



Collective action in large-scale social media networks

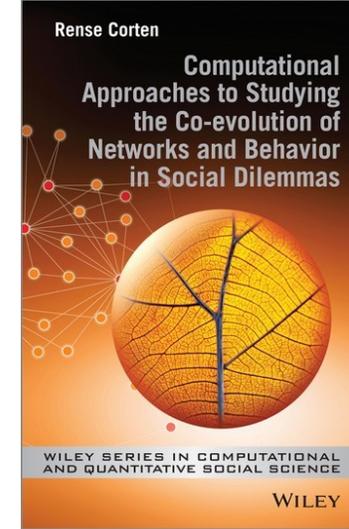
Rense Corten

Research

Dissertation (2009): theory and empirics on co-evolution of networks and behavior in social dilemmas

Branching out: empirical studies on social media networks

Current: Vidi project on trust in the sharing economy
Also: trust on Dark Web markets



Sources of Segregation in Social Networks: A Novel Approach Using Facebook

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Approaches and methods

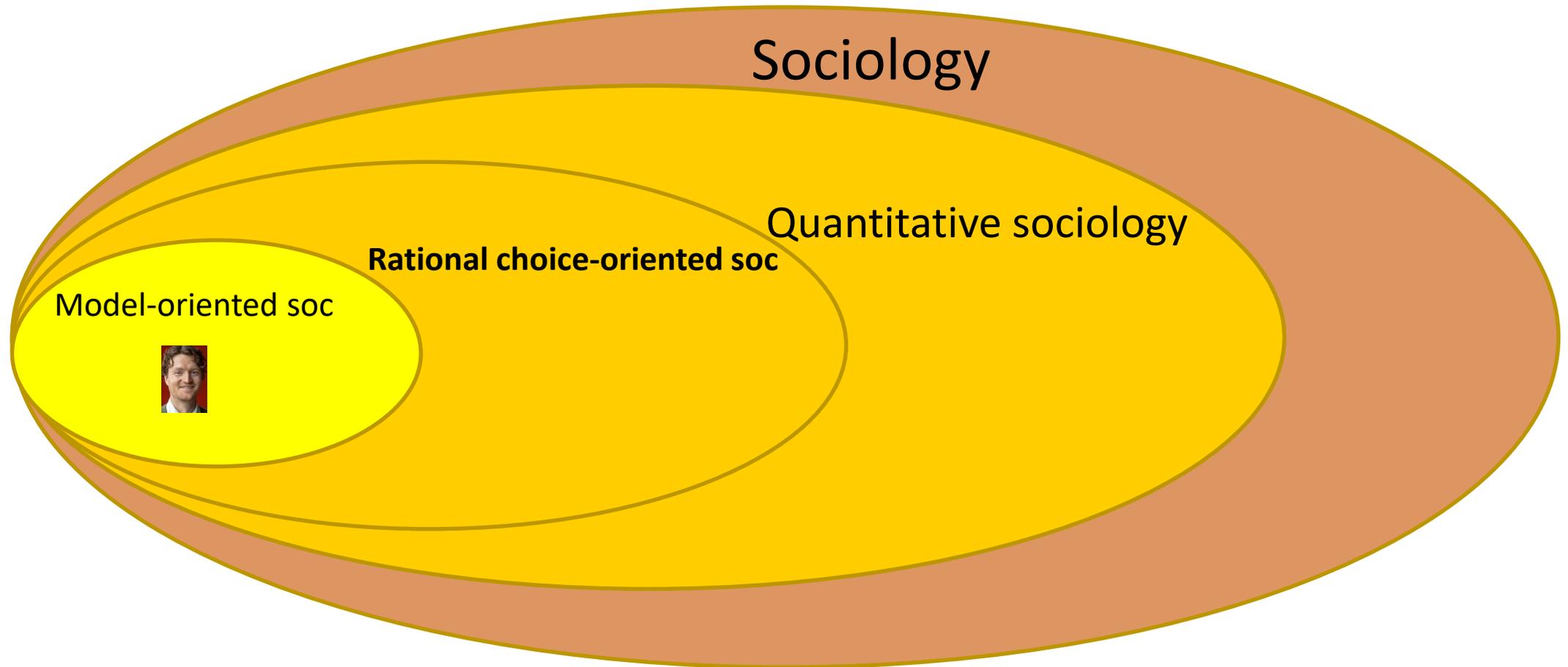
Theory:

