NIMH (PI: Rich)
2019 – 2022 NSF *State representations in multi-purpose and multi-region neural network models of cognition.* (PIs: Rajan, Deisseroth, Rich, Rudebeck)
2015 – 2020 K08 Mentored Clinical Scientist Research Development Award, NIH/NIDA, *Multi-Scale Orbitofrontal Networks Underlying Reward Processing* (PI: Rich)
2005 – 2008 Kirschstein NRSA Predoctoral Fellowship NIH/NIMH, *Prefrontal Cortex Contributions to Behavior Organization* (PI: Rich)

Foundation Research Grants

2019 – 2021 Brain and Behavior Research Foundation NARSAD Young Research Investigator Grant *The Neural Basis of Expectation and Bias in Large-scale Brain Networks* (PI: Rich)
2018 – 2021 Whitehall Foundation Research Grant *Neural mechanisms of self-generated mnemonic strategies* (PI: Rich)
2018 – 2022 Pew Scholars Program in Biomedical Sciences, *The neural basis of expectation and bias in large-scale orbitofrontal networks* (PI: Rich)
2018 Schneider-Lesser Foundation Junior Faculty Fellowship (PI: Rich)
2012 – 2015 Hilda and Preston Davis Foundation Postdoctoral Fellowship in

Eating Disorders Research, *The Role of Limbic and Prefrontal Cortex in Coding Food and Non-food Values* (PI: Rich)

1999, 2000 Howard Hughes Undergraduate Research Grant

Mentored Trainee Awards

2022 – 2024 *Integration of social and nonsocial information in the primate brain.* F99/K00 DSPAN Award (F99 NS125826) NIH/NINDS (PI: Simon)

2021 – 2024 *Decision-making in the context of multi-attribute options.* NRSA Predoctoral Fellowship (F31 MH127901) NIH/NIMH (PI: Perkins)

Other Awards

2019 – FBI Scholars Award, Joseph and Nancy DiSabato Research Scholar
Wireless neural recording of social behavior in freely moving non -human primates (PIs: Rich, Rajan, Rudebeck)

2019 Young Scientist Travel Award, Arthur M. Sackler Colloquium Using Monkey Models to Understand and Develop Treatments for Human Brain Disorders

2010 Basic Science Best Achievement Award for Paper Published in 2009

2006 Mount Sinai Graduate School Teaching Award

2002 Audrey Butvay Gruss Science Award

2002 Benjamin Brown Scholarship

2001 Poskitt Scholarship for Biology Undergraduate

Teaching

2024 Modern Statistics for Modern Biology, Course co-director
Icahn School of Medicine at Mount Sinai, Graduate School

2021 – 2022 Neural Data Analysis, Course co-director
Icahn School of Medicine at Mount Sinai, Graduate School

2020 – present Core 3: Systems and Cognitive Neuroscience, Guest Lecturer
Icahn School of Medicine at Mount Sinai, Graduate School

2017 – 2023 Selected Topics in Neuroscience, Course co-director
Icahn School of Medicine at Mount Sinai, Graduate School

2014 Psychopharmacology, Instructor
Department of Psychology, California State University East Bay

2007 – 2008 Introduction to Statistics, Instructor
Stern College for Women of Yeshiva University

2005 – 2007 Lab Instructor/TA Biostatistical Concepts and Methods
Mount Sinai Graduate School

2003 – 2010 AHA Basic Care Life Support
CPR Instructor/ 2004-2006 Course Coordinator
Mount Sinai School of Medicine

Memberships, Committees, and Conference organization

Society for Neuroscience

2024 – present Gordon Research Conference (GRC) Neurobiology of Cognition, Co-chair

2023 – present Computational and Systems Neuroscience (COSYNE), Program Committee

2022 – 2024 Gordon Research Conference (GRC) Neurobiology of Cognition, Co-vice Chair

2022, 2023 Cognitive Computational Neuroscience (CCN), Technical Programs Committee

2019 Reinforcement Learning and Decision Making (RLDM 2019) Program Committee

2018 – present Computational Properties of Prefrontal Cortex (CPPC) Meeting, Executive Organizing Committee

