Consensus formation times in anisotropic societies

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We developed a statistical mechanics model to study the emergence of a consensus in societies of adapting, interacting agents constrained by a social rule B.

The term consensus is understood to be the level of agreement amongst the agents in favor or against the predetermined socially accepted position delivered by B [1]. B represents the set of rules that determine what is socially acceptable. Such rules are the result of previous consensus-forming processes, typically observed in any functioning society [2,3].

Agents form their opinions on social issues based on partial information received regularly during the process. The volume of information increases over time and, the agents being adaptive, they update their opinions accordingly. At the end of the process the level of agreement between agents and B is measured to determine whether a consensus is formed supporting or rebutting the social order.

The model we work with was presented in reference [4] and possesses the following characteristics:

1) There is a mechanism for the agents to assimilate information and update their opinions.

2) The model considers the existence of a set of rules B that determine what is socially acceptable.

3) The model considers the interaction H_0 of the agents with their neighbors [5], with a strength proportional to the credibility of the neighbors, their number and their proximity to the agent.

In the mean field approximation we find that if the agents' interaction H_0 is weak, all agents adapt to the social rule B, with which they form a consensus; but if the interaction is sufficiently strong a consensus is built against the established status quo. We observed that, after a transient time α_t, agents asymptotically approach complete consensus by following a path where they neglect their neighbors' opinions on socially neutral issues (i.e. issues for which the society as a whole has no opinion). α_t is found to be finite for most values of the inter-agent interaction H_0 and temperature $1/\beta$, with exception of the values $H_0 = 1$, $\beta = 0$ and the region determined by the inequalities β

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