

Hannah Paris Cowley

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EDUCATION

The Johns Hopkins University Bloomberg School of Public Health

May 2024

Master of Public Health

GPA: 4.0

Capstone: *Differential expression analysis in post-mortem brain samples of bipolar disorder patients treated with and without lithium*

Graduate Certificate in Public Mental Health Research

The Johns Hopkins University Krieger School of Arts and Sciences

May 2018

Bachelor of Arts in Cognitive Science (Honors)

GPA: 3.74

Minor in Computer Science

RESEARCH EXPERIENCE

LinkedIn: <https://tinyurl.com/hpc-profile>

Senior Professional Research Scientist

August 2024 - Present

The Johns Hopkins University Applied Physics Laboratory – Laurel, MD, USA

Provide technical and project management leadership to a diverse portfolio of research projects funded by external agencies and internal sources. Responsible for identifying new research opportunities and leading proposal development.

- Provides expert data science contributions in Python and R programming languages to five projects spanning public health and fundamental clinical research areas, on small and large teams.
- Supports relevant projects with public health and mental health subject matter expertise, including guiding the formation of research questions, designing experiments, and interfacing with sponsors and external collaborators
- Leads collaboration with internal and external stakeholders to identify new research opportunities, craft proposals
- Line manager to a team of seven technical contributors of widely varying experience levels, identifying appropriate project tasking, mitigating interpersonal challenges, and aiding in goal-setting
- Member of the Neuroscience Group leadership team, driving research and staff development priorities

Master's Student Researcher

January 2023 - Present

The Johns Hopkins University Bloomberg School of Public Health – Baltimore, MD, USA

Continues Master of Public Health practicum and capstone projects on a volunteer basis under the supervision of Dr. Peter Zandi (Johns Hopkins School of Medicine & Johns Hopkins Bloomberg School of Public Health), collaborating with Dr. Reza Karbalaee and Mr. Michael Gold (Johns Hopkins School of Medicine).

- Utilizes R programming language and high performance computing cluster to assess the impact of lithium treatment on the brain through differential expression analysis methods
- Collaborates with fellow research mentee on analogous project analyzing differential expression of individuals with depression versus bipolar disorder
- Completes literature reviews and results validation to support publication development

Associate Professional Research Scientist

September 2019 - August 2024

The Johns Hopkins University Applied Physics Laboratory – Laurel, MD, USA

Supported a variety of projects as a data scientist and researcher, additionally learning technical writing and research proposal development skills. Completed MPH, certificate in public mental health research, additional mathematics coursework on a part-time basis while employed full-time (full scholarship support from JHU/APL).

- Competitively awarded JHU/APL internal research funding (\$30K) to design and implement virtual reality game for assessing attention deficits
- Designed and developed a Python-based model to track individual doses of COVID-19 vaccine across the Federal government supply chain on a team of >10 members, in support of HHS COVID-19 response
- Project manager and data scientist project to identify brain morphological characteristics predictive of future cognitive decline in patients with subjective cognitive decline, in collaboration with the Johns Hopkins Richman Family Precision Medicine Center of Excellence in Alzheimer's Disease (\$80K awarded)
- Assistant project manager and lead survey developer for the Howard County, Maryland COVID-19 Serology Study to assess seroprevalence, protective behaviors in local community sample of ~3,000 individuals

Data Science Intern

August 2017 - June 2018

The Johns Hopkins University Applied Physics Laboratory – Laurel, MD, USA

Developed Python software and experimental paradigms to compare the performance of machine learning algorithms and naive humans on simple image recognition tasks in support of the IARPA MICrONS program.

CIRCUIT Program Summer Intern

May 2017 - August 2017

The Johns Hopkins University Applied Physics Laboratory – Laurel, MD, USA

Developed web-based and augmented reality big data neuroscience visualization tools in support of the IARPA MICrONS program.

Undergraduate Research Assistant

January 2015 - August 2017

The Johns Hopkins University Cognitive Neuropsychology Laboratory - Baltimore, MD, USA

Contributed to experimental design and data analysis in case study of an adolescent girl with a deficit in spatial reasoning, culminating in first peer-reviewed publication.

