

# Linnéa Gyllingberg

*Fulbright Scholar and Wallenberg Postdoctoral Fellow, Department of Mathematics, UCLA*

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## Summary

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I am an interdisciplinary researcher and applied mathematician with a strong interest in using mathematics to understand biological intelligence. My research focuses on developing and analysing mathematical models for biological applications, using dynamical systems, network models, and agent-based modelling. I am particularly interested in how oscillatory dynamics in adaptive networks contribute to learning and decision-making in non-neural systems.

## Academic Positions

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- **2024–2026:** Fulbright Scholar & Knut and Alice Wallenberg Postdoctoral Fellow, Department of Mathematics, University of California, Los Angeles, USA.
- **Autumn 2024:** Research Fellow, "Mathematics of Intelligences" Program, Institute of Pure and Applied Mathematics, University of California, Los Angeles, USA.
- **2016–2024:** Ph.D. Student, Department of Mathematics, Uppsala University, Sweden.  
*Parental leave (October 2019–December 2020, October 2021–August 2022) during PhD studies.*
- **Autumn 2018:** Graduate Fellow, "Mathematical Biology" Program, Mittag-Leffler Institute, Stockholm, Sweden.
- **Spring 2017:** Visiting Ph.D. Student, Department of Mathematics, Imperial College London, UK.
- **2013–2016:** Teaching Assistant, Department of Mathematics, Uppsala University, Sweden.

## Education

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- **2016–2024:** Doctorate of Philosophy in Applied Mathematics and Statistics, Uppsala University, Sweden. *Thesis: "The Art of Modelling Oscillations and Feedback across Biological Scales"*
- **2013–2016:** Master of Science in Mathematics, Uppsala University. *Thesis: "Mean Field Approximations of Spatial Models of Evolution"*
- **2010–2013:** Bachelor of Science in Mathematics, Uppsala University. *Thesis: "Evolutionary Language Games"*
- **Spring 2014:** Erasmus Exchange, Mathematical Biology, Technische Universität München, Germany.
- **2012–2014:** Additional coursework in Linguistics and Nordic Languages at University of Iceland, Uppsala University, and Helsinki University (72 ECTS in total), studied in parallel with studies in Mathematics.

## Industrial Experience

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- **2014:** Analyst, Precis Digital, Stockholm, Sweden. Worked on Bayesian statistical modeling for price optimization of Google Ads and developed Markov models and game theoretical models for attribution processes.

## Publications and Preprints

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7. Wenjun Zhao, Alma Plaza-Rodriguez, Pichayathida Luanpaisanon, Elena Xinyi Wang, **Linnéa Gyllingberg**, Elana J. Fertig, Genevieve L. Stein-O'Brien *Inferring the regulation dynamics of oscillatory networks from scRNA-seq data*, bioRxiv 2025.11.08.687360, submitted, 2025.
6. Kira Pugh, **Linnéa Gyllingberg**, Stanislav Stratiev, Sara Hamis. *A bibliometric study on mathematical oncology: interdisciplinarity, internationality, collaboration and trending topics*, Journal of Mathematical Biology, 2025.
5. Polyphony Bruna and **Linnéa Gyllingberg**. *Cognition without neurons: modelling anticipation in a basal reservoir computer*, arXiv:2505.02114, submitted, 2025.
4. **Linnéa Gyllingberg**, Yu Tian, David J.T. Sumpter. *A minimal model of cognition based on oscillatory and current-based reinforcement processes*, Journal of the Royal Society Interface, 2025.
3. **Linnéa Gyllingberg**, David J.T. Sumpter, Åke Brännström. *Finding analytical approximations for discrete, stochastic, individual-based models of ecology*, Mathematical Biosciences, 2023.
2. **Linnéa Gyllingberg**, Alex Szorkovszky, David J.T. Sumpter. *Using neuronal models to capture burst and glide motion and leadership in fish*, Journal of The Royal Society Interface, 2023.
1. **Linnéa Gyllingberg**, Abeba Birhane, David J.T. Sumpter. *The lost art of mathematical modelling*, Mathematical Biosciences, 2023.

## Grants

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**Total Funding Awarded: SEK 3,600,000 (approx. USD 335,000)**

- **2024–2026:** Knut and Alice Wallenberg Postdoctoral Fellowship (USD 175,000).
- **2024:** Fulbright Research Scholar (SEK 63,000).
- **2024:** STINT International Postdoc Fellowship (SEK 1,200,000, offered, declined).
- **2024:** Lennanders Postdoctoral Fellowship (SEK 300,000, offered, declined).
- **2016–2025:** Multiple travel and research grants (total: SEK 454,000), including:
  - **2025:** AWM-NSF Travel Grant (USD 3500).
  - **2025:** SIAM Child Care Grant for the SIAM Conference on Applications of Dynamical Systems (USD 425)
  - **2023, 2024:** G.S. Magnuson Foundation (total: SEK 56,500).
  - **2024:** Uddeholms Travel Scholarship (SEK 30,000).

