

# Carlos Gershenson García

Center Leo Apostel for  
Interdisciplinary Studies  
Vrije Universiteit Brussel  
Krijgskundestraat 33  
B-1160 Brussel – Belgium

[cgershen@vub.ac.be](mailto:cgershen@vub.ac.be)  
<http://homepages.vub.ac.be/~cgershen/>  
Phone: +32 2 640 67 37  
Shared Fax: +32 2 644 07 44

## Research Interests

- **Complexity:** Self-organization, evolution of complexity, agent-based modelling, information, networks.
- **Artificial Life:** origin and evolution of life, robustness, random Boolean networks, discrete dynamic networks.
- **Cognitive Science:** origin and evolution of situated-embodied-dynamic cognitive systems, adaptive behavior, animats, virtual laboratories, concept construction and sharing, artificial societies.
- **Engineering:** design and control of self-organizing systems, methodologies, biologically-inspired systems, coordination, synchronization, traffic control, adaptive communication protocols.
- **Philosophy of Science.**

## Academic Education

- Studying **PhD** at the Centrum Leo Apostel of the Vrije Universiteit Brussel, Belgium (2002-), on “Design and Control of Self-organizing Systems” (With a scholarship from the Consejo Nacional de Ciencia y Tecnología (CONACYT)).
- **MSc** in Evolutionary and Adaptive Systems, School of Cognitive and Computer Sciences, University of Sussex, UK (2001-2002) (With a scholarship from the Consejo Nacional de Ciencia y Tecnología (CONACYT)). Thesis: A Comparison of Different Cognitive Paradigms Using Simple Animats in a Virtual Laboratory, with Implications to the Notion of Cognition.
- **BEng** in Computer Engineering at the Fundación Arturo Rosenblueth, México. 9.72/10.0 avg. Thesis: “Artificial Societies of Intelligent Agents”, Valedictorian with Honours (1996-2001).
- Coursed five semesters of Philosophy at Facultad de Filosofía y Letras, Universidad Nacional Autónoma de México. 8.5/10.0 avg. (1998-2001).
- Research student at project *Genia*, directed by Dr. Jaime Lagunez (1997-2001) at the Instituto de Química, Universidad Nacional Autónoma de México.
- Student at the Karyn Kupciner International Summer School, in the Theoretical Mathematics Department of the Weizmann Institute of Science, Rehovot, Israel (1999).
- Advanced Mathematics course at the Escuela Superior de Física y Matemáticas

del Instituto Politécnico Nacional, México (1993).

- **High School:** 9.3/10.0 avg. at the Escuela Nacional Preparatoria No. 6 “Antonio Caso”, Universidad Nacional Autónoma de México, Outstanding student (1993-1996).

## Qualifications

- PhD in Sciences (expected spring 2007)
- MSc in Evolutionary and Adaptive Systems (2002).
- BEng in Computer Engineering, valedictorian with honours (2001).
- High school certificate, outstanding student (1996).

## Professional Appointments

- Assistant Researcher, Centrum Leo Apostel for Interdisciplinary Studies. Free University of Brussels (VUB) (2002-).
- Collaborator with La Jornada newspaper (In the scientific supplement) (1998-)
- Development Director of Principia Informatica (Coordination of Graduate Studies at the Universidad Autónoma del Carmen, Development of Internet applications, taught Internet Technologies graduate course) (1999-). (On leave).
- Web developer for the Evolutionary and Adaptive Systems Group, School of Cognitive and Computer Sciences, University of Sussex (2002).
- Consulting for Tecnología, Medios y Aplicaciones (Tecnimedia). Worked as developer for the project Astra of TELMEX (2001).
- Director of Software Development of Praktisch Kontakt México (1998-2000). (Project Leader and Developer in various Internet projects).
- Teacher at the Diplomado en Informática Médica in the Facultad de Medicina, UNAM. (Artificial Intelligence graduate course) (2000).
- Teacher at the Fundación Arturo Rosenblueth (1999-2000) (Introduction to Computing undergraduate courses).

