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Opinion dynamics on complex networks: the role of model design

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From the physical point of view it is always an interesting question how the details of a model at the microscopic scale manifest at the macroscopic level. In the field of opinion dynamics such a macroscopic quantity is the opinion, defined in case of binary models as the magnetization.

Early models of opinion dynamics were usually put on 1D chains or 2D square lattices. Even in these simple geometries there was a certain freedom in designing a model. In particular, the form of the influence group exerting social pressure on individuals could differ significantly between models.

With the emergence of the network science in the last decades the 1D chains and square lattices are more and more often replaced by different kinds of complex networks as the underlying topology of social interactions. This is simply due to the fact that in many situations those networks capture the contact patterns among people in a more realistic way. However, although those networks allow for even more freedom to model designers, according to Macy and Willer "there was a little effort to provide analysis of how results differ depending on the model design".

I my talk I will use the q-voter model as an example of a binary opinion model and generalize it to complex networks. Different topologies of the influence group will be discussed together with their impact on the opinion dynamics. I will show, by making use of Monte Carlo simulations and simple probabilistic arguments that the differences between model designs may be either important or negligible depending on the average path lengths of the underlying networks.

References:

A. Jędrzejewski, K. Sznajd-Weron, J. Szwabiński, Physica A 446 (2016) 110-119