

Contact Information

Department of Mathematics
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Employment

2012 - Current Postdoctoral Fellow, Pomona College

Education

University of Illinois at Urbana-Champaign, Urbana, IL

August 2005 - December 2011

Ph.D. Mathematics, December 2011

Thesis Adviser: Robert G. Muncaster

Thesis Title: "General Incentives in Finite Game Theory"

M.S. Mathematics, 2010

San Jose State University, San Jose, CA

August 2002 - May 2006, GPA: 3.69/4.00

B.S. Computer Science, Major GPA: 3.58/4.00

B.A. Mathematics, Major GPA: 3.82/4.00

Essex County College, Newark, NJ

January 2000 - June 2002, GPA: 3.75/4.00

A.A.S. Mathematics, Major GPA: 4.00/4.00, High Honors

Publications

Accepted

The Art of War: Beyond Memory-one Strategies in Population Games with Marc Harper and Christopher Lee. arXiv preprint [arXiv:1405.4327](https://arxiv.org/abs/1405.4327) (2014). (accepted: PLOS ONE)

Stability of Evolutionary Dynamics on Time Scales with Marc Harper. arXiv preprint [arXiv:1210.5539](https://arxiv.org/abs/1210.5539) (2012). (accepted: Dynamic Games and Applications)

Submitted

- “Stationary Stability for Evolutionary Dynamics in Finite Populations” with Marc Harper. arXiv preprint [arXiv:1311.0941](https://arxiv.org/abs/1311.0941) (2013). (submitted: Journal of Dynamics and Games)
- “Incentive Processes in Finite Populations” with Marc Harper. arXiv preprint [arXiv:1306.2389](https://arxiv.org/abs/1306.2389) (2013). (submitted: Journal of Theoretical Biology)
- “Mean Evolutionary Dynamics for Stochastically Switching Environments” with Marc Harper and Andrew Vlasic. arXiv preprint [arXiv:1306.2373](https://arxiv.org/abs/1306.2373) (2013). (submitted: Theoretical Population Biology)
- “The Kullback-Liebler Divergence as a Lyapunov Function for Incentive Based Game Dynamics.” arXiv preprint [arXiv:1207.0036](https://arxiv.org/abs/1207.0036) (2012). (submitted: SIAM Journal on Control and Optimization)
- “The Uniform Distribution in Incentive Dynamics.” arXiv preprint [arXiv:1207.0037](https://arxiv.org/abs/1207.0037) (2012). (submitted: Games and Economic Behavior)
- “On the Existence of General Equilibrium in Finite Games and General Game Dynamics.” arXiv preprint [arXiv:1201.2384](https://arxiv.org/abs/1201.2384) (2012). (submitted: Journal of Economic Theory)

Work in Progress

- “The Impossibility of Convergence to Optimal Strategy in Rock Paper Scissor Game in Continuous Payoff Positive Dynamics” with Thalia Spinrad.
- “Entropic Equilibria Selection of Stationary Extrema in Finite Populations” with Marc Harper.
- “Evolution on Random Graphs” with Alana Shine and Marc Harper.
- “Vaccinations for Epidemics: A Game Theoretic Approach” with Jessica Vincent.

Other Scholarly Works

- Dashiell Fryer, Klaus Witz (2004). Visualizing Chaos in Classic Dynamical Systems. Unpublished.
- Goldston, D. A., & Yildirim, C. Y. (2007). Higher correlations of divisor sums related to primes III: Small gaps between primes. *Proceedings of the London Mathematical Society*, 95(3), 653-686. (Acknowledged as a contributor)

Supervision of Undergraduate Research

Summer Research

- Maximilian Hoffman (2013). *Evolutionary Dynamics of Chemical Reactions*. Funded by Kenneth Cooke Memorial Fund.

Senior Thesis

Names in **bold** received distinction for their work.

Erika Parks (2013). *Using Survival Models to Predict Recidivism*.

Grant Stafford (2013). *Information Theoretic Connections between Game Theory and Machine Learning*.

Jessica Vincent (2013). *Evolutionary Dynamics and Population Games*.

Erick Deras (2014). *Game Theory Applied to Games: On How Checkers is More Complex Than It Appears*.

