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Nodes that think: An empirical agent-based model of advice giving grounded on framing and memory

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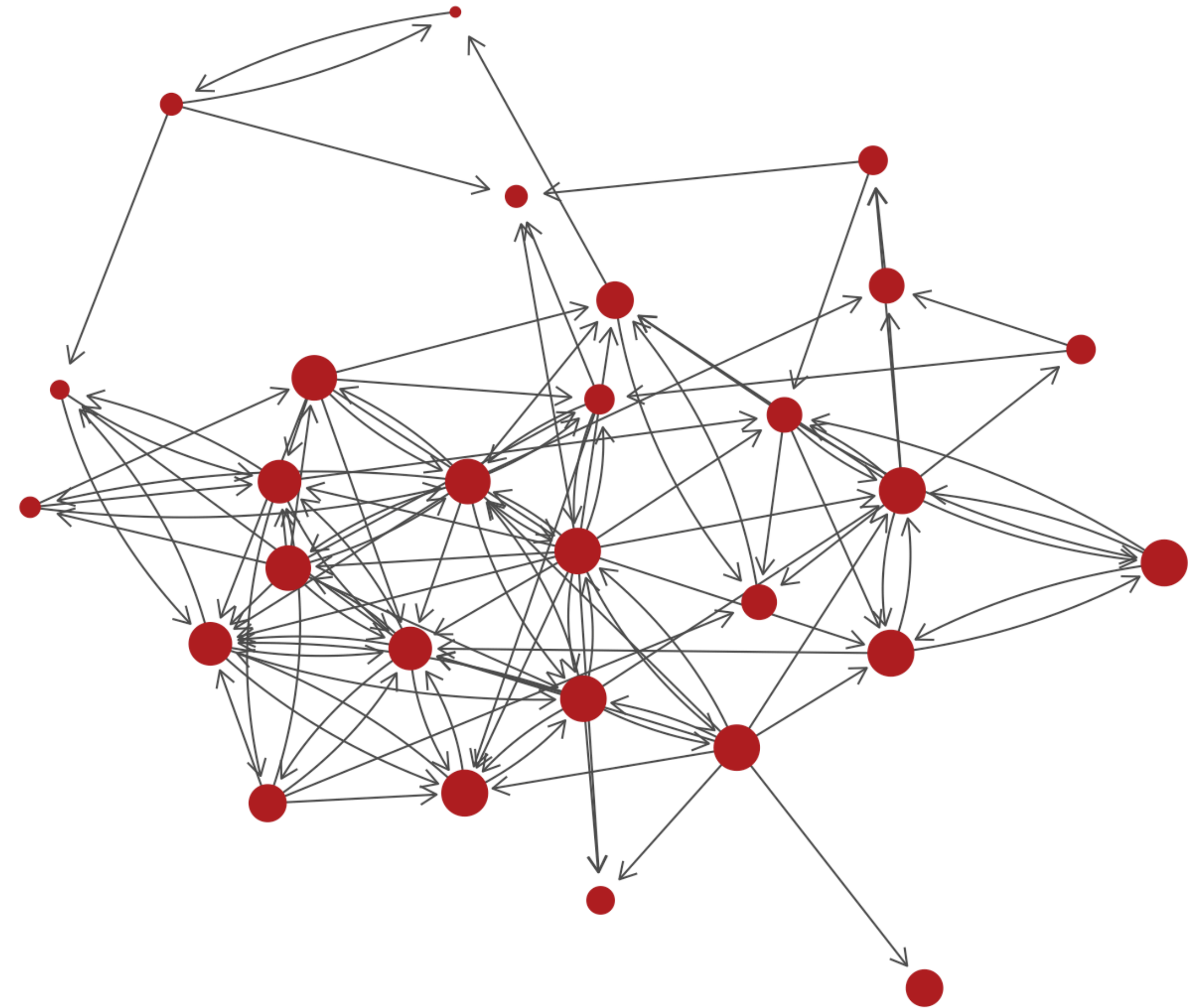
Network modelling vs. social behaviour

