Jeffrey William Brown

Assistant Teacher Professor of Biobehavioral Health
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EDUCATION

University of Illinois at Urbana-Champaign, Urbana, IL
PhD in Biophysics and Computational Biology, August 2014
Dissertation title: "Reciprocal interactions between feeding and turning motor networks mediate foraging decisions in a predatory sea-slug"
Dissertation advisor: Dr. Rhanor Gillette

Harvard University, Cambridge, MA
AB in Physics, *cum laude*, January 2005

NON-DEGREE COURSEWORK

University of California at Berkeley, **Berkeley, CA**
Course in Mining and Modeling of Neuroscience Data, July 2017

Marine Biological Laboratory, Woods Hole, MA
Neural Systems and Behavior Course, Summer 2009

University of Washington, Friday Harbor Laboratories, Friday Harbor, WA
Biomechanics Course, Summer 2008

TEACHING AND MENTORING EXPERIENCE

Assistant Teaching Professor, 2023-present
The Pennsylvania State University, University Park

Adjunct Assistant Professor, 2023-present
College of Nursing, Rosalind Franklin University of Medicine and Science

- Co-created and co-taught a curriculum, including lecture, laboratory, problem-based learning, and assessment materials, for a new clinical neuroscience course in a Master's program certifying psychiatric-mental health nurse practitioners

Visiting Lecturer, 2021-2022
Deadly Shapes, Hostage Brains (NEUR 130)/Neuron to Brain (NEUR 301), Lake Forest College

- Assembled and delivered learning sessions on the human visual system, co-led a book discussion, and contributed semi-weekly neuroscience news e-mail bulletins for an introductory undergraduate course
- Organized, led a discussion, and developed an assessment around personal, peer-reviewed research for an advanced undergraduate neuroscience course

Co-Lecturer, 2020-2023
Neuronal Physiology and Signaling, Rosalind Franklin University

- Developed lectures and assessments for and lectured to neuroscience graduate students on neurophysiology, electrophysiological recording techniques, and synaptic mechanisms

Research Assistant Professor (2017-2018), **Lecturer** (2015-2017), **Visiting Lecturer** (2014-2015), and **Course Director of Neuroscience**, 2014-2018
University of Illinois College of Medicine at Urbana-Champaign

- Administrated and taught a first-year medical neuroscience curriculum to 120-140 students (modified in 2018 as an advanced undergraduate/graduate course offered through the Neuroscience Program, UIUC)
- Utilized active learning strategies to design a comprehensive set of clinically oriented, interactive learning sessions, worksheets, reviews, and problem- and team-based learning activities
- Created a course question bank consisting of several hundred USMLE-oriented questions and accompanying explanations
- Established active collaborations with local neurologists and neurosurgeons to enhance clinical learning
- Led an administrative task force in revising basic and clinical sciences course website design
- Sponsored, performed piano at, and contributed multiple talks on music and neuroscience at the UI-COM Music and Medicine Symposium in Urbana (2016) and Peoria (2017)
- Organized and conducted USMLE Step 1 neuroscience reviews for second-year students at UI-COM Urbana, Peoria, and Rockford
- Developed curricular materials on molecular/cellular neuroscience and autonomic neurophysiology for use throughout the UI-COM system
- Invited to lecture on molecular/cellular neuroscience and autonomic neurophysiology at UI-COM Peoria

HONORS, AWARDS, AND FELLOWSHIPS IN EDUCATION

Faculty Graduation Speaker, May 2019
University of Illinois College of Medicine at Peoria

- Selected by the Class of 2019 to deliver the faculty graduation speech at medical school convocation

List of Teachers Ranked as Excellent or Outstanding by Their Students, 2010-2014, 2016-2018
Center for Innovation in Teaching and Learning, U of I

- Recognized for excellence in teaching as course director of M-1 Neuroscience at UI-COM Urbana (2016-2018) and as a teaching assistant for Molecular and Cellular Neuroscience 245, 247, 416, and 462 (2010-2014)
- Selected as "outstanding" in Spring 2017, 2018 (M-1 Neuroscience), Spring 2014 (MCB 462), and Fall 2011 (MCB 416) based on scoring in the top 10% of faculty for all evaluative criteria

