

Jefferson E. Roy

Neuroscientist with extensive experience in the investigation of goal-directed behavior using electrophysiological recording techniques. Knowledgeable about grant management and budgeting. Engaged technical consultant.

KEY STRENGTHS

- Cognitive study design
- In vivo recording
- Matlab and Julia
- Mentoring and supervision
- Scientific writing
- Surgical procedures
- Technical consulting
- Science outreach
- Content creation
- Compliance
- Budgeting
- Grant writing

NEUROSCIENCE EXPERIENCE

- Research Scientist III***2007-present**Cambridge, MA, USA*

The Picower Institute for Learning and Memory at MIT under mentorship of Dr. Earl K. Miller

 - Investigating neuronal mechanisms of cognitive flexibility during goal-directed behavior
 - Design and implement multiple electrophysiological non-human primate studies of cognitive behavior
 - Analyze complex neuronal signals and behavior with custom Matlab and Julia scripts
 - Proficient with chronic array implantation and recordings, acute recordings, EEG recordings, and electrical stimulation
- Associate Lab Director of Miller Lab***2013-present**Cambridge, MA, USA*

The Picower Institute for Learning and Memory at MIT

 - Perform and teach surgical procedures (e.g. headposts, acute recording chambers, chronic arrays)
 - Collaborative mentor to new postdoctoral researchers and graduate students
 - Ensure budgetary compliance per MIT, NIH, NSF, and industry guidelines
 - Ensure biosafety and animal use compliance per MIT, USDA, and AAALAC guidelines
 - Manage grant applications and progress reports
 - Member of MIT Compassion Fatigue Committee (2024-present)
 - Member of MIT Committee on Animal Care (2025-present)
- Postdoctoral Associate***2002-2007**Cambridge, MA, USA*

The Picower Institute for Learning and Memory at MIT under mentorship of Dr. Earl K. Miller
- Graduate Student***1995-2002**Montréal, QC, Canada*

McGill University Department of Physiology with Dr. Kathleen E. Cullen

 - Investigated neuronal control of the VOR, VCR, and eye movements in alert behaving non-human primates

CONSULTING

- Muddled Mind Consulting LLC. (Founder)***2013-present**Cambridge, MA, USA*
 - Provide neuroscience technical consulting services to companies that includes writing whitepapers, data analysis, grant writing and editing, scripts/storyboards, educational content creation, and instruction

EDUCATION

- McGill University**, Ph.D. in Physiology (Dean’s Honours List)*Montréal, QC, Canada*
- University of Western Ontario**, B.Sc. in Physiology (Honours List)*London, ON, Canada*

COURSES

- Google Project Management Certificate: by Google on Coursera2024

OUTREACH

- The Innovation Institute***2019-2021**Newton, MA, USA*
 - Instruction of grade 4-5 students in hands-on science exploration of body systems (e.g. muscles, CNS, bones)

Science from Scientists

2014-2017

Bedford, MA, USA

- Taught engaging lessons to 4th grade students with the mission to improve attitudes and aptitudes in STEM fields.

Judge for Middle and High Schools Science Fairs

- Boston Public School Citywide Science Fair

2016-2017, 2023-24

Boston, MA, USA

- Massachusetts State High School Science and Engineering Fair

2009-2023

Cambridge, MA, USA

PUBLICATIONS

Book

Bundgaard, M.H. and Roy, J.E., The Motivated Brain. Copenhagen:CreateSpace, 2014.

Selected Manuscripts

Miller, E.K., Brincat, S.L., and **Roy, J.E.** (2026) Analog cognition and consciousness. *J. Neurosci.* 46 (33) e0711262026; <https://doi.org/10.1523/JNEUROSCI.0711-26.2026>.

Eisen, A. J., Bardon, A. G., Ballesteros, J. J., Bastos, A. M., Donoghue, J. A., Mahnke, M. K., Brincat, S. L., **Roy, J.**, Ishizawa, Y., Brown, E. N., Fiete, I., & Miller, E. K. (2026) Similar destabilization of neural dynamics under different general anesthetics, *Cell Reports*, <https://doi.org/10.1016/j.celrep.2026.117048>.

Broschard, M.B., **Roy, J.E.**, Brincat, S.L., Mahnke, M.K., and Miller, E.K. (2025) Evidence for an active handoff between cerebral hemispheres during target tracking, *J. Neurosci.* DOI: 10.1523/JNEUROSCI.0841-25.2025.

Bardon, A.G., Ballesteros, J.J., Brincat, S.L., **Roy, J.E.**, Mahnke, M.M., Ishizawa, Y., Brown, E.N., and Miller, E.K. (2025) Convergent effects of different anesthetics on changes in phase alignment of cortical oscillations, *Cell Reports*.

Miller, E.K., Brincat, S.L., and **Roy, J.E.** (2024) Cognition is an emergent property. *Curr. Opin. Behav. Sci.*

Bastos, A.M., Donoghue, J.A., Brincat, S.L., Mahnke, M., Yanar, J., Correa, J., Waite, A.S., Lundqvist, M., **Roy, J.**, Brown, E.N. and Miller, E.K. (2021) Neural effects of propofol-induced unconsciousness and its reversal using thalamic stimulation. *eLife*, DOI: 10.7554/eLife.60824.

Tiganj, Z., Cromer, J.A., **Roy, J.E.**, Miller, E.K., and Howard, M.W. (2018) Compressed Timeline of Recent Experience in Monkey LPFC. *J.Cogn. Neurosci*, 1-16.

Wutz, A., Loonis, R., **Roy, J.E.**, Donoghue, J.A., and Miller, E.K. (2018) Different levels of category abstraction by different dynamics in different prefrontal areas. *Neuron*, 97, 716-726.

Stanley, D.A., **Roy, J.E.**, Aoi, M.C., Kopell, N.J., and Miller, E.K. (2018) Low-beta Oscillations Turn Up the Gain During Category Judgments. *Cerebral Cortex*, 28, 116-130.

Roy, J.E., Buschman, T.J., and Miller, E.K. (2014) Prefrontal Cortex Neurons Reflect Categorical Decisions About Ambiguous Stimuli. *J.Cogn. Neurosci*, 26, 1283-1291.

Buschman, T.J., Siegel, M., **Roy, J.E.**, and Miller, E.K. (2011) Neural Substrates of Cognitive Capacity Limitations. *PNAS*, 108, 11252-11255.

Cromer, J., **Roy, J.E.**, Buschman, T.J., and Miller, E.K. (2011) Comparison of Primate Prefrontal and Premotor Cortex Neuronal Activity During Visual Categorization. *J. Cogn. Neurosci*, 23, 3355-3365.

Roy, J.E., Riesenhuber, M., Poggio, T., and Miller, E.K. (2010) Prefrontal Cortex Activity during Flexible Categorization. *J. Neurosci.* 30, 8519-8528.

Cromer, J., **Roy, J.E.**, and Miller, E.K. (2010) Representation of Multiple, Independent Categories in the Primate Prefrontal Cortex. *Neuron* 66, 796-807.

Cullen, K.E. and **Roy, J.E.** (2004) Signal Processing in the Vestibular System during Active versus Passive Head Movements. *J. Neurophysiol.* 91, 1919-1933.

Roy, J.E. and Cullen, K.E. (2004) Dissociating Self-Generated from Passively Applied Head Motion: Neural Mechanisms in the Vestibular Nuclei. *J. Neurosci.* 24, 2102-2111.