CURRENT PROJECTS

DARPA Neural Evidence Aggregation Tool (NEAT)

Jan 2022 - Present

Sponsor: Defense Advanced Research Projects Activity (DARPA)

Project Goal: Improve state of the art in armed forces suicide attempt prediction through the use of neural and physiological assessment.

Project Role: Provide public mental health expertise, data science and machine learning support as a member of the APL Validation Team, serving as an expert advisor to DARPA sponsor on the strengths and weaknesses of performer approaches.

Electronic Surveillance System for the Early Notification of Community-Based Epidemics (ESSENCE)

Sept 2024 - Present

Sponsor: U.S. Centers for Disease Control and Prevention

Project Goal: Create a pilot tool to assist CDC epidemiologists in assessing trends of public health significance.

Project Role: Rapidly develop Python software for determining whether user should be alerted for concerning disease trends in light of historical, geographic, and sociodemographic context

Lucidity

Jun 2024 - Present

Sponsor-Collaborator: Dr. Kishore Kuchibhotla (Johns Hopkins University)

Project Goal: Determine incidence and predictors of paradoxical lucidity in patients with Alzheimer's disease and related dementias.

Project Role: (JHU/APL Project Manager; NIH Key Personnel) Analyze cognitive testing and physiology data recorded from mobile application to identify correlates of lucid intervals. Communicate findings to internal and external stakeholders. Manage budget and regulatory requirements of APL effort.

PaCER: Pancreatic Cancer Extraordinary Responders

Sep 2023- Present

Sponsor-Collaborator: Dr. Daniel Laheru (Johns Hopkins School of Medicine)

Project Goal: Identify correlates and predictors of extraordinarily positive response to pancreatic cancer treatment

Project Role: Design and perform rigorous statistical analyses of Electronic Health Record (EHR) data from pancreatic cancer patients treated in the Johns Hopkins Health System for features indicating extraordinarily positive treatment response. Communicate findings to internal and external stakeholders.

PUBLICATIONS, PRESENTATIONS, & PATENTS

Google Scholar: <https://tinyurl.com/hpc-google-scholar>

Peer-Reviewed Publications

- Kabotyanski, K. E., Yi, H. G., Hingorani, R., Robinson, B. S., **Cowley, H. P.**, Fifer, M. S., et al. (2024). Towards objective, temporally resolved neurobehavioral predictors of emotional state. *Brain Stimulation: Basic, Translational, and Clinical Research in Neuromodulation*, 17(6), 1208–1212. doi:10.1016/j.brs.2024.10.007
- Brown, A. C., Koshute, P. T., **Cowley, H. P.**, Robinette, M. S., Gravelyn, S. R., Patel, S. V., ... & Colella, T. A. (2023). A Saliva-Based Serological and Behavioral Analysis of SARS-CoV-2 Antibody Prevalence in Howard County, Maryland. *Microbiology Spectrum*, 11(4), e02765-22.
- **Cowley, H. P.**, Robinette, M. S., Matelsky, J. K., Xenos, D., Kashyap, A., Ibrahim, N. F., ... & Gray-Roncal, W. (2023). Using machine learning on clinical data to identify unexpected patterns in groups of COVID-19 patients. *Scientific reports*, 13(1), 2236.
- **Cowley, H. P.**, Natter, M., Gray-Roncal, K., Rhodes, R. E., Johnson, E. C., Drenkow, N., ... & Gray-Roncal, W. (2022). A framework for rigorous evaluation of human performance in human and machine learning comparison studies. *Scientific reports*, 12(1), 5444.
- Rhodes, R. E., **Cowley, H. P.**, Huang, J. G., Gray-Roncal, W., Wester, B. A., & Drenkow, N. (2021). Benchmarking human performance for visual search of aerial images. *Frontiers in Psychology*, 12, 733021.
- Wasko, S., Rhodes, R. E., Goforth, M., Bos, N., **Cowley, H. P.**, Matthews, G., ... & Kopecky, J. (2021). Using alternate reality games to find a needle in a haystack: An approach for testing insider threat detection methods. *Computers & Security*, 107, 102314.
- Johnson, E. C., Wilt, M., Rodriguez, L. M., Norman-Tenazas, R., Rivera, C., Drenkow, N., ... **Cowley, H. P.**, ..., & R. Gray-Roncal, W. (2020). Toward a scalable framework for reproducible processing of volumetric, nanoscale neuroimaging datasets. *GigaScience*, 9(12), giaa147.
- Matelsky, J. K., Downs, J., **Cowley, H. P.**, Wester, B., & Gray-Roncal, W. (2020). A substrate for modular, extensible data-visualization. *Big data analytics*, 5, 1-15.
- Hatfield, M., Reilhac, C., **Cowley, H.**, Chang, E., & McCloskey, M. (2017). Cognitive processes in spatial mapping: Evidence from a developmental spatial deficit. *Cognitive neuropsychology*, 34(5), 294-311.

