ELIZABETH SPENCER

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EDUCATION

Boston University, Graduate Program for Neuroscience, (computational specialty)   2015 - Present
Advisor: Mark Kramer, Ph.D.

University of Maryland, College Park (Honors Program)   2011 - 2015
BS: Mathematics (GPA 3.74) & **BA:** French Language and Literature (GPA 4.0)
Minor Physics

RESEARCH GRANTS

National Science Foundation Graduate Research Fellow   Apr 2017
Proposal to analyze how dynamic functional networks fluctuate along their anatomical white matter
pathways, "A Dynamic Approach to Resolving the Brain."

RESEARCH EXPERIENCE

Dissertation, Boston University (BU), Boston, MA   2015 - Present
Advisors: Mark Kramer, Ph.D. - Neural Dynamics & Data Analysis Lab (BU)
                Catherine Chu, M.D. - Chu Lab at Massachusetts General Hospital (MGH)
"Development of biomarkers and statistical models to characterize disease with applications in
childhood epilepsy and Angelman syndrome."
- Characterized the relationship between sleep spindles and neurocognitive deficits in epileptic
  encephalopathy - In collaboration with the Chu Lab (2017 - Present).
- Developed approach to use a clinical biomarker, delta power, to measure treatment response
  in Angelman syndrome - Internship with Biogen (2020).
- Developed procedure to increase statistical power of Granger-causal analysis through
  temporal smoothing.

Research in Industrial Projects for Students   Summer 2014
Institute for Pure and Applied Mathematics, University of California, Los Angeles, CA
The Aerospace Corporation, El Segundo, CA
- Studied methods for computing the channel capacity of satellite communication systems.

Undergraduate research assistant   Fall 2013
Center for Harmonic Analysis, University of Maryland (UMD), College Park, MD
Advisor: Wojciech Czaja, Ph.D.
- Studied wavelet transforms with applications in medical imaging.

Summer Undergraduate Applied Mathematics Institute   Summer 2013
Center for Nonlinear Analysis**,** Carnegie Mellon University, Pittsburgh, PA
- Studied statistical regression techniques, including general additive models, linear models,
  and smoothing splines, to build models to predict galaxy redshifts.

PEER-REVIEWED ACTIVITIES

Publications

OSTROWSKI, L., **SPENCER, E.**, BIRD, L., THIBERT, R., KOMOROWSKI, R., KRAMER, M., CHU, C. (2020). *Delta power is a robust biomarker of cognitive function in Angelman Syndrome.* Nature Communications, under review.

MARTINET, L.-E., KRAMER, M. A., VILES, W., PERKINS, L. N., **SPENCER, E.**, CHU, C. J., CASH, S. S., & KOLACZYK, E. D. (2020). *Robust dynamic community detection with applications to human brain functional networks*. Nature Communications, 11(1), 2785.

SPENCER, E., MARTINET, L. E., ESKANDAR, E. N., CHU, C. J., KOLACZYK, E. D., CASH, S. S., EDEN, U. T., & KRAMER, M. A. (2018). *A procedure to increase the power of Granger-causal analysis through temporal smoothing*. Journal of Neuroscience Methods, 308(July), 48–61.

Presentations

"Brain Networks in Epilepsy"	Apr 2019
Math Department Community Seminar, BU, Boston, MA	
"Procedure to increase the power of Granger-causal analysis through temporal smoothing"	Apr 2018
Cognitive Rhythms Collaborative, MIT, Cambridge, MA	
"NSF Graduate Research Fellowship Session"	Sept 2017
American Mathematical Society Professional Development Series, BU, Boston, MA	

Posters

"Characterizing the relationship between sleep spindles and neurocognitive deficits in epileptic encephalopathy"
    Society for Neuroscience Annual Meeting, Chicago, IL   Oct 2019

"Characterizing the relationship between functional connectivity and neurocognitive deficits in benign epilepsy with centrotemporal spikes"
    Statistical Analysis of Neuronal Data, Pittsburgh, PA   May 2019
    Society for Neuroscience Annual Meeting, San Diego, CA   Nov 2018

"Network inference for dynamic modeling of epileptic seizures"
    Society for Neuroscience Annual Meeting, Washington, D.C.   Nov 2017

"Calculating Channel Capacity of Satellite Communications"
    Joint Mathematics Meetings, San Antonio, TX   Nov 2017

"Developing Regression Models to Predict Galaxy Redshifts"
    Joint Mathematics Meetings, Baltimore, MD   Jan 2015

"Applied Harmonic Analysis for Retinal Imaging – Dimensionality Reduction and Classification"
    Biosciences Research and Technology Review, UMD, College Park, MD   Nov 2013

PROFESSIONAL TRAINING

Summer Workshop on the Dynamic Brain   Aug - Sept 2019
Allen Institute for Brain Science & University of Washington, Friday Harbor, WA
Two-week course featuring lectures on computational modeling applied to visual system
neuroscience, Python bootcamp and group project using the Allen Institute's open datasets (project:
characterization of oscillations in visual cortex).

The MIT IMPACT program   Spring 2019
Massachusetts Institute of Technology, Cambridge, MA
Semester long mentorship program to refine research focus to optimize scientific impact, develop
communication skills and engage in professional development with faculty from institutions and
companies in the Boston area.

Summer School in Computational Sensory-Motor Neuroscience   Aug - Sept 2016
University of Minnesota, Minneapolis, MN
Two-week course featuring lectures on modeling applied to sensory and movement science and group
project (project: modeling the relationship between reward and sensory feedback in sensorimotor
adaptation).

Course in Mining and Modeling of Neuroscience Data   July - Aug 2016
Redwood Center for Theoretical Neuroscience, University of California, Berkeley, CA
Two-week course featuring computational and statistical modeling techniques for analyzing big data.

HONORS AND AWARDS

First Place Computational Neuroscience Poster   Feb 2018, Mar 2020
Poster session for all students in the Graduate Program for Neuroscience (judged by faculty).

Third Place Henry I. Russek Student Achievement Award   Apr 2019
Departmental award for excellence in the Graduate Medical Sciences.

PROFESSIONAL ACTIVITIES AND SERVICE

NeuroArts Forum: Co-Organizer   Oct 2019
Lecture series brining neuroscientists and artists from different communities to facilitate crosstalk
between the arts and sciences.

Directed Reading Program: Mentor   Fall 2018 & Spring 2019
Paired with undergraduate semesterly to guide working through a mathematics textbook, work on a
related project and prepare presentation, studied:
- Dr. Kolaczyk's *Statistical Analysis of Network Data: Methods and Models*.
- Drs. Kolaczyk and Csardi's *Statistical Analysis of Network Data with R*.

Graduate Women in Science and Engineering Undergraduate Mentorship Program Fall 2018

Neuroscience Graduate Student Organization Outreach Committee   2016 – 2019
- Prepared and organized activities for BU booth at Boston's Museum of Science annual Brain
Awareness Week (Winter 2016 – 19).

- Volunteer for SET (Science, Engineering, Technology) in the city – Day of Career Exploration for High School Girls (April 2018).
- Helped design four-part after school neuroscience club series at William H. Lincoln Elementary School (Fall 2017).

West End House Elementary Girls Science Club, volunteer   Fall 2017 – Spring 2018
Computational Neuroscience Student Organization, Treasurer   2016

SKILLS

Computer Proficiencies:	MATLAB (expert); R (advanced); and Python (intermediate).
Languages:	English and French.