

Shingo Takahashi, David Sallach, Juliette Rouchier (Eds.)

Advancing Social Simulation: The First World Congress

Shingo Takahashi, David Sallach,  
Juliette Rouchier (Eds.)

# Advancing Social Simulation: The First World Congress

With 108 Figures



Springer

Shingo Takahashi  
Professor  
Waseda University  
3-4-1 Okubo, Shinjuku, Tokyo 169-8555, Japan

David Sallach  
Associate Director  
Center for Complex Adaptive Agent Systems Simulation  
Argonne National Laboratory  
9700 South Cass Avenue, Bldg. 900  
Argonne, IL 60439-4832, USA

Juliette Rouchier  
GREQAM  
2 rue de la charite 13236  
Marseille cedex 02, France

Library of Congress Control Number: 2007931734

ISBN 978-4-431-73150-4 Springer Tokyo Berlin Heidelberg New York

Printed in Japan

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in other ways, and storage in data banks.

The use of registered names, trademarks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

Springer is a part of Springer Science+Business Media  
springer.com  
© Springer 2007  
Printed in Japan

Typesetting: Camera-ready by the editors and authors  
Printing and binding: Hicom, Japan

Printed on acid-free paper

---

## Foreword

The First World Congress on Social Simulation (WCSS '06) was held at Kyoto University, Japan, August 21-25, 2006. WCSS '06 was the first joint congress in cooperation with the three leading regional associations for social simulation domains: the Pacific Asian Association for Agent-Based Approach in Social Systems Sciences (PAAA), the North American Association for Computational Social and Organization Science (NAACSOS), and the European Social Simulation Association (ESSA).

The idea to have the world congress started at the beginning of the new millennium. Although differences of objective, agenda and approach existed, WCSS '06 has provided a splendid opportunity for adherents to these different approaches to explore their differences, to identify common features and goals, and perhaps to define and agree regarding methods and criteria for evaluating the strengths, limitations and potentials of simulation techniques and applications.

Thanks to tremendous efforts of the representatives of these societies, WCSS '06 was co-hosted by the Tokyo Institute of Technology, 21st Century COE Program: Creation of Agent-Based Social Systems Sciences; Kyoto University, 21st Century COE Program: Informatics Research Center for Development of Knowledge Society Infrastructure, 21st Century COE Program: Interfaces for Advanced Economic Analysis, Academic Center for Computing and Media Studies, Kyoto University, Department of Social Informatics; and the Japan Society for Promotion of Sciences (JSPS).

WCSS '06 was successful, because of so many contributors, attendees, and committee members from around the world. The success of WCSS '06 was one small step for us, one giant leap for the new emerging scientific area: social simulation. On behalf of the congress committee, it is my great pleasure to publish the post-proceedings. The contents of the proceedings will be useful for all those who have an interest in social simulation.

Professor Takao Terano, Conference Chair  
Department of Computational Intelligence and Systems Science  
Tokyo Institute of Technology  
January, 2007

---

## Preface

It is our pleasure to publish *Advancing Social Simulation: The First World Congress* as the post-proceedings of the First World Congress on Social Simulation (WCSS '06) held at Kyoto University, Japan, August 21-25, 2006.

Agent-based modeling and social simulation have emerged as both developments of, and sometimes challenges to, the social sciences. Developments from within the social sciences include agent-based computational economics and investigations of theoretical sociological concepts using formal simulation techniques. Challenges to the social sciences include the development of qualitative modeling techniques, the implementation of agent-based models to investigate phenomena for which conventional economic, social, and organizational models have no face validity, and the application of physical modeling techniques to social processes.

Approaches to model and theory validation have also been changed by the advent of agent-based social simulation as econophysicists and others develop models that produce numerical outputs that are difficult to analyze by classical statistical or econometric methods. Some scholars use logic-based social simulation approaches to search for new social theory, while others question whether such theory is possible or even necessary. It is increasingly common to develop social simulation models and approaches that transcend disciplinary boundaries. Emergence of social structures and norms through dynamic social interaction has long been an important concern.

