

Brendan Hasz

Ph.D. Candidate in Neuroscience

David Redish Lab, University of Minnesota, Twin Cities

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Education

Ph.D. Neuroscience, University of Minnesota, 2019 (expected)

B.S. Neuroscience and Computer Science, with High Honors, Brandeis University, 2013

Honors and Awards

NSF Neuroengineering IGERT Fellowship, 2013

NIH Undergraduate Computational Neuroscience Traineeship, 2012

Brandeis University Dean's List: Fall 2009, Spring 2012, Fall 2012, Spring 2013

Publications and Posters

Papers

Hasz, B. & Redish, A.D. (2018) Deliberation and Procedural Automation on a Two-Step Task for Rats. *Frontiers in Integrative Neuroscience* 12:30. doi: 10.3389/fnint.2018.00030

Theses

Storing Autoassociative Memories through Gamma-frequency Binding between Cell Assemblies of Neural Oscillators, Undergraduate Senior Thesis, May 2013

Oral Presentations

Uncertainty in Model-based and Model-free Neural Decision Making Systems. (2017, April). Invited talk at Carleton College, Northfield, MN.

Uncertainty and Arbitration in Decision Making Systems. (2017, February). Department of Neuroscience Colloquium, University of Minnesota Twin Cities, Minneapolis, MN.

Behavioral Correlates of Model-based and Model-free Neural Decision Making Systems. (2016, November). Invited talk at the Minnesota Institute for Neuroeconomics and Decision Science Fall Research Symposium, Minneapolis, MN.

Model-based and Model-free Neural Decision Making Systems. (2016, March). Department of Neuroscience Colloquium, University of Minnesota Twin Cities, Minneapolis, MN.

Poster Presentations

Hasz, B., & Redish, A.D. (2017, November). Behavioral correlates of deliberation and habit on a contingency switching task for rats. Poster session presented at the Society for Neuroscience Annual Meeting, Washington, DC. Program No. 709.01.

Hasz, B., & Redish, A.D. (2017, April). Spike Decoding without Spike-sorting using Kernel Density Estimation. Poster session presented at the Minnesota Neuromodulation Symposium, Minneapolis, MN.

Hasz, B., & Redish, A.D. (2016, November). A two-step decision-task for rats reveals behavioral correlates of model-based and model-free decisions. Poster session presented at the Society for Neuroscience Annual Meeting, San Diego, CA. Program No. 638.08.

Hasz, B., & Redish, A.D. (2016, September). Behavioral Correlates of Model-based and Model-free Decisions are Revealed by a Two-step Decision-task for Rats. Poster session presented at the Institute for Engineering in Medicine Annual Conference and Retreat, Minneapolis, MN.

Hasz, B., & Redish, A.D. (2016, April). A Spatial Two-stage Decision Task for Rats. Poster session presented at the Center for Cognitive Sciences Spring Research Day, Minneapolis, MN.

Hasz, B., & Redish, A.D. (2016, April). An Unsupervised Algorithm for Neural Spike Sorting inspired by Superparamagnetic Clustering. Poster session presented at the Minnesota Neuromodulation Symposium, Minneapolis, MN.

Hasz, B., & Redish, A.D. (2015, September). A Spatial Two-stage Decision Task for Rats. Poster session presented at the Institute for Engineering in Medicine Annual Conference and Retreat, Minneapolis, MN.

Hasz, B., & Miller, P. (2012, August). Synaptic Conditions for Phase-Difference Bistability in PING Networks. Poster session presented at the Undergraduate Research Day, Brandeis University, Waltham, MA.

Reviews

J. Experimental Psychology General, October 2016

Cell Reports, March 2018

Research / Lab Experience

Ph.D. Thesis Research

David Redish Lab, University of Minnesota, Minneapolis MN

July 2014 - Present

Wrote pipelines in MATLAB and C for spike detection and extraction from raw Intan data, running Kilosort on raw Intan data, and running Klusta on raw Intan data.

Designed and constructed a contingency-switching decision task for rats, and acquired behavioral and neural data from rats running the task using custom MATLAB software. Fit reinforcement learning algorithms and Bayesian mixed models to rat behavior using STAN.

Implemented an algorithm in Python for decoding sensory variables from spike features without spike-sorting, using kernel density estimation.

Designed and constructed a two-stage decision task for rats, and acquired behavioral and neural data from rats running the task. Fit reinforcement learning models to rat behavior using STAN.

Customized and implemented a high-performance clustering algorithm in C to sort spikes from multi-electrode recordings.

Designed and constructed a virtual reality apparatus for rats, enabling 2d navigation with 3 degrees of freedom. Recorded and analyzed hippocampal LFP and spikes, acquired from a chronically implanted silicon probe, from rats running on several virtual tasks.

