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CARNEGIE MELLON UNIVERSITY and

SANTA FE INSTITUTE

VITAE

NAME **John Howard Miller**

ADDRESS

Carnegie Mellon University
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EDUCATION

Ph.D., Economics, University of Michigan, 1988.
M.A., Economics, University of Michigan, 1984.
B.A., Economics, with Distinction, University of Colorado, 1982.
B.S., Finance, Cum Laude, University of Colorado, 1982.

RESEARCH INTERESTS

Economic and game theory, complex adaptive social systems, auction markets, cooperation, experimental and behavioral economics, and adaptive computation.

ACADEMIC POSITIONS

Professor of Economics and Social Science, Department of Social and Decision Sciences (SDS) (and Tepper School of Business, by courtesy), Carnegie Mellon University (CMU), 2000 to present.
Associate Professor of Economics and Decision Sciences, SDS (and Tepper, by courtesy), CMU, 1995 to 1999.
Assistant Professor of Economics and Decision Sciences, SDS (and Tepper, by courtesy), CMU, 1990 to 1994.
Research Professor, Santa Fe Institute, 2003 to 2011.
External Professor, Santa Fe Institute, 1989 to 2002, 2012 to present.
Post-doctoral Fellow, Santa Fe Institute, 1988 to 1990.

ADMIN. POSITIONS

Chair, Science Steering Committee (and *ex officio* Board of Trustees and Science Board), Santa Fe Institute, 2015 to present.
Director of Graduate Studies, SDS, CMU, 2020 to present.
Faculty Director, Omidyar Fellows Program, SFI, 2012 to 2019.
Head, SDS, CMU, 2002 to 2014 (Acting Head, 2002-5).
Interim Vice President, Santa Fe Institute, 2004 to 2005.
Head, Information Systems Program (and Major prior to 2000), CMU, 1998 to 2001.
Director (and cofounder with J. Holland) of the program in Adaptive Computation, Santa Fe Institute, 1990 to 1992. Directorate, 1992 to 1999.

FELLOWSHIPS AND HONORS

Elliot Dunlap Smith Award for Distinguished Teaching and Educational Service, College of Humanities and Social Sciences, CMU, 1995.
Post-doctoral Fellowship, Santa Fe Institute, 1988 to 1990.
NICHD Graduate Fellowship in Economic Demography, 1983 to 1987.
Val B. Fischer Award in Social Sciences, University of Colorado, 1982.

TEACHING AND RESEARCH EXPERIENCE

Cofounder, codirector, and faculty member for the annual *Graduate Workshop in Computational Social Science and Complexity*, Santa Fe, New Mexico, 1995 to present (2020 cancelled due to COVID).

Teaching, SDS, CMU, 1990 to present. Courses in game theory, principles of economics and social decision making (laboratory-based), intermediate microeconomics and policy analysis, empirical research methods, complex adaptive social systems, senior project course (joint with Engineering and Public Policy), and graduate research.

Post-doctoral Fellow, Santa Fe Institute, Santa Fe, New Mexico, 1988 to 1990.

Teaching Assistant, Department of Economics, University of Michigan, 1987 to 1988 (core graduate microeconomic theory courses under H. Varian and L. Blume).

Research Fellow, Economic Demography Training Program, University of Michigan, Population Studies Center, 1983 to 1987.

Editorial Assistant and Reviewer, 1985 to 1986 (reviewed, edited, proof-read, and developed questions for H. Varian, *Intermediate Microeconomics: A Modern Approach* (Norton, 1987), and created questions and answers for T. Bergstrom and H. Varian, *Workouts in Intermediate Microeconomics* (Norton, 1987)).

Research Assistant, Department of Economics, University of Michigan, 1985 (under T. Bergstrom).

Teaching Assistant, Department of Economics, University of Michigan, 1983, and Department of Economics, University of Colorado, 1981 to 1982.

Researcher, Office of Energy Conservation, State of Colorado, 1981 to 1983.

