

Honi Raphael Sanders, Ph.D.

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Neuroscience Postdoctoral Associate • Massachusetts Institute of Technology
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EDUCATION

Brandeis University; Waltham, MA GPA: 3.9/4.0
Ph.D. in Neuroscience, February 2016

University of Chicago; Chicago, IL GPA: 3.2/4.0
B.S. in Mathematics, minor in Computational Neuroscience, June 2010

RESEARCH EXPERIENCE

2016 – Postdoctoral Assoc. with Dr. Matthew Wilson, MIT, Dr. Samuel Gershman, Harvard
2010 – 2015 Graduate Research in the lab of Dr. John Lisman, Brandeis University
2007 – 2009 Lab Technician in the lab of Dr. Daniel McGehee, University of Chicago
Summer 2009 Summer research with Dr. David Hansel, Université Paris Descartes
Summer 2006 Summer research with Dr. Cynthia Stauffacher, Purdue University

TEACHING EXPERIENCE

Summer 2020 Teaching Assistant, Neuromatch Academy
Spring 2019-21 Lecturer, 9.301 Neural Plasticity and Learning & Memory, MIT
Winter 2018-21 Lecturer, Quantitative Methods Workshop, MIT
Summer 2014-16 Instructor, SPINES course, Marine Biological Laboratory
Spring 2012 Teaching Assistant, NBIO136 Computational Neuroscience, Brandeis University
Fall 2011 Teaching Assistant, BIOL60 Evolution, Brandeis University

HONORS

- Grass Fellow, Marine Biology Laboratory, 2015
- Mind, Brain and Machine course participant, Marine Biology Laboratory, 2014
- Neural Systems and Behavior course participant, Marine Biology Laboratory, 2013
- Best Poster by Junior Graduate Student at Volen Center for Complex Systems Retreat, 2012
- F. Champion Ward Third Year International Travel Grant recipient, 2009
- NIH Summer Program in Neuroscience and Neuroengineering participant, 2008
- Research Experience for Undergraduates in Mathematics, University of Chicago, 2007
- National Merit Scholar
- Robert C. Byrd Honors Scholarship, 2006-2010
- American Math Competition 12 Honor Roll of Distinction, 2005, 2006

RESEARCH SUPPORT RECEIVED

- NIH F31MH103966, (Individual Predoctoral Fellowship), 9/2014-8/2016
Title: Information Representation in the Hippocampus During Experience and Recall
Role: PI
Status: Complete

PUBLICATIONS

Peer Reviewed:

- **Sanders H**, Wilson MA, Gershman SJ (2020). Hippocampal Remapping as Hidden State Inference. *Elife*. doi: [10.7554/eLife.51140](https://doi.org/10.7554/eLife.51140)
- **Sanders H**, Ji D, Sasaki T, Leutgeb JK, Wilson MA, Lisman JE (2019). Temporal coding and rate remapping: Representation of nonspatial information in the hippocampus. *Hippocampus*. doi: [10.1002/hipo.23020](https://doi.org/10.1002/hipo.23020)
- **Sanders H**, Renno-Costa C, Idiart M, Lisman J (2015). Grid cells and place cells: an integrated view of their navigational/memory function. *Trends in Neurosciences*. doi: [10.1016/j.tins.2015.10.004](https://doi.org/10.1016/j.tins.2015.10.004)
- **Sanders H**, Kolterman B, Shusterman R, Rinberg D, Koulakov A, Lisman J (2014). A network that performs brute-force conversion of a temporal sequence to a spatial pattern: relevance to odor recognition. *Frontiers in Computational Neuroscience*, 8(108). doi: [10.3389/fncom.2014.00108](https://doi.org/10.3389/fncom.2014.00108)
- **Sanders H**, Berends M, Major G, Goldman MS, & Lisman JE (2013). NMDA and GABAB (KIR) Conductances: The “Perfect Couple” for Bistability. *Journal of Neuroscience*. doi: [10.1523/JNEUROSCI.1854-12.2013](https://doi.org/10.1523/JNEUROSCI.1854-12.2013)

Non-peer Reviewed:

- **Sanders, H**, Wilson, M, Klukas, M, Sharma, S, & Fiete, I. (2020). Efficient Inference in Structured Spaces. *Cell*, 183(5), 1147-1148. doi: [10.1016/j.cell.2020.11.008](https://doi.org/10.1016/j.cell.2020.11.008)
- Lisman J and **Sanders H**: F1000Prime Recommendation of [Fenton AA and Muller RU, Proc Natl Acad Sci USA 1998 ,95(6):3182-7]. In F1000Prime, 03 Jun 2016; DOI: 10.3410/f.723977107.793519210. [F1000Prime.com/723977107#eval793519210](https://www.f1000prime.com/723977107#eval793519210)
- Lisman J and **Sanders H**: F1000Prime Recommendation of Evaluation [Schomburg EW et al., Neuron 2014, 84(2):470-85]. In F1000Prime, 05 Aug 2015; DOI: 10.3410/f.718892254.793508496. [F1000Prime.com/718892254#eval793508496](https://www.f1000prime.com/718892254#eval793508496)
- Lisman J and **Sanders H**: F1000Prime Recommendation of Evaluation [Agarwal G et al., Science 2014, 344(6184):626-30]. In F1000Prime, 19 Aug 2014; DOI: 10.3410/f.718378815.793496122. [F1000Prime.com/718378815#eval793496122](https://www.f1000prime.com/718378815#eval793496122)
- Lisman J and **Sanders H**: F1000Prime Recommendation of Evaluation [Goldin MA et al., PLoS ONE 2013, 8(6):e67814]. In F1000Prime, 12 Dec 2013; DOI: 10.3410/f.718033157.793487820. [F1000Prime.com/718033157#eval793487820](https://www.f1000prime.com/718033157#eval793487820)

