

Agent-based Computational Economics Reading List

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1 Course description

Economics is a social science that tries to explain how individual decision-making and individual actions generate macroscopic social and economic phenomena. Nowadays, in many of the social sciences (sociology, political science, economics) there is a lively debate about using computation and simulation to model the behavior of economic and social actors.

This course will give an overview of the current developments in computational modelling in various fields of research. These models can be in micro or macro, from small toy models to large integrated simulations of entire artificial economies.

We start with cellular automata models (Conway's Game of Life, Schelling's Residential Tipping Model).

We then look at the Sugarscape model of Epstein and Axtell which combines a CA environment with agents connected through social networks.

Next, we study the work done by Epstein and Axtell together with anthropologists and archeologists on the Replication of Anasazi population in Long House Valley, as an example of successful *generative social science*. The artificial society they create is able to replicate (or retrodict, or *explain*) the settlement and movement of the real Anasazi population over a period of 300 years.

After these introductory examples we turn to agent-based macroeconomics: to a model we have developed in our group, which is called the EURACE@Unibi model.

Artificial Financial Markets: Noise traders versus fundamentalists on financial markets (LeBaron, Day and Huang, Brock and Hommes).

We also look at agent-based models of real economic markets. The Fruit and Vegetables market in Marseille with local interaction and bargaining.

Finally, we consider important work being done in the field of experimental economics on expectation formation. We look at results on laboratory experiments and models that try to match how human subjects form price expectations. We give an overview of expectations formation experiments performed in Amsterdam (Brock and Hommes).

All the articles for this course you will find in the Reading List. PDFs of the articles are available online from my website, in compressed files:

http://www.wiwi.uni-bielefeld.de/lehrbereiche/vwl/etace/team/Sander_van_der_Hoog

Browse to Teaching Material → Course on Agent-based Computational Economics.

2 Resources

2.1 Literature in the Library

Books are in the library in the Semesterapparat S van der Hoog II.

North, MJ and Macal, CM, 2007. *Managing Business Complexity: Discovering Strategic Solutions with Agent-Based Modeling and Simulation*, Oxford University Press: New York, NY. Chaps. 5, 6, 7, 11, 14.

Epstein Joshua M and Robert Axtell, 1996. *Growing artificial societies: social science from the bottom up. Complex adaptive systems*, Washington, D.C.; Cambridge, Mass.; London: Brookings Institution Press: MIT Press.

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

Edmonds, Bruce and Ruth Meyer, 2013, *Simulating Social Complexity: A Handbook*. Chaps. 6 and 8.

Phan, Denis and Frédéric Amblard, 2007, *Agent-based Modelling and Simulation in the Social and Human Sciences. GEMAS Studies in Social Analysis*. Bardwell Press. Chaps. 3 and 12.

2.2 Further Reading

Epstein, *Generative Social Science: Studies in Agent-Based Computational Modeling*.

Thomas C. Schelling, 1978. *Micromotives and Macro Behavior*, Norton, N.Y..

Casti, 1997. *Would-be worlds*. John Wiley & Sons.

Gilbert, Nigel and Klaus Troitzsch, *Simulation for the Social Scientist*. Ch. 7-9 on Multi-agent models.

Railsback, Steven F. and Volker Grimm, 2011, *Agent-based and Individual-based Modeling: A Practical Introduction*, Princeton University Press. Supplementary material: <http://www.railsback-grimm-abm-book.com/>

2.3 Supplementary material on the Web

Use a search engine (DuckDuckGo, Startpage, ...) to find these:

TED Stephen Wolfram, Computing a theory of everything
http://www.ted.com/talks/stephen_wolfram_computing_a_theory_of_everything

TEDxRotterdam, Igor Nikolic, Complex adaptive systems

Miles Parker: Why Model Reality?

Miles Parker: Why Agent-Based Modeling? Part I

Lee Smolin: Physics Envy and Economic Theory

SIMSOC: Recommendations for ABM videos

3 Reading list per lecture

All starred entries are mandatory readings. These are recommended for further understanding of the material covered in class.

PRE-AMBLE: GENERAL EQUILIBRIUM THEORY – WHAT’S WRONG?

