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EDUCATION

1988: Ph.D., Economics, The Johns Hopkins University
1987: M.A., Economics, The Johns Hopkins University
1984: B.S., Operations Research & Industrial Engineering, Cornell University

PRINCIPAL ACADEMIC APPOINTMENTS

2018-Present: Associate Dean, College of Liberal Arts and Social Sciences, Cleveland State University
2004-Present: Professor, Department of Economics, Cleveland State University
1989-Present: Graduate Faculty, Cleveland State University
2015-2018: Director, Master of Arts in Economics Program, Cleveland State University
2004-2015: Chairman, Department of Economics, Cleveland State University
1993-2004: Associate Professor, Department of Economics, Cleveland State University
1988-1993: Assistant Professor, Department of Economics, Cleveland State University

SHORTER-TERM ACADEMIC APPOINTMENTS

1-6/1999: Visiting Associate Professor, Owen Graduate School of Management, Vanderbilt University
1-6/1995: Visiting Associate Professor, Department of Economics, The Johns Hopkins University

PROFESSIONAL ACTIVITIES

Editorial positions

2016-Present: Member, Advisory Board, *Preprints* (MDPI)
2015-Present: Member, Editorial Board, *Administrative Sciences* (MDPI)
2012-2014: Guest Editor, Special Issue on “Computational Organization Theory,”
Administrative Sciences

Advisory and review committees

2018: Member, Scientific Program Committee, Fifth International Conference on Behavioral, Economic, Socio-Cultural Computing (BESC 2018): Kaohsiung, Taiwan

- 2018: Member, Scientific Program Committee, Conference on Complex Systems (CCS 2018), Complex Systems Society: Thessaloniki, Greece
- 2018: Member, Scientific Program Committee, Ninth International Conference on Complex Systems (ICCS 2018): Cambridge, MA, USA
- 2017: Member, Scientific Program Committee, Fourth International Conference on Behavioral, Economic, Socio-Cultural Computing (BESC 2017): Krakow, Poland
- 2017: Member, Scientific Program Committee, Conference on Complex Systems (CCS 2017), Complex Systems Society: Cancun, Mexico
- 2016: Member, Scientific Program Committee, Third International Conference on Behavioral, Economic, Socio-Cultural Computing (BESC 2016): Durham, North Carolina
- 2015: Member, Scientific Program Committee, Second International Conference on Behavioral, Economic, Socio-Cultural Computing (BESC 2015): Nanjing, China
- 2007: Member, Davidson Fellows Review Committee, Davidson Institute
- 2007: Member, Grant Review Panel, *Human and Social Dynamics* Program, National Science Foundation
- 2006: Member, Selection Committee for Doctoral Student Research Paper Competition, North American Association for Computational Social and Organizational Science (NAACSOS)
- 2006: Member, Davidson Fellows Review Committee, Davidson Institute
- 2006: Member, International Scientific Committee, Third Workshop of Society for Computational Economics on *Complex Behavior in Economics: Modeling, Computing, and Mastering Complexity*: Aix-en-Provence, France
- 2004: Member, Grant Review Panel, *Human and Social Dynamics* Program, National Science Foundation
- 2003: Member, International Scientific Committee, Second Workshop of Society for Computational Economics on *Complex Behavior in Economics: Modeling, Computing, and Mastering Complexity*: Aix-en-Provence, France

RESEARCH GRANTS AND AWARDS

- 2008-2011: Faculty Research Development Grant for *A Computational Model of Industry Evolution*, Cleveland State University
- 2000-2002: National Science Foundation Research Grant (SES-0078752) for *Computational Modeling of Multi-Level/Multi-Unit Organizations*, Co-Principal Investigator (joint with Joseph E. Harrington, Jr.)
- 1989-1990: Research and Creative Activities Grant for *Exclusive Dealing Contracts and Market Foreclosure*, Cleveland State University
- 6-8/1989: Research Challenge Grant, Cleveland State University

UNIVERSITY SERVICE (recent years only; departmental activities not included)

