Andrew Grady Johnson, Ph.D.

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Summary

Computational scientist combining machine learning, agent-based modeling, and urban systems research to model fine-grained human movement. Uses LLMs to convert unstructured policy text into analysis-ready data. Trained in microbiology and eco/evo theory, with active interest in biodefense and biosecurity policy.

Education

Aug. 2017 – Sep. 2024 **University of Pennsylvania**, *Ph.D., M.Sc.* in Biology
Dissertation title: *Community Ecology of the Gut Microbiome.*
Advisor: Dustin Brisson

Aug. 2008 – Dec. 2012 **North Carolina State University**, *B.S.* in Animal Science

Professional Experience

Sep. 2024 – Current **Penn Institute for Urban Research**
Position: ORISE Postdoctoral Fellow
- Building and evaluating computational models of fine-grained pedestrian movement in cities using cell phone mobility data and built-environment features.
- Developing a tree-based machine learning pipeline (Random Forest, LightGBM, XGBoost, etc.) in Python that stacks and ensembles models to decrease error.
- Using an agent-based modeling framework in Python to simulate pedestrian decision-making and test movement assumptions under controlled scenarios.

Aug. 2023 – May 2024 **Wharton, University of Pennsylvania**
Position: Research Associate
- Applied stacked ensemble machine learning models to predict zoning restrictiveness from built-environment features. Improved error by 8% +.
- Developed an LLM-based pipeline to extract structured variables from unstructured municipal zoning ordinances.
- Communicated technical methods and results to interdisciplinary and non-technical executive-level stakeholders to support decision-making.

Aug. 2022 – May 2023 **Perry World House, University of Pennsylvania**
Position: Graduate Fellow
- Worked at the intersection of scientific and policy challenges in modern biodefense and biosecurity, writing policy-facing essays on pathogens of enhanced pandemic potential and dual-use research of concern (PEPP/DURC).

Jul. 2022 – Sep. 2024 **Adaptive Cities Working Group**
Position: Scientific Advisor (Ecology and Simulation Design)
- Interdisciplinary working group, in partnership with the Rockefeller Foundation and the Brookings, focused on the intersection of cities, heat waves, and health.
- Played key role technical project design and consderations.

Aug. 2017 – Sep. 2024 **Department of Biology, University of Pennsylvania**
Position: *Ph.D.* Candidate
- Built and validated a highly controlled experimental microbiome system for studying host-associated community dynamics.
- Applied ecological theory (community assembly, stability) to the gut microbiome.

Scientific/Technical Leadership

- **5 Years** Led multiple scientific teams (<= 6 researchers), across disciplines (e.g. biology, data science, etc.)
- **4 Years** Advised trainees across career stages (2 master's, 3 post-bacc, 7 undergraduates, 2 high school).

Select Personal Projects

Executive Action Summary Mailer (Python)

- Converts executive actions (executive orders, memorandums, etc.) from the White House webpage to text files, passes them to Open AI's API for a terse, structured summary, and emails it.

NYT Letter Boxed Solver (Python)

- Searches for a minimal chain of words that use every letter provided, where each word starts with the last letter of the previous word and no adjacent letters come from the same side. Built a custom word bank by parsing text files from Project Gutenberg.

Skills

Coding	Python, R, Java, LaTeX, HTML
Technology	Git/Github, Jupyter, Anaconda, Overleaf, Netlogo
AI/ML/Stat.	Random Forest, Gradient Boosted Models, Stacking, Ensembling, Agent-Based Models, Probability Theory, Graduate TA for university statistics (twice)
Communication	**Writing** Strong ability across academic, policy, and general audiences. **Speaking** Skilled at presenting technical material for academic, policy, executive, NGO, and public audiences.

Research Publications

1. A. Johnson, "Community ecology of the gut microbiome," Ph.D. dissertation, University of Pennsylvania, 2024.
2. B. Raynor et al., "Movement patterns of free-roaming dogs on heterogeneous urban landscapes: Implications for rabies control," *Preventive veterinary medicine*, vol. 178, p. 104 978, 2020.
3. R. Castillo-Neyra et al., "Reemergence of canine rabies in complex urban environments: Lessons from an outbreak in arequipa, peru," in *American Journal of Tropical Medicine and Hygiene*, vol. 97, 2017, pp. 578–578.

Fellowships, Awards, & Achievements

2024	**ORISE Postdoctoral Research Fellowship**, Enhanced Computational Modeling of Human Navigation in Urbanized Environments, $200,000
	Schmidt Science Fellowship Nominee, University of Pennsylvania
2022	**Perry World House Graduate Fellowship**, University of Pennsylvania
	SASGov Research Student Grant, University of Pennsylvania, $2,000
2021	**GAPSA-Provost Fellowship for Interdisciplinary Innovation**, Penn Provost's Office, $6,000
2020	**President**, Penn Biology Graduate Group
	Teece Dissertation Research Fellowship, University of Pennsylvania, $2,500
	SASGov Research Student Grant, University of Pennsylvania, $2,000

Organizations & Hobbies

Jan. 2025 – Current	**Writing**, Flash creative nonfiction and fiction, poetry. Pieces currently out for review.
Aug. 2019 – Sep. 2024	**Judo**, Penn Judo Club/Main Line Judo Club, Member