



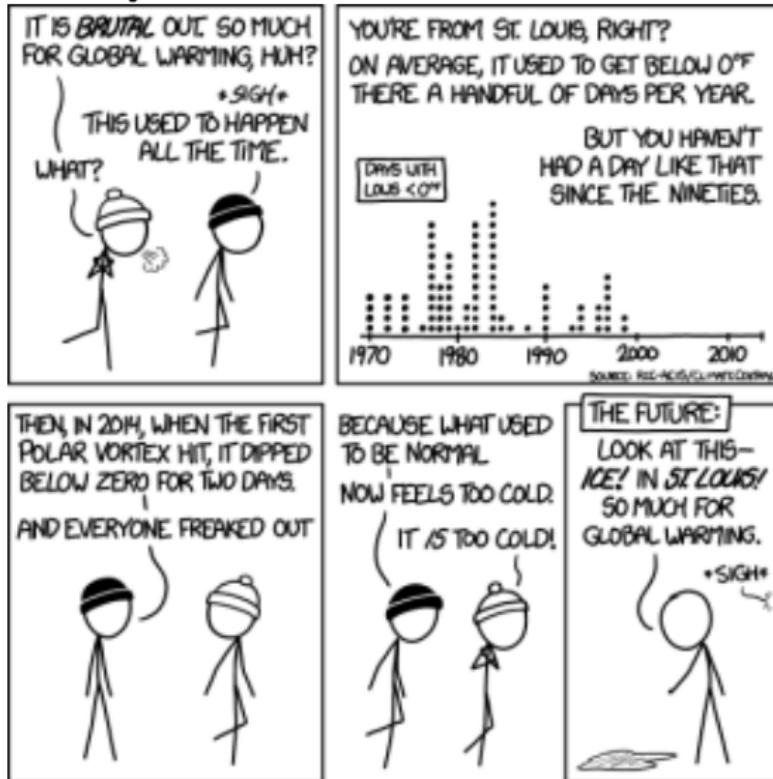
Generations in Bounded Confidence Models

