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## CURRICULUM VITÆ

William Brian ARTHUR

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### Positions Held

2000-present	External Professor, Santa Fe Institute
1996-present	Visiting Researcher, Intelligent Systems Lab, (Xerox) PARC
2019-2020	Fellow, Center for Advanced Study in the Behavioral Sciences, Stanford
2010-2018	Senior Advisor to the President, and Nanyang Visiting Professor, Nanyang Technological Univ, Singapore
1994-2003	Citibank Professor, Santa Fe Institute
1983-1996	Stanford University: Dean and Virginia Morrison Professor of Population Studies and Economics; Professor, Food Research Institute; Professor of Economics (by courtesy); Professor of Human Biology
1995, 1988-1989	Director, Economics Research Program, Santa Fe Institute
1977-1983:	Research Scholar, International Institute for Applied Systems Analysis, Laxenburg, Austria
1974-1977:	Associate, Center for Policy Studies, The Population Council, New York
1973-1975:	Assistant Professor (Research), Department of Economics, University of California, Berkeley

### Honors & Awards

2019 Citation Laureate (Award made by Web of Science to “researchers of  
Nobel Class.”)

The Lagrange Prize in Complexity Sciences (inaugural), 2008.

Joseph A. Schumpeter Prize in Economics, 1990 (shared), International  
Schumpeter Society

Doctor of Economic Science (Honorary), National University of Ireland, Galway, 2000

Doctor of Science (Honorary), University of Lancaster, UK, Dec. 2009

IBM Faculty Fellow, 2009

Fellow of the Econometric Society

Guggenheim Fellowship, 1987

PriceWaterhouseCoopers Fellow, 1998-1999

### Education

Doctorate: Ph.D. in Operations Research, Univ. of California, Berkeley, 1973

Post-Doc in Economics, UC Berkeley, 1974

Master's degree: M.A. in Economics, University of California, Berkeley, 1973

M.A. in Mathematics, University of Michigan, 1969

M.A. in Operational Research, University of Lancaster, UK, 1967

Bachelor's degree: B.Sc. with 1st class Honours, in Electrical Engineering, Queen's University, Belfast, N. Ireland, 1966

### Current Research

#### Interests

Computational modeling; complexity and the economy; technology; innovation

#### Founder

The Santa Fe Institute 1988 (member of Founders Society)

Morrison Inst for Population and the Environment 1990, Stanford

Complexity Institute, Nanyang Technological Univ, Singapore 2014

### Professional Activities

Member, Board of Trustees, Santa Fe Institute 1994-2005

Member, Science Board, Santa Fe Institute, 1988-2006

Member, Research Council, Canadian Inst for Adv Research, 1991-95

Member, Institute for Advanced Study, Amsterdam 2017 – present

Member, Complexity Hub, Vienna, 2016 – present

## SELECTED PUBLICATIONS

Google Scholar Citations: 47,500. (10 publications have over 1,000 citations.)

Books:

*Complexity Economics: Proc of the Santa Fe Inst 2019 Fall Symposium*, ed. with E. Beinhocker and A. Stanger, SFI Press, 2020

*Complexity and the Economy*, Oxford University Press, October 2014. Chinese edition 2018.

*The Nature of Technology: What it is and How it Evolves*, The Free Press, Simon & Schuster, and Penguin Books (UK), 2009. Also in Chinese, Japanese, and Italian.

*The Economy as an Evolving Complex System II*. Edited (with S. Durlauf and D. Lane), Addison-Wesley, 1997.

*Increasing Returns and Path-Dependence in the Economy*, University of Michigan Press, Ann Arbor, Mich., 1994.

*The Economic Consequences of Changing Age Distributions*. Edited (with R.D. Lee and G. Rodgers), Oxford University Press, 1987.

Selected Papers and Articles:

“Economics in Nouns and Verbs.” Preprint on ArXiv, <https://arxiv.org/abs/2104.01868>, 2021.

“Foundations of Complexity Economics.” *Nature Reviews Physics*, 3, 136-45, 2021.