## Professional Service

- **Contributing Editor** for Complexity Digest (<http://www.comdig.com>) (2001-)
- **Webmaster** for the International Society of Artificial Life (<http://alife.org>) (2002-)
- **Book and Software Review Editor** for the Artificial Life journal, MIT Press
- **Ad hoc Editor:** Special issue on the Evolution of Complexity. *Artificial Life* (forthcoming 2007) Together with Tom Lenaerts.
- **Ad hoc Reviewer:**
  - **For Books:** MIT Press
  - **For Journals:** Artificial Life, Advances in Complex Systems, Physica D, Europhysics Letters, Journal of Artificial Societies and Social Simulation, International Journal of Unconventional Computing, Acta Biotheoretica,

- International Journal for Equity in Health
- **For Volumes:** Merelli, E., P. Gonzalez and A. Omicini (eds) (2005). LNCS Transaction on Computational Systems Biology.
- **Workshop organization:**
  - Workshop on the Evolution of Complexity, at the ALife X conference. Indiana University, June 3<sup>rd</sup>, 2006. Together with Tom Lenaerts
  - Philosophy and Complexity session of the Complexity, Science and Society Conference 2005. University of Liverpool. September 11-15, 2005.
- **Conference Programme Committee:**
  - ECAL 2007, IXth European Conference on Artificial Life. Lisbon, Portugal
  - International Conference on Complex Systems, ICCS2006. Boston, MA.
  - ALife X, the Tenth International Conference on the Simulation and Synthesis of Living Systems. Indiana University.
  - ECAL 2005 - VIIIth European Conference on Artificial Life. University of Kent.
  - International Congress on Computational Intelligence, CIIC-2005. Montería, Colombia.
  - Multi-Agent Systems and Complexity session of the Complexity, Science and Society Conference 2005. University of Liverpool.
  - International Congress on Computational Intelligence, CIIC-2003, National University of Colombia, Campus Medellín City

## Publications

Abstracts, full articles and unpublished/submitted papers not listed here are available at <http://homepages.vub.ac.be/~cgershen/pubs.html>

## Theses

- Gershenson, C. (forthcoming 2007). Design and Control of Self-organizing Systems. *Unpublished PhD Thesis*. Vrije Universiteit Brussel, Belgium.
- Gershenson, C. (2002). A Comparison of Different Cognitive Paradigms Using Simple Animats in a Virtual Laboratory, with Implications to the Notion of Cognition. *Unpublished MSc Thesis*. School of Cognitive and Computer Sciences. University of Sussex.
- Gershenson, C. (2001). Artificial Societies of Intelligent Agents. *Unpublished BEng Thesis*. Fundación Arturo Rosenblueth, México.

## Books

- Gershenson, C. (Ed.) (forthcoming) *5 Questions on Complexity*. Automatic Press/VIP.
- Gershenson, C, D. Aerts, and B. Edmonds (Eds.). (forthcoming 2006). *Worldviews, Science and Us: Philosophy and Complexity*. World Scientific.

## In Journals

- Gershenson, C. (2007). Book Review: "Life Evolving: Molecules, Mind, and Meaning", by Christian De Duve. *Artificial Life* **13** (1):91-92.
- Gershenson, C. (2005). Self-Organizing Traffic Lights. *Complex Systems* **16** (1): 29-53.
- Gershenson, C. (2004). Cognitive Paradigms: Which One is the Best? *Cognitive Systems Research*, **5** (2):135-156, June 2004.
- Heylighen, F. and C. Gershenson (2003). The Meaning of Self-organization in Computing. *IEEE Intelligent Systems*, section Trends & Controversies - Self-organization and Information Systems, **18** (4):72-75, July/August 2003.
- Gershenson, C. (2002). Philosophical Ideas on the Simulation of Social Behaviour. *Journal of Artificial Societies and Social Simulation* **5** (3).

### **In Books**

- Gershenson, C. (forthcoming 2007). Towards a General Methodology for Designing Self-Organizing Systems. In Bogg, J. and R. Geyer (eds.) *Complexity, Science and Society*. Radcliffe Publishing, Oxford.
- Heylighen, F., P. Cilliers, and C. Gershenson (forthcoming 2007). Complexity and Philosophy. In Bogg, J. and R. Geyer (eds.) *Complexity, Science and Society*. Radcliffe Publishing, Oxford.
- Gershenson, C. and F. Heylighen (2005). How can we think the complex? In Richardson, Kurt (Ed.) *Managing the Complex Volume One: Philosophy, Theory and Application*. Chapter 3. Information Age Publishing