ADDITIONAL INFORMATION

Founding and Executive Editor, *Primers in Complex Systems*, Princeton University Press and SFI (2007 to present). Current published volumes: *Viruses as Complex Adaptive Systems*, Ricard Sole and Santiago F. Elena (2019); *Natural Complexity*, Paul Charbonneau (2017); *Spin Glasses and Complexity*, Dan Stein and Chalres Newman (2013); *Phase Transitions*, Ricard Sole (2011); *Diversity and Complexity*, Scott Page (2011); and *Ant Encounters*, Deborah Gordon (2010).

Advisory Board, Center for Complexity in Business, University of Maryland, 2008 to 2017.

International Monitoring Panel, German Federal Ministry of Education and Research (BMBF), 2008 to 2016.

Editorial Board, Santa Fe Institute (1999 to present).

Editorial Board, *International Journal of Complexity in Leadership and Management* (2008 to present).

Associate Editor, *Journal of Economic Behavior and Organizations* (1996–2004).

Associate Editor, *Journal of Computational Economics* (1997 to present).

Editorial Board, *Journal of Evolutionary Economics* (1998 to 2022).

Referee for *American Economic Review, American Political Science Review, BioScience, Complexity, Complex Systems, Computational Economics, Econometrica, Economic Behavior and Organization, Economic Dynamics and Control, Economic J., Evolutionary Economics*, *Games and Economic Behavior, ICGA, IEEE, Intl. J. of Game Theory, J. of Economics, J. of Econometrics, J. of Economic Education, J. of Economic Literature, J. of Political Economy, J. of Theoretical Biology, J. of Theoretical Politics,* National Science Foundation, *Nature PhysicaD*, *PNAS*, *Science*, and Social Sciences and Humanities Research Council of Canada.

Cofounded and coorganized a workshop on "Computational Political Economy" (with K. Kollman and S. Page), NSF, Ann Arbor, MI, Fall, 1998.

Cofounded and coorganized workshops on "Theoretical Computation in Economics" (with M. Boldrin) and "Adaptive Computation" (with J. Holland), Santa Fe Institute, Santa Fe, New Mexico, Spring 1992.

Invited lecturer, Summer School on Complex Systems Analysis, Santa Fe, New Mexico, 1989–91, 1995-1998, 2006. Full lecture series in 1995 and 1998.

RESEARCH GRANTS

High Throughput Screening Program Gulf Coast Consortia (subproject Combinatorial Drug Discovery Program, $4.5M, with Cliff Stephan and Ralph Zinner). Cancer Prevention and Research Institute of Texas, 2011–16, $12.6M.

Workshop in Collective Decision Making (SFI, PI with Nigel Franks and Tom Seeley). SFI, 2009, $45,000.

Austronesian Societies: Reading Social Structure from the Genome (U. Arizona and SFI, co-PI with four others). NSF, 2004 to 2007, $681,934.

Creating a New Paradigm for Online Education (CMU, co-PI with four others). Hewlett Foundation, 2002 to 2005, $1.9M. The grant served as the start of CMU's Open Learning Initiative, which is ongoing and funded by a variety of sources.

Collaborative Research on Computational Political Economy (CMU and U. of Michigan, co-PI with K. Kollman and S. Page). NSF, 1997 to 1999, $200,000.

Human Dimensions of Global Climatic Change (CMU, co-PI with many others). NSF cooperative agreement, 1996 to 2001, $5.3M.

A Graduate Workshop in Computational Economics (SFI, co-PI with S. Page). Santa Fe Institute and Coopers and Lybrand (and McCune Foundation, 2001), 1995 to 2001, approximately $75,000 each year. *Graduate Workshop in Computational Social Science and Complexity*, 2002 to present, approximately $45,000 each year with various funders.

Collaborative Research on Party Competition in Democratic Elections (CMU, U. of Michigan, and U. of Iowa, co-PI with K. Kollman and S. Page). NSF, 1994 to 1996, $150,000.

Founding Workshop on Theoretical Computation in Economics (SFI, with M. Boldrin). Sloan Foundation, National Bureau of Economic Research (NSF), and National Center for Supercomputing Applications, April, 1992, $28,000.

Founding Workshop on Adaptive Computation (SFI). Sloan Foundation, March, 1992, $30,000.