Rotation Project, Determining Spike Times from Ca Imaging Data

Timothy Ebner Lab, University of Minnesota, Minneapolis MN

April 2014 - May 2014

Implemented a program to deconvolve calcium imaging signals, in order to estimate spike times of ensembles of neurons simultaneously.

Rotation Project, Determining if Dorsal Striatal Neurons show Theta Phase Precession

David Redish Lab, University of Minnesota, Minneapolis MN

January 2014 - March 2014

Ran a rat on a spatial maze while recording from hippocampus and dorsal striatum using a high-density tetrode drive. Analyzed the correlation between striatal cell spike times and the hippocampal theta rhythm.

Rotation Project, Predicting Epileptic Potential from Neuronal Connectivity

Duane Nykamp Lab, University of Minnesota, Minneapolis MN

November 2013 - December 2013

Designed and ran simulations in C++ to determine what data collection strategy was optimal in order to estimate certain neuronal connectivity statistics thought to be predictive of epilepsy.

Rotation Project, Simulating VPL Neuron Responses to DBS

Matthew Johnson Lab, University of Minnesota, Minneapolis MN
September 2013 - October 2013

Implemented a system in Python which allowed for the conversion of downloaded neuron morphologies to files able to be simulated in the NEURON simulation environment, including the modulation of extracellular voltages by a virtual deep brain stimulation lead.

Senior Thesis in Computational Neuroscience

Paul Miller Lab, Brandeis University, Waltham MA
May 2012 - May 2013

Received NIH undergraduate grant to research potential mechanisms behind binding of neural ensembles in cortex using spiking and rate-model neural network simulations.

Wrote simulations of neural oscillator models in C and MATLAB.

Completed a senior thesis about the project.

Data Entry Associate

Everyday Health, Inc, North Adams MA
May 2010 - August 2010

Searched internet and vendors for nutritional information of their products

Performed manual data entry and food classification

Wrote VBA scripts to parse large charts of nutritional data and enter information into database

Undergraduate Research Assistant

Sacha Nelson Lab, Brandeis University, Waltham MA
August 2009 - May 2010

Marked, weaned, and took tail samples of mice

Ran PCR and gel electrophoresis on samples

Used ultramicrotome to create mouse brain slices

Stained slices with antibodies and fluorescent tags

Affixed slices to microscope slides

Imaged slices using confocal fluorescence microscope

Assistant Phlebotomist

The Memory Clinic, Bennington VT
August 2008 - December 2008

Isolated blood serum using centrifuge

Created blood smear slides

Set up and ran ECG tests on patients

Teaching Experience

Cell and Molecular Neurobiology Teaching Assistant

Neuroscience Department, University of Minnesota, Minneapolis MN
August 2017

Teaching assistant for a week-long graduate Neurobiology Laboratory course which involved frog sciatic nerve electrophysiology

Assisted students with dissections and electrophysiology labs

Neurobiology Laboratory Teaching Assistant

Neuroscience Department, University of Minnesota, Minneapolis MN

September 2016 - December 2016

Teaching assistant for an undergraduate Neurobiology Laboratory course which involved rat surgeries for the injection of anterograde and retrograde tracers; rat perfusion; brain extraction, slicing, and staining; and fluorescent imaging of brain tissue

Assisted students with surgeries, in-class labs, homework assignments, and projects

Graded homework, projects, presentations, and lab notebooks

Neurobiology Laboratory Teaching Assistant

Neuroscience Department, University of Minnesota, Minneapolis MN

September 2015 - December 2015

Teaching assistant for an undergraduate Neurobiology Laboratory course which involved rat surgeries for the injection of anterograde and retrograde tracers; rat perfusion; brain extraction, slicing, and staining; and fluorescent imaging of brain tissue

Assisted students with surgeries, in-class labs, homework assignments, and projects

Graded homework, projects, presentations, and lab notebooks

Designed lab for students using the NEURON simulation environment

3D Animation Teaching Assistant

Computer Science Department, Brandeis University, Waltham MA

January 2012 - May 2012

Teaching assistant for a 3D animation class using Blender 3D animation software

Assisted students with homework assignments

Graded projects

Created example homework projects

Professional Outreach

Brain Awareness Week Instructor, various Schools across the Twin Cities area, 2014 - Present

Presenter at "Social Science", Science Museum of Minnesota, October 2015 and 2016

Volunteer at the Annual Brain Bee Competition, Minneapolis, MN, 2016

Brains at the Fair, Minnesota State Fair University of Minnesota Booth, August 2016

Last updated: August 9, 2018

<https://brendanhasz.github.io>