CURRICULUM VITAE

ROBERT L. AXTELL

Academic Appointments

Current

George Mason University: 2006-present

Professor, Department of Computational and Data Sciences, College of Science;

Co-Director, Computational Public Policy Lab; joint between the Krasnow Institute for Advanced Study and the Schar School of Policy and Government;

Affiliated Professor, Dep't. of Economics, College of Humanities & Social Sciences;

External Professor, Santa Fe Institute (SFI);

External Faculty, Northwestern University Institute on Complex Systems (NICO);

Previous

Chair, Department of Computational Social Science, Krasnow Institute for Advanced Study, George Mason University, 2008-2015;

Visiting Professor, Complexity Economics Programme, Mathematical Institute, and Visiting Fellow, Hertford College, University of Oxford, 2013-14;

Senior Fellow, Economic Studies, Foreign Policy Studies and Governance Studies Programs, The Brookings Institution, Washington, D.C.; founding member of the Center on Social and Economic Dynamics (CSED), 1992-2006;

Mellon Visiting Distinguished Professor, Middlebury College, Fall 2004;

Visiting Professor of Economics, Graduate Faculty of Political and Social Science, The New School for Social Research, Spring 2004;

Adjunct Professor of Computer Science, Georgetown University, 2003;

Visiting Associate Professor of Economics, Johns Hopkins University, 1998-2001;

Research Staff Member, American Enterprise Institute, 1990-91.

Research Focus

Computational models of economic, financial, and social phenomena; complexity of markets; firm dynamics from micro-data; parallel computing for economic modeling; heavy-tailed stochastic processes; behaviorally-grounded models of decision-making; complex adaptive systems, agent-based computing.

Education

Ph.D., Carnegie Mellon University, 1989-1992; Andrew Carnegie fellow; areas of study: microeconomics, game theory, computer science, environmental policy, operations research, inequality; dissertation on multi-level models;

B.S., University of Detroit, 1978-83; Insignis Scholar (full scholarship), major in engineering, minor in economics; Alpha Sigma Nu (Jesuit Honor Society), Tau Beta Pi (Engineering Honor Society), Omega Chi Epsilon highest GPA award.

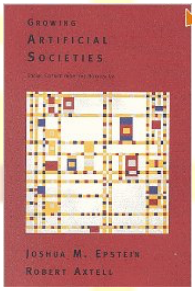
Impact

Citations: ~16,000 Google Scholar citations c July 2019;

Research supervision: 28 Ph.D. dissertations supervised, 2011-present (top 1% in the Mathematics Genealogy Project), 8 in process; 80+ Ph.D. committees served

External research funding: ~$5 million as PI, more than $15 million as member of proposing teams (NSF, DARPA, ONR, SBA, private foundations).

Books

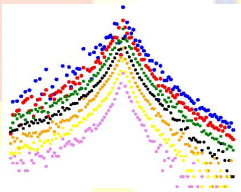


Growing Artificial Societies: Social Science from the Bottom Up, co-authored with Joshua M. Epstein, 1996, Brookings Institution Press/MIT Press, with CD-ROM; translated into Japanese, Swedish, and Chinese; adopted as textbook in departments of economics, political science, business, sociology, anthropology, computer science, physics, operations management, engineering, philosophy, public policy, English (science fiction), and complex systems.

Dynamics of Firms from the Bottom Up: Data, Theory and Models, with Omar Guerrero, forthcoming, MIT Press.

Foundations of Agent Computing in the Social and Economic Sciences: Modeling Emergent Phenomena from the Bottom Up, Cambridge University Press, 2021.

Refereed Publications



"(Spontaneous) Order without Optimality, forthcoming, *Advanced Studies in Political Economy*, S. Haeffele and V. Storr, eds.

"A computational approach to managing coupled human-environmental systems: the POSEIDON model of ocean fisheries," by R. Bailey, E. Carrella, Axtell, M. Burgess, R. Cabral, M. Drexler, C. Dorsett, J. Madsen, A. Merkl, and S. Saul, forthcoming, *Sustainability Science*.

"Where We are Headed versus Where We Want to Go: Economic Theory at a Crossroads?" 2018, *Evolutionary Studies in Imaginative Culture*.

"Endogenous Firm Dynamics and Labor Flows via Heterogeneous Agent," 2018, in *Handbook of Computational Economics, Volume IV: Heterogeneous Agents* (Elsevier B.V.), C. Homes and B. Lebaron, eds.

"Hayek Enriched by Complexity Enriched by Hayek," 2017, *Advances in Austrian Economics 21*: 63-121;

"120 Million Agents Self-Organize into 6 Million Firms: A Model of the U.S. Private Sector," 2016, in *Proceedings of the 15th International Conference on Autonomous Agents and Multiagent Systems* (Singapore), J Thangarajah *et al*., eds.;

"Employment Growth Through Labor Flow Networks," with O. Guerrero, 2013, *PLOS One*, vol. 8, no. 5 (May);

"Getting at Systemic Risk via an Agent-Based Model of the Housing Market," by J. Geanakoplos, Axtell, J.D. Farmer, P. Howitt, B. Conlee, J. Goldstein, M. Hendrey, N.M. Palmer and C.Y. Yang, 2012, *American Economic Review: Papers and Proceedings* (May) *102* (3): 53-58;

"Using Agentization for Exploring Firm and Labor Dynamics," by O. Guerrero, 2010, in *Artificial Economics* (The Hague: Netherlands).

"Bounded Rationality via Recursion," by M. Latek, Axtell and B. Kaminski, 2009, in *Proceedings of the Eighth International Joint Conference on Autonomous Agents and Multi-Agent Systems* (Budapest, Hungary), ACM Press: N.Y.;

"Common Components in Firms' Growth and the Scaling Puzzle," by A. Palestrini, Axtell and M. Gallegati, 2008, *Economics Bulletin*, *12* (35): 1-8. "The Rise of Computationally-Enabled Economics: Intro to the Special Issue of the *Eastern Economic Journal* on Agent-Based Modeling," 2008, *34*: 423-428;

"An Agent-Based model of Tax Compliance with Social Networks," by Axtell, C. Johnson and A. Korobow, 2007, *National Tax Journal, 60*: 589-610;

"What Economic Agents Do: How Cognition and Interaction Lead To Emergence and Complexity," 2007, *Review of Austrian Economics*, *20*: 105-122;

