Sam **Zorowitz**

PhD Candidate at the Princeton Neuroscience Institute

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Education

Princeton University — *Princeton, NJ*

PhD Candidate in Neuroscience — *Sep. 2017 - Present*

- Advisors: Yael Niv, Nathaniel Daw
- Cumulative GPA: 3.90
- Supported by National Science Foundation Graduate Research Fellowship (NSF GRF)

Johns Hopkins University — *Baltimore, MD*

BA in Psychological & Brain Sciences — *Sep. 2010 - May 2014*

- Cumulative GPA: 3.91
- Phi Beta Kappa, General University Honors

Skills

Quantitative	Bayesian data analysis, cognitive modeling, item response theory, psychometrics
Programming	Python, R, Matlab, HTML, JavaScript, CSS, Unix
Software	Stan, Jax, PsychoPy, Psychtoolbox, jsPsych

Research Experience

Princeton University — *Princeton, NJ*

PhD Candidate in Neuroscience — *Sep. 2017 - Present*

- Formalized classic theories of clinical anxiety using Bayesian decision theory, and demonstrated how this new model ties together a number of seemingly disjoint phenomena in anxious disorders.
- Designing experiments to dissociate biased beliefs about self-efficacy and environmental control in anxious patients.
- Developing psychometrically-validated battery of decision making and reinforcement learning tasks to measure and dimensionally characterize decision making in healthy and clinical samples.
- Built NivTurk, lightweight software for securely serving and storing data from online computational psychiatry experiments. Tested on over 3000 participants across Amazon Mechanical Turk and Prolific.

Massachusetts General Hospital / Harvard Medical School — *Boston, MA*

Clinical Research Coordinator — *Jun. 2014 - Jun. 2017*

- Devised hierarchical Bayesian model of decision making conflict, integrating both choice and reaction time data, in an approach-avoidance gambling task for use in predicting conflict-related signals in fMRI & EEG neural data.
- Lead analyst on study investigating the effects of DBS on executive control in patients with severe depression. Found that DBS improved patients' performance on a Stroop-like task, which was indirectly predictive of patients' clinical response to DBS.
- Adapted Bayesian state space models of associative learning to a reversal learning paradigm and demonstrated its efficacy in improving fMRI signal-to-noise ratio.
- Interviewed and assisted patients with severe psychopathology as part of clinical and study visits.

Johns Hopkins University — *Baltimore, MD*

Undergraduate Research Assistant — *Aug. 2012 - May 2014*

- With John Kruschke: designed a novel experiment to test models of counterfactual reasoning in judgments of responsibility, blame, and redistributive justice.
- With Jared Lorince: modeled social imitative behaviors in two million users of an online music-archiving community (Last.fm).
- With Marc Boulay: investigated social and sexual network predictors of HIV risk in MSM populations in Abuja and Lagos, Nigeria.

Publications

Journal Articles

Zorowitz, S., Niv, Y., Bennett, D. (under review). Inattentive responding can induce spurious associations between task behavior and symptom measures. https://psyarxiv.com/rynhk

Zorowitz, S., Bennett, D., Choe, G., Niv, Y. (2021). A Recurring Reproduction Error in the Administration of the Generalized Anxiety Disorder Scale. Lancet Psychiatry. 8(3), P180-181.

Zorowitz, S., Momennejad, I., & Daw, N. D. (2020). Anxiety, avoidance, and sequential evaluation. Computational Psychiatry, 4, 1-17.

Zorowitz, S., Rockhill, A. P., Ellard, K. K., Link, K. E., Herrington, T., Pizzagalli, D. A., Widge, A. S., Deckersbach, T., Dougherty, D. D. (2019). The Neural Basis of Approach-Avoidance Conflict: A Model Based Analysis. eNeuro.

Langdon, A. J., Hathaway, B. A., **Zorowitz, S.**, Harris, C. B. W., Winstanley, C. A. (2019). Relative insensitivity to time-out punishments induced by win-paired cues in a rat gambling task. Psychopharmacology, 236(8), 2543-2556.

Widge, A. S., **Zorowitz, S.**, Basu, I., Paulk, A. C., Cash, S. S., Eskandar, E. N., Deckersbach, T., Miller, E. K., Dougherty, D. D. (2019). Deep Brain Stimulation of the Internal Capsule Enhances Human Cognitive Control and Prefrontal Cortex Function. Nature Communications, 10(1), 1-11.