### **In Proceedings:**

- Rodriguez, M.A., Steinbock, D.J., Watkins, J.H., Gershenson, C., Bollen, J., Grey, V., deGraf, B. (2007). Smartocracy: Social Networks for Collective Decision Making, 2007 Hawaii International Conference on Systems Science (HICSS), Track: Electronic Government – E-Democracy, LA-UR-06-2244, Waikoloa, Hawaii, January 2007.
- Gershenson, C., S. A. Kauffman, and I. Shmulevich (2006). The Role of Redundancy in the Robustness of Random Boolean Networks. In Rocha, L. M., L. S. Yaeger, M. A. Bedau, D. Floreano, R. L. Goldstone, and A. Vespignani (Eds.), *Artificial Life X, Proceedings of the Tenth International Conference on the Simulation and Synthesis of Living Systems*. pp. 35-42. MIT Press.
- Gershenson, C. and T. Lenaerts (2006). Evolution of Complexity: Introduction to the Workshop. *Artificial Life X Workshop Proceedings*. pp. 71-72.
- Gershenson, C. (2004). Updating Schemes in Random Boolean Networks: Do They Really Matter? In Pollack, J., M. Bedau, P. Husbands, T. Ikegami, and R. A. Watson (eds.) *Artificial Life IX, Proceedings of the Ninth International Conference on the Simulation and Synthesis of Living Systems*. pp. 238-243. MIT Press.
- Gershenson, C. (2004). Introduction to Random Boolean Networks. In Bedau, M., P. Husbands, T. Hutton, S. Kumar, and H. Suzuki (eds.) *Workshop and Tutorial Proceedings, Ninth International Conference on the Simulation and Synthesis of Living Systems (ALife IX)*. pp. 160-173.

- Gershenson, C. and F. Heylighen (2004). Protocol Requirements for Self-organizing Artifacts: Towards an Ambient Intelligence In *Proceedings of International Conference on Complex Systems ICCS2004*. Also *VUB AI-Lab Memo 04-04*.
- de la Mora-B., C.-R., C. Gershenson and García-Vega, A. (2004). Representation Development and Behavior Modifiers. In Lemaître, C., C. A. Reyes, and J. A. González (Eds.) *Advances in Artificial Intelligence – IBERAMIA 2004: 9th Ibero-American Conference on AI*. p. 504. LNAI 3315. Springer.
- Gershenson, C. and F. Heylighen (2003). When Can we Call a System Self-organizing? In Banzhaf, W, T. Christaller, P. Dittrich, J. T. Kim, and J. Ziegler, *Advances in Artificial Life, 7<sup>th</sup> European Conference, ECAL 2003, Dortmund, Germany*, pp. 606-614. LNAI 2801. Springer.
- Gershenson, C., J. Broekaert, and D. Aerts (2003). Contextual Random Boolean Networks. In Banzhaf, W, T. Christaller, P. Dittrich, J. T. Kim, and J. Ziegler, *Advances in Artificial Life, 7<sup>th</sup> European Conference, ECAL 2003, Dortmund, Germany*, pp. 615-624. LNAI 2801. Springer.
- Gershenson, C. (2003). Comparing Different Cognitive Paradigms with a Virtual Laboratory. *IJCAI-03: Proceedings of the Eighteenth International Joint Conference on Artificial Intelligence*, pp. 1635-6. Morgan Kaufmann.
- Gershenson, C. (2002). Complex Philosophy. *Proceedings of the 1<sup>st</sup> Biennial Seminar on Philosophical, Methodological & Epistemological Implications of Complexity Theory*. La Habana, Cuba. Also in *InterJournal of Complex Systems*, 544.
- Gershenson, C. (2002). Behaviour-based Knowledge Systems: An Epigenetic Path from Behaviour to Knowledge. In Prince, C. G., Y. Demiris, Y. Marom, H. Kozima, and C. Balkenius (eds). *Proceedings of the Second International Workshop on Epigenetic Robotics: Modelling Cognitive Development in Robotic Systems*. pp. 35-41. Lund University Cognitive Studies 94.
- Gershenson, C. (2002). Classification of Random Boolean Networks. In Standish, R. K., M. A. Bedau, and H. A. Abbass (eds.) *Artificial Life VIII: Proceedings of the Eight International Conference on Artificial Life*. pp. 1-8. Sydney, Australia. MIT Press.
- Gershenson, C., M. A. Porter, A. Probst, M. Marko, and A. Das. (2002) A Study on the Relevance of Information in Discriminative and Non-Discriminative Media. *InterJournal of Complex Systems*, 533.
- Das, A., M. Marko, A. Probst, M. A. Porter, and C. Gershenson (2002). Neural Net Model for Featured Word Extraction. *InterJournal of Complex Systems*, 539.
- Marko, M., M. A. Porter, A. Probst, C. Gershenson, and A. Das (2002). Transforming the World Wide Web into a Complexity-Based Semantic Network. *InterJournal of Complex Systems*, 568.
- Gershenson, C. (2001). Comments to Neutrosophy. In Smarandache, F. (Ed.) *Proceedings of the First International Conference on Neutrosophy, Neutrosophic Logic, Set, Probability and Statistics*, pp. 139-146. University of New Mexico. Gallup, NM. Xiquan.
- González, P. P., M. Cárdenas, C. Gershenson, and J. Lagúnez-Otero (2001). Integration of Computational Techniques for the Modelling of Signal Transduction. In N. E.