"The Complexity of Exchange," 2005, *Economic Journal*, vol. 115, no. 504 (June): 193-210;

"Group Formation with Splitting Rules in Social Dilemmas" by T. Yamashita, Axtell, K. Kurumatani, and A. Ohuchi, 2003, in *Proceedings of the Second International Joint Conference on Autonomous Agents and Multi-Agent Systems* (Melbourne, Victoria, Australia), ACM Press: N.Y.;

"Non-Cooperative Dynamics of Multi-Agent Teams," 2002, in *Proceedings of the First International Joint Conference on Autonomous Agents and Multi-Agent Systems* (Bologna, Italy), M. Gini *et al*., eds., ACM Press: N.Y.; reprinted in *Complexity in Economics*, J.B. Rosser, Jr., ed., Edward Elgar: Cheltenham, UK (2004);

"Agent-Based Modeling and Industrial Ecology," by C.J. Andrews, Axtell, and M.J. Small), 2002, *Journal of Industrial Ecology*, vol. 5, no. 4: 10-13;

"Population Growth and Collapse in a Multi-Agent Model of the Kayenta Anasazi in Long House Valley," by Axtell, J.M. Epstein, J. Dean, G. Gumerman, S. Chakravarty, R. Hammond, J. Harburger, M. Parker, and S. McCarroll, 2002, *Proceedings of the National Academy of Sciences*, vol. 99 (suppl. 3): 7275-7279; synopses by J. Diamond appeared in the 11 October 2002 issue of *Nature* and by G. Gumerman in the 14 September 2002 issue of *Science News*;

"Zipf Distribution of U.S. Firm Sizes," 2001, *Science 293:* 1818-1820; synopses by P. Ball appeared in the 13 September 2001 issue of *Nature* and by I. Peterson in the 20 October 2001 issue of *Science News*; reprinted in *Complexity in Economics*, J.B. Rosser, Jr., ed., Edward Elgar: Cheltenham, UK (2004);

Refereed Publications (concluded)

"The Emergence of Classes in a Multi-Agent Bargaining Model," by Axtell, J.M. Epstein and H.P. Young, 2001, in S. Durlauf and H.P. Young, eds., *Social Dynamics*, MIT Press: Cambridge, Mass.; a synopsis by B. Bowers appeared in the 28 March 1998 issue of *Science News*;

"Effects of Interaction Topology and Activation Regime in Several Multi-Agent Systems," 2000, in S. Moss and P. Davidsson, eds., *Multi Agent Based Simulation*, Lecture Notes in Artificial Intelligence, vol. 1979. Springer: N.Y.;

"Why Agents? On the Varied Motivations for Agent Computing in the Social Sciences," in C.M. Macal and D. Sallach, eds., *Agent Simulation: Applications, Models and Tools*. University of Chicago/Argonne National Lab: Batavia, Il; online: www.agent2002.anl.gov/proceedings/1999.pdf; reprinted as chapter 1 in *Computational Social Science*, vol. 1 of 4, N. Gilbert, ed., Sage: N.Y. (2010);

"Coordination in Transient Social Networks: An Agent-Based Model of the Timing of Retirement," with J.M. Epstein, R. Hall, discussant, 1999, in H. Aaron, ed., *Behavioral Dimensions of Retirement Economics*, Russell Sage/Brookings Institution Press: Washington, D.C.;

"Foresight as a Survival Characteristic: When (If Ever) Does the Long View Pay?" with R.U. Ayres, 1996, *Technological Forecasting and Social Change*, vol. 51: 209-235; best paper award for this journal 1996;

"Aligning Simulation Models: A Case Study and Results," by Axtell, R. Axelrod, J.M. Epstein and M. Cohen, 1996, *Computational and Mathematical Organization Theory*, vol. 1, no. 2: 123-141; reprinted in Robert Axelrod, 1997, *The Complexity of Cooperation*, Princeton University Press: Princeton, N.J.;

"Artificial Societies and Generative Social Science," with J.M. Epstein, 1996, in *Proceedings of the Int'l. Symposium on Artificial Life and Robotics*, M. Sugisaka, editor, Oita, Japan: Int'l. Society for Artificial Life and Robotics;

"Reevaluating the Relationship between Transferable Property Rights and Command-and-Control Regulation," with R.W. Hahn, 1995, *Journal of Regulatory Economics*, vol. 8: 125-148;

"Agent-Based Modeling: Understanding Our Creations," with J.M. Epstein, 1994, *Bulletin of the Santa Fe Institute*, vol. IX, number 2: 29-32.

Book Chapters

"Challenges of Integrating Complexity and Evolution into Economics," by Axtell, A. Kirman, I.D. Couzin, D. Fricke, T. Hens, M.E. Hochberg, J.E. Mayfield, P. Schuster, and R. Sethi, 2016, in D.S. Wilson and A. Kirman, eds., *Complexity and Evolution*, MIT Press: Cambridge, Massachusetts;

"Holland, Emergence, and the 'Inside-Outside' Dichotomy," *Aha...That is Interesting! John H. Holland 85 Years Young*. Exploring Complexity vol. 1, in J.W. Vasbinder, ed., 2015 Hackenack, N.J., World Scientific Publishing Co. Pte Ltd.

"The End of the Beginning for Multi-Agent Systems Social Science," 2007, in F. Amblard and D. Phan, eds., *Multi-Agent Modeling and Simulation: Applications in the Social Sciences*; appeared first in French as "La fin des débuts pour les systèmes multi-agents en science sociales," 2006, in F. Amblard and D. Phan, eds., *Modélisation et simulation multi-agent: Applications pour les Sciences de l'Homme et de la Societé*, Hermes Science: Paris;

"Co-evolution of social sciences and engineering systems," 2007, *Frontiers of Engineering*, National Academies Press: Washington, D.C.