Widge, A. S., Ellard, K. K., Paulk, A. C., Basu, I., Yousefi, A., **Zorowitz, S.**, … Eskandar, E. N. (2017). Treating refractory mental illness with closed-loop brain stimulation: Progress towards a patient-specific transdiagnostic approach. Experimental Neurology, 287, 461-472.

Klein, E., Goering, S., Gagne, J., Shea, C. V., Franklin, R., **Zorowitz, S.**, … & Widge, A. S. (2016). Brain-computer interface-based control of closed-loop brain stimulation: attitudes and ethical considerations. Brain-Computer Interfaces, 3(3), 140-148.

Rodriguez-Hart, C., Liu, H., Nowak, R. G., Orazulike, I., **Zorowitz, S.**, Crowell, T. A., … Charurat, M. (2016). Serosorting and Sexual Risk for HIV Infection at the Ego-Alter Dyadic Level: An Egocentric Sexual Network Study Among MSM in Nigeria. AIDS and Behavior, 20(11), 2762-2771.

Widge, A. S., Licon, E., **Zorowitz, S.**, Corse, A., Arulpragasam, A. R., Camprodon, J. A., … Dougherty, D. D. (2016). Predictors of Hypomania During Ventral Capsule/Ventral Striatum Deep Brain Stimulation. The Journal of Neuropsychiatry and Clinical Neurosciences, 28(1), 38–44.

Widge, A. S., **Zorowitz, S.**, Link, K., Miller, E. K., Deckersbach, T., Eskandar, E. N., & Dougherty, D. D. (2015). Ventral Capsule/Ventral Striatum Deep Brain Stimulation Does Not Consistently Diminish Occipital Cross-Frequency Coupling. Biological Psychiatry, 80(7), e59-e60.

Franklin, R., **Zorowitz, S.**, Corse, A. K., Widge, A. S., & Deckersbach, T. (2015). Lurasidone for the treatment of bipolar depression: an evidence-based review. Neuropsychiatric Disease and Treatment, 11, 2143–2152.

Lorince, J., **Zorowitz, S.**, Murdock, J., & Todd, P. M. (2015). The Wisdom of the Few? "Supertaggers" in Collaborative Tagging Systems. The Journal of Web Science: Vol. 1: No. 1, pp 16-32.

Conference Proceedings

Zorowitz, S., Momennejad, I., & Daw, N. D. (2019). Anxiety, avoidance, and sequential evaluation. Reinforcement Learning and Decision Making.

Langdon, A. J., Hathaway, B. A., **Zorowitz, S.**, Harris, C. B. W., Winstanley, C. A. Insensitivity to time-out punishments induced by win-paired cues in a rat gambling task. Reinforcement Learning and Decision Making.

Lorince, J., **Zorowitz, S.**, Murdock, J., & Todd, P. M. (2014). Supertagger behavior in building folksonomies. In Proceedings of the 2014 ACM conference on Web science (pp. 129–138). ACM.

Conference Posters

Zorowitz, S., Lane, P. L., Daw, N. D. (2021). The value of free choice in anxiety. To be presented at Society of Biological Psychiatry.

Paredes, N., **Zorowitz, S.**, Niv, Y. (2021). The psychometric properties of the Pavlovian Instrumental Transfer task in an online adult sample. To be presented at Society of Biological Psychiatry.

Zaller, I., **Zorowitz, S.**, Niv, Y. (2021). Information seeking on the horizons task does not predict anxious symptomatology. To be presented at Society of Biological Psychiatry.

Paredes, N., **Zorowitz, S.**, Niv, Y. (2021). The psychometric properties of the Pavlovian Instrumental Transfer task in an online adult sample. Presented at Society for Neuroscience Global Connectome.

Zaller, I., **Zorowitz, S.**, Niv, Y. (2021). Information seeking on the horizons task does not predict anxious symptomatology. Presented at Society for Neuroscience Global Connectome.

Zorowitz, S., Bennett, D., Niv, Y. (2020). The Relation between Probability Weighting and Subclinical Anxiety in Decisions under Uncertainty. Presented at Society for Biological Psychiatry. New York City, New York.

Bennett, D., Radulescu, A., **Zorowitz, S.**, Niv, Y. (2019). Assessing mood's effects on attention in value-based decision making. Presented at Society for Affective Science. Boston, Massachusetts.

