

# How Trust and Higher-Order Interactions Shape the Timing of Idea Adoption

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Trust is a fundamental ingredient for social cohesion, institutional stability, and collective action, especially in times of uncertainty and crisis. Yet contemporary societies are characterized by declining trust alongside an increasingly rapid spread of new ideas, practices, and behaviors, driven by global connectivity, media exposure, and social influence. In such settings, interactions are rarely limited to isolated pairs of individuals: group pressure, collective discussion, and widespread communication play a central role in shaping adoption dynamics.

In this work, we introduce a conceptual modeling framework to explore how trust, global influence, and group interactions jointly affect the diffusion of ideas. The approach combines mean-field differential equations with a simplicial-complex representation of signed Higher-Order Networks. It captures both interpersonal relationships and collective influences, allowing us to examine how adoption unfolds over time under different values of the interpersonal distrust level. After establishing the well-defined nature of the model and a qualitative analysis result for the equation expressing it, we investigate the system's dynamics through a series of numerical simulations and focus in particular on two practically relevant moments: when an idea reaches a majority of the population and when adoption becomes nearly complete.

The model we present provides powerful insights into the mechanisms underlying the diffusion of ideas or practices' adoption, and shows the importance of trust in reaching consensus. It also allows one to study the interplay of trust and distrust within higher order interactions. While lending itself to interpretations with various sociological nuances, it certainly does not capture the full complexity of the real world. In summary, our findings highlight that stronger group influence can accelerate collective adoption, but only when trust levels are sufficiently high. Widespread distrust, by contrast, slows down diffusion and diminishes the effectiveness of group pressure. Importantly, global influence - such as advertising or mass communication - can partially compensate for low trust, reducing adoption delays even in unfavorable environments. The framework also accounts for situations in which full adoption is never achieved. Overall, the model offers qualitative insights into how trust-building and communication strategies may shape collective outcomes in social, political, and economic contexts.

Reference: N. Cinardi, M.L. Bertotti, Trust, distrust and higher-order interactions. What is needed for ideas adoption in a connected society, *Chaos, Solitons and Fractals*, 202 (2026), 117584