"Afterword to 'Nonlinear Models in Archaeology'," with J.S. Lansing, 2006, in C.S. Beekman and W.W. Baden, eds., *Nonlinear Approaches in Archaeology*, Ashgate Press;

"Multi-Agent Systems Macro: A Prospectus," 2006, in D Colander, ed., *Post-Walrasian Macroeconomics: Beyond the Dynamic Stochastic General Equilibrium Model*, Cambridge University Press: N.Y.;

"Investigation of a Mutual Choice Metanorm in Group Dynamics for Solving Social Dilemmas," by T. Yamashita, Axtell, K. Kurumatani and A. Ohuchi, 2003, in *Multi-Agent Systems for Mass-User Support*, K. Kurumatani, S-H. Chen and A. Ohuchi, eds., Lecture Notes in AI, vol. 3012. Springer: N.Y.;

"Economics as Distributed Computation," 2003, in H. Deguchi, K. Takadama and T. Terano, eds., *Meeting the Challenge of Social Problems via Agent-Based Simulation*, Springer: Tokyo;

Book Chapters (concluded)

"Empirical Analysis of Multi-Agent Systems Models in the Social Sciences," 2001, in *Formal Approaches to Agent-Based Systems*, J.L. Rash and others, eds. Lecture Notes in Artificial Intelligence, vol. 1871. Springer: N.Y.;
"Economics as Distributed Computation," 2003, in H. Deguchi, K. Takadama and T. Terano, eds., *Meeting the Challenge of Social Problems via Agent-Based Simulation*, Springer: Tokyo;
"Empirical Analysis of Multi-Agent Systems Models in the Social Sciences," 2001, in *Formal Approaches to Agent-Based Systems*, J.L. Rash and others, eds. Lecture Notes in Artificial Intelligence, vol. 1871. Springer: N.Y.;
"Understanding Anasazi Culture Change Through Agent-Based Modeling" by J.S. Dean, G.J. Gumerman, J.M. Epstein, Axtell, A.C. Swedlund, M.T. Parker, and S. McCarroll, 1999, in T. Kohler and G. Gumerman, eds., *Dynamics in Human and Primate Societies*, Oxford University Press: N.Y.

Policy Publication

"Changing How We Discount to Make Public Policy More Responsive to Citizens' Time Preferences," with G.J. McRae, 2006, *AEI-Brookings Joint Center Policy Brief*.

Research Reports

From Maps to Models: Augmenting the Nation's Geospatial Intelligence Capabilities, by D.M. Higdon, Axtell, V. Balaji, L.E. Buja, K.V. Calvin, K.M. Carley, R. Castano, R.R. Coifman, O. Ghattas, J.A. Hansen, A.M. Michalak, S. Shekhar and S. Wang, 2016, Washington, D.C., The National Academies Press;
"Volatility and Asymmetry of Small Firm Growth Rates Over Increasing Time Frames," 2006, by R. Perline, Axtell and D. Teitelbaum, published by the U.S. Small Business Administration, Office of Advocacy;
"Social Influences and Smoking Behavior: Final Report to the American Legacy Foundation," 2006, by Axtell, S. Durlauf, J.M. Epstein, R. Hammond, B. Klemens, J. Parker, Z. Song, T. Valente, and H.P. Young, Center on Social and Economic Dynamics, The Brookings Institution.
"Firm Size Dynamics of Industries: Stochastic Growth Processes, Large Fluctuations, and the Population of Firms as a Complex System," 2004, by Axtell and D. Teitelbaum, published by the U.S. Small Business Administration, Office of Advocacy;
"The Emergence of Firms in a Population of Agents: Local Increasing Returns, Unstable Nash Equilibria, and Power Law Size Distributions," 1999, working paper, Santa Fe Institute, Santa Fe, N.M.

Papers in the publication process

"The Network Picture of Labor Flow," by E. Lopez, O. Guerrero, and Axtell, submitted to *Complexity;*
"A Comparison of Languages and Frameworks for the Parallelization of a Simple Agent Model," by S. McCabe, D. Brearcliffe, P. Froncek, M. Hansen, V. Kane, D. Taghawi-Nejad, and Axtell, submitted to *MABS*;
"The Network Composition of Aggregate Unemployment," by Axtell, O. Guerrero, and E. Lopez," submitted to the *Journal of Economic Behavior and Org*.;
"Beyond the Nash Program: Aggregate Steady-States without Agent-Level Equilibria," under revision, *Review of Behavioral Economics;*
"Methodology of Agent Computing in Economics and Finance," with J.D. Farmer, invited to the *Journal of Economic Literature*;
"On the Growth of Firms, One Worker at a Time: Beyond Gibrat's Law," with O. Guerrero, submitted to *Science Advances*;

Working Papers

"A Model of the Housing Market Bubble in Metropolitan Washington, D.C.," by Axtell, J.D. Farmer, J. Geanakoplos, P. Howitt, E. Carrella, B. Conlee, J. Goldstein, M. Hendrey, P. Kalikman, D. Masad, N. Palmer, and C.-Y. Yang;
"Completely Monotone Discounting, I: Stationary Discount Spectra" and "Completely Monotone Discounting, II: Non-Stationary Discount Spectra";
"Competitive Innovation and the Emergence of Technological Epochs," by Axtell, R. Casstevens, M Hendrey, W. Kennedy and W. Litsch;
"Agentization: Relaxing Simplistic Assumptions with Agent Computing";
"A Positive Theory of Emergence for Multi-Agent Systems";
"The High Cost of Stability in Two-Sided Matching: How Much Social Welfare Should be Sacrificed in the Pursuit of Stability?" with S.O. Kimbrough;

Working Papers (concluded)

"A Positive Theory of Emergence for Multi-Agent Systems";
"The High Cost of Stability in Two-Sided Matching: How Much Social Welfare Should be Sacrificed in the Pursuit of Stability?" with S.O. Kimbrough;
"The Emergence of Cities: A Microeconomic Explanation of Zipf's Law," with R. Florida;
"Growing Solutions to Commons Problems";
"Team Pollution: The Optimality of Market-based Regulations Depends Sensitively on the Profit Maximization Hypothesis";
"Radicals, Revolutionaries and Reactionaries in a Multi-Agent Model of Class Norms," with S. Chakravarty;
"Paternalistic Agents: Some Problems Arising When Humans are Served by Rational Agents".