- Formal modeling
- Game theory
- Agent-based modeling

Empirical research:

- Lab experiments (e.g, Corten & Buskens 2010; Hofstra et al 2015, Kas et al., 2020)
- Survey research (e.g., Corten & Knecht 2013; Hofstra et al, 2016)
- Digital traces (e.g., Corten 2012; Norbutas & Corten 2018; Przepiorka et al., 2017)
- ... and combinations (Hofstra et al., 2017)

Sociology in perspective



Online platforms in large-scale collective action: examples



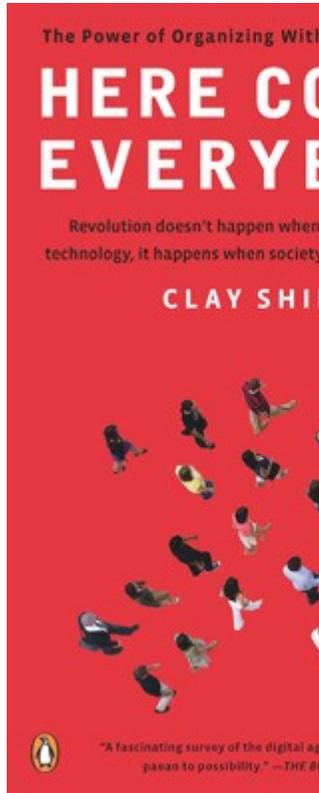
The role of social media in political protest has been controversial

ANNALS OF INNOVATION | OCTOBER 4, 2010 ISSUE

SIVA VAIDHYANATHAN | IDEAS | 12.27.2019 09:08 AM

The Two Myths of the Internet

The 2010s began with one story about the political power of technology. It ended with another. Both were wrong.



Social media can't provide what social change has always required. 120

General question

To what extent do online mass communication technologies facilitate the emergence of bottom-up collective action?

Specific questions

- How does the likelihood of large-scale collective action depend on:
 - Network topology
 - The nature of information diffusion (what happens in ties)
 - Structure of the underlying “game”
- What is the role of online platforms in the organization of collective action?
 - How does the likelihood of emergence differ between typical online network structures and typical offline network structures?

