

STEPHEN PARKER SINGLETON

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Education

June 2020 - April 2023	Computational Biology, Ph.D.	Cornell University
August 2015 - June 2017	Chemistry, M.S.	Cornell University
August 2011-May 2015	Chemistry, B.S.	University of South Carolina

Professional Experience

May 2024 - Present	Postdoctoral Researcher Advisor: Ted Satterthwaite	Penn Lifespan Informatics and Neuroimaging Center University of Pennsylvania Perelman School of Medicine
<ul style="list-style-type: none">Assessing the clinical efficacy and risks of psychedelic-assisted therapies.Developing new tools and frameworks for measuring psychedelic-induced functional plasticity in the brain using fMRI.		
April 2023 - April 2024	Postdoctoral Researcher Advisor: Amy Kuceyeski	Computational Connectomics Lab Weill Cornell Medicine
<ul style="list-style-type: none">Studied the effects of pharmacology, substance use, and trauma on human brain activity/connectivity using network control theory and multimodal neuroimaging.Mentored undergraduate and graduate students on their rotation/thesis projects.		
June 2020 - April 2023	NSF Graduate Research Fellow Advisor: Amy Kuceyeski	Department of Computational Biology Cornell University
<ul style="list-style-type: none">Studied the effects of psychedelics on human brain activity/connectivity in the Computational Connectomics Lab.Utilized advanced techniques in network control theory, statistics, and machine learning to quantify brain dynamics.Identified neural correlates of MDMA-assisted therapy for PTSD in humans using audio script-driven memory recollection during fMRI.Coding experience: MATLAB, R, python, bash, git.Experience with preprocessing and analysis of fMRI, dMRI, PET.Network (graph) neuroscience, feature extraction, biomarker discovery.		
August 2017 - June 2020	Teacher High School	Palmetto Scholars Academy North Charleston, SC
<ul style="list-style-type: none">Designed and implemented a diverse 10th grade chemistry curriculum for intellectually gifted students.Instructor of dual-enrollment Chemistry 110/111 lecture and lab course along with an Introduction to Research class to prepare junior students for their senior capstone project.Utilized a project-based-learning curriculum for an experimental chemistry elective course.		
June 2015 - August 2017	Graduate Research Assistant Advisor: Brett P. Fors	Department of Chemistry & Chemical Biology Cornell University
<ul style="list-style-type: none">Developed novel catalyst systems for controlling polymer topology <i>in situ</i>, utilizing visible light as an external stimulus.Structure-property relationships of these new materials studied via NMR, rheology, and SAXS.Random forest classifier implemented to map structure-property relationships.		
August 2013 - May 2015	Undergraduate Researcher Advisor: Chuanbing Tang	Department of Chemistry & Biochemistry University of South Carolina
<ul style="list-style-type: none">Development and classification of cationic, rosin acid-derived, compounds and polymers as novel antimicrobial agents.Surface initiated ATRP modification of glass surfaces for medical device and implant applications.Novel monomer synthesis and natural product functionalization, purification, and characterization.		
May 2013 - August 2014	Applications/Development Chemist Intern I & II	MeadWestvaco (now Ingevity) North Charleston, SC
<ul style="list-style-type: none">Ladder study performed involving HM-PSA formulation and preparation, physical and rheological testing, followed by multivariate analysis (PCA, PLSA) to create an iterative screening process for new product development and adhesive formulation.Explored various synthetic pathways for the development of new products with targeted end-use properties in adhesive systems.		

Teaching and Outreach

April 2023 - Present	Machine Learning in Medicine Virtual Seminar Series	Cornell University Ithaca, NY
<ul style="list-style-type: none">An inter-campus collaborative with the goal of bringing together researchers with common interests in machine learning applied to clinical questions/dataInvite and host speakers from academia and industry for our regular virtual seminar series.		
April 2019 - May 2022	Advisor High School Senior Capstone Experience	Palmetto Scholars Academy North Charleston, SC
<ul style="list-style-type: none">Mentoring high school students interested in scientific research to develop, plan, and perform their thesis research for their Senior Capstone Project.Students carry out hands-on research, write a thesis, and defend it against a committee.		
August 2017 - May 2018	Head Coach VEX High School Robotics	Palmetto Scholars Academy North Charleston, SC
<ul style="list-style-type: none">Coached 4 high school VEX teams during the 2017-2018 In The Zone challenge.Teams earned 2 Excellence Awards, 2 Design Awards, and 1 Tournament Champions award.2 Teams made it to SC State Tournament and 1 team advanced to the US CREATE Open event in Council Bluffs, Iowa.		
January 2016 - June 2017	Outreach Coordinator	Fors Research Group Cornell University
August 2015 - June 2017	Families Learning Science Together Workshop Volunteer	Cornell Center for Materials Research Cornell University
August 2015 - May 2016	Graduate Teaching Assistant Organic Chemistry Laboratory	Department of Chemistry & Chemical Biology Cornell University
October - November 2015	Family Science Nights Module Instructor	Sciencenter Museum Ithaca, NY
January 2013 - May 2013	Teaching Assistant General Chemistry Laboratory	Department of Chemistry & Biochemistry University of South Carolina