Ph.D. Dissertation Committee Service

Dr. Sherzod Abdulkadirov, School of Public Policy, G. Mason; dissertation on democratization processes modeled using agents; Res. Fellow, Mercatus Ctr.;
Brent Auble, Department of Computational and Data Sciences, George Mason; dissertation on automated narration creation in ABMs, in progress;
Dr. Gabriel Balan, Department of Computer Science, George Mason; dissertation on computer science and game theory; Senior technical staff, Oracle;
Dr. Anamaria Berea, Dep't. of Comp. Social Sci., G. Mason; dissertation on agent-based modeling of entrepreneurship; Smith School of Business, U. Maryland;
Dr. Nanette Blandin, Ed.D., George Washington, 2007; dissertation on leadership in complex adaptive organizations; Associate Principal, Isaacson, Miller;
Dr. Kim Bloomquist, Dep't. of Comp. Social Sci., G. Mason; dissertation modeling tax compliance with agents; Economist, Internal Revenue Service;
Dr. Mary Boardman, School of Public Policy, George Mason; dissertation on agent modeling of international aid operations; Methodologist at Globalytica;
Tom Briggs, Department of Computational and Data Sciences, George Mason; dissertation on small group dynamics, in progress;
Dr. Seth Brown, Dep't. of Infrastructure and Environmental Eng., George Mason; dissertation on green storm water runoff systems; engineering consulting;
Dr. Shawn Bucholz, Department of Computational Social Science, George Mason; dissertation on agent-based modeling of the housing market; HUD;
Dr. Guillermo Calderon-Meza, Dep't. of Sys. Eng. and Ops. Res., Mason; dissertation on agent modeling of air traffic ops.; Software Dev. Engineer, Microsoft;
Dr. Ernesto Carrella, Dep't. of Comp. Social Sci., G. Mason; dissertation on agent models of firm competition; Research Fellow, University of Oxford;
Dr. Randy Casstevens, Department of Computational Social Science, George Mason; dissertation on technological change; Charles River Associates;
Dr. James Caton, Dep't. of Economics, G. Mason; dissertation on entrepreneurship using agent models; Ass't. Professor at N. Dakota St. University;
Dr. Ermanno Catullo, Dep't. of Economics, U. of Torino (Italy); dissertation on int'l trade using agents; post-doc, Universita Politecnica delle Marche, Italy;
Dr. Ken Comer, Dep't. of Systems Engineering and Operations Res., G. Mason; dissertation on agent activation regimes; Senior Analyst, Booz-Allen Hamilton;
Dr. Kevin Comer, Dep't. of Comp. and Data Sciences, G. Mason; dissertation on agent models of healthcare; Senior Engineer, MITRE Corporation;
Dr. Michael Crone, Department of Mathematics, George Mason; dissertation on the nonlinear dynamics of fisheries; campaign consultant;
Abigail Devereux, Department of Economics, George Mason; dissertation on gender segregation using agent computing, in progress;

Total:
89 *Ph.D. students over* 21 *years,*
75 *over* 13 *years at George Mason*

My roles:
***Advisor* (*bold*): 35**
Committee: 54

Status:
Complete: 74
In progress: 15

26 *Ph.D. degrees supervised at Mason and completed from* 2011 - *present*

Ph.D. Dissertation Committee Service (continued)

Dr. T. Clark Durant, Department of Economics, George Mason, 2007; dissertation on computational voting theory; Staff member, McKinsey & Co.;
Trang Escobar, Dep't. of Computational and Data Sciences, G. Mason; dissertation on evolutionary game theory and agent modeling; in progress;
Dr. Aaron Frank, Dep't. of Comp. Social Sci., Mason; dissertation: a complexity perspective on national intelligence; Core Faculty, RAND Grad. School;
Teresa Franks, Department of Computational and Data Sciences, George Mason; dissertation on financial market networks, in progress;
Dr. Santiago Gangotena, Department of Economics, George Mason; dissertation on the emergence of money; Universidad San Francisco de Quito, Ecuador;
Dr. Nathan Goldschlag, Department of Economics, George Mason; dissertation on agent modeling of economic innovation; Staff member, Bureau of Census;
Dr. Jon Goldstein, Dep't. of Comp. Social Sci., G. Mason; dissertation on agent modeling of banks and mortgages; Computational Analytics, BAE Systems;
Dr. Omar Guerrero, Dep't. of Comp. Social Sci., G. Mason; dissertation on firm dynamics; Fellow at the Turing Institute and University College London;
Dr. Timothy Gulden, School of Public Affairs, University of Maryland, 2004; dissertation: agent modeling for policy; Policy Researcher, RAND Corporation;
Dr. Forest Hare, School of Public Policy, George Mason; dissertation on agent modeling of collective security in the national defense context; SAIC;
Dr. Matthew Hoffman, Dep't. of Political Sci., G. Washington, 2000; dissertation on agent models of environmental norms; Prof. of Political Sci., U. Toronto;
Brant Horio, Department of Computational Social Science, George Mason; dissertation on information warfare; in process;
Dr. Yinyue Hu, School of Policy, Gov't. and Int'l. Affairs, G. Mason; dissertation on electronic medical records and hospital networks; insurance industry;
Vince Kane, Department of Computational and Data Sciences, George Mason; dissertation on modeling the industrial revolution, in progress;
Jackie Kazil, Department of Computational and Data Sciences, George Mason; dissertation on the MESA framework for agent models in Python; in process;
Dr. Erik Kimbrough, Dep't. of Comp. and Data Sciences, Mason; dissertation on the emergence of economic institutions; Assoc. Prof. of Econ., Chapman U.;
Dr. Matt Koehler, Dep't. of Comp. Social Sci., Mason; dissertation on complex adaptive systems applied to the law; MITRE Corporation;
Dr. André L'Huillier, Department of Computational and Data Sciences, George Mason; dissertation on the video game industry, assistant professor;
Dr. Maciej Latek, Dep't. of Comp. Social Science, G. Mason; dissertation on bounded rationality and agent modeling; Co-founder, Scensei;
Dr. Michael Makowsky, Dep't. of Economics, G. Mason, 2008; dissertation on agent modeling of religion; Assoc. Prof. of Economics, Clemson University;
Dr. David Masad, Dep't. of Comp. Social Sci., Mason; dissertation on an agent-based framework for political events; Comp. Soc. Scientist, Booz Allen;
Dr. Will McBride, Department of Economics, George Mason; dissertation on money and free banking; Chief Economist, Tax Foundation;
Dr. Cristina Metgher, Dep't. of Comp. Social Sci., G. Mason; dissertation on agent modeling of cancer epidemiology; Open Cancer Network start-up;
Dr. Ali Naqvi, Dep't. of Economics, New School for Social Res.; dissertation on agent models of disaster response; Vienna Univ. of Economics and Business;
Sanjay Nayar, Computational Social Science, George Mason; dissertation on models of panic at the individual and social levels, in progress;

By field:
CSS: 40
Economics: 24
Policy: 11
Computer sci.: 3
Engineering: 5
Other: 6

Ph.D. Dissertation Committee Service (continued)

