Symposium Issue on Social Simulation: An Introduction
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What is This?
Social simulation is the study of social phenomena by means of computer models where the micro-level behavior, interaction, and the social environment are explicitly modeled with a view to understanding their macro outcomes. Although relevant progress in social simulation has been made toward understanding important complex social puzzles, including urban segregation patterns, social norms, opinion dynamics, and market behavior (e.g., Edmonds & Ruth, 2013), this field has developed more on the transdisciplinary edges, rather than within the mainstream of the social sciences. This has the result that it has higher recognition in disciplines such as computer sciences, behavioral sciences, physics, and ecology than in the social sciences, with which it shares its subject matter. This pattern of impact was confirmed by a recent analysis of the *Journal of Artificial Societies and Social Simulation*, the flagship social simulation journal, where Squazzoni and Casnici (2013) found that social simulation articles cited a lot of the social science literature but were themselves cited more outside social sciences. They argued that social simulation is a cross-disciplinary field that is doing more to disseminate social science concepts and topics into distant fields than it has been effective at changing social sciences from the within (see also Meyer, Lorscheid, & Troitzsch, 2009; Meyer, Zaggl, & Carley, 2011).

While we do not underestimate the importance of cross-disciplinary domains and cross-fertilization between disciplines, with this special issue we aim to strengthen links between social simulation and the wider social sciences by showing how this approach can help explain relevant social science puzzles. Thus, we have included a representative variety of studies, from quantitative to more qualitative oriented analyses, so as to give a comprehensive overview of the potentials of this technique. In this way, we hope to show how social simulation can help fill a gap between quality and quantity, logic reasoning and measurement, which is one of the main problems in the social science (e.g., Squazzoni, 2012).

The issue starts with an overview on social simulation provided by Flaminio Squazzoni, Wander Jager, and Bruce Edmonds. where important challenges of this approach for the development of social sciences are discussed. A particular focus is on the role of behavioral heterogeneity and the interplay of social behavior and structure, which are typically out of the scope of more established social science approaches, such as quantitative sociology and economics.

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The second article, by Kenneth Joseph, Geoffrey Morgan, Michael K. Martin, and Kathleen M. Carley, deals with the coevolution of stereotypes, culture, and social relationships in determining ethnocentrism. Inspired by an innovative mix of constructivism and structuralism, the article presents a model which shows that shared culture, social relations, and group stereotypes are deeply interwoven in generating ethnocentrism. Results indicate that, in cases where culture and group structure are aligned or when a homogeneous National culture is triggered by potential ethnocentric features, increasing the spread of cultural forms between groups is not sufficient to mitigate ethnocentric stereotypes.

The third article, by Martin Neumann, concerns a similar topic from the perspective of diversity breeds conflict theory but follows a more empirical-oriented approach. The author examines the escalation of ethnocentric in the former Yugoslavia by focusing on the transition from relatively harmonious and stable ethnic relations to social conflict giving rise to genocide. Along the same line of the previous article, results indicate that political radicalization is more likely in ethnically homogeneous societies.

The fourth article, by Daniel Villatoro, Giulia Andrighetto, Jordi Brandts, Luis Gustavo Nardin, Jordi Sabater-Mir, and Rosaria Conte, investigates the signaling function of social norms for cooperation and is a good example of a model that cross-fertilizes computational and lab experimental research, which is a growing field in social simulation. Extending traditional behavioral and experimental work on the relevance of punishment for cooperation toward a social group dimension, this article shows that punishment may be effective not only in triggering rational responses by individuals, thanks to the material negative incentives it conveys, but also for the signaling function it plays in communicating a normative content related to expected good behavior.

The fifth and sixth articles deal with social networks, which try to cast light on implications of certain structural aspects of the social environment for collective behavior. Although social networks are an older field than social simulation with its own history and traditions, the synergy between the social network and social simulation approaches are now becoming clear. Both seek some kind of formal representation of the social phenomena we are faced with, but in a way that does some justice to the complexity of social structure. Social networks are a natural product of many social simulations, and social simulations needed to explore the processes by which social networks are built, adapt, and decay.

The article by Mustafa Yavas and Gönenç Yücel examines the role of homophily in diffusion processes. Results showed that homophily may have a nonlinear effect in that, although initial levels foster the diffusion of innovation, upon a certain threshold, it can decrease it. Moreover, they showed that a mismatch could occur between micro and macro dynamics, with situations where homophily-induced local maxima at the micro proliferate even when macro convergence is decreasing at the macro level.

The article by Elisabeth Zu Erbach-Schoenberg, Seth Bullock, and Sally C. Brailsford presents a dynamic model of social network formation and maintenance that matches certain structural components of many social systems, such as online communities, markets, and the scientific community. The model looks at the interplay of individual behavior and social dynamics and examines the influence of spatial embeddedness in constraining this interplay. Although abstract and not directly connected with empirical data, these two examples allow us to understand the importance of social network structure and dynamics to understand macro outcomes and the link between individual behavior and social dynamics.

The seventh article, by Christopher Frantz, Martin Purvis, and Mariusz Nowostawski, examines the importance of social institutions for economic development, by drawing inspiration from medieval trade and comparing the case of Genoese and Maghribi traders. Inspired by the influential work by Avner Greif (e.g., Greif, 2006) and brilliantly combining different sources of empirical data, the model shows that the mode of communication and the formal institutional arrangements developed
by the Genoese trading community were dysfunctional to fully exploit informal social norms, such as reciprocity and trust. It is a good example of combination between computational modeling and historical and socioeconomic research.

The last article, by Juan Barcelo, Florencia Del Castillo, Ricardo Del Olmo, Laura Mameli, Francisco José Miguel Quesada, David Poza, and Xavier Vila, examines the emergence of cultural identities and their implications for cooperation in hunter-gatherer societies. Based on ethnoarchaeological data and inspired to the case of Patagonia from 7,000 BC, the model shows that group identities and economic development could enter in conflict and that one of the possible explanations for the disappearance of these societies has little to do with environmental and technological constraints and more with the weak enlargement of social ties across different groups.

To conclude, this issue includes a heterogeneous sample of contributions that represent high-quality research with potential implications for social science. Some articles are more quantitative, others closer to game theory and experimental investigation, someone more inspired by qualitative research, but all represent the core of social simulation ideas. We must say that the field is not yet mature—it needs further development to become a strong social science research program. Problems of weak links between theory, models, and empirical data (e.g., Moss & Edmonds, 2005), the need for more robust methodological standards to build models and validate simulation results (e.g., Richiardi, Leombruni, Saam, & Sonnessa, 2006), not to mention the need for efforts to increase the computational literacy of social scientists, are only a few examples of weaknesses that social simulation research is called to overcome. However, the pace and extent of the diffusion of this approach in the social science domain and the constantly growing dimension of the community of scholars doing this type of research, already testify to consistent progress toward a tipping point, after which this type of research will become an important pillar of the social sciences.

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