2018 – 2020 Mount Sinai MD/PhD Admissions Committee

2006 – 2008 Mount Sinai Graduate School Steering Committee

2005 – 2007 Mount Sinai MD/PhD Admissions Committee

Ad Hoc Work, Professional Service and Outreach

Guest speaker 2024, Curious Science Writers Summer Program, supported by Americans for Medical Progress (AMP)

Mentor, Journal of Neuroscience's *Journal Club* series 2024
Co-organizer, Lipschultz Center Cognitive Neuroscience Symposium 2024, New York, NY
SfN Journals: In Conversation webinar series 2024
Co-organizer, Computational Properties of Prefrontal Cortex (CPPC) 2024, Bethesda, MD
Society for Neuroscience 2023 Minisymposium Co-chair, *Decoding Cognitive Signals from the Prefrontal Cortex*
MINDS Community Brain Fair 2023
Mock interviews, Summer Undergraduate Research Program for Underrepresented Scholars (SURP4US) 2023
Winter Conference on the Neurobiology of Learning and Memory 2023 Session Co-organizer, Neural *decoding approaches to understanding learning and memory*
Reviewer, Ben Barres Spotlight Awards 2021 - 2023
Reviewer, Human Frontier Science Program (HFSP) Postdoctoral Fellowships 2021
Reviewer, Chan Zuckerberg Biohub Investigator Awards 2021
Reviewer, Computational and Systems Neuroscience (COSYNE) Meeting 2020-2021
Society for Neuroscience Reviewer Mentor Program 2019 – 2022
Mount Sinai Committee on Special Awards, Pew Biomedical Scholars Application Review, 2019 - 2024
Future of Behavioral Neuroscience workshop. 2019. Session co-chair: *How to best use theory and computation to inform behavioral and recording experiments.*
Organizer, Friedman Brain Institute Faculty Retreat 2018
Alumni Panel, Icahn School of Medicine MSTP Annual Retreat 2018
Center for Excellence in Youth Education, Day-with-a-Scientist Series 2018
Panelist, *The Places You'll Go: Conversations with Women Alumni* 2017, hosted by Mount Sinai Women in MSTP and Women in Science and Medicine (WiSM)
Icahn School of Medicine, Department of Neuroscience Faculty Search Committee Co-chair 2017, 2020, 2022
Society for Neuroscience 2016 Minisymposium Co-chair, *Neural Mechanisms of Economic Choice*

Editorial positions:

Reviewing Editor, *Journal of Neuroscience* 2022 – present
Board of Reviewing Editors, *eLife* 2020 – present
Associate Editor, *Journal of Neuroscience* 2019 – 2022

NIH Study section service:

Research Program Awards (R35) 2024
BRAIN Initiative: Exploratory Team-Research BRAIN Circuit Programs - eTeamBCP (U01) 2023
BRAIN Initiative Advanced Postdoctoral Career Transition Award to Promote Diversity (K99/R00) 2023
Limited Competition National Primate Research Centers Special Emphasis Panel 2022
Katz Early-Stage Investigator Grant Special Emphasis Panel 2022
NIH BRAINS Initiative U01 Special Emphasis Panel Study Section 2021
Human Complex Mental Function (HCMF) Study Section ad hoc member 2021, 2022
NIMH K99/R00 Special Emphasis Panel Study Section 2021
Cognition and Perception (CP) Study Section ad hoc member 2020

Ad-hoc reviewer for: *Nature, Science*, *Cell*, *Nature Neuroscience, Neuron, Current Biology, Nature Communications, PNAS, Cell Reports, Current Opinion in Behavioral Sciences, Behavioral Neuroscience, Cerebral Cortex, European Journal of Neuroscience, Brain and Neuroscience Advances, Psychiatry Research, and others*

Publications

Book Chapters

Simon, J., Rudebeck, P.H., **Rich, E.L.** From affective to cognitive processing: Functional organization of the medial frontal cortex. In Roesch, M., Amarante, L., Laubach, M., Brockett, A. (Eds.) What does Medial

Frontal Cortex Signal During Behavior? Insights from Behavioral Neurophysiology. *International Review of Neurobiology*, 2021 Vol 161. Academic Press. https://doi.org/10.1016/bs.irn.2020.11.011.

