

JENNIFER STISO

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EDUCATION

University of Pennsylvania

PhD Neuroscience

Aug 2016 – Present

Philadelphia, PA

- GPA: 3.6/4.0

University of California Berkeley

BA Molecular and Cellular Biology; Cognitive Science

Aug 2012 – June 2016

Berkeley, CA

- GPA: 3.6/4.0

Positions

PhD Candidate

Complex Systems Group (Prof. Danielle Bassett)

June 2017 – Present

Philadelphia, PA

- Computational neuroscience, graph theory, and machine learning

Rotation Student

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

Aug 2016 - June 2017

Philadelphia, PA

- Dynamical systems theory, and cognitive neuroscience

Undergraduate Researcher

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

Feb 2014 - Aug 2016

Berkeley, CA

- Cognitive neuroscience, psychophysics

SKILLS

- **Programming:** Python, R, MATLAB, Java, Latex, Javascript
- **Soft Skills:** communication, time management, organization

Coursework

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

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 electrocorticography patients to probe relational learning.
- Characterized individual differences in learning using maximum-entropy based model of relational learning.
- Designed electrophysiological analyses to test for evidence low dimensional representations of relational structure, and evidence of medial temporal lobe involvement in relational learning.

Combating Citation Bias (Google Chrome Extension)

In Progress

Complex Systems Group (Prof. Danielle Bassett)

Philadelphia, PA

- Women and underrepresented minorities are disproportionately under-cited in many scientific disciplines. However, 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 to 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.
- 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 crucial skill for successfully interactions that varies 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.

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*
- **Stiso, J.**, Bassett, D. S. (2018). Spatial Embedding Imposes Constraints on the Network Architectures of Neural Systems. *Trends in Cognitive Science*. doi:10.1016/j.tics.2018.09.007
- 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*

- 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

Presentations

Invited Talks

International

- **Network Models of Brain Structure, Function, and Control.** Organization for Human Brain Mapping - datascience 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 Minisymposium - 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

Internal

- **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)

HONORS AND AWARDS

Blavatnik Fellowship Finalist 2019
University of Pennsylvania

Jameson Hurvich Travel Award 2019
University of Pennsylvania

Google PhD Fellowship Internal Nominee University of Pennsylvania	2018
Systems and Integrative Biology T32 University of Pennsylvania	2016
NSF GRFP Honorable Mention National	2016
Robert J. Glushko Prize University of California, Berkeley	2015
SURF L&S Fellowship University of California, Berkeley	2014
Goldberg Undergraduate Research Fellowship University of California Berkeley	2013

Professional Memberships

Penn Biotech Group Member	2019 University of Pennsylvania
Society for Neuroscience Member	2018 International
Graduate Led Initiatives and Activities Professional Development Chair (2017), Co-director (2018), Secretary (2019)	2016 University of Pennsylvania

Community Involvement

Teaching 2019 - Present

- Translating materials for graduate level statistics course from MATLAB to R.
- Taught and developed material for graduate level Python bootcamp. I wrote lectures on Pandas data structures, and machine learning with SciKit Learn. 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.

Peer Reviewer 2018 - Present

- *Journal of Nonlinear Science, NeuroImage*

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.

Cognitive Science Students Association

- Taught basic neuroscience to elementary schoolers; included handling human, sheep, and rat brains.
- Helped plan and organize annual conference for undergraduate and graduate researchers in cognitive science.

Rejections and Failures**Neuroengineering and Medicine T32**

2019

University of Pennsylvania

NRSA F31

2019

National

Behavioral and Cognitive Neuroscience T32

2018

University of Pennsylvania

NRSA F31

2018

University of Pennsylvania

Google PhD Fellowship

2017

International