Best Instructor in M-1 Curriculum, August-September 2017 Block
University of Illinois College of Medicine at Peoria

- Voted by the Class of 2021 as the faculty member best exemplifying excellence in teaching for the introductory curriculum block (Block 1)

Raymond B. Allen Instructorship Award (Golden Apple Award), 2015-2016 Academic Year
University of Illinois College of Medicine at Urbana-Champaign

- Voted by the UI-COM Urbana Class of 2019 as the faculty member exemplifying excellence in teaching

The College of Medicine-Urban Health Program Director's Award, 2015-2016 Academic Year
University of Illinois College of Medicine at Urbana-Champaign

- Awarded to an individual who "demonstrate[s] an outstanding and longstanding commitment to Excellence in Teaching, Leadership & Service & Commitment to Student Success"

James E. Heath Award for Excellence in Teaching Physiology, 2012-2013 Academic Year
Department of Molecular and Integrative Physiology, School of MCB, University of Illinois

- Selected among faculty and graduate students in recognition of outstanding contributions to undergraduate education

Certificate of Distinction in Teaching, 2005-2006
Derek Bok Center for Teaching and Learning, Harvard University

- Received award two consecutive semesters for Applied Mathematics 21ab and five semesters for Chemistry E-1ab and Chemistry S-1

CURRICULUM DEVELOPMENT EXPERIENCE

Faculty Consultant, 2017-2020
USMLE-Rx/Scholar-Rx, MedIQ Learning LLC, Elizabethtown, KY

- Reviewed and supervised the construction of clinical case studies and content modules for commercial use on the USMLE-Rx Step 1 preparatory website
- Defined medical neuroscience learning objectives for the comprehensive online ScholarRx curriculum

Course Developer, 2011-2012
College of Liberal Arts and Sciences (LAS), U of I

- Awarded a fellowship by the Assistant Dean of LAS to develop a distance-learning, graduate-level neuroethology course based on MCB 416
- Spearheaded all aspects of course design, including the creation of a curriculum, problem sets, quizzes, discussion forums, student Wiki pages, and examinations
- Revised, extended, and facilitated the recording of course lectures

Graduate Research Assistant, 2010-2011
Project NEURON, College of Education, U of I

- Collaboratively developed four inquiry-based biology curricula
- Wrote protocols for curriculum-related animal husbandry and aquarium maintenance
- Facilitated and co-facilitated several curriculum-related discussions at the 2010 and 2011 Project NEURON Neuroscience Teacher Institute for Illinois high school science teachers

ACADEMIC AND COMMUNITY SERVICE

Faculty Advisor, Nittany Neuroscience Club, 2024-present

- Faculty advisor and regular presenter for Penn State's first undergraduate neuroscience interest group

Faculty Member, Understanding and Defining Teaching Excellence Workgroup, 2024-present

- Volunteered to serve in workgroup defining criteria for teaching excellence and developing framework for revisions to peer- and self-evaluation processes in the Department of Biobehavioral Health (PSU)

Faculty Member, **Scholarships and Award Committee**, 2023-present

- Evaluated undergraduate and graduate student achievement for formal recognition in the Department of Biobehavioral Health (PSU)

Review Editor, ***Frontiers in Integrative Neuroscience***, 2022-present

Co-Chair, ***Berghia*** **Brain Project U01 (NIH) Trainee Group**, 2021

- Organized and led bimonthly meetings for 30+ postdoctoral associates, graduate students, and undergraduates aimed at exchanging scientific, technical, and career information

Judge, **Illinois Junior Academy of Science Region 6 Science Fair**, 2021

- Evaluated written reports and presentations in the areas of chemistry, physics, and economics for Chicago-area high school students

Faculty Activity Leader, Brain Exploration, Illinois Summer Neuroscience Institute, Summer 2015-2016