By institution:
George Mason: 74
New School for Social Research: 5
George Washington: 3
European universities: 4
Other: 3

Dr. Ana Nelson, Dep't. of Economics, Trinity College Dublin, 2007; dissertation on agent models of firm formation and evolution; Chief Scientist, Cosmify;
Dr. Matthew Oldham, Department of Computational and Data Sciences, George Mason; dissertation on agent-based financial markets;
Dr. Nathan Palmer, Dep't. of Computational Social Science, G. Mason; dissertation on agent-based models of consumption; Federal Reserve Board;
Dr. Claudia Pharis, School of Public Policy, George Mason; dissertation on complexity science and regional development; Founder, Catalyst Institute;
Dr. Thomas Pike, Dep't. of Comp. and Data Sciences, Mason; dissertation on agent tools for defense intelligence analysis; Nat'l. Intelligence University;
Dr. Bianica Pint, Dep't. of Comp. Social Sci, G. Mason; dissertation on agent models of conflict; Virginia Tech Biocomplexity Institute;
Dr. Chenna Reddy, Dep't. of Comp. Social Sci., G. Mason; dissertation on experimental network games; Researcher, American Institutes of Research;
Dr. Elaine Reed, Department of Computational Social Science, George Mason; dissertation on the emergence and evolution of institutions, MITRE Corp.;
Dr. Seyed Mohammad Rizi, Dep't. of Computational Social Science, G. Mason; dissertation on agent modeling of development aid; Co-founder, Scensei;
Dr. Pedro Romero, Department of Economics, George Mason; dissertation on bank runs; Assistant Professor at the University of Quito, Ecuador;
Dr. Rong Rong, Dep't. of Economics, G. Mason; dissertation on experimental game theory; Ass't. Prof. of Resource Economics at the U. of Mass., Amherst;
Dr. Ovi Chris Rouly, Dep't. of Comp. Social Sci., G. Mason; dissertation on cognitively rich agents in small groups using SecondLife; ETH Zurich;
Dr. Ricardo Ruiz, Dep't. of Econ., New School for Social Res., 2003; dissertation on regional development using agents; Prof., Fed. U. of Minas Gerais, Brazil;
Dr. Holly Russo, Dep't. of Comp. Social Sci., G. Mason; dissertation on agent-based computational economics; AI/ML working group;
Dr. Markus Schneider, Department of Economics, New School for Social Research, dissertation on labor; Assistant Professor, University of Denver;
Dr. Ross Schuchard, Dep't. of Comp. and Data Sci., G. Mason; dissertation on the complexity of online environments; Ass't. Prof., Naval Postgraduate School;
John Schuler, Department of Economics, George Mason; dissertation on machine learning and agent-based modeling, in progress;
Dr. Steve Scott, Dep't. of Comp. Social Sci., G. Mason, dissertation on agent modeling for natural resource management; MITRE Corporation;
Dr. Chad Seagren, Dep't. of Econ., G. Mason; dissertation on law and economics using agent-based modeling; Ass't. Prof. of Ops. Res., Naval Postgrad. School;
Dr. Joseph Shaheen, Department of Computational and Data Sciences, George Mason; dissertation on social networks, ORISE post-doc at George Mason;
Brandon Shapiro, Dep't. of Computational and Data Sciences, George Mason; dissertation on complexity ideas applied to national security; in process;
Dr. Chris Shin, Dep't. of Comp. Social Sci., G. Mason, dissertation on economic inequality; Statistician, Food and Drug Administration;
Dr. Walid Sharabati, Department of Computational and Data Sciences, George Mason, dissertation on the evolution of social networks; data scientist;
Dr. Nathanael Smith, Department of Economics, George Mason, dissertation on multi-firm competition; Arkansas Development Finance Authority;

Ph.D. Dissertation Committee Service (concluded)

Dr. Michael Strobel, Department of Economics, George Mason; dissertation on behavioral decision making and retirement; military officer;
Mark Stover, School of Conflict Analysis and Resolution; dissertation on Easter Island using agents, in progress;
Dr. Ryan Sutter, School of Public Policy, George Mason; dissertation on models of regional growth; Staff member, U.S. Department of Labor;
Dr. Davoud Taghawi-Nejad, Department of Economics, University of Torino (Italy); dissertation on an agent modeling framework for economics; Post-doctoral scholar, University of Oxford;
Dr. Daniel Teitelbuam, Department of Engineering and Public Policy, Carnegie Mellon, 1998; dissertation on agent-based modeling of firm behavior;
Russell Thomas, Department of Computational Social Science, George Mason; dissertation on innovation using agent computing, in progress;
Dr. Brian Tivnan, Ed.D., George Washington University, 2006; dissertation on computational organizational models; Chief Engineer for Modeling and Simulation, MITRE Corporation;
Dr. Leanne Ussher, Department of Economics, New School for Social Research, 2004; dissertation on agent modeling of financial markets; Visiting Professor of Economics, Bard College;
Dr. Marcos Valdivia, Department of Economics, New School for Social Research, 2005; dissertation on agent-based models of information economics; Regional Center for Multidisciplinary Research, National University of Mexico;
Dr. Vipin Veetil, Department of Economics, George Mason; dissertation on agent models of inter-firm networks; Ass't. Prof., Indian Inst. of Tech., Madras;
Harold Walbert, Department of Computational Social Science, George Mason; dissertation on social network models of international conflict; in progress;
Dr. Richard Wallick, Dep't. of Economics, G. Mason, 2012; dissertation on Austrian economics and agents; Bureau of Labor Statistics (BLS);
Dr. Jessica Wang, Department of Information Technology, George Mason; dissertation on software piracy, joint supervision with Andrew Loerch;
Dr. Keith Waters, Schar School of Policy and Gov't., G. Mason; dissertation on firm formation and regional economics (jointly supervised with S. Fuller);
Dr. Ermo Wei, Department of Computer Science, George Mason; dissertation on multi-agent learning, machine learning researcher at DropBox;
Dr. Drew Wicke, Department of Computer Science, George Mason; dissertation on resource-bounded task allocation in multi-agent systems, industry;
Brian Wilson, Schar School of Government and Policy, George Mason; dissertation on development policy using agent-based models; in progress;
Dr. Sarah Wise, Department of Comp. Social Science, George Mason; dissertation on geosocial informatics; post-doctoral fellow, University College, London;
Chun-Yi Yang, Department of Computational Social Science; George Mason, dissertation on agent-based macroeconomics, in progress;
Dr. Wayne Zandbergen, Department of Computational Social Science, George Mason; dissertation on the Panic of 1893; serial entrepreneur;
Dr. Ryan Zelnio, School of Public Policy, George Mason; dissertation on innovation systems; Associate Director, Office of Net Technical Assessments;
Dr. Junfu Zhang, Department of Economics, Johns Hopkins University; dissertation on residential segregation; Professor at Clark University.