“Algorithms and the Shift in Modern Science,” *Beijer InstDiscussion* 269, Swedish Acad. Sci, 2020.

“Kenneth Arrow and Nonequilibrium Economics,” *Quantitative Finance*, Jan 2019.

“How we became Modern,” in *The Chronicles of Evolution*, S. Shuzhen and B. Seet, eds. Wildtype Books, Singapore, 2018

“A Program that Evolves a Programmable Computer,” with S. Turner and R. Hanel, in progress, 2018.

“Understanding the Evolution of Technology,” *Asian Scientist*, Nov 2018.

“Where is Technology Taking the Economy?” *McKinsey Quarterly*, Oct-Nov 2017.

“Complexity Economics: A New Framework for Economic Thought,” in *Complexity and the Economy*, W. B. Arthur, ed., Oxford Univ. Press, 2014.

- “All Systems will be Gamed: Exploitive Behavior in Economic and Policy Systems,” in *Complexity and the Economy*, W. B. Arthur, ed., Oxford Univ. Press, 2014.
- "Do Markets Lead Always to Best Outcomes? A Comment on Neil Kay's paper," *Research Policy*, 2013.
- “The Second Economy,” *McKinsey Quarterly*, Oct-Nov 2011.
- “The Structure of Invention,” *Research Policy*, 2007.
- “The Evolution of Technology in a Simple Computer Model,” with W. Polak, *Complexity*, 11, 5, May 2006.
- “Agent-Based Modeling and Out-Of-Equilibrium Economics,” *Handbook of Computational Economics*, Vol. 2, K. Judd and L. Tesfatsion, eds, Elsevier/North-Holland, 2006.
- “Cognition: the Black Box of Economics,” *The Complexity Vision and the Teaching of Economics*, D. Colander, ed., 2000, Edward Elgar Publishers.
- Reprinted (in Italian) *Papers on Evolutionary Economics* edited by Flaminio Squazzoni Mauro Lombardi, Franco Angeli, Milan, Italy, 2003.
- “Time Series Properties of an Artificial Stock Market,” with B. LeBaron and R. Palmer, *Journal of Economic Dynamics and Control*, 23, 1487-1516, 1999.
- “Complexity and the Economy,” *Science*, 2 April 1999, 284, 107-109.
- Reprinted in: *The Complexity Vision and the Teaching of Economics*, D. Colander, ed., Edward Elgar Publishers, 2000; *The Elgar Companion to Neo-Schumpeterian Economics*, H. Hanusch and A. Pyka, Eds. Edward Elgar Publishers, forthcoming, 2007.
- “Asset Pricing Under Endogenous Expectations in an Artificial Stock Market,” with J.H. Holland, B. LeBaron, R. Palmer, and P. Tayler, SFI Paper 96-12-093, *Economic Notes*.
- Reprinted in *The Economy as an Evolving Complex System II*. Edited (with S. Durlauf and D. Lane), Addison-Wesley, 1997.
- “Beyond Rational Expectations: Indeterminacy in Economic and Financial Markets” in *Frontiers of the New Institutional Economics*, J.N. Drobak and J.V. Nye (eds.), Academic Press, 1997.
- “The End of Certainty in Economics,” in *Einstein meets Magritte*, D. Aerts, J. Broekaert and E. Mathijs, eds. 1999, Kluwer academic Publishers, Holland. Reprinted in *The Biology of Business*, J.H. Clippinger, 1999, Jossey-Bass Publishers.
- “How Fast is Technology Evolving?” Essay in *Scientific American*, Feb 1997.
- “Increasing Returns and the New World of Business,” *Harvard Business Review*, July-Aug 1996.
- Reprinted in: *The Diamond Weekly*, Japan; *The Strategist Quarterly*, India; *Seeing Differently*, John Seely Brown, Harvard Business School Press, 1997; *The Knowledge Economy*, Dale Neef, ed. 1997, Butterworth-Heinemann, Boston; *Strategy for Business*, in

*Managing High-Tech Industries*, HBR Press, 1999; Mariana Mazzucato, ed., *The Open University*, Sage Publications, 2002

