SOE 13: Social Systems, Opinion and Group Dynamics

Time: Wednesday 10:15–11:45 Location: GÖR 226

SOE 13.1 Wed 10:15 GÖR 226

Ignorance is bliss. An agent-based model of the diffusion of norm violation in networks — •Michael Mäs[1] and Karl-Dieter Opp[2] — [1]ETH Zurich, Switzerland — [2]University of Leipzig, Germany

Classical sociological theories assume that individuals will deviate norms more when they learn that there is more norm violation than they expected. Based on this assumption, it has been predicted that norm-violating behavior such as tax evasion and fare dodging increases when a population is informed about the actual rates of norm violation on these dimensions. We challenge this prediction, arguing that there may also be individuals who violated the behavior before the actual rate of norm violation was disclosed. These individuals might have overestimated the rate of norm violation and will start following the norm when they are informed about a relatively low rate of norm violation. These decisions might neutralize the increase in overall norm violation that has been predicted, resulting in a stable crime rate.

To test the logical validity of our criticism, we developed an agent-based model. Agents are represented as nodes in a network and individually estimate the rate of norm violation based on the behavior of their network contacts. Agents violate norms when this estimate exceeds their individual norm acceptance. We studied model dynamics that obtain when the actual rate of norm violation is disclosed. With simulation experiments, we explored the conditions of increasing and decreasing rates of norm violation, focusing on the distribution of norm acceptance in the population and the structure of the social network. We also studied scenarios where norm acceptance is flexible.

SOE 13.2 Wed 10:30 GÖR 226

Age-dependent voter model — •Toni Pérez[1], Konstantin Klemm[2], and Victor M. Eguíluz[1] — [1]Institute of Cross-Disciplinary Physics and Complex Systems (IFISC), Spain — [2]Institute for Theoretical Chemistry, University of Vienna, Austria

The dynamics of adoption of different features such as innovations, opinions, or ideas is a topic that has attracted the attention of researchers from disciplines as diverse as Economics, Sociology, and Physics. The complex composition of modern societies allows for conservative groups, who hold traditional ideas for a long time, to coexist with groups of people open to fast innovation. This fact, however, has not been translated yet to the diverse variety of innovation models. Here we consider a model that takes into account the time an individual has held its feature (opinion, idea, or innovation). Specifically, we address the question of how the time since adoption of a feature by an individual influences its spreading. As one of our analytical results, we determine the expected time a new created feature takes to fixate, i.e. be adopted by the whole system. With N individuals in a well-mixed population, the scaling of fixation time $S(N)$ ranges from $S(N) \sim \log(N)$ to $S(N) \sim \exp(N)$, depending on the microscopic spreading rule giving preference to recently adopted or long conserved features.

SOE 13.3 Wed 10:45 GÖR 226

Opinion formation on a gradient — Michael Gastner[1,2,3], •Nikolitsa Markou[4], Gunnar Pruessner[2], and Moez Draief[4] — [1]Department of Engineering Mathematics, University of Bristol, Merchant Venturers Building, Woodland Road, Bristol BS8 1UB, UK — [2]Department of Mathematics, Imperial College London, South Kensington Campus, London SW7 2AZ, UK — [3]Institute of Technical Physics and Material Science, Research Centre for Natural Sciences, Hungarian Academy of Sciences, P.O. Box 49, H-1525 Budapest, Hungary — [4]Department of Electrical and Electronic Engineering, Imperial College London, South Kensington Campus, London SW7 2AZ, UK

Statistical physicists have become interested in models of collective social behavior such as opinion formation, where individuals change their inherently preferred opinion if their friends disagree. Real preferences often depend on regional cultural differences, which we model here as a spatial gradient g in the initial opinion. The gradient does not only add reality to the model. It can also reveal that opinion clusters in two dimensions are typically in the standard (i.e., independent) percolation universality class, thus settling a recent controversy about a non-consensus model. However, we also present a model where the width of the transition between opinions scales $\propto g^{-1/4}$, not $\propto g^{-4/7}$ as in independent percolation, and the cluster size distribution is consistent with first-order percolation.

SOE 13.4 Wed 11:00 GÖR 226

Match data in soccer as a new trend: relevant information or unnecessary details? — •Andreas Heuer and Oliver Rubner — WWU Münster, Inst. f. Phys. Chemie, D-48149 Münster

Companies like Opta and Impire record a large amount of data, characterizing many details of soccer matches. Examples are number of passes, ball possession, shots, fouls, just to mention a few. However, the relevance of the different observables is far from evident. For example, does the running distance, covered by the players of a team, reflect the quality of that team?

From a scientific perspective different questions emerge when analyzing the individual observables: (1) How team-specific are these observables? Have different teams different characteristics, e.g. for the number of fouls? (2) How relevant are the individual observables to characterize the strength of a team? For example, is the fraction of ball possessions a good indicator of the team quality? (3) How can one measure the success of a team in a given match beyond the obvious number of scored goals which is often simply subject to good or bad luck. Whereas (1) and (2) deal with the overall behavior during a whole season, (3) analyzes the properties of individual matches.

Using statistical concepts, appropriate for the analysis of the time series of sports data [1,2], all questions can be answered in general terms. It will become clear which part of the match data is of real importance.

[1] A. Heuer, O. Rubner, Eur. Phys. J. B 67, 445-458 (2009).
[2] A. Heuer, "Der perfekte Tipp", Wiley-VCH (2012).

SOE 13.5 Wed 11:15 GÖR 226

Distribution of Attention in YouTube — •José M. Miotto and Eduardo G. Altmann — Max Planck Institute for the Physics of Complex Systems, Dresden, Germany

Records of users activity in YouTube allow for a detailed study of the dynamics of attention distribution in social media. In this talk we describe and model the main statistical properties of the number of views of Youtube videos. We focus on the characterization and predictability of extreme events, the small number of videos in the tail of the distribution for views which capture a considerable amount of the total attention.

SOE 13.6 Wed 11:30 GÖR 226

Stochastic growth in social systems — •Juergen Mimkes[1] and Stefan Hutzler[2] — [1]Physics Department, Paderborn University — [2]Physics Department, Trinity College, Dublin

Stochastic growth in social systems is observed in many instances: in opinion formation a new idea is evolving, in elections one party may grow at the costs of others, in the interaction of languages one language may displaces another, in wars one country may grow at the costs of others, in nature we find growth and survival of the fittest. Stochastic growth in social systems may be calculated similar to crystal growth in physical systems. Simulations based on local optimization of the free energy may visualize the process of stochastic opinion growth, but not the outcome of an election.