* Muth, J., 1961, Rational expectations and the theory of price movements, *Econometrica* 29.

* Arrow, K., 1968, Economic Equilibrium, *International Encyclopedia of the Social Sciences*.

Sonnenschein, H., 1972, Market excess-demand functions, *Econometrica* 40 (3): 549–563.

Sonnenschein, H., 1973, Do Walrass identity and continuity characterize the class of community excessdemand functions?, *Journal of Economic Theory* 6: 345–354.

Mantel, R., 1974, On the characterization of aggregate excess-demand, *Journal of Economic Theory* 7: 348–353.

Debreu, G., 1974, Excess-demand functions, *Journal of Mathematical Economics* 1: 15–21.

* Kirman, Alan P., 1989, The intrinsic limits of modern economic theory: the emperor has no clothes. *Economic Journal* 99.

* Kirman, Alan P. 1992, Whom or What Does the Representative Individual Represent?, *Journal of Economic Perspectives*, 6(2): 117–136.

Rizvi, A.T., 1994, The microfoundations project in general equilibrium theory, *Cambridge Journal of Economics* 18.

Buiter, W., 2009, The unfortunate uselessness of most 'state of the art' academic monetary economics, *Financial Times*, Blog FT.com/Maverecon.

* Hahn, F., 2005, An interview with Frank Hahn on the occasion of his 80th birthday, *Storia del pensiero economico* 2.

Foley, Duncan K., 2010, What’s wrong with the fundamental existence and welfare theorems?, *Journal of Economic Behavior & Organization* 75 (2), 115-131.

Pålsson Syll, L., 2014, Micro vs. macro, *Real-world economics review* (66), 12 – 29. <http://www.paecon.net/PAERreview/issue66/Syll166.pdf>

Bouchaud, Jean-Philippe, 2008, Economics needs a scientific revolution. *Nature* 457, 147.

Bouchaud, Jean-Philippe, 2009, The (unfortunate) complexity of the economy. <http://arxiv.org/pdf/0904.0805>.

Supplementary material on the Web

Joseph Stiglitz – An Agenda for Reforming Economic Theory

https://www.youtube.com/watch?v=L9KAd_nqINY

3.1 Bounded Rationality

Simon, Herbert, 1957, A Behavioral Model of Rational Choice. In: *Models of Man, Social and Rational: Mathematical Essays on Rational Human Behavior in a Social Setting*. New York: Wiley.

Simon, Herbert, 1991, Bounded Rationality and Organizational Learning. *Organization Science* 2 (1): 125-134.

Kahneman, Daniel, and Amos Tversky, 1979, Prospect Theory: An Analysis of Decision Under Risk. *Econometrica* XLVII, 263-291.

Kahneman, Daniel (2003). "Maps of bounded rationality: psychology for behavioral economics". *The American Economic Review* 93 (5): 1449-75.

Sargent, Thomas J., 1993, *Bounded Rationality in Macroeconomics*. Oxford University Press, New York, NY.

De Vany, Arthur, 1996, Book review of *Bounded rationality in macroeconomics* by Thomas J. Sargent, *Journal of Economic Dynamics and Control*, Volume 20, Issue 5, May, 811–817.

Conlisk, John, 1996, Why Bounded Rationality, *Journal of Economic Literature* 34 (2), 669–700.

Leijonhufvud, Axel, 1993, Towards a Not-Too-Rational Macroeconomics, *Southern Economic Journal* 60(1), 1–13.

Axtell, RL, 1999, Why Agents? On The Varied Motivations For Agent Computing. In: *Proceedings of the Workshop on Agent Simulation: Applications, Models, and Tools* (Eds. Macal, Charles M. and Sallach, David, University of Chicago: Argonne National Laboratory, pp. 3–24.

Richiardi, 2003, *The Promises and Perils of Agent-Based Computational Economics*, LABORatorio Revelli Working Paper

Bibliography of Robert Axtell:

<http://scholar.google.com/citations?user=K822uYQAAAAJ&hl=en>

Selected articles:

Axtell, RL, 2001, Zipf Distribution of U.S. Firm Sizes, *Sciens* 293, 1818–1820.

