

BRIAN D. CONNELLY

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Education

- 2012 **Ph.D. in Computer Science; Ecology, Evolutionary Biology, and Behavior**
 Dissertation: *Ecological Effects on the Evolution of Cooperative Behaviors*
 Advisor: Philip K. McKinley
 Michigan State University, East Lansing, MI USA
- 2005 **M.S. in Computer Science**
 Thesis: *A Distributed Approach to Managing Large Simulation Data Sets*
 Advisors: Li Xiao and Michael Feig
 Michigan State University, East Lansing, MI USA
- 2002 **B.S. in Computer Science**
 Minors in German and Psychology
 Research Mentors: Douglas E. Comer and Robert Melara
 Purdue University, West Lafayette, IN USA

Professional Experience

- 2013– **Postdoctoral Research Fellow:** NSF Postdoctoral Research Fellowship in Biology (PRFB)
 Research: *The Co-Evolution of Cooperation and Communication in Quorum Sensing Systems*
 Mentors: Benjamin Kerr (University of Washington) and Michael Doebeli (University of British Columbia)
- 2012–2013 **Postdoctoral Research Associate:** BEACON Center for the Study of Evolution in Action
 Research: The evolution of cooperation and quorum sensing
 Michigan State University and University of Washington
- 2011–2012 **Graduate Research Assistant:** BEACON Center for the Study of Evolution in Action
 Research: Ecological effects on the evolution of cooperation and bacterial biofilm formation
 Michigan State University, East Lansing, MI USA
- 2009–2011 **Graduate Research Assistant:** Department of Computer Science and Engineering
 Research: Ecological effects on the evolution of cooperation and bacterial biofilm formation
 Michigan State University, East Lansing, MI USA
- 2007–2009 **Graduate Research Assistant:** Department of Computer Science and Engineering
 Research: The evolution of cooperative behaviors
 Michigan State University, East Lansing, MI USA
- 2003–2007 **Graduate Research Assistant:** Department of Biochemistry and Molecular Biology
 Research: The analysis and management of large molecular dynamics simulation data sets
 Michigan State University, East Lansing, MI USA
- 2000 **Software Engineering Internship:** Intel Corporation
 Responsibilities: Software development, research, design of project distribution system
 Hillsboro, OR USA

