

JENNIFER STISO

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EDUCATION

University of Pennsylvania

PhD Neuroscience | GPA 3.6/4.0

Jan 2021
Philadelphia, PA

University of California Berkeley

BA Molecular and Cellular Biology; Cognitive Science | GPA 3.6/4.0

June 2016
Berkeley, CA

Positions

PhD Candidate

Complex Systems Group (Prof. Danielle Bassett)
Computational neuroscience

June 2017 – Present
Philadelphia, PA

Rotation Student

University of Pennsylvania, (PI Sharon Thompson-Schill & Tim Lucas)
Cognitive neuroscience

Aug 2016 - June 2017
Philadelphia, PA

Undergraduate Researcher

Knight Laboratory (Prof. Robert Knight) Cognitive Action Laboratory (Prof. Richard Ivry)
Cognitive neuroscience

Feb 2014 - Aug 2016
Berkeley, CA

SKILLS

- **Programming:** Python, R, MATLAB, Java, Latex, Javascript
- **Fields:** neuroscience, graph theory, control theory, machine learning, dynamical systems, psychology
- **Soft Skills:** communication, time management, organization

Projects

Neurophysiological Mechanisms of Human Relational Learning

Complex Systems Group (Prof. Danielle Bassett)

In Progress
Philadelphia, PA

- Flexible, domain-general relational learning is an integral part of human learning, but is difficult to reproduce in artificial systems. Precise recordings of human neural activity during relational learning are needed to understand what allows for this flexibility in humans, and evaluate if similar mechanisms can be translated to artificial systems.
- Designed tasks for large-scale online behavioral experiments on Amazon's Mechanical Turk and in person experiments with epilepsy patients with electrocorticographic recordings to probe relational learning.
- Characterized individual differences in learning using a single parameter (maximum entropy) model of temporally discounted state prediction of relational learning.
- Designed electrophysiological analyses to test for evidence of low dimensional representations of relational structure, and evidence of medial temporal lobe involvement in relational learning.

Combating Citation Bias (Google Chrome Extension)

Complex Systems Group (Prof. Danielle Bassett)

In Progress
Philadelphia, PA

- Women and underrepresented minorities are disproportionately under-cited in many scientific disciplines. Tools to help scientists combat these biases are scarce.
- Currently designing and building extension for Google Chrome to add probabilistic information about the gender and race of authors on a given publication to Google Scholar searches.

Network Control Theoretic Models of Human Brain Dynamics

2017 - 2019

Complex Systems Group (Prof. Danielle Bassett)

Philadelphia, PA

- Understanding and quantifying the relationship between the structure of potential communication pathways in the brain and observed neural dynamics is an important open question in neuroscience. Network control theory is a potentially powerful tool for investigating this relationship and modeling neural response to stimulation based therapies.
- Designed network control theoretic models of direct electrical brain stimulation, and used these models to make theoretical predictions of when and where to stimulate in order to improve memory performance.

Brain Computer Interface 2017 - 2019 Complex Systems Group (Prof. Danielle Bassett) Philadelphia, PA

- Implemented data-driven method of network decomposition (non-negative matrix factorization) to investigate dynamic functional networks that support brain-computer interface learning.
- Used metrics from control theory to posit a role for identified subnetworks in sustaining attention during learning.

Neurophysiological Underpinnings of Social Behaviors

Feb 2014 - Aug 2016

Knight Laboratory (Prof. Robert Knight)

Berkeley, CA

- The ability to understand and infer the actions or emotions of others is a crucial skill for successful interactions that vary greatly across individuals and cultures. However, the neural mechanisms underlying these inferences have been difficult to characterize.
- Designed, collected, and analyzed EEG, ECoG and dual EEG experiments to investigate social behaviors.
- Trained other undergraduates on professional usage and maintenance of EEG equipment.

Consulting

Medical Device Startup

In Progress

Penn Biotech Group

Philadelphia, PA

- Quantified early adoption market and execution strategy for small health-tech startup in the Philadelphia area that specializes in neurofeedback devices.

PUBLICATIONS

Articles

Published

- **Stiso, J.**, Khambhati, A. N., Menara, T., Kahn, A. E., Stein, J. M., Das, S. R., Gorniak, R., Tracy, J., Litt, B., Davis, K.A., Pasqualetti, F., Lucas, T.H., Bassett, D. S. (2019). White Matter Network Architecture Guides Direct Electrical Stimulation Through Optimal State Transitions. *Cell Reports*, 28(10), 2554-2566.
- **Stiso, J.**, Bassett, D. S. (2018). Spatial Embedding Imposes Constraints on the Network Architectures of Neural Systems. *Trends in Cognitive Science*, 22(12), 1127-1142.
- Buch, V.P., Richardson, A.G., Brandon, C., **Stiso, J.**, Khattak, M.N., Bassett, D.S., Lucas, T.H. (2018) Network brain-computer interface (nBCI): An alternative approach for cognitive prosthetics. *Frontiers in Neuroscience*. 12(790).

