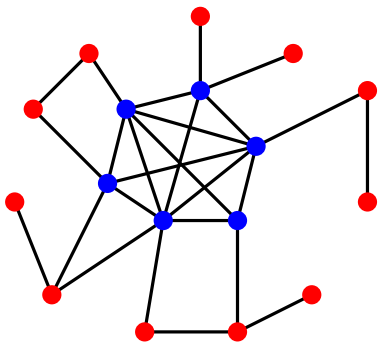


Phase Transition of the 2-Choices Dynamics on Core-Periphery Networks

E. Cruciani, E. Natale, **A. Nusser**, G. Scornavacca



Highlights of Algorithms 2018

Opinion Dynamics

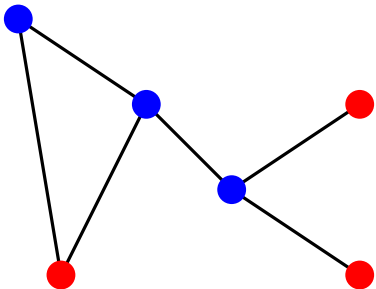
Given:

- graph
- node coloring

Dynamics:

- Simple update rule of a node's color...
- ...depending on its neighbors' colors.

→ Updates happen in **synchronous rounds**.



Opinion Dynamics

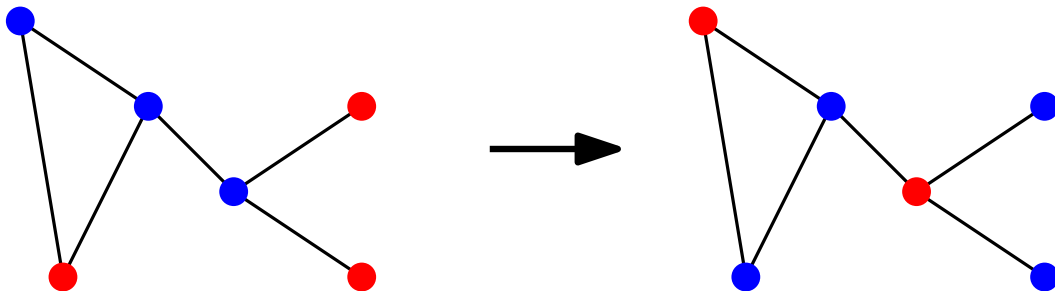
Given:

- graph
- node coloring

Dynamics:

- Simple update rule of a node's color...
- ...depending on its neighbors' colors.

→ Updates happen in **synchronous rounds**.



Opinion Dynamics

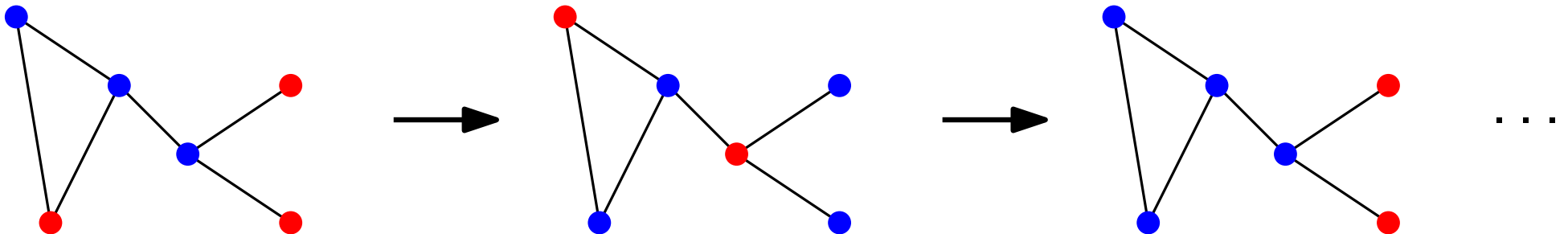
Given:

