

Table of Contents

Artificial Chemistries, Pre-biotic Evolution

Chemical Organizations at Different Spatial Scales	1
<i>Pietro Speroni di Fenizio and Peter Dittrich</i>	
Formulating Membrane Dynamics with the Reaction of Surface Objects ..	12
<i>Kazuto Tominaga, Tooru Watanabe, and Maki Suzuki</i>	
Multi-level Selectional Stalemate in a Simple Artificial Chemistry	22
<i>Barry McMullin, Ciarán Kelly, and Darragh O'Brien</i>	
Simulation Model for Functionalized Vesicles: Lipid-Peptide Integration in Minimal Protocells	32
<i>Kepa Ruiz-Mirazo and Fabio Mavelli</i>	

Evolution

Emergence of Genetic Coding: An Information-Theoretic Model	42
<i>Mahendra Piraveenan, Daniel Polani, and Mikhail Prokopenko</i>	
Emergent Phenomena Only Belong to Biology	53
<i>Hugues Bersini and Christophe Philemotte</i>	
Genotype Editing and the Evolution of Regulation and Memory	63
<i>Luis M. Rocha and Jasleen Kaur</i>	
Investigating the Emergence of Phenotypic Plasticity in Evolving Digital Organisms	74
<i>Jeff Clune, Charles Ofria, and Robert T. Pennock</i>	
Simulation of the Evolution of Aging: Effects of Aggression and Kin-Recognition	84
<i>Svetlana Krivenko and Mikhail Burtsev</i>	

Ecosystems

Artificial Ecosystem Selection for Evolutionary Optimisation	93
<i>Hywel T.P. Williams and Timothy M. Lenton</i>	
Building Virtual Ecosystems from Artificial Chemistry	103
<i>Alan Dorin and Kevin B. Korb</i>	

Energy Flows and Maximum Power on an Evolutionary Ecological Network Model	113
<i>Jiang Zhang</i>	
Entropy Production in Ecosystems	123
<i>Nathaniel Virgo and Inman Harvey</i>	
Increasing Complexity Can Increase Stability in a Self-regulating Ecosystem	133
<i>James Dyke, Jamie McDonald-Gibson, Ezequiel Di Paolo, and Inman Harvey</i>	
Niche Differentiation and Coexistence in a Multi-resource Ecosystem with Competition	143
<i>Walter de Back, László Gulyás, and George Kampis</i>	
Variance in Water Temperature as a Factor in the Modelling of Starfish and Mussel Population Density and Diversity	153
<i>David White</i>	

Morphodynamics, Development

Cell Tracking: Genesis and Epigenesis in an Artificial Organism	163
<i>Alessandro Fontana</i>	
Developmental Neural Heterogeneity Through Coarse-Coding Regulation	172
<i>Jekanthan Thangavelautham and Gabriele M.T. D'Eleuterio</i>	
Re-examination of Swimming Motion of Virtually Evolved Creature Based on Fluid Dynamics	183
<i>Yoshiyuki Usami</i>	

Adaptive Behavior

Adaptation to Sensory Delays	193
<i>Marieke Rohde and Ezequiel Di Paolo</i>	
Adapting to Your Body	203
<i>Peter Fine, Ezequiel Di Paolo, and Eduardo Izquierdo</i>	
An Analysis of Behavioral Attractor Dynamics	213
<i>Alberto Montebelli, Carlos Herrera, and Tom Ziemke</i>	
Artificial Emotions: Are We Ready for Them?	223
<i>Jackeline Spinola de Freitas and João Queiroz</i>	
Evolution of an Adaptive Sleep Response in Digital Organisms	233
<i>Benjamin E. Beckmann, Philip K. McKinley, and Charles Ofria</i>	

Where Did I Put My Glasses? Determining Trustfulness of Records in Episodic Memory by Means of an Associative Network	243
<i>Cyril Brom, Klára Pešková, and Jiří Lukavský</i>	

Grounding Action-Selection in Event-Based Anticipation	253
<i>Philippe Capdepuy, Daniel Polani, and Chrystopher L. Nehaniv</i>	

Learning and Evolution

Aging in Artificial Learning Systems	263
<i>Sarunas Raudys</i>	

An Analysis of the Effects of Lifetime Learning on Population Fitness and Diversity in an NK Fitness Landscape	273
<i>Dara Curran, Colm O’Riordan, and Humphrey Sorensen</i>	

Embodied Evolution and Learning: The Neglected Timing of Maturation .	284
<i>Steffen Wischmann, Kristin Stamm, and Florentin Wörgötter</i>	

Evolution and Learning in an Intrinsically Motivated Reinforcement Learning Robot	294
<i>Massimiliano Schembri, Marco Mirolli, and Gianluca Baldassarre</i>	

