John McAlister

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Education

Expected May 2026 **PhD. in Mathematics** — University of Tennessee - Knoxville
Mathematical Biology concentration

May 2023 **M.S. in Mathematics** — University of Tennessee - Knoxville
Concurrent with PhD program

May 2021 **B.S. in Zoology** — The Ohio State University
With Honors Research Distinction

May 2021 **B.S. in Mathematics** — The Ohio State University
Math-Bio track

Research Interests

I study mathematical biology and game theoretic modeling. Using tools from PDEs, nonlocal equations and graph theory, my main focus is the interaction between relational structure and game theoretic dynamics.

Papers

In review **McAlister J.S.**, Fefferman, N.H. Mengesha, T.A. (2025) *Nonlinear Nonlocal Diffusion Equation for the Analysis of Continuous Coordination and Anti-coordination Type Games.* submitted to Physical Reviews E.
https://doi.org/10.48550/arXiv.2506.13929

In review **McAlister J. S.**, Brunner, J.L., Galvin, D. J., Fefferman, N.H. (2025) *A Game Theoretic Treatment of Contagion in Trade Networks.* Submitted to PLOS computational Biology. https://doi.org/10.48550/arXiv.2504.06905

April 2025 Kirkland, S., Li, C., **McAlister, J.S.**, and Zhang, X. (2025) *Edge Addition and theChange in Kemeny's Constant.* Discrete Applied Mathematics.
https://doi.org/10.1016/j.dam.2025.04.031

January 2025 **McAlister, J.S.**, Fefferman N. H. (2025) *Insights into the coordination game withneutral options through simulation.* Dynamic Games and Applicationshttps://doi.org/10.1007/s13235-024-00612-4

January 2025 **McAlister, J.S.**, M.J. Blum, Y. Bromberg, N.H. Fefferman, Q. He, E. Lofgren, D.L. Miller, C. Schreiner, K. Selcuk Candan, H. Szabo-Rogers, and J. M. Reed (2025) *An Interdisciplinary Perspective of the Built-Environment Microbiome.* FEMS Microbiology Ecology https://doi.org/10.1093/femsec/fiae166

December 2023 Fefferman, N.H., **McAlister, J.S.,** Akpa, B.S., Akwataghibe, K., Azad F.T., Barkley K., Bleichrodt, A., Blum M.J., Bourouiba, L., Bromberg, Y., Candan K.S., Chowell, G.,Clancey, E., Cathroan, F.A., DeWitte, S.N., Fernandez, P., Finnoff, D., Flaherty, D.T.,Gibson, N.L., Harris, N., He, Q., Lofgren, E.T., Miller, D.L., Moody, J., Muccio, K.,Nunn, C.L., Papeş, M., Pachalidis, I.Ch., Pasquale, D.K., Reed, M.J., Rogers, M. B.,Schreiner, C. L., Strand E.B., Swanson C.S., Szabo-Rodgers, H. L., and Ryan, S. J. (2023) *A New Paradigm for Pandemic Preparedness.* Current Epidemiological Reports.
https://doi.org/10.1007/s40471-023-00336-w

April 2022 **McAlister, J.S.**, Hamilton, I. (2022) *An Adaptive Dynamic Model for the Vigilance Game in Group Foragers.* Journal of Theoretical Biology. 538:111033. https://doi.org/10.1016/j.jtbi.2022.111030

Posters and Presentations

August 2025 **McAlister. J. S.**(2025)*Replicator Dynamics with Spatial Structure for Evolutionary Games.* **Invited Talk** at the NSF APPEX center Summer Research Symposium at the University of Tennessee - Knoxville

September 2024 **McAlister. J. S.**(2024)*Structured Coordination in Continuous Spatial and Strategic Domains* Talk given at AMETHYST: Game Theory in Complex Systems during the Conference on Complex Systems 2024 at the University of Exeter

March 2024 **McAlister J. S.**(2024)*The Structured Coordination Game with Neutral Options* Talk given at The Mathematical Association of America - South East Section Meeting at the University of Tennessee - Knoxville

November 2023 **McAlister J. S.**(2023)*Spatially Structured Coordination Games and their Applications in Theoretical Ecology.* Talk given as part of the Oral Specialty Exam as a graduation requirement at the University of Tennessee - Knoxville.

