

Mood Radicalization in Hyperconnected Social Networks

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In recent years, extremist forums have surged on social media platforms while perceived social isolation was at historic highs [1]. Previous studies suggested that ideological echo chambers increased radicalization [2]. Others suggested that the hyper-connected network itself, which increased access to different and opposing views, might be to blame [3]. In this study, we used agent-based modeling to investigate whether hyper-connectivity might exacerbate mood radicalization within social networks.

In the simulation, agents were assigned random scores called "mood". Moods were regarded as "good" if above a predefined value and "bad" if below it. The agents then played thousands of rounds of prisoner's-dilemma-like games with their neighbors on a Watts–Strogatz graph in random order. During the interaction, agents with good moods always chose to cooperate. Agents defected otherwise. The agent and its interacting neighbor collectively decided their future mood among three possible outcomes: cooperate-cooperate (cc), cooperate-defect (cd), defect-defect (dd). In this simulation, the reward for cc is more than the reward for defecting party of cd. Games with similar pay-off matrix have been used in social neuroscience research to probe interaction patterns of lonely and well-connected people [4] [5]. We added two types of noise to test the simulation's robustness. In the "mood regression" model, a fraction of the mood deviance, defined as the difference between current mood and neutral mood, was taken away to make the mood closer to neutral. In the "random noise" model, agents had a random increase or decrease of mood that represent environmental influence other than social interaction. Those changes happened every-time after each agent in the graph completed one round of interaction.

The simulation results suggested that agents were more likely to end up with radical moods in a hyper-connected network than in a sparsely-connected network (Figure 1). While the current results might be derived analytically, given the simple initial setup, the method provides great advantages to model social networks with more sophisticated topology, such as those with different centrality measures. These findings may provide an alternative perspective to model and understand radicalization and isolation on social media. Future work shall focus on creating more realistic social network simulations and collecting network and sentient data from social media platforms such as Twitter to verify this model.

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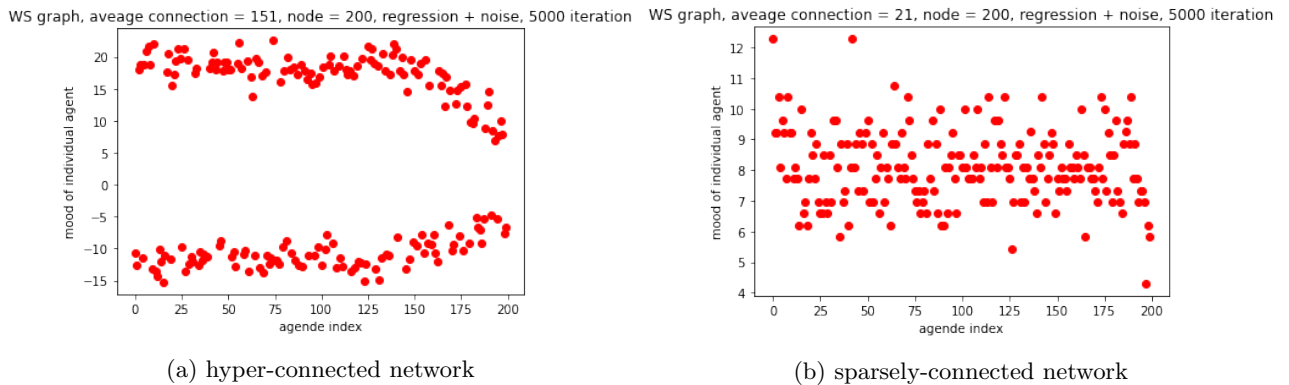


Figure 1: Simulation (with noise and mood regression) output after 5000 round of iterations. Agents' moods in the hyper-connected network diverged into two stripes, indicating mood radicalization, while those in the sparsely-connected network showed no sign of divergence