Publications

- 2015 **Connelly, B. D.**, Dickinson, K. J., Hammarlund, S. P., Kerr, B., “Negative niche construction favors the evolution of cooperation”. *Evolutionary Ecology* (2015), pp. 1–17
- ▶ Hammarlund [†], S. P., Connelly [†], B. D., Dickinson, K. J., Kerr, B., “The Evolution of Cooperation by the Hankshaw Effect”. *Submitted* (2015)
[†]*shared first authorship*, preprint doi:10.1101/016667
- 2012 **Connelly, B. D.**, Zaman, L., McKinley, P. K., “The SEEDS Platform for Evolutionary and Ecological Simulations”. *Proceedings of the Genetic and Evolutionary Computation Conference*. 2012, pp. 133–140
- ▶ Beckmann, B. E., Knoester, D. B., **Connelly, B. D.**, Waters, C. M., McKinley, P. K., “Evolution of resistance to quorum quenching in digital organisms”. *Artificial Life* (2012), pp. 1–20
 - ▶ **Connelly, B. D.**, “Ecological Effects on the Evolution of Cooperative Behaviors”. PhD thesis. Michigan State University, Apr. 2012
- 2011 **Connelly, B. D.**, Zaman, L., McKinley, P. K., Ofria, C., “Modeling the Evolutionary Dynamics of Plasmids in Spatial Populations”. *Proceedings of the Genetic and Evolutionary Computation Conference*. 2011, pp. 227–233
- 2010 **Connelly, B. D.**, Zaman, L., Ofria, C., McKinley, P. K., “Social Structure and the Maintenance of Biodiversity”. *Proceedings of the 12th International Conference on the Synthesis and Simulation of Living Systems (ALIFE)*. 2010, pp. 461–468
- ▶ **Connelly, B. D.**, Beckmann, B. E., McKinley, P. K., “Resource Abundance Promotes the Evolution of Public Goods Cooperation”. *Proceedings of the Genetic and Evolutionary Computation Conference*. 2010, pp. 143–150
- 2009 **Connelly, B. D.**, McKinley, P. K., “Evolving Social Behavior in Adverse Environments”. *Proceedings of 10th European Conference on Artificial Life*. 2009, pp. 498–498
- ▶ **Connelly, B. D.**, McKinley, P. K., Beckmann, B. E., “Evolving Cooperative Pheromone Usage in Digital Organisms”. English. *Proceedings of IEEE Symposium on Artificial Life*. 2009, pp. 184–191
- 2008 Feig, M., Tanizaki, S., Chocholousova, J., Sayadi, M., Clifford, J. W., **Connelly, B. D.**, Mukherjee, S., Law, S. M., “Simulating Biomolecules in Cellular Environments”. *Proceedings of the NIC Workshop, From Computational Biophysics to Systems Biology (CBSB08)*. 2008, pp. 23–39
- ▶ Tanizaki, S., Clifford, J. W., **Connelly, B. D.**, Feig, M., “Conformational sampling of peptides in cellular environments”. *Biophysical Journal* 94.3 (2008), pp. 747–759
- 2006 **Connelly, B. D.**, Bowron, C. W., Xiao, L., Tan, P.-N., Wang, C., “Adaptively Routing P2P Queries Using Association Analysis”. *Proceedings of the 2006 International Conference on Parallel Processing*. 2006, pp. 281–288
- 2005 **Connelly, B. D.**, “A distributed approach to managing large simulation data sets”. MS thesis. Michigan State University, May 2005

Honors, Awards, and Fellowships

- 2015 **Seed Grant:** Brian D. Connelly (PI), Caroline Turner, and Benjamin Kerr. *Evolution of Cooperation through Niche Construction Feedback*
 BEACON Center for the Study of Evolution in Action

- ▶ **Seed Grant:** Noah Ribeck, Luis Zaman, Brian D. Connelly, and Richard E. Lenski. *Lineage Interference: Toward a general theory of asexual adaptation*
BEACON Center for the Study of Evolution in Action
- 2014 **GitHub Organization Award:** Awarded Silver-level organizational account for developing workflows for digital lab notebooks and open access research materials
- ▶ **Google Research Cloud Services Award:** Brian D. Connelly, Sylvie Estrella, and Benjamin Kerr. *Expanding the Scale of Eco-Evolutionary Models.*
- 2013 **Postdoctoral Research Fellowship**
National Science Foundation Postdoctoral Research Fellowships in Biology (PRFB)
- ▶ **Seed Grant:** Josephine R. Chandler, Christopher M. Waters, John E. Mittler, Brian D. Connelly, Eric Bruger, Ajai A. Dandekar, Marvin Whiteley, Rebecca Sholz, Benjamin Kerr, and Jacob Bayless da Costa. *Exploring Hamilton's Rule in Quorum Sensing Systems*
BEACON Center for the Study of Evolution in Action
- ▶ **Seed Grant:** Wenying Shou, Charles Ofria, Benjamin Kerr, Brian D. Connelly, Luis Zaman, Adam J. Waite, Katherine J. Dickinson, and Sarah P. Hammarlund. *Genetic Niche Hiking: A New Hypothesis for the Evolution of Cooperation*
BEACON Center for the Study of Evolution in Action
- 2012 **Outstanding Graduate Student**
Department of Computer Science and Engineering, Michigan State University
- ▶ **Outstanding Service Award**
Department of Computer Science and Engineering, Michigan State University
- ▶ **Nominee for Fitch-Beach Outstanding Graduate Research Award**
College of Engineering, Michigan State University
- ▶ **Seed Grant:** E. Peter Greenberg, Josephine R. Chandler, Christopher M. Waters, John E. Mittler, Brian D. Connelly, Eric Bruger, S. Brook Peterson, Nerva Espinosa, Silja Heilmann, Benjamin Kerr, Philip K. McKinley, and Jacob Bayless da Costa. *Exploring Hamilton's Rule in Quorum Sensing Systems*
BEACON Center for the Study of Evolution in Action
- 2010 **Best Paper**
Genetic and Evolutionary Computation Conference (GECCO) 2010 for *Resource Abundance Promotes the Evolution of Public Goods Cooperation*
- 2006 **Best Poster, 3rd Place**
Department of Computer Science and Engineering, Michigan State University for *Adaptively Routing P2P Queries Using Association Analysis*
- 2004 **Graduate Research Fellowship**
Quantitative Biology Program, Michigan State University for research project: *The Simulation Database (SimDB) for Comparing Molecular Dynamics Simulations*