Rich, E.L., Averbeck, B.B. Neurophysiology: Differentiating functional contributions across prefrontal cortex. In Banich, M.T., Haber, S.N., Robbins, T.W. (Eds.) The Frontal Cortex: Organization, Networks, and Function" *Strüngmann Forum Reports,* 2024 Vol 34. MIT Press. ISBN:9780262549530

Murray, E.A., Averbeck, B.B., Badre, D., Constantinidis, C., Cools, R., Curtis, C.E., Fellows, L.K., Mitchell, A.S., Murray, J.D., **Rich, E.L.**, D'Esposito, M. Functional fractionation and integration: Physiology, Networks, and Behaviors. In Banich, M.T., Haber, S.N., Robbins, T.W. (Eds.) The Frontal Cortex: Organization, Networks, and Function" *Strüngmann Forum Reports,* 2024 Vol 34. MIT Press. ISBN:9780262549530

Articles (* of special interest)

*Perkins, A.Q., **Rich, E.L**. Attention-dependent attribute comparisons underlie multi-attribute decision-making in orbitofrontal cortex. *BioRxiv* 2024.11.12.623291; doi: https://doi.org/10.1101/2024.11.12.623291

Yang, F.C., Chiang, F.K., **Rich, E.L**. Burwell, R.D. Pulvinar perturbation causes functional reorganization of visual attentional information in posterior parietal cortex. *BioRxiv* 2024.09.29.615686. https://doi.org/10.1101/2024.09.29.615686

*Simon, J. **Rich, E.L.** Neural populations in macaque anterior cingulate cortex encode social image identities. *Nat Commun.* 15, 7500 (2024). doi: 10.1038/s41467-024-51825-5

Simon, J. **Rich, E.L.** Stimulating social interest: The translational value of basic investigations into frontal cortex function. *Neuron* 2024 Aug 7, 112(15):2461-2463. doi: 10.1016/j.neuron.2024.07.004

Commentary for Fan et al., 2024.

*Perkins, A.Q., Gillis, Z.S., **Rich, E.L**. Multi-attribute decision-making in macaques relies on direct attribute comparisons. *J Cog Neurosci* 2024 Jun 26, 1-19. doi: 10.1162/jocn_a_02208

*Chien, J. Wallis, J.D., **Rich, E.L**. Abstraction of reward context facilitates relative reward coding in dorsal and ventral anterior cingulate cortex. *J Neurosci* 2023 Aug;43(33):5944-5962. doi: 10.1523/JNEUROSCI.0292-23.2023

*Chiang, F.K., Wallis, J.D., **Rich, E.L**. Cognitive strategies shift information from single neurons to populations in prefrontal cortex. *Neuron*. 2022 Feb 16;110(4):709-721.e4. doi: 10.1016/j.neuron.2021.11.021.

Afzal, M.F., Márton, C.D., **Rich, E.L.**, Rajan, K. TRAKR - A reservoir-based tool for fast and accurate classification of neural time-series patterns. *bioRxiv* 2021 https://doi.org/10.1101/2021.10.13.464288

Enel, P. Perkins, A.Q., **Rich, E.L.** Heterogeneous value coding in orbitofrontal populations. *Behav Neurosci* 2021 Apr;135(2):245-254. doi: doi.org/10.1037/bne0000457

Perkins, A.Q., **Rich, E.L.** Identifying identity and attributing value to attributes: reconsidering mechanisms of preference decisions. *Curr Opin Behav Sci.* 2021 Oct;41:98-105. doi: https://doi.org/10.1016/j.cobeha.2021.04.019.

*Enel, P., Wallis, J.D., **Rich, E.L.** Stable and dynamic representations of value in the prefrontal cortex. *Elife.* 2020 Jul 6;9e54313. doi: 10.7554/eLife.54313.

Rudebeck, P.H., **Rich, E.L.,** Mayberg, H.S. From bed to bench side: reverse translation to optimize neuromodulation for mood disorders. *Proc Natl Acad Sci.* 2019 Dec 23;116(52):26288-96. doi: 10.1073/pnas.1902287116.

Rudebeck, P.H., **Rich, E.L.** Orbitofrontal cortex. *Curr Biol*. 2018 Sep 24;28(18):R1083-R1088. doi: 10.1016/j.cub.2018.07.018

Rich, E.L., Stoll, F.M., Rudebeck, P.H. Linking dynamic patterns of neural activity in orbitofrontal cortex with decision making. *Curr Opin Neurobiol.* 2017 Nov 20;49:24-32. doi: 10.1016/j.conb.2017.11.002.