Publications in Progress

- **Cowley, H. P.**, Kuo, N., Adams, R., Onda, K., Nowrangi, M.A., Mathur, A., Lyketsos, C.G., Zandi, P., Oishi, K. Brain anatomical features forecast future cognitive decline: Predicting cognitive decline in memory clinic visitors with mild to no objective cognitive impairments. (In Preparation).
- Kitchell, L., Conroy, J., **Cowley, H.P.**, et al. A unified model of the United States COVID-19 vaccine supply from manufacture to administration. (In Preparation; Title is draft).

Oral Presentations

- **Cowley, Hannah, P.** “Alzheimer’s Disease Subtype Identification and Prognostication Using Brain Imaging and EHR Data.” Johns Hopkins inHealth Precision Medicine Symposium, 3 October 2023, Baltimore, Maryland. Invited Talk.

Poster Presentations

- **Cowley, H.P.**, et al. (November 2019). *NAVIGATE: Neuroanatomical validation of MR-based connectomes*. [Poster Presentation]. Society for Neuroscience Annual Meeting 2019, Chicago, IL, USA.
- Meister, N., **Cowley, H.P.**, et al. (February 2019). *Methods to identify patient clusters and build precision analytics for diagnosis, prognosis and treatment*. [Poster Presentation]. ACTRIMS Forum 2019, Dallas, TX, USA.
- Brown, M., et al. (February 2019). *Toward a reproducible framework for evaluating neuroimaging algorithms for clinical research*. [Poster Presentation]. ACTRIMS Forum 2019, Dallas, TX, USA.
- Bishop, C. et al., (November 2017). *RETINA: Realtime evaluation tools for integrated neuroscience analysis*. [Poster Presentation]. Society for Neuroscience Annual Meeting 2017, Washington, DC, USA.

Patents

- Rosen, A., Mecoli, C., Stewart, W.C., **Cowley, H.P.**, Chapman, M., Chee, B. Graphical User Interfaces and Systems for Presenting and Analyzing Large Patient Data Sets. (U.S. Patent Pending, International Application No. PCT/US2023/023071) https://patentscope.wipo.int/search/en/detail.jsf?docId=WO2023229980&_cid=P20-M2WC74-94539-1

HONORS & AWARDS

Honors

- Delta Omega Public Health Honor Society - Baltimore, Maryland, USA *Inducted May 2024*
- Krieger School of Arts and Sciences Honors Graduate - Baltimore, Maryland, USA *May 2018*
- Psi Chi National Psychology Honor Society - Baltimore, Maryland, USA *Inducted May 2017*
- Omega Psi National Cognitive Science Honor Society - Baltimore, Maryland, USA *Inducted May 2016*
- Johns Hopkins University Dean’s List - Baltimore, Maryland, USA *(Multiple Sem.) 2014 - 2018*

Awards

- APL Special Achievement Award *2024*
- Research and Exploratory Development Department Bravo Award *(10+ times) 2020 - 2024*
- APL Special Achievement Award *2023*
- APL Special Achievement Award *2022*
- (Nominee) APL Achievement Award Nominee for Outstanding Paper in Externally Refereed Journal *2021*
- (Finalist) Fast Company World Changing Ideas: COVID-19 subcohort discovery *2021*
- APL Special Achievement Award *2021*

Memberships

- The Cathedral of the Incarnation Episcopal Church - Baltimore, Maryland, USA *2014 - Present*
- Zeta Omicron Chapter of Alpha Phi Women’s Fraternity - Baltimore, Maryland, USA *2015 - 2018*