Pascal S.P. Steger

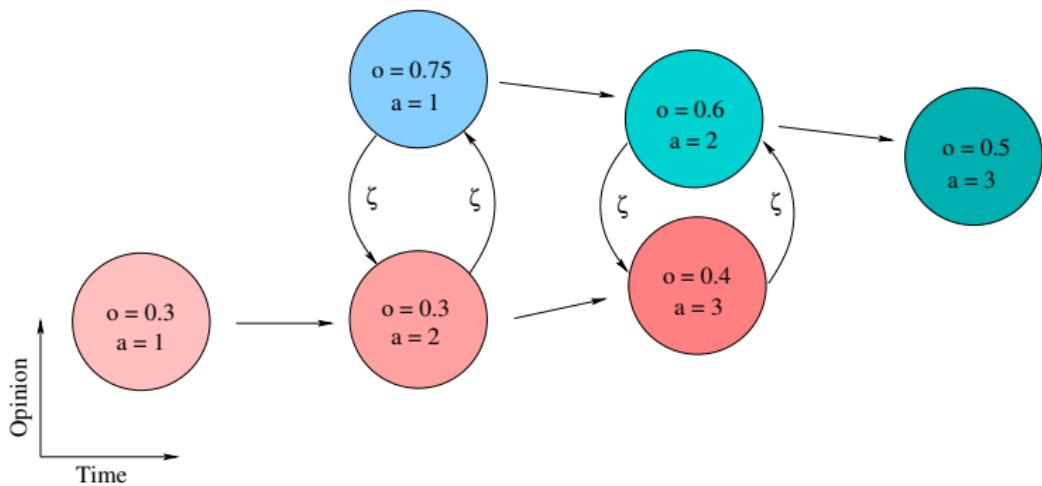
ETH Zurich

May 15, 2014

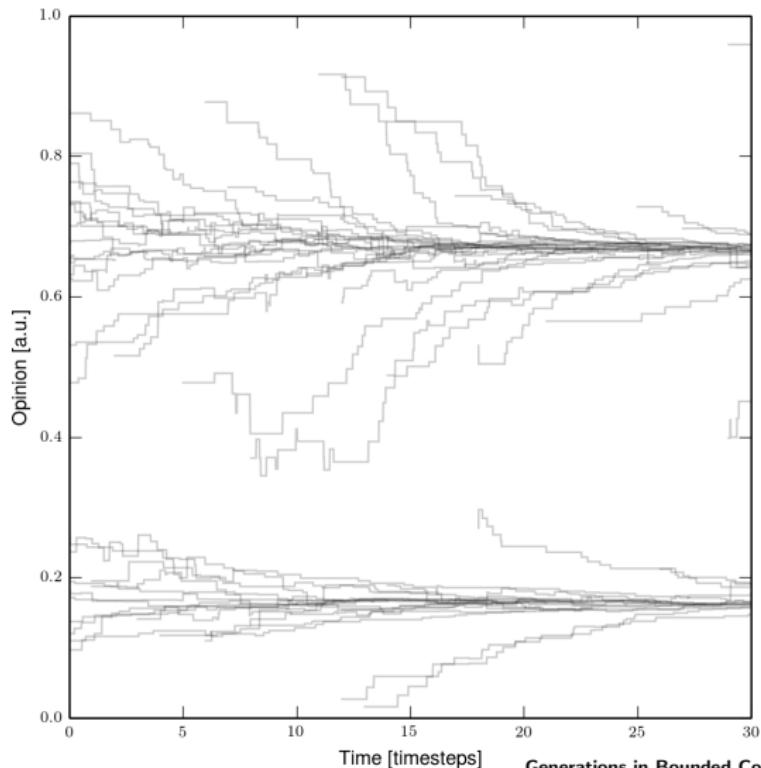
Change of Opinions



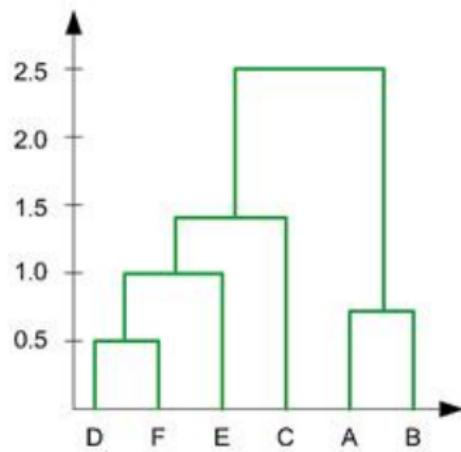
Model



Evolution



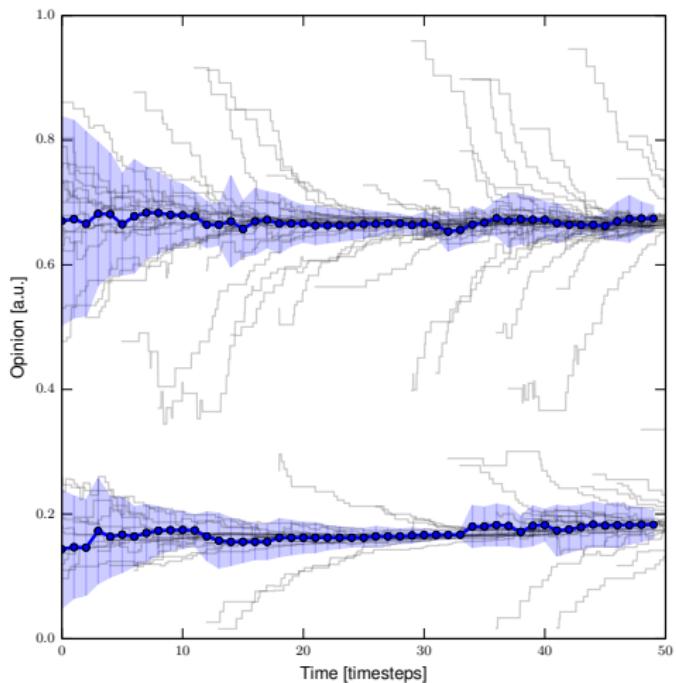
Grouping With Hierarchical Clustering



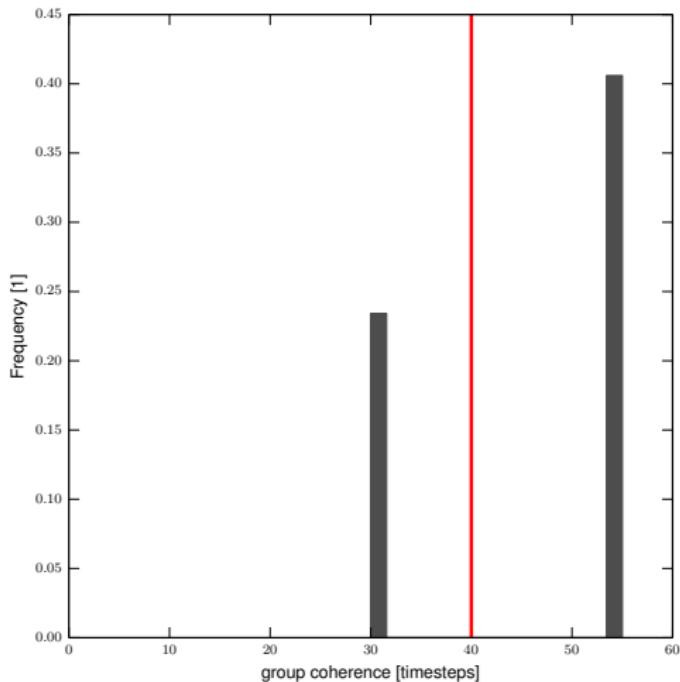
A group features

- at least 2 agents
- no bigger distance between members than to the nearest non-member

Grouping in Action



Group Evolution



Analytic Treatment: Steady State

- Brownian Motion

$$E(|O_i(T + \Delta T) - O_i(T)|) = \sqrt{\frac{2\Delta T}{\pi} \frac{\varepsilon \zeta}{2N_i}}$$

