Recovering from Viral Narratives

Delayed Interventions and Strategic Seeding in Polarised Networks

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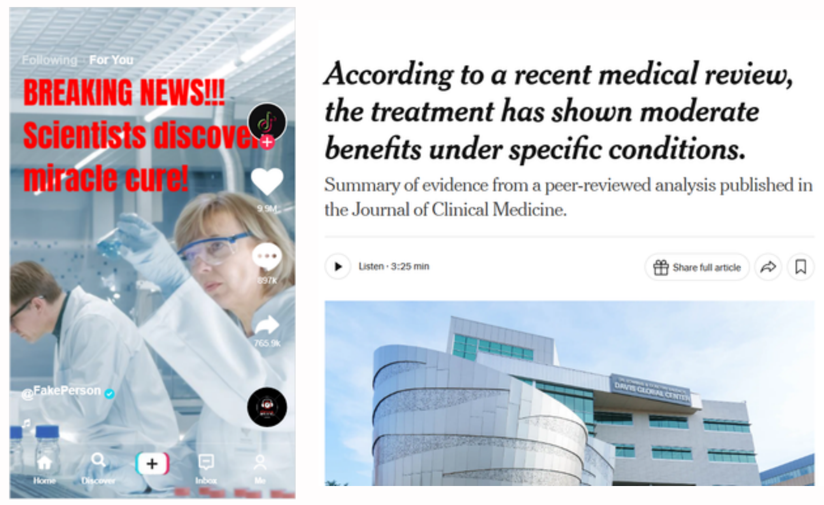
PROJECT REPOSITORY

https://github.com/alexandrugaloiu/RPpolarisation

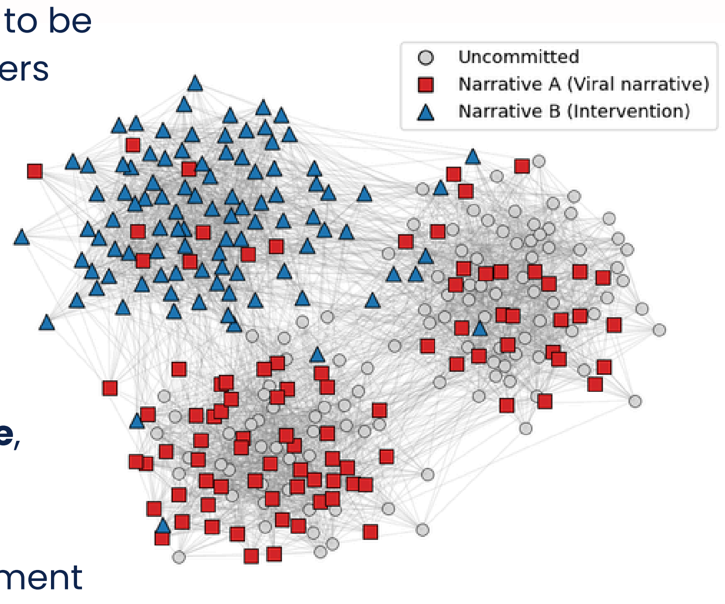
Motivation



- **Online social networks** enable spread of **narratives**.
- **Different** spreading mechanisms [1]
  - **viral**, limited exposure
  - **social reinforcement**, repeated exposure
- **Objective**: **interventions** against harmful online narratives

Competing Narrative Diffusion Problem

- **One social network** partitioned in disjunct **communities**
- **Two** narratives compete to be adopted by the same users
- Narrative **A** = **viral information**
- Narrative **B** = **corrective intervention**
- Factors investigated:
  - **community structure**, segregation
  - intervention **timing**
  - **strategic seed** placement



Research question

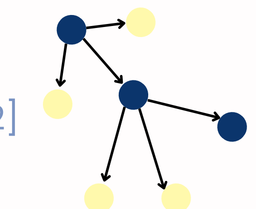
How do
- **network structure,**
- **intervention timing**
- **intervention strategy**

influence competition between **viral** and **reinforcement-based** diffusion processes?

Approach

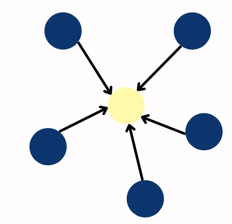
Narrative **A** → **Independent Cascade** (IC) [2]

$$P(activation) = p$$



Narrative **B** → **Linear Threshold** (LT) [2]

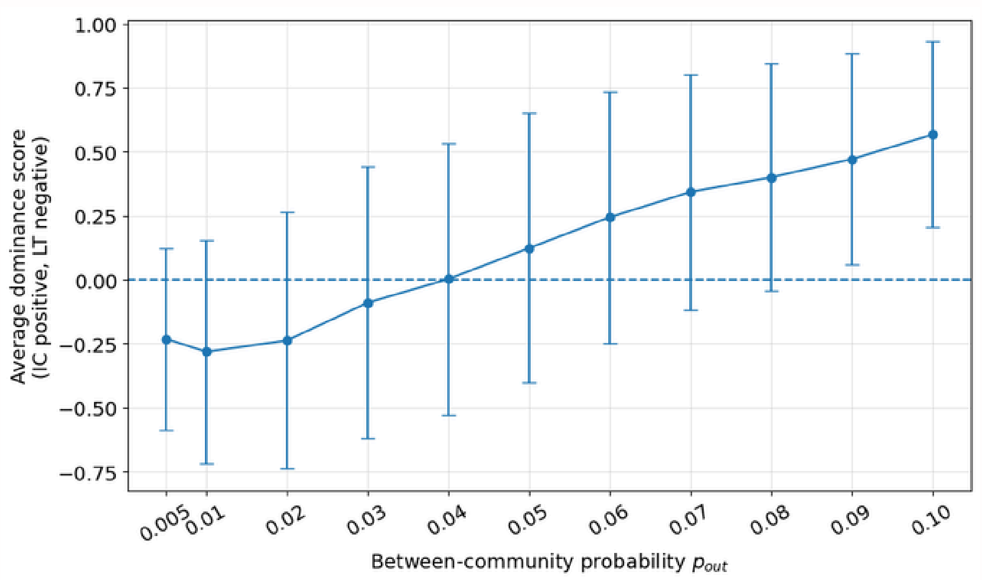
$$\frac{\text{active neighbors}}{\text{total neighbors}} \geq \theta$$