Volunteer Experience

August 2017 - May 2023	President Homeowner's Association	Jericho on the Ashley North Charleston, SC
October 2016	Service Volunteer	Montgomery Park Playground Build Dryden, NY
September 2013 - June 2015	President and Founder	Gates at Williams-Brice Recycling Committee Columbia, SC
Summers of 2013-2014	Service Volunteer	The Hope Lodge, American Cancer Society Charleston, SC

Honors and Awards

Fulbright Research Grant Alternate — 2022 (*Neural and subjective effects of mescaline in naturalistic settings*)
National Science Foundation Graduate Research Fellow — 2016 - 2017; 2020 - 2022
Graduation with Leadership Distinction in Research — May, 2015
University of South Carolina Outstanding Senior Award — April, 2015
Who's Who Among American Colleges and Universities Award — April, 2015
Hypercube Scholar Award — April, 2015
Hiram S. and Lawanda Allen Scholarship for Excellence in Chemistry — April, 2014
Magellan Scholarship for Undergraduate Research — April, 2014
Outstanding Poster Presentation, Presented at the South Carolina ACS Awards Day — April, 2014
South Carolina Palmetto Fellows Scholar — August, 2011 - May, 2015
USC Dean's Scholar — August, 2011 - May, 2015

Publications

Original Research:

A. I. Luppi, S. P. Singleton, J. Y. Hansen, K. W. Jamison, D. Bzdok, A. Kuceyeski, R. F. Betzel, B. Misic “Contributions of network structure, chemoarchitecture and diagnostic categories to transitions between cognitive topographies,” **Nature Biomedical Engineering**, **2024** 2023.03.16.532981; doi: <https://doi.org/10.1038/s41551-024-01242-2>.

S. Parker Singleton, Amy Kuceyeski “Bridging Psilocybin-Induced Changes in the Brain’s Dynamic Functional Connectome With an Individual’s Subjective Experience,” **Biological Psychiatry: Cognitive Neuroscience and Neuroimaging**, **2024**; doi: <https://doi.org/10.1016/j.bpsc.2024.05.003>.

S. Parker Singleton, Puneet Velidi, Louisa Schilling, Andrea I. Luppi, Keith Jamison, Linden Parkes, Amy Kuceyeski “Altered structural connectivity and functional brain dynamics in individuals with heavy alcohol use elucidated via network control theory,” **Biological Psychiatry: Cognitive Neuroscience and Neuroimaging**, **2024**; doi: <https://doi.org/10.1016/j.bpsc.2024.05.006>.

S. Parker Singleton, Christopher Timmermann, Andrea I. Luppi, Emma Eckernäs, Leor Roseman, Robin L. Carhart-Harris, Amy Kuceyeski “Time-resolved network control analysis of human brain dynamics under DMT,” **bioRxiv** **2023**.05.11.540409; doi: [10.1101/2023.05.11.540409](https://doi.org/10.1101/2023.05.11.540409). **Under Revision at Nature Communications Biology**.

S. P. Singleton “This Is Your Brain on Drugs: A Multimodal Neuroimaging and Computational Investigation into the Effects of Psychedelic Tryptamines and MDMA on Human Brain Dynamics,” **Doctoral Dissertation, Cornell University ProQuest Dissertations & Theses**, **2023**. 30420106.

S. P. Singleton, J. B. Wang, M. Mithoefer, C. Hanlon, M. S. George, A. Mithoefer, O. Mithoefer, A. R Coker, B. Yazar-Klosinski, A. Emerson, R. Doblin, A. Kuceyeski “Altered brain activity and functional connectivity after MDMA-assisted therapy for post-traumatic stress disorder,” **Frontiers in Psychiatry**, **2023** 13:947622. doi: [10.3389/fpsyt.2022.947622](https://doi.org/10.3389/fpsyt.2022.947622)

S. P. Singleton, A. I. Luppi, R. L. Carhart-Harris, J. Cruzat, L. Roseman, D.J. Nutt, G. Deco, M. L. Kringelbach, E. A. Stamatakis, A. Kuceyeski “Receptor-informed network control theory links LSD and psilocybin to a flattening of the brain’s control energy landscape,” **Nature Communications**, **2022** DOI: [10.1038/s41467-022-33578-1](https://doi.org/10.1038/s41467-022-33578-1).

M. Nadgorny, D. T. Gentekos, Z. Xiao, S. P. Singleton, B. P. Fors, L. A. Connal “Manipulation of Molecular Weight Distribution Shape as a New Strategy to Control Processing Parameters,” **Macromolecular Rapid Communications**, **2017** DOI: [10.1002/marc.201700352](https://doi.org/10.1002/marc.201700352)

M. S. Ganewatta, K. P. Miller, S. P. Singleton, P. Mehrpouya-Bahrami, Y. P. Chen, Y. Yan, M. Nagarkatti, P. Nagarkatti, A. W. Decho, C. Tang “Antibacterial and Biofilm-Disrupting Coatings from Resin Acid-Derived Materials,” **Biomacromolecules**, **2015** DOI: [10.1021/acs.biomac.5b01005](https://doi.org/10.1021/acs.biomac.5b01005).