Careers:
Academia: 27
Government: 8
Industry: 20
FFRDCs: 7
Start-ups: 4
NGOs: 3
Military: 4
Other: 1

Research Funding

Current and recent: Ocean Conservancy, PI, 2014-present, ~$200K of $2 million project; Institute for New Economic Thinking (INET), $250K, co-PI, 2011-13; NSF, Decision-Making Under Uncertainty, $100K, 2010-15; Office of Naval Research, ~ $1 million/ year, PI, 2009-11; NSF Science of Science Policy, ~ $400K, PI, 2009-11; MARS Corporation, ~$100K, PI, 2009-10; NSF Human Social Dynamics, ~ $700K, PI, 2006-2010.

Past: American Legacy Foundation, Carnegie Endowment, Gillman Foundation, Environmental Protection Agency, MacArthur Foundation (to start-up the Center on Social and Economic Dynamics at Brookings with other Center members), NSF IIS, Pew Charitable Trusts, Alex C. Walker Foundation.

Invited Speaker

Recent Plenary and Keynote Talks

Turing Institute (2018), ABM17 (San Diego, 2017), Complexity-Based Analytics and Policies for Social Good (CAPS, Washington, D.C., 2017), Duke Forest Conference (Durham, 2016), Computational Social Science Society of America (Santa Fe, 2015), Complex Systems Society (Tempe, 2015), Santa Fe Institute, 30th Anniversary (Santa Fe, 2014), European Social Simulation Association (ESSA, Warsaw, 2013), European Meeting on Applied Evolutionary Economics (Nice, 2013), Behavior Representation in Modeling and Simulation (BRIMS, Charleston, 2010), Organization Science Winter Meeting (Squaw Valley, 2008), Engineering Societies in the Agents World (Athens, 2007), Northwestern Institute for Complexity (NICO, Evanston, 2007), Complexity 2006 (Aix-en-Provence), Artificial Economies (Lille, 2005), North American Association for Computational Social and Organizational Science (NAACSOS, Notre Dame, 2005), Society for Computational Economics (SCE, Washington, D.C., 2005), Computing in Economics and Finance (CEF, Raleigh, 2003), International Workshop on Agent-based Approaches in Economic and Social Complex Systems (Tokyo, 2002), First UCLA Conference on Agent-based Modeling and Social Complexity (Lake Arrowhead, 2002).

Colleges and Universities

Aix-en-Provence, Arizona, Arizona State, Bath, Bielefeld, Bochum, Boston University, CalTech, Carnegie Mellon, Chicago, Columbia, Cornell, Dartmouth, Duke, Emory, Essex, European University Institute (Florence), Friedrich Schiller University, George Washington, Georgetown, Georgia, Georgia Tech, Hamilton, Harvard, Howard, Illinois, Indiana, Iowa, Iowa State, James Madison, Johns Hopkins, Leicester, Limerick, Lucca, Mallorca, Maryland, MIT, Michigan, Michigan State, Middlebury, Nanyang Technological University (Singapore), New School for Social Research, NYU, Northwestern, Open University (UK), Oxford, Penn, Pisa, Portland State, Princeton, Queen Mary, Quito, Rutgers, Stanford, Strathclyde, SUNY Stony Brook, Sun-Yat Sen (China), Tianjin (China), Trento, Turin, UC Davis, UCLA, UC Santa Barbara, University of Massachusetts-Amherst, UNC Charlotte, São Paulo, Toronto, Trinity College Dublin, Virginia Tech, Vermont, Warsaw, Warwick, Washington (Seattle), Williams, Wisconsin, and Yale.

Research Institutions and Organizations

AAAS, Atalaya Institute (Santa Fe), Atlantic Council, Bionomics Institute, Center for Advanced Study in the Behavioral Sciences (Stanford), Catalyst Institute (DC), Conservation International, Council on Foreign Relations, Environmental Defense Fund (EDF), Esalen Institute, Highlands Forum, Howard Hughes Medical Institute, International Institute for Applied Systems Analysis (IIASA), King Abdullah Petroleum Studies and Research Center (KAPSARC), Lorentz Center (Leiden), MITRE, New England Complex Systems Institute, Perimeter Institute, Public Policy Institute of California (PPIC), RAND, Resources for the Future (RFF), Santa Fe Institute (SFI), School for Advanced Research, Washington Center for Complexity and Public Policy, Washington Area INFORMS (WINFORMS), and World Resources Institute (WRI).

Governmental, International, and Nongovernment Organizations

Air Force Studies Board, Census Department, Chatham House (UK), Center for the Study of Science, Technology and Policy (Bangalore), Defense Advanced Research Projects Agency (DARPA), Department of Agriculture, Department of Commerce, Department of Homeland Security, Environmental Protection Agency (EPA), Federal Reserve Board (Kansas City), Institute for Defense Analyses (IDA), Inter-American Development Bank (IADB), Internal Revenue Service (IRS), International Monetary Fund (IMF), Los Alamos National Laboratory (LANL), National Academies of Science, Engineering and Medicine (NASEM), National Aeronautics and Space Administration (NASA, Ames and Goddard), National Institute for Standards and Technology (NIST), National Institutes of Health (NIH), National Science Foundation (NSF), Naval Research Lab (NRL), Oak Ridge National Laboratory, Ocean Conservancy, Office of Financial Research (OFR), Office of Science and Technology Policy (OSTP), Organization for Economic Cooperation and Development (OECD), Sandia National Laboratory, Smithsonian Institution, and Transportation Safety Administration (TSA).

Foundations

Carnegie Endowment, Howard Gillman Foundation, Hewlett Foundation, John D. and Catherine T. MacArthur Foundation, Markle Foundation, Pew Charitable Trusts, Rockefeller Brothers Fund, Sloan Foundation, and the Alex C. Walker Foundation.

Corporations

Accenture, Bios Group, Alidade Institute, Cap Gemini Ernst & Young, Freddie Mac, Intel, IBM (Watson and Almaden), KPMG, Legg Mason, LMI, Mars, and Monsanto.