Santacruz, S.R., **Rich, E.L.**, Wallis, J.D., Carmena, J.M. Caudate microstimulation increases value of specific choices. *Curr Biol.* 2017 Nov 6;27(21):3375-3383.e3. doi: 10.1016/j.cub.2017.09.051.

Rich, E.L., Wallis, J.D. Spatiotemporal dynamics of information encoding revealed in orbitofrontal high-gamma. *Nat Commun.* 2017 Oct 26;8(1):1139. doi: 10.1038/s41467-017-01253-5.

***Rich, E.L.**, Wallis, J.D. Decoding Subjective Decisions from Orbitofrontal Cortex. *Nat Neurosci*. 2016 Jul;19(7):973-80. doi: 10.1038/nn.4320.

Rich, E.L., Wallis, J.D. What stays the same in orbitofrontal cortex. *Nat Neurosci.* 2016 May 26;19(6):768-70. doi: 10.1038/nn.4305.

Commentary for Xie and Padoa-Schioppa, 2016.

Rich, E.L., Wallis, J.D. Medial-lateral organization of the orbitofrontal cortex. *J Cogn Neurosci*. 2014 Jul; 26(7):1347-62. doi: 10.1162/jocn_a_00573.

Rich E.L., Wallis, J.D. Prefrontal-Amygdala Interactions Underlying Value Coding. *Neuron*. 2013 Dec; 80(6):1344-1346. doi: 10.1016/j.neuron.2013.11.027.

Commentary for Rudebeck and Murray, 2013.

Perez-Rodriguez, M.M., Hazlett, E.A., **Rich, E.L.**, Ripoll, L.H., Weiner, D.M., Spence, N., Goodman, M., Koenigsberg, H.W., Siever, L.J., New, A.S. Striatal activity in borderline personality disorder with comorbid intermittent explosive disorder: sex differences. *J Psychiatr Res*. 2012 Jun;46(6):797-804. doi: 10.1016/j.jpsychires.2012.02.014.

Wallis, J.D., **Rich, E.L.** Challenges of Interpreting Frontal Neurons during Value-Based Decision-Making. *Front Neurosci*. 2011;5:124. doi: 10.3389/fnins.2011.00124.

***Rich, E.L.**, Shapiro, M.L. Rat prefrontal cortical neurons selectively code strategy switches. *J Neurosci*. 2009 Jun:29(22):7208-19. doi: 10.1523/JNEUROSCI.6068-08.2009.

Bozdagi O, **Rich E**, Tronel S, Sadahiro M, Patterson K, Shapiro ML, Alberini CM, Huntley GW, Salton SR. The neurotrophin-inducible gene Vgf regulates hippocampal function and behavior through a brain-derived neurotrophic factor-dependent mechanism. *J Neurosci*. 2008 Sept;28(39):9857-69. doi: 10.1523/JNEUROSCI.3145-08.2008.

Romero, L.M., **Rich, E.L.** Photoperiodically-induced changes in hypothalamic-pituitary-adrenal axis sensitivity in captive house sparrows (*Passer domesticus*). *Comp Biochem Physiol A Mol Integr Physiol*. 2007 Jun; 147(2):562-8. doi: 10.1016/j.cbpa.2007.02.004.

Rich, E.L., Shapiro, M.L. Prelimbic/Infralimbic inactivation impairs memory for multiple task switches, but not flexible selection of familiar tasks. *J Neurosci*. 2007 Apr; 27(17):4747-4755. doi: 10.1523/JNEUROSCI.0369-07.2007.

Rich, E.L., Romero, L.M. Exposure to chronic stress downregulates corticosterone responses to acute stressors. *Am J Physiol Regul Integr Comp Physiol*. 2005 Jun; 288(6):R1628-36. doi: 10.1152/ajpregu.00484.2004.

Rich, E.L., Romero, L.M. Daily and photoperiod variations of basal and stress-induced corticosterone concentrations in house sparrows (*Passer domesticus*). *J Comp Physiol [B]*. 2001 Oct; 11(7):543-7. doi: 10.1007/s003600100204.

