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## Book review of 'Agent-Based Computational Sociology' by Flaminio Squazzoni

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## **“Agent-Based Computational Sociology”**

by Flaminio Squazzoni

John Wiley and Sons, Chichester, West Sussex, UK, 2012

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### **Book Review by Martin Neumann**

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Squazzoni’s book on Agent-Based Computational Sociology (in the following: ABM for agent-based modeling) has been published in 2012 by Wiley. It provides an introduction into ABM from perspective of sociological theory. Its purpose is to contribute to a crossfertilisation of different research methods. The book abstains from using complicated formulas. The intended audience are sociologists who are not familiar with this still rather new method. This fills a gap in the literature. The classical textbook on social simulation, Gilbert and Troitzsch’s ‘Simulation for the Social Scientist’ (2nd edition 2005) focuses on methodological issues. Moreover, recently a number of books from a complexity science perspective have been published which include ABM as a tool to understand social complexity. Commonly these are interdisciplinary compendia which do not put great emphasis on classical sociological theory. The unique feature of this book is to integrate ABM into canonical social theory.

The Book is organised in four main chapters: The first chapter provides an introduction to ABM, to characterise the distinguishing contributions of ABM to sociological theory. The next two chapters provide an overview of a number of influential simulation models, distinguished by the research questions of ‘Co-operation, co-ordination and social norms’ and ‘social influence’. The fourth chapter discusses the methodology of ABM. Squazzoni emphasises the importance of scientific transparency, which is particular important for a still rather new methodology such as ABM. The importance of transparency to cumulative

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research is demonstrated at two examples: Replication and multi-level validation on various stages of the research process. Finally a concluding chapter and two appendixes are provided.

The first appendix provides an overview of resources, such as research centres and journals. In the second appendix programme codes are documented. This might be a role-model of scientific transparency. However, I wonder if the (only barely documented) code can be read by social scientists who are not trained in programming.

ABM is defined as "*the study of social patterns by computer models of social interaction between heterogeneous agents embedded in given social structures*" (Squazzoni 2012, p. xii).

Agents are little programme codes which are executed independently within a simulated environment. Squazzoni argues that this feature makes ABM particular appropriate to the study of society because of an "*ontological correspondence with the atoms of social life*" (Squazzoni 2012, p. xii). ABM allows to study how macro social patterns are generated by individual interactions. The emphasis on interaction as a distinctive feature of the social is the theoretical standpoint of the author. Relying on Herbert Simon, Mark Granovetter, Raymond Boudon and Thomas Schelling, the author advocates ABM as a prime tool for analytical sociology. This guides the selection of models described in chapter two and three. Squazzoni classifies different modelling approaches as a) highly abstract Artificial Societies, b) abstract models of certain social phenomena, c) middle-range models, which remain theoretical but have a clear specified explanatory range, d) case-based models, which describe a well circumscribed empirical phenomenon, and e) applied simulations for policy advice. The focus of the book is on c), i.e. middle-range models.

The book presents a distinctive theoretical perspective. On the one hand, Squazzoni argues against the representative actor of economic theory, emphasising the importance of heterogeneity and social structures. On the other hand, the author emphasises that "*complex and unpredictable social outcomes ... can be generated by relatively simple and rational individual action ...*" (p. 166). Thus he prefers agents as simple as possible. This is a distinctive point of view in a controversial debate within the ABM community, denoted by the author as 'simplification' and 'complexification' of agents. Squazzoni argues for the former.

Consequently a lot of game theory can be found throughout the book. For instance, social norms are discussed by the example of Axelrod's well-known model the evolution of cooperation and its various variations. Indeed, the finding that in the long run a *tit-for-tat* strategy is beneficial for rational egoists still remains one of the key contributions of a modelling approach to social theory. However, this is a one-way direction from the micro to the macro. The reverse dynamics from the macro to the micro is only barely captured by this approach. Yet, already Max Weber's classical study of the 'protestant ethics and the spirit of capitalism' shows how social dynamics in turn penetrates the individual micro level. In my opinion, the 'complexification' approach provides opportunities to attract the interest of sociologists, interested in such research questions. A number of normative agents have been developed recently, following this account (e.g. Campenni et al. 2010). This is not captured in the book. Nevertheless, beside this little quarrel, the book provides a rich source for sociologists and it can be hoped that it will contribute to a cross-fertilisation of sociological methods, including ABM, within a wider sociological community.

## References:

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2. Campenni, M., Cecconi, F., Andrighetto, G., Conte, R. (2010) *Norm and social compliance. A computational study*. IJATS 2(1): 50 – 62.