Computational researchers have developed interests in agent-based social simulation as a new scientific field and to provide test beds of new computer and network technologies. Also there are practical requirements to uncover phenomena of complex social activities such as world economics, cooperation and competition across regions, social networks, environmental issues such as social impacts of climate change, and spreading of epidemic diseases.

The first World Conference on Social Simulation (WCSS '06) was intended to bring together all of these approaches to social simulation and these research agendas. WCSS '06 was sponsored by the main regional societies for social simulation research: the Pacific Asian Association for Agent-Based Ap-

proach in Social Systems Sciences (PAAA), the hosts and local organizers of the conference; the North American Association for Computational Social and Organizational Science (NAACSOS); and the European Social Simulation Association (ESSA).

As a collaborative effort, the three Program Committee Co-Chairs were actually nominated from each regional society, and the Program Committee consisted of 103 members in total. Though we were geographically apart from one another, we had kept in close communication electronically and contributed equally to the process of program formation.

The Program Committee concentrated only on selecting regular papers for oral and poster presentations. To regular sessions, 99 full papers were submitted. Each paper submitted was reviewed by three reviewers, each of whom was assigned from each regional society. Reflecting the state that the area of social simulation has been widely developing, the evaluations of three reviewers for one paper could often be split. To put them together, the average score of each paper was calculated from the evaluation scores with the confidence of the reviewers. Finally, according to the ordering of the averages, 91 full papers were accepted, 75 for oral presentations and 16 for poster ones.

This book includes 24 regular papers and 2 student contest awards papers as well as the plenary and invited talks, which have been selected by the three Program Committee Co-Chairs.

We are grateful for the efforts of the Program Committee members who reviewed various types of papers. Also, we would like to express much gratitude to all of the authors for contributing their works.

Finally, special thanks are owed to the Organizing Committee members Mr Shogo Iwashita and Mr Yusuke Goto for their excellent assistance in handling so many operations concerning the reviewing and editing processes.

Program Committee Co-Chairs

Shingo Takahashi (PAAA)  
David Sallach (NAACSOS)  
Juliette Rouchier (ESSA)

---

# Contents

<b>KAIZEN for Agent-Based Modeling</b> <i>Takao Terano</i> .....	1
<b>Collective Decisions in Multi-Agent Systems</b> <i>Frank Schweitzer</i> .....	7
<b>Logic for Situated Action</b> <i>David L. Sallach</i> .....	13
<b>Complexity and the Place of Formalism in Social Science</b> <i>Scott Moss</i> .....	23
<b>Toward a Productive Interaction Between Simulations and Theory in Economic Science</b> <i>Yoshinori Shiozawa</i> .....	35
<b>Emergence of Peace due to Neutral Attitude Toward Others</b> <i>Yutaka Nakai</i> .....	47
<b>A Roadmap to Realistic Computational Models of Civil Wars</b> <i>Luc Girardin, Lars-Erik Cederman</i> .....	59
<b>Why Do We Like to Stay with Our Friends? Modelling the Evolutionary Dynamics of Interpersonal Commitment</b> <i>Istvan Back, Andreas Flache</i> .....	71
<b>The Fate of Bilingualism in a Model of Language Competition</b> <i>Xavier Castelló, Lucía Loureiro-Porto, Víctor M. Eguíluz, Mari San Miguel</i> .....	83
<b>A Comparative Study of Order-Driven and Quote-Driven Markets Using Artificial Markets</b> <i>Tsuyoshi Matsunaga, Hajime Kita</i> .....	95