Invited Talks

2024

Attributing value to attributes during value-based decision-making. National Institutes of Mental Health. Bethesda, MD.

Attributing value to attributes during value-based decision-making. Psychological and Brain Sciences, University of Iowa. Iowa City, IA.

Mechanisms of multi-attribute decision-making. Quadrennial meeting on OFC function. Paris, France

Abstraction of reward context facilitates relative reward coding in the anterior cingulate cortex. Cosyne Workshops. Cascais, Portugal.

2023

Cognitive strategies change mnemonic codes in prefrontal cortex. Society for Neuroscience Minisymposium. Washington DC.

Neural coding for flexible behavior in prefrontal cortex. Department of Neuroscience Baylor College of Medicine. Houston, TX.

Neural coding for flexible behavior in prefrontal cortex. Research Unit 5159 Resolving the prefrontal circuits of cognitive flexibility Lecture Series. Hamburg, Germany (virtual seminar)

Neural circuits and mechanisms for social cognition. Keynote address, The Friedman Brain Institute 15th Anniversary Symposium. New York, NY.

Neural coding for flexible behavior in prefrontal cortex. Center for Systems Neuroscience. Boston University School of Medicine, Boston, MA.

Neural coding for flexible behavior in prefrontal cortex. Neuroscience Institute Seminar. University of Chicago, Chicago, IL. *student-selected speaker

Cognitive strategies change mnemonic codes in prefrontal cortex, Park City Winter Conference on the Neurobiology of Learning and Memory 2023. Park City, UT.

2022

Neural coding for flexible behavior in prefrontal cortex. Center for Neuroscience Special Seminar. University of Pittsburgh, Pittsburgh, PA.

Neural coding for flexible behavior in prefrontal cortex. Tübingen Neuro-Campus Neurocolloquium 2022. International Max Planck Research School, Max Planck Institute for Biological Cybernetics and the University of Tübingen, Tübingen, Germany (virtual seminar) *student-selected speaker

Neural coding for flexible behavior in prefrontal cortex. Neuroscience Seminar Series 2022. University of Washington, Seattle, WA.

Neural coding for flexible behavior in prefrontal cortex. Center for Molecular and Behavioral Neuroscience Seminar Series 2022. Rutgers University, Newark, NJ.

Cognitive strategies change mnemonic codes in prefrontal cortex, Frontal Cortex 2022, Gordon Research Conferences. Ventura, CA.

Cognitive strategies change mnemonic codes in prefrontal cortex, Neurobiology of Cognition 2022, Gordon Research Conferences. Newry, ME.

Neurons, populations, and tuning curves. Keynote address, Friedman Brain Institute Annual Retreat 2022 New York, NY.

The orbitofrontal cortex, value, and mechanisms of decision-making. The Neurobiology of Reward and Decision-making Conference 2022. Lake Arrowhead, CA.

Behavioral Strategies Shift Information from Single Neurons to Populations in Prefrontal Cortex. *In symposium* Innovative Approaches and Tools to Study Animal Behavior in Neuroscience Research of Mental Health. Society of Biological Psychiatry 2022 Annual Meeting. New Orleans, LA.

Neural coding for flexible behavior in prefrontal cortex. Psychology/Neuroscience Seminar Series 2022. Vanderbilt University, Nashville, TN.

Cognitive strategies dynamically shift neural codes in prefrontal cortex. Computational Properties of Prefrontal Cortex Conference 2022. Oxford, UK.

2021

Flexible neural coding of self-organized behaviors. Département de neurosciences Seminar 2021. Université de Montréal, Montréal QC, Canada (virtual seminar)

Neural dynamics underlying memory and decision-making in prefrontal cortex. Department of Neuroscience Seminar 2021. Northwestern University Feinberg School of Medicine, Chicago, IL (virtual seminar)

2020

Neural dynamics underlying memory and decision-making in prefrontal cortex. Center for Brain Science Seminar 2020. Harvard University, Cambridge, MA (virtual seminar)

Taste expectations and motivated behavior in the macaque orbitofrontal cortex. International Symposium on Olfaction and Taste (ISOT) 2020. (virtual conference symposium)

Neural dynamics underlying memory and decision-making in prefrontal cortex. Rockefeller University Neuroscience Seminar Series 2020. New York, NY. (virtual seminar)

Neural dynamics underlying memory and decision-making in prefrontal cortex. Yale University 2020. New Haven, CT.