The role of *groups*



Telegram

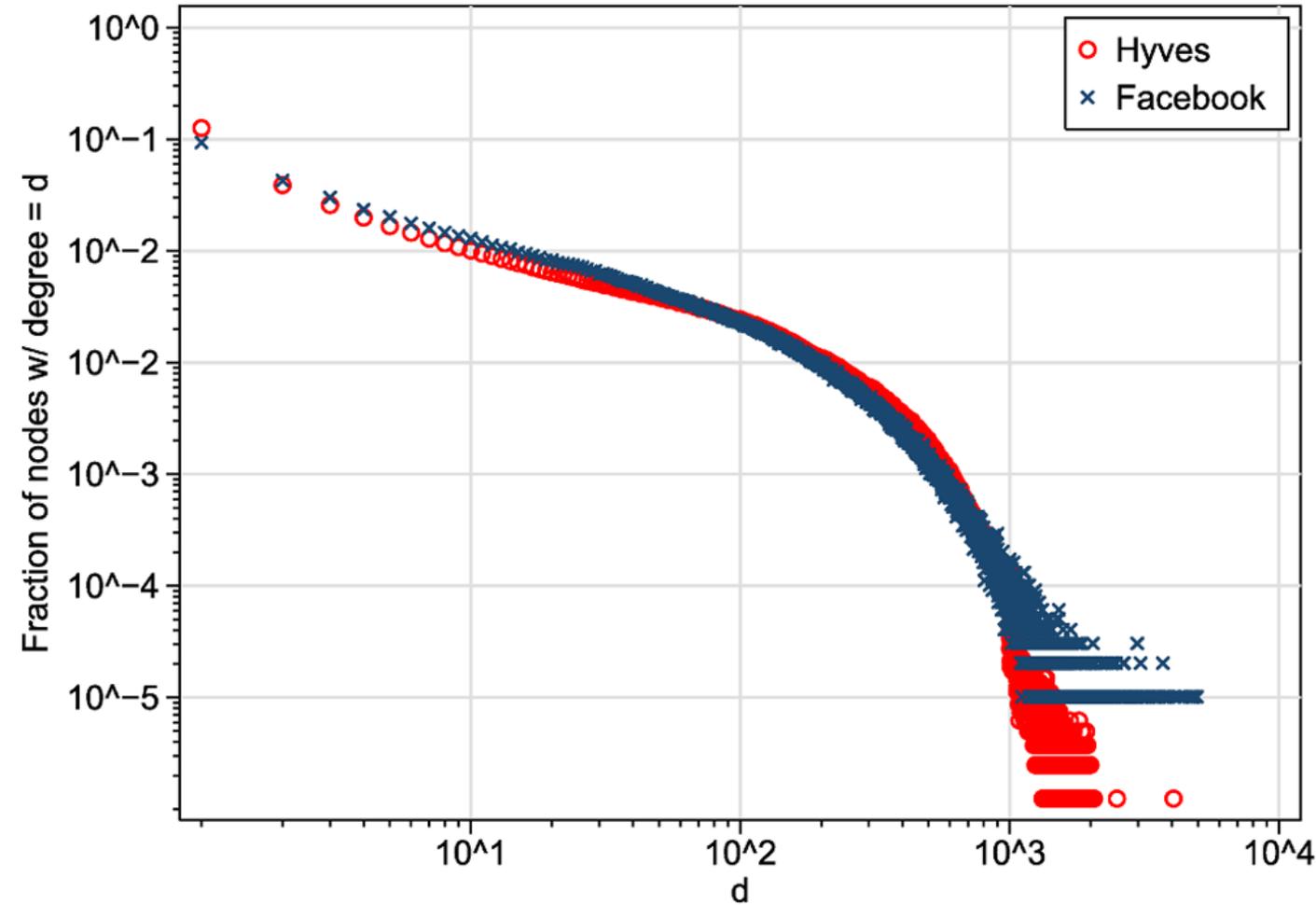


Challenges

- Network structure with many groups seems qualitatively different from "typical" structures
- Little known about the actual network structure of group-heavy social media--> data not accessible
- Analytical models for collective action inconsistent and often not tractable for large complex networks

What do we know about the topology of social media?

- Empirical regularities in structure, that sometimes differ from other large complex networks (Cortén 2012; Jackson & Rogers 2007)
- Similarity between online and offline social networks, e.g., Assortativeness (Hofstra et al. 2017), layering (Dunbar et al. 2015)



Degree distributions of Hyves and Facebook (Cortén 2012)

Some common approaches to collective action in networks from (analytical) sociology

- Threshold models (Granovetter 1978, Watts 2002)
- Games on networks:
 - Coordination
 - Prisoner's Dilemmas
 - Public good games
- Complex contagion (Centola & Macy, 2007)
- Critical mass theory (Oliver Marwell, 1985)
- ... And many other models (e.g., Gould, 1993)

Granovetter's Threshold model: basic assumptions

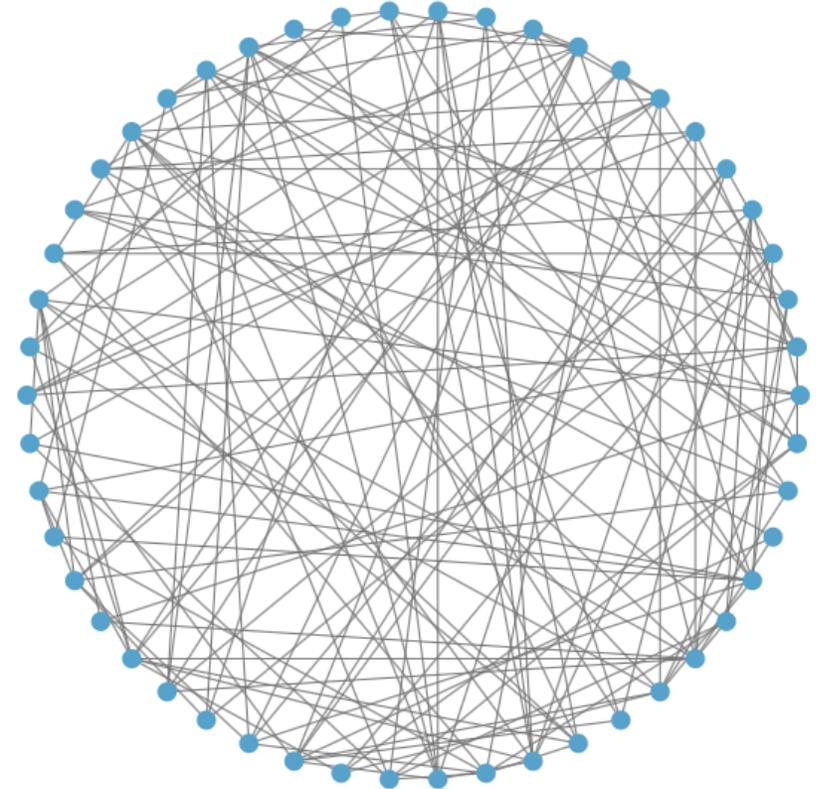
- N actors, each have their own *threshold* θ_i
- Process takes place in rounds
- θ_i = actor i will join the collective action at t if at least a proportion θ_i of the population has joined at $t-1$
- θ_i may be interpreted as result of i 's individual cost-benefit comparison, as a function of participation by others
- Every actor observes the entire population