The Analysis of Strategic Behavior (CMU). Sun Microsystems Equipment Grant, 1990, $56,000.

SOFTWARE

classX and *CORE Economics Project—Experiencing Economics* now use key experiments and learning material from *Experiments with Economic Principles*, 2020 to present.

EconX, an online educational system for teaching the core principles of economics via experiments (founding course in Carnegie Mellon's *Open Learning Initiative*), 2004 to present.

EconU, a prototype online educational system for teaching the core principles of economics via experiments, 1998 to 2003.

WORKING PAPERS, DRAFTS, AND NOTES

Lawrence De Geest and John H. Miller, "Evolving Institutions: Can Adaptive Agents Solve the Free Rider Problem?," in progress.

Nik Gurney and John H. Miller, "Human Search on Rugged Landscapes," in progress.

Christina Boyce-Jacino and John H. Miller, "*Exegesis:* Detecting Motives for Moral Behavior," in progress.

John H. Miller, Ralph Zinner, and Brittany Barrett, "Directed Discovery of Novel Drug Cocktails," Santa Fe Institute working paper, 05-07-031, 2005.

Ken Kollman, John H. Miller, and Scott E. Page, "A Simplified Framework for Analyzing the Behavior of Political Institutions," 1999.

Ken Kollman, John H. Miller, and Scott E. Page, "Discovering Solutions to Difficult Problems," 1999.

Ramon Marimon and John H. Miller, "Money as a Medium of Exchange in an Economy with Genetically Reproduced Decision Rules," notes, 1990.

John H. Miller, "A Strategic Taxonomy of Repeated 2x2 Games Played by Adaptive Agents," note.

John H. Miller, "Towards a Mathematics of a Turing Gas," June, 1990.

Robin Cowan and John H. Miller, "Economic Life on a Lattice: Equilibria, Information, and Rules of Thumb," Santa Fe Institute working paper, 90-010, 1990.

John H. Miller, "A Genetic Model of Adaptive Economic Behavior," University of Michigan working paper, 1986.

PUBLISHED BOOKS

John H. Miller, *Ex Machina: Coevolving Machines and the Origins of the Social Universe*, Santa Fe Institute Press, forthcoming.

John H. Miller, Serguey Braguinsky, David A. Hounshell (eds), *Experimental Capitalism: The Nanoeconomics of American High-Tech Industry* by Steven Klepper, Princeton University Press, 2016.

John H. Miller, *A Crude Look at the Whole: The Science of Complex Systems in Business, Life, and Society*, Basic Books, 2015.

John H. Miller and Scott E. Page, *Complex Adaptive Social Systems: An Introduction to Computational Models of Social Life*, Princeton University Press, 2007.

Ken Kollman, John H. Miller, and Scott E. Page (eds), *Computational Models in Political Economy*, MIT Press, 2003.

Theodore Bergstrom and John H. Miller, *Experiments with Economic Principles: Microeconomics* 2nd ed, McGraw Hill, 2000 (1997 1st ed).

Theodore Bergstrom and John H. Miller, *Instructor's Manual for Experiments with Economic Principles: Microeconomics* 2nd ed, McGraw Hill, 2000 (1997 1st ed).

PUBLISHED PAPERS

J. Stephen Lansing, Guy S. Jacobs, Sean S. Downey, Peter K. Norquest, Murray P. Cox, Steven L. Kuhn, Herawati Sudoyo, John H. Miller, and Pradiptajati Kusuma, "Deep Ancestry of Collapsing Networks of Nomadic Hunter-Gatherers in Borneo," *Evolutionary Human Sciences*, forthcoming.

Jiin Jung, Aaron Bramson, William D. Crano, Scott E. Page, and John H. Miller, "Cultural Drift, Indirect Minority Influence, Network Structure, and Their Impacts on Cultural Change and Diversity," *American Psychologist*, 76(6) (2021):1039–53.

Sara Abdollahi, Alex L. Davis, John H. Miller, and Adam W. Feinberg, "Expert-guided optimization for 3D printing of soft and liquid materials," *PLoS ONE*, 13(4):e0194890, (5 April, 2018):1–19.