2019

Stable and dynamic representations of value in the orbitofrontal cortex. Fourth Quadrennial meeting on OFC function 2019. Paris, France

Neural dynamics underlying memory and decision-making in prefrontal cortex. Department of Neuroscience Seminar Series 2019. Brown University. Providence, RI

Dynamics of evaluation and choice in the orbitofrontal cortex. Bernstein Conference 2019 Satellite Workshop, Cortical computations via metastable activity. Berlin, Germany.

Value and choice in the orbitofrontal cortex. National Institute of Mental Health (NIMH) ANGST symposium 2019. Bethesda, MD.

Value and choice in the orbitofrontal cortex. Mount Sinai Depression and Anxiety Center Science Seminar 2019. New York, NY.

2018

Dynamic value representations underlying decision-making. Neurobiology of Cognition 2018, Gordon Research Conferences. Newry, ME.

Reward and decision-making in the orbitofrontal cortex. Columbia University Emerging Addiction Science Workshop 2018. New York, NY.

2017

Task specific value encoding in the human orbitofrontal cortex. Society for Neuroscience 2017. Washington, DC.

Dynamic encoding of choice in the orbitofrontal cortex. SUNY Downstate, Neuroscience Research Seminar 2017, New York, NY

Dynamic Neural Signatures of Subjectivity in Choice. Columbia University Workshop on Information Processing and Behavioral Variability 2017. New York, NY.

Dynamic encoding of choice in the orbitofrontal cortex. Cognitive Neuroscience Society (CNS) 2017. San Francisco, CA.

Dynamic encoding of choice in the orbitofrontal cortex. Computational and Systems Neuroscience (COSYNE) Workshops, 2017. Snowbird, UT.

2016 and earlier

Dynamic encoding of choice in the orbitofrontal cortex. Society for Neuroscience 2016. San Diego, CA.

Competing neural representations of choice alternatives in orbitofrontal cortex during value-based decisions. Society for Neuroscience 2015. Chicago, IL.

Evidence for directionality in orbitofrontal local field potentials. Society for Neuroscience 2014. Washington, DC.

Spatiotemporal dynamics of value coding in the orbitofrontal cortex. Computational Properties of Prefrontal Cortex Conference 2014. Whistler, Canada.

Functional organization of the orbitofrontal cortex. San Francisco VA Medical Center Substance Abuse Seminar 2013. San Francisco, CA.

Prefrontal cortical activity in place and response task switching. Neurobiology of Learning and Memory Winter Conference 2008. Park City, UT.

Prefrontal cortical contributions to behavior organization. Mount Sinai Annual Graduate School Retreat 2008. New York, NY.

Prelimbic/infralimbic inactivation impairs memory for multiple task switches. Mount Sinai Meet the Authors Lecture Series 2007. New York, NY.

Abstracts & Posters

McConnell, S., **Rich, E.L.** Neural dynamics of updating taste reward expectations. Society for Neuroscience 2024.

Perkins, A.Q., **Rich, E.L**. Decision-making in the context of multi-attribute options. Society for Neuroscience 2024.

Simon, J. **Rich, E.L.** Neuron populations in anterior cingulate cortex gyrus dissociate informative from uninformative social cues. Society for Neuroscience 2024.

Glimcher, P. Nguyen, D., **Rich, E.L.,** Wallis, J.D. Louie, K. Dynamic evolution of the decisional reference point across frontal brain regions in the monkey. Society for Neuroscience 2024.

Chiang, FK, **Rich, E.L.** Rostro-caudal gradient of structured representation in primate lateral prefrontal cortex. Computational Properties of Prefrontal Cortex 2024.

McConnell, S., **Rich, E.L.** Neural mechanisms of the influence of reward expectations on behavior. Quadrennial Meeting on OFC Function 2024.

Perkins, A.Q., **Rich, E.L**. Decision-making in the context of multi-attribute options. Quadrennial Meeting on OFC Function 2024.

McConnell, S., **Rich, E.L.** Neural mechanisms of the influence of reward expectations on perception and behavior. Society for Neuroscience 2023.