- Statistical **modelling of social network** data trades **mathematical tractability** with **behavioural realism** (Renzini et al., 2024) —> underdetermined evidence of causal mechanisms
 1. cannot disentangle actors' motives underlying network local patterns
 2. cannot model actors' memory of past interaction
 3. often need to assume actors' access to full information on the network
- Fails to model dynamics of prosocial behaviour:
 - driven by a mix of **instrumental expediency** and **normative** compliance with **solidaristic** obligations towards others (Simpson & Willer, 2015)
 - **time-varying** and **context-dependent** (Lindenberg, 2006; Esser & Kroneberg, 2015)

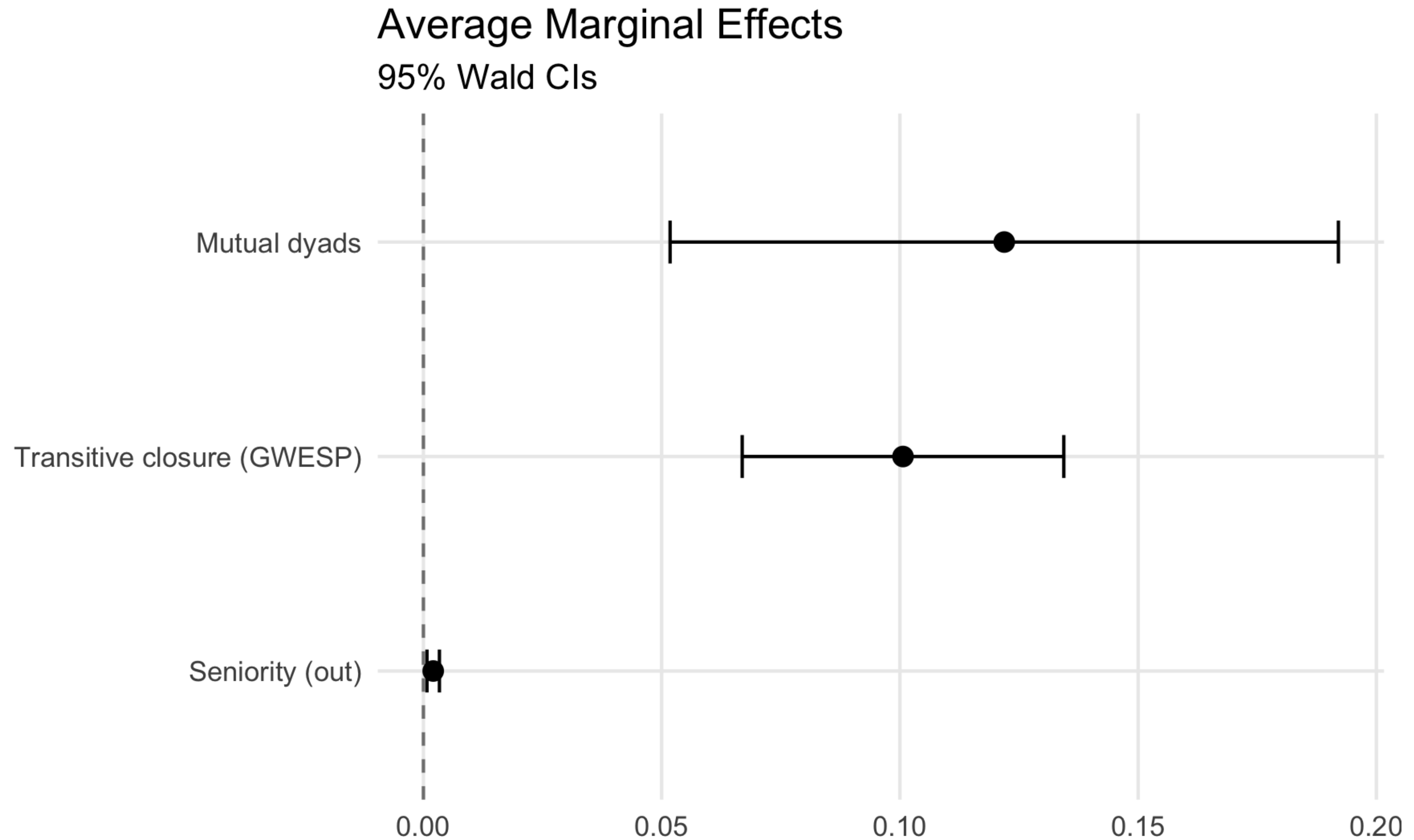


Data

- **Data collection:** 2016 face-to-face questionnaire administration
 - **Context:** freelance workers sharing a coworking space in Brescia, Italy (no shared collective identity, frequent business collaborations —> see Bianchi et al., 2018)