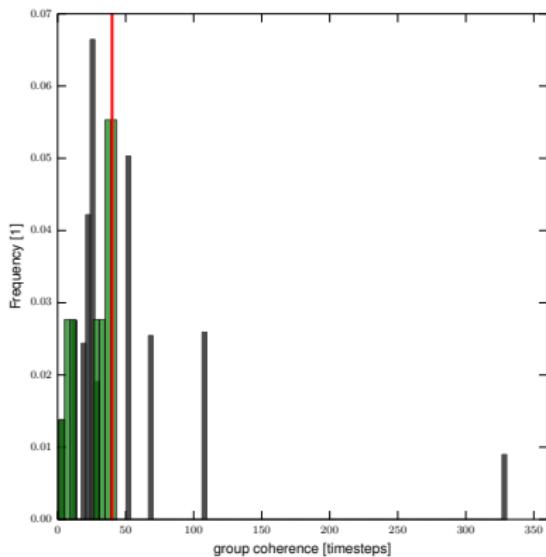
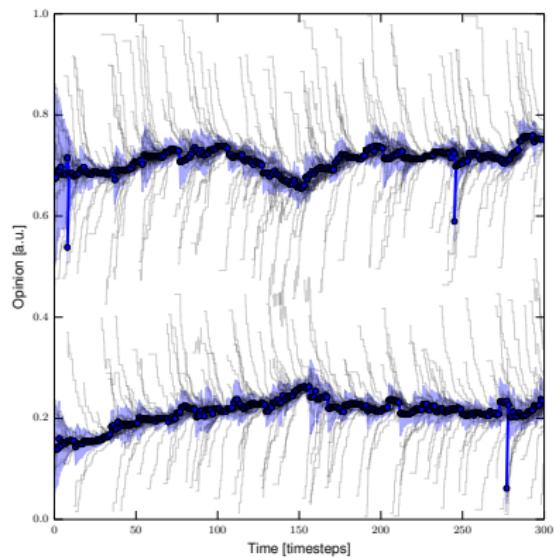
- mean step size is $\varepsilon \zeta / (2N_i)$
- merging with adjacent group after diffusion over $\varepsilon/2$
- change timescale from diffusion and merging time-scales

$$\begin{aligned}\Delta T &\approx \frac{\pi}{4} \frac{N_i \varepsilon}{\zeta} + T_p \\ T_p &= \frac{N_i(T)}{N_{\text{tot}}} \cdot N_{\text{it.pertimestep}} \cdot \zeta\end{aligned}$$

- fiducial configuration $\varepsilon = 0.25$, $\zeta = 0.1$, $N_i \approx 50 \cdot 2\varepsilon = 25$

