

# BRADLEY HAROLD THEILMAN

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## EDUCATION

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**University of California, San Diego**  
Ph.D. in Computational Neuroscience

*August 2014 - Present*  
GPA: 4.0/4.0

**University of Cincinnati**  
B.S. in Mathematics and Biomedical Engineering  
Summa Cum Laude

*August 2009 - May 2014*  
GPA: 4.0/4.0

**Milford High School**  
Valedictorian

*August 2005 - May 2009*  
GPA: 4.45/4.0

## PUBLICATIONS, PROCEEDINGS, PREPRINTS

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Theilman, B.H., Perks, K.E., and Gentner, T.Q. Topological Invariance of Natural Stimulus Representations in Songbird Auditory Cortex. Submitted.

Sainburg, T., Theilman, B.H., Thielk, M., Migliori, B., and Gentner, T.Q. (2019). Parallels in the Sequential Organization of Birdsong and Human Speech. *Nature Communications*. Accepted.

Bradley, T.D., Lewis, M., Master, J., Theilman, B.H. (2018). Translating and Evolving: Towards a Model of Language Change in DisCoCat. *Electronic Proceedings in Theoretical Computer Science* **283**:50-61. <https://arxiv.org/abs/1811.11041v1> (authors listed alphabetically)

Sainburg, T., Thielk, M., Theilman, B.H., Migliori, B., and Gentner, T.Q. (2018) Generative adversarial interpolative autoencoding: adversarial training on latent space interpolations encourage convex latent distributions. ArXiv preprint. <https://arxiv.org/abs/1807.06650>

Todd, J.B., Theilman, B.H., and Wendell, D.W. (2012). Detailed kinetic analysis of the  $\Phi 29$  DNA packaging motor providing evidence for coordinated intersubunit ATPase activity of gp16. *Virology*. **432**:370-675

## TALKS AND POSTERS

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First Workshop on Topology and Neuroscience, Lausanne, Switzerland  
Poster Title: Topological Analysis of Population Activity in a Songbird

November 2018

Applied Category Theory, Leiden, Netherlands  
Talk Title: Towards a model of language change in DisCoCat

April 2018

COSYNE - Salt Lake City, UT

February 2017

Poster Title: Topological Analysis of Neural Population Activity in the Auditory System of the European Starling

Janelia Research Campus Undergraduate Scholar Symposium  
Poster Title: Volatile Currents are Noise-Shaped by Neural Spike Generation

August 2012

Biophysical Society Annual Meeting, San Diego, CA

February 2012

Poster Title: Light Stimulated Insulin Release from Pancreatic Beta Cells

## TECHNICAL SKILLS

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<b>Computer Languages</b>	Python, C/C++, MATLAB, Mathematica, CUDA
<b>Software &amp; Tools</b>	Unix/Linux, FreeCAD, EAGLE, Tensorflow, OpenGL,
<b>Hardware</b>	Raspberry Pi, Arduino, OpenEphys

## EXPERIENCE

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**Gentner Lab** January 2015 - Present  
*UC San Diego* Adviser: Timothy Gentner, Ph.D.

- Conducted research on the auditory system of European starlings.
- Developed novel mathematical tools using algebraic topology to characterize neural population activity.
- Designed, manufactured, tested, and deployed customized, embedded operant conditioning hardware and software using Raspberry Pi single-board computers for 30 operant and chronic electrophysiology boxes.
- Constructed several electrophysiology rigs around the OpenEphys system for avian auditory neuroscience experiments.
- Developed and deployed an in-house data acquisition and processing pipeline for multielectrode array in-vivo neural recordings

**Complex Adaptive Systems Laboratory, UC** January 2013 - January 2014  
*University of Cincinnati* Adviser: Ali Minai, Ph.D.

- Constructed spiking neural network simulations to investigate the implications of network structure on network activity.
- Supported by a University of Cincinnati Research Council Undergraduate Fellowship.

**Mathematics Capstone** August 2013 - May 2014  
*University of Cincinnati* Adviser: Nageswari Shanmugalingam, Ph.D.

- Proved theorems about the Hausdorff dimensions of fractal sets inside the Heisenberg group.

**Janelia Research Campus Undergraduate Scholars Program** June 2012 - August 2012  
*Ashburn, VA* Adviser: Dmitri Chklovskii, Ph.D.

- Analyzed the noise-shaping properties of neuron spike generation mechanisms.
- Modeled individual neurons as Delta-Sigma Analog-to-Digital converters
- Presented a poster and talk at the Undergraduate Scholar Symposium.

**Nanobiological Systems Laboratory** January 2010 - March 2012  
*University of Cincinnati* Adviser: David Wendell, Ph.D.

- Synthesized and characterized gold-coated iron nanoparticles for potential therapeutic applications.
- Used channelrhodopsin to create light-activated pancreatic beta cells for stimulated insulin release
- Measured the enzyme kinetics of a bacteriophage DNA packaging motor, observing a novel interaction between motor subunits.
- Managed laboratory equipment and supplies.
- Presented work at various poster sessions in and outside of Cincinnati.
- Supported by a UC College of Medicine Summer Undergraduate Fellowship.

## AWARDS

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Best paper award, Applied Category Theory Adjoint School	2018
UCSD Neurosciences Graduate Teaching Award of Excellence	2017

COSYNE New Attendee Travel Grant	2017
UC Presidential Leadership Medal of Excellence (Highest award for undergraduates)	2014
UC Research Council Undergraduate Research Fellowship Grant	2013
Jeanne Gulden Endowed Mathematics Scholarship	2013
Harry Kieval Mathematics Scholarship	2013
Barry M. Goldwater Scholarship	2012
Highest Achievement in Freshman Chemistry Award	2010
Summer Undergraduate Research Fellowship, UC College of Medicine	2010
Full (\$80,000 over 5 years) Cincinnatus Presidential Scholarship, University of Cincinnati	2009
UC Honors Program (Top 6% of the university)	2009

## TEACHING EXPERIENCE

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<b>Mathematical Foundations for Computational Neuroscience</b>	2017
<i>UC San Diego</i>	

Course co-organizer. Provided basic computational and mathematical skills for graduate students in the life sciences. Planned and produced lectures and problem sets.

## ORGANIZATIONAL INVOLVEMENT AND LEADERSHIP

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McDonald Cadet Leadership Conference, U.S. Military Academy, West Point	2013
UC Amateur Radio Club, President	2011 - 2012

## UNIVERSITY SERVICE

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UCSD Neurosciences Retreat Committee	2014 - Present
UCSD Neurosciences Recruitment Committee	2014 - Present
UCSD Neurosciences Peer Advising Committee	2016 - Present
UC Director of Nationally Competitive Awards Search Committee	2011

## WORK EXPERIENCE

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<b>UC Office of the President</b>	December 2010 - April 2014
Support the university president and his office for special events such as commencement and fundraising	

## OTHER

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Licensed Radio Amateur, Extra Class, Callsign: KD6UC	2010 - Present
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