

# JEFFREY A. FLETCHER

## Contact Information

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## Education

**Ph.D. Systems Science**, Portland State University, 2004

*Fundamental Conditions for the Evolution of Altruism: Towards a Unification of Theories*

**M.S. Computer Science**, Portland State University, 1995

*Software Engineering Considerations in Evolutionary Modeling*

**B.S. Biology**, University of Oregon, 1982, with honors

**Santa Fe Institute**, Complex Systems Summer School, 1999

**Oregon Health Sciences University**, School of Medicine, 1982-1985

Two years, including national boards. Courses in anatomy, biochemistry, histology, genetics, developmental biology, physiology, immunology, pathology, and public health.

## Professional Experience

**Adjunct Assistant Professor**, University Studies Program, Portland State University, 2008.

Teaching three different courses this year:

*Freedom, Privacy, and Technology*: Sophomore Inquiry course that investigates potential conflicts between our strong desire for freedom and privacy and our impulse to make use of modern technology to achieve greater control over the conditions in which we live.

Explores the nature and the value of both freedom and privacy from philosophical, psychological, sociological, ethical, and legal perspectives, and how current and future advances in science and technology will affect them. Includes seminar style small-group discussions, short papers, group projects, and presentations.

*Natural Science Inquiry*: Sophomore Inquiry course that engages students in scientific investigations of their own design around problems encountered in everyday life.

Collaborative inquiry-based projects require: 1) independent and collaborative work, 2) use of library and associated databases to access scientific information, 3) collection of data, 4) use of computer software to organize, analyze, and present data, and 5) interpretation, construction, and informed defense of knowledge claims.

*Sustainability*: Freshman inquiry course that explores the possibilities and limitations of developing truly sustainable systems, including exploring ways we can maintain a sustainable relationship between our human communities and the natural world. This necessarily includes investigating the interconnectedness among ecological, social, economic, and cultural systems. These issues will be explored through literature, films, case studies, art, books, and original group and individual projects and papers.

**Freshman Inquiry Portfolio Reviewer**, University Studies Program, PSU, 2008.

Two days of assessing student portfolios for evidence of satisfying University Studies learning goals. Assessments done individually and in collaboration with colleagues.

**Adjunct Assistant Professor**, Systems Science Graduate Program, PSU, 2008.

Teaching Game Theory course that explores basic principles of game theory through many small-group and individual activities including applying relevant concepts to daily life. Course includes a substantial project. Topics include utility theory, evolutionary game theory, auction theory, coalition theory, and resource management applications, as well as other special topics depending on student interest.

**Instructor**, Integrated Science Program, University of British Columbia, 2006-2007.

Teach three upper division courses:

*Models in Science*: explores relationship between the scientific method and scientific models. Hands-on experience in a variety of modeling tools; substantial modeling project.

*Game Theory*: the basics of game theory explored through many small-group and individual activities including applying relevant concepts to daily life; substantial project.

*Interdisciplinary Seminar*: expose students to a wide range of scientific disciplines, trains them to critically evaluate scientific material, and promotes public presentation skills.

**Instructor**, Department of Zoology, University of British Columbia, 2007.

Taught biomathematics course for upper division biology majors. Course covers derivations of classic models from first principles, construction and analysis of models, as well as ample practice with software tools such as Mathematica.

**NSF International Postdoctoral Fellowship**, UBC, Zoology, 2004-2007.

Research methods include analytical, numerical, and individual-based models as well as empirical research on the social spiders of the neo-tropics. Sponsors: Leticia Avilés, (UBC Dept. of Zoology) and Michael Doebeli (UBC Depts. of Zoology and Mathematics).

**Facilitator for Leadership and Team Building Activities**, 1988-2005.

Designed and facilitated activities to help groups explore their leadership styles and team dynamics. I've done this many times over the years, including for high school students in YCC, Upward Bound, and Outdoor school programs as well as for teaching staffs where I've taught, and most recently for business leaders at a Chamber of Commerce retreat.

**Instructor**, School of Business Administration, Portland State University, 2004.

Taught upper division course in Web Development for three terms. Course emphasized general web design considerations and development of interactive web pages using ASP technology interacting with a database.

**Software Design Engineer**, MedicaLogic/Medscape, 1995-2002.

Designed and implemented a wide variety of software tools including stand-alone, client/server, and Internet based products. Many data intensive tools designed for quick navigation of large datasets. Requirements gathering, customer validation, and management of large multi-month projects. **Languages**: Java, C++, C, Visual Basic, Prolog, Lisp, Pascal, FORTRAN. **Database**: Access, Oracle, SQL, SQL loader scripts.

