Research > COMPOSING WITH PROCESS: PERSPECTIVES ON GENERATIVE AND SYSTEMS MUSIC

Generative music is a term used to describe music which has been composed using a set of rules or system. This series of nine episodes explores generative approaches (including algorithmic, systems-based, formalised and procedural) to composition and performance primarily in the context of experimental technologies and music practices of the latter part of the twentieth century and examines the use of determinacy and indeterminacy in music and how these relate to issues around control, automation and artistic intention.

Each episode in the series is accompanied by an additional programme featuring exclusive or unpublished sound pieces by leading sound artists and composers working in the field.

PDF Contents:

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Mark Fell is a Sheffield (UK) based artist and musician. He has performed and exhibited extensively at major international festivals and institutions. In 2000 he was awarded an honorary mention at the prestigious ARS Electronica, and in 2004 was nominated for the Quartz award for research in digital music. He recently completed a major new commission for Thyssen-Bornemisza Art Contemporary, Vienna which premiered at Youniverse, International Biennal of Contemporary Arts, Sevilla. www.markfell.com

Joe Gilmore is an artist and graphic designer based in Leeds (UK). His work has been exhibited at various digital art festivals and galleries. His recorded works have been published internationally on several record labels including: 12k/Line (New York), Entr'acte (London), Cut (Zürich), Fällt (Belfast) and Leonardo Music Journal (San Francisco). Joe is currently a part-time lecturer in the department of Graphic Design at Leeds College of Art & Design. He is also a founder of rand()%, an Internet radio station which streamed generative music. joe.qubik.com

COMPOSING WITH PROCESS: PERSPECTIVES ON GENERATIVE AND SYSTEMS MUSIC #8.1

Models of change

This episode considers the notion of change in music. It looks at how scientific and mathematical concepts can be used to model change in the acoustic domain.

01. Summary

Episode eight in the series continues to look at how composers working with generative systems implement change in their works. This episode focuses on models of change using mathematical structures derived from complex dynamic systems observed in nature. Through advances in mathematics, physics and biology, the programme looks at how composers have utilised the central findings of chaos theory and emergent systems – such as cellular automata, Lindenmeyer Systems and fractal geometry – to generate automated dynamic patterns of change.

02. Playlist

Part I

Emmanuel Deruty, 'Hénon Map' (unreleased)
Laurie Spiegel, 'Strand of Life ("Viroid")'(*Unseen Worlds*, Aesthetic Engineering, 1994)
David Dunn, 'Lorenz' (excerpt) (*Autonomous and Dynamic Systems,* New World Records, 2007)
Mike Winters, 'Fig8_Lorenz.mp3' (from www.music.mcgill.ca/~raymond/Sonification_of_the_Natural_World)
Mike Winters, 'Fig9_Rossler_Periodic.mp3' (from www.music.mcgill.ca/~raymond/Sonification_of_the_Natural_World)
Mike Winters, 'Fig11_ConChua_Chaotic.mp3' (from www.music.mcgill.ca/~raymond/Sonification_of_the_Natural_World)
Iannis Xenakis, 'Horos' (*Works for Large Orchestra Vol. 3*, Timpani, 2002)
Peter Beyls, 'Drake Circus' (*Nonstandard I*, Nonstandard, 2006)
Stelios Manousakis, 'Example 1' (unreleased)
Stelios Manousakis, 'Example 2' (unreleased)
Stelios Manousakis, 'Example 3' (unreleased)
Stelios Manousakis, 'Supplement2-Fractal_granular_Synthesis_with_Lsystems' (unreleased)
Hazard, Kimport and Johnson, 'Hopper.mid' (unreleased)

