

Generative Music and Cellular Automata Bibliography

Compiled by David M Burraston Feb 2008

Complex systems such as Cellular Automata (CA) produce global behaviour based on the interactions of simple units (cells). They are fascinating objects, producing more pattern than a single human is capable of observing within their own lifetime. Their evolution is specified by local interaction rules that generate some form of ordered, complex or chaotic behaviour. This wide variety of behaviour represents an important generative tool for both the artist and scientist. CA are at the forefront of the exciting new field of complex systems, having a long and distinguished history in computer science, also forming a foundation for Artificial Life research. The following is an extensive bibliography (popular, historical and technical) of books, papers and websites relating to the interdisciplinary field of generative music and Cellular Automata. The technical papers on CA have been chosen for their particular relevance to both art and science, from the many thousands of papers now available.

- Adamatzky, A. (1994) *Identification of Cellular Automata*. Taylor & Francis.
- Adamatzky, A. (2001) *Computing in Nonlinear Media and Automata Collectives*. Institute of Physics Publishing.
- Aizawa, Y., Nishikawa, I. & Kaneko, K. (1990) Soliton Turbulence in One-Dimensional Cellular Automata. *Physica D* 45:307-327
- Albert, J. & Culik, K. (1987) A Simple and Universal Cellular Automaton and its One-Way and Totalistic Version. *Complex Systems* 1: 1-16
- Ashby, W. R. (1956) *An Introduction to Cybernetics*. Chapman and Hall. (Available at <http://pcp.vub.ac.be/books/IntroCyb.pdf>)
- Ashby, W. R. (1960) *Design for a Brain*. Chapman and Hall
- Banks, E. (1971) *Information Processing and Transmission in Cellular Automata*. Doctoral Dissertation and Technical Report MAC TR-81, MIT Project MAC
- Beys, P. (1989) The Musical Universe of Cellular Automata. In T. Wells & D. Butler, Eds., *Proceedings of the 1989 International Computer Music Conference*. International Computer Music Association pp34-41.
- Beys, P. (1990) Musical Morphologies from Self-organising Systems. *Interface, Journal of New Music Research*, 19(2-3): 205-218.
- Beys, P. (1991) Self-Organising Control Structures using Multiple Cellular Automata. *Proceedings of the 1991 International Computer Music Conference*. Montreal, Canada: International Computer Music Association pp254-257.
- Beys, P. (1997) Aesthetic Navigation. *Proceedings of the JIM Conference*, Lyon, France.
- Beys, P. (1998) Interactive Cellular Automata. *Evolution 2.0 CDROM*, Liverpool Art School and Merseyside On-Line Ltd.
- Beys, P. (2000) Synthetic Creatures in Context. *Intersens et Nouvelles Technologies*, MIM (Laboratoire Musique et Informatique de Marseille).
- Beys, P. (2003) Selectionist musical automata : Integrating explicit instruction and evolutionary algorithms. *IX Brazilian Symposium on Computer Music*. Brazilian Computing Society.
- Beys, P. (2004) Cellular Automata Mapping Procedures. *Proceedings of the 2004 International Computer Music Conference*.

- Bilotta, E., Pantano, P. & Talarico, V. (2000) Music Generation through Cellular Automata: How to Give Life to Strange Creatures. *Generative Art GA2000*, Milano, Italia.
- Bilotta, E. & Pantano, P. (2000) In search for musical fitness on consonance. *Electronic Musicological Review*, Special Issue 5.3.
- Bilotta, E. & Pantano, P. (2001) Artificial Life Music Tells of Complexity. *Proc. of Artificial Life Models for Musical Applications* (ECAL 2001 Workshop).
- Bilotta, E. & Pantano, P. (2002) Synthetic Harmonies: Recent results. *Leonardo* 35(2): 35-42, MIT Press.
- Bilotta, E. Lafusa, A. & Pantano, P. (2003) Searching for Complex CA Rules with GAs. *Complexity* 8(3): 56-67.