- 2015-Present: CLASS Research Advisory Board
- 2016: Search Committee for Associate Vice President for Research
- 2011-2012: Program Review Committee for University Honors Program (Chair)

- 2010-2011: CLASS Program Review Committee for Communications, Drama, and Music
 2010-2011: CLASS Dean's Advisory Committee
 2006-2008: CLASS Dean's Advisory Committee
 2007: Evaluation of the Proposed Ph.D. Program in *Spatially Integrated Social Science (SISS)* at University of Toledo (on behalf of the College of Graduate Studies)
 2005-2006: Search Committee for CLASS Associate Dean (Chair)
 2003-2007: University Graduate Council
 2002-2007: University Instructional Media Services Committee
 2003-2004: Arts & Sciences Program Review Committee for Sociology, Health Sciences, and Physics
 2002-2003: CSU *Reflections & Visions* Project (Co-founder) – joint with David Richardson (English) and Vijay K. Mathur (Economics)

TEACHING EXPERIENCE

- 1988-Present: Cleveland State University
Industrial Organization (BA)
Principles of Microeconomics (BA)
Intermediate Microeconomics (BA)
Public Regulation of Business (BA)
Managerial Economics (BA)
Game Theory & Business Strategy (BA)
Game Theory and Social Science (BA, Honors)
Game Theory and Strategic Behavior (BA)
Industrial Organization (MA)
Competition & Strategy (MA)
Economic Concepts (MBA)
Microeconomics (MBA)
Managerial Economics (MBA)
- 1999: Vanderbilt University (Owen Graduate School of Management)
Game Theory & Business Strategy (MBA)
- 1995: Johns Hopkins University
Elements of Microeconomics (BA)
Economics of Regulation (BA)

RESEARCH INTERESTS

Agent-Based Modelling, Antitrust Law and Economics, Competition Policy, Competitive Strategy, Computational Economics, Epidemiology, Industrial Organization, Industry Dynamics, Infectious Diseases, Mathematical and Computational Modeling, Microeconomic Theory, Modeling Social and Behavioral Dynamics, Organization Theory, Social Norms, Social Network Theory

PUBLICATIONS

Book

2015 *A Computational Model of Industry Dynamics*. London: Routledge, 2015.

Articles

2018 “Computational Industrial Economics: A Generative Approach to Dynamic Analysis in Industrial Organization,” in: Shu-Heng Chen, Mak Kaboudan, and Ye-Rong Du, eds., *Oxford Handbook of Computational Economics and Finance*, New York: Oxford University Press, 2018, 594-634.

2015 “Competition Policy,” in: David J. Teece and Mie Augier, eds., *The Palgrave Encyclopedia of Strategic Management*, London: Palgrave Macmillan, 2015.

(<http://www.palgraveconnect.com/esm/doifinder/10.1057/9781137294678.076>

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2015 “When Can We Expect a Corporate Leniency Program to Result in Fewer Cartels?” (with Joseph E. Harrington, Jr.), *Journal of Law and Economics*, 58 (2015), 417-449.

2013 “Individual Learning and Social Learning: Endogenous Division of Cognitive Labor in a Population of Co-evolving Problem-Solvers,” (with Joseph E. Harrington, Jr.), *Administrative Sciences*, 3 (2013), 53-75 [Special issue on *Computational Organization Theory*]

2011 “Emergent Social Learning Networks in Organizations with Heterogeneous Agents,” *Advances in Complex Systems*, 14 (2011), 169-199

2011 “Entry, Exit, and the Endogenous Market Structure in Technologically Turbulent Industries,” *Eastern Economic Journal*, 37 (2011), 51-84 [Symposium Issue on *Agent-Based Computational Economics*]

2011 “Agent-Based Modeling and Computational Experiments in Industrial Organization: Growing Firms and Industries *in silico*,” *Eastern Economic Journal*, 37 (2011), 28-34 [Symposium Issue on *Agent-Based Computational Economics*]