- Mastorakis and L. A. Pecorelli-Peres (Eds.) *Advances in Systems Science: Measurement, Circuits and Control*. WSES Press.
- González, P. P., C. Gershenson, M. Cárdenas, and J. Lagunez.(2000) Modelling intracellular signalling networks using behaviour-based systems and the blackboard architecture, *Proceedings of the International Conference: Mathematics and Computers in Biology and Chemistry (MCBC 2000)*, Montego Bay, Jamaica.
- Gershenson, C. and P. P. González, (2000). Dynamic Adjustment of the Motivation Degree in an Action Selection Mechanism . *Proceedings of ISA '2000*. Wollongong, Australia.
- Gershenson, C., P. P. González, and J. Negrete. (2000) Thinking Adaptive: Towards a Behaviours Virtual Laboratory. In Meyer et. al. (eds.) *SAB 2000 Proceedings Supplement*. Paris, France. ISAB press.
- Gershenson, C., P. P. González, and J. Negrete. (2000) Action Selection Properties in a Software Simulated Agent, in Cairó et. al. (Eds.) *MICAI 2000: Advances in Artificial Intelligence*. Lecture Notes in Artificial Intelligence 1793, pp. 634-648. Springer-Verlag.
- González, P. P., J. Negrete, A. Barreiro and C. Gershenson.(2000) A Model for Combination of External and Internal Stimuli in the Action Selection of an Autonomous Agent, in Cairó et. al. (Eds.) *MICAI 2000: Advances in Artificial Intelligence*. Lecture Notes in Artificial Intelligence 1793, pp. 621-633. Springer-Verlag.
- Gershenson, C. (1999) Modelling Emotions with Multidimensional Logic. *Proceedings of the 18th International Conference of the North American Fuzzy Information Processing Society (NAFIPS '99)*, pp. 42-46. New York City, NY. IEEE Press.
- Gershenson, C. (1998). Lógica multidimensional: un modelo de lógica paraconsistente. *Memorias XI Congreso Nacional ANIEI*, pp. 132-141. Xalapa, México.
- Gershenson, C. (1998). Control de Tráfico con Agentes: CRASH. *Memorias XI Congreso Nacional ANIEI*. Xalapa, México.
- Gershenson, C. (1997). El Juego de la Vida en 3D. *Memorias X Congreso Nacional ANIEI*. Monterrey, México.
- Gershenson, C. (1997). Aplicaciones de la Topología. *Memorias X Congreso Nacional ANIEI*. Monterrey, México.

**In La Jornada (Mexican national newspaper, scientific divulgation):**

- “Porqué las Máquinas No Conquistarán al Mundo” (Why Machines Will Not Take Over the World). 24/sep/03.
- “Sistemas Complejos” (Complex Systems). 11/dec/00.
- “Manipulando la Evolución” (Manipulating Evolution). 15/nov/99
- “Emergencia y Evolución” (Emergence and Evolution). 25/oct/99
- “Inteligencia Artificial e Inteligencia Natural” (Artificial Intelligence and Natural Intelligence). 14/jun/99
- “Tecnología y desempleo” (Technology and unemployment). nov/9/98
- “Las farmacéuticas y la genética” (Pharmaceutics and genetics), in collaboration with

Jaime Lagunez. 25/may/98

“Pros y contras de la clonación humana” (Pros and cons of human cloning). mar/9/98

“Nuestro futuro genético y la medicina” (Our genetic future and medicine). feb/2/98

### **In local journals:**

“Paradigmas para Diseñar e Implementar Sistemas Complejos” (Paradigms for Designing and Implementing Complex Systems). *InterFAR* 1(8), April 2003

“Medieval”. *Gaceta de Becarios de Telmex*, August, 1997

### **Translations:**

Morin, E. (2007). *Restricted Complexity, General Complexity* (Translated from French by C. Gershenson). In Gershenson, C., D. Aerts, and B. Edmonds (Eds.). *Worldviews, Science and Us: Philosophy and Complexity*. World Scientific.

### **Conferences, Presentations and Talks**

“Towards Self-organizing Bureaucracies” Seminar given to the Evolution, Complexity, and Cognition group, VUB, Brussels, Belgium. January 10<sup>th</sup>, 2007.

“Self-organizing traffic lights: A realistic simulation of the Wetstraat” Presentation given (with Seung Bae Cools) at the cabinet of the Minister of Mobility and Public Works, Pascal Smet. Brussels, Belgium. December 5<sup>th</sup>, 2006.

“A General Methodology for Designing Self-Organizing Systems” Seminar given at IRIDIA, ULB, Brussels, Belgium. October 27<sup>th</sup>, 2006.

