AKSOE 1 Dynamics of Groups and Organizations I

Zeit: Freitag 10:00–12:30 Raum: TU P-N203

Hauptvortrag AKSOE 1.1 Fr 10:00 TU P-N203

Self-Organized Complexity in Economics and Finance — •Luis A. Nunes Amaral — Department of Chemical and Biological Engineering, Northwestern University, Evanston, IL 60208, USA

In my talk I will first discuss the reason why I use the word "complexity". In particular, I will differentiate between complicated and complex. Then, I will briefly review the set of tools and concepts that appear to be particularly useful when studying complex systems. I will then present some arguments for how uncertainty, on one hand, and the network of interactions, on the other, determine the type of strategies implemented by the agents. I will then discuss a simple model that illustrates the constraints imposed by uncertainty and connectivity on strategy evolution and selection. [**1**] Complex networks - augmenting the framework for the study of complex systems. Amaral, LAN, & Ottino, JM, Eur. Phys. J. B 38, 147-162 (2004). [**2**] Efficient system-wide coordination in noisy environments. Moreira, AA, Mathur, A, Diermeier, D, & Amaral, LAN, Proc. Natl. Acad. Sci. U. S. A. 101, 12085-12090 (2004). [**3**] Different scaling behaviors of commodity spot and future prices. Matia, K, Amaral, LAN, Goodwin, SP, & Stanley, HE, Phys. Rev. E 66, art. no. 045103, 1-4 (2002). [**4**] Application of statistical physics methods and concepts to the study of science & technology systems. Amaral, LAN, Gopikrishnan, P, Matia, K, Plerou, V, & Stanley, HE, Scientometrics 51, 9-36 (2001). [**5**] Inverse cubic law for the distribution of stock price variations. Gopikrishnan, P, Meyer, M, Amaral, LAN, & Stanley, HE, Eur. Phys. J. B 3, 139-140 (1998). [**6**] Power law scaling for a system of interacting units with complex internal structure. Amaral, LAN, Buldyrev, SV, Havlin, S, Salinger, MA, & Stanley, HE, Phys. Rev. Lett. 80, 1385-1388 (1998). [**7**] Universal features in the growth dynamics of complex organizations. Lee, YK, Amaral, LAN, Canning, D, Meyer, M, & Stanley, HE, Phys. Rev. Lett. 81, 3275-3278 (1998). [**8**] Scaling behaviour in the growth of companies. Stanley, MHR, Amaral, LAN, Buldyrev, SV, Havlin, S, Leschhorn, H, Maass, P, Salinger, MA, & Stanley, HE, Nature 379, 804-806 (1996).

— 15 min. Break —

AKSOE 1.2 Fr 11:00 TU P-N203

Opinion formation and election results: analytical approach — •František Slanina — Institute of Physics, Academy of Sciences of the Czech Republic, Na Slovance 2, 18221 Praha, Czech Republic

The Sznajd model, which describes opinion formation and social influence, is treated analytically on a complete graph. We prove the existence of the phase transition in the original formulation of the model, while for the Ochrombel modification we find smooth behaviour without transition. We calculate the average time to reach the stationary state as well as the exponential tail of its probability distribution. An analytical argument for the observed $1/n$ dependence in the distribution of votes in Brazilian elections is provided.

AKSOE 1.3 Fr 11:30 TU P-N203

Monte Carlo simulation of the rise and the fall of languages — •Dietrich Stauffer and Christian Schulze — Institute for Theoretical Physics, Cologne University, D-50923 K"oln

Similar to biological evolution and speciation we define a language through a string of 8 or 16 bits. The parent gives its language to its children, apart from a random mutation from zero to one or from one to zero; initially all bits are zero. The Verhulst deaths are taken as proportional to the total number of people, while in addition languages spoken by many people are preferred over small languages. For a fixed population size, a sharp phase transition is observed: For low mutation rates, one language contains nearly all people; for high mutation rates, no language dominates and the size distribution of languages is roughly log-normal as for present human languages. A simple scaling law is valid.

AKSOE 1.4 Fr 12:00 TU P-N203

Multiplicative Models for Company Dynamics — •Frank Schweitzer — D-MTEC, ETH Zentrum, CH-8032 Zuerich

Since the pioneering work of Gibrat (1931) stochastic models with multiplicative noise are used to describe the growth of companies. The talk reviews current results in this field, with particular emphasis on US and Japanese firms. Further, a simple model of investment strategies is discussed.