



## 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

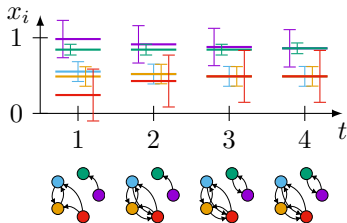
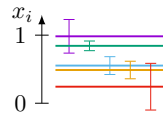
- What is the role of idiosyncratic levels of confidence of agents on the formation of consensus in the society?

### Our contribution

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

## Hegselmann-Krause model

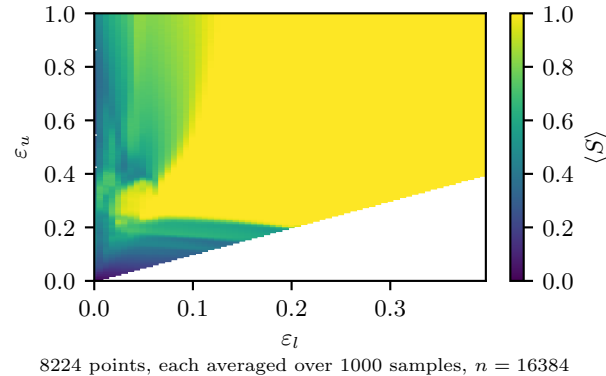
- $n$  agents  $i$  with opinion  $x_i$
- $x_i \in [0, 1]$  continuous variable
- agents have idiosyncratic confidence  $\varepsilon_i$
- agents can only be influenced by others with a similar opinion, depending on their confidence (small  $\varepsilon_i \rightarrow$  closed minded, large  $\varepsilon_i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



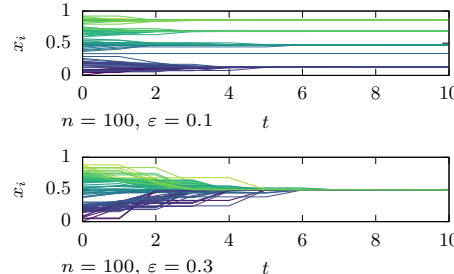
## Heterogeneity affects consensus

### 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

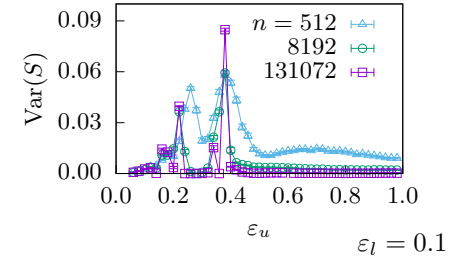
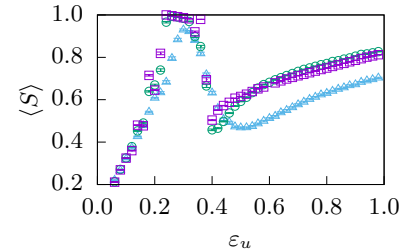


- after some time either consensus is reached or different opinions coexist



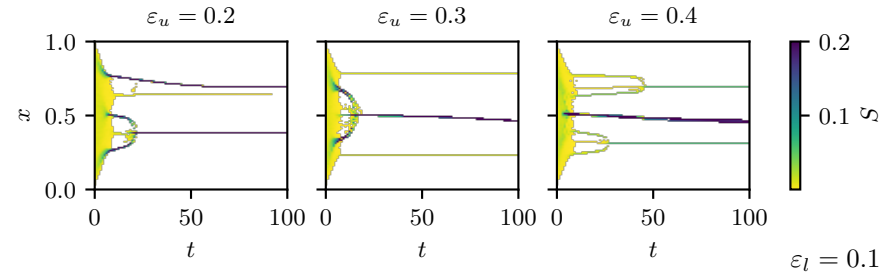
### Finite-size analysis

- more open mindedness generally enhances consensus
- if closed minded agents (low  $\varepsilon_l$ ) are present, introducing too many open minded ones (high  $\varepsilon_u$ ) 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)