PRESENTATIONS

Invited Talks:

- Hippocampal Remapping as Learned Clustering of Experience (2018). Cognitive Maps Nanosymposium, Society for Neuroscience Meeting, San Diego, CA.
- Two Halves of Hippocampal Theta Have Different Firing Phenomena (2016). Cognitive Rhythms Collaborative Retreat, Boston University.
- Reconciling Rate Remapping and Phase Precession in Place Cells (2015). Harvard University.
- Gamma Discretization of Long Sequence of Olfactory Bulb Activity Allows for Temporal-Spatial Transformation (2015). Hebrew University.
- Reconciling Rate Remapping and Phase Precession in Place Cells (2014). University of California San Diego.
- Basic Concepts in Computational Neuroscience as Exemplified in Hippocampal Circuitry and Function (2014). Integrative Graduate Education and Research Traineeship (IGERT) Geometry and Dynamics Program Summer School, Brandeis University.

PRESENTATIONS

Poster Presentations:

- Nilchian P, Wilson M, **Sanders H** (2020). Structured Heterogeneity in Remapping Behavior Across Animals, Annual Biomedical Research Conference for Minority Students, Virtual.
- Robinson C, Nilchian P, Wilson M, **Sanders H** (2020). Spatial Distribution of Place Fields, Annual Biomedical Research Conference for Minority Students, Virtual.
- Nilchian P, Wilson M, **Sanders H** (2019). Characteristics of Hippocampal Remapping in Repeated and Different Environments, Annual Biomedical Research Conference for Minority Students, Anaheim, CA.
- **Sanders H**, Wilson M, Gershman S (2019). Hippocampal Remapping as Learned Clustering of Experience, Cognitive Computational Neuroscience, Berlin, Germany.
- **Sanders H**, Wilson M, Gershman S (2018). Hippocampal Remapping as Learned Clustering of Experience, Gordon Research Conference: Neurobiology of Cognition, Newry, ME.
- **Sanders H**, Wilson M, Gershman S (2018). Hippocampal Remapping as Learned Clustering of Experience, International Conference for Learning and Memory, Huntington Beach, CA.
- **Sanders H**, Ji D, Wilson M, Lisman JE (2016). Hippocampal Theta: Signature of a Multi-Part Process, Center for Brain Science Retreat, Harvard University.
- **Sanders H**, Ji D, Lisman JE (2014). How do hippocampal place cells provide two types of information in the same spike train?, Cognitive Rhythms Collaborative Retreat, Boston, MA.
- **Sanders H**, Ji D, Lisman JE (2013). Does rate remapping interfere with phase coding in hippocampal place cells?, *Society for Neuroscience Abstracts* 863.18.
- **Sanders H**, Kolterman B, Rinberg D, Koulakov A, Lisman J (2013). Transformation of a temporal sequence to a spatial pattern of activity in piriform cortex, Computational and Systems Neuroscience (Cosyne) Meeting, Salt Lake City, UT.
- **Sanders H**, Kolterman B, Rinberg D, Koulakov A, Lisman J (2012). Temporal-Spatial transformation in the piriform cortex, *Society for Neuroscience Abstracts* 783.08.
- **Sanders H**, Berends M, Major G, Goldman MS, and Lisman JE (2012). NMDA and GABA B: The Perfect Couple for Bistability, Volen Center for Complex Systems Retreat, Brandeis University.

PROFESSIONAL SOCIETY MEMBERSHIPS

Organization for Computational Neurosciences, 2013-present

Faculty of 1000, Associate Faculty Member, 2013-2016

Society for Neuroscience, 2006-present

OUTREACH AND SERVICE

Summer 2020 Research Mentor, MIT Summer Research Program in Biology (virtual format) for women and under-represented students in STEM

Summer 2019 Research Mentor, 10-week Center for Brains, Minds, and Machines REU program for women and under-represented students in STEM

Winter 2018-20 Lecturer, Quantitative Methods Workshop, MIT. Full afternoon computer lab for > 80 students & faculty from minority serving institutions and urban public institutions.

Summer 2014-16 Instructor, SPINES course, Marine Biological Laboratory. SPINES trains successful neuroscientists from backgrounds underrepresented in neuroscience.

Reviewer for Cognitive Computational Neuroscience, Psychological Review