**Internet**: Java server pages, Java beans, Weblogic. **Operating Systems**: Windows, NT, XP, Macintosh, UNIX with shell programming, DOS.

**Instructor**, Systems Science Ph.D. Program, Portland State University, 1999.

Taught graduate course in Artificial Life. Course emphasized a survey of the ALife literature as well as hands on experience designing and implementing computer simulations in evolutionary dynamics, growth and development, and sensory perception.

**Instructor, Graduate TA**, Computer Science, Portland State University, 1994-1997.

Taught many introductory software engineering courses both as a graduate TA and as an adjunct faculty instructor. Role in both cases was nearly identical with full teaching, course design, and student evaluation responsibilities. Languages taught: FORTRAN, C, Visual Basic, and UNIX shells.

**Science Teacher**, Upward Bound Program at Portland State University, 1993-1995.

Designed and taught science curriculum (with laboratory studies) for 50 disadvantaged high school students including summer, after school, and Saturday programs. Included biology, chemistry, physics, human physiology, and software engineering.

**English Teacher**, Selnate Language School, Japan, 1990-1991.

Taught several weekly English conversation classes for a variety of students from elementary school to adults. Specialized in preparing Japanese scientists for giving talks in English at international conferences and finalizing their English manuscripts.

**Environmental Sciences Instructor**, Multnomah County Outdoor School, 1986-1989.

Responsible for designing and implementing “hands on” environmental education programs for sixth grade students who participated in one week residential program during the school year. Supervised, trained, and evaluated high school teaching assistants.

**Director**, Sunrise Youth Service Camp, Washington County ESD, 1989.

Administered week-long residential camp for 1<sup>st</sup> and 2<sup>nd</sup> year high school students identified as being “at risk” of dropping out of school. This was a pilot program where students participated in community service projects, tutoring sessions, group counseling, recreation, and social activities. Supervised 30 students and five staff members.

**Fisheries Biologist**, National Marine Fisheries Foreign Observer Program, 1988-1989.

Two eight week cruises on Polish and Soviet vessels. Duties included: designing sampling methods, data collection, and monitoring ship’s personnel for compliance to U.S. fishing regulations while in U.S. waters.

**Environmental Education Coordinator**, Youth Conservation Corp, 1988.

Designed and implemented diverse hands-on environmental summer education program for 45 disadvantaged high school students. Coordinated fieldtrips and invited speakers. Residential program (including adjudicated youth) involving conservation work projects and daily environmental education in Mt. Hood National Forest.

**Teaching Assistant / Lab Instructor**, University of Oregon, 1981-1982.

Taught upper division biology lab courses in Molecular Genetics, Gene Activation and Development, and Cell Physiology. Responsible for designing and giving lab lectures, grading lab reports, and holding office hours.

### **Journal Publications ([www.sysc.pdx.edu/~jeff/research.html](http://www.sysc.pdx.edu/~jeff/research.html))**

**Fletcher, J. A.**, and M. Doebeli. **2008**. A Simple and General Explanation for the Evolution of Altruism. *Proceedings of the Royal Society B* (in press, doi:10.1098/rspb.2008.0829).

**Fletcher, J. A.**, and M. Zwick. **2007**. The Evolution of Altruism: Game theory in Multilevel Selection and Inclusive Fitness. *Journal of Theoretical Biology* 245: 26-36.

**Fletcher, J.A.**, and Zwick, M., **2006**. Unifying the Theories of Inclusive Fitness and Reciprocal Altruism. *The American Naturalist* 168:252-262.

**Fletcher, J. A.**, M. Zwick, M. Doebeli, and D. S. Wilson. **2006**. What's Wrong with Inclusive Fitness? *Trends in Ecology and Evolution* 21:597-598.

**Fletcher, J. A.**, and M. Doebeli. **2006**. How Altruism Evolves: Assortment and Synergy. *Journal of Evolutionary Biology* 19:1389-1393.

**Fletcher, J.A.**, **2006**. Book Review: *Evolutionary Game Theory, Natural Selection, and Darwinian Dynamics* by Thomas L. Vincent and Joel S. Brown. *Journal of Mammalian Evolution* 13:157-159.

**Fletcher, J.A.** and Zwick, M., **2004**. Strong Altruism Can Evolve in Randomly Formed Groups. *Journal of Theoretical Biology*, 228:303-313.

Avilés, L., **Fletcher, J.A.**, and Cutter, A.D., **2004**. Ecology, Demography, and Kinship in Social Evolution. *The American Naturalist*, 164: 132-144.