- Bilotta, E. Lafusa, A. & Pantano, P. (2004) Life-Like Self-Reproducers. *Complexity* 8(3): 56-67.
- Bowcott, P. (1989) Cellular Automata as a means of high level control of granular synthesis. In T. Wells & D. Butler. *Proceedings of the 1989 International Computer Music Conference*. San Francisco: ICMA pp55-57.
- Brown, A. (2005) Exploring Rhythmic Automata. *Proceedings of the 3rd European Workshop on Evolutionary Music and Art*.
- Brown, P. (2002) Stepping Stones in the Mist. In Bentley, P. J. & Corne, D. W. Eds. *Creative Evolutionary Systems*. Morgan Kaufmann.
- Brown, P. (2005) Personal communication.
- Burks, A. (Ed) (1970) *Essays on Cellular Automata*. Univ. of Illinois Press.
- Burraston, D., E. Edmonds, D. Livingstone, and E. Miranda. (2004) Cellular Automata in MIDI based Computer Music. *Proceedings of the 2004 International Computer Music Conference*.
- Burraston, D. and E. Edmonds. (2004) Global Dynamics Approach to Generative Music Experiments with One Dimensional Cellular Automata. *Proceedings of the 2004 Australasian Computer Music Conference*. pp29-38
- Burraston, D. (2005) Structuring Cellular Automata Rule Space with Attractor Basins. *Proceedings of Generative Arts Practice Symposium 2005*. pp21-40
- Burraston, D. (2005) Babelitis. *Proceedings of Generative Arts Practice Symposium 2005*. pp144-149
- Burraston, D. and Edmonds, E. (2005) Cellular Automata in Generative Electronic Music and Sonic Art : A Historical and Technical Review. *Digital Creativity* 16(3) pp165-185
- Burraston, D. (2005) Variety, Pattern and Isomorphism. *Proceedings of the Third Iteration Conference*. Monash University. pp107-117
- Burraston, D. (2005) Composition at the Edge of Chaos. *Proceedings of the 2005 Australasian Computer Music Conference*. (Brisbane, July 2005). pp27-35
- Burraston, D. (2005) One Dimensional Cellular Automata Musical Experiments with Max. *Proceedings of the 11th International Conference on Human-Computer Interaction*. HCI International. **(INVITED)**
- Burraston, D. (2006) *Generative Music and Cellular Automata*. PhD Thesis. Creativity and Cognition Studios, University of Technology, Sydney, Australia.
- Burraston, D. and Martin, A. (2006) Digital Behaviours and Generative Music, "Wild Nature and the Digital Life" Special Issue, *Leonardo Electronic Almanac* Vol 14, No. 7 – 8
- Burraston, D. (2007) Fundamental Insights on Complex Systems arising from Generative Arts Practice. *Leonardo* Vol 40 (4) pp372-3.
- Burraston, D. (2007) Generative Music and Cellular Automata. PhD Thesis Abstract. *Leonardo Abstracts Database (LABS)* <http://leonardolabs.pomona.edu>
- Burraston, D. (2008) Cellular Automata Rule Space Structure : A Generative Music Perspective. *Complex Systems* (Accepted, issue TBA)

- Burraston, D. (2008) Cellular Machinations II : Creativity and Complexity in Practice-Based Research. *Leonardo* (**INVITED**, issue TBA)
- Burraston, D. (2008) Cellular Machinations I : Unknowable Determinism in Music. *Leonardo* (Accepted, issue TBA)
- Burraston, D. (2008) Generative Music and Cellular Automata. PhD Thesis Abstract. *Leonardo Electronic Almanac* (**INVITED**, issue TBA)
- Burraston, D. (2008) *Noyzelab website*. www.noyzelab.com
- Burt, W. (1991) Interactive Improvisations with Electronic Music Systems. *Sounds Australian*, Summer 1991-92.
- Burt, W. (1996) Some parentheses around algorithmic composition. *Organised Sound* 1(3): 167-172.
