

Special issue on: Social simulation

The challenge of social simulation: an introduction to the special issue

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Abstract This special issue on social simulation presents a collection of selected papers from the 5th conference of the European Social Simulation Association held in Brescia, Italy 1st to 5th September 2008. This collection includes multi-faceted research from this trans-disciplinary community that revolves around social simulation.

Keywords Social simulation · ESSA · Social systems · Complex systems · Micro–macro link

1 Introduction

This special issue consists of a collection of selected papers that were presented at the fifth conference of the European Social Simulation Association held in Brescia 1st to 5th September 2008. Although not intentionally aimed at providing a close representation from the wide variety of topics presented at the conference, it does exemplify the multi-faceted research of this community that revolves around social simulation.

Presently chaired by Rosaria Conte (Scott Moss, Nigel Gilbert and Wander Jager as past-presidents), The European Social Simulation Association (ESSA) was originally established in 2003 to bring together scientists from various disciplines interested in promoting social simulation research, education and application in Europe. It also cooperates with other similar scientific associations established in the US (NAACSOS) and in Japan (PAAA). Although relatively recent, the association now has about four hundred members, a particularly successful

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newsletter (now managed by Nick Gotts with past contributions from David Hales, Frédéric Amblard, Shah Jamal Alam and Bogdan Werth). It has five special interest groups on topics such as market dynamics, policy, social conflict, reputation and societal transitions and actively promotes conferences, workshops, seminars and education initiatives, particularly addressed to post-graduate and PhD students.

ESSA scientists originate from various disciplines, including social sciences, cognitive sciences, political sciences, economics, computer sciences, ecology, artificial intelligence, philosophy and physics, all share a common objective of explaining social phenomena by using computer simulation models. This brief introductory paper aims to put these papers into context and to highlight the main challenges facing social simulation.

2 What is social simulation and its challenges

Social simulation is the study of social outcomes using computer simulation where agents' behaviour, interaction between agents and environmental constraints (e.g., geography, space, institutions and structural conditions) are explicitly modelled to explain social phenomena (e.g., Macy 2002; Epstein 2006). Computer simulation is used to understand the generative process between assumptions on a micro-level (e.g., how agents behave, how they interact) and the consequences that agents' interactions create over time at a macro level, as well as to understand the impact of macro level dynamics on a micro level.

In respect to conventional analytic models, the added value of social simulation models (i.e., agent-based models) is that they involve enough descriptive information to capture the peculiarity of social interaction. Unlike standard economics, social simulation models are explicitly based on a realistic picture of human behavior that uses evidence from experimental behavioral sciences, social psychology and the social sciences. Agents are considered adaptively and/or rationally bounded heterogeneous entities, which interact locally and are influenced by others' behavior. There is no pre-established analytic interest in finding an equilibrium solution. On the contrary, social simulation researchers are interested in analyzing micro–macro properties, in particular out-of-equilibrium dynamics that emerge from local dispersed interactions. Unlike quantitative macro sociology, as well as other simulation methods (i.e., system dynamics), social simulation is focused on generative processes and explanations, i.e., on explicit representation of agents and their heterogeneity (Epstein 2006; Gilbert 2008).

As Amblard and Jager correctly pointed out (2008), social systems have complex properties that are hard to reduce and predict. Basically, this is because social systems largely depend on interactions between agents in terms of beliefs and preferences, positions in the social structure and network, information and are particularly susceptible to social influences. This implies that small details at a micro level can make a big difference at the macro level, that understanding system behavior depends on non-linear aggregation mechanisms and that closed analytical solutions do not always apply. Moreover, cognition in social agents adds complexity

to the analysis, as, unlike many physical and natural systems, social systems are not only complex at a macro level, i.e., in aggregation, but also at a micro level.

To paraphrase Edmonds, Hernandez and Troitzsch (2007), this makes social simulation the ‘killer application’ of agent-based computer simulation modeling. First, this is so from the point of view of computational techniques, since the challenge of applying agent-based models to social phenomena involves the new development of methods and tools (i.e., including empirical data or cognitive properties in agent modules). Secondly, from a substantive point of view, as social simulation models can effectively reconcile cognitive, behavioral and social sciences, as well as even larger trans-disciplinary collaboration.

3 Contents of the special issue

As we have said, this special issue represents a wide range of topics, in most cases by breaking the boundaries between sciences and disciplines, looking for effective new connections and starting from issues rather than from pre-established grand theories.

The first paper by Paul Ormerod and Greg Wiltshire addresses the relevance of social networks to understand the impressive growth of binge drinking among young people in the UK. This is an emerging social phenomenon not only in the UK, which has serious consequences for public health and needs policy solutions. This paper is a brilliant example of how answers can be found when an agent-based model is used with empirical data. At the same time, it allows us to appreciate the empirical relevance of social networks to explain a social outcome.

The second paper by Marco Campenni, Giulia Andrighetto, Federico Cecconi and Rosaria Conte enters the realm of social norms, i.e., an issue of paramount interest for social simulation. The authors illustrate a model that helps reframe the standard micro–macro view on norms including more precise attention to the macro-micro properties of norms, e.g., “immergence”. Unlike standard views on norms in social simulation and institutional and evolutionary economics, here the interest is on how norms are cognitively recognized by agents and how this recognition makes a concrete difference, e.g., by explaining norm innovation.

The third paper by Mohamed Abdou and Nigel Gilbert presents an interesting model that combines social and economic analysis of workplace segregation. The authors develop a simple model that helps overcome the traditional static or linear approach to this issue and allows us to capture the co-evolution of social and workplace segregation.

The fourth paper by Edmund Chattoe-Brown is an ambitious paper that refines sociological theories on rational action by taking into account communication and socially shared information. By doing this, the author shows how social simulation model can be used to extend more traditional views on individual choice.

The fifth paper by Mark A. Kramer, Roger Costello and John Griffith shows how social simulation models can achieve not only powerful analytic results but can also seriously cover policy concerns. The authors give an original model that helps us understand how citizens could be used as “sensors” to help repress violence and

other social conflict issues. By emphasizing reputation mechanisms, the model concludes that policy and institutional interventions on social systems can positively affect social control in new ways. This paper contributes to the growing literature on policy issues in social simulation.

The sixth paper by Edoardo Mollona and Andrea Marozzi represents the vast field of social simulation concerned with organisational theories and models, which seems to be more lively in the US and in Japan than in Europe. The authors show self-organization mechanisms that combine network structures and organizational tasks.

The last paper by İlker Yildirim and Pinar Yolum focuses on the collaboration between agents in symbiotic groups, by suggesting interesting extensions of previous models. This paper is an example of the growing contribution that computer scientists are providing to social simulation.

Last but not least, the sixth ESSA conference will be held at the University of Surrey, Guilford, UK, 14th to 18th September 2009, organized by Nigel Gilbert with the collaboration of Bruce Edmonds. Thanks to the collaboration between ESSA, NAACSOS, and PAAAA, on October 2010, the third world congress on social simulation is scheduled in Kassel, Germany after previous world congresses held in Kyoto (2006) and Washington (2008).

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