**Fletcher, J.A.**, Zwick, M., Bedau, M.A., **1996**. Dependence of Adaptability on Environmental Structure in a Simple Evolutionary Model. *Adaptive Behavior*, 4(3/4):275-307.

#### **Proceedings Publications ([www.sysc.pdx.edu/~jeff/research.html](http://www.sysc.pdx.edu/~jeff/research.html))**

**Fletcher, J. A.**, and M. Zwick. **2004**, Hamilton's Rule Applied to Reciprocal Altruism. In *Proceedings IEEE Congress on Evolutionary Computation*, Portland, OR, 994-1000, v. 1.

**Fletcher, J.A.** and Zwick, M., **2001**. Altruism, the Prisoner's Dilemma, and the Components of Selection. In *Proceedings of the 2001 IEEE Systems, Man, and Cybernetics Conference*, Tucson, Arizona, 1966-1971, v. 3.

**Fletcher, J.A.** and Zwick, M., **2000**. N-Player Prisoner's Dilemma in Multiple Groups: A Model of Multilevel Selection. In *Proceedings of the Artificial Life VII Workshops*, Portland, OR, Ellis Boudreau and Carlo Maley, eds., 86-89.

**Fletcher, J.A.** and Zwick, M., **2000**. Simpson's Paradox Can Emerge from the N-Player Prisoner's Dilemma: Implications for the Evolution of Altruistic Behavior. In *Proceedings of The World Congress of the Systems Sciences and ISSS 2000*, Allen, J.K. and Wilby, J.M. eds., Toronto, Canada: International Society for the Systems Sciences.

**Fletcher, J.A.**, Bedau, M., Zwick, M.A., **1998**. Effect of Environmental Structure on Evolutionary Adaptation. In *Proceedings of the Artificial Life VI Conference*, Los Angeles; C. Adami, R. Belew, H. Kitano, and C. Taylor, eds., MIT Press, 189-198.

#### **Invited Presentations**

*Evolution of Altruism Theory: Different Accounting Methods or Different Causal Explanations?* Systems Science Seminar, Portland State University, February 2008

*Reconsidering Kin Selection Theory, Statistical vs. Causal Selection Decompositions.*

Program for Evolutionary Dynamics, Harvard University, Cambridge, MA, June 2007

*Advances in Social Evolution Theory: Is Genetic Similarity the Key?* Seminar for Ecology and Evolutionary Biology Department. University of Arizona, Tucson, AZ, April 2007

*Unification and Controversy in Evolution of Altruism Theory*, Postdoctoral Seminar, Santa Fe Institute, Santa Fe, NM, February 2007.

*Controversy and Unification in Evolution of Altruism Theory*, Ecology, Evolution, and Conservation Biology Seminar Series, University of Nevada, Reno, NV, November 2006.

*Remarks on Artificial Life Research*, Roundtable Discussion on Role of Artificial Life in Art, Surrey Art Museum, Surrey, BC, March 2006.

*Unifying Game Theoretic and Inclusive Fitness Models of Altruism. Les Ecologistes* Seminar, Behavioural Ecology Research Group, Simon Fraser University, Vancouver, BC, November 2005.

*Evolution of Altruism Fundamentals: Towards a Unification of Theories.* Departmental Seminar, Portland State University Biology Department, Portland, OR, May 2004.

*The Evolution of Altruism: A New Game Theoretic Approach.* Cascade Systems Science Society Seminar, Portland, OR, December 2003.

*The Evolution of Altruism: Game Theory, Multilevel Selection, and Inclusive Fitness.* Evolution, Ecology, and Biodiversity Seminar, Department of Zoology, University of British Columbia, Vancouver, BC, October 2003.

***A Game-Theoretic Perspective on the Relationship Between Altruism and Components of Selection.*** Seminar for Ecology and Evolutionary Biology Department. University of Arizona, Tucson, AZ, October 2001.

***A Game Theoretic Model of Multilevel Selection: Implications for the Evolution of Altruistic Behavior.*** Workshop on the “Evolution of Sociality”, Wissenschaftskolleg zu Berlin (Berlin Institute for Advanced Study), Germany, May 2001.

***N-Player Prisoner's Dilemma in Multiple Groups: A Model of Multilevel Selection.*** Workshop on “ALife’s Role in the Group Selection Debate”, ALife VII Conference, Portland, OR, August 2000.