Evolving Cultural Learning Parameters in an NK Fitness Landscape . . .	304
<i>Dara Curran, Colm O’Riordan, and Humphrey Sorensen</i>	

How Does Niche Construction Reverse the Baldwin Effect?	315
<i>Hajime Yamauchi</i>	

Improving Search Efficiency in the Action Space of an Instance-Based Reinforcement Learning Technique for Multi-robot Systems	325
<i>Toshiyuki Yasuda and Kazuhiro Ohkura</i>	

Improving Agent Localisation Through Stereotypical Motion	335
<i>Bart Baddeley and Andrew Philippides</i>	

Neuroevolution of Agents Capable of Reactive and Deliberative Behaviours in Novel and Dynamic Environments	345
<i>Edward Robinson, Timothy Ellis, and Alastair Channon</i>	

On the Adaptive Disadvantage of Lamarckianism in Rapidly Changing Environments	355
<i>Ingo Paenke, Bernhard Sendhoff, Jon Rowe, and Chrisantha Fernando</i>	

The Dynamics of Associative Learning in an Evolved Situated Agent . . .	365
<i>Eduardo Izquierdo and Inman Harvey</i>	

Communication, Constitution of Meaning, Language

Constructing the Basic <i>Umwelt</i> of Artificial Agents: An Information-Theoretic Approach	375
<i>Philippe Capdepuy, Daniel Polani, and Chrystopher L. Nehaniv</i>	
Directed Evolution of Communication and Cooperation in Digital Organisms	384
<i>David B. Knoester, Philip K. McKinley, Benjamin Beckmann, and Charles Ofria</i>	
Evolution of Acoustic Communication Between Two Cooperating Robots.	395
<i>Elio Tuci and Christos Ampatzis</i>	
Group Size Effects on the Emergence of Compositional Structures in Language	405
<i>Paul Vogt</i>	
Language Learning Dynamics: Coexistence and Selection of Grammars ..	415
<i>Valery Tereshko</i>	
Multi-level Selection in the Emergence of Language Systematicity	425
<i>Luc Steels, Remi van Trijp, and Pieter Wellens</i>	
Protolanguages That Are Semi-holophrastic	435
<i>Mike Dowman</i>	
From the Outside-In: Embodied Attention in Toddlers	445
<i>Linda B. Smith, Chen Yu, and Alfredo Pereira</i>	

Agency, Autopoiesis, Autonomy

Autonomy: A Review and a Reappraisal	455
<i>Tom Froese, Nathaniel Virgo, and Eduardo Izquierdo</i>	
Category Theoretical Distinction Between Autopoiesis and (M,R) Systems	465
<i>Tatsuya Nomura</i>	
Measuring Autonomy by Multivariate Autoregressive Modelling	475
<i>Anil K. Seth</i>	
Minimal Agency Detection of Embodied Agents.....	485
<i>Hiroyuki Iizuka and Ezequiel Di Paolo</i>	

Alife and Art

Hermeneutic Resonance in Animats and Art.....	495
<i>Alasdair Turner</i>	

Robotic Superstrings Installation: A-Life Science & Art	505
<i>Mauro Francaviglia, Marcella Giulia Lorenzi, and Michael Petry</i>	

Dynamics of Social Systems, Collective Behavior

A Distributed Formation Algorithm to Organize Agents with No Coordinate Agreement	515
<i>Gregory Studer and Inman Harvey</i>	
A Multi-level Selection Model for the Emergence of Social Norms	525
<i>Francisco C. Santos, Fabio A.C.C. Chalub, and Jorge M. Pacheco</i>	
Evolution of Cooperation in a Population of Selfish Adaptive Agents	535
<i>Jorge M. Pacheco, Tom Lenaerts, and Francisco C. Santos</i>	
Evolutionary Dilemmas in a Social Network	545
<i>Leslie Luthi, Enea Pestelacci, and Marco Tomassini</i>	
Exogenous Fault Detection in a Collective Robotic Task	555
<i>Anders Lyhne Christensen, Rehan O'Grady, Mauro Birattari, and Marco Dorigo</i>	
From Artificial Societies to New Social Science Theory	565
<i>Eric Silverman and John Bryden</i>	
From Solitary to Collective Behaviours: Decision Making and Cooperation	575
<i>Vito Trianni, Christos Ampatzis, Anders Lyhne Christensen, Elio Tuci, Marco Dorigo, and Stefano Nolfi</i>	
Individual Selection for Cooperative Group Formation	585
<i>Simon T. Powers, Alexandra S. Penn and Richard A. Watson</i>	
Institutional Robotics	595
<i>Porfírio Silva and Pedro U. Lima</i>	
Investigating the Evolution of Cooperative Behaviour in a Minimally Spatial Model	605
<i>Simon T. Powers and Richard A. Watson</i>	
Modeling Decentralized Organizational Change in Honeybee Societies ...	615
<i>Mark Hoogendoorn, Martijn C. Schut and Jan Treur</i>	
Social Facilitation on the Development of Foraging Behaviors in a Population of Autonomous Robots	625
<i>Alberto Acerbi, Davide Marocco and Stefano Nolfi</i>	
Social Impact Theory Based Optimizer	635
<i>Martin Macas̆ and Lenka Lhotská</i>	