Axtell, RL, 2001, *The Evolution of Cities: A Microeconomic Explanation of Zipfs Law*. Working paper. The Brookings Institution

Axtell, RL and JM Epstein, Agent-based modeling: Understanding our creations, *The Bulletin of the Santa Fe Institute* 9 (2), 28–32.

THEORY OF AGENT-BASED MODELLING

See also: <http://www2.econ.iastate.edu/tesfatsi/ace.htm#Intro>, Section: Introductory Materials

3.2 Intro: What are Agent-based Models?

- * Epstein, 2008, Why Model? *Journal of Artificial Societies and Social Simulation* 11 (4) 12.
- * Axtell, 2000, Why agents? On the varied motivations for agent computing in the social sciences, Working Paper No. 17, Center on Social and Economic Dynamics, The Brookings Institution.
- * North, Macal: Ch. 3 Agents Up Close and Ch. 4 The roots of ABMS
- * Axtell, 2002, Economics as Distributed Computation. In: Meeting the challenge of social problems via agent-based simulation (T. Terano, H. Deguchi and K. Takadama, eds.), pp. 3-24.

Further reading:

- Axtell, R., 2007, What economic agents do: How cognition and interaction lead to emergence and complexity, *The Review of Austrian Economics* 20(2), 105-122.
- Axtell, R., 2005, The Complexity of Exchange, *The Economic Journal* 115 (504), F193–F210.
- Tesfatsion, Leigh, 2006, Agent-Based Computational Economics: A Constructive Approach to Economic Theory, Ch. 16 of *Handbook of Computational Economics* 2, 831-880.
- Borshchev, A. and Filippov, A. 2004. From System Dynamics and Discrete Event to Practical Agent Based Modeling: Reasons, Techniques, Tools. The 22nd International Conference of the System Dynamics Society, July 25 - 29, 2004, Oxford, England.
- Epstein, 1999, Agent-Based Computational Models and Generative Social Science, *Complexity* 4(5), 41-60.
- Miller, John H. and Page, Scott E. 2007, *Complex Adaptive Systems: An Introduction to Computational Models of Social Life*. Princeton NJ: Princeton University Press. Chapter 6.

3.3 Finite State Automata Models: The Iterated Prisoners' Dilemma

- * Miller, John H., 1996, The coevolution of automata in the repeated prisoner's dilemma. *Journal of Economic Behavior and Organization* Vol. 29, 87- 112
- * Teck-Hua Ho, 1996, Finite automata play repeated prisoner's dilemma with information processing costs *Journal of Economic Dynamics and Control* Vol 20(1-3), 173-207.

Further reading:

- Axelrod, R., 1984. *The Evolution of Cooperation*. Basic Books, New York.

Huberman, B.A., Glance, N.S., 1993. Evolutionary games and computer simulations. *Proceedings of the National Academy of Sciences* 90, 77167718.

Linster, B., 1992. Evolutionary stability in the infinitely repeated prisoners' dilemma played by two-state Moore machines. *Southern Economic Journal*, pp. 880903.

Klos, T.B., 1999. Decentralized interaction and co-adaptation in the repeated prisoner's dilemma. *Computational and Mathematical Organization Theory* 5 2, 147165.

Oliver Kirchkamp (2000), Spatial Evolution of Automata in the Prisoners' Dilemma, *Journal of Economic Behaviour and Organization*, Vol. 43, 239-262.

3.4 Cellular Automata Models: Schelling's Model of Segregation

* Gilbert, N. and Troitzsch, K., *Simulation for the Social Scientist*. Ch. 7 on Cellular Automata, pp. 159-177.

* Schelling, T., 1974, On the ecology of micromotives. In *The corporate society*, Robert Morris (ed.). 19-64 (See especially 43-54).

Further reading:

Schelling, T., 1978, *Micromotives and macrobehavior*. New York: W. W. Norton. (See especially pp. 137-55.)

Sakoda, J.M., The Checkerboard Model of Social Interaction, *Journal of Mathematical Sociology* 1, 119 - 132.

3.5 Exploitation vs. Exploration: The Sugarscape Model

Sugarscape model:

Epstein J M and Axtell R (1996) *Growing artificial societies: social science from the bottom up*. Brookings Institution Press: MIT Press, Washington, D.C.

