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The Open-Access Journal for the Basic Principles of Diffusion Theory, Experiment and Application

Discontinuous Transitions in Stochastic Models of Collective Opinion Dynamics

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Changes of our opinions can be caused by many reasons and sometimes it is useful to describe a part of them as a stochastic process or an effect of a social temperature. It follows the collective dynamics of social groups depends not only on deterministic interactions between group members but also on a social noise coming for example from communication disturbances or complexity of our beliefs.

The lecture will show that a combination of stochastic and deterministic social interactions can lead to discontinuous transitions in collective group opinions. The effect will be demonstrated with several examples: (i) a social impact model of a strong leader, (ii) a model of interactions between competing social groups, (iii) a temporal bilayer echo-chamber model and (iv) a model of structural balance dynamics. For all these systems critical values of the social noise as calculated from analytical approaches are in a good agreement with agent based numerical simulations.

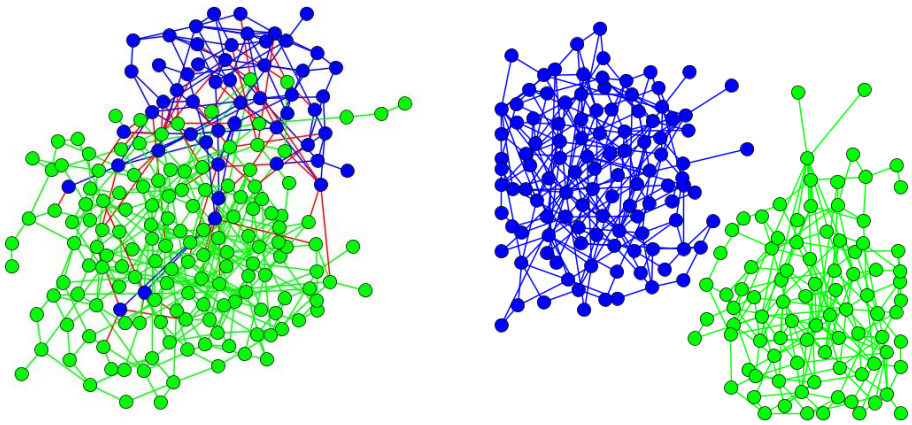

Figure 1: Social structures emerging in the coevolving voter model in which an agent can take the opinion of his neighbour or stick to his own view and seek a connection to an agent of the same state. Left: the case when the probability of social link rewiring is less than a critical value and society is differentiated (green and blue agents) but opposite groups are connected (red links). Right: the probability of social link rewiring is larger than a critical value and society has split into two disjointed subgroups with opposing views. The evolution will be illustrated by on-line computer animations.

References

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