2009 “Modeling the Birth and Death of Cartels with an Application to Evaluating Competition Policy,” (with Joseph E. Harrington, Jr.), *Journal of the European Economic Association*, 7 (2009), 1400-1435

2009 “Industry Dynamics with Knowledge-Based Competition: A Computational Study of Entry and Exit Patterns,” *Journal of Economic Interaction and Coordination*, 4 (2009), 73-114

- 2007 “Innovators, Imitators, and the Evolving Architecture of Problem-Solving Networks,” (with Joseph E. Harrington, Jr.), *Organization Science*, 18 (2007), 648-666
- 2007 “Decentralization,” in: Stewart Clegg and James R. Bailey, editors, *International Encyclopedia of Organization Studies*, Volume 1, SAGE Publications, Thousand Oaks, CA, 2007, 359-362
- 2006 “Agent-Based Models of Organizations,” (with Joseph E. Harrington, Jr.), in: Leigh Tesfatsion and Kenneth L. Judd, eds., *Handbook of Computational Economics II: Agent-Based Computational Economics*, Elsevier, 2006, 1273-1337
- 2005 “Discovery and Diffusion of Knowledge in an Endogenous Social Network,” (with Joseph E. Harrington, Jr.), *American Journal of Sociology*, 110 (2005), 937-976
- 2005 “Co-Evolution of Firms and Consumers and the Implications for Market Dominance,” (with Joseph E. Harrington, Jr.), *Journal of Economic Dynamics and Control*, 29 (2005), 245-276
- 2004 “Organization of Innovation in a Multi-Unit Firm: Coordinating Adaptive Search on Multiple Rugged Landscapes,” (with Joseph E. Harrington, Jr.), in: William Barnett, Christophe Deissenberg, and Gustav Feichtinger, editors, *Economic Complexity: Non-linear Dynamics, Multi-agents Economies, and Learning*, International Symposia on Economic Theory and Econometrics, Vol. 14, 2004, Elsevier, Amsterdam, 189-214
- 2003 “Multi-Market Competition, Consumer Search, and the Organizational Structure of Multi-Unit Firms,” (with Joseph E. Harrington, Jr.), *Management Science*, 49 (2003), 541-552
- 2002 “Decentralized Business Strategies in a Multi-Unit Firm,” (with Joseph E. Harrington, Jr.), *Annals of Operations Research*, 109 (2002), 77-98
- 2000 “Centralization vs. Decentralization in a Multi-Unit Organization: A Computational Model of a Retail Chain as a Multi-Agent Adaptive System,” (with Joseph E. Harrington, Jr.), *Management Science*, 46 (2000), 1427-1440
- 1998 “Product Switching Cost and Strategic Flexibility,” *Journal of Economics and Management Strategy*, 7 (1998), 461-488
- 1997 “Organizational Structure and Firm Innovation in a Retail Chain,” (with Joseph E. Harrington, Jr.), *Computational and Mathematical Organization Theory*, 3 (1997), 267-288

- 1996 “The Interactive Effect of Product Differentiation and Cost Variability on Profit,” (with Joseph E. Harrington, Jr.), *Journal of Economics and Management Strategy*, 5 (1996), 175-193
- 1993 “Flexible Manufacturing, Uncertain Consumer Tastes, and Strategic Entry Deterrence,” *Journal of Industrial Economics*, XLI (1993), 77-90
- 1992 “Inter-temporal Product Choice and Its Effects on Collusive Firm Behavior,” *International Economic Review*, 33 (1992), 773-793
- 1992 “Exclusive Dealing Contracts in a Successive Duopoly with Side Payments,” *Southern Economic Journal*, 59 (1992), 180-193
- 1991 “The Effects of Product Differentiation on Collusive Pricing,” *International Journal of Industrial Organization*, 9 (1991), 453-469
- 1988 “The Effects of Irreversible Investment in Durable Capacity on the Incentive for Horizontal Merger,” (with Joseph E. Harrington, Jr.), *Southern Economic Journal*, 55 (1988), 443-453