NetLogo implementation: <http://ccl.northwestern.edu/netlogo/models/community/Sugarscape>

Java implementation: <http://sugarscape.sourceforge.net/sugarscape.html>

AGENT-BASED MODELS: APPLICATIONS

3.6 Agent-based Macroeconomics I: The Research Program

See also: <http://www2.econ.iastate.edu/tesfatsi/amulmark.htm>

* Nature article on Agent-based Economics: *Nature*, August 6, 2009, 460 (7256), pp. 667.

* Axtell, *Multi-Agent Systems Macro: A Prospectus*. In: *Post-Walrasian Macroeconomics*, D. Colander (Ed.), Cambridge University Press.

David Colander, Peter Howitt, Alan Kirman, Axel Leijonhufvud and Perry Mehrling, 2008. "Beyond DSGE Models: Toward an Empirically Based Macroeconomics," *American Economic Review* 98(2), 236-40.

Eurace Consortium, 2008, EURACE VisionDocument.

Further reading: See also: <http://www2.econ.iastate.edu/tesfatsi/afinance.htm>, Section 1: Rethinking Economic Methodology in the Wake of the Subprime Financial Crisis

Krugman, P., 2009, How Did Economists Get It So Wrong?, Times article Sept. 2, 2009 (corrected version Sept. 6 2009).

Kirman, Whom or What does the Representative Agent represent?

3.7 Agent-based Macroeconomics II: Models

Eurace@Unibi Group: Download PDFs here:

http://www.wiwi.uni-bielefeld.de/lehrbereiche/vwl/etace/Eurace_Unibi/Model_Documentation and here:

http://www.wiwi.uni-bielefeld.de/lehrbereiche/vwl/etace/Eurace_Unibi/Research_Papers_using_the_Eurace_Unibi_Model

* Dawid, H., Gemkow, S., Harting, P., van der Hoog, S., & Neugart, M. (2013). Agent-Based Macroeconomic Modeling and Policy Analysis: The Eurace@Unibi Model, in: S-H Chen & M. Kaboudan (Eds), Handbook on Computational Economics and Finance. Oxford University Press.

* Dawid, H., Gemkow, S., Harting, P., van der Hoog, S., & Neugart, M. 2012. The Eurace@Unibi Model: An Agent-Based Macroeconomic Model for Economic Policy Analysis. Working Paper Bielefeld University.

Dawid, H., Gemkow, S., Harting, P., van der Hoog, S., & Neugart, M. 2012. Eurace@Unibi Model v1.0 User Manual. Working Paper Bielefeld University.

Dawid, H. and P. Harting, 2012. Capturing Firm Behavior in Agent-Based Models of Industry Evolution and Macroeconomic Dynamics, in G. Bnsdorf (Ed.), Applied Evolutionary Economics, Behavior and Organizations, Edward-Elgar, pp. 103-130.

EURACE Group:

* Deissenberg, C., van der Hoog, S. & Dawid, H., 2008, EURACE: A Massively Parallel Agent-Based Model of the European Economy, Applied Mathematics and Computation 204 (2), 541-552. URL: <http://dx.doi.org/10.1016/j.amc.2008.05.116>

* Dawid, H., Deissenberg, C. & van der Hoog, S. 2008. Production and Finance in EURACE, in: K. Schredelseker & F. Hauser (Eds), Complexity and Artificial Markets, 614, Lecture notes in economic and mathematical systems, Complexity and artificial markets. Springer, 147158.

van der Hoog, S. & Deissenberg Ch., 2011, Energy Shocks and Macroeconomic Stabilization Policies in an Agent-based Macro Model. In: H. Dawid and W. Semmler (Eds.), Computational Methods in Economic Dynamics', Springer: Berlin.

Pisa Group:

* Dosi, Giovanni, Giorgio Fagiolo, Mauro Napoletano, Andrea Roventini and Tania Treibich, 2013, Appropriate Macroeconomic Policy for Complex Economies. LEM Papers Series 2013

Dosi, G., Fagiolo, G., Roventini, A., 2008, Schumpeter Meeting Keynes: A Policy-Friendly Model of Endogenous Growth and Business Cycles, LEM Papers Series 2008/21.