- graph
- node coloring

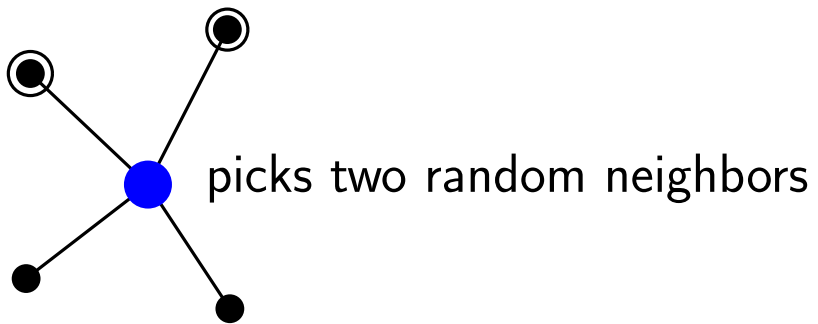
Dynamics:

- Simple update rule of a node's color...
- ...depending on its neighbors' colors.

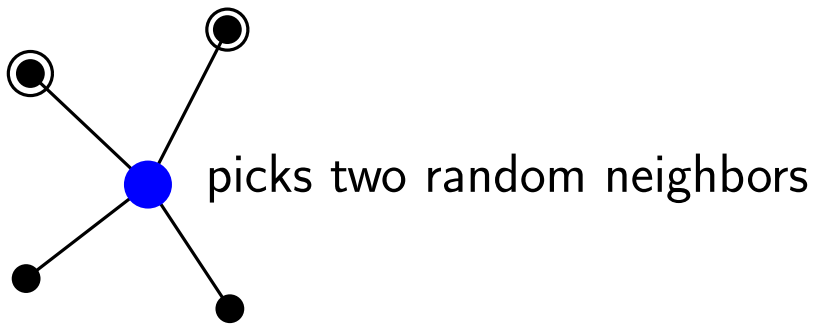
→ Updates happen in **synchronous rounds**.



2-Choices Dynamics

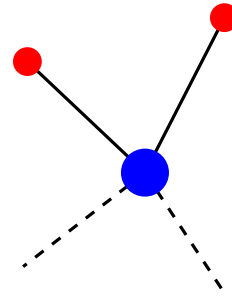


2-Choices Dynamics



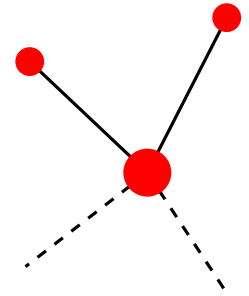
if same color

An arrow points from the initial state to the first intermediate state, with the text "if same color" written above it.

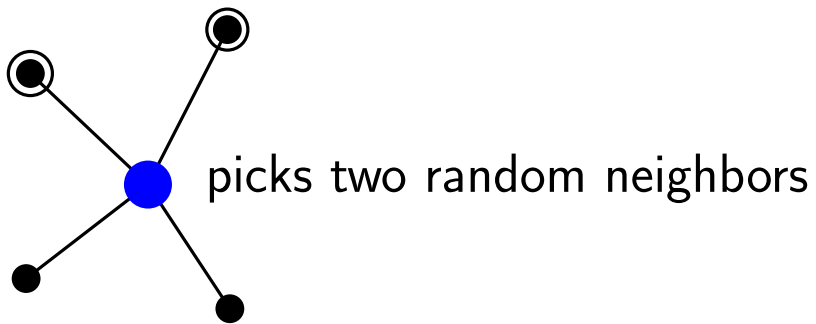


change

An arrow points from the first intermediate state to the final state, with the text "change" written above it.

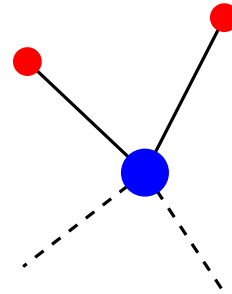


2-Choices Dynamics



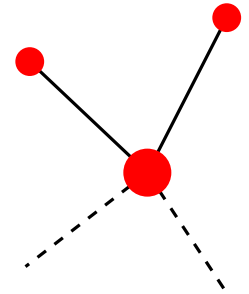
if same color

An arrow pointing from the initial state to the first transition state.