- Perry, A., Saunders S., **Stiso, J.**, Dewar, C., Lubell, J., Meling, T., Endestad, T., Solbakk, A.K., & Knight, R.T. (2017). Effects of Prefrontal Cortex Damage on Action and Emotion Understanding: EEG and behavioral evidence. *Brain*, 140(4), 1086–1099.
- Perry, A., **Stiso, J.**, Chang, E. F., Lin, J. J., Parvizi, J., & Knight, R. T. (2017). Mirroring in the Human Brain: Deciphering the Spatial-Temporal Patterns of the Human Mirror Neuron System. *Cerebral Cortex*, 1–10.
- **Stiso, J.**, & Perry, A. (2016). How Do We Understand Other People? *Frontiers for Young Minds*, 4(September).

In Revision

- Cui Z., **Stiso, J.**, Baum, G.L., Kim, J.Z., Roalf, D.R., Betzel, R.F., Gu, S., Lu, Z., Xia, C.H., Ciric, R., Moore, T.M., Shinohara, R.T., Ruparel, K., Davatzikos, C., Pasqualetti, F., Gur, R.E., Gur, R.C., Bassett, D.S., Satterthwaite, T.D. (2018). Optimization of Energy State Transition Trajectory Supports the Development of Executive Function During Youth. *Nature Human Behavior*
- Karrer, T.M., Kim, J.Z., **Stiso, J.**, Kahn, A.E., Pasqualetti, F., Habel, U. and Bassett, D.S. (2019). A practical guide to methodological considerations in the controllability of structural brain network. *Journal of Neural Engineering*

Under Review

- **Stiso, J.**, Corsi, M.C., Vettel, J.M., Garcia, J.O., de Vico Fallani, F., Bassett, D. S. (2019). Learning in brain-computer interface control evidenced by joint decomposition of brain and behavior. *Nature Communications*

Book Chapters

- Bassett, D.S., **Stiso, J.**. Spatial Brain Networks. Invited as a chapter in the volume entitled “Spatial Networks” from Comptes-rendus Academie des sciences. doi:10.1016/j.crhy.2018.09.006

Press

- ["Penn Researchers' Model Optimizes Brain Stimulation Therapies, Improving Memory in Tests"](#). Penn Engineering Medium Article

Presentations

Invited Talks

International

- **Network Models of Brain Structure, Function, and Control.** Organization for Human Brain Mapping - data science in neuroscience symposium. Rome, Italy. 2019
- **Using Control Theory to Model Direct Electrical Brain Stimulation.** Networks in Big Data and Personalized Medicine Satellite. Paris, France. 2018

National

- **Network Science Approaches to Neural Function in Epilepsy.** American Epilepsy Society - Engineering and Neurostimulation Special Interest Group. New Orleans, LA. 2018
- **Large-scale Control of Human Brain Structural Networks: applications in direct electrical stimulation.** Society for Neuroscience Mini symposium - Exposing Neural Dynamics Using Real-Time Control: From Neurons to Human Behavior and Psychopathy. San Diego, CA. 2018
- **Towards a Mathematical Model of Direct Electrical Brain Stimulation.** Topology in Biology Seminar. Philadelphia, PA. 2018

- **Barriers to Open Science in Graduate School.** Open Science Week panel (planned) 2019
- **Investigating the Role of the Hippocampus in Higher-order Statistical Learning.** Collaborative ECoG research protocol meeting 2019
- **Network Models of Brain Structure, Function, and Control.** Graduate Research in Progress Seminar 2019
- **Investigating the Neurophysiological Correlates of Higher-order Statistical Learning in Humans.** CNI +/- 2018
- **Towards a Mathematical Model of Direct Electrical Brain Stimulation.** Graduate Research in Progress Seminar 2018