- Chareyron, J. (1988) Sound synthesis and Processing by Means of Linear Cellular Automata. *Proceedings of the 1988 International Computer Music Conference*. ICMA.
- Chareyron, J. (1990) Digital synthesis of self-modifying waveforms by means of linear automata. *Computer Music Journal*, 14(4): 25-41
- Codd, E. F. (1968) *Cellular Automata*, ACM Monograph Series. New York: Academic Press.
- Coveney, P. & Highfield, R. (1995) *Frontiers of Complexity : The Search for Order in a Chaotic World*. Faber and Faber.
- Crutchfield, J. P. and K. Young, K. (1990) Computation at the Onset of Chaos. In *Entropy, Complexity, and Physics of Information*, W. Zurek, editor, SFI Studies in the Sciences of Complexity, VIII, Addison-Wesley, Reading, Massachusetts : 223-269
- Crutchfield, J. P. and Hanson, J. E. (1993) Turbulent Pattern Bases for Cellular Automata. *Physica D* 69: 279-301
- Crutchfield, J. P. (1994) The Calculi of Emergence: Computation, Dynamics, and Induction. *Physica D* 75: 11-54
- Crutchfield, J. P. (2002) What Lies Between Order and Chaos? in *Art and Complexity*, J. Casti, editor, Oxford University Press.
- Culik, K., Hurd, L. & Yu, S. (1990) Computation Theoretic Aspects of Cellular Automata. *Physica D* 45: 357-378
- Dewdney, A. K. (1988) *The Armchair Universe : An Exploration of Computer Worlds*. W. H. Freeman & Company.
- Dewdney, A. K. (1989) A cellular universe of debris, droplets, defects, and demons. *Scientific American*, August, 88-91.
- Dorin, A. (2002) Liquiprism : Generating Polyrhythms with Cellular Automata. *Proceedings of the 8th International Conference on Auditory Display*, Nakatsu & Kawahara (eds), Advanced Telecommunications Research International (ATR), Kyoto, Japan, July 2002, pp447-451
- Edgar, R. & Ryan, J. (1986) *LINA*. Exhibition of the 1986 International Computer Music Conference, ICMA
- Edmonds, E., Brown, P. & Burraston, D. Eds. (2005) *Proceedings of Generative Arts Practice Symposium 2005*. Creativity & Cognition Studio Press.
- Flake, G. W. (1999) *The Computational Beauty of Nature*. MIT Press.
- Fredkin, E. (1992) *Finite Nature*. www.digitalphilosophy.org
- Fredkin, E. (1990) Digital Mechanics. *Physica D*. 45: 254-270
- Gardner, M. (1970) The Fantastic Combinations of John Conway's New Solitaire Game 'Life'. *Scientific American* 223(4): 120-123.
- Golomb, S. W. (1967) *Shift Register Sequences*. Holden-Day.
- Grassberger, P. (1986) Long-Range Effects in an Elementary Cellular Automaton. *Journal of Statistical Physics* 45 Nos 1/2: 27-39

- Griffeath, D. & Moore, C. (2003) *New Directions in Cellular Automata*. Oxford University Press.
- Hanson, J. E. and Crutchfield, J. P. (1992) The Attractor-Basin Portrait of a Cellular Automaton. *J. Statistical Physics* 66: 1415-1462
- Hanson, J. E. & Crutchfield, J. P. (1997) Computational Mechanics of Cellular Automata : An example. *Physica D* 103: 169-189
- Hoffmann, P. (2002) Towards an "Automated Art": Algorithmic Processes in Xenakis' Compositions. *Contemporary Music Review* 21 Nos 2/3: 121-131
- Hunt, A., Kirk, R. & Orton, R. (1991) Musical Applications of a Cellular Automata Workstation. *Proceedings of the 1991 International Computer Music Conference*. Montreal, Canada: International Computer Music Association. pp165-168.