Alana Shine (2014). *Evolutionary Graph Theory*.

Durrell O'Neal (2014). *Causality and Statistics*.

Teaching Experience

Pomona College

Calc II, III, & Calculus II with Applications to the Life Sciences, Vector Calculus, Differential Equations and Modeling, Introduction to Analysis, Linear Algebra

University of Illinois

Traditional Discussion Calculus I, and Calculus III.

Merit Discussion Calculus I and II, Preparation for Calculus, Differential Equations.

Small Lecture/Discussion Calculus II.

Large Lecture Differential Equations Plus

Grading Complex Variables, Partial Differential Equations (Graduate Level).

Tutoring Preparation for Calculus.

Outreach

2015 Richard Tapia Celebration of Diversity in Computing Scholarship Referee.

Minisymposium on Theoretical and Numerical Results in Dynamical Systems Workshop Celebrating Diversity, SIAM Annual Meeting, Chicago, IL. July 9, 2014.

Unifying the Equations of Life: Time Scale Calculus and Evolutionary Dynamics. (invited).

2014 Pomona Academy for Youth Success (PAYS) Rising 11th grade Math Instructor for high achieving underrepresented minority high school students in the Pomona area.

2006 & 2010 Underrepresented Programs Seminar Invited to SJSU to speak to the underrepresented programs (including MARC and McNair Scholars) on succeeding in graduate school and my own research.

2008 & 2009 Summer Math Enrichment Program Coordinated a summer program for middle school students from the [Champaign Unit 4 School District](#). The program doubled as preparation for mostly low income and underrepresented students and also as professional development for their instructors.

2001-2002 Essex County College Peer tutor for Physics, Mathematics, and Computer Science to a predominantly underrepresented student base.

Presentations

Contributed Paper Session on Evolution and Ecology, SIAM Life Science, Charlotte, NC. August 6, 2014.

The Information Player: a Novel Strategy That Dominates Zero Determinant and Other Known Strategies in Multiplayer Evolutionary Games.

Contributed Paper Session on Evolution and Ecology, SIAM Life Science, Charlotte, NC. August 6, 2014.

Evolutionary Stability for Evolutionary Dynamics in Finite Populations.

Minisymposium on Theoretical and Numerical Results in Dynamical Systems Workshop Celebrating Diversity, SIAM Annual Meeting, Chicago, IL. July 9, 2014.

Unifying the Equations of Life: Time Scale Calculus and Evolutionary Dynamics. (invited).

Contributed Paper Session on Probability and Statistics, SIAM Annual Meeting, Chicago, IL. July 8, 2014.

Evolutionary Stability for Evolutionary Dynamics in Finite Populations.

AMS Session on Probability and Stochastic Dynamical Systems, Joint Math Meeting, Baltimore, MD. January 18, 2014.

Evolutionary Stability in Finite Populations.

Mathematics of Social Learning, IPAM Poster Session, Los Angeles, CA. January 6-7, 2014.

Winning Populations Games with Machine Learning and Statistical Inference.

Special Session on Teaching ODEs: Best Practices from CODEE AMS Western Fall Sectional Meeting, Riverside, CA. Nov 2, 2013.

Constructing Jordan Forms.

Contributed Paper Session SIAM Conference on Application of Dynamical Systems, Snowbird, UT. May 21, 2013.

Time-Scale Lyapunov Functions for Incentive Dynamics on Riemannian Geometries.

Claremont Colleges Mathematics Colloquium, Harvey Mudd College, Claremont, CA. April 17, 2013.

Unifying the Equations of Life: Time Scale Calculus and Evolutionary Dynamics. (invited).

Applied Math Seminar, Claremont Center for Mathematics Sciences, Claremont McKenna College, Claremont, CA. February 20, 2013.

Time-Scale Lyapunov Functions for Incentive Dynamics on Riemannian Geometries. (invited).

AMS Contributed Paper Session, Joint Math Meeting, San Diego, CA. January 9, 2013.

Time-Scale Lyapunov Functions for Incentive Dynamics on Riemannian Geometries.

Claremont Colleges Mathematics Colloquium, Pomona College, Claremont, CA. April 12, 2012.

