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Social contagion and norm emergence on simplicial complexes and hypergraphs

Complex networks have been successfully used to describe dynamical processes of social and biological importance. Two classic examples are the spread of diseases and the emergence of shared norms in populations of networked interacting individuals. However, pairwise interactions are often not enough to fully characterize contagion or coordination processes, where influence and reinforcement are at work. Here we present recent results on the higher-order generalization of the SIS process and of the naming game. First, we numerically show that a higher-order contagion model displays novel phenomena, such as a discontinuous transition induced by higher-order interactions. We show analytically that the transition is discontinuous and that a bistable region appears where healthy and endemic states co-exist. Our results help explain why critical masses are required to initiate social changes and contribute to the understanding of higher-order interactions in complex systems. We then turn to the naming game as a prototypical example of norm emergence and show that higher-order interactions can create interesting novel phenomenologies, for example, they can explain how –when communication among agents is inefficient– even very small committed minorities are able to bring the system to a tipping point and flip the majority in the system. We conclude with an outlook on higher-order models, posing new questions and paving the way for modelling dynamical processes on these networks.