Professional Activities

North American Editor of the *Journal of Economic Interaction and Coordination*, Springer, from inception 2006-2012;

Associate Editor of the *Journal of Artificial Societies and Social Simulation* (JASSS), from inception to 2002.

Conference/ Workshop Director/ Organizer

Co-organizer (with J.M. Epstein, Johns Hopkins) of International Congress on Agent Computing, November 2016;

Organizer with Ocean Conservancy officials of a workshop on Modeling Behavior of Individual Commercial Fishers, February 2015;

Co-organizer of joint Santa Fe Institute-Krasnow Institute for Advanced Study short course on Financial Complexity, May 2012, Arlington campus;

Co-organizer (with J.D. Farmer, Santa Fe) of NSF workshop "Agent-Based Modeling of the Financial Crisis," Airlie House, Warrenton, VA, June 2010;

Co-chairman (with C. Cioffi-Revilla, Mason) of the Workshop on Economies of Heterogeneous Interacting Agents (WEHIA), George Mason, June 2007;

Co-director (with L. Tesfatsion, Iowa State) of the Summer School on "Agent-Based Modeling," Computable and Experimental Economics Laboratory, University of Trento, A. Leijonhufvud organizer, July 2006;

Organizer, AAAS Symposium, "Artificial Agent Societies and Social Complexity: A Computational Future for the Social Sciences," Annual Mtg., Denver, 2003;

Co-organizer (with G. Karakoulas, University of Toronto) of NSF-sponsored workshop "Agents in Artificial and Natural Economies," bringing together social scientists who use software agents, with computer scientists who build self-interested agents in multi-agent systems, CSED, Washington, 2001.

Lecturer at Schools for Advanced Students

International Monetary Fund lectures on firm dynamics (January 2017);

Santa Fe Institute Summer School, St. John's College (June 2013, 2016, 2017);

Santa Fe Institute short course on "Exploring Complexity in Social Systems and Economics (2015 and 2016);

Winter School on Macro-Modeling, University of Limerick, Ireland (Feb. 2014);

Introduction to Complexity, Portland State University (May 2010);

Summer School on Complex Systems in the Social Sciences, Warsaw, Poland (September 2006);

CNRS School on "Modélisations et simulations multi-agents de systèmes complexes pour les Science de l'Homme et de la Société: Principes et méthodes de conception et d'usage," Ile de Porquerolles, France (September 2005);

CNRS Summer School on "Models for Complex Systems in the Human and Social Sciences," Ecole Normale Supérieure de Lyon (July 2004);

"First Winter School on the Physics of Socio-Economic Systems," Konstanz, Germany (February 2004);

Summer School on "Adaptive Economic Processes," Computable and Experimental Economics Laboratory, University of Trento, Italy (July 2002).

Institutional Advisory Boards

International Scientific Advisory Council, Waterloo Institute for Complexity & Innovation, University of Waterloo, Canada, 2012-present;

International Advisory Board, Center for Agent Modeling of Dynamic Networks (CABDyN), Oxford University, U.K, 2005 - present.

World Scientific Book Series, *Complex Systems and Interdisciplinary Science*, 2004 – .

Dean's Leadership Council, Carnegie Institute of Technology, Carnegie Mellon University, 2004 - 2006;

External Advisory Board, Program on Social Complexity and Ph.D. Program in Computational Social Science, George Mason University, 2003 – 2006.

Referee/ Reviewer Activity

Journals

Advances in Economics and Business, Algorithmic Finance, American Economic Review, American Political Science Review, American Sociological Review, Berkeley Electronic Journals in Economics, CESifo Economic Studies, Chaos, Complexity, Computational Economics, Computational and Mathematical Organization Theory, Ecological Economics, Ecological Modeling, Economics of Governance, Econometrica, Economic Inquiry, Economics of Governance, Environmental Science and Technology, Environment, Systems and Decisions, ETH Zurich Research Commission, Games and Economic Behavior, Health Economics, Human Ecology, Intelligent Systems in Accounting, Finance, and Management, J of Artificial Societies and Social Simulation, J of Autonomous Agents and Multi-Agent Systems, J of Business Research, J of Computable Economics, J of Conflict Resolution, J of Defense Modeling and Simulation, Journal of Economic Behavior and Organization, J of Economic Dynamics and Control, J of Economic Interaction and Coordination, J of Evolutionary Economics, Journal of Experimental Criminology, J of Infrastructure Systems, J of Management Studies, J of Mathematical Sociology, J of Politics, J of the Royal Society Interface, J of Theoretical Politics, Leadership Quarterly, Management Science, Mathematical Social Sciences, Mind and Society, National Tax Journal, Nature, New Journal of Physics, Physica A, Political Studies, Proceedings of the National Academy of Sciences (USA), Psychological Review, Public Libraryo f Science (PLoS), Quantitative Finance, Rationality and Society, Regional Studies, Research in the History of Economic Thought and Methodology, Review of Austrian Economics, Review of Industrial Organization, Science, Science Advances, Simulation Modeling Practice and Theory, Sociological Methods and Research, Social Networks, *Social Science Computing Reviews, Social Science Quarterly*, and *Sustainability.*

Academic Presses and Publishers

The Brookings Institution Press, Cambridge University Press, Columbia University Press, Imperial College Press, MIT Press, Network for Pluralist Economics (Netzwerk für Plurale Ökonomik), Oxford University Press, Princeton University Press, Stanford University Press, University of Chicago Press, University of Strasbourg Institute for Advanced Study, Wiley, World Scientific.

Conferences

Artificial Life (ALife) VI, Autonomous Agents 1998, Autonomous Agents 1999, Multi-Agent Based Simulation (MABS) 2000, International Joint Conference on Artificial Intelligence (IJCAI) 2001, Workshop on Economies of Heterogeneous Interacting Agents (WEHIA) 2002, Society for Computational Economics (SCE) 2002, MABS 2002, Complexity in Economics 2003, MABS 2003, IJCAI 2003, Autonomous Agents and Multi-Agent Systems (AAMAS) 2004, Trading Agent Competition 2004, Massive Multi-Agent Systems (MMAS) 2004, AAMAS 2005, Collective Formation and Self-Organization in Biological and Social Systems 2005, Systems Dynamics Society 2005, Fluctuations and Noise in Finance and Economics (2005), AAMAS 2006, MABS 2006, MMAS 2006, Complexity in Economics 2006, SCE 2006, Artificial Economics 2006, NAACSOS 2007, AAMAS Workshop on Emergent Intelligence of Networked Agents (WEIN) 2007, Second World Congress on Social Simulation 2008, AAMAS 2009, MABS 2009, Computational Social Science Society of America (CSSSA) 2011, MABS 2014, Fifth World Congress on Social Simulation 2014, AAMAS 2016, MABS 2016, AAMAS 2017.