Simon, J. **Rich, E.L.** Anterior cingulate cortex neurons encode social identity during decision-making task. Society for Neuroscience 2023.

Chiang, FK, **Rich, E.L.** Rostro-caudal gradient of structured representation in primate lateral prefrontal cortex. Society for Neuroscience 2023.

Perkins, A.Q., **Rich, E.L**. Decision-making in the context of multi-attribute options. Society for Neuroscience 2023.

Chiang, FK, **Rich, E.L.** Rostro-caudal gradient of structured representation in primate lateral prefrontal cortex. Simian Collective 2023.

Perkins, A.Q., **Rich, E.L**. Decision-making in the context of multi-attribute options. Society for Neuroscience 2022.

Simon, J., **Rich, E.L.** Anterior cingulate cortex neurons encode social identity during decision-making task. Society for Neuroscience 2022.

Afzal, M.F., Marton, C.D., **Rich, E.L.**, Rajan, K. Distinguishing neural time-series patterns based on reservoir-derived error. Conference on Cognitive Computational Neuroscience (CCN), 2022. doi: 10.32470/CCN.2022.1071-0

Simon, J., **Rich, E.L**. Anterior cingulate cortex neurons encode social identity during decision-making task Frontal Cortex 2022, Gordon Research Conferences.

Perkins, A.Q., **Rich, E.L.** Decision-making in the context of multi-attribute options. Frontal Cortex 2022, Gordon Research Conferences.

Chiang, F.K., **Rich, E.L**. Functional heterogeneity of prefrontal coding in a self-ordered working memory task. Neurobiology of Cognition 2022, Gordon Research Conferences.

Perkins, A.Q., **Rich, E.L.** Decision-making in the context of multi-attribute options. The Neurobiology of Reward and Decision-making Conference 2022.

Chiang, F.K., **Rich, E.L**. Functional heterogeneity of prefrontal oscillations in a self-ordered working memory task. Society for Neuroscience 2021.

Chiang, F.K., Wallis, J.D., **Rich, E.L.** Distributed representations in primate DLPFC with strategy use in a self-ordered working memory task. Computational and Systems Neuroscience (COSYNE) 2021.

Chiang, F.K., Wallis, J.D., **Rich, E.L.** Distributed representations in primate DLPFC with strategy use in a self-ordered working memory task. SfN Global Connectome 2021.

Perkins, A.Q., **Rich, E.L.** Decision-making in the context of multi-attribute options. SfN Global Connectome 2021.

Simon, J., **Rich, E.L.** Eye-gaze dynamics using nonsocial and social visual guides for decision-making. SfN Global Connectome 2021.

Chiang, F.K., Wallis, J.D., **Rich, E.L.** Mnemonic strategies create distributed population codes for working memory in lateral prefrontal cortex. AREADNE Conference on Encoding and Decoding of Neural Ensembles 2020.

Enel, P., Wallis, J.D., **Rich, E.L.** Dynamics of value representations in the prefrontal cortex. AREADNE Conference on Encoding and Decoding of Neural Ensembles 2020.

Chiang, F.K., **Rich, E.L.** Prefrontal tuning in mnemonic chunking in a spatial self-ordered search task. Friedman Brain Institute Annual Retreat 2020.

Chiang, F.K., **Rich, E.L.** Prefrontal tuning in mnemonic chunking in a spatial self-ordered search task. Cognitive Neuroscience Society (CNS) 2020.

Chiang, F.K., **Rich, E.L.** Neural mechanisms of mnemonic chunking. Control Processes Conference 2019.

Enel, P., Wallis, J.D., **Rich, E.L.** Is it stable or dynamic? Value representation in the prefrontal cortex of macaque monkeys during a delay. Nanosymposium. Society for Neuroscience 2019.

Gillis, Z.S., **Rich, E.L.** The role of the orbitofrontal cortex in updating value expectations. Society for Neuroscience 2019.

Gillis, Z.S., Perkins, A.Q., **Rich, E.L.** Decision-making in the context of multi-attribute options. Society for Neuroscience 2019.

Chiang, F.K. Wallis, J.D., **Rich, E.L.** Adaptive coding of multiplexed information in primate lateral prefrontal cortex. Society for Neuroscience 2019.