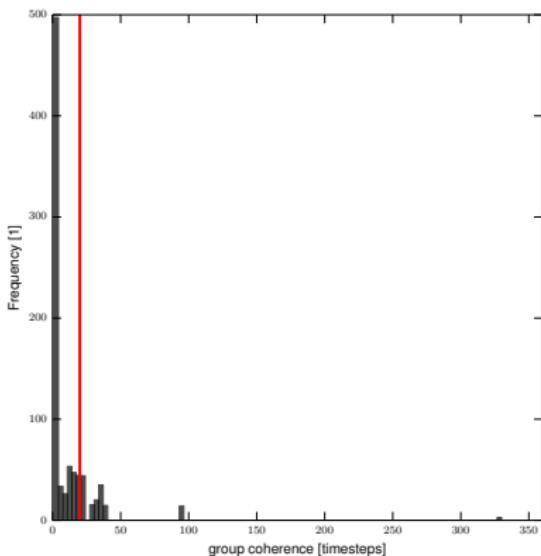
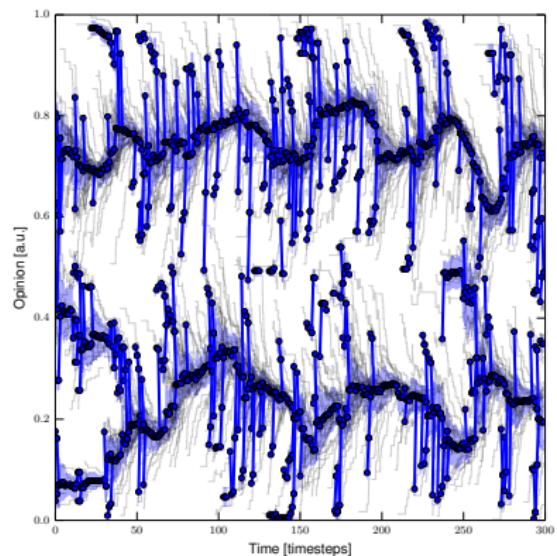
$$\Delta T = 40 + 5 = 45$$

Fiducial Simulation

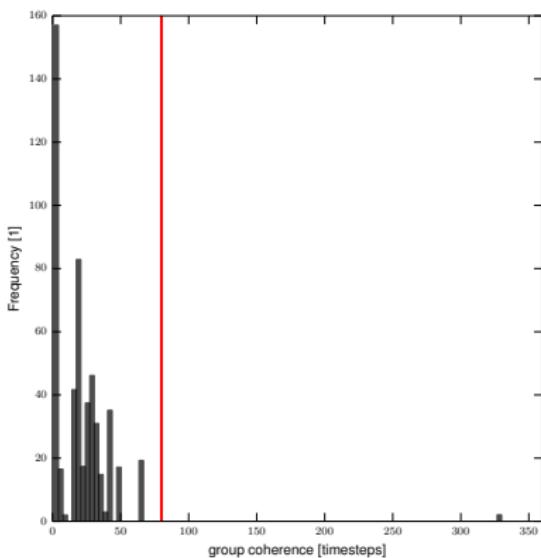
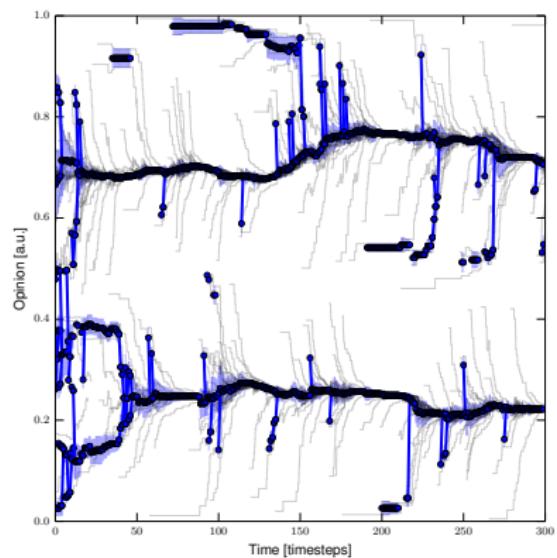


- $a_{\max} = 40$, $\varepsilon = 0.25$, $\zeta = 0.1$, $N_{\text{tot}} = 50$, $T_{\max} = 300$

