

SOE 10: Opinion Formation I

Time: Tuesday 10:15–11:15

Location: H37

SOE 10.1 Tue 10:15 H37

Dynamics of competing words — ●FAKHTEH GHANBARNEJAD, MARTIN GERLACH, JOSE M. MIOTTO, and EDUARDO G. ALTMANN — Max Planck Institute for the Physics of Complex Systems, Dresden, Germany

How does a community choose between different terms with similar meanings? How is consensus achieved? How is the evolution of the frequency of words borrowed from different languages when compared to their translated counterparts? Answering these questions would not only help us to improve our understanding of language change but would also bring insights on the dynamics of social interactions. Borrowing and social interactions are two key elements shaping language change and have accelerated during recent decades due to globalization. In this work, we apply data mining techniques to statistically analyze empirical data in different communities. We try to detect the general trends of emerging and competing words. We focus on scientific and technical terms for which consensus is usually stimulated, and we try to estimate the impact and significance of these regulatory efforts. We then compare different simple models and compare their predictions to the empirical data and we discuss if social network structure could play role on the dynamics of words spreading.

SOE 10.2 Tue 10:30 H37

A model of adaptive convergence in science — ●STEFANO BALIETTI and DIRK HELBING — Clausiusstrasse 50 8092 Zurich

How does scientific consensus of separate communities ("schools") emerge? This study brings together two areas of research, organizational learning and opinion formation models, and it is in line with the recommendations of Nicolas Payette (2011) "For an Integrated Approach to Agent- Based Modeling of Science".

A population of scientists exploring an epistemic landscape simultaneously takes into account the desire for individuality and the effects of social influence coming from related opinions. Noise is used as a driver for the formation of metastable clusters of opinions characterized by consensus within clusters, and diversity between them (Maes, Flache, and Helbing, 2010).

Our preliminary results show formation of interesting consensus patterns emerging from simple interactions of a large number of individuals in space. Clusters formed in local minima can be displaced by opinions with higher attractiveness, once discovered, and clusters that grow too large can spontaneously split into subclusters (Mulkey and Edge, 1972).

SOE 10.3 Tue 10:45 H37

Phase transitions in the q-voter model with two types of stochastic driving — ●PIOTR NYCZKA, KATARZYNA SZNAJD-WERON, and JERZY CISŁO — Institute of Theoretical Physics, University of Wrocław, pl. Maxa Born'a 9, 50-204 Wrocław, Poland

We study a nonlinear q-voter model with stochastic driving on a complete graph. We investigate two types of stochasticity that, using the language of social sciences, can be interpreted as different kinds of nonconformity. From a social point of view, it is very important to distinguish between two types nonconformity, so-called anticonformity and independence. A majority of work has suggested that these social differences may be completely irrelevant in terms of microscopic modeling that uses tools of statistical physics and that both types of nonconformity play the role of so-called social temperature. In this paper we clarify the concept of social temperature and show that different types of noise may lead to qualitatively different emergent properties. In particular, we show that in the model with anticonformity the critical value of noise increases with parameter q, whereas in the model with independence the critical value of noise decreases with q. Moreover, in the model with anticonformity the phase transition is continuous for any value of q, whereas in the model with independence the transition is continuous for $q \leq 5$ and discontinuous for $q > 5$.

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SOE 10.4 Tue 11:00 H37

Modeling spatial patterns in voting behavior — ●JUAN FERNANDEZ-GRACIA, KRYSZTOF SUCHECKI, JOSE J. RAMASCO, VICTOR M. EGUILUZ, and MAXI SAN MIGUEL — IFISC, Palma de Mallorca, Spain

A very rich set of results has been derived from different opinion models. Nevertheless this theoretical efforts require at some point a confrontation with empirical data, which has been mostly elusive. The difficulty of designing social experiments is certainly one of the reasons. Nevertheless the present big data paradigm should help us in this direction. We claim that election data is a rich source of data for contrasting opinion models.

We try to fill the gap between theory and observations by testing the voter model as a model for voters. We develop a metapopulation framework for the voter model which incorporates the mobility patterns that are available from commuting data. Furthermore using real data on commuting behavior and population sizes incorporates to the model the non trivial heterogeneities found in real demographic data. We contrast the results of the model with features of election results and find that certainly the voter model is able to explain spatial features observed in real elections.