Teaching and Mentorship

- 2014 **Guest Lecture:** Introduction to digital evolution research with Avida-ED
Experimental Evolutionary Ecology (UW Biology 481)
- ▶ **Mentor:** Worked with two zoology and one computer science graduate students to conduct course research project modeling the evolution of pheromone-based navigation for *Multi-disciplinary Research Methods for the Study of Evolution* at BEACON Center for the Study of Evolution in Action

- 2013 **Tutorial Instructor:** *Data Visualization! How to convey scientific datasets through plots, movies, and interaction.*
BEACON Center for the Study of Evolution in Action Congress 2013
- ▶ **Guest Lecture:** *Digital Evolution*
Evolutionary Biology (UW Biology 354)
 - ▶ **Mentor:** Worked with two undergraduate students to conduct research and gain experience through Biology 482: *Independent Research in Experimental Evolutionary Ecology* at the University of Washington
- 2012 **Mentor:** Worked with a Lansing, Michigan area high school biology teacher to develop and conduct experimental evolution studies and corresponding classroom materials as part of the Research Experience for Teachers (RET) program at MSU
- ▶ **Seminar Organizer:** Organized, led, and developed *BEACON Toolkit*, a seminar series introducing computational techniques to researchers in evolutionary biology and ecology
- 2011 **Guest Lecture:** *Ecological Effects on the Evolution of Cooperative Behavior*
Evolutionary Dynamics and Modeling (MSU Microbiology and Molecular Genetics 982)
- ▶ **Tutorial Instructor:** *SEEDS: Life Off of the Grid*
BEACON Center of the Study of Evolution in Action
- 2008 **Lead Teaching Assistant:** Technical Computing and Problem Solving (MSU CSE 131)
Responsibilities: Managed group of 17 teaching assistants, designed biweekly labs and quizzes, designed midterm examinations, taught biweekly labs, assisted in weekly lectures, held office hours, grading
Michigan State University, East Lansing, MI USA
- 2005–2006, 2007–2008 **Teaching Assistant:** Technical Computing and Problem Solving (MSU CSE 131)
Responsibilities: Taught biweekly labs, assisted in lectures, held office hours, grading
Michigan State University, East Lansing, MI USA
- 1999–2000, 2001–2002 **Teaching Assistant:** Problem Solving and Programming (Purdue CS 180)
Responsibilities: Taught weekly labs, developed class projects, grading
Purdue University, West Lafayette, IN USA