Gillis, Z.S., **Rich, E.L.** The role of the orbitofrontal cortex in expectation formation and alteration. Friedman Brain Institute Annual Retreat 2019.

Enel, P. Wallis, J.D., **Rich, E.L.** Is it stable or dynamic? Value representation in the prefrontal cortex of macaque monkeys during a delay. Friedman Brain Institute Annual Retreat 2019.

Chiang, F.K., **Rich, E.L.** Ensemble decoding of spatial and sequential information in primate lateral prefrontal cortex. Friedman Brain Institute Annual Retreat 2019.

Gillis, Z.S., **Rich, E.L.** The role of the orbitofrontal cortex in expectation and motivation. Society for Neuroscience 2018.

Chiang, F.K., Wallis, J.D., **Rich, E.L.** Ensemble decoding of spatial and mnemonic information in lateral prefrontal cortex. Society for Neuroscience 2018.

Enel, P., Wallis, J.D. **Rich, E.L.** Representations and dynamics in OFC and ACC in a value based decision making task. Society for Neuroscience 2018.

Enel, P., Wallis, J.D. **Rich, E.L.** Representations and dynamics in OFC and ACC in a value based decision making task. Computational Properties of Prefrontal Cortex 2018.

Chiang, F.K., **Rich, E.L.** Prefrontal tuning in mnemonic strategies in a spatial self-ordered search task. Computational Properties of Prefrontal Cortex 2018.

Chiang, F.K., **Rich, E.L.** Prefrontal tuning in mnemonic strategies in a spatial self-ordered search task. Friedman Brain Institute Annual Retreat 2018.

Santacruz, S.R., **Rich, E.L.**, Wallis, J.D., Carmena, J.M. Stimulation in primate caudate nucleus mediates decision-making behavior in free-choice task. Society for Neuroscience 2016.

Rich, E.L., Wallis, J.D. Decoding subjective decisions from the orbitofrontal cortex. AREADNE Conference on Encoding and Decoding of Neural Ensembles 2016.

Rich, E.L., Wallis, J.D., Dawes, H., Chang, E.F. Encoding of stimulus value estimates in high-frequency epicortical signals in human OFC. Quadriennal Meeting on OFC Function 2015

Chang, E.F., Case, J, Wallis, J.D., **Rich, E.L.** Learned representations of sensory stimulus value in large-scale brain networks. Society for Neuroscience 2015.

Rich, E.L., Wallis, J.D. Evidence for directionality in orbitofrontal local field potentials. Computational and Systems Neuroscience (COSYNE) 2015.

Rich, E.L., Wallis, J.D. Representation of primary and secondary rewards in orbitofrontal cortex. Society for Neuroscience 2013.

Rich, E.L., Wallis, J.D. Prefrontal cortex differentially encodes stimuli and actions associated with rewards or punishment. Society for Neuroscience 2012.

Rich, E.L., Wallis, J.D. Differential effects of positive and negative reinforcement on behavior. Society for Neuroscience 2011.

Rich, E.L., Shapiro, M.L. Strategy switching correlates in rat prelimbic/infralimbic neurons. Society for Neuroscience 2007.

Rich, E.L., Shapiro, M.L. Rat prelimbic/infralimbic areas contribute to multiple strategy switches. Society for Neuroscience 2006.

Rich, E.L., Romero, L.M. Corticosterone response to variable doses of dexamethasone, CRF and ACTH in the European Starling (*Sturnus vulgaris*). Society for Integrative and Comparative Biology 2002.

Romero, L.M., **Rich, E.L.**, Tran, K.D., Nephew, B.C. Regulation of corticosterone release in captive house sparrows. Society for Integrative and Comparative Biology 2002.

Rich, E.L., Romero, L.M. Daily and seasonal variation in basal and stress-induced levels of corticosterone in house sparrows. N.E.U.R.O.N. 2000.

Online data sets and analysis code

Single- and multi-unit firing rate of two macaque monkeys' OFC and ACC neurons in value based decision-making task. Re. Enel et al., 2020. doi:10.5061/dryad.4j0zpc88b

Cognitive strategies shift information from single neurons to populations in prefrontal cortex. Re. Chiang et al., 2022. doi: 10.5281/zenodo.5708963