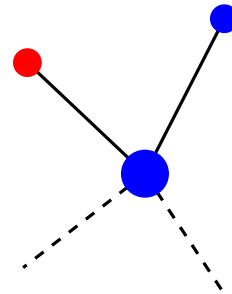
change

An arrow pointing from the transition state to the final state.



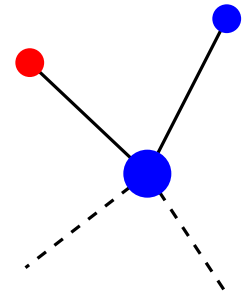
if different color

An arrow pointing from the initial state to the second transition state.



keep

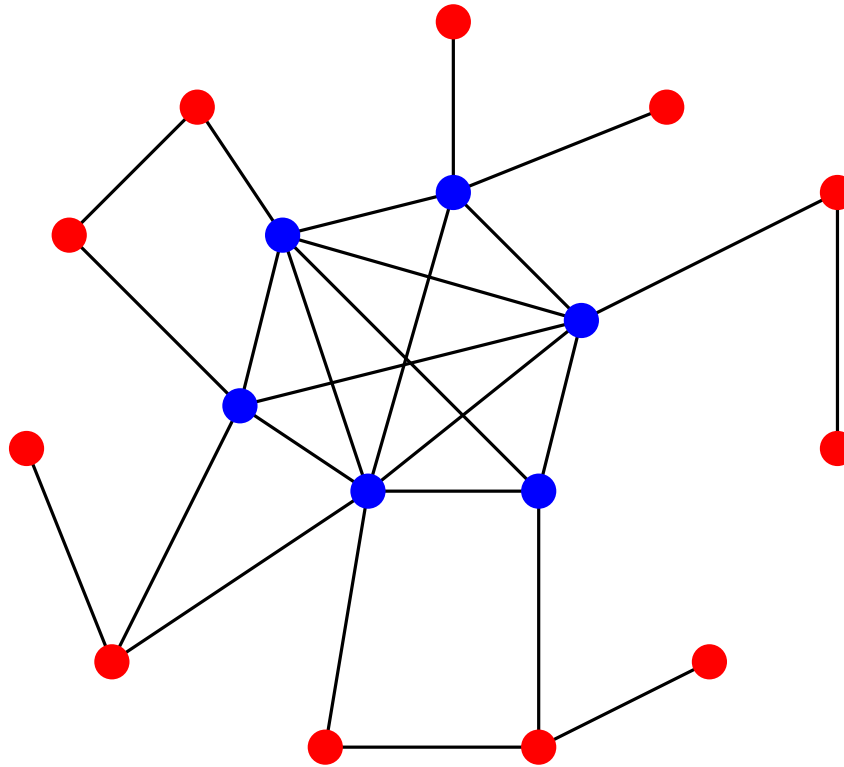
An arrow pointing from the transition state to the final state.



Core-Periphery Networks

Core: Set of densely connected nodes.

Periphery: Remaining nodes, loosely connected and dominated by core.