 - **Advice giving:** Who do you usually turn to for professional advice? (Transposed matrix)
 - Individual attributes: **seniority**
-
- # individuals (nodes) = 29
 - # ties = 120
 - density = 0.15
 - avg. degree = 4.10 (SD = 3.57)
 - avg. seniority (months) = 29.34 (SD 14.26)



Evidence of reciprocation - what mechanism?





Model

- **Node sampling:** *Ego* receives a request for help from *alter*
- **Threshold-based selection:** *Ego* will help *alter* ($x_{ij} = 1$) if its perceived costs (i.e., # of currently helped people, weighted by a *tolerance* factor) do not exceed its tolerance threshold

$$c_{i,t} \leq \theta_i \cdot \tau_i, \quad \tau_i = \max \text{outdegree}_i$$

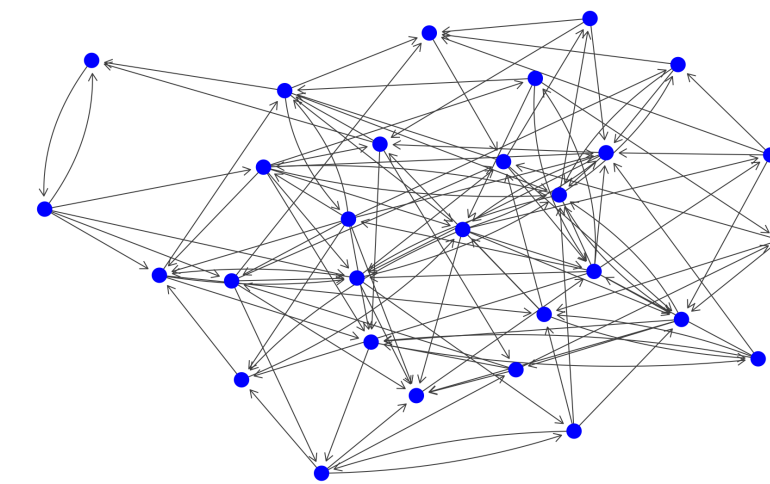
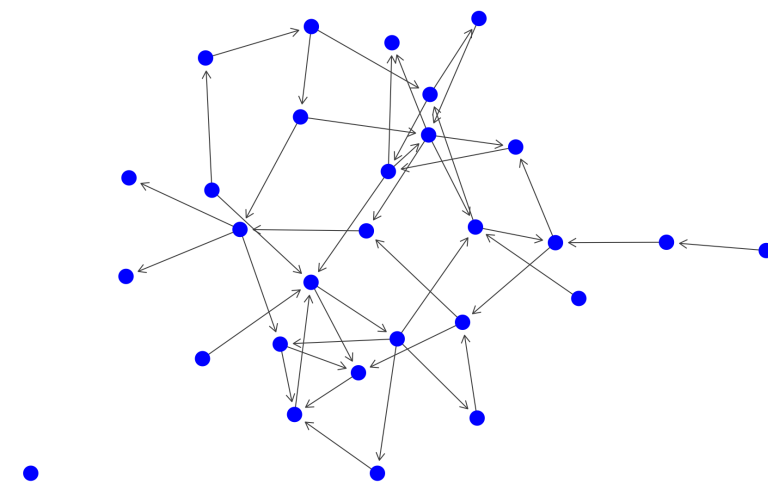
- The tolerance factor depends on **seniority**
- **Memory of negative interactions:** *Ego* will not help if *alter* has refused to help *ego* in the past