Network generation:
- Stochastic Block Model (SBM) [3]
- Lancichinetti–Fortunato–Radicchi (LFR) [4]

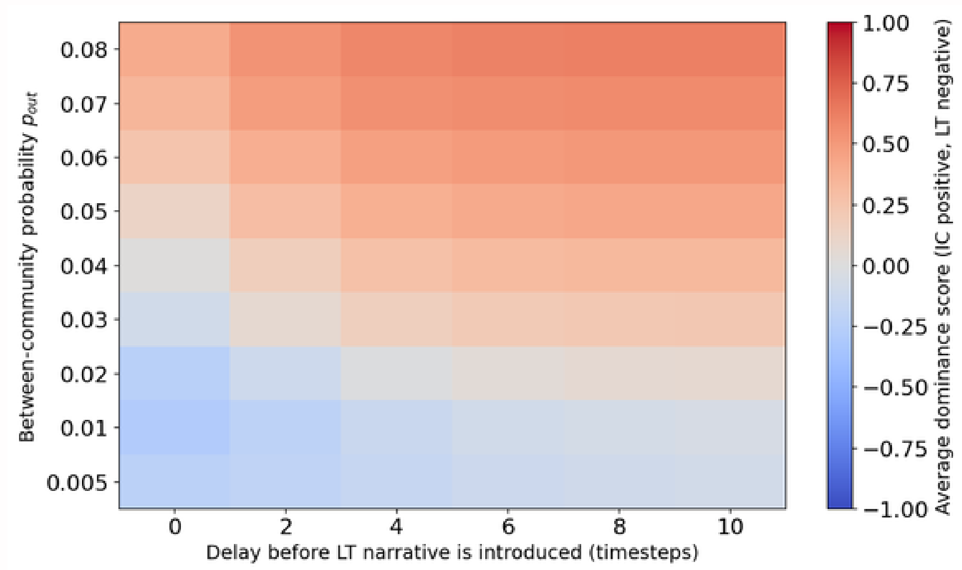
Key metrics:
- Adoption counts: $|A|, |B|$
- Dominance score: $D = \frac{|A| - |B|}{N}$

Experiment 1: Community structure



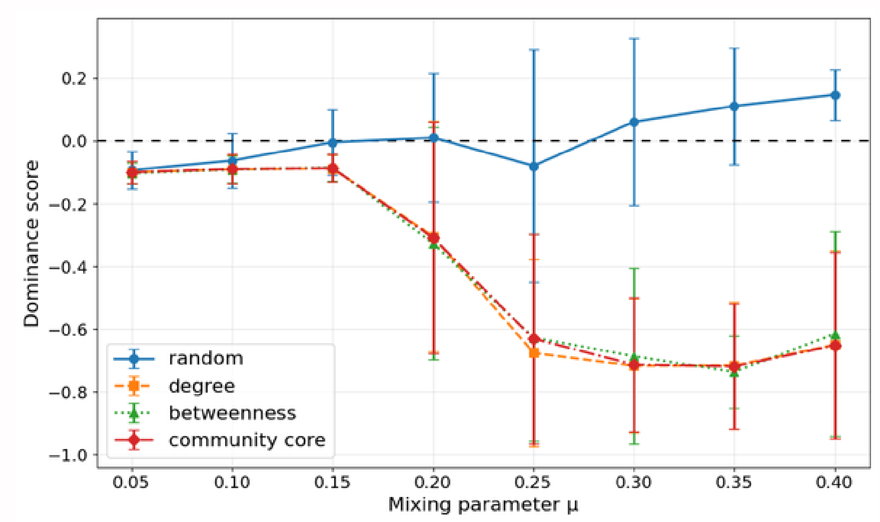
Key findings:
- **More segregation → corrective intervention** (LT) wins
- **Less segregation → viral narrative** (IC) wins

Experiment 2: Delayed interventions



Key findings:
- delays reduce intervention effectiveness
- interventions **still competitive** in **highly segregated** networks

Experiment 3: Strategic seed placement



Key findings:
- strategic seedings **outperform** random seeding
- strategic seeding **changes the relationship** between segregation and intervention success

Conclusion

- **Network structure** strongly affects **intervention success**
- **Delayed** interventions can still **recover**
- **Strategic seeding** strongly improves outcomes

Effective interventions depend on **when, where and how** the network is structured, **not just the message**.

Future work

- Real social-media networks
- More realistic diffusion models
- Dynamic opinions

End Goal: Better public communication tools

References

[1] Centola & Macy (2007), Complex Contagions and the Weakness of Long Ties.
[2] Kempe et al. (2003), Maximizing the Spread of Influence through a Social Network.
[3] Holland et al. (1983), Stochastic Blockmodels: First Steps.
[4] Lancichinetti et al. (2008), Benchmark Graphs for Testing Community Detection Algorithms.
[5] Budak et al. (2011), Limiting the Spread of Misinformation in Social Networks.
[6] Stein et al. (2023), Network Segregation and the Propagation of Misinformation.