<b>A Hybrid Approach to Modelling Advertising Effects — An Application to Optimal Lying in the Software Business</b> <i>Jürgen Wöckl, Alfred Taudes</i> .....	107
<b>Emergence of the Leader-Follower Structure Among Consumers: What Type of Consumers Would Be the Most Influential in the Marketplace?</b> <i>Makoto Mizuno, Shoichiro Inoue, Masami Noguchi</i> .....	117
<b>A Declarative Model Assembly Infrastructure for Verification and Validation</b> <i>M. J. North, T. R. Howe, N. T. Collier, J. R. Vos</i> .....	129
<b>What if Hayek Goes Shopping in the Bazaar?</b> <i>Enrico E. Bertacchini, Marco Lamieri</i> .....	141
<b>Making More Sense of Agent-Based Simulation for Agricultural Policy Analysis</b> <i>Kathrin Happe, Konrad Kellermann</i> .....	153
<b>Multi-Agent Simulations to Explore Rules for Rural Credit Management in a Highland Farming Community of Northern Thailand</b> <i>Cécile Barnaud, François Bousquet, Guy Trebuil</i> .....	165
<b>Interactive Agent-Based Simulation Environment of SABER</b> <i>Akira Sasaki, Hiroshi Deguchi</i> .....	177
<b>Agent-Based Modeling Simulation of Social Adaptation and Long-Term Change in Inner Asia</b> <i>Claudio Cioffi-Revilla, Sean Luke, Dawn C. Parker, J. Daniel Rogers, William W. Fitzhugh, William Honeychurch, Bruno Frohlich, Paula DePriest, Chunag Amartuvshin</i> .....	189
<b>Effective Guidelines for Organizational Learning in the Organizational Cybernetics Framework</b> <i>Yusuke Goto, Shingo Takahashi</i> .....	201
<b>Newcomers in Self-Organising Task Groups: A Pilot Study</b> <i>Kees Zoethout, Wander Jager, Eric Molleman</i> .....	213
<b>Learning and Belief Dissemination Through Coaction</b> <i>Juliette Rouchier, Hironori Shiina</i> .....	225
<b>The Emergence of Social Networks from Interactive Learning</b> <i>José I. Santos, Ricardo del Olmo, Javier Pajares</i> .....	237



<b>Guess You're Right on This One Too: Central and Peripheral Processing in Attitude Changes in Large Populations</b> <i>Wander Jager, Frédéric Amblard</i> . . . . .	249
<b>Vulnerability of Cooperation on Scale-Free Networks</b> <i>Yoshifumi Ishida, Hitoshi Yamamoto, Isamu Okada, Toshizumi Ohta</i> . . .	261
<b>Evolution of Compassion Under Un-Repeated Interaction</b> <i>Shinsuke Suzuki, Eizo Akiyama</i> . . . . .	273
<b>The Signals of Play: An ABM of Affective Signatures in Children's Playgroups</b> <i>Shana K. Schmidt, William A. Griffin</i> . . . . .	283
<b>e*plore v.0: Principia for Strategic Exploration of Social Simulation Experiments Design Space</b> <i>Luis Antunes, Helder Coelho, João Balsa, Ana Respício</i> . . . . .	295
<b>Hominids Foraging in a Complex Landscape: Could <i>Homo ergaster</i> and <i>Australopithecus boisei</i> Meet Their Calories Requirements?</b> <i>Marco A. Janssen, Jeanne M. Sept, Cameron S. Griffith</i> . . . . .	307
<b>Dynamics of Task Oriented Agent Behaviour in Multiple Layer Social Networks</b> <i>Andreas Ernst, Friedrich Krebs, Claudia Zehnpfund</i> . . . . .	319
<b>Modelling Migration in the Sahel: An Alternative to Cost-Benefit Analysis</b> <i>Bogdan Werth, Scott Moss</i> . . . . .	331
<b>Case-Based Model of Emotional Expression Influence on Work Group Socialization and Performance</b> <i>Lu Yang, Nigel Gilbert</i> . . . . .	343