“Future Directions in Artificial Life” **Invited panelist** at round table discussion at the ALife X conference. Bloomington, IN, USA, June 7<sup>th</sup>, 2006.

“The Role of Redundancy in the Robustness of Random Boolean Networks” Poster presented at the ALife X conference. Bloomington, IN, USA, June 6<sup>th</sup>, 2006.

“A General Methodology for Designing Self-Organizing Systems” Talk given at Redfish Group. Santa Fe, NM, USA, May 31<sup>st</sup>, 2006.

“A General Methodology for Designing Self-Organizing Systems” Seminar given at the Kansai Advanced Research Center. Kobe, Japan, April 13<sup>th</sup>, 2006.

“Self-Organizing Traffic Lights” Seminar given At Tokyo University, Japan, April 6<sup>th</sup>, 2006.

“A General Methodology for Designing Self-Organizing Systems” **Invited talk** at CSS’05. Liverpool, UK. September 14<sup>th</sup>, 2005.

“Introduction to Random Boolean Networks” Tutorial given (with Andy Wuensche) at the ECAL conference. Canterbury, UK. September 5<sup>th</sup>, 2005.

“Self-organizing traffic lights: An alternative for Brussels” Presentation given at the cabinet of the Minister of Mobility and Public Works, Pascal Smet. Brussels, Belgium. August 24<sup>th</sup>, 2005.

“A General Methodology for Designing Self-Organizing Systems” Seminar given to the Evolution, Complexity, and Cognition group, VUB, Brussels, Belgium. June 17<sup>th</sup>, 2005.

“Self-Organizing Traffic Lights” Seminar given to the Evolution, Complexity, and

- Cognition group, VUB, Brussels, Belgium. January 28<sup>th</sup>, 2005.
- “Self-Organizing Traffic Lights” Poster presented at the 1<sup>st</sup> European Conference on Complex Systems. Torino, Italy, December 5<sup>th</sup>-7<sup>th</sup>, 2004; and at the Nonlinearity, Fluctuations, and Complexity Conference. ULB, Brussels, Belgium, March 16<sup>th</sup>-19<sup>th</sup>, 2005
- “Protocol Requirements for Self-organizing Artifacts: Towards an Ambient Intelligence” and “Self-organizing Traffic Lights”. Double seminar given to the VUB AILab, Brussels, Belgium. November 26<sup>th</sup>, 2004.
- “Updating Schemes in Random Boolean Networks: Do They Really Matter?” Poster presented at the ALife IX conference. Boston, MA, September 14<sup>th</sup>, 2004.
- “Introduction to Random Boolean Networks” Tutorial given (with Andy Wuensche) at the ALife IX conference. Boston, MA, September 12<sup>th</sup>, 2004.
- “Imitation Promotes Cooperation” Talk given at the Social Connectionism Meeting. Genval, Belgium. June 17<sup>th</sup>, 2004.
- “Protocol Requirements for Self-organizing Artifacts: Towards an Ambient Intelligence” Talk given at the 5<sup>th</sup> International Conference on Complex Systems (ICCS). Boston, MA. May 20<sup>th</sup>, 2004.
- “Phase Transitions in Random Boolean Networks with Different Updating Schemes”. Talk given at the Nonlinear Dynamics and Statistical Mechanics Days. Université Libre de Bruxelles. April 27<sup>th</sup>, 2004
- “Updating Schemes in Random Boolean Networks”, “C. S. Lewis’ “The Four Loves” as a Metaphor for Evolution”, and “Topologies and Dynamics of Sexual Networks”. Talks given at the Rule 110 Winterworkshop, Haus Neuland, Bielefeld, Germany. March 6<sup>th</sup> - 13<sup>th</sup>, 2004.
- “When Can we Call a System Self-organizing?” Seminar given at IRIDIA, ULB, Brussels, Belgium. October 6<sup>th</sup>, 2003.
- “Contextual Random Boolean Networks” Talk given at ECAL 2003, Dortmund, Germany. September 16<sup>th</sup>, 2003.
- “When Can we Call a System Self-organizing?” Poster presented at ECAL 2003, Dortmund, Germany. September 16<sup>th</sup>, 2003.
- “Contextual Random Boolean Networks” Talk given at the Centrum Leo Apostel, VUB, Brussels, Belgium. September 2<sup>nd</sup>, 2003.
- “When Can we Call a System Self-organizing?” Talk given at the Centrum Leo Apostel, VUB, Brussels, Belgium. March 11<sup>th</sup>, 2003.
- “Classification of Random Boolean Networks” Talk given at the ALife VIII conference. UNSW, Sydney, Australia. December 11<sup>th</sup>, 2002.
- “Comparing Cognitive Paradigms: Which one is the best?” Talk given to the ALERGIC group. University of Sussex. October 23<sup>rd</sup>, 2002. Also given to the VUB AILab, Brussels, Belgium.. November 22<sup>nd</sup>, 2002
- “Behaviour-based Knowledge Systems: An Epigenetic Path from Behaviour to Knowledge”. Talk given at the Second International Workshop on Epigenetic Robotics. Edinburgh, Scotland. August 10<sup>th</sup>, 2002.
- “KEBA Virtual Laboratory”. Demo given at From Animals to Animats: The Seventh