Widge, A. S., **Zorowitz, S.**, Afzal, A., Farnes, K., Paulk, A. C., Miller, E. K., Deckersbach, T., Cash, S. S., Dougherty, D. D. (2016). Deep Brain Stimulation of Striatal White Matter Alters Top-Down Control Signals in Cingulate and Prefrontal Cortices. Presented at the American College of Neuropsychopharmacology, Hollywood, Florida.

Sitnikova, T. A., **Zorowitz, S.**, Afzal, A., Gilmour, A. L., Ellard, K. K., Herrington, T. M., … Deckersbach, T. (2016). Oscillatory synchronization enables dynamic information processing to resolve reward seeking vs. risk avoidance conflict. Poster presented at the Society for Neuroscience, San Diego, CA.

Zorowitz, S., Afzal, A., Deckersbach, T., Ellard., K. K., Gilmour, A. L., Dougherty, D. D., Eskandar, E. N., Widge, A. W. (2016). Bayesian State-Space Modeling of Reversal Learning. Poster presented at the Society for Neuroscience, San Diego, CA.

Afzal, A., **Zorowitz, S.**, Ellard, K. K., Widge, A. S., Gilmour, A. L., Dougherty, D. D., Eskandar, E. N., Deckersbach, T. Neural Correlates of Approach-Avoidance Behavior in Decision Making. Poster presented at the Society for Neuroscience, San Diego, CA.

Afzal, A., **Zorowitz, S.**, Ellard, K. K., Widge, A. S., Gilmour, A. L., Dougherty, D. D., Eskandar, E. N., Deckersbach, T. Neural Correlates of Approach-Avoidance Behavior in Decision Making. Poster presented at the Society of Biological Psychiatry, Atlanta, GA.

Zorowitz, S., Franklin, R., Kunwar, P. S., Greve, D. N., Block, S., Moran, L. R., Schwartz, C. E. (2016). A High-reactive Temperamental Profile in 4 Month-Old Infants Predicts Reduced Amygdala Volume and Increased Amygdala Reactivity in Adults. Poster presented at the Society of Biological Psychiatry, Atlanta, GA.

Widge, A. S., **Zorowitz, S.**, Tang, W., Miller, E. K., Deckersbach, T., & Dougherty, D. D. (2015). Behavioral and neural biomarkers of improved top-down control mediate clinical response to ventral capsule/ventral striatum deep brain stimulation in major depression. Poster presented at the Society of Biological Psychiatry, Toronto, Canada.

Teaching

Princeton University — *Princeton, NJ*

Graduate Student Bootcamp Leader — *Summer 2020*

- Organized and oversaw 3 week long math and programming bootcamp for incoming graduate students.
- Lectured on python programming, model fitting, and significance testing.

Assistant Instructor for Laboratory in Principles of Neuroscience — *Spring 2020*

- Taught scientific python programming to undergraduate students.
- Designed in-class exercises and problems sets on fMRI preprocessing and mass univariate analysis.

Graduate Student Bootcamp Instructor — *Summer 2019*

- Designed and taught a three day Intro to Python for Neuroscience series for the PNI Graduate Bootcamp.
- Bootcamp materials covered core Python, numeric computing, statistics, and vizualization.

Assistant Instructor for Graduate Methods in Cognitive Neuroscience — *Spring 2019*

- Designed lecture materials for teaching neuroimaging analysis (fMRI, EEG) in python.
- Designed novel problem sets for teaching neuroimaging analysis and computational reproducibility.

Assistant Instructor for Fundamentals of Neuroscience — *Fall 2018*

- Taught three undergraduate precepts per week.
- Co-designed lecture materials, wrote exam questions, and organized review sessions.

Columbia University — *New York City, NY*

Workshop Organizer — *Summer 2017*

- Designed and taught a two-week Intro to Python for Data Science workshop for the QMSS Masters Program.
- Workshop materials covered scientific computing, machine learning, statistical analysis, and webscraping.

Mentoring

2020 **Kiersten Marr**, Junior project and senior thesis at Princeton University
2020 **Livia Qoshe**, Junior project and senior thesis at Princeton University
2020 **Isabel Zaller**, Independent work at Princeton University
2020 **Natalie Paredes**, Summer internship at Princeton University
2017 **Katherine Link**, Summer internship at Harvard Medical School

Fellowships & Awards

2019 **Graduate Research Fellowship**, National Science Foundation
2019 **Student Travel Award**, Conference on Reinforcement Learning & Decision Making
2017 **Centennial Fellowship**, Princeton University
2016 **Top Poster in Translational Research**, Society of Biological Psychiatry