SOE 19: Social Systems, Opinion and Group Dynamics II

Time: Thursday 11:30–12:15 Location: H 0110

SOE 19.1 Thu 11:30 H 0110

Serial phases of primacy in growing networks of cooperation — •Anne-Ly Do[1], Abhishek Dasgupta[2], and Thilo Gross[3] — [1]Max Planck Institute for the Physics of Complex Systems, Dresden, Deutschland — [2]University of Oxford, Oxford, Great Britain — [3]University of Bristol, Bristol, Great Britain

Intelligent agents, such as individuals, companies, or nations, can form complex networks of collaborative interactions. In these networks the collaborative behavior of an individual is strongly influenced by the topological neighborhood, while the topology of the network itself evolves in response to the agents' behavior. We discuss a class of simple but general models, in which growing populations of rational, self-interested agents are able to establish and maintain different levels of cooperation with different, self-chosen partners. We show analytically and numerically that the network growth features distinct phases. In every such phase, a small group of agents succeeds to obligate all newly added agents and thus to acquire privileged topological positions, which enable them to extract extraordinarily high payoffs. We determine the factors that qualify an agent for primacy as well as the factors that indicate a forthcoming shift in primacy.

SOE 19.2 Thu 11:45 H 0110

Reconciling long-term cultural diversity and short-term collective social behavior — •Diego Garlaschelli — Lorentz Institute for Theoretical Physics, University of Leiden, Niels Bohrweg 2, NL-2333 CA Leiden, The Netherlands

An outstanding open problem is whether collective social phenomena occurring over short timescales can systematically reduce cultural heterogeneity in the long run. Theoretical models suggest that short-term collective behavior and long-term cultural diversity are mutually excluding, since they require very different levels of social influence. The latter jointly depends on two factors: the topology of the underlying social network and the overlap between individuals in multidimensional cultural space. However, while the empirical properties of social networks are intensively studied, little is known about the large-scale organization of real societies in cultural space, so that random input specifications are necessarily used in models. Here we use a large dataset to perform a high-dimensional analysis of the scientific beliefs of thousands of Europeans. We find that inter-opinion correlations determine a nontrivial ultrametric hierarchy of individuals in cultural space. When empirical data are used as inputs in models, ultrametricity has strong and counterintuitive effects. On short timescales, it facilitates a symmetry-breaking phase transition triggering coordinated social behavior. On long time-scales, it suppresses cultural convergence by restricting it within disjoint groups. Thus the distribution of individuals in cultural space appears to optimize the coexistence of short-term collective behavior and long-term cultural diversity.

SOE 19.3 Thu 12:00 H 0110

Can We Measure Nations' Solidarity and Justice? — •Hermann Rampacher — Seehaldenstraße 10 D-88662 Überlingen

Assuming social systems could be stabilized by specific n-tupels [r(i)] of social rules, solidarity and justice using these rules can become observables. Each rule prohibits an action, which risks with probability p(i)the stability of the global cicilization. If a certaim rule r(i) is broken, this contributes to self-destroying the global cicilization and as well to harm individuals. The [n(i)] have to be constructed by computer simulation, because the rules r(i) are mutually strongly correlated and compatible. Elementary rules can be identified using thought experiments, non-elementary rules only by empirical research. Breaking a first rule does effect breaking of all those rules with first rule. The grater the risks p(i, the lower the nation's solidarity; optimal yolidarity can be reached only if all agents contribute actively. The values of the p(j)) belonging to rules, prohibiting violence measure a nation's social temperature T. Hence a higher T is an alarm signal. To measure J we concentrate on the breaking of elementary rules. State authorities have to intervene to limit the harm arising from broken rules. The value of the nation's total harm after all contraventions of r plus all interventions measures the actual valuJ. This approach can serve to diagnose an nation's current situation and its foreseeable evaluation in the nearest future.