- International Conference on the Simulation of Adaptive Behavior. Edinburgh, Scotland. August 7<sup>th</sup>, 2002.
- “So... What is Cognition?”. Poster presented at Sussex University. July 10<sup>th</sup>, 2002.
- “On the Subjectivity of Cognition”. Talk given at the Workshop on Distributed Cognition. Center Leo Apostel. Free University of Brussels. July 6<sup>th</sup>, 2002.
- “Complex Philosophy”, “A Study on the Relevance of Information in Discriminative and Non-Discriminative Media”, “Neural Net Model for Featured Word Extraction”, and “Transforming the World Wide Web into a Complexity-Based Semantic Network”. Posters presented at the 4th International Conference on Complex Systems. Nashua, NH, June 10<sup>th</sup>, 2002.
- “Knowledge Emerging from Behaviour”. Talk given to the Cognitive Sciences Group, Lund University, Sweden. May 8<sup>th</sup>, 2002.
- “Contextuality: A Philosophical Paradigm”. Talk given the E-Intentionality group. University of Sussex. March 1<sup>st</sup>, 2002.
- “Classification of Random Boolean Networks”. Talk given to the ALERGIC group. University of Sussex. February 19<sup>th</sup>, 2002.
- “Complex Philosophy”. Talk given to the LOINAS group. University of Sussex. December, 2001.
- “Artificial Societies of Intelligent Agents” BEng Thesis Defense, approved with honours. March 3<sup>rd</sup>, 2001, Fundación Arturo Rosenblueth, México.
- “Un laboratoire comportemental virtuel”. Demo presented in From Animals to Animats: the Sixth International Conference on the Simulation of Adaptive Behavior. September 14<sup>th</sup>, 2000. Paris, France.
- “Thinking Adaptive: Towards a Behaviours Virtual Laboratory”. Poster presented in From Animals to Animats: the Sixth International Conference on the Simulation of Adaptive Behavior. September 11<sup>th</sup>, 2000. Paris, France.
- “Action Selection and Weak Social Action” in the 3rd International Conference of Complex Systems (ICCS3), poster presented May 21<sup>th</sup>, 2000, Nashua, NH.
- “Action Selection Properties in a Software Simulated Agent” Talk given at the 1<sup>st</sup> Mexican International Conference of Artificial Intelligence (MICA I 2000). April 13<sup>th</sup>, 2000, Acapulco, México.
- “A Model for Combination of External and Internal Stimuli in the Action Selection of an Autonomous Agent” Talk given at the 1<sup>st</sup> Mexican International Conference of Artificial Intelligence (MICA I 2000). April 13<sup>th</sup>, 2000, Acapulco, México.
- “Manipulating Evolution” **Invited talk** at the 8va Semana de Biología Experimental, UAM Iztapalapa, México. October 27<sup>th</sup>, 1999.
- “Modelling Emotions with Multidimensional Logic”. Talk given at the 18th International Conference of the North American Fuzzy Information Process Society – NAFIPS '99, New York City, NY. June 10<sup>th</sup>, 1999.
- “Towards a Revolution in Science and Philosophy”, **Invited talk** at the XI Semana Académica de la UAQ, Querétaro, México. March 16<sup>th</sup>, 1999.
- “Modelling Emotions with Multidimensional Logic”, **Invited talk** at the XI Semana Académica de la UAQ, Querétaro, México. March 16<sup>th</sup>, 1999.

“Multidimensional Logic: a model of paraconsistent logic”. Talk at the XI Congreso Nacional de la ANIEI (Asociación Nacional de Instituciones de Enseñanza en Informática) sobre Informática y Computación. Xalapa, Mexico. October 8<sup>th</sup>, 1998.

“Traffic Control with Agents: CRASH”. Talk at the XI Congreso Nacional de la ANIEI sobre Informática y Computación. Xalapa, Mexico. October 8<sup>th</sup>, 1998.

“Topology Applications”. Talk at the X Congreso Nacional de la ANIEI sobre Informática y Computación, Monterrey, México. October 9<sup>th</sup>, 1997.