Dosi, G., Fagiolo, G., Roventini, A., 2005, Animal Spirits, Lumpy Investment, and Endogenous Business Cycles, LEM Papers Series 2005/04.

Ancona/Milan Group:

Delli Gatti, D. Desiderio, S., Gaffeo, E., Cirillo, P. and Gallegati, M., Ch. 1 Macroeconomics from the bottom-up. pp.1-30.

3.8 Agent-based Macroeconomics III: Policy analysis

3.8.1 Fiscal policy models

Dawid, H. and Neugart, M., 2010, Agent-based Models for Economic Policy Design, Eastern Economic Journal (Vol. 00), 1-7.

Haber, G., (2008), Monetary and Fiscal Policy Analysis With an Agent-Based Macroeconomic Model, Journal of Economics and Statistics (Jahrbuecher fuer Nationaloekonomie und Statistik), 228(2+3), 276-295.

3.8.2 Credit regulation: Basel II and III

* van der Hoog S, Dawid H (2015, Submitted), Bubbles, Crashes and the Financial Cycle: Insights from a Stock-Flow Consistent Agent-Based Macroeconomic Model. Bielefeld Working Papers in Economics and Management No. 01-2015.

* Ashraf, Q., Gershman, B., Howitt, P., 2011. Banks, market organization, and macroeconomic performance: An agent-based computational analysis. NBER Working Papers 17102, National Bureau of Economic Research.

Krug, S., Lengnick, M. and Wohltmann, H.-W., 2014. The impact of Basel III on financial (in)stability: An agent-based credit network approach, Economics Working Papers 2014-13, Christian-Albrechts-University of Kiel, Department of Economics.

Delli Gatti, D., Gallegati, M., Greenwald, B. Russo, A., Stiglitz, J.E., Business fluctuations and bankruptcy avalanches in an evolving network economy. Journal of Economic Interaction and Coordination (2009) 4:195212.

Delli Gatti, D., Di Guilmi, C., Gallegati, M. and Giulioni, G., Financial Fragility, Industrial Dynamics and Business Fluctuations in an Agent Based Model.

3.8.3 Models of the interbank market

* Delli Gatti, D., Gallegati, M., Greenwald, B. Russo, A., Stiglitz, J.E., 2010, The Financial Accelerator in an Evolving Credit Network. Journal of Economic Dynamics and Control 34(9), 1627-1650.

Iori, G., Jafarey, S. and Padilla, F.G., 2006, Systemic risk on the interbank market. Journal of Economic Behavior and Organization 61, 525542.

3.8.4 Labour market policy models

Dawid, H., Gemkow, S., Harting, P. & Neugart, M., 2009. On the Effects of Skill Upgrading in the Presence of Spatial Labor Market Frictions: An Agent-Based Analysis of Spatial Policy Design, *Journal of Artificial Societies and Social Simulation* 12 (4) 5.

Dawid, H., Gemkow, S., Harting, P. and M. Neugart, 2012. Labor market integration policies and the convergence of regions: the role of skills and technology diffusion, *Journal of Evolutionary Economics*, 22, 543-562.

Dawid, H., Harting, P. and Neugart, M., 2013. Spatial labor market frictions and economic convergence: policy implications from a heterogeneous agent model, Working Paper, Bielefeld University.

3.9 Artificial Financial Markets

See also: <http://www2.econ.iastate.edu/tesfatsi/afinance.htm>, Section 2: Agent-Based Financial Economics: Introductory Readings.

* Nature articles on Agent-based Finance: *Nature*, August 6, 2009, 460 (7256), pp. 680-682, 685-686.

* LeBaron, B., June 2002, Building the Santa Fe Artificial Stock Market, Working Paper Brandeis University.

* Lux, T. and Marchesi, M., 1999, Scaling and criticality in a stochastic multi-agent model of a financial market, *Nature* 397 (11), 498-500.

* LeBaron, Blake, 2006, Agent-based Computational Finance, Ch. 24 in *Handbook of Computational Economics 2*, Tesfatsion and Judd (Eds.), Elsevier, North-Holland: Amsterdam.

