

# Jefferson Edward Roy

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## Summary of Expertise

- Neuroscience methods
  - Mentoring and supervision
  - Animal behavior training / surgeries
  - Scientific writing and presentations
  - Matlab programming for analysis
  - Technical consulting
  - Peer-review
  - Microsoft Office / Adobe Illustrator
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## Education

### **McGill University**, Montréal, QC, Canada

- Ph.D. in the Department of Physiology Dean's Honours List (1995-2003).  
Thesis: Signal Processing by Vestibular Nuclei Neurons: Dissociating Sensory, Motor, and Cognitive Influences.

### **University of Western Ontario**, London, ON, Canada

- B.Sc. (Honours) in Physiology, Department of Physiology (1989-1994).
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## Neuroscience Experience

### **Picower Institute for Learning and Memory at MIT**, Cambridge, MA, USA

Research Scientist under the mentorship of Earl K. Miller, Ph.D. (Sept. 2007-present).  
Postdoctoral associate (Sept. 2002-Sept. 2007)

- Investigating neuronal mechanisms of cognitive flexibility during goal-directed behavior.
  - Designed and implemented multiple non-human primate studies.
  - Recorded activity of multiple neurons in two brain regions simultaneously.
  - Analyzed complex neuronal signals and behavior with custom Matlab scripts.

### **McGill University Department of Physiology**, Montréal, QC, Canada

Ph.D. student under the mentorship of Kathleen E. Cullen, Ph.D. (1995-2003).

- Investigated neuronal mechanisms involved in the control of the vestibuloocular reflex and vestibulocollic reflex in the alert behaving non-human primates.
    - Designed and implemented studies in which animals generated specific eye/head/body movements while recording activity of brainstem.
    - Analyzed complex neuronal signals and behavior with custom Matlab scripts.
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## Technical Consulting and Freelancing

### **Motivation Factor Inc.**, Copenhagen, Denmark

- Neuroscience consultant for a novel framework that targets change processes and motivation and is based on cognitive psychology and brain research (March 2012 - present).

### **Boundless Learning Inc.**, Boston, MA, USA

- Freelance content generation for open-source textbooks (Feb. 2012 - present).

### **InnerSea Technology Inc.**, Bedford, MA, USA

- Designed behavioral protocols for the evaluation of an innovative neural prosthetic interface in amputees for DARPA grant applications (Dec. 2010 - March 2011).
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## Mentoring, Teaching, and Outreach

**Picower Institute for Learning and Memory at MIT**, Cambridge, MA, USA

- Currently mentoring a postdoctoral associate and a graduate student (functional non-human primate MRI study).
- Supervised, and mentored undergraduate students for 1 1/2 years. Now in PhD programs at University of California Berkeley and Brown University.
- Invited to present at campus-wide professional development seminars to non-scientists:
  - Animal Care Staff - outlining non-human primate neuroscience research (2007).
  - Clinical Veterinary Staff - describing results of my research projects (2005).

#### **Massachusetts State Science and Engineering Fair**, Cambridge, MA, USA

- Judge at State High School Science Fair, 2009, 2011, 2012.

#### **Literacy Volunteers of Massachusetts**, Boston, MA, USA

- Volunteer tutor (2 hrs/week) for adult students (2003-2009).

#### **McGill University Department of Physiology**, Montréal, QC, Canada

- Introductory Physiology Laboratory Teaching Assistant (4 weeks/year for 6 years).
- Physiology Day of the McGill Summer Science School Program (2002-2003).
- Graduate student member on Faculty of Medicine Animal Care Committee (1998-2003).

#### **Editorial activities**

- *Ad hoc* reviewer for PLoS One

#### **Fellowships and Awards**

- Canadian Institutes of Health Research Postdoctoral Fellowship (2002-2004).
- Canadian Institutes of Health Research Doctoral Research Award (1998-2001).

#### **Publications**

- Buschman, T.J., Siegel, M., **Roy, J.E.**, and Miller, E.K. Neural substrates of cognitive capacity limitations. *PNAS*, 108, 11252-11255, 2011.
- Cromer, J., **Roy, J.E.**, Buschman, T.J., and Miller, E.K. Comparison of Primate Prefrontal and Premotor Cortex Neuronal Activity During Visual Categorization. *J. Cogn. Neurosci.*, in press.
- **Roy, J.E.**, Riesenhuber, M., Poggio, T., and Miller, E.K. Prefrontal Cortex Activity during Flexible Categorization. *J. Neurosci.* 30, 8519-8528, 2010.
- Cromer, J., **Roy, J.E.**, and Miller, E.K. Representation of Multiple, Independent Categories in the Primate Prefrontal Cortex. *Neuron* 66, 796-807, 2010.
- Cullen, K.E. and **Roy, J.E.** Signal Processing in the Vestibular System during Active versus Passive Head Movements. *J. Neurophysiol.* 91, 1919-1933, 2004.
- **Roy, J.E.** and Cullen, K.E. Dissociating Self-Generated from Passively Applied Head Motion: Neural Mechanisms in the Vestibular Nuclei. *J. Neurosci.* 24, 2102-2111, 2004.
- **Roy, J.E.** and Cullen, K.E. Brain Stem Pursuit Pathways: Dissociating Visual, Vestibular, and Proprioceptive Inputs during Combined Eye-Head Gaze Tracking. *J. Neurophysiol.* 90: 271-290, 2003.
- **Roy, J.E.** and Cullen, K.E. Vestibuloocular Reflex Signal Modulation During Voluntary versus Passive Head Movements. *J. Neurophysiol.* 87, 2337-2357, 2002.
- **Roy, J.E.** and Cullen, K.E. Selective Processing of Vestibular Reafference During Self-generated Head Motion. *J. Neurosci.* 21, 2131-2142, 2001.
- **Roy, J.E.** and Cullen, K.E. A Neural Correlate for Vestibulo-Ocular Reflex Suppression During Voluntary Eye-Head Gaze Shifts. *Nature Neurosci.* 1, 404-410, 1998.
- Seven invited presentations and >20 posters at international conferences.