SOE 3: Evolutionary Dynamics of Social Systems

Time: Monday 10:00–10:45   Location: MA 001

SOE 3.1   Mon 10:00   MA 001

Evolution and Ecology of the Digital World — •Kaj Kolja Kleineberg and Marian Boguna — Departament de Física Fonamental, Universitat de Barcelona, Martí Franquè 1, 08028 Barcelona, Spain

The overwhelming success of Web 2.0, within which online social networks are key actors, has induced a paradigm shift in the nature of human interactions. The user-driven character of Web 2.0 services has allowed researchers to quantify large-scale social patterns for the first time. However, the mechanisms that determine the fate of networks at the system level are still poorly understood. For instance, the simultaneous existence of multiple digital services naturally raises questions concerning which conditions these services can coexist under. Analogously to the case of population dynamics, the digital world forms a complex ecosystem of interacting networks. The fitness of each network depends on its capacity to attract and maintain users' attention, which constitutes a limited resource. Here, we introduce an ecological theory of the digital world which exhibits stable coexistence of several networks as well as the dominance of an individual one, in contrast to the competitive exclusion principle. Interestingly, our theory also predicts that the most probable outcome is the coexistence of a moderate number of services, in agreement with empirical observations.

SOE 3.2   Mon 10:15   MA 001

The Expert Game - Emergence of trust, social capital and exploitation protection in an impersonal environment — •Florian Uekermann — Niels Bohr Institute, Copenhagen, Denmark

We present the Expert Game, a simple socio-economic experiment, which mimics professional communication and collaboration in an impersonal environment (using standardized electronic messages).

In the Expert Game, each subject is assigned a task and an expertise. The tasks and expertises are assigned such that each subjects task matches another subjects expertise. The goal for each subjects is to find their expert and receive help from him. Finding this expert can be accelerated by receiving a referral to the expert from a third person. In each round the subjects can choose between asking someone for help or replying to such a request by sending a referral or helping with a task. The subjects face a dilemma: Replies are detrimental to their immediate performance, but nobody can achieve his goal without help.

Our experiments show that in a session of repeated games with 16 subjects, mutual preferential treatment emerges, indicating a mutual trust relationship. We also measure a higher winning efficiency compared to a control with hidden identities.

In simulations using a simple model of the participants behavior, we show how individual reputations lead to exploitation protection and emergence of measurable social capital. We give a generally applicable quantitative definition of social capital and describe how it can be measured.

SOE 3.3   Mon 10:30   MA 001

Traveling waves in evolutionary dynamics — •Reinhard Mahnke[1], Jevgenijs Kaupuzs[2], Martins Brics[1], Hans Weber[3], and Sebastian Rosmej[1] — [1]Rostock University, Institute of Physics, D-18051 Rostock, Germany — [2]University of Latvia, LV-1459 Riga, Latvia — [3]Lulea University of Technology, S-97187 Lulea, Sweden

Here we consider models based on certain evolutionary dynamics written as Fisher-Eigen equation. Each species has its own fitness. We investigate the probability density as function of time for the evolution of a population of different species.

This reaction-diffusion (also called adoption-exploration) dynamics shows traveling waves soltions relevant for evolutionaly biology as well as in social systems.

In the context of the Fisher equation we explore the expansion and evolution of patterns or trends as an important example.