

SOE 9: Opinion Formation

Time: Wednesday 11:00–12:20

Location: SOEa

SOE 9.1 Wed 11:00 SOEa

Social nucleation: From physics to group formation and opinion polarization — ●GEORGES ANDRES and FRANK SCHWEITZER — Chair of Systems Design, ETH Zurich, Weinbergstrasse 58, 8092 Zurich, Switzerland

Individuals form groups, which subsequently develop larger domains via competition and coalescence. How much have these social processes in common with established mechanisms of phase transitions in physics? Are nucleation in metastable systems or spinodal decomposition of thermodynamic phases or percolation in porous media suitable paradigms for modeling the emergence of large social groups? We answer this challenging question by providing an agent-based model that combines group formation and opinion dynamics in a novel manner. Opinion formation is a fast process and determines the formation of groups. On a slower time scale, groups can form larger clusters of various numbers, density and stability. These clusters can merge, split or rearrange, to develop either compact phases, networks of high modularity, or quasistable cluster distributions. Dependent on the choice of parameters for opinion dynamics and social influence, our model can reproduce social phenomena such as consensus, weak or strong polarization, social networks of various densities or stable minorities.

SOE 9.2 Wed 11:20 SOEa

Ideological differences in engagement in public debate on Twitter — ●FELIX GAISBAUER, ARMIN POURNAKI, SVEN BANISCH, and ECKEHARD OLBRICH — Max Planck Institute for Mathematics in the Sciences, Inselstrasse 22, 04103 Leipzig

We analyse public debate on Twitter via network representations of retweets and replies. We show that through the interplay of the two networks, it is possible to identify ideological differences in activity patterns between different opinion groups on the platform. The method is employed to observe public debate about two events: The Saxon state elections and violent riots in the city of Leipzig in 2019. We show that in both cases, (i) opinion groups differ in their propensities to get involved in debate, and therefore have unequal impact on public opinion. Users retweeting far-right parties and politicians are significantly more active, hence their positions are disproportionately visible. (ii) Said users act significantly more confrontational, as becomes visible in the local assortativity distribution of the reply network, while other opinion groups tend to debate largely amongst themselves.

SOE 9.3 Wed 11:40 SOEa

Modeling Opinion Formations in Europe: A new Perspective — ●MARTIN GESTEFELD, JAN LORENZ, NILS HENSCHL, and KLAUS BOEHNKE — Jacobs University Bremen, Bremen, Deutschland

In recent years, politics and especially election results appear to be more polarized than in the years before. Empirical evidence for opinion polarization has been found regarding specific topics but there is still a lack of evidence for a general trend in society. The presented work compares the characteristics of various polarization measurements and determines similarities between them in empirical data. In an exploratory data analysis of the European Social Survey, individual responses are analyzed on the left-right political self-placements and similar attitudes. By applying a new model, we demonstrate that people who placed their opinions on a 0 to 10 scale can be split up into five distinct groups. In addition to this model, we are able to decompose a formal measurement and provide detailed information on the degree of polarization in each of our distinct groups. Over the complete data set, cross-topic, cross-country, and time-trends are analyzed and compared to establish an overview and new perspective on polarization in Europe.

SOE 9.4 Wed 12:00 SOEa

Opinion Formation in distributed topologies: the voter model on hierarchical networks — ●KATERYNA ISIROVA^{1,2}, OLEKSANDR POTH², and JENS CHRISTIAN CLAUSSEN¹ — ¹Department of Mathematics, Aston University, Birmingham, UK — ²V. N. Karazin Kharkiv National University, Ukraine

The voter model is a paradigmatic stochastic model that has been widely employed especially for modeling of emergent social phenomena as opinion formation. Consensus formation protocols however also occur in the dynamics of computer networks, where the verification of nodes may become time-critical in large networks, and depend on the network topology. In society, consensus is formed (or not) via messages to neighbours in the network and likewise depends on the network structure. Here, we investigate the average time to consensus in a variety of different hierarchical and other network topologies, namely, small-world networks, various tree structures and hierarchical networks. For hierarchical networks, we consider the straightforward generalization where influencing a node occurs with different probability depending on the direction of hierarchy. Systematic Monte-Carlo simulations show that the average time to consensus in hierarchical networks is considerably larger than in regular graphs and small-world networks.