

# STEPHEN PARKER SINGLETON

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## Education

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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

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May 2024 - Present	Postdoctoral Researcher Advisor: Ted Satterthwaite	Penn Lifespan Informatics and Neuroimaging Center University of Pennsylvania Perelman School of Medicine
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- 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
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- 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
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- 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
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- 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
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- Developed novel catalyst systems for controlling polymer topology *in situ*, 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
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- 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
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- 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

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April 2023 - Present	Machine Learning in Medicine Virtual Seminar Series	Cornell University Ithaca, NY
	<ul style="list-style-type: none"><li>An inter-campus collaborative with the goal of bringing together researchers with common interests in machine learning applied to clinical questions/data</li><li>Invite and host speakers from academia and industry for our regular virtual seminar series.</li></ul>	
April 2019 - May 2022	Advisor High School Senior Capstone Experience	Palmetto Scholars Academy North Charleston, SC
	<ul style="list-style-type: none"><li>Mentoring high school students interested in scientific research to develop, plan, and perform their thesis research for their Senior Capstone Project.</li><li>Students carry out hands-on research, write a thesis, and defend it against a committee.</li></ul>	
August 2017 - May 2018	Head Coach VEX High School Robotics	Palmetto Scholars Academy North Charleston, SC
	<ul style="list-style-type: none"><li>Coached 4 high school VEX teams during the 2017-2018 In The Zone challenge.</li><li>Teams earned 2 Excellence Awards, 2 Design Awards, and 1 Tournament Champions award.</li><li>2 Teams made it to SC State Tournament and 1 team advanced to the US CREATE Open event in Council Bluffs, Iowa.</li></ul>	
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

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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

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**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

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**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*,” *bioRxiv* **2023**.11.27.568762; doi: <https://doi.org/10.1101/2023.11.27.568762>. **Under Revision at Biological Psychiatry: Cognitive Neuroscience and Neuroimaging.**

Nate Roy, **S. Parker Singleton**, Keith Jamison, Pratik Mukherjee, Sudhin Shah, Amy Kuceyeski “*Altered control energy and entropy of brain dynamics in individuals with mild traumatic brain injury*,” **Under Review at Human Brain Mapping.**

**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.**

A. I. Luppi, **S. P. Singleton**, J. Y. Hansen, K. Jamison, D. Bzdok, A. Kuceyeski, R. F. Betzel, B. Misic “*Transitions between cognitive topographies: contributions of network structure, chemoarchitecture, and diagnostic category*,” *bioRxiv*, **2023**.03.16.532981; doi: <https://doi.org/10.1101/2023.03.16.532981>. **Accepted at Nature Biomedical Engineering.**

**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, 2023.**

**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*,” *Front. Psychiatry*, **2023** 13:947622. doi: [10.3389/fpsy.2022.947622](https://doi.org/10.3389/fpsy.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).

## Presentations

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

### Poster presentations:

- “*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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