SOE 9: Social Systems, Opinion and Group Dynamics I

Time: Tuesday 12:30–13:30 Location: H44

SOE 9.1 Tue 12:30 H44

Towards Simulating the Foundations of Society - A Multi-Agent Game-Theoretical Approach — •Dirk Helbing and Anders Johansson — ETH Zurich, Swiss Federal Institute of Technology, Switzerland

To study social interactions, we propose an agent-based model with spatial interactions that can be analytically treated within a evolutionary game-theoretical framework. In order to understand social systems, it is essential to identify the circumstances under which individuals spontaneously start cooperating or developing shared behaviors, norms, and culture. In this connection, it is important to study the role of social mechanisms such as repeated interactions, group selection, network formation, costly punishment and group pressure, and how they allow to transform social dilemmas into interactive situations that promote the social system. Furthermore, it is interesting to study the role that social inequality, the protection of private property, or the on-going globalization play for the resulting "character" of a social system (cooperative or not). It is well-known that social cooperation can suddenly break down, giving rise to poverty or conflict. The decline of high cultures and the outbreak of civil wars or revolutions are well-known examples. The more surprising is it that one can develop an integrated, analytical game-theoretical description of phenomena as different as the outbreak and breakdown of cooperation, the formation of norms or subcultures, and the occurrence of social polarization.

SOE 9.2 Tue 13:00 H44

Agent-based modelling of nest-site choice by honeybee swarms — •Tobias Galla — Theoretical Physics, School of Physics and Astronomy, University of Manchester, Manchester M13 9PL, UK

In a recent paper List, Elsholtz and Seeley [Phil. Trans. Roy. Soc. B 364 (2009) 755] devised an agent-based model of the the nest-choice dynamics in swarms of honeybees. Using tools from statistical physics we here present a simplified version of their model, and confirm analytically that both interdependence and independence are needed for the bees to reach a consensus on the best nest site. Based on our analytical theory it is possible to characterize the co-ordination outcome exactly on the deterministic level, and to a good approximation if stochastic effects are taken into account. The model applies more generally to decision making processes in humans, and can be used to address questions of consensus formation in committees or groups.

Reference: Tobias Galla, Journal of Theoretical Biology Volume 262 (2010) 186-196