- Hosted, co-organized, and led a human and sheep brain exploration activity at the University of Illinois College of Medicine for underrepresented undergraduates across two summers

Faculty Member, **Student Progress and Promotions Committee**, 2015-2018

- Evaluated academic and clinical progress and conduct at the University of Illinois College of Medicine

Chair, Course Website Task Force, Fall 2014

- Led a committee of faculty and staff at the University of Illinois College of Medicine to overhaul website design for first- and second-year courses

Volunteer Coordinator, Champaign Area Trap Spay, Neuter, and Return Program (CATsNAP), 2013-2021

- Coordinated activities for several dozen volunteer caretaker-socializers and oversaw animal wellness for a feline rescue shelter based in Champaign, IL
- Organized and participated in special events, feral cat shelter construction, animal transport, and supply procurement/distribution

RESEARCH TRAINING EXPERIENCE

Postdoctoral Research Associate, 2019-2023

William Frost Group, Center for Brain Function and Repair, Rosalind Franklin University, North Chicago, IL

- Developed novel experimental methods to utilize fluorescence calcium imaging to record large-scale network activity in the central nervous system of a novel gastropod model organism
- Developed code to map and animate optically recorded activity to individual neurons for elucidation of precise spatiotemporal network dynamics
- Imaged small nervous systems using voltage-sensitive dyes and developed novel analytical tools to study mechanisms of neural network optimization
- Characterized a previously unstudied defensive behavior in a gastropod mollusk and its potential to be modulated by learning
- Fellowships/Awards: **Finalist, NIH BRAIN Initiative "Show Us Your Brains!" Photo and Video Contest** (2020)

Postdoctoral Research Associate, 2015-2019

Daniel Llano Group, College of Medicine, U of I

- Developed a MATLAB-based open-loop thalamo-reticulo-cortical model to explore synaptic mechanisms underlying thalamocortical and intrathalamic signal propagation
- Designed and executed experiments elucidating the correlation between electrical activity and thermogenesis in neurons (collaboration with Prof. Sanjiv Sinha, Department of Mechanical Engineering, U of I)

Graduate Research Assistant, 2008-2014

Rhanor Gillette Group, Center for Biophysics and Computational Biology, U of I

- Utilized various electrophysiological methods to quantify how sensory representations modulate motor network interactions in the context of cost-benefit decisions
- Coordinated a collaborative team (U of I/University of Puerto Rico, San Juan, PR) to characterize the histology and physiological significance of dopamine in sensory processing
- Enhanced a computational model of cost-benefit analysis in a simple foraging animal using neurophysiological and behavioral data
- Fellowships/Awards: **Heiligenberg Student Travel Award** (Gordon Neuroethology Conference, 2013); **Science Education Partnership Award (SEPA) Research Assistantship** (NIH-funded award supporting graduate research and "Project NEURON" collaboration, 2010-2011; **University of Illinois Graduate College Conference Travel Award** (Society for Neuroscience Conference, 2010); **Grass Foundation Summer Scholarship** (award supporting coursework at Marine Biological Laboratories, Summer 2009); **Sensory Neuroscience Training Grant** (NIH-funded award supporting graduate research, 2008-2009); **Molecular Biology Training Grant** (UIUC-funded award supporting graduate research, 2007-2008)

Research Assistant, 2006-2007
Aravinthan Samuel Group, Department of Physics, Harvard University

- Characterized thermotactic behavioral plasticity in *C. elegans* upon placement in isotherms after varying periods of temperature-mediated starvation

Undergraduate Research Fellow, 2004-2005
Isaac Silvera Group, Department of Physics, Harvard University

- Investigated methods for and ran experimental trials to synthesize metallic hydrogen via ultra-high pressurization in a diamond-anvil cell coupled with pulsed laser heating
- Designed and built a micrometer-precision motorized diamond grinder
- Awarded Harvard College Research Fellowship/Fels Fund Research Fellowship (2004)

PROFESSIONAL AFFILIATIONS

Society for Neuroscience
Sigma Xi (Nominee)

PEER-REVIEWED PUBLICATIONS

Hill, E. S., Wang, J., **Brown, J.W.**, Mistry, V. K., Frost, W. N. (2024). "Surprising multifunctionality of a *Tritonia* swim CPG neuron: C2 drives the early phase of postswim crawling despite being silent during the behavior." *Journal of Neurophysiology*, **132**(1), 96-107.

