NICHOLAS WILLIAM BARENDREGT

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EDUCATION

University of Colorado Boulder — Advisor: Zachary P. Kilpatrick
Ph.D. in Applied Mathematics — May 2023
Dissertation: *Adaptive Decision-Making in Dynamic Environments Using Sequential Bayesian Inference*
M.S. in Applied Mathematics — May 2021

Case Western Reserve University — Advisor: Peter J. Thomas
B.S. in Applied Mathematics, *summa cum laude* — May 2018

PROFESSIONAL APPOINTMENTS

BioFrontiers Institute, University of Colorado Boulder
Postdoctoral Research Associate — October 2023 - Present
Advisor: Orit Peleg

PUBLICATIONS

Refereed Journal Publications

1. N.W. Barendregt, E.G. Webb, & Z.P. Kilpatrick, *Adaptive Bayesian Inference of Markov Transition Rates*, **Proc. R. Soc. A** 479:20220453 (2023).
2. N.W. Barendregt & P.J. Thomas, *Heteroclinic cycling and extinction in May-Leonard models with demographic stochasticity*, **J. Math. Biol** 86:30 (2023).
3. N.W. Barendregt, J.I. Gold, K. Josić, & Z.P. Kilpatrick, *Normative Decision Rules in Changing Environments*, **eLife** 11:e79824 (2022).
4. N.W. Barendregt, K. Josić, & Z.P. Kilpatrick, *Analyzing dynamic decision-making models using Chapman-Kolmogorov equations*, **J Comput Neurosci** 47, 205-222 (2019).

AWARDS AND FELLOWSHIPS

Summer Graduate School Fellowship — 2022
University of Colorado Boulder
Student Travel Grant — 2021
SIAM Dynamical Systems Conference
Best Pre-Doctoral Poster — 2020
GCC TCN
Best Poster in Natural Sciences — 2017
Intersections: SOURCE Symposium and Poster Session

CONFERENCE PRESENTATIONS AND PARTICIPATION

Contributed Conference Presentations (Peer-reviewed)

1. "An Information-Theoretic Model for Firefly Flash Pattern Evolution" (poster) at **Dynamics Days**, Davis, California, 1/2024.
2. "A Normative Framework for Balancing Reward- and Information-Seeking Behaviors in Dynamic Environments" (poster) at **Cosyne**, Montréal, Canada, 2/2023.

3. "Adaptive Bayesian Inference of Markov Transition Rates" at **Dynamics Days**, 8/2021 (virtual).
4. "Normative and Dynamic Urgency in Unpredictable Environments" at **SIAM Dynamical Systems**, 5/2021 (virtual).
5. "Normative Adaptive Decision Rules in Static Environments" at **GCC TCN**, 1/2021 (virtual).
6. "Time-Dependent Decision Urgency in Dynamic Reward and Evidence-Quality Conditions" (poster) at **Cosyne**, Denver, Colorado, 2/2020.
7. "Time-Dependent Decision Urgency in Dynamic Reward and Evidence-Quality Conditions" (poster) at **GCC TCN**, Houston, Texas, 1/2020.
8. "Chapman-Kolmogorov Equations for Dynamic Decision-Making" (poster) at **SMB Annual Meeting**, Montréal, Canada, 7/2019.

Seminar Talks

1. "Heteroclinic Cycling and Extension in Winnerless Competition Models with Demographic Stochasticity" at **Complex/Dynamical Systems Seminar at University of Colorado Boulder**, Boulder, Colorado, 10/2018.

Invited Minisymposium & Small Workshop Presentations

1. "Efficienty of Reward- and Information-Maximizing Strategies in Dynamic Environments" at **SIAM Life Sciences**, Portland, Oregon, 6/2024.
2. "Time-Constrained Decision Making in Correlated Environments" at **Janelia Junior Scientist Workshop on Theoretical Neuroscience**, Ashburn, Virginia, 11/2022.
3. "Normative Decision Rules in Changing Environments" at **Mathematical Models in Biology from Information Theory to Thermodynamics: BIRS Workshop**, Banff, Canada, 8/2022.
4. "Adaptive Decision Rules are Optimal in Simple Environments" at **JMM (Minisymposium): Stochastic Models in Studying Biological Systems**, 4/2022 (virtual).

Other Presentations

1. "Heteroclinic Cycling in Discrete Population Models" (poster) at **Intersections: SOURCE Symposium and Poster Session at Case Western Reserve University**, Cleveland, Ohio, 12/2017.
2. "Heteroclinic Cycling in Discrete Population Models" (poster) at **Undergraduate Capstone Conference at MBI**, Columbus, Ohio, 8/2017.

Conference/Seminar Organization

1. **Stochastic Models for Complex Decision Making**, (with Timothy Verstynen) Minisymposium at SIAM Life Sciences (4 speakers), 7/2022, Pittsburgh, Pennsylvania.
2. **Mathematical Models for Decision Making**, (with Jonathan Rubin) Minisymposium at SMB Annual Meeting (4 speakers), 6/2021 (virtual).
3. **Multi-Scale Models of Decision-Making**, (with Subekshya Bidari) Minisymposium at SIAM Life Sciences (6 speakers), 6/2020-7/2020 (virtual).
4. **MathNeuro Seminar Series**, (with Subekshya Bidari and Zachary Kilpatrick), (9 speakers), 6/2020-7/2020 (virtual).

TEACHING EXPERIENCE

University of Colorado Boulder	Term	Units	Undergrads	Grads	Rating
Differential Equations with Linear Algebra (Teaching Assistant)	S22	3	40	—	4.73/5.00
Differential Equations with Linear Algebra (Teaching Assistant, virtual)	F20	3	39	—	4.54/5.00
Calculus 2 for Engineers (Teaching Assistant)	F19	3	63	—	5.61/6.00
Calculus 1 for Engineers (Teaching Assistant)	F18	3	46	—	5.82/6.00

REVIEWING AND EDITING

- **Journal Referee:** *Nature Reviews Neuroscience*

AFFILIATIONS AND MEMBERSHIPS

Member, SIAM January 2020 - Present

SERVICE AND COMMITTEE POSITIONS

Graduate Student Peer Mentor August 2019 - August 2022
University of Colorado Boulder, Department of Applied Mathematics

Student Representative, Graduate Studies Committee August 2019 - September 2020
University of Colorado Boulder, Department of Applied Mathematics