The Role of Collective Reproduction in Evolution	645
<i>John Bryden</i>	
Fear and the Behaviour of Virtual Flocking Animals	655
<i>Carlos Delgado-Mata and Ruth S. Aylett</i>	

Swarm and Ant Colony Systems

Comparing ACO Algorithms for Solving the Bi-criteria Military Path-Finding Problem	665
<i>Antonio M. Mora, Juan J. Merelo, Cristian Millán, Juan Torrecillas, Juan L.J. Laredo, and Pedro A. Castillo</i>	
Decentralized Control and Interactive Design Methods for Large-Scale Heterogeneous Self-organizing Swarms	675
<i>Hiroki Sayama</i>	
EcoPS - a Model of Group-Foraging with Particle Swarm Systems	685
<i>Cecilia Di Chio and Paolo Di Chio</i>	
Efficient Multi-foraging in Swarm Robotics	696
<i>Alexandre Campo and Marco Dorigo</i>	
Modelling the Effects of Colony Age on the Foraging Behaviour of Harvester Ants	706
<i>Tom Diethe and Peter Bentley</i>	

Robotics and Autonomous Agents: Concepts and Applications

A Mechanism to Self-assemble Patterns with Autonomous Robots	716
<i>Anders Lyhne Christensen, Rehan O'Grady, and Marco Dorigo</i>	
Binocular Vision-Based Robot Control with Active Hand-Eye Coordination	726
<i>Wen-Chung Chang</i>	
Controlling an Anthropomimetic Robot: A Preliminary Investigation	736
<i>Hugo Gravato Marques, Richard Newcombe, and Owen Holland</i>	
Evolution of Neural Networks for Active Control of Tethered Airfoils	746
<i>Allister Furey, and Inman Harvey</i>	
Feathered Flyer: Integrating Morphological Computation and Sensory Reflexes into a Physically Simulated Flapping-Wing Robot for Robust Flight Manoeuvre	756
<i>YoonSik Shim and Phil Husbands</i>	

Guided Self-organisation for Autonomous Robot Development	766
<i>Georg Martius, J. Michael Herrmann, and Ralf Der</i>	
Near-Optimal Mobile Robot Recharging with the Rate-Maximizing Forager	776
<i>Jens Wawerla and Richard T. Vaughan</i>	
Neural Uncertainty and Sensorimotor Robustness	786
<i>Jose A. Fernandez-Leon and Ezequiel A. Di Paolo</i>	
Simulations of Simulations in Evolutionary Robotics	796
<i>Edgar Bermudez Contreras and Anil K. Seth</i>	
Synthesizing Physically-Realistic Environmental Models from Robot Exploration	806
<i>Josh Bongard</i>	
The Evolution of Pain	816
<i>Alberto Acerbi and Domenico Parisi</i>	

Evolutionary Computation

A Computational Morphogenesis Approach to Simple Structure Development	825
<i>Enrique Fernández-Blanco, Julián Dorado, Juan R. Rabuñal, Marcos Gestal, and Nieves Pedreira</i>	
Program Evolvability Under Environmental Variations and Neutrality . . .	835
<i>Tina Yu</i>	
The Creativity Potential Within Evolutionary Algorithms	845
<i>David Iclănzan</i>	
The Problems with Counting Ancestors in a Simple Genetic Algorithm . .	855
<i>Robert Collier and Mark Wineberg</i>	

Networks, Cellular Automata, Complex Systems

Asynchronous Graph-Rewriting Automata and Simulation of Synchronous Execution	865
<i>Kohji Tomita, Satoshi Murata, and Haruhisa Kurokawa</i>	
Catalysis by Self-assembled Structures in Emergent Reaction Networks . .	876
<i>Gianluca Gazzola, Andrew Buchanan, Norman Packard, and Mark Bedau</i>	