Book reviews

- 2013 Review of *Game Theory: A Nontechnical Introduction to the Analysis of Strategy* by Roger A. McCain, *Eastern Economic Journal*, 39 (2013), 267-269

WORKING PAPERS

- 2018 “Spatially Heterogeneous Vaccine Coverage and Externalities in a Computational Model of Epidemics” (with Troy Tassier), April 2018
- 2018 “A Dynamic Computational Model of Social Stigma” (with Joseph E. Harrington, Jr.), April 2018
- 2015 “A Non-Equilibrium Theory of Merger Waves,” April 2015
- 2014 “Non-Equilibrium Dynamics in the Evolution of Industries: A Computational Study,” June 2014
- 2013 “Cyclical Industrial Dynamics in a Model of Schumpeterian Competition with Fluctuating Demand,” April 2013
- 2012 “Muddling through the Gales of Creative Destruction: A Non-Equilibrium Computational Model of Schumpeterian Competition,” September 2012
- 2012 “A Note on the Dynamics of Firm Turnovers in the East Liverpool (Ohio) Pottery Industry, 1825-2010,” May 2012

- 2010 “The Impact of a Corporate Leniency Program on Antitrust Enforcement and Cartelization” (with Joseph E. Harrington, Jr.), February 2009 [Revised: April 2010]
- 2007 “Partition and Delegate: A Computational Algorithm for Generating Nested Organizational Hierarchies with a Fixed Number of Tasks,” June 2007
- 2001 “Co-Evolution of Firms and Consumers and the Implications for Market Dominance,” (with Joseph E. Harrington, Jr.), *Center on Social and Economic Dynamics Working Paper Series No. 23*, The Brookings Institution, October 2001
- 2000 “Centralization vs. Decentralization in a Multi-Unit Organization: A Computational Model of a Retail Chain as a Multi-Agent Adaptive System,” (with Joseph E. Harrington, Jr.), *Santa Fe Institute Working Paper 00-02-010*, 2000

REFEREE/REVIEWER ACTIVITIES

- Journals: *Administrative Sciences, American Economic Review, American Journal of Sociology, Annals of Operations Research, Canadian Journal of Economics, Central European Journal of Operations Research, Computational Economics, Computational Management Science, Computational and Mathematical Organization Theory, Eastern Economic Journal, Ecology and Society, Economic Journal, Economic Inquiry, Economic Theory, European Economic Review, Economics (e-journal), International Economic Review, International Journal of Industrial Organization, Journal of Artificial Societies and Social Simulation, Journal of Economic Behavior and Organization, Journal of Economic Dynamics and Control, Journal of Economic Interaction and Coordination, Journal of Economics and Business, Journal of Economics and Management Strategy, Journal of Economic Theory, Journal of Industrial Economics, Management Science, Managerial and Decision Economics, Marketing Science, Metroeconomica, Organization Science, Quarterly Journal of Business and Economics, RAND Journal of Economics, Review of Economic Studies, Review of Industrial Organization, Scandinavian Journal of Economics, Southern Economic Journal, Strategy Science, Zeitschrift Für Nationalökonomie*
- Publishers: Cambridge University Press, Harper Collins Publishers, John Wiley & Sons, Inc., Addison Wesley Longman, Prentice Hall, MIT Press, Stanford University Press, W. W. Norton & Company
- Foundations: Israel Science Foundation (Israel)
National Science Foundation (USA)
- Tenure-
Promotion Rutgers University, Newark
Fordham university
- Reviews: University of Akron
Binghamton University

GRADUATE ADVISING – DOCTORAL DISSERTATIONS (recent years only)

- Completed: Dissertation Committee Member, Terrence Motsi, *The Influence of Stereotypes on Country and Product Country Image: A Social Identity and Consumer Culture Theory Approach*. August 11, 2016, Cleveland State University. [Position: Assistant Professor, Business and Nonprofit Management, Earlham College]
- Completed: Dissertation Committee Member, Mikhail Oet, *Financial Stress in an Adaptive System: From Empirical Validity to Theoretical Foundations*. March 5, 2016, Case Western Reserve University. [Position: Economist, BNY Mellon]