Extension to random networks: Watts (2002)

- Actors observe only their local network
- Further simplification: all actors have the same threshold

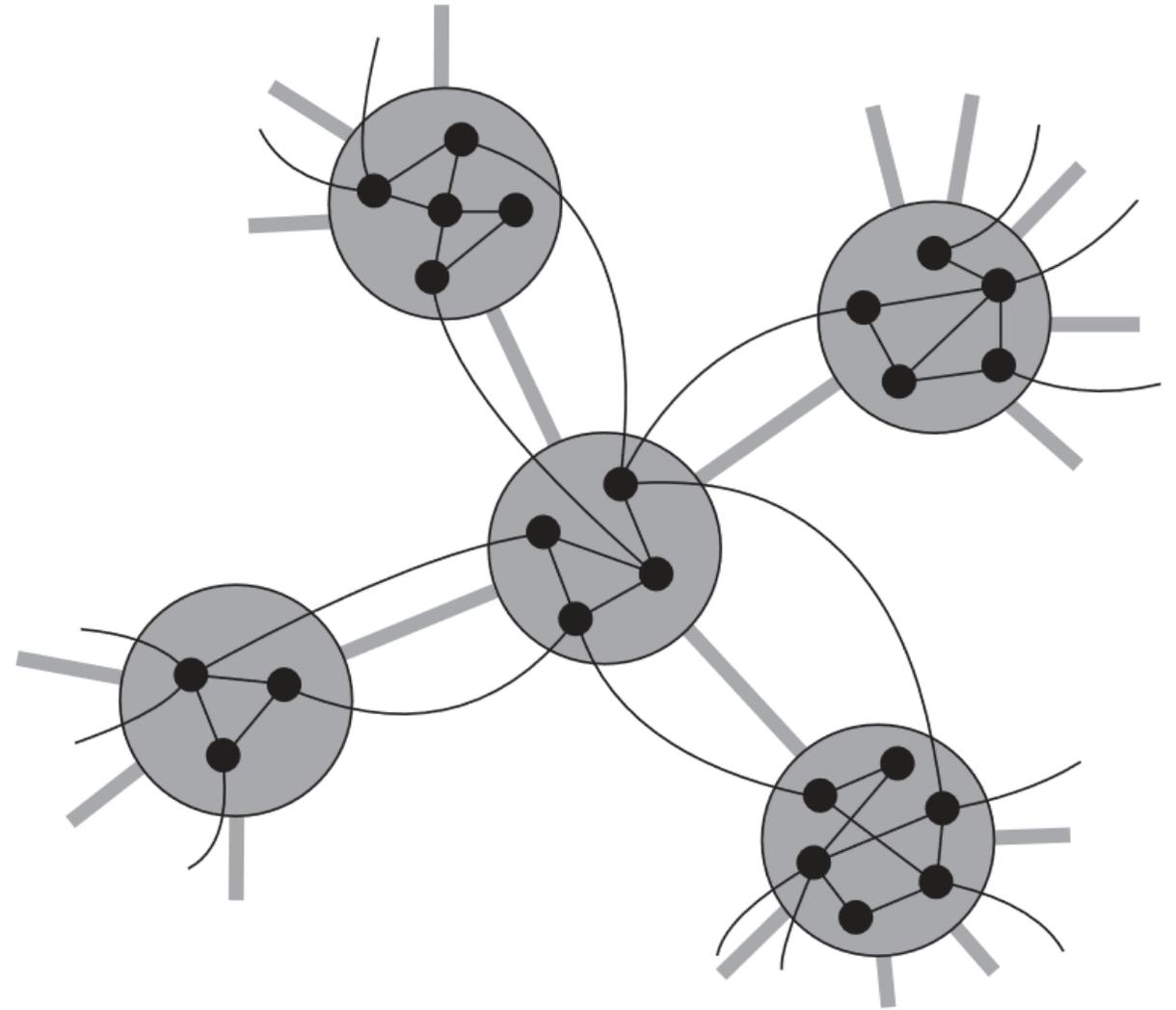
Results:

- Cascades only occur if “vulnerable” actors are connected across the population (cf. critical mass)
- Actors with *fewer* links are more vulnerable
→ density of the network should be not too high nor too low! → cascade windows



Extensions to networks with group structure: Watts & Dodds (2009)

- “Random group networks” (Newman et al. 2001) and “Generalized affiliation networks” (Watts et al. 2002)
- Wider cascade windows than in random networks, but different between group network models
- Reasons for differences poorly understood (Watts & Dodds, 2009)

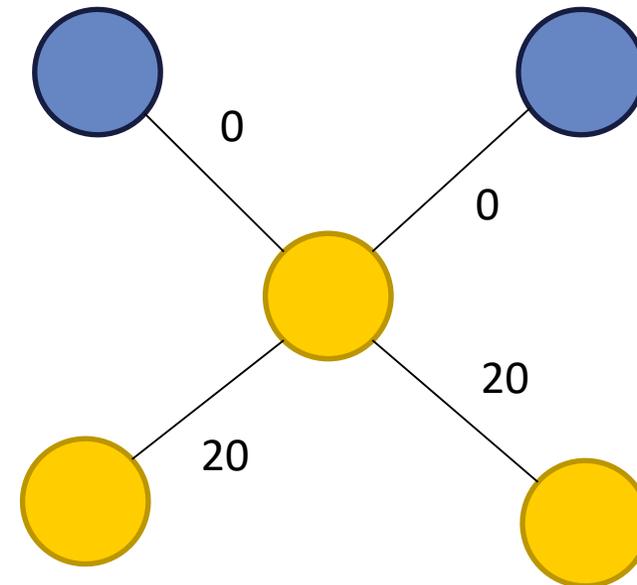


Random group network (Watts and Dodds, 2009)

Game theoretical approaches: Coordination games

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YELLOW	20,20	0,10
BLUE	10,0	14,14

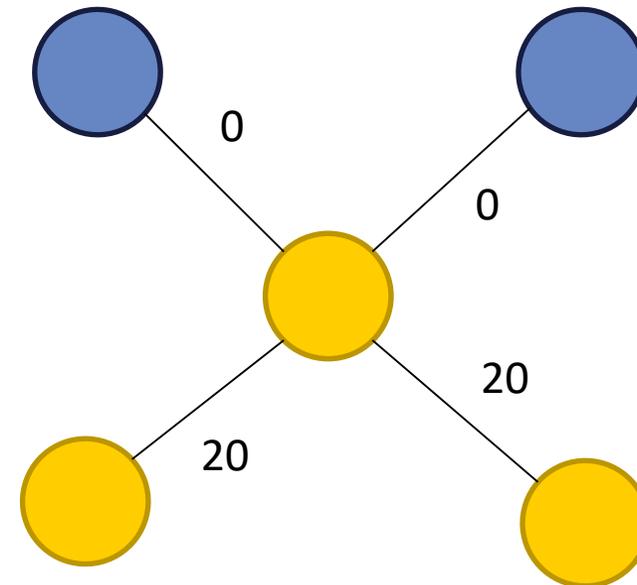
- Actors have incentives to conform to their neighbors...
- ...but some alternatives are intrinsically “better” (payoff dominant)...
- ...while others are risk dominant
- Networks may be exogenous (Buskens and Snijders, 2016, Frey et al., 2012) or endogenous (Buskens et al., 2008; Corten & Buskens, 2010)