“Game of Life in 3D”. Talk at the X Congreso Nacional de la ANIEI sobre Informática y Computación, Monterrey, México. October 8<sup>th</sup>, 1997.

## Scientific Software Developed

The programs and their source code are available at the listed webpages.

- RAN: Random Agent Networks: A simple simulation for illustrating the benefits of self-organization in social organizations. Java. 2006.
  - <http://rans.sourceforge.net/>
- SOTL: Self-organizing Traffic Lights. Multi-agent traffic simulation of a simple regular city. NetLogo. 2004-2005.
  - <http://homepages.vub.ac.be/~cgershen/sos/#sotl>
- RBNLab: A software laboratory for studying the properties of different types of random Boolean networks. Java. 2001-2005.
  - <http://rbn.sourceforge.net/>
- SOTraCon: Self-organizing Traffic Control. Virtual Laboratory. Java 3D. 2003.
  - <http://homepages.vub.ac.be/~cgershen/sos/#sotracon>
- KEB: A virtual laboratory for comparing different types of cognitive architectures. Java 3D. 2001-2002.
  - <http://homepages.vub.ac.be/~cgershen/cogs/keb/>
- ASIA: A behavioural virtual laboratory used for studying Artificial Societies of Intelligent Agents. Java and VRML. 1999-2001.
  - <http://homepages.vub.ac.be/~cgershen/jlagunez/asia/bvl/>
- CRASH: Car and Road Automated Simulation in Hyperways. Agent-based traffic simulation where cars do not stop at crossings. C++. 1998.
  - <http://homepages.vub.ac.be/~cgershen/jlagunez/crash/>

## Media & Popular Science Coverage

- 'Smart' Traffic Lights Sense Congestion. Anna Salleh. *Discovery News*. 2006/11/02. <http://tinyurl.com/3xkpfh>
- *Le peuple des connecteurs*. Thierry Crouzet. Bourin Editor, 2006. <http://tinyurl.com/fo5pq>
- Self-organizing systems design. In *Complexity at Large*. *Complexity* 11(1):4,

2005/10/18.

- Les feux de croisement sont capables de s'autogérer. *Science & Vie* 1049, Février 2005, p. 32
- Adaptive lights organize traffic. Kimberly Patch, *Technology Research News*. 2005/01/26. <http://tinyurl.com/ghesm>
- Matemáticas antes de cruzar. *Página 12*. 2005/01/07. <http://tinyurl.com/y8cby7>
- Zet zelf het licht op groen. *De Tijd* 2004/12/13, p. 17.
- Alle macht aan de verkeerslichten. *Trends.be*. 2004/12/09. <http://tinyurl.com/z7xbr>
- Grüne Welle auf Verlangen. *Bayerischer Rundfunk* 2004/12/08. <http://tinyurl.com/g6ma9>
- Ampel Je nach Verkehr von Rot auf Grün. *Wienweb.at* 2004/12/07. <http://tinyurl.com/tlnt2>
- Perfekte Ampelschaltung. *Berliner Morgenpost* 2004/12/07. <http://tinyurl.com/sfhxc>
- Beating the lights. Philip Ball, *News @ Nature* 2004/12/03. <http://tinyurl.com/j43ar>
- Rules aim to get devices talking. Eric Smalley, *Technology Research News*. 2004/06/02. <http://tinyurl.com/jtkrw>

## Collaborators

**Biology:** Stuart A. Kauffman, Jaime Lagunez-Otero, Tom Lenaerts, Ilya Shmulevich, Andrew Wuensche

**Computer Science:** Johan Bollen, Seung-Bae Cools, Carlos-Rubén de la Mora-Basañez, Angélica García-Vega, Pedro-Pablo González-Pérez, José Negrete-Martínez, Marko A. Rodríguez, Daniel J. Steinbock, Jennifer H. Watkins

**Philosophy:** Paul Cilliers, Bruce Edmonds

**Physics:** Diederik Aerts, Jan Broeckaert, Atin Das, Bart D'Hooghe, Francis Heylighen, Gottfried Mayer-Kress, Mason A. Porter

## Mentors

Javier Fernández-Pacheco, Jaime Lagunez-Otero, Pedro-Pablo González-Pérez, José Negrete-Martínez, José-Luis Mateos, Inman R. Harvey, Ezequiel A. Di Paolo, Andy Clark, Chris Thornton, Francis Heylighen, Diederik Aerts, Julián-José Merelo-Guervós.

## Students Advised

- Seung Bae Cools. «A realistic simulation for self-organizing traffic lights». BSc in Computer Science, Vrije Universiteit Brussel. 2005-2006.