Hommes, C.H., 2006, Heterogeneous Agent Models in Economics and Finance, Ch. 23 (1109-1186) in *Handbook of Computational Economics, Volume 2*, Tesfatsion and Judd (Eds.), Elsevier, North-Holland: Amsterdam.

Further reading:

Palmer, R.G., W.B. Arthur, J.H. Holland, B.D. LeBaron and P. Tayler, 1994, Artificial economic life: a simple model of a stock market, *Physica D* 75.

LeBaron, Blake, 2001, A builder's guide to agent-based financial markets. *Quantitative Finance* 1, 254-261.

Brock, W. A. and Hommes, C. H. (1998), Heterogeneous beliefs and routes to chaos in a simple asset pricing model, *Journal of Economic Dynamics and Control* 22(8-9), 1235-1274.

Hommes, C.H. and Wagener, F.O.O., 2009, Complex Evolutionary Systems in Behavioral Finance *Handbook of Financial Markets: Dynamics and Evolution*, 217-276.

Westerhoff, Frank, 2009, A simple agent-based financial market model: direct interactions and comparisons of trading profits. Bamberg university Working Paper No. 61.

Heun, Michael, 2007, Finanzmarktsimulation Mit Multiagentensystemen, Springer.

Hai-Chuan Xu, Wei Zhang, Xiong Xiong, and Wei-Xing Zhou, 2014, An agent-based computational model for China's stock market and stock index futures market
URL: <http://d.repec.org/n?u=RePEc:arx:papers:1404.1052&r=cmp>

Sornette, D., 2014, Physics and Financial Economics (1776-2014): Puzzles, Ising and Agent-Based models
URL: <http://d.repec.org/n?u=RePEc:arx:papers:1404.0243&r=cmp>

THE REAL WORLD

3.10 Laboratory Experiments and Expectation Formation Mechanisms

* Muth, John, 1961, Rational expectations and the theory of price movements, *Econometrica* 29.

* Hommes, C.H., Sonnemans, J., Tuinstra, J. and van de Velden, H., (2005), A , *Journal of Economic Dynamics and Control* 29(4), 823-843.

* Hommes, C.H., Sonnemans, J., Tuinstra, J. and van de Velden, H., 2005, Coordination of Expectations in Asset Pricing Experiments, *Review of Financial Studies* 18(3), 955-980.

Hommes, C, and Anufriev, M, 2008, Evolution of Market Heuristics, forthcoming in *Knowledge and Engineering Review*.

Hommes, C.H., 1998, On the consistency of backward-looking expectations: The case of the cobweb, *Journal of Economic Behavior and Organization* 33(3-4), 333-362.

3.11 Bargaining in real markets

* Moulet, S and Rouchier, J, 2008, The influence of seller learning and time constraints on sequential bargaining in an artificial perishable goods market, *Journal of Economic Dynamics and Control*, 32(7), 2322-2348,

Kirman, A., Schulz, R., Härdle, W. and Werwatz, A., 2005, Transactions that did not happen and their influence on prices, *Journal of Economic Behavior and Organization* 56, 567-591.

THE COMPUTER SCIENCE OF AGENT-BASED MODELLING

3.12 How to build Agent-based Models

Miller, John H. and Page, Scott E. 2007, *Complex Adaptive Systems: An Introduction to Computational Models of Social Life*. Princeton NJ: Princeton University Press. Chapter 6 and 7.

* Gilbert, N. and Troitzsch, K., *Simulation for the Social Scientist*. Ch. 8 on Multi-agent models, pp.159-177.

Frameworks for building ABMs: FLAME

Download PDFs here:

<http://www.wiwi.uni-bielefeld.de/vpl1/research/eurace-unibi.html>

* Mike Holcombe, Simon Coakley and Rod Smallwood, 2006. A General Framework for Agent-based Modelling of Complex Systems. Department of Computer Science, Sheffield University.

Simon Coakley, Rod Smallwood and Mike Holcombe, 2006. Using X-Machines as a formal basis for describing agents in agent-based modelling, Proceedings of the 2006 Agent-Directed Simulation Conference.