---

# WCSS '06 Organization

## Conference Chair

**Takao Terano**, Tokyo Institute of Technology, Japan

## Program Committee Co-Chairs

**Shingo Takahashi**, Waseda University, Japan

**David L. Sallach**, Argonne National Laboratory, USA

**Juliette Rouchier**, GREQAM, France

## Student Demonstrations, Exhibitions, & Work-shops Co-Chairs

**Hiroshi Deguchi**, Tokyo Institute of Technology, Japan

**Claudio Cioffi-Revilla**, George Mason University, USA

**Wander Jager**, University of Groningen, The Netherlands

## Program Committee Members

### PAAA

**David Batten**, Commonwealth Scientific and Industrial Research Organisation, Australia

**Shu-Heng Chen**, National Chengchi University, Taiwan

**Sung-Bae Cho**, Yonsei University, Korea

**Hiroshi Deguchi**, Tokyo Institute of Technology, Japan

**Norman Foo**, University of South Wales, Australia

**Lee Hau**, The Kyoto College of Graduate Studies for Informatics, Japan

**Takanori Ida**, Kyoto University, Japan

**Toru Ishida**, Kyoto University, Japan

**Masayuki Ishinishi**, Japan Defense Agency, Japan

**Toshiyuki Kaneda**, Nagoya Institute of Technology, Japan

**Toshiji Kawagoe**, Future University-Hakodate, Japan

**Kyoichi Kijima**, Tokyo Institute of Technology, Japan

**Hajime Kita**, Kyoto University, Japan

**Yusuke Koyama**, Tokyo Institute of Technology, Japan  
**Kambiz Maani**, The University of Auckland, New Zealand  
**Hiroyuki Matsui**, Kyoto University, Japan  
**Ryan McAllister**, Commonwealth Scientific and Industrial Research Organisation, Australia  
**Yutaka Nakai**, Shibaura Institute of Technology, Japan  
**Yoshihiro Nakajima**, Osaka City University, Japan  
**Yasuhiko Nakashima**, Nara Institute of Science and Technology, Japan  
**Akira Namatame**, National Defense Academy, Japan  
**Isamu Okada**, Soka University, Japan  
**Isao Ono**, Tokyo Institute of Technology, Japan  
**Philippa Pattison**, The University of Melbourne, Australia  
**Panomsak Promburom**, Chang Mai University, Thailand  
**Utomo Sarjono Putro**, Institut Teknologi Bandung, Indonesia  
**Ryo Sato**, University of Tsukuba, Japan  
**Naoki Shiba**, Nihon University, Japan  
**Keiki Takadama**, The University of Electro-Communications, Japan  
**Takao Terano**, Tokyo Institute of Technology, Japan  
**David W. K. Yeung**, Hong Kong Baptist University and St. Petersburg State University, China  
**Keiko Zaima**, Senshu University, Japan

#### NAACSOS

**Steve Bankes**, Evolving Logic, USA  
**Kathleen Carley**, Carnegie Mellon University, USA  
**Dawn Cassandra Parker**, George Mason University, USA  
**Claudio Cioffi-Revilla**, George Mason University, USA  
**William Griffen**, Arizona State University, USA  
**Timothy Gulden**, University of Maryland, USA  
**Tom Howe**, Argonne National Laboratory, USA  
**Marco Janssen**, Indiana University, USA  
**David Lazar**, Harvard University, USA  
**Blake LeBaron**, Brandeis University, USA  
**Zhian Li**, Argonne National Laboratory, USA  
**Sean Luke**, George Mason University, USA  
**Charles Macal**, Argonne National Laboratory, USA  
**Michael Macy**, Cornell University, USA  
**William McKelvey**, UCLA, USA  
**Veena Mellarkod**, Texas Tech University, USA  
**Collier Nicholson**, Argonne National Laboratory, USA  
**Michael North**, Argonne National Laboratory, USA  
**Jonathon Ozik**, University of Chicago, USA  
**Scott Page**, University of Michigan, USA  
**Michael Prietula**, Emory University, USA  
**William Rand**, Northwestern University, USA