April 2023 **McAlister J. S.**(2023) *An Adaptive Dynamic Model for a Vigilance Game among Group Foragers.* Talk given at the SIAM Graduate Research Showcase at the University of Tennessee-Knoxville

October 2020 **McAlister, J. S.**, Hamilton, I. (2020) *An Adaptive Dynamic Model for the Vigilance Game in Group Foragers.* Poster presented at the Undergraduate Research Conference at the National Institute of Mathematical and Biological Synthesis at the University of Tennessee - Knoxville.

November 2019 Allen, R., Bains, A., Anderson, H., **McAlister, J. S.** (2019). *Parameter Estimation within an SIR Model of American Chestnut Blight.* Talk given at the Undergraduate Research Festival at The Ohio State University

August 2019 Allen, R., Bains, A., Anderson, H., **McAlister, J. S.** (2019). *Parameter Estimation within an SIR Model of American Chestnut Blight.* poster presented at the Summer Research Expo at the University of Wisconsin - La Crosse

Funding

Proposals

April 2024 **New Techniques for the Analysis of Coordination in General Discrete and Continuous Domains** Submitted to DARPA DSO Critical Orientation of Mathematics to Produce Advancements in Science and Security (COMPASS) (DARPA-EA-25-02-03) **Selected to give Oral Proposal Package** (OPP)

Support

Spring 2025 GRA supported by NSF(DBI) #2312115 **PIPP Phase II: Analysis and Prediction of Pandemic Expansion (APPEX)**

Fall 2024 GRA supported by NSF(DEB) #2207922 **Socioeconomic and Epidemiological Drivers of Pathogen Dynamics in Wildlife Trade Networks**

Fall 2024 GRA supported by NSF(DRL) #2247074 **Developing and Early Understanding of Contagion in Preschool- and Kindergarten-Aged Children**

Fall 2023 GRA supported by NSF(CCF) #2200140 **PIPP Phase I: Predicting Emergence in Multidisciplinary Pandemic Tipping-points(PREEMPT)**

Awards

February 2024 **Eaves Teaching Award** - nominee
— Nominated for excellence in teaching among late career graduate students
April 2023 **Eaves Teaching Award** - Finalist
— Awarded for excellence in teaching among early career graduate students
April 2023 **Math GTA Teaching Excellence Fellowship** - Winner
— Nominated for commitment to further the teaching mission of the University.
August 2021 **Academic Performance Assistantship** - Winner
— Awarded for meeting academic milestones in the PhD program early.

Workshops

May 2022 **CBMS conference: Interface of Mathematical Biology and Linear Algebra**
University of Central Florida, Orlando, FL.

Mentorship and Teaching Experience

July 2024 - Present **Applied Math Undergraduate Research Mentor**
University of Tennessee - Knoxville, Knoxville, TN.

Aug 2022 - Dec. 2023 **Graduate Teaching Associate - Instructor of Record** MATH 113
University of Tennessee-Knoxville, Knoxville, TN.

Aug 2021 - May 2022 **Graduate Teaching Assistant** MATH 119, 125
University of Tennessee-Knoxville, Knoxville, TN.

Aug 2019- May 2021 **Undergraduate Teaching Assistant** MATH 1075, 1149, 1150
The Ohio State University, Columbus, OH.

Leadership and Volunteerism

2022-2024 **Member**—Graduate Teaching Assistantship Advisory Council

2023-2024 **Senator**—Graduate Student Senate

2022-2023 **President**—Math Graduate Student Council

Research Experience

January 2022- Present — **Graduate Research Assistant — Fefferman Lab**
University of Tennessee - Knoxville, Knoxville, TN.
Advisor: Prof. Nina Fefferman

May 2018- May 2021 — **Undergraduate Researcher — Hamilton Lab**
The Ohio State University, Columbus, OH.
Advisor: Prof. Ian Hamilton

May-Aug. 2019 — **REU Fellow — Ecological Modeling of the Mississippi River Basin**
University of Wisconsin - La Crosse, La Crosse WI.
Advisors: Prof. Robert Allen, Prof. Anita Baines, Prof. James Pierce, Prof. Greg Sandland

Software Experience

Proficient

- R
- Python
- MatLab
- LaTeX
- Mathematica

Experienced

- C#
- Java
- Maple
- JMP
- NetLogo