- **2024:** Knigge Travel Grant (SEK 2,500).
- **2024:** Sederholms Travel Grant (SEK 29,000).
- **2024:** Tullberg Grant for Biological Research (SEK 37,000).
- **2023, 2024:** Liljewalch Travel Scholarship (total: SEK 50,000).
- **2023:** Zandrén's Grant (SEK 15,000).
- **2023:** G-Research Grant for Early Career Researchers (GBP 1,200).
- **2017–2024:** Anna Maria Lundin Travel Scholarship (total: SEK 122,500).
- **2016:** Wilgott Stenholm Travel Scholarship (SEK 49,500).

## Workshops, Summer Schools and Shorter Research Visits

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- **April 2025,** Research visit to Dr. Anastasia Bizyaeva, Department of Mechanical Engineering, Cornell University, USA.
- **January 2025,** Women in Mathematical Computational Biology Workshop, Institute for Computational and Experimental Research in Mathematics (ICERM), Brown University, USA.
- **May 2024,** The Lake Como Summer School: *"Complex Networks: Theory, Methods, and Applications,"* Como, Italy.
- **April 2024,** Research visit to Dr. Audrey Dussutour's lab, Centre national de la recherche scientifique (CNRS), Toulouse, France.
- **January 2024,** Research visit to Professor Mason Porter's group, Department of Mathematics, University of California, Los Angeles, USA.
- **August 2018,** The Helsinki Summer School on Mathematical Ecology and Evolution, Turku, Finland.
- **April 2018,** Research visit to Dr Sara Merino-Aceituno's group at the Department of Mathematics, University of Sussex, UK.

## Awards

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- **2024:** Fulbright Swedish Scholar Award 2024–2025. Awarded by the Fulbright Commission for postdoctoral research at the University of California, Los Angeles (UCLA).
- **2023:** Awarded O. Andrén's Scholarship (SEK 25,000). Awarded to a Ph.D. student at Uppsala University for exceptional academic performance.
- **2019:** Uppsala Electrical Engineering Students' Pedagogical Prize, Uppsala University.
- **2017:** Best Talk at Imperial College London Society for Industrial and Applied Mathematics (SIAM) 3rd Annual Conference, Imperial College, London, UK

## Teaching Experience

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### Lecturer & Course Instructor

- **Transform Methods (1MA034),** Uppsala University *Lecturer, Course Designer, and Examiner (Autumn 2017 and 2018)*

- Designed and delivered lectures, developed assignments, and assessed student performance.
- Course evaluation scores: 4.9/5 (2017), 4.7/5 (2018).
- Awarded the Uppsala Electrical Engineering Students' Pedagogical Prize (2019) for excellence in teaching this course.

### Guest Lecturer

- **Perceptions of U.S. Abroad (GLBLST 19)**, UCLA (Winter 2025).
- **Mathematical Methods of Physics (1FA121)**, Uppsala University (Spring 2024).
- **Modelling of Dynamic Systems (1RT155)**, Uppsala University (Spring 2023).

### Teaching Assistant

*Extensive experience as a teaching assistant over ten years, covering a range of undergraduate mathematics courses. Responsibilities included leading problem-solving sessions, supervising exercises, and grading.*

- **Transform Methods (1MA034)** (2013, 2015, 2016, 2019, 2022).
- **Single Variable Calculus (1MA013)** (2013, 2015, 2016, 2021).
- **Linear Algebra and Geometry I (1MA025)** (Autumn 2016).
- **Mathematics Project with LaTeX (1MA193)** (Spring 2018).
- **Introduction to Studies in Mathematics (1MA219)** (Autumn 2018).

### Summer Review Course Lecturer

*Taught intensive review courses to help students prepare for final exams.*

- **Transform Methods (1MA034)** (Summer 2015).
- **Algebra I (1MA004)** (Summer 2014).
- **Single Variable Calculus (1MA013)** (Summer 2013).