Presentations

- 2015 **Invited Talk:** *Finding the Right Niche: Even Cooperators Get the Blues*
Ecology and Evolution of Quorum Sensing Group
University of Washington, Michigan State University, and University of Kansas
- ▶ **Invited Talk:** *The Evolution of Cooperation by the Hankshaw Effect and Niche Construction*
Evolution and Systematics Group at the University of Washington
 - ▶ **Guest Blog Post:** *The Evolution of Cooperation by the Hankshaw Effect: A Big Thumbs Up for Cooperation!*
BEACON Center for the Study of Evolution in Action
 - ▶ **Poster:** *Negative Niche Construction Favors the Evolution of Cooperation*
BEACON Congress 2015
- 2013 **Conference Presentation:** *The Co-Evolution of Cooperation and Communication in Quorum Sensing Systems*
BEACON Congress 2013
- ▶ **Guest Blog Post:** *When Cooperating Means Just Saying No*
BEACON Center for the Study of Evolution in Action
 - ▶ **Invited Talk:** *Ecological Effects on the Evolution of Cooperation*
North Carolina A&T State University

- 2011 **Conference Presentation:** *Modeling the Evolutionary Dynamics of Plasmids in Spatial Populations*
Genetic and Evolutionary Computation Conference (GECCO), Dublin, Ireland
 - ▶ **Guest Blog Post:** *The Role of Environment in the Evolution of Cooperation*
BEACON Center of the Study of Evolution in Action
 - ▶ **Invited Talk:** *Social Structure and the Maintenance of Biodiversity*
BEACON Center of the Study of Evolution in Action
 - ▶ **Guest Lecture:** *Evolving Cooperative Behaviors*
Advanced Topics in Distributed Computing Systems (MSU CSE 912)
 - ▶ **Poster:** *Resource Abundance and the Evolution of Cooperation*
BEACON NSF Site Visit
- 2010 **Invited Talk:** *Environmental Resource Abundance and the Evolution of Cooperation*
BEACON Center of the Study of Evolution in Action
 - ▶ **Conference Presentation:** *Social Structure and the Maintenance of Biodiversity*
12th International Conference on the Synthesis and Simulation of Living Systems (ALIFE), Odense, Denmark
 - ▶ **Conference Presentation:** *Resource Abundance Promotes the Evolution of Public Goods Cooperation*
Genetic and Evolutionary Computation Conference (GECCO), Portland, Oregon, USA
 - ▶ **Poster:** *Resource Abundance Promotes the Evolution of Public Goods Cooperation*
MSU Computer Science and Engineering Poster Workshop
- 2009 **Conference Presentation:** *Evolving Cooperative Pheromone Usage in Digital Organisms*
IEEE Symposium Series on Computational Intelligence in Nashville, Tennessee, USA
 - ▶ **Poster:** *Evolving Social Behavior in Adverse Environments*
European Conference on Artificial Life 2009, Budapest, Hungary
- 2008 **Poster:** *Evolving the Cooperative Use of Pheromones*
MSU Computer Science and Engineering 40th Anniversary Open House
- 2007 **Guest Lecture:** *Peer-to-Peer Networks*
Computer Networks (MSU CSE 422)
- 2006 **Poster:** *Adaptively Routing P2P Queries Using Association Analysis*
MSU Computer Science and Engineering Poster Workshop
- 2005 **Poster:** *SimDB: The Molecular Dynamics Simulation Database*
MSU Biochemistry and Molecular Biology Poster Workshop

Service Activities

University Committee Service

- 2014–2015 Biology Department Representative, University of Washington Postdoctoral Association
- 2013–2014 UW Biology Faculty Appointments Committee
- 2011–2012 MSU College of Engineering Research Committee
 - 2011 Co-founder, BEACON Students and Postdocs Association
 - 2011 MSU College of Engineering Graduate Studies Committee
- 2009–2012 Chair, MSU CSE Graduate Students Association
- 2009–2010 MSU CSE Computing Environment Committee
- 2007–2008 MSU CSE Graduate Studies and Research Committee

2006–2007	MSU CSE Faculty Meetings
2004–2012	MSU CSE Graduate Students Association

Peer Reviewing

- Journal of Evolutionary Biology (2)
- Artificial Life (1)