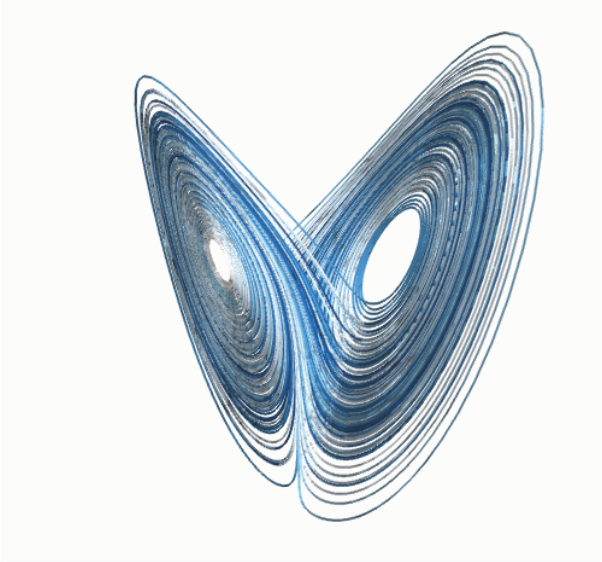
03. Bibliography

M.V. Berry, I.C. Percival, N.O. Weiss, et. al., *Dynamical Chaos*, The Royal Society, London, 1987.

Peter Beyls, 'Chaos and Creativity: The Dynamic Systems Approach to Musical Composition', *Leonardo Music Journal*, vol. 1, no. 1, 1991.

Dave Burraston and Ernest Edmonds, 'Cellular Automata in Generative Electronic Music and Sonic Art: Historical and Technical Review', *Digital Creativity*, Routledge, 2005.

Jacques Chareyron, 'Digital Synthesis of Self-Modifying Waveforms by Means of Linear Automata', *Computer Music Journal*, vol. 14/4, 1990.



[Lorenz Attractor]

James P. Crutchfield, 'Between Order and Chaos', *Nature Physics 8*, 2012, pp. 17–24

David Dunn, *Autonomous and Dynamical Systems* (Audio CD liner notes), New World Records, 2007.

James Gleick, *Chaos: Making a New Science.* London: Vintage Books, 1998.

Rubén Hinojosa Chapel, *Realtime Algorithmic Music Systems From Fractals and Chaotic Functions: Toward an Active Musical Instrument.* Barcelona: Universitat Pompeu Fabra, 2003.

Kenneth McAlpine, et. al., 'Making Music with Algorithms: A Case-Study System', *Computer Music Journal*, vol. 13/2, 1999

R. Michael Winters, 'Musical Mapping of Chaotic Attractors'. Wooster, Ohio: Physics Department, The College of Wooster, 2009.

Peter Hoffmann, *Music Out of Nothing? A Rigorous Approach to Algorithmic Composition by Iannis Xenakis*, Technische Universität Berlin, 1998.

Stelios Manousakis, 'Non-Standard Synthesis with L-Systems', *Leonardo Music Journal*, issue 19, MIT Press, December 2009.

Stephen Wolfram, *A New Kind of Science*. Champaign, IL: Wolfram Media Inc., 2002.

04. Related links

Wolfram Science
www.wolframscience.com

Chaosynth
www.nyrsound.com/Chaosynth/CsynInformation.htm

Cellular Automata
comp.uark.edu/~dmillen/cam.html
object-e.net/research/spacesound

Rhythmicon demonstration
www.youtube.com/watch?v=HkodVcuPVAo

L-Systems
mathworld.wolfram.com/LindenmayerSystem.html
mathworld.wolfram.com/ElementaryCellularAutomaton.html

Stelios Manousakis
modularbrains.net

Lorenz Attractor
en.wikipedia.org/wiki/Lorenz_attractor

Julie Set Fractal with music by Laurie Spiegel
www.youtube.com/watch?v=7rBDNxpJQQs

Mike Winters, 'Sonification of the Natural World'
www.music.mcgill.ca/~raymond/Sonification_of_the_Natural_World

05. Acknowledgements

Recorded at The Music Research Centre, University of York, UK. Special thanks to Peter Beyls and Nonstandard.

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