Macro-micro feedback on behaviour

- density -> - tolerance

+ density -> + tolerance



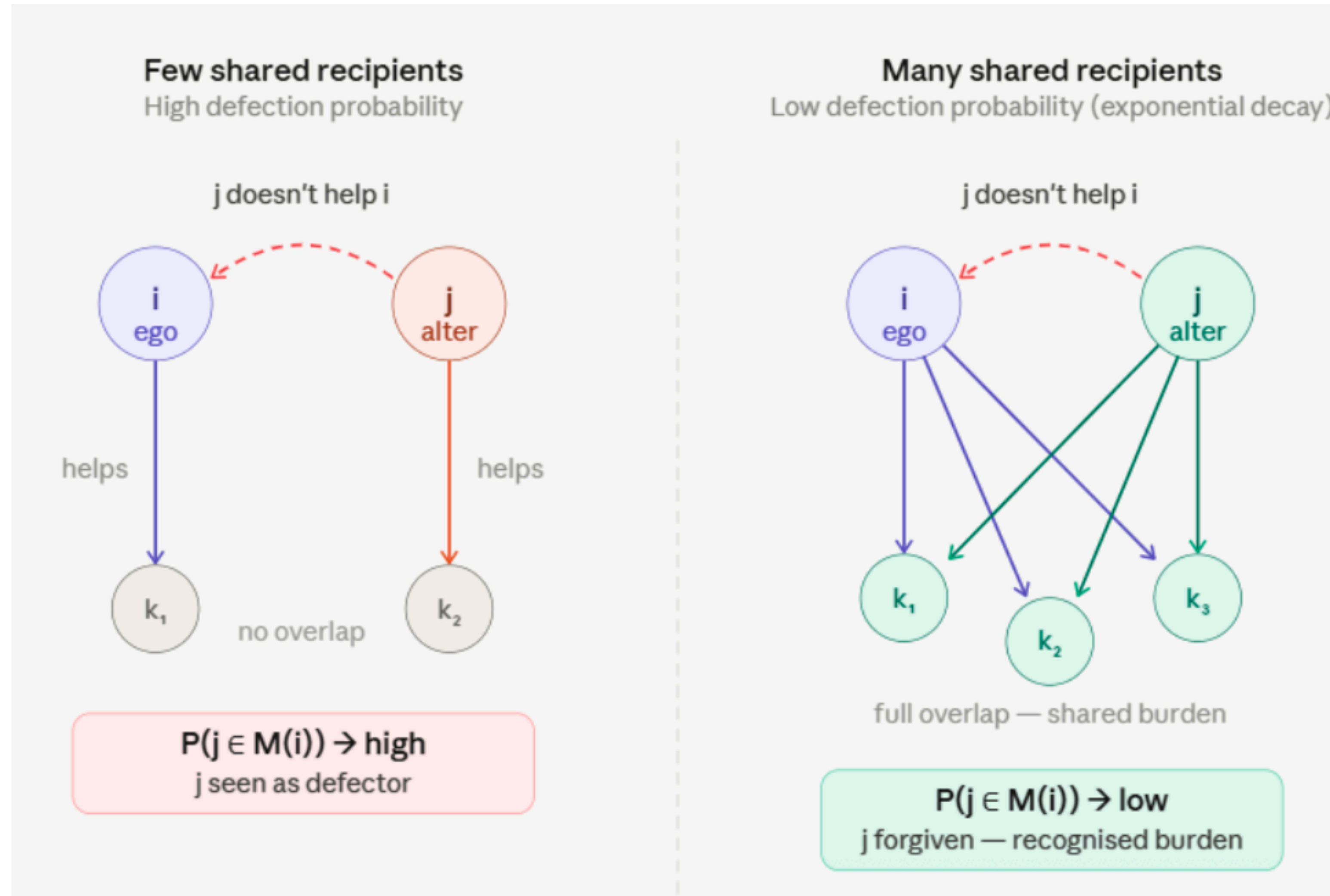
Instrumental

Solidaristic

