Blake Porter, B.A. Hons

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Education:

Ph.D. in Psychology February 2014 - Present
University of Otago – Dunedin, NZ

B.A. in Neuroscience with Honors September 2009 - May 2013
Minor: Human Physiology
Boston University – Boston, MA

Research Experience:

David Bilkey Lab for Brain and Behavior February 2014 – Present
In conjunction with the Brain Health and Research Center
University of Otago, Dunedin, NZ

Use of *in vivo* electrophysiology techniques to investigate how self-control is represented at a neural level, the effects self-control has on the brain's representation of the world, and the circuit level dynamics of planning actions utilizing self-control information.

Howard Eichenbaum Lab for Cognitive Neurobiology Spring 2012 – January 2014
Boston University, Boston, MA, USA

Use of *in vivo* electrophysiology techniques to investigate the structure of memory consolidation and organization in the hippocampus with learning, hippocampal and medial prefrontal circuit dynamics in a context-guided object association task, and to investigate the neural mechanisms by which conjunctive encoding within the dentate gyrus and between the dentate gyrus and other hippocampal subregions.

Publications:

- Lara M. Rangel, Blake Porter, Ian S. Heimbuch, Pamela D. Riverère, Katie R. Keefe, and Howard Eichenbaum. *Conjunctive encoding in the Dentate Gyrus of the Hippocampus*. (in prep)

- Lara M. Rangel, Blake Porter, Carl H. Budlong, Pamela D. Riverère, Katie R. Keefe, and Howard Eichenbaum. *Rhythmic coordination of associative memory representations*. (in prep)

- Anja Farovik, Ryan Place, Samuel McKenzie, Blake Porter, Catherine Munro, and Howard Eichenbaum. *Orbitofrontal cortex encodes memories within value-based schemas and represents contexts that guide memory retrieval*. Journal of Neuroscience. 27 May 2015. 35(21): 8333-8344. doi: 10.1523/JNEUROSCI.0134-15.2015

- Sam McKenzie, Andrea J. Frank, Nathaniel R. Kinsky, Blake Porter, Pamela D. Riverère, and Howard Eichenbaum. *Hippocampal Representation of Related and Opposing Memories Develop within Distinct, Hierarchically Organized Neural Schemas*. Neuron. 2 July 2014. 83(1)202 - 215. http://dx.doi.org/10.1016/j.neuron.2014.05.019

Poster Presentations:

- Lara M. Rangel, Katie R. Keefe, Pamela D. Riverère, Carl H. Budlong, Ian S. Heimbuch, Blake Porter, and Howard Eichenbaum. *Single cell and ensemble odor-place representations in the Dentate Gyrus and CA1 of the Hippocampus*. Society for Neuroscience 2014 Conference.

- Lara M. Rangel, Jeremiah S. Rosen, K. V. Chawla, Brian J. Ferreri, Ian Heimbuch, Blake Porter, and Howard Eichenbaum. *Persistent increases in beta frequency oscillatory activity in the Dentate Gyrus of the Hippocampus During Object-Context Association Intervals.* Society for Neuroscience 2013 Conference.

- Anja Farovik, Sam McKenzie, Ryan Place, Blake Porter, and Howard Eichenbaum. *Neural activity by Medial Prefrontal cell ensembles during context-guided object discrimination*. Society for Neuroscience 2013 Conference.

- Sam McKenzie, Andrea Frank, Lara M. Rangel, Jeremiah S. Rosen, Vittoria Smeglin, Blake Porter, and Howard Eichenbaum. *Multidimensional coding in the Hippocampal network*. Society for Neuroscience 2013 Conference.

- Blake Porter, Andrea Frank, and Howard Eichenbaum. *How does the Hippocampus integrate multiple related memory representations?* Boston University Undergraduate Research Opportunities Program Symposium, 2012.

Research Awards:

- PhD Scholarship from Dr. Bilkey's Marsden Grant for "The Brain Mechanisms of Self-Control" — February 2014 - Present
  University of Otago — $25,000/year

- UROP/HHMI Summer Grant for investigating "How Does the Hippocampus Integrate Multiple Related Memory Representations" — Summer 2012
  Boston University — $4,000

Teaching Experience:

Research Teaching and Mentoring: teaching students rodent behavioural training and *in vivo* electrophysiology methods. May 2013 - Present

Advisees (their subsequent pursuit):
Ian Heimbuch (PhD student, UCLA), Brian Ferreri, and Jessica Barton (MSc, Victoria University).

Mentor for Boston University Mind and Brain Society Fall 2011 – Spring 2013
Mentored incoming freshman in the Undergraduate Neuroscience Program at BU.

Technical Expertise:

- **Animal Behavior**: Rat handling and training on context-object and odor-place associative memory tasks, effort modulated linear tracks, dual animal interaction task. Video behavioural scoring (Cineplex Editor) and behavioural spatial tracking analysis (Matlab). Designing and implementing novel tasks targeted at effort based neural computations.
- ***In vivo* electrophysiology**: 8 – 96 channel microdrive design and construction for multisite recordings using conventional and 3D printing techniques. Implementation of wireless *in vivo* recording systems and methods. Stereotaxic surgical implantation of microdrives and electrodes for single unit and local field potential recordings in awake-behaving rats targeting hippocampal subregions (CA1, CA3, DG), medial prefrontal cortex, orbitofrontal cortex, and anterior cingulate cortex. Recording single units and local field potentials in awake-behaving rats, spike sorting, and perfusions.
- **Computer programming:** Matlab for analysis of behavioural, single unit, and local field potential data. Arduino Development Environment for Arduino microcontrollers for the use of data collection and maze controlling (ie, doors, touch screens, solenoids, etc).

Research Interests:

- How the brain encodes self-control, how self-control modulates the brain's representations of the world, and how self-control influences goal setting, decision making, and persistence.
- The study of brain rhythms and their underlying mechanisms to investigate circuit level communication between the hippocampus and downstream structures, particularly the prefrontal cortex.
- How brain structures organize similar and distinct memories and how memory organization influences learning and decision making.
- How the brain represents space in three dimensions when the z-axis is behaviourally relevant.