SEMINARS AND CONFERENCE PRESENTATIONS (since 1999)

- 3/2018: 44th Eastern Economic Association Annual Conference, Boston, Massachusetts, “A Computational Network Model of Epidemics: Implications of Spatial Heterogeneity in Vaccination Coverage”
- 2/2017: 43rd Eastern Economic Association Annual Conference, New York City, New York, “The Social Dynamics of Stigma”
- 11/2016: International Congress on Agent Computing, George Mason University, Fairfax, Virginia, “The Social Dynamics of Stigma”
- 11/2016: 7th Northeast Ohio Economics Workshop, Cleveland State University, Cleveland, Ohio, “The Social Dynamics of Stigma”
- 2/2015: 41st Eastern Economic Association Annual Conference, New York City, New York, “A Non-Equilibrium Theory of Merger Waves”
- 5/2013: 39th Eastern Economic Association Annual Conference, New York City, New York, “On Cyclical Industrial Dynamics: Schumpeterian Competition with Fluctuating Demand”
- 6/2012: 18th International Conference on Computing in Economics and Finance, Society for Computational Economics, Prague, Czech Republic, “Muddling through the Gales of Creative Destruction: A Non-Equilibrium Computational Model of Schumpeterian Competition”
- 6/2012: 17th Workshop on Economic Heterogeneous Interacting Agents (WEHIA), University of Pantheon-Assas, Paris II, Paris, France, “Computational Industrial Economics: A Generative Approach to Dynamic Analysis in Industrial Organization”
- 3/2012: 38th Eastern Economic Association Annual Conference, Boston, Massachusetts, “Muddling through the Gales of Creative Destruction: A Non-Equilibrium Computational Model of Schumpeterian Competition”
- 4/2011: 9th Annual International Industrial Organization Conference, Boston, Massachusetts, “Schumpeterian Competition with Myopic but Adaptive Firms: Endogenous R&D and Industrial Structure”
- 2/2011: 37th Eastern Economic Association Annual Conference, New York City, New York, “A Computational Model of Schumpeterian Competition with Myopic but Adaptive Firms”

- 7/2010: 16th International Conference on Computing in Economics and Finance, Society for Computational Economics, London, England, “Entry, Exit, and the Endogenous Market Structure in Technologically Turbulent Industries”
- 5/2010: 8th Annual International Industrial Organization Conference, University of British Columbia, Vancouver, Canada, “Entry, Exit, and the Endogenous Market Structure in Technologically Turbulent Industries”
- 5/2010: International Workshop on Emergent Intelligence on Networked Agents (WEIN 2010), Toronto, Canada, “Emergent Social Learning Networks in Organizations with Heterogeneous Agents”
- 4/2010: Department of Economics, Youngstown State University, “Entry, Exit, and the Endogenous Market Structure in Technologically Turbulent Industries”
- 3/2010: Midwest Economics Association Conference 2010, Evanston, Illinois, “Firm Turnovers and the Endogenous Market Structure in Technologically Turbulent Industries with Heterogeneous Firms”
- 9/2009: Department of Economics, Kent State University, “Firm Turnovers and the Endogenous Market Structure in Technologically Turbulent Industries with Heterogeneous Firms”
- 7/2007: The 25th International Conference of the System Dynamics Society, Boston, Massachusetts, “Non-Equilibrium Industry Dynamics with Knowledge-Based Competition: An Agent-Based Computational Model”
- 2/2007: Eastern Economic Association Annual Conference, New York City, New York, “Non-Equilibrium Industry Dynamics with Knowledge-Based Competition: An Agent-Based Computational Model”
- 9/2006: Third Conference on *Mathematical Methods in Counter-Terrorism*, The Institute of World Politics, Washington, D.C., “Discovery and Diffusion of Knowledge in an Endogenous Social Network”
- 5/2006: Third International Meeting of *Complexity 2006*, Aix-en-Provence, France, “Individual Learning and Social Learning: Endogenous Division of Cognitive Labor in a Population of Co-evolving Problem-Solvers” (Invited Session, Session Organizer, Session Chair)
- 11/2005: Annual Meeting of the *Southern Economic Association*, Washington, D.C., “Innovators, Imitators, and the Evolving Architecture of Social Networks”
- 7/2005: *Social Network Analysis: Advances & Empirical Applications*, Oxford University, England, “Innovators, Imitators, and the Evolving Architecture of Social Networks”
- 6/2005: *North American Association for Computational Social and Organizational Science* Conference, University of Notre Dame, “Innovators, Imitators, and the Evolving Architecture of Social Networks”
- 5/2004: *Handbook of Computational Economics* Conference, Center for the Study of Complex Systems, University of Michigan, “Agent-Based Models of Organizations”
- 10/2003: DePaul University, Department of Economics, “Discovery and Diffusion of Knowledge in an Endogenous Social Network”
- 5/2003: Second Workshop of the Special Interest Group on Economic Dynamics (Society for Computational Economics) on *Complex Behavior in Economics: Modeling, Computing, and Mastering Complexity*, Aix-en-Provence, France, “Discovery and Diffusion of Knowledge in an Endogenous Social Network”