### **Contributed Presentations**

***Unifying the Theories of Inclusive Fitness and Reciprocal Altruism.*** International Conference on Complex Systems, Boston, MA, June 2006

***What’s Wrong with Inclusive Fitness?*** Evolution 2006 Conference, Stony Brook, NY, June 2006.

***What’s Wrong with Inclusive Fitness?*** Evolutionary Biology in the Pacific Northwest (EVO-WIBO), Port Townsend, WA, April 2006.

***The Evolution of Altruism: Game Theory in Inclusive Fitness and Multilevel Selection.*** Evolution 2005, Fairbanks, AK, June 2005.

***Hamilton's rule in Reciprocal Altruism and Symbiosis.*** Evolution 2005, Fairbanks, AK, June 2005.

***Applying Hamilton’s Rule to Reciprocal Altruism: A Challenge to the “Selfish Gene” Perspective.*** Ecology and Evolution Retreat. UBC, October 2004.

***Hamilton's Rule Applied to Reciprocal Altruism.*** IEEE Congress on Evolutionary Computation, Portland, OR, June 2004.

***Strong Altruism Can Evolve in Randomly Formed Groups.*** Evolution 2003 Conference, Chico, CA, July 2003.

### **Symposium/Workshops Organized**

***ALife’s Role in the Group Selection Debate,*** Invited creator and co-coordinator of workshop at ALife VII Conference, Portland, OR, August 2000. Included inviting presenters and reviewing manuscripts submitted by workshop contributors for workshop proceedings. Participants included Athena Aktipis, Leticia Avilés, Joshua Mitteldorf, John Pepper, and Michael Wade.

### **Poster Sessions**

***A Game Theoretic Basis for Multilevel Selection Theory.*** W.D. Hamilton International Symposium, Bloomington, Indiana, April 2001.

## Reviewer For

**Journals:** *Proceeding of the National Academy of Sciences USA, The American Naturalist, Quarterly Review of Biology, Evolution, Animal Behaviour, Journal of Theoretical Biology, Artificial Life, Bulletin of Mathematical Biology, Adaptive Behavior, IEEE Transactions on Evolutionary Computation, Physics Letters A, Journal of Autonomous Agents and Multi-Agent Systems*

**Conferences:** *European Conference on Artificial Life (ECAL 2001), International Artificial Life Conference Workshops (ALife VII 2000)*

**Funding Agencies:** *National Science Foundation, Directorate for Biological Sciences*

## Guest Class Lectures

**Artificial Life Course**, Portland State University, April 2002 and March 2005

**Evolution Course**, Lewis and Clark College, October 2003

**Game Theory Course**, Portland State University, February 2001 and May 2003 and 2006

**Career Day**, talk on science careers, Springwater Trail High School, April 2003

**Philosophy of Biology Course**, Reed College, February 2003

**Freshman Inquiry Course**, Portland State University, May 2001 and 2002

## Other Service Activities

**Let's Talk Science** – Plan and present classroom science activities for 2<sup>nd</sup> – 4<sup>th</sup> graders, Sir Richard McBride Elementary School, 2005-2007.

**Keelboat Fleet Captain** – University of British Columbia Sailing Club, 2006-2007.

**Science World** – Workshops on Animal Adaptations, Oct. 2005.

**Canada-Wide Science Fair** – Judge in Health Sciences, Vancouver, BC, May 2005.

**International Science and Engineering Fair** – Judge in Environmental Sciences, Portland, OR, May 2004.

**Big Brothers, Big Sisters of Metropolitan Portland** – Mentor, 2002-2006.

**Start Making a Reader Today (SMART)** – Read weekly to 1<sup>st</sup> and 2<sup>nd</sup> graders at Buckman Elementary School, 2000-2004.

**Hands on Portland** – Various projects including Oregon Food Bank, Human Solutions, and Community Cycling Center, 1999-2004.

## Honors and Awards

**National Science Foundation International Postdoctoral Research Fellowship** – Department of Zoology, University of British Columbia, 2004-2007.

**Volunteer of the Month** – Let's Talk Science Program, May 2005.

**Oregon Graduate Laurels Scholarship** – Portland State University, 1997-2004.

**Invited Participant and Speaker** – Workshop on *The Evolution of Sociality*, Wissenschaftskolleg zu Berlin (Berlin Institute for Advanced Study), May 2001.

**Full Scholarship** – Santa Fe Institute Complex Systems Summer School, 1999.

**Teaching Excellence Award** – Selnate English School, Japan, 1991.

**Milhon Scholarship** – Oregon Health Sciences University, Medical School, 1983-85.

**Summer Clinical Fellowship** – National Institute of Mental Health, 1984.

**Graduated with Honors, Dean's List** – University of Oregon, 1978-82.