Complex evolving and adaptive networks

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We explore the coupled dynamics of the internal states of a set of interacting elements and the network of interactions among them. Interactions are modelled by a spatial game and the network of interaction links evolves adapting to the outcome of the game. As an example we consider a model of cooperation where we show that the *plasticity* of the network, the possibility to change the interaction links, facilitates the formation of a stationary solution. The coupled dynamics leads to a hierarchical interaction network that sustains a highly cooperative state. The resulting network has the characteristics of a small world network when a mechanism of local partner selection is introduced in the adaptive network dynamics. The highly connected nodes in the hierarchical structure of the network play a leading role in the stability of the network. Perturbations acting on the state of these special nodes trigger global avalanches leading to complete network reorganization.