Brown, J.W., Berg, O.H., Boutko, A., Stoerck, C., Boersma, M.A., Frost, W.N. (2024). "Division of labor for defensive retaliation and preemption by the peripheral and central nervous systems in the nudibranch *Berghia*." *Current Biology*, **34**(10):2175-85.

Gribkova, E. D., Lee, C. A., **Brown, J. W.**, Cui, J., Liu, Y., Norekian, T., & Gillette, R. (2023). "A common modular design of nervous systems originating in soft-bodied invertebrates." *Frontiers in Physiology*, 14:1263453.

Lee, C.A., **Brown, J.W.**, Gillette, R. (2023) "Coordination of Locomotion by Serotonergic Neurons in the Predatory Gastropod *Pleurobranchaea californica*." *Journal of Neuroscience*, **43**:3647-57.

Hill, E.S.*, **Brown, J.W.***, Frost, W.N. (2020) "Photodiode-Based Optical Imaging for Recording Network Dynamics with Single-Neuron Resolution in Non-Transgenic Invertebrates." *Journal of Visualized Experiments*, **161**:e61623. ***Co-first authorship**

Brown, J.W., Taheri, A., Kenyon, R.V., Berger-Wolf, T., Llano, D.A. (2020) "Signal Propagation via Open-Loop Intrathalamic Architectures: A Computational Model." *eNeuro*, **7**(1): ENEURO.0441-19.2020.

Rajagopal, M.C., **Brown, J.W.**, Gelda, D., Valavala, K.V., Wang, H., Llano, D.A., Gillette, R., Sinha, S. (2019) "Transient heat release during induced mitochondrial proton uncoupling." *Communications Biology,* **2**:279.

Esmaeeli, S., Murphy, K., Swords, G.M., Ibrahim, B.A., **Brown, J.W.**, Llano, D.A. (2019) "Visual hallucinations, thalamocortical physiology and Lewy body disease: A review." *Neuroscience & Behavioral Reviews*, **103**:337-51.

Brown, J.W., Schaub, B.M., Klusas, B.L., Tran, A.X., Duman, A.J., Haney, S.J., Boris., A.C., Delgado, N., Torres G., Rolón-Martínez, S., Vaasjo, L.O., Miller, M.W., Gillette, R. (2018) "A role for dopamine in the peripheral sensory processing of a gastropod mollusk." *PLoS ONE*, **13**(12):e0208891.

Brown, J.W., Caetano-Anollés, D., Catanho, M.J., Gribkova, E., Tian, K., Ryckman, N.R., Voloshin, M., Gillette, R. (2018) "Implementing Goal-Directed Foraging Decisions of a Simpler Nervous System in Simulation." *eNeuro* **5**(1):ENEURO.0400-17.2018.

Gillette R., **Brown J.W.** (2015) "The Sea Slug, *Pleurobranchaea californica*: A Signpost Species in the Evolution of Complex Nervous Systems and Behavior." *Integrative and Comparative Biology*, **55**(6):1058-69.

Hirayama, K., Catanho, M., **Brown, J.W.**, Gillette, R. (2012) "A Core Circuit Module for Cost/Benefit Decision." *Frontiers in Neuroscience*, **6**(123):1-6.

Chi, C.A., Clark, D.A., Lee, S., Biron, D., Luo, L., Gabel, C.V., **Brown, J.**, Sengupta, P., Samuel, A.D.T. (2007) "Temperature and food mediate long-term thermotactic behavioral plasticity by association-independent mechanisms in *C. elegans*." *Journal of Experimental Biology*, **210**:4043-52.