Game theoretical approaches: PD-like games

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- Defection is typically the dominant strategy in the base game
- Explanations of cooperation typically rely on evolutionary games, or reputation building → role of information diffusion



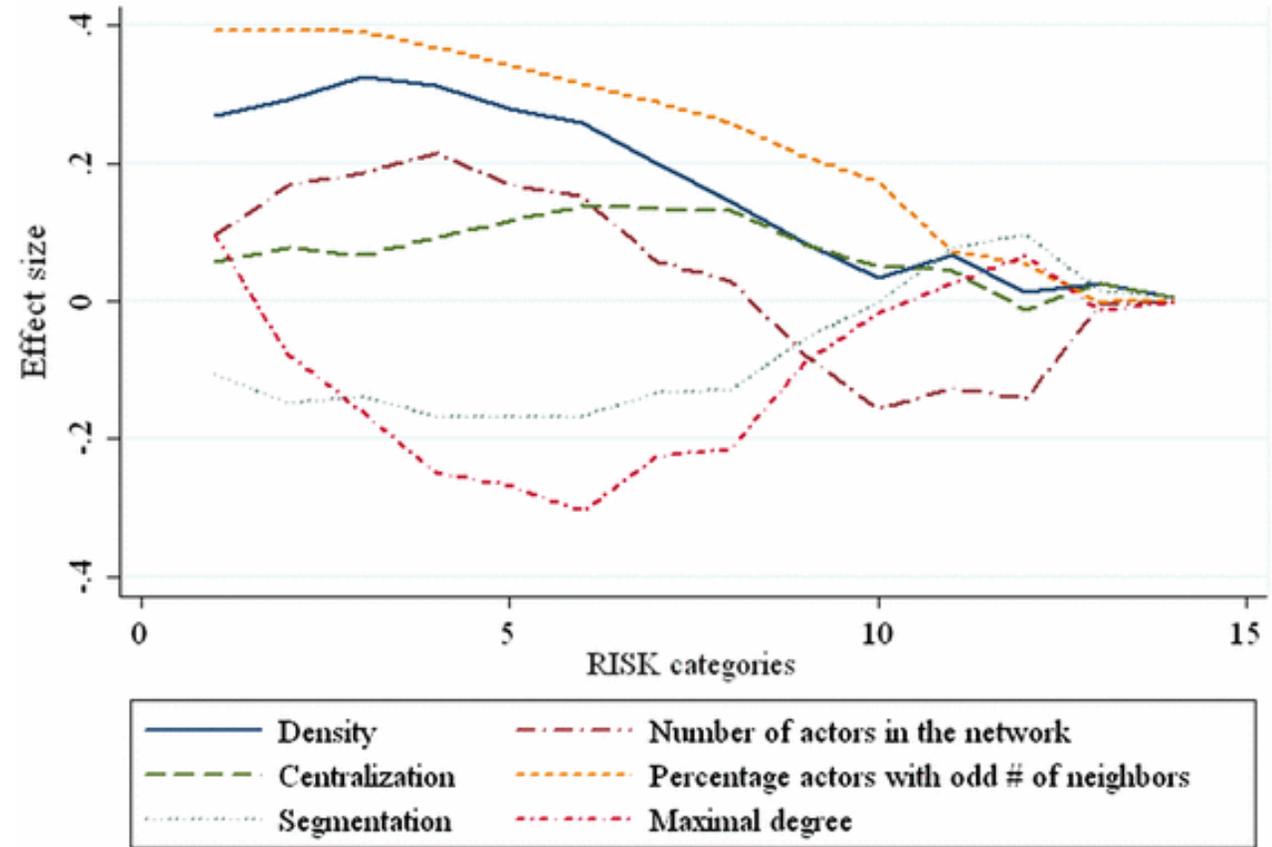
Results on coordination games

Exogenous networks:

- Outcomes depend on network structure in non-trivial ways
- Evidence for forward-looking behavior in experiments

Endogenous networks:

- Outcomes depend on costs of ties and available information
- Empirical decision making is complex



Effects of features network structure on reaching payoff-dominant outcomes (Buskens & Snijders, 2016)

Tentative first steps

1. Try to characterize networks with group structure (cf. Newman et al. 2001), leading to informative hypotheses that are *testable with scarce data*
2. Develop models for collective action on such networks that are (reasonably) tractable *and* sociologically plausible