



Introduction

Bounded confidence means that one will not be convinced by someone with a very different opinion. We study the influence of heterogeneous confidences, in the Hegselmann-Krause model [1]. We observe surprising effects that trusting other agents less can facilitate the formation of a consensus opinion.

The question

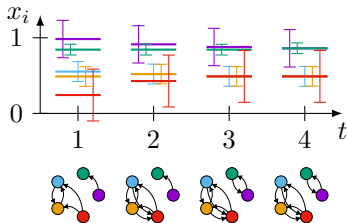
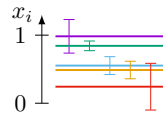
- What is the role of idiosyncratic levels of confidence of agents on the formation of consensus in the society?

Our contribution

- Phase diagram of the fully heterogeneous bounded confidence Hegselmann-Krause model

Hegselmann-Krause model

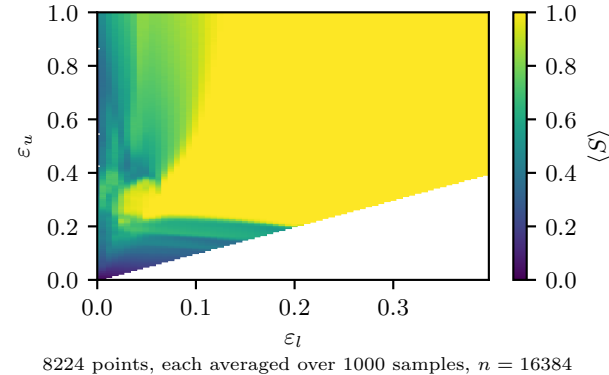
- n agents i with opinion x_i
- $x_i \in [0, 1]$ continuous variable
- agents have idiosyncratic confidence ε_i
- agents can only be influenced by others with a similar opinion, depending on their confidence (small $\varepsilon_i \rightarrow$ closed minded, large $\varepsilon_i \rightarrow$ open minded)
- compromise at each time step t : take average opinion of the influencing agents
- interactions are not symmetric
- interaction network changes with time



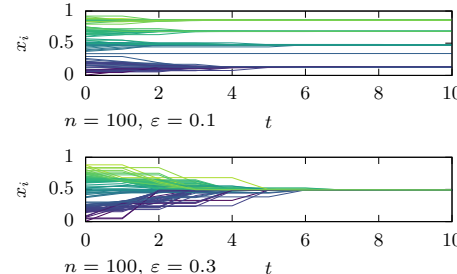
Heterogeneity affects consensus

Systematic study of the phase diagram

- confidence distributed uniformly in $[\varepsilon_l, \varepsilon_u]$
- $\langle S \rangle$ mean fraction of agents with most popular final opinion
- $\langle S \rangle \rightarrow 1 \Leftrightarrow$ consensus

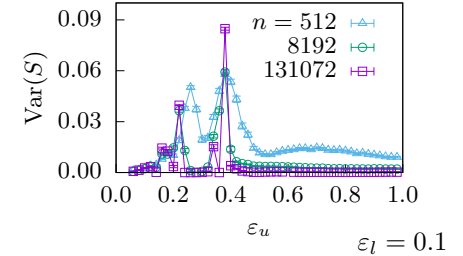
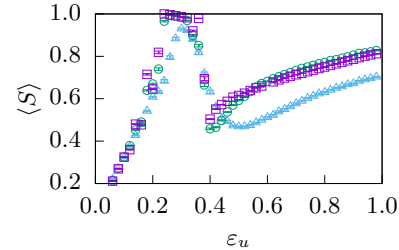


- after some time either consensus is reached or different opinions coexist



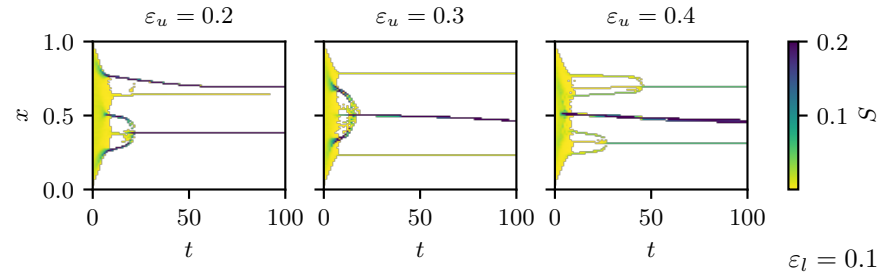
Finite-size analysis

- more open mindedness generally enhances consensus
- if closed minded agents (low ε_l) are present, introducing too many open minded ones (high ε_l) destroys consensus!



Dynamics

- open minded agents reach majority opinion too fast and leave closed minded agents behind



Bibliography

- [1] Hegselmann, Krause "Opinion dynamics and bounded confidence models, analysis, and simulation." Journal of Artificial Societies and Social Simulation 5 (2002).
- [2] Schawe, Hernández "When open mindedness hinders consensus." Scientific Reports 10, 8273 (2020)