## Awards

- CONACYT scholarship for graduate studies, Mexico (2001-)
- Fundación Telmex scholarship, Mexico (1996-2001).

- Karyn Kupcinec International Summer School, Weizmann Institute of Science, Israel (1999)
- SEP scholarship, Mexico (1989-1991).

## Remarks

- 1<sup>st</sup> place at the prototypes contest of the EXPO ESCOM 98, with CRASH (Car and Road Automated Simulation in Hyperways).
- 2<sup>nd</sup> place at the 3<sup>rd</sup> (Mexican) Informatics Olympiad (1998).
- Zone finalist in: Ruta Hidalgo (6<sup>th</sup> grade), (Mexican) Mathematics Olympiad (9<sup>th</sup> and 12<sup>th</sup> grades), and (Mexican) Chemistry Olympiad (11<sup>th</sup> grade).
- Participant in 9 (Mexican) National Swimming Championships (1993-1997) and finalist in 3 of them.
- Collaborator in the book “Los Derechos Humanos Para Niños” (Human Rights for children). ISBN 968-7456-34-5.
- Author of the novels: “Nacidos para morir” (Born to die) registered at the Dirección General de Derechos de Autor (Num. of reg. 116171), and “Nacidos para morir, segunda parte” (Born to die, part 2)(Num. of reg. 147352).
- Author of “Cuentos” (Tales). (Num. of reg. 147351)

## Skills

- **Languages:** Native: Spanish, Fluent: English, Conversational: Russian, French, Dutch. Reading: Portuguese, Italian.
- **Sciences:** mathematics, physics, electronics, systems theory, evolution theory, complexity theory.
- **Computing Sciences:** structured, object-oriented, and agent-oriented programming, structured, object-oriented, and agent-oriented analysis and design, data structures, file organization, data bases, compilers, operating systems.
  - **Programming languages:** Java, Pascal, Delphi, C, C++, Smalltalk, LISP, Prolog, APL, J, NetLogo.
  - **Operating Systems:** Linux, Irix, Solaris, MacOS, OpenStep, Windows, DOS.
  - **Various:** UML, Rational Rose, Mathematica, Matlab, Derive, HTML, VRML, Java3D, SQL, Informix, Tuxedo.
- **Artificial intelligence:** Behaviour-based systems, knowledge-based systems, evolutionary and adaptive systems, expert systems, artificial neural networks, knowledge representation, multi-agent systems, artificial societies.
- **Philosophy:** Logics, ontology, aesthetics, ethics, epistemology.
- **Art:** drawing, painting, photography, poetry and prose.

## Professional References

**Dr. Stuart A. Kauffman**

[skauffman@ucalgary.ca](mailto:skauffman@ucalgary.ca) +1 (403) 220-8349

Director, The Institute for Biocomplexity and Informatics  
The University of Calgary. Calgary, AB. T2N 1N4 Canada

**Mark A. Bedau**

[mab@reed.edu](mailto:mab@reed.edu) +39 041 2346931

Professor of Philosophy and Humanities, Reed College  
Adjunct Professor of Systems Science, Portland State University  
Editor-in-Chief, Artificial Life  
3203 SE Woodstock Blvd. Portland OR 97202-8199, USA

**Dr. Inman R. Harvey**

[inmanh@sussex.ac.uk](mailto:inmanh@sussex.ac.uk) +44 1273 678431

Senior Lecturer in CS and AI, Department of Informatics, University of Sussex  
Brighton BN1 9QH, United Kingdom

**Dr. Ezequiel A. Di Paolo**

[ezequiel@sussex.ac.uk](mailto:ezequiel@sussex.ac.uk) +44 1273 877763

Senior Lecturer in Evolutionary and Adaptive Systems  
Department of Informatics, University of Sussex  
Brighton, BN1 9QH, United Kingdom

**Prof. Dr. Francis Heylighen**

[fheyligh@vub.ac.be](mailto:fheyligh@vub.ac.be) +32 2 640 67 37

Director. Evolution, Complexity and Cognition group  
Center Leo Apostel for Interdisciplinary Studies, Vrije Universiteit Brussel  
Krijgskundestraat 33, B-1160 Brussel – Belgium

**Dr. José Negrete-Martínez**

[jnegrete@uv.mx](mailto:jnegrete@uv.mx) +52 288 817 2957

Departamento de Inteligencia Artificial. Facultad de Física e Inteligencia Artificial  
Universidad Veracruzana

Departamento de Biología Celular y Fisiología. Instituto de Investigaciones Biomédicas.  
UNAM. Unidad Periférica en Xalapa. Veracruz. México.  
Calle Sebastián Camacho #5, Xalapa Centro. CP 91000. Veracruz. México.