## Selected Presentations and Talks

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### Invited Talks & Seminars

- **Department of Mechanical Engineering**, Cornell University, USA, 2025. *"Mathematical models of basal cognition."*
- **Department of Physics**, Syracuse University, USA, 2025. *"Mathematical models of basal cognition."*
- **Department of Cognitive and Information Sciences**, UC Merced, USA, 2025. *"Mathematical models of basal cognition."*
- **Laboratory of Cell Geometry**, UC San Francisco, USA, 2025. *"Mathematical models of basal cognition."*

- **Institute for Pure and Applied Mathematics**, UCLA, USA, 2024. *"Mathematical models of basal cognition."*
- **Institute for Pure and Applied Mathematics**, UCLA, USA, 2024. *"Mathematical models of basal cognition."*
- **Brainnet+ Workshop**, Royal Institute of Technology, Stockholm, Sweden, 2024. *"Beyond Neurons: Modeling Basal Cognition in Slime Molds."*
- **The National Institute for Theoretical and Computational Sciences**, Stellenbosch University, South Africa, 2024. *"Modeling Basal Cognition."* (Online Seminar)
- **Icelab**, Umeå University, Sweden, 2024. *"Modeling Basal Cognition."*
- **Collective Behaviour Seminar**, Online, 2024. *"Using neuronal models to capture burst-and-glide motion and leadership in fish."*

### Conference & Workshop Presentations

- **SIAM Conference on Applications of Dynamical Systems**, Denver, USA, 2025. Talk: *"A minimal model of cognition based on oscillatory and current-based reinforcement processes"*
- **Biological Systems that Learn**, National Institute for Theory and Mathematics in Biology (NITMB), Chicago, USA, 2025. Poster: *"Oscillations and Adaptation: Mathematical Models of Non-Neural Cognition."*
- **Mathematics of Intelligences Culminating Workshop at Lake Arrowhead**, Institute for Pure and Applied Mathematics, University of California, Los Angeles, 2024. Talk: *"Non-neural pattern completion in an adaptive reservoir computer."*
- **AI4Research Annual Workshop**, Uppsala University, Sweden, 2023. Poster: *"The lost art of mathematical modeling—How should we do mathematical modeling in the machine learning era?"*
- **Collective Behaviour Workshop**, Isaac Newton Institute, Cambridge, UK, 2023. Talk: *"Using neuronal models to capture burst-and-glide motion and leadership in fish."*
- **Collective Intelligence Symposium**, Santa Fe Institute, New Mexico, USA, 2023. Poster: *"The lost art of mathematical modelling."*
- **Data-Driven Mechanistic Mathematical Modelling for Life-Science Applications**, Chalmers University, Gothenburg, Sweden, 2023. Talk: *"The lost art of mathematical modelling—How should we do mathematical modelling in the machine learning era?"*
- **Conference on Complex Systems**, Cancún, Mexico, 2017. Talk: *"Spatial models of the evolution of social behaviour: Can helping and non-helping behaviour coexist?"*
- **Imperial College London SIAM 3rd Annual Conference**, Imperial College London, UK, 2017. Talk: *"Spatial models of the evolution of social behaviour: Can helping and non-helping behaviour coexist?"*
- **9th Workshop on Dynamical Systems Applied to Biology and Natural Sciences (DSABNS)**, Turin, Italy, 2018. Talk: *"A spatial model for the evolution of social behaviour."*
- **8th Swedish Meeting on Mathematics in Biology**, Gothenburg, Sweden, 2016. Talk: *"The evolution of reproductive helping through resource competition."*

## Science Outreach & Diversity Initiatives

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- **2024–2025:** Mentor, "Women in Mathematics" Program, UCLA. Mentoring female undergraduate students in mathematics.
- **2017–2018:** Organizer, Breakfast Meetings for Women and Non-Binary Math Students, Uppsala University. Organized regular breakfast meetings to create a social and supportive space for women and non-binary students in mathematics.
- **2014:** Organizer, Mathematics Day for Female High School Students, Uppsala University. Planned and ran a one-day event to encourage high school girls to study mathematics.

## Professional Activities

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### Reviewer

- Mathematical Biosciences
- Discrete and Continuous Dynamical Systems Series B
- Chaos, Solitons & Fractals
- Analysis and Mathematical Physics

### Institutional Committee Service

- **2016–2018:** Ph.D. Student Representative, Equal Opportunities Group, Department of Mathematics, Uppsala University.
- **2013–2014:** Student Representative, Academic Senate, Uppsala University.
- **2012–2014:** Student Representative, Educational Board of Science, Uppsala University.
- **2012–2014:** Student Representative, Equal Opportunities Group, Department of Mathematics, Uppsala University.
- **2013–2014:** Student Representative, Master Programme Council of Mathematics, Uppsala University.
- **2013–2014:** Student Representative, Bachelor Programme Council of Mathematics, Uppsala University.