**Robert Reynolds**, Wayne State University, USA  
**Fabio Rojas**, Indiana University, USA  
**Keven Ruby**, University of Chicago, USA  
**Keith Sawyer**, Washington University, USA  
**Darren Schreiber**, University of Pennsylvania, USA  
**Maksim Tsvetovat**, George Mason University, USA  
**Ronald G. Whitfield**, Argonne National Laboratory, USA  
**H. Peyton Young**, John Hopkins University, USA

## ESSA

**Ryan Mac Allister**, Commonwealth Scientific and Industrial Research Organisation, Australia  
**Frederic Amblard**, Université de Toulouse I, France  
**Luis Antunes**, Porto University, Portugal  
**Olivier Barreteau**, CEMAGREF, France  
**Sibertin-Blanc**, IRIT, Université de Toulouse 1, France  
**Lars-Erik Cedermann**, Swiss Federal Institute of Technology Zurich (ETH), Switzerland  
**Rosaria Conte**, Institute for Cognitive Science and Technology (ISTC/CNR), Italy  
**Nuno David**, Instituto de Ciências do Trabalho e da Empresa (ISCTE), Portugal  
**Guillaume Deffuant**, CEMAGREF, France  
**Alessio Delre**, University of Groningen, The Netherlands  
**Alexis Drogoul**, Université Paris 6, LIP6, France  
**Bruce Edmonds**, Centre for Policy Modelling, Manchester Metropolitan University, UK  
**Andreas Flache**, University of Groningen, The Netherlands  
**Gale Gboyd**, Argonne National Laboratory, USA  
**Nigel Gilbert**, University of Surrey, UK  
**Nick Gotts**, MacAulay Institute, UK  
**David Hales**, University of Bologna, Italy  
**Rainer Hegselmann**, Bayreuth University, Germany  
**Arvid Hoffmann**, University of Groningen, The Netherlands  
**Cesareo Hernandez Iglesias**, University of Valladolid, Spain  
**Luis Izquierdo**, Macaulay Land Use Research Institute, UK  
**Wander Jager**, University of Groningen, The Netherlands  
**Jean-Daniel Kant**, Université Paris 6, LIP6, France  
**Scott Moss**, Centre for Policy Modelling, Manchester Metropolitan University, UK  
**Michael Möhring**, Koblenz University, Germany  
**Emma Norling**, Centre for Policy Modelling, Manchester Metropolitan University, UK  
**Javier Pajares**, Universidad de Valladolid, Spain

**Mario Paolucci**, Institute for Cognitive Science and Technology (ISTC/CNR), Italy

**Adolfo López-Paredes**, INSISOC, University of Valladolid, Spain

**Jaime Simao Sichman**, University of Sao Paulo, Brazil

**Alex Smadjl**, Commonwealth Scientific and Industrial Research Organisation, Australia

**Rodolfo Sousa**, Centre for Policy Modelling, Manchester Metropolitan University, UK

**Flaminio Squazzoni**, University of Brescia, Italy

**Richard Taylor**, Centre for Policy Modelling, Manchester Metropolitan University, UK

**Klaus Troitzsch**, Koblenz University, Germany

**Harko Verhagen**, Stockholm University, Sweden

**Nils Weidmann**, Swiss Federal Institute of Technology Zurich (ETH), Switzerland

## **Local Arrangement Co-Chairs**

**Hajime Kita**, Kyoto University, Japan

**Hiroyuki Matsui**, Kyoto University, Japan

## **Local Arrangement Committee**

**Yusuke Arai**, Tokyo Institute of Technology, Japan

**Lee Hau**, The Kyoto College of Graduate Studies for Informatics, Japan

**Reiko Hishiyama**, Waseda University, Japan

**Yusuke Koyama**, Tokyo Institute of Technology, Japan

**Mikihiko Mori**, Kyoto University, Japan

**Naoki Mori**, Osaka Prefecture University, Japan

**Yoshihiro Nakajima**, Osaka City University, Japan

**Takashi Yamada**, Tokyo Institute of Technology, Japan