dominance: $\frac{|c(\mathcal{C}, \mathcal{P})|}{|c(\mathcal{P}, \mathcal{P})|}$

Main Result

When running the 2-Choices dynamics on core-periphery networks with

- core initially blue
- periphery initially red

Main Result

When running the 2-Choices dynamics on core-periphery networks with

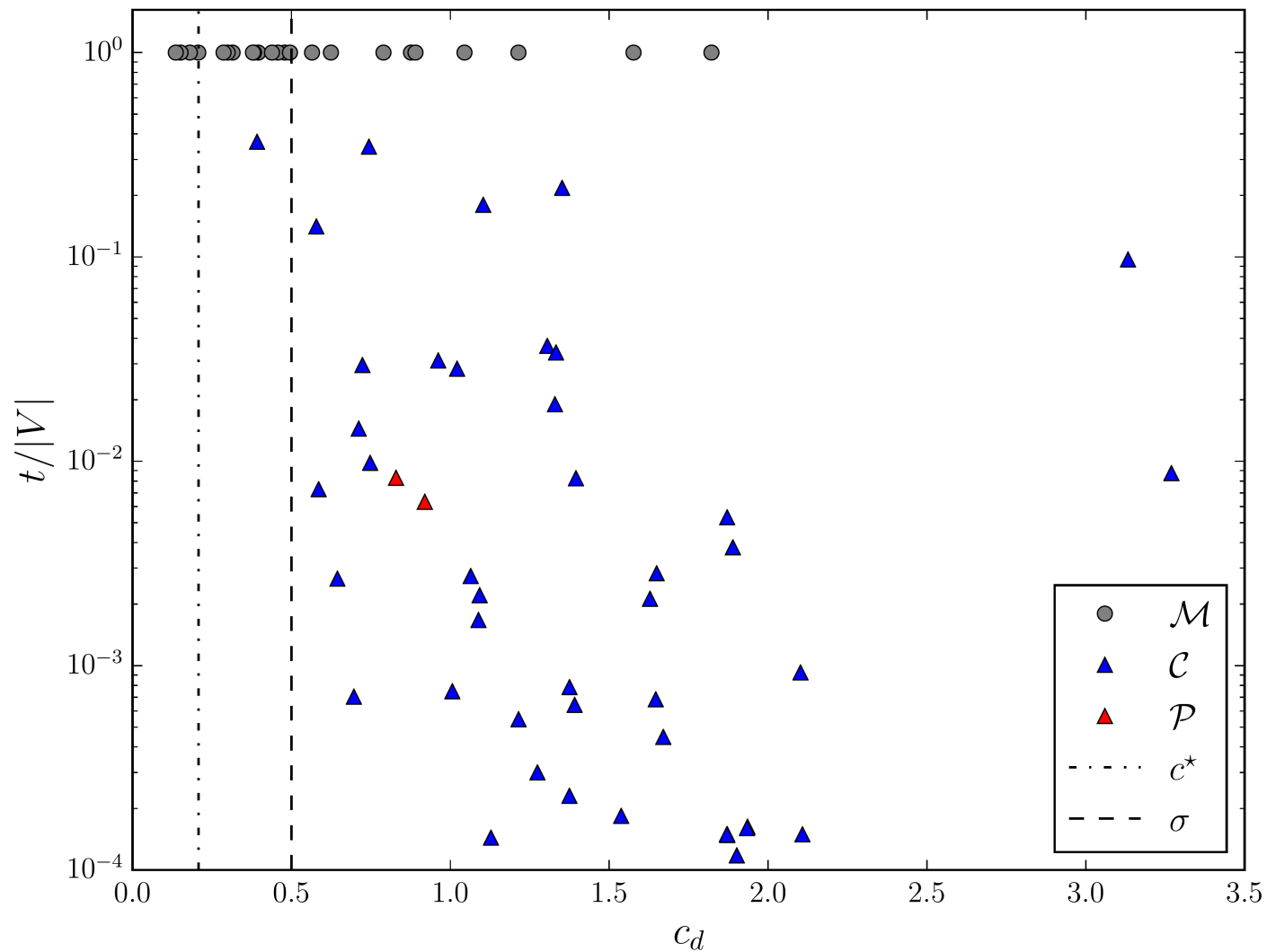
- core initially blue
- periphery initially red

then

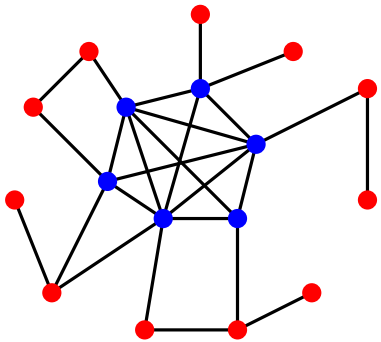
- **if dominance is above a universal threshold:**
 - consensus on blue color in $\mathcal{O}(\log n)$ rounds w.h.p.
- **otherwise:**
 - metastable phase for $n^{\omega(1)}$ rounds w.h.p.

Experiments

Tests conducted on **70 real-world networks** (SNAP, KONECT).



See you at the poster session! :)



