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

April 2023 - Present — Postdoctoral Researcher, Advisor: Amy Kuceyeski — Department of Radiology, Weill Cornell Medicine

- Studying the effects of pharmacology, substance use, and trauma on human brain activity/connectivity in the Computational Connectomics Lab.
- Mentor 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

- Studying the effects of pharmacology on human brain activity/connectivity in the Computational Connectomics Lab.
- Utilizing advanced techniques in network control theory, statistics, and machine learning to quantify brain dynamics.
- Identifying 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

- 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

- 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

- 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

- 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

- An inter-campus collaborative with the goal of bringing together researchers with common interests in machine learning applied to clinical questions/data
- Invite and host speakers from academia and tech for our regular virtual seminar series.

April 2019 - May 2022 | Advisor
High School Senior Capstone Experience | Palmetto Scholars Academy
North Charleston, SC

- 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

- 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 Instrutor | Sciencenter Museum
Ithaca, NY

January 2013 - May 2013 | Teaching Assistant
General Chemistry Laboratory | Department of Chemistry & Biochemistry
University of South Carolina

Volunteer Experience

April 2021 - Present | Night Attendant | Zen Therapeutic Solutions
Charleston, SC

- Phase 1, 2, and 3: MDMA-assisted psychotherapy research with MAPS/MPBC.
- Overnight shadow for study participants following their 8 hr long therapeutic sessions with MDMA.

August 2017 - Present | 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

S. Parker Singleton, Puneet Velidi, Keith Jamison, Amy Kuceyeski *"Altered control energy and entropy of brain dynamics in individuals who use substances"* ***IN PREP.***

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,"* ***Submitted.***

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. ***Under Review 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** 2023.03.16.532981; doi: https://doi.org/10.1101/2023.03.16.532981. ***Under Review at Nature Biomedical Engineering.***

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/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.

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

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.

Presentations

***Symposia, panels and workshops*:**
- *"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
- "*Harnessing neural and cognitive plasticity with psychedelics,"* Cleveland Clinic Psychedelic Science Group, online, **2022.**
- *"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**.