Yoav Kallus, John H. Miller, and Eric Libby, "Paradoxes in Leaky Microbial Trade," *Nature Communications*, 8:1361, (8 November, 2017):1–10.

Alex L. Davis, John H. Miller, and Sudeep Bahtia, "Are Preferences for Allocating Harm Rational?," *Decision*, (3 April, 2017).

John H. Miller and Michele Tumminello, "Bazaar Economics," *Journal of Economic Behavior and Organization*, 119 (2015):163–81.

Russell Golman, David Hagman, and John H. Miller, "Polya's Bees: A Model of Decentralized Decision Making," *Science Advances*, 1 e1500253 (2015).

Ralph Zinner, Brittany Barrett, Elmira Popova, Paul Damien, Andrei Volgin, Juri Gelovani, Reuben Lotan, Hai Tran, Claudio Pisano, Scott Lippman, Gordon Mills, Li Mao, and John H. Miller, "Algorithmic Guided Screening of Drug Combinations of Arbitrary Size for Activity Against Cancer Cells," *Molecular Cancer Therapeutics*, 8 (2009):521–32. (Note: The author ordering (and inclusion of coauthors) follows the convention of medical journals, I'm one of the two primary coauthors on this paper.)

James Andreoni and John H. Miller, "Analyzing Choice with Revealed Preference: Is Altruism Rational?," in Charles Plott and Vernon Smith (eds.), *The Handbook of Experimental Economics Results* v1, North Holland (2008):481–7.

J. Stephen Lansing and John H. Miller, "Cooperation, Games, and Ecological Feedback: Some Insights from Bali," *Current Anthropology*, 46 (2005).

John H. Miller and Scott Page, "The Standing Ovation Problem," *Complexity*, 9 (2004):8–16.

John H. Miller and Scott Moser, "Communication and Coordination," *Complexity*, 9 (2004):31–40.

James Andreoni and John H. Miller, "Giving According to GARP: An Experimental Study of Rationality and Altruism," *Econometrica*, 70 (2002):737–753. (Reprinted in *New Developments in Experimental Economics*, Enrica Carbone and Chris Starmer (eds), Edward Elgar Publishing, 2007; and *The New Behavioral Economics*, Elias Khalil (ed), Edward Elgar Publishing, 2009.)

John H. Miller, Carter Butts, and David Rode, "Communication and Cooperation," *Journal of Economic Behavior and Organization*, 47 (2002):179–95.

John H. Miller, "Evolving Information Processing Organizations," in Alessandro Lomi and Erik R. Larsen (eds.) *Dynamics of Organizations: Computational Modeling and Organization Theories*, MIT Press, Cambridge, Massachusetts (2001):307–27.

Ken Kollman, John H. Miller, and Scott Page, "Consequences of Nonlinear Preferences in a Federal Political System," in Diana Richards (ed.), *Political Complexity: Nonlinear Models of Politics*, University of Michigan Press, Ann Arbor, MI (2000):23–45.

Ken Kollman, John H. Miller, and Scott E. Page, "Decentralization and the Search for Policy Solutions," *Journal of Law, Economics, and Organization*, 16 (2000):102–28.

John H. Miller and Peter Stadler, "The Dynamics of Adaptive Parties under Spatial Voting," *Journal of Economic Dynamics and Control*, 23 (1998):171–189.

Robin Cowan and John H. Miller, "Technological Standards with Local Externalities and Decentralized Behavior," *Journal of Evolutionary Economics* 8 (1998):285–96.

John H. Miller, "Active Nonlinear Tests (ANTs) of Complex Simulations Models," *Management Science* 44:6 (June, 1998):820–30.

Ken Kollman, John H. Miller, and Scott Page, "Political Parties and Electoral Landscapes," *British Journal of Political Science* 28 (1998):139–158.

Ken Kollman, John H. Miller, and Scott Page, "Political Institutions and Sorting in a Tiebout Model," *American Economic Review* 87:5 (December, 1997):977–992.