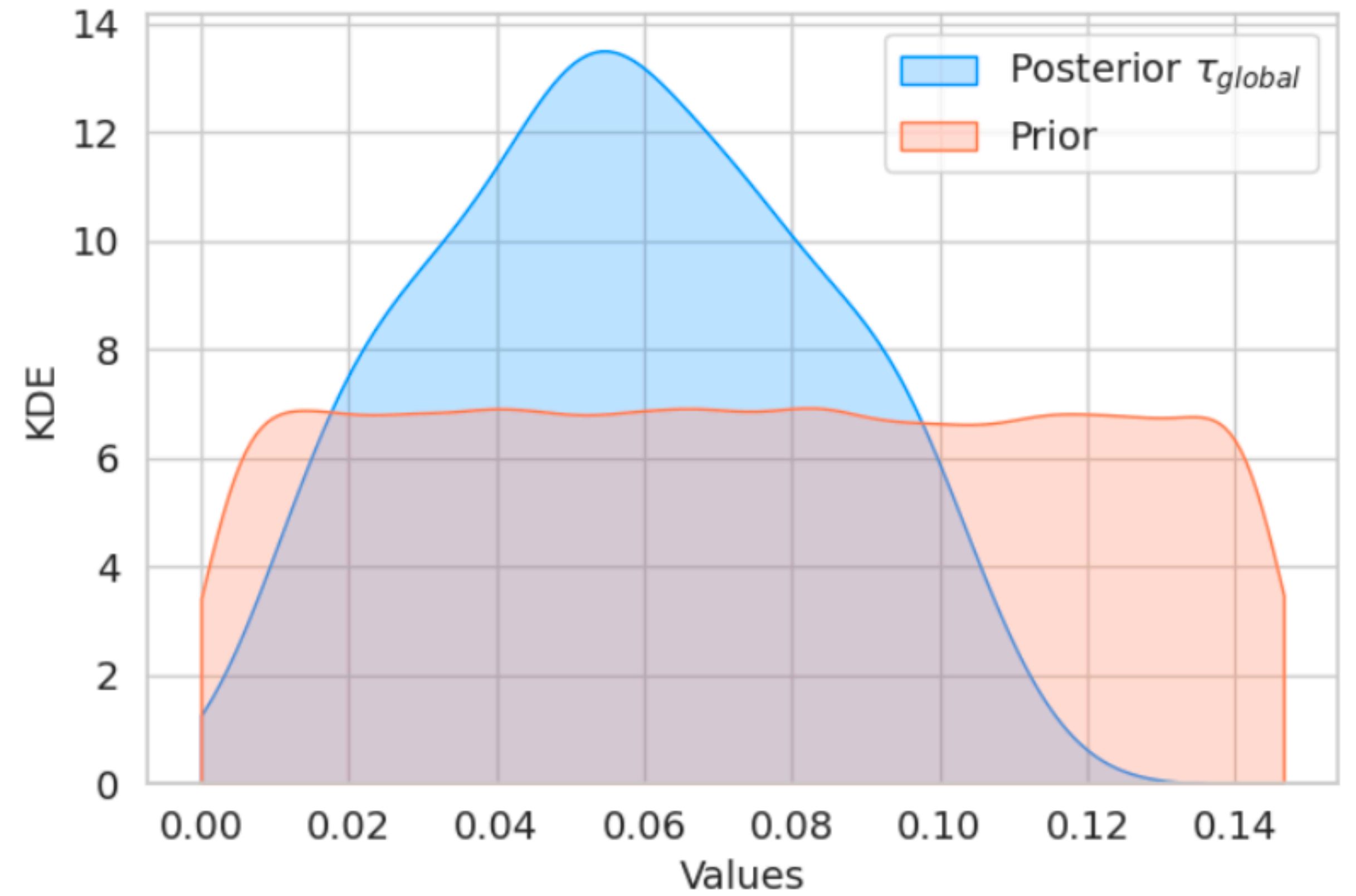
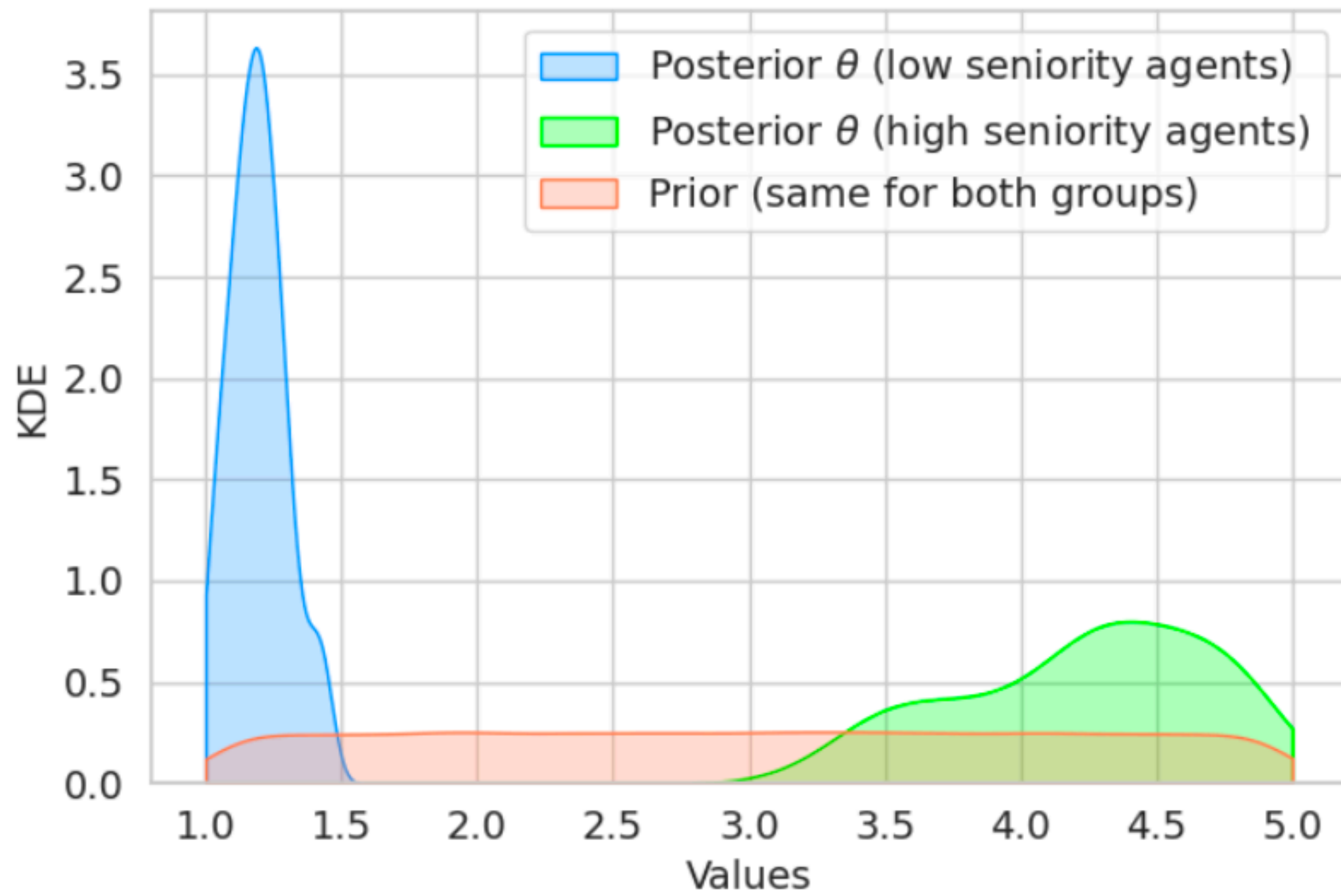