- 6/2002: Computational and Mathematical Organization Theory Conference, Carnegie Mellon University, “Innovation versus Imitation in Stochastic Social Networks with Decentralized Reinforcement Learning”
- 5/2002: Lake Arrowhead Conference on Computational Social Science and Social Complexity, UCLA, “Learning from the Competition: External Spillovers and the Organizational Structures of Competing Multi-Unit Firms”
- 1/2002: North American Winter Meetings of the Econometric Society, Atlanta, GA, “Multi-Market Competition, Consumer Search, and the Organizational Structure of Multi-Unit Firms”
- 9/2001: Conference on *Managing Knowledge in Organizations: Creating, Retaining, and Transferring Knowledge*, GSIA, Carnegie Mellon University, “Consumer Search, Competition, and the Organizational Structure of Multi-Unit Firms”
- 6/2001: 7th International Conference of the Society of Computational Economics, Yale University, “Consumer Search, Competition, and the Organizational Structure of Multi-Unit Firms”
- 8/2000: World Congress of the Econometric Society, University of Washington (Seattle), “Centralization vs. Decentralization in a Multi-Unit Organization: A Computational Model of a Retail Chain as a Multi-Agent Adaptive System”
- 7/2000: Computational Social and Organizational Science Conference, Carnegie Mellon University, “Competition and the Organizational Structure of Multi-Unit Firms”
- 5/2000: *Complex Behavior in Economics* workshop, Aix-en-Provence, France, “Centralization vs. Decentralization in a Multi-Unit Organization: A Computational Model of a Retail Chain as a Multi-Agent Adaptive System”
- 6/1999: Society for Computational Economics Conference, Boston College, “Organizational Structure and Perpetual Innovation: A Computational Model of a Retail Chain”
- 5/1999: Computational and Mathematical Organization Theory Workshop, INFORMS (Institute for Operations Research and the Management Sciences) 1999 Meetings, Cincinnati, OH, “Organizational Structure and Perpetual Innovation: A Computational Model of a Retail Chain”
- 1/1999: Owen Graduate School of Management, Vanderbilt University, “Organizational Structure and Perpetual Innovation: A Computational Model of a Retail Chain”

MISCELLANEOUS

- 12/2010: Invited Lecture, “Collective Action in Large Groups,” Cuyahoga Community College – West Campus
- 4/2010: Invited Lecture, “Computational Modeling and Analysis in Economics,” Annual Lecture Series, *Ways of Knowing*, College of Liberal Arts and Social Sciences, Cleveland State University
- 1/2010: Invited Lecture, “Game Theory and Economics: Individual Choices and Social Consequences,” Scholars in STEM (Science, Technology, Engineering, and Mathematics) Program, Cleveland State University