General Incentives in Finite Game Theory. (invited)

Info/Evo Seminar, University of California - Los Angeles, Los Angeles, CA. November 14, 2011.

General Incentives in Game Theory (invited)

Mathematics Colloquium, San Jose State University, San Jose, CA. April 27, 2011.

General Incentives in Game Theory (invited)

Graduate Analysis Seminar, University of Illinois at Urbana-Champaign, Urbana, IL. April 22, 2011.

General Incentives in Game Theory

Underrepresented Programs Seminar, San Jose State University, San Jose, CA. 2010.

Graduate School: A Survival Guide (invited)

Graduate Analysis Seminar, University of Illinois at Urbana-Champaign, Urbana, IL. October 2, 2009. *An Introduction to Game Theory: The Nash Equilibrium*

Evolutionary Game Theory Seminar, University of Illinois at Urbana-Champaign, Urbana, IL. 2009. *Existence of General Equilibrium in Finite Games*

Evolutionary Game Theory Seminar, University of Illinois at Urbana-Champaign, Urbana, IL. 2008.

Two Proofs for the Existence of Nash Equilibrium in Finite Games and Possible Extensions

Graduate Analysis Seminar, University of Illinois at Urbana-Champaign, Urbana, IL. April 18, 2007.

Game Theory in Political Science

Underrepresented Programs Seminar, San Jose State University, San Jose, CA. 2006.

Graduate School: Year One (invited)

Northern California Undergraduate Mathematics Conference, Sonoma State University, Rohnert Park, CA. April 16, 2005.

Small Gaps Between Primes

Annual Biomedical Research Conference for Minority Students, Dallas, TX. December 11, 2004.

Visualizing Chaos in Classic Dynamical Systems

Oral Presentation, SROP, University of Illinois at Urbana-Champaign, Champaign, IL. August 2004.

Visualizing Chaos in Classic Dynamical Systems

Roundtable Discussion, CIC Conference, University of Iowa, Iowa City, IA. July 2004.

Visualizing Chaos in Classic Dynamical Systems

Research Experience

Institute for Pure and Applied Mathematics Mathematics of Social Learning Workshop, January 2014.

Institute for Pure and Applied Mathematics Algorithmic Game Theory Workshop, January 2011.

National Science Foundation Research Experience for Graduate Students (REGS) Summer Research Fellow, 2010.

San Jose State University Department of Mathematics, San Jose, CA. Research trainee (with Dr. Goldston), June 2003 - August 2005.

University of Illinois at Urbana-Champaign Department of Curriculum and Instruction, Summer Research Opportunities Program (SROP) participant (with Dr. Witz), June 2004 - August 2004.

Professional Service

Pomona College

Community of Ordinary Differential Equations Educators (CODEE) Journal Associate Editor for Submissions 2013 - present.

University of Illinois

Graduate Affairs Committee, 2010-2011

Undergraduate Affairs Committee, 2009-2010

Illinois Council of Teachers Mathematics State Finals Competition Oral Presentation Judge, 2008

Mentor for first time Merit teaching assistants
(mentored 5 Merit TA's)

Awards and Honors

Pomona College

NSF Travel Award - SIAM Annual Meeting, 2014

IPAM Registration Award - Mathematics of Social Learning, 2014

NSF Early Career Travel Award - SIAM Conference on Dynamical Systems and its Applications, 2013

University of Illinois

Graduate Teaching Certificate, 2011

NSF Travel Award - IPAM Workshop: Algorithmic Game Theory, 2011

NSF REGS Summer Research Fellow, 2010

NSF Travel Award - IMA Special Workshop: Career Opportunities for Underrepresented Groups in Mathematical Sciences, 2010

Graduate College Fellow, 2005-2007 and 2009-2010

Summer Research Opportunities Program, 2004

Named to the List of Teachers Ranked as Excellent by Their Students
(4 of 5 semesters, rated outstanding 2 times)

San Jose State University

Dean's Scholar, 2005

The Hoggart Award for Outstanding Research Potential, 2005

The Morton Future Teacher Award, 2004

Minority Access to Research Careers (MARC) Research Traineeship, 2003-2005

Essex County College

Open Door Foundation Scholarship, 2002

Dean's List (4 semesters)