Tolerance for same-status actors

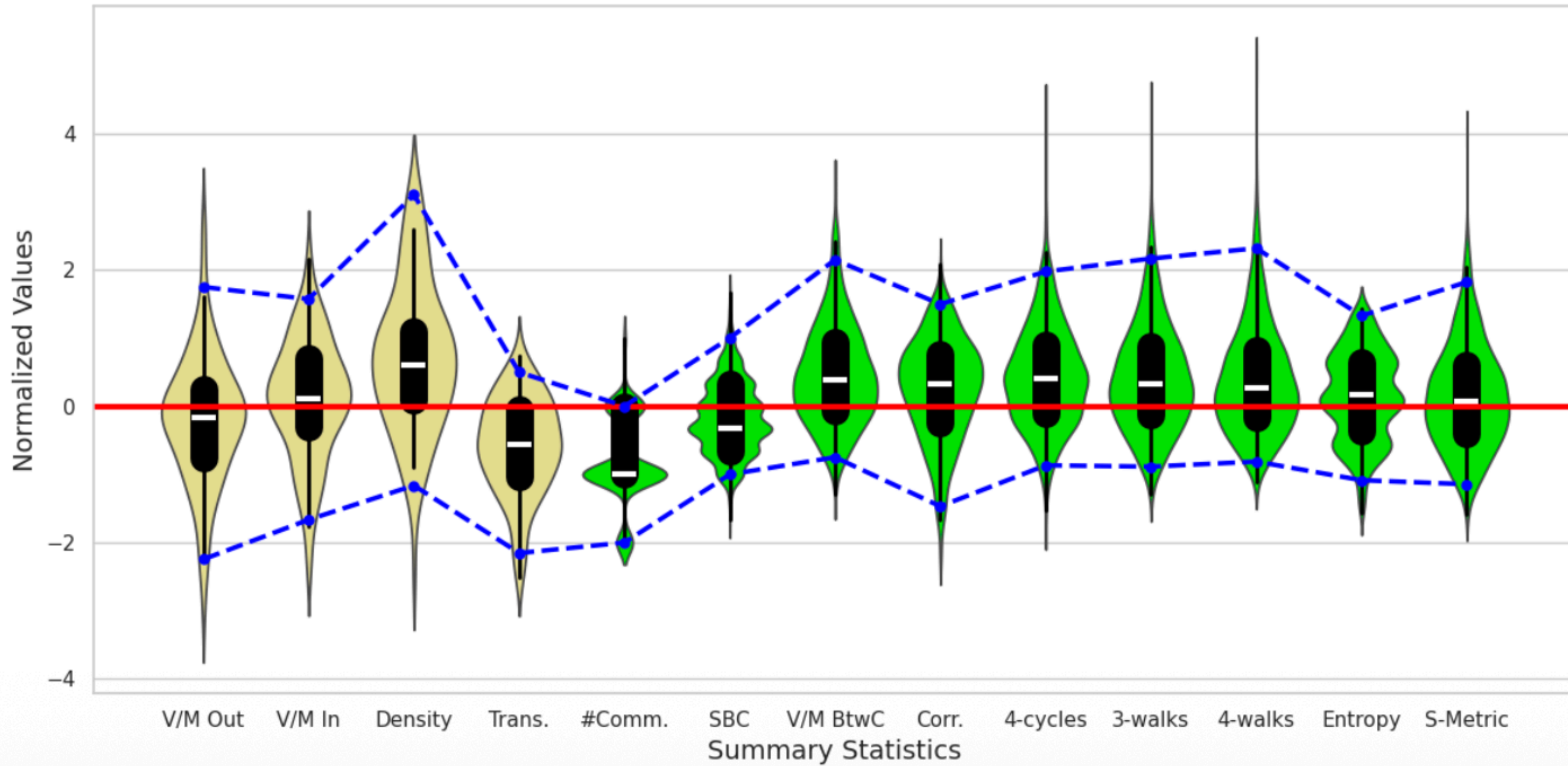


Results



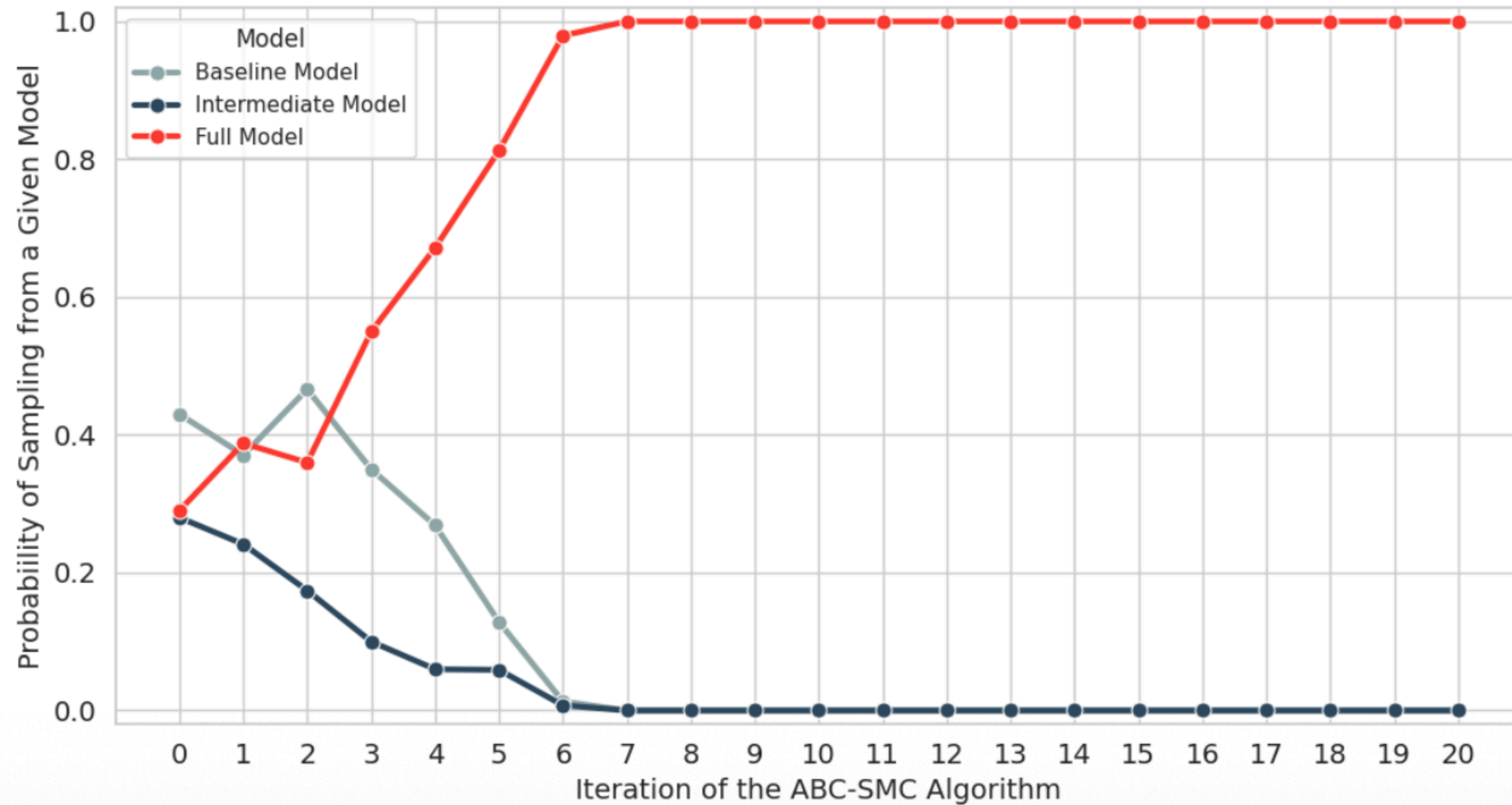
SMC-ABC

Model fit





Model selection





Conclusion

- **Empirical agent-based models** allow to estimate the likelihood of (unobserved) cognitive components of social mechanisms
- Evidence of **within-individual, time-varying framing** dynamics in explaining **prosocial behaviour** in a small social system
- **Cognition matters!** Mechanism models ignoring context-dependent motives underlying behaviour might fail to adequately explain prosocial behaviour

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