Research Organizations

Austrian Research Agency, Central European University, Department of Energy (DOE), Economic and Social Research Council (ESRC, UK), Engineering and Physical Sciences Research Council (EPSRC, UK), European Research Commission, Comision Nacional de Investigacion Cientifica y Yechnologica (Chile), French National Research Agency (ANR), National Institutes of Health (NIH), National Science Foundation (NSF), Netherlands Research Council (NWO), Pew Charitable Trusts, the Sloan Foundation, and the Swiss Research Agency for Technology and Information.

Current Research

'Full-scale' models of markets, firms, and cities by incorporating administrative and other 'big data' into agent-based computational codes; parallel execution of the resulting large models; analysis and estimation of such models;

Evolution of technology, science policy, and specification of agents from laboratory experiments; machine learning techniques for multi-agent systems.

Awards

"Software of the Year" award from *Byte* magazine's Jerry Pournelle/'Chaos Manor' for Sugarscape;
Growing Artificial Societies nominated for award by the Peace Science Society;
Best paper award, *Tech. Forecasting and Social Change* (with R.U. Ayres), 1996;
Andrew Carnegie Fellow, Carnegie Mellon University, 1991-1992;
Insignis Scholar, University of Detroit, 1978-1983.

Software

Manager of the Ascape development project (M. Parker software engineer), a native Java framework for the creation of agent-based models in software (www.brookings.edu/es/dynamics/models/ ascape/main.htm); distributed freely to academic users and licensed commercially by Brookings;

Architect, developer and manager of the Sugarscape computer code, 20K lines of object-oriented code that served as the basis of the *Growing Artificial Societies* book and CD-ROM (www.brookings.edu/es/dynamics/sugarscape/default.htm); distributed freely to academic users and licensed commercially by Brookings.

Dissertation

"Theory of Model Aggregation for Dynamical Systems with Application to Problems of Global Change" (Advisor: G.J. McRae; Committee: L. Lave, M.G. Morgan and M.J. Small).

Courses Taught

George Mason University: 23 semesters
- CDS 205 — Introduction to Agent-Based Modeling and Simulation;
- CSS 600 — Introduction to Computational Social Science;
- CSS 610/CSI 709/ECON 895/EVPP 741/GEOG 590/PUAD 749/SOCI 599 – Agent-Based Modeling and Simulation in the Social Sciences;
- CSS 650 — Exactly Solvable Models in the Social Sciences;
- CSS 695/ECON 895 — Agent-Based Computational Economics;
- CSS 739/ECON 895 — Mathematical Foundations of Agent Systems;
- CSS 739/ECON 895 — Game Theory: Rational, Behavioral, Evolutionary and Computational;
- CSS 739 — Advanced Agent-Based Computing in the Social Sciences.

Middlebury College: 1 semester
- CSCI/ECON 0494 – Complexity and Social Systems;
- Interdisciplinary Faculty Colloquium on Complex Adaptive Systems;

The New School for Social Research: 1 semester
- GECO 6200 – Graduate Microeconomics I;
- GECO 6335 – Research Workshop in Economic Theory and Modeling;
- COSC 412 – Computational Economics;

The Johns Hopkins University: 2 semesters
- 180.316 – Computational Methods in the Social Sciences.

Professional Society Affiliations

American Association for the Advancement of Science (AAAS);
American Economic Association (AEA);
Association for Computing Machinery (ACM);
Econometric Society (ES);
Economic Science Society for Heterogeneous Interacting Agents (ESHIA);
Institute for Electrical and Electronic Engineers (IEEE)
Society for Computational Economics (SCE).

Media Exposure

Business press

Atlantic Monthly (multiple times), *Chronicle of Higher Education* (7/96, 7/98), *Die Zeit* (in German), *Focus* (in German), *New Yorker*, *Washington Post Sunday Magazine*, and *Wirtschafts Woche* (in German).

Science press

Economist (multiple times), *Fast Company*, *Harvard Business Review* (5/01, 3/02), and *Le Temps Strategique* (in French).

Computer press

Discover, *Nature* (9/01, 10/10/02, 8/6/09, 3/31/11), *New Scientist* (10/97, 10/04), *Science* (11/96, 9/01), *Science News* (11/96, 3/98, 10/01, 9/02), *Scientific American* (11/94, 2/97, 7/05), *Scientific American Archaeology*, and *Technology Review*.

Interview

Byte, *Computers in Physics*, *Dr. Dobb's Journal*, and *Wired* (many times).

Newspapers

D. Colander, R. Holt and J.B. Rosser, Jr., eds., *The Changing Face of Economics: Conversations with Cutting Edge Economists* (University of Michigan Press, 2004).

Radio

Boston Globe, *Detroit Free Press*, *Financial Times*, *Los Angeles Times*, *Wall Street Journal*, and the *Washington Post*.

Online media

NPR's Soundprint show "Digital Darwinism," and BBC News.

Bloomberg.com (Mark Buchanan, 2013, www.bloomberg.com/news/2013-04-07/beware-of-economists-peddling-elegant-models.html), *Business 2.0*, *Discovery Online*, *Nature Online*, *Science NetLinks*, and *United Press International* (www.upi.com/view.cfm?StoryID=10052002-045657-6167r).

Museum Installation

Mannheim Landesmuseum fur Technik und Arbeit, exhibit entitled "Bionik – Zukunftstechnik lernt von der Natur".

Consulting

BAE Systems (Arlington, Virginia), Bios Group (Santa Fe), Cap Gemini Ernst & Young - Center for Business Innovation (Cambridge, Mass.), Department of Defense, Insight Policy Research (Arlington, Virginia), Logistics Management International (McLean, Virginia), MARS Corporation, MITRE, Monitor Networks, NuTech Solutions (Charlotte, N.C.), Sandia National Labs, State of Indiana Business Development Office, Techno-Venture Management (Cambridge, Mass.), USDA SNAP Program.

Contact Information

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