ADDITIONAL EMPLOYMENT EXPERIENCE

Student Attendant

Jan 2017 - May 2018

The Johns Hopkins University Varsity Athletics Program - Baltimore, MD, USA

Managed equipment on a shift schedule for the athletics department as a member of a large team

Director of Marketing

Sept 2015 - Oct 2016

ShapeU, LLC - Baltimore, MD, USA

Coordinated partnership, product development, and customer outreach efforts for a venture-backed, early-stage technology startup company

Farm Hand

Jan 2010 - Aug 2014

Blue Horseshoe Farm, LLC - Charlton, NY, USA

Contributed to the care of approximately 20 chickens, 12 horses, 3 outdoor cats, and 2 dogs including maintaining farm equipment and facilities, monitoring signs of animal health and illness, and completing demanding, time-sensitive daily care tasks with family members and non-family employees

RESEARCH MENTORSHIP & SERVICE

Data Safety Monitoring Board Member

Jan 2019 - Present

The Use of Technology to Improve MS Clinical Trials and Clinical Care - Baltimore, Maryland, USA

- Review clinical trial protocol, research progress, and protocol deviations in support of clinical trial conducted at the Johns Hopkins University School of Medicine to assess the ability of technology tools to detect Multiple Sclerosis relapses (PI: Dr. Ellen Mowry, MD, MCR)

Research and Exploratory Development Department Internship Program Lead

Jan 2021 - Aug 2024

The Johns Hopkins University Applied Physics Laboratory - Laurel, Maryland, USA

- Developed department-wide internship program for 75+ undergraduate and graduate interns (annually), supporting their research growth and skill development
- Lead successful transition of program to new, junior staff leadership in the summer of 2024; provided mentorship during transition

Research and Exploratory Development Department Mentor

Jan 2021 - Dec 2023

The Johns Hopkins University Applied Physics Laboratory - Laurel, Maryland, USA

- Volunteer mentor for two junior staff members, aiding them in professional and technical goal development and execution

CIRCUIT Program Research Mentor

June 2018 - May 2021

The Johns Hopkins University Applied Physics Laboratory - Laurel, Maryland, USA

- Served as lead mentor for three cohorts of undergraduate and high school students (4-6 per year), working on projects supporting the IARPA MICrONS project, Johns Hopkins Precision Medicine Analytics Platform Project, and other sponsor-funded work
- Coordinated student tasking and identified research directions, balancing ensuring smooth execution of project priorities and encouraging students to pursue their interest areas

Treasurer & Member

June 2015 - May 2018

The Johns Hopkins University Women In Computer Science - Baltimore, Maryland, USA

- Treasurer (Aug 2016 - May 2017) of campus club to advocate for the advancement of women and non-binary students in computer science
- Lead implementation of a peer mentorship program within the club to provide mutual support to individuals facing barriers to STEM participation

ADDITIONAL SERVICE

Altar Guild Member

Jan 2023- Present

Cathedral of the Incarnation Episcopal Church - Baltimore, Maryland, USA

- Launder and repair sacred linens adhering to strict quality control guidelines as a member of a large team, ensuring linens are available at all times for Eucharist

Flower Guild Member

Jan 2022- Present

Cathedral of the Incarnation Episcopal Church, Baltimore, Maryland - USA

- Design, procure raw materials, manage donations and budgets, prepare arrangements, and receive feedback for key Church holidays and regular services
- Partner with Clergy and lay leadership to understand expectations; communicate to other volunteers

Board of Directors Member

Jan 2020- Present

Sterling Valley Homestead, Inc. - Sterling, New York, USA

- Jointly manage repairs, cash flow, and property decision-making; participate in formal board meetings and vote on matters of significance as part of a team of extended relatives entrusted with care of the homestead of our ancestor, John Hunter

SKILLS

Research

- EHR analysis (proficient)
- Experimental design (proficient); Human subjects research (proficient)
- IRB protocol development (proficient); Scientific writing (proficient)
- Statistical analysis (intermediate); biostatistics (intermediate)
- Grant/proposal development (beginner)

Technical

- Programming languages: Python (proficient), R (intermediate), Java (beginner)
- Python data science (numpy, pandas, scipy, matplotlib; proficient)
- Unix (intermediate)
- Machine learning (Python-based; intermediate)
- LaTeX (beginner)
- Genomics analysis (beginner)
- High performance computing (beginner)