Commentaries and Perspectives:

S. Parker Singleton, Amy Kuceyeski “Bridging Psilocybin-Induced Changes in the Brain’s Dynamic Functional Connectome With an Individual’s Subjective Experience,” **Biological Psychiatry: Cognitive Neuroscience and Neuroimaging**, **2024**; doi: <https://doi.org/10.1016/j.bpsc.2024.05.003>.

Presentations

Invited talks, panels, workshops:

- “Pharmacologically-informed network control theory,” The Nora Volkow group at the National Institute on Alcohol Abuse and Alcoholism online, **2023**.
- “Unlocking DMT Horizons: Exploring the clinical potential of DMT,” OPEN Foundation, online, **2023**.
- “Harnessing neural and cognitive plasticity with psychedelics,” Cleveland Clinic Psychedelic Science Group, online, **2022**.
- “Modeling brain dynamics using psychedelics,” Maastricht University, Maastricht, Netherlands, **2022**.
- “The flowing brain on psychedelics”, Oxford Psychedelic Society, online, **2021**. Recording: <https://youtu.be/wwovwxFuWUE>
- “Chemistry and Music Workshop,” American Chemical Society National Meeting, Orlando, FL, **2019**.

Oral presentations:

- “This is your brain on drugs: A multimodal neuroimaging and computational investigation into the effects of psychedelics and MDMA on human brain dynamics,” Dissertation Defense Seminar, Department of Computational Biology, Cornell University, **2023**. Recording: <https://youtu.be/yE6NuOi3BAI>
- “Altered neural activity patterns following MDMA-assisted therapy for PTSD: an fMRI pilot study,” Interdisciplinary Conference on Psychedelic Research, Haarlem, Netherlands, **2022**. Recording: <https://youtu.be/iV0CcJzOk6E>
- “A flattened energy landscape under LSD and psilocybin: how psychedelics advance our ability to model brain dynamics,” Psychedemia: Neuroscience Panel, Columbus, OH, **2022**. Recording: <https://youtu.be/khaVhAL9NFQ>
- “Evidence for a flattened energy landscape under LSD and Psilocybin,” Canadian Computational Neuroscience Spotlight, online, **2022**.
- “Neurobiology of MDMA-assisted therapy for PTSD,” Cornell Computational Biology Student Seminar Series, Ithaca, NY, **2022**.
- “LSD flattens the brain’s energy landscape: insights from receptor-informed network control theory,” Cornell Computational Biology Student Seminar Series, Ithaca, NY, **2021**.
- “Antibacterial and Biofilm-Disrupting Coating Sustainable Materials,” University of South Carolina Discovery Day for Undergraduate Researchers, Columbia, SC, **2015**.

Oral presentations (cont.):

- “Antibacterial and Biofilm-Disrupting Coating Sustainable Materials,” Southeastern Undergraduate Research Conference, Montgomery, AL, **2015**.

Poster presentations:

- “Altered structural connectivity and functional brain dynamics in individuals with heavy alcohol use elucidated via network control theory” Organization for Human Brain Mapping, Seoul, South Korea, **2024**.
 - “Time-resolved network control analysis of human brain dynamics under DMT,” Organization for Human Brain Mapping, Montreal, Canada, **2023**.
 - “Altered brain activity and functional connectivity after MDMA-assisted therapy for post-traumatic stress disorder,” Psychedelic Science 2023, Denver, CO, **2023**.
 - “LSD and psilocybin flatten the brain’s energy landscape: insights from receptor-informed network control theory,” Organization for Human Brain Mapping, Glasgow, U.K., **2022**.
 - “Evidence for altered neural activity patterns after MDMA-assisted therapy in adults with chronic and severe post-traumatic stress disorder: a pilot study,” Organization for Human Brain Mapping, Glasgow, U.K., **2022**.
 - “LSD and psilocybin flatten the brain’s energy landscape: insights from receptor-informed network control theory,” From Research to Reality: Global Summit on Psychedelic Therapies and Medicine, Toronto, CA, **2022**.
 - “Evidence for altered neural activity patterns after MDMA-assisted therapy in adults with chronic and severe post-traumatic stress disorder: a pilot study,” From Research to Reality: Global Summit on Psychedelic Therapies and Medicine, Toronto, CA, **2022**.
 - “LSD flattens the brain’s energy landscape: insights from receptor-informed network control theory,” Organization for Human Brain Mapping, online, **2021**.
 - “Sustainable Antimicrobial Coatings from Resin Acids,” American Chemical Society Awards Day, Orangeburg, SC, **2014**.
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