* Simon Coakley, Marian Gheorghe, Mike Holcombe, Shawn Chin, David Worth, Chris Greenough, 2012. Exploitation of High Performance Computing in the FLAME Agent-Based Simulation Framework, Proceedings of the 14th International Conference on High Performance Computing and Communications

The Model Development Cycle

Railsback and Grimm: Individual-based Modelling

Ch. 1, Part I: On the process of modelling

North and Macal, 2007, Managing Business Complexity

* Ch. 5: The Role of ABMS

Compares ABMS to other modelling approaches. Important figure: 5.1 on p.61.

* Ch. 6: Discovering Agents and Agent Behaviors

Important: State Machine Diagrams and Activity diagrams.

Ch. 7: Office ABMS

Small-scale ABMS, on agent modelling environments

Ch. 14: ABMS Project Management

Tables on model design, Task tables.

* Jean-Pierre Müller and Pierre Bommel: An Introduction to UML for Modelling in the Human and Social Sciences. In Phan and Amblard, 2007, Ch. 12.

C. LePage and Pierre Bommel: A methodology for building agent-based simulations of common-pool resources management: from a conceptual model designed with UML to its implementation in CORMAS. In Phan and Amblard, 2007, Ch. 7.

3.13 Verification and validation of simulation models

* North and Macal, Ch.11: ABMS Verification and Validation

* Kleijnen, J.P.C., 1995, Verification and Validation of simulation Models, European Journal of Operations research 82, 145-162.

* Lambrecht, Marc R., Philip L. Ivens, Nico J. Vandaele, and John H. Miller, 1998, Active Nonlinear Tests (ANTs) of Complex Simulation Models. Management Science 44(6), 820-830.

* Sargent, R.G., 1998, Verification And Validation Of Simulation Models, Electrical Engineering and Computer Science. Paper 7.

Barlas, Y., 1994, Model validation in Systems Dynamics, Systems Dynamics, Methodological and Technical Issues.

Barlas, Y., 1996, Formal aspects of model validity and validation in system dynamics, Systems Dynamics Review 12 (3), 183-210.

Edmonds and Meyer, 2013, Simulating Social Complexity: A Handbook, Ch.6: Checking simulations: Detecting and avoiding errors and artifacts

Edmonds and Meyer, 2013, Simulating Social Complexity: A Handbook, Ch.8: Validating Simulations

Phan and Amblard, 2007, Ch. 3 by Vincent Ginot and Hervé Monod: Exploring Models by Simulation: Application to Sensitivity Analysis.

Galán, Izquierdo, Izquierdo, Santos, del Olmo, López-Paredes and Edmonds, 2009: Errors and Artefacts in Agent-Based Modelling, Journal of Artificial Societies and Social Simulation vol. 12, no. 1 1 (<http://jasss.soc.surrey.ac.uk/12/1/1.html>)

3.14 Computation, complexity and economics

Roberto Leombruni, Matteo Richiardi, Why are economists sceptical about agent-based simulations? Physica A 355 (2005) 103109.

Aki Lehtinen and Jaakko Kuorikoski (2007), Computing the Perfect Model: Why Do Economists Shun Simulation?, Philosophy of Science, 74 (July): 304329.

Further reading:

Judd, K.L. (2006), Computationally-intensive analyses in economics, in L. Tesfatsion and K. L. Judd, eds, 'Handbook of Computational Economics', Vol. Volume 2: Agent-Based Computational Economics, North-Holland, chapter 32, pp. 1551-1564.

Judd, K.L. (2006), Computational economics and economic theory: Substitutes or complements?, Journal of Economic Dynamics and Control, 21: 907-42.

J. Barkley Rosser, The Nature and Future of Econophysics, 2006, in New Economic Windows, Econophysics of Stock and other Markets, Proceedings of the Econophys- Kolkata II, edited by Arnab Chatterjee and Bikas K Chakrabarti

J. Barkley Rosser, Debating the role of econophysics. Nonlinear Dynamics Psychol Life Sci 2008 Jul; 12(3):311-23.

Mauro Gallegati, Steve Keen, Thomas Lux, Paul Ormerod, Worrying trends in econophysics. Physica A 370 (2006) 16.