Posters

- **Stiso, J.**, Corsi, M.C., Vettel, J.M., Garcia, J.O., de Vico Fallani, F., Bassett, D. S. Dynamic functional beta-band connectivity during BCI learning drives brain activity to support sustained attention. Presented at OHBM, Rome (2019)
- He, X., **Stiso, J.**, Kim, J.Z., Lu, Z., Cornblath, E.J., Menara, T., Pasqualetti, F., Sperling, M.R., Tracy J.I., Bassett, D.S. Characterizing the optimal control energy trajectory in temporal lobe epilepsy. Presented at OHBM, Rome (2019)
- Cui Z., **Stiso, J.**, Baum, G.L., Kim, J.Z., Roalf, D.R., Betzel, R.F., Gu, S., Lu, Z., Xia, C.H., Ciric, R., Moore, T.M., Shinohara, R.T., Ruparel, K., Davatzikos, C., Pasqualetti, F., Gur, R.E., Gur, R.C., Bassett, D.S., Satterthwaite, T.D. (2018). Optimization of Energy State Transition Trajectory Supports the Development of Executive Function During Youth. Presented at OHBM, Rome (2019)
- Buch V. P., Brandon C., Archer R., **Stiso, J.**, Rammayya A., Yang A., Richardson, A. G., Bassett, D.S., Lucas, T.H. Novel inter-trial resting state network analysis can reliably predict learning and performance of a simple cognitive reaction time task. American Association of Neurological Surgeons. San Diego (2019)
- **Stiso, J.**, Khambhati, A. N., Menara, T., Kahn, A. E., Stein, J. M., Das, S. R., ... Bassett, D. S. White Matter Network Architecture Guides Direct Electrical Stimulation Through Optimal State Transitions. Presented at NetSci, Paris (2018), Computational Cognitive Neuroscience, Philadelphia (2018) and Society for Neuroscience, San Diego (2018)
- **Stiso, J.**, Hudgins E., Brandon C., Williams S., Richardson A., Kelz M., Proekt A., Lucas T. Intracranial Recordings Applied Towards a Better Predictor of Unconscious States. Presented at Congress of Neurological Surgeons (2017)
- Perry, A., Saunders S., **Stiso, J.**, Dewar, C., Lubell, J., Meling, T., Endestad, T., Solbakk, A.K., & Knight, R.T. Effects of prefrontal cortex damage on emotion understanding. Presented at CNS, San Francisco (2017)
- Perry, A., **Stiso, J.**, Dewar, C., Lin, J.J., Knight, R.T. The role of the orbitofrontal cortex in regulation of interpersonal space. Presented at SfN conference, San Diego (2016)
- Perry, A., **Stiso, J.**, Chang, E. F., Lin, J. J., Parvizi, J., & Knight, R. T. Perception through action: Where and When. Presented at the SfN conference (2015) and California Cognitive Science Conference (2016)
- Perry, A., **Stiso, J.**, Chang, E.F., Schalk, G., Brunner, P., Lin, J.J., Knight, R.T. Viewing and Imitating Goal Directed Actions. Presented at the SfN (2014) and the California Cognitive Science conference (2015)

TEACHING

Teaching Assistant

2019 - Present

- Translating materials for graduate level statistics course from MATLAB to R.

- Taught and developed material for graduate level Python bootcamp. This bootcamp also included two lessons on neural networks with Keras.
- Teaching assistant for introduction to the biological basis of behavior (BBB109) at the University of Pennsylvania.

Guest Lecture

2019 - Present

- Taught lecture on applications of network control theory to neuroscience to graduate level network neuroscience course (BE566)
- Taught guest lecture on learning memory in high school summer neuroscience class offer through Upward Bound.

Materials

2019 - Present

- Translating materials for graduate level statistics course from MATLAB to R.
- Wrote lectures on Pandas data structures, and machine learning with SciKit Learn for Python boot camp.

HONORS AND AWARDS

Blavatnik Fellowship Finalist

2019

University of Pennsylvania

Jameson Hurvich Travel Award

2019

University of Pennsylvania

Google PhD Fellowship Internal Nominee

2018

University of Pennsylvania

Systems and Integrative Biology T32

2016

University of Pennsylvania

NSF GRFP Honorable Mention

2016

National

Robert J. Glushko Prize

2015

University of California, Berkeley

SURF L&S Fellowship

2014

University of California, Berkeley

Goldberg Undergraduate Research Fellowship

2013

University of California Berkeley

Coursework

- **Math and Computer Science:** computational models of cognition, data structures, data science, discrete mathematics, linear algebra, machine learning (including neural networks), statistics
 - **Biology and Social Science:** biochemistry, biophysics, electricity and magnetism, genetics, linguistics, organic chemistry, perception, philosophy of mind, neurobiology, and neuropsychology
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Community Involvement

Professional Memberships

Present

- Penn Biotech Group (2019)
- Society for Neuroscience (2018)
- Penn Data Science Group (2017)
- Graduate Led Initiatives and Activities (2016)

Peer Reviewer

2018 - Present

- *Journal of Nonlinear Science, NeuroImage*

Journal Clubs

2017 - Present

- Organized the Cognitive Neuroscience and Neuroimaging journal club at Penn. This included administrative roles as well as presenting at least once per semester.

Outreach

2016 - Present

Graduate Led Initiatives and Activities

- Elected secretary in 2019.
- Elected co-director in 2018; negotiated funding increases from three different sources, totaling a 41% increase in funds.
- Elected chair of professional development in 2017; managed several subcommittees, accountable for professional development budget and introduced a new undergraduate mentor program.
- Volunteered to teach high school students neuroscience and research in general as part of Upward Bound, volunteered at the Philadelphia Science Festival.
- Developed and designed a networking website for neuroscience students and alumni from Penn.

2019

Penn Network Visualization Organization

- Organizing committee for week long internship program for high school artists in the Philadelphia areas to learn about science and create science inspired pieces for their portfolio.

2013 - 2014

Cognitive Science Students Association

- Taught basic neuroscience to elementary school students; planned annual conference for undergraduate and graduate researchers in cognitive science.