PREPRINTS, SUBMITTED PUBLICATIONS, AND WORKS IN PROGRESS

Brown, J.W., Hill, E.S., Frost, W.N. "Electroporation as a noninvasive method for loading gastropod neurons with calcium activity indicators." (in progress)

Brown, J.W., Gillette, R. "Feeding network excitation drives a progressive reconfiguration of the turn motor network in a predatory sea-slug." (in progress)

RESEARCH PRESENTATIONS–HIGHLIGHTS

Neural division of labor: the marine gastropod *Berghia* defends against attack using its PNS for rapid retaliation and its CNS to erect a defensive screen (Poster), Society for Neuroscience Conference, San Diego, CA, November 12-16, 2022

Electroporation as a noninvasive method for loading gastropod neurons with calcium activity indicators (Virtual Poster/Presentation), Society for Neuroscience Conference, November 8-11, 2021

Computational tools for rapidly visualizing large-scale activity with single-neuron, single-spike resolution in simple brains (Virtual Poster), Society for Neuroscience Global Connectome, Virtual Conference, January 11-13, 2021

New computational tools for rapidly visualizing large-scale activity with single-neuron, single-spike resolution in simple brains (Talk), Rosalind Franklin University Neuroscience Research Symposium, Virtual Conference, July 23, 2020

A rapid optical imaging and automated analytical workflow for characterizing network behavior in the new model species *Berghia* and other gastropods (Virtual Poster/Presentation), BRAIN Initiative Investigators Meeting, Virtual Conference, June 1-2, 2020

Characterization of a defensive behavior in a newly introduced model gastropod (Poster), Rosalind Franklin All-School Research Consortium, North Chicago, IL, March 18, 2020 (Conferenced Canceled due to COVID-19)

Reticulothalamic and intrareticular synaptic motifs determine oscillatory and propagative properties of thalamocortical signals (Poster), Society for Neuroscience Conference and Advances and Perspectives in Auditory Neuroscience Conference, Washington, DC, November 10-15, 2017

Multi-channel open-loop thalamoreticular architectures support thalamocortical wave propagation (Poster), Society for Neuroscience Conference, San Diego, CA, November 12-16, 2016

Feeding network excitation drives a progressive reconfiguration of the turn motor network in a predatory sea-slug (Poster), Society for Neuroscience Conference, Chicago, IL, October 17-21, 2015

Hunger is a powerful drive: corollary discharge neurons of the feeding motor network switch avoidance to approach based on appetitive state in the sea-slug *Pleurobranchaea* (Talk & Poster), Gordon Conference and Seminar for Neuroethology, West Dover, VT, August 17-23, 2013

Distribution of tyrosine-hydroxylase-like immunoreactivity in the predatory sea-slug *Pleurobranchaea californica* (Poster), Society for Neuroscience Conference, New Orleans, LA, October 13-17, 2012

A sensory-driven model of turn computation in a predatory sea-slug (Poster), 10th International Congress of Neuroethology, College Park, MD, August 5-10, 2012

The Cutting Edge: Integrating Contemporary Neuroscience and Molecular Biology to Teach About Regeneration and the Nervous System (Poster), Society for Neuroscience Conference, Washington, DC, November 12-16, 2011

Putting the brain aside: Peripheral sensory integration in a predatory sea-slug (Talk), Advances in Sensory and Developmental Neuroscience Weekly Seminar, U of I, September 2, 2011

PRESS COVERAGE

"Immutable Traits, Inclusive Teaching." Hypothesis Magazine, Rosalind Franklin University (Penney, A.). 2021 Edition.

"The Art of the BRAIN: Mapping the Mind." NIH/Brain Initiative (Lichtenberg, N.). Published on April 30, 2021.

"Tiny thermometer measures how mitochondria heat up the cell by unleashing proton energy." University of Illinois News Bureau (Touchstone, L.A.). Published on August 29, 2019.

"Virtual predator is 'self-aware', behaves like living counterpart." ScienceDaily. Published on March 1, 2018.

"Meet the cyber SLUG: Scientists develop virtual sea creature that is self-aware and behaves like predators on the ocean floor." DailyMail (O'Niell, M.). Published on March 1, 2018.