Conference Committee Membership

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| 2015 | <p>Diversity Coordinator: Evolution in Washington, Idaho, British Columbia, and Oregon (EVO-WIBO) 2016</p> <ul style="list-style-type: none"> ▶ Artificial Life/Robotics/Evolvable Hardware Track, Genetic and Evolutionary Computation Conference (GECCO) |
| 2014 | <p>Fourteenth International Conference on the Synthesis and Simulation of Living Systems (ALIFE)</p> <ul style="list-style-type: none"> ▶ Artificial Life/Robotics/Evolvable Hardware Track, Genetic and Evolutionary Computation Conference (GECCO) |
| 2013 | <p>Artificial Life/Robotics/Evolvable Hardware Track, Genetic and Evolutionary Computation Conference (GECCO)</p> <ul style="list-style-type: none"> ▶ Generative and Developmental Systems Track, Genetic and Evolutionary Computation Conference (GECCO) |
| 2012 | <p>Thirteenth International Conference on the Synthesis and Simulation of Living Systems (ALIFE)</p> <ul style="list-style-type: none"> ▶ Artificial Life/Robotics/Evolvable Hardware Track, Genetic and Evolutionary Computation Conference (GECCO) |

Outreach

Education Outreach

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| 2015 | <p><i>Where is Evolution Going??</i>, developed and led an activity exploring the evolutionary process at Pacific Science Center, Seattle, WA</p> <ul style="list-style-type: none"> ▶ Grant reviewer for the Portal to the Public network of Informal Science Education organizations ▶ Mentor for 8th Grade Science Experiment, Beaver Lake Middle School, Issaquah, WA ▶ <i>How Do Germs Change?</i>, co-led an activity about your bacteria and antibiotics for Paws-On Science: Husky Weekend at Pacific Science Center, Seattle, WA ▶ Contributor and featured scientist for <i>Career Machine</i>, an interactive kiosk introducing scientists to the public at Pacific Science Center, Seattle, WA |
| 2014 | <p>Helped students conduct experiments examining bacterial growth and the effect of hand washing at Sacajawea Elementary School, Seattle, WA</p> <ul style="list-style-type: none"> ▶ Science Fair Judge at Jane Addams K-8 School, Seattle, WA ▶ Judge for Biology Graduate Student Symposium, University of Washington |
| 2013 | <p>Science Fair Judge at Jane Addams K-8 School, Seattle, WA</p> <ul style="list-style-type: none"> ▶ Co-Instructor and Co-Organizer of <i>CompCamp</i>, an introduction to computational tools and programming for biologists, Department of Biology, University of Washington |
| 2012 | <p>Developed and taught <i>BEACON Tools</i>: A seminar series introducing computational tools for data-driven science to students, postdocs, and faculty of BEACON Center</p> |

- ▶ Taught groups of third grade students from East Lansing, MI about the evolutionary process using Picbreeder
- ▶ Worked with MSU's Graduate Women In Science showing high school students science and engineering using computers, robots, and digital evolution as part of the NSF-sponsored College Ambition Program
- 2011 Taught groups of first grade students from East Lansing, MI about the evolutionary process using Picbreeder

External Activities

- 2013–2014 Volunteer, Decibel International Festival of Electronic Music Performance, Visual Art and New Media
- 2002–pres. Volunteer counselor for Hoosier Burn Camp, a camp for child burn survivors

Software Contributions

- **Primary Developer**, SEEDS Platform for computational ecology and evolution
Available: <https://github.com/briandconnelly/seeds>
- **Primary Developer**, pushoverr, an R package for sending notifications
Available: <https://github.com/briandconnelly/pushoverr>
- **Primary Developer**, PlateTools for reading, manipulating, and analyzing microplate data
Available: <https://github.com/briandconnelly/PlateTools>
- **Developer**, Avida Digital Evolution Platform
Available: <http://avida.devosoft.org>