- “Complexity in Economic and Financial Markets,” *Complexity*, 1, 20-25, 1995
- “Artificial Economic Life: a Simple Model of a Stockmarket,” with R. Palmer, J. Holland, B. LeBaron, and P. Taylor, *Physica D*, 75, 264-274, 1994
- “Inductive Reasoning and Bounded Rationality [the El Farol Problem],” *American Economic Review*, (A.E.A. Papers and Proc.), 84, 406-411, 1994.  
Reprinted in: *Economic Herald of Rostov State University*. 1. No. 3, 2003.
- “On the Evolution of Complexity,” in *Complexity*, G. Cowan, D. Pines, D. Melzer (eds.) Addison-Wesley, 1994
- “Economic Agents that Behave like Human Agents,” *Journal of Evolutionary Econ.*, 3, 1-22, 1993.  
Reprinted in *The Legacy of Joseph A. Schumpeter*, H. Hanusch, Ed., Edward Elgar Publishers, 2000
- “Information Contagion,” with David A. Lane, *Structural Change and Economic Dynamics*, 4, 81-104, 1993
- “Why do Things become more Complex?” Essay in *Scientific American*, May 1993
- “Dynamic Equilibria in Markets with a Conformity Effect,” with Andrzej Ruszczynski, *Archives of Control Sciences*, 37, 7-31, 1992
- “Learning and Adaptation in the Economy,” Santa Fe Institute Paper 92-07-038 , 1992
- “Dynamics and Structures,” with Michael Landesmann and Roberto Scazzieri, *Structural Change and Economic Dynamics*, 2, 1-7, 1991.
- “On Classifier Systems and Models of Learning in the Economy,” mimeo, Santa Fe Inst, 1990
- “Designing Economic Agents that Act like Human Agents: A Behavioral Approach to Bounded Rationality,” *American Economic Review* (A.E.A. Papers and Proc.) 81, 353-359, 1991.  
Reprinted in *The Economic Legacy of Robert Lucas, Jr.* K.D. Hoover, Ed. 1998, Edw. Elgar
- "Positive Feedbacks in the Economy," *Scientific American*, 262, 92-99, Feb. 1990
- “A Learning Algorithm that Mimics Human Learning,” Santa Fe Institute Paper 90-026, 1990
- “Silicon Valley Locational Clusters: When do Increasing Returns Imply Monopoly?”  
*Mathematical Social Sciences*, 19, 235-251, 1990. Reprinted in *New Economic Geography*, J. Vernon Henderson, ed., Edward Elgar, 2005.
- "The Economy as a Complex System," in *Complex Systems*, D. Stein (ed.), Wiley, NY, 1989

"Nash-Discovering Automata for Finite-Action Games," Mimeo. Santa Fe Institute, 1989

"Self-Reinforcing Mechanisms in Economics," in *The Economy as an Evolving Complex System*, pp 9-33, P. Anderson, K. J. Arrow and D. Pines (eds.), Wiley, NY, 1988

"Competing Technologies, Increasing Returns, and Lock-In by Historical Events," *Economic Journal*, 99, 116-131, 1989, (IIASA Paper WP-83-90, September 1983).

Reprinted in: *The Economics of Technical Change and International Trade*, G. Dosi, J. Pavitt and L. Soete, eds. 1991, New York Univ. Press, N. York; in *Technical Change and Economic Theory*, G. Dosi, ed, 1992, IFIAS Research Series; in *The Economics of Productivity*, E. N. Wolff, 1997, Edward Elgar Publishers; in *Economics of Innovation*, Christopher Freeman, ed. 1997, Edward Elgar Publishers; in *Market Process Theories*, P.J Boettke and D. L. Prychitko, eds. 1998, Edward Elgar Publishers; in *The Economics of Increasing Returns*, ed. G. Heal, 1999, Edward Elgar Publishers; in *The Economics of Structural Change*, ed. H. Hagemann and M. Landesmann and R. Scazzari, 2002, Edward Elgar, Publishers; in *Complexity in Economics*, J. Barkley Rosser, 2002, Edward Elgar Publishers.