Community Detection in Complex Networks Using Collaborative Evolutionary Algorithms	886
<i>Anca Gog, D. Dumitrescu, and Béat Hirsbrunner</i>	
Detecting Non-trivial Computation in Complex Dynamics	895
<i>Joseph T. Lizier, Mikhail Prokopenko, and Albert Y. Zomaya</i>	
Evolution of One-Dimensional Cellular Automata by $1/f$ Noise	905
<i>Shigeru Ninagawa</i>	
Genotype Reuse More Important than Genotype Size in Evolvability of Embodied Neural Networks	915
<i>Chad W. Seys and Randall D. Beer</i>	
Information-Cloning of Scale-Free Networks	925
<i>Mahendra Piraveenan, Mikhail Prokopenko, and Albert Y. Zomaya</i>	
MBEANN: Mutation-Based Evolving Artificial Neural Networks	936
<i>Kazuhiro Ohkura, Toshiyuki Yasuda, Yuichi Kawamatsu, Yoshiyuki Matsumura, and Kanji Ueda</i>	
Measuring Entropy in Embodied Neural Agents with Homeostatic Units: A Link Between Complexity and Cybernetics	946
<i>Jorge Simão</i>	
Networks Regulating Networks: The Effects of Constraints on Topological Evolution	956
<i>Francisco C. Santos, Hugues Bersini, and Tom Lenaerts</i>	
Preliminary Investigations on the Evolvability of a Non-spatial GasNet Model	966
<i>Patricia A. Vargas, Ezequiel A. Di Paolo, and Phil Husbands</i>	
Semi-synchronous Activation in Scale-Free Boolean Networks	976
<i>Christian Darabos, Mario Giacobini, and Marco Tomassini</i>	
Spatial Embedding and Complexity: The Small-World Is Not Enough . . .	986
<i>Christopher L. Buckley and Seth Bullock</i>	
The Application of the Idea of Extended Cellular Automata for Some Pedestrian Behaviors	996
<i>Eva Dudek-Dyduch, Jarosław Wąs, and Bartłomiej Gudowski</i>	
Transients of Active Tracking: A Stroll in Attractor Spaces	1006
<i>Mario Negrello and Frank Pasemann</i>	
Wavelet Network with Hybrid Algorithm to Linearize High Power Amplifiers	1016
<i>Nibaldo Rodriguez and Claudio Cubillos</i>	

Models and Methodologies

A Behavior-Based Model of the Hydra, Phylum Cnidaria	1024
<i>Malin Aktius, Mats Nordahl, and Tom Ziemke</i>	
A Computational System for Investigating Chemotaxis-Based Cell Aggregation	1034
<i>Manolya Eyiurekli, Peter I. Lekes, and David E. Breen</i>	
A Signal Based Approach to Artificial Agent Modeling	1050
<i>Luís Morgado and Graça Gaspar</i>	
Construction of Hypercycles in Typogenetics with Evolutionary Algorithms	1060
<i>Chohwa Gwak and Kyubum Wee</i>	
Designing a Methodology to Estimate Complexity of Protein Structures .	1069
<i>Alejandro Balbín and Eugenio Andrade</i>	
Designing for Surprise	1079
<i>Telmo Menezes and Ernesto Costa</i>	
Evolving Virtual Neuronal Morphologies: A Case Study in Genetic L-Systems Programming	1089
<i>Benjamin Torben-Nielsen</i>	
Folding Protein-Like Structures with Open L-Systems	1100
<i>Gemma B. Danks, Susan Stepney, and Leo S.D. Caves</i>	
Formal Model of Embodiment on Abstract Systems: From Hierarchy to Heterarchy	1110
<i>Kohei Nakajima, Soya Shinkai, and Takashi Ikegami</i>	
Neuro-evolution Methods for Designing Emergent Specialization	1120
<i>Geoff S. Nitschke</i>	
Neutral Emergence and Coarse Graining	1131
<i>Andrew Weeks, Susan Stepney, and Fiona Polack</i>	
New Models for Old Questions: Evolutionary Robotics and the 'A Not B' Error	1141
<i>Rachel Wood and Ezequiel Di Paolo</i>	
PLAZZMID: An Evolutionary Agent-Based Architecture Inspired by Bacteria and Bees	1151
<i>Susan Stepney, Tim Clarke, and Peter Young</i>	
Self-organizing Acoustic Categories in Sensor Arrays	1161
<i>Ivan Escobar, Erika Vilches, Edgar E. Vallejo, Martin L. Cody, and Charles E. Taylor</i>	

Self-organizing Systems Based on Bio-inspired Properties	1171
<i>André Stauffer, Daniel Mange, and Joël Rossier</i>	
Stepwise Transition from Direct Encoding to Artificial Ontogeny in Neuroevolution	1182
<i>Benjamin Inden</i>	
Symbiosis, Synergy and Modularity: Introducing the Reciprocal Synergy Symbiosis Algorithm	1192
<i>Rob Mills and Richard A. Watson</i>	
Turing Complete Catalytic Particle Computers	1202
<i>Anthony M.L. Liekens and Chrisantha T. Fernando</i>	
Author Index	1213

<http://www.springer.com/978-3-540-74912-7>

Advances in Artificial Life

9th European Conference, ECAL 2007, Lisbon, Portugal,

September 10-14, 2007, Proceedings

Almeida e Costa, F. (Ed.)

2007, XVIII, 1218 p. In 2 volumes, not available
separately., Softcover

ISBN: 978-3-540-74912-7