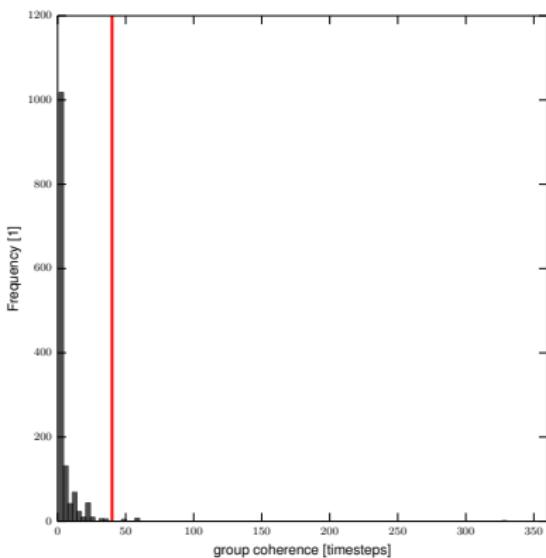
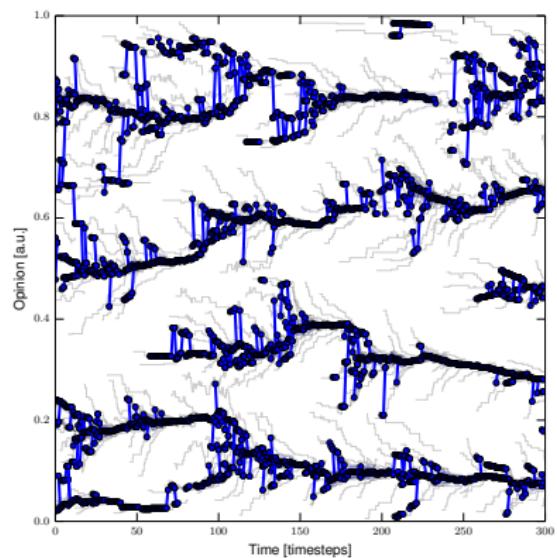
Low $a_{\max} = 20$



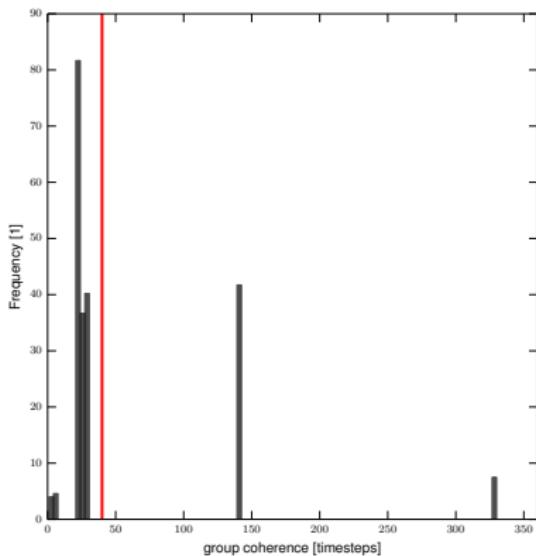
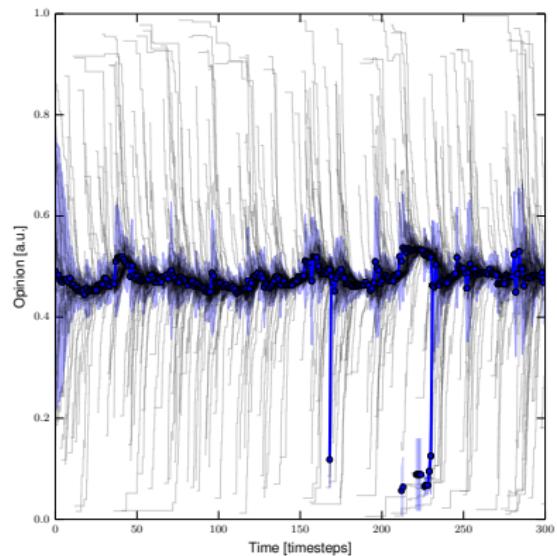
High $a_{\max} = 80$



Low $\varepsilon = 0.1$



High $\varepsilon = 0.4$



Summary

- evolution of group opinion happens
- on timescales $\Delta T \in [0, 3a_{\max}]$
- important parameters: ε , noise $1/a_{\max}$