Ken Kollman, John H. Miller, and Scott Page, "Landscape Formation in a Spatial Voting Model," *Economic Letters* 55:1 (August, 1997): 121–130.

Ken Kollman, John H. Miller, and Scott E. Page, "Computational Political Economy," in *The Economy as an Evolving Complex System II*, Brian Arthur, Steven Durlauf, and David Lane (eds.), Addison Wesley, 1997.

John H. Miller, "The Coevolution of Automata in the Repeated Prisoner's Dilemma," *Journal of Economic Behavior and Organization* 29:1 (January, 1996):87–112.

James Andreoni and John H. Miller, "Auctions with Artificial Adaptive Agents," *Journal of Games and Economic Behavior* 10 (1995):39–64.

Steven Klepper and John H. Miller, "Entry, Exit, and Shakeouts in the United States in New Manufactured Products," *International Journal of Industrial Organization* 13 (1995):567–91.

John H. Miller and Martin Shubik, "Some Dynamics of a Strategic Market Game," *Journal of Economics* 60 (1994).

John Rust, John H. Miller, and Richard Palmer, "Characterizing Effective Trading Strategies: Insights from a Computerized Double Auction Tournament," *Journal of Economic Dynamics and Control* 18 (1994):61–96.

James Andreoni and John H. Miller, "Rational Cooperation in the Finitely Repeated Prisoner's Dilemma: Experimental Evidence," *Economic Journal* 103:418 (May, 1993):570–85.

James Andreoni and John H. Miller, "Auction Experiments in Artificial Worlds," *Cuadernos*, 54 (1993/2):211–221 (translated into Spanish).

David Kendrick, et al., *Research Opportunities in Computational Economics*, report to the National Science Foundation, 1991, and *Journal of Computational Economics* 6 (November, 1993):257–314.

Scott Page, Ken Kollman, and John H. Miller, "Adaptive Parties and Spatial Voting Theory," in B. Grofman (ed), *Information, Participation and Choice*, University of Michigan Press (1993):161–72.

Peter Stadler, Walter Fontana, and John H. Miller, "Random Catalytic Reaction Networks," *PhysicaD* 63:3/4 (May, 1993):378–92.

Ken Kollman, John H. Miller, and Scott Page, "Adaptive Parties in Spatial Elections," *American Political Science Review* 86 (December, 1992):929–37.

John Rust, John H. Miller, and Richard Palmer, "Behavior of Trading Automata in a Computerized Double Auction Market," in *The Double Auction Market: Institutions, Theories, and Evidence*, D. Friedman and J. Rust (eds), Addison Wesley (1992):155–98.

John H. Holland and John H. Miller, "Artificial Adaptive Agents in Economic Theory," *American Economic Review, Papers and Proceedings* 81 (May, 1991):365–70. Reprinted in *Computational Social Science* v1, SAGE Benchmarks in Social Research Methods series, Nigel Gilbert (ed.), Sage (2010):297–305.

John H. Miller and James Andreoni, "Can Evolutionary Dynamics Explain Free Riding in Experiments?," *Economics Letters* 36 (1991):9–15;

Stephanie Forrest and John H. Miller, "Emergent Behaviors of Classifier Systems," *PhysicaD* 42 (1990):213–27.

John H. Miller, "Artificial Intelligence Techniques and the Analysis of Strategic Behavior," invited paper, DRET, INSTITUT d'Expertise et de Prospective de L'ECOLE NORMALE SUPERIEURE, Paris, 1990 (translated into French).

John Rust, Richard Palmer, and John H. Miller, "A Double Auction Market for Computerized Traders," *Proceedings of the 1989 Advanced Computing for the Social Sciences Conference*, Oak Ridge National Laboratory and the U.S. Bureau of the Census, 1990.

John H. Miller and Stephanie Forrest, "The Dynamical Behavior of Classifier Systems: An Approach," in *Proceedings of the Third Annual Conference on Genetic Algorithms and Their Applications,* Morgan-Kaufman, 1989.

Richard Palmer, John Rust, and John H. Miller, "A Double Auction Market for Computerized Traders: Participant's Manual," Santa Fe Institute, 1989.