Polarization in Social Networks: Investigating Opinion Dynamics Through Human Experiments and Agent-Based Simulation

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Ideological polarization in the United States has grown substantially in recent decades. Recent research establishes that this newfound polarization is eroding American democracy — akin to how it has in Hungary, Venezuela, and Turkey — but there is little consensus on its primary causes. Polarization is well-established to occur in single-issue contexts. Here I investigated polarization in multi-issue contexts with models of opinion dynamics explored through human experiments and agent-based social simulations. I specifically sought to understand (i) how ideologies evolve in social networks and (ii) how partisan actors in a population affect the group's polarization. The experiments and simulations revealed individuals in dense communities rapidly develop a consensus ideology when abstract issues are presented as binary choices — notably, this ideological consensus is not equivalent to ideological polarization. Interestingly, however, I found that small minorities of partisan agents exacerbate polarization of larger populations in social networks with clique-based topologies. Networks of 250 adaptive-opinion agents fluctuated between slightly polarized and depolarized. The introduction of just two partisan (fixed-opinion) agents increased the stability of this polarization, and the introduction of just 50 agents increased both the stability and magnitude of this polarization. These results suggest that social networks are highly sensitive to partisan influencers and that social network topology is a critical factor in whether a social network will polarize and the nature of this polarization. Understanding and modeling the root causes of polarization is crucial for understanding how to combat the harmful effects polarization has on individuals and societies.

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