- IsleEx (2005) <http://jmge.net/camusic.htm>
- Ito, H. (1988) Intriguing Properties of Global Structure in Some Classes of Finite Cellular Automata. *Physica D* 31: 318-338
- Jen, E. (1986) Global Properties of Cellular Automata. *Journal of Statistical Physics*. (43): 219-242
- Katrami, A. I., Kirk, R. & Myatt, A. (1991) Manipulation of cellular automata and fractal landscape mappings. *Proceedings of the 1991 International Computer Music Conference*. Montreal, Canada: International Computer Music Association pp106-109.
- Kauffman, S. (1993) *The Origins of Order, Self-Organisation and Selection in Evolution*. Oxford University Press.
- Kreger, T. (1997) Cellular Automata in the Spectral Domain. *Proceedings of Interface 1997*. University of Auckland, Auckland.
- Kreger, T. (1999) Real-time Cellular Automata Filters Implemented with Max MSP. *Proceedings of the Australasian Computer Music Conference 1999*. Victoria University of Wellington, N.Z.
- Lafusa, A. & Bossomaier, T. (2005) Localisation of critical transition phenomena in Cellular Automata rule-space. *Proceedings of the 2005 Australian Conference on Artificial Life*.
- Langton, C. G. (1986) Studying Artificial Life with Cellular Automata. *Physica D* 22D: 120-149
- Langton, C. G. (1990) Computation at the Edge of Chaos : Phase Transitions and Emergent Computation. *Physica D*. (42): 12-37.
- Langton, C. G. (1991) Life at the Edge of Chaos. In *Artificial Life II, Proceedings Vol. X. SFI Studies in the Sciences of Complexity*, Addison-Wesley.
- Li, W. (1988) *Pretty Pictures Generated by Two-state Five-neighbor Cellular Automata* (CCSR-88-15 available from www.ccsr.uiuc.edu/techreports.html)
- Li, W. (1989) Complex Patterns Generated by Next Nearest Neighbors Cellular Automata. *Comput. & Graphics* 13(4): 531-537
- Li, W. (1989) *Problems in Complex Systems*. PhD Thesis. Columbia University. (CCSR-89-09 available from www.ccsr.uiuc.edu/techreports.html)
- Li, W. & Packard, N. H. (1990) The Structure of the Elementary Cellular Automata Rule Space. *Complex Systems* (4): 281-297
- Li, W. Packard, N. H. & Langton, C. G. (1990) Transition Phenomena in Cellular Automata Rule Space. *Physica D* (45): 77-94
- Martin, A. (1994) Two Dimensional Reaction-Diffusion System for MIDI Composition. *Synaesthetica '94 Proceedings, Australian Centre for the Arts and Technology (ACAT)*, Australian National University.
- Martin, A. (1995) Sound Synthesis for One Dimensional Reaction-Diffusion Systems. *Proceedings of the ACMA 1995 Conference*, Australasian Computer Music Association.

- Martin, A. (1996) *The Application of Reaction-Diffusion Systems to Computer Music*. Master of Arts (Electronic Art) Sub-thesis, Australian Centre for the Arts and Technology (ACAT), Australian National University.
- Martin, A. (1996) Reaction-Diffusion Systems for Algorithmic Composition. *Organised Sound* 1(3): 195-201.
- McIntosh, H. V. (1990) *Linear Cellular Automata*. <http://delta.cs.cinvestav.mx/~mcintosh>
- McIntosh, H. V. (1990) *What Has and Hasn't Been Done With Cellular Automata*. <http://delta.cs.cinvestav.mx/~mcintosh/newweb/marcowhat.html>
- McIntosh, H. V. (1990) Wolfram's Class IV Automata and a Good Life. *Physica D* 25: 105-121.
- Meinhardt, H. (2003) *The Algorithmic Beauty of Sea Shells*. Springer.
- Millen, D. (1990) Cellular Automata Music. *Proceedings of the 1990 International Computer Music Conference*. San Francisco: ICMA pp314-316.
- Millen, D. (1992). Generation of formal patterns for music composition by means of cellular automata. In A. Strange Ed., *Proceedings of the 1992 International Computer Music Conference*. San Francisco: ICMA pp398-399.
- Millen, D. (2004) An Interactive Cellular Automata Music Application in Cocoa. . *Proceedings of the 2004 International Computer Music Conference*.
- Millen, D. (2005) comp.uark.edu/~dmillen/cam.html
- Miranda, E. R. (2001) *Composing with Music Computers*. Focal Press.
- Miranda, E. R. (2002) *Computer Sound Synthesis for the Electronic Musician*. 2nd Edition, Focal Press.
- Miranda, E. R. (2003). On the evolution of music in a society of self-taught digital creatures. *Digital Creativity* 14(1): 29-42.
- Mitchell, M. (1996) Computation in Cellular Automata: A Selected Review. In Schuster, H. G. & Gramss, T. Eds. *Nonstandard Computation*. Weinheim: VCH Verlagsgesellschaft.
- Nicolis, G & Prigogine, I. (1989) *Exploring Complexity : An Introduction*. W. H. Freeman & Company.
- Nisho, H. 1975. A Classified Bibliography on Cellular Automata Theory – With a Focus on Recent Japanese References. *Proc. Int. Symp. On Uniform Structures, Automata and Logic*. Tokyo, August 1975.
- NYR (2005). Chaosynth. www.nyrsound.com
- Oliveira, G., Oliveira, P. & Omar, N. (2001) Definition and Application of a Five-Parameter Characterization of One-Dimensional Cellular Automata Rule Space. *Artificial Life* 7: 277-301
- Oliveira, G., Oliveira, P. & Omar, N. (2001) Guidelines for Dynamics-based Parameterization of One-Dimensional Cellular Automata Rule Spaces. *Complexity* 6(2): 63-71.
- Orton, R., Hunt, A. & Kirk, R. (1991) Graphical Control of Granular Synthesis using a Cellular Automata and the Freehand Program. *Montreal ICMC 1991 Proceedings*, pp416-418.
- Packard, N. H. (1988) Adaption Toward the Edge of Chaos. In Kelso, J. A. S., Mandell, A. J. & Shlesinger, M. F. Eds. *Dynamic Patterns in Complex Systems*. World Scientific. pp293-301
- Pritchard, J. (1992) *The Chaos Cookbook: a practical programming guide*. Butterworth-Heinemann
- Roads, C. (1996) *The Computer Music Tutorial*. MIT Press.
- Shalizi, C. R. (2001) *Causal Architecture, Complexity and Self-Organization in Time Series and Cellular Automata*. Ph.D. Dissertation, Physics Department, University of Wisconsin-Madison.
- Silver, S. A. (2006) *Life Lexicon*. www.argentum.freemove.co.uk/lex_home.htm

- Sipper, M. (1997) *Evolution of Parallel Cellular Machines : The Cellular Programming Approach*. Springer Verlag.
- Sipper, M. (1998) Fifty years of research on self-replication: An overview. *Artificial Life* 4:237-257.
- Solomos, M. (2005) Cellular Automata in Xenakis' Music. Theory and Practice. In Georgaki, A. & Solomos, M. Eds. *Proceedings of the International Symposium Iannis Xenakis*. pp120-137
- Stauffer, A. & Sipper, M. (2002) An interactive self-replicator implemented in hardware. *Artificial Life* 8(2): 175-183.
- Toffoli, T. & Margolus, N. (1987) *Cellular Automata Machines : a new environment for modelling*. MIT Press.
- Toffoli, T. & Margolus, N. (1990) Invertible cellular automata: A review. *Physica D* 45: 229-253.
- Turing, A. (1952) The Chemical Basis of Morphogenesis. *Philosophical Transactions of the Royal Society*.
- Turk, G. (1991) Generating textures on arbitrary surfaces using reaction-diffusion. *Computer Graphics* 25(4): 289-298.
- Vaidhyanathan, S., Minai, A. & Helmuth, M. (1999) ca : A System for Granular Processing of sound using Cellular Automata. *Proceedings of the 2nd COST G-6 Workshop on Digital Audio (DAFx99)* 1999, NTNU, Trondheim.
- Varga, B. A. (1996) *Conversations with Iannis Xenakis*. London : Faber and Faber.
- Von Neumann, J. (1966) *The Theory of Self-Reproducing Automata*. Edited and completed by A. Burks. University of Illinois Press.
- Voorhees, B. (1996) *Computational Analysis of One-Dimensional Cellular Automata*. World Scientific.
- Vorn, B. (2006) Lifetools. www.billvorn.com
- Walker, C. C. & Ashby, W. R. (1966) On Temporal Characteristics of Behaviour in Certain Complex Systems. *Kybernetik* 3: 100-108
- Walker, C. C. & Aadryan, A. A. (1971) Amount of Computation Preceding Externally Detectable Steady-State Behaviour in a Class of Complex Systems. *Bio-Medical Computing* 2: 85-94.
- Walker, C. C. (1971) Behaviour of a Class of Complex Systems: the Effect of System Size on Properties of Terminal Cycles. *Journal of Cybernetics* 1(4): 55-67
- Walker, C. C. (1987) Stability of Equilibrium States and Limit Cycles in Sparsely Connected, Structurally Complex Boolean Nets. *Complex Systems* 1: 1063-1086
- Wolfram, S. (Ed.). (1986) *Theory and Applications of Cellular Automata*. Singapore: World Scientific. (NOTE : This contains practically all of Wolfram's published papers on CA in a single volume)
- Wolfram, S. (1988) Complex Systems Theory. In *Emerging Syntheses in Science: Proceedings of the Founding Workshops of the Santa Fe Institute*. Addison-Wesley. pp183-189
- Wolfram, S. (2002) *A New Kind of Science*. Wolfram Media.
- Wuensche, A. & Langton, C. (1999) *Complexity in Small Universes*. www.ddlab.com
- Wuensche, A. & Lesser, M. (1992) *The Global Dynamics of Cellular Automata : An Atlas of Basin of Attraction Fields of One-Dimensional Cellular Automata*. Addison-Wesley. (Available as PDF from www.ddlab.com)
- Wuensche, A. (1994) *Complexity in One-D Cellular Automata: Gliders, Basins of Attraction and the Z parameter*, Santa Fe Institute working paper 94-04-025
- Wuensche, A. (1997) *Attractor Basins of Discrete Networks*. Cognitive Science Research Paper 461, Univ. of Sussex, D.Phil thesis.

- Wuensche, A. (1998) *Classifying Cellular Automata Automatically*, Santa Fe Institute working paper 98-02-018
- Wuensche, A. (1999) Classifying Cellular Automata Automatically: Finding gliders, filtering, and relating space-time patterns, attractor basins, and the Z parameter, *Complexity* 4(3): 47-66
- Wuensche, A. (2002) Basins of Attraction in Network Dynamics: A Conceptual Framework for Biomolecular Networks, in Schlosser, G. & Wagner, G.P. Eds. *Modularity in Development and Evolution*. Chicago University Press 2004, Chp 13, 288-311. (Santa Fe Institute working paper 02-02-004, 2002)
- Wuensche, A. (2005) Glider dynamics in 3-value hexagonal cellular automata: the beehive rule. *Journal of Unconventional Computing*.
- Wuensche, A. (2008) *Discrete Dynamics Lab*. Discrete Dynamics Inc. (Manual and information freely available from www.ddlab.com)
- Xenakis, I. (1992) *Formalised Music*. (Revised Edition). Pendragon Press.
- Zuse, K. (1969) *Rechnender Raum* (Vieweg, Braunschweig); translated as "Calculating Space", AZT-70-164- GEMIT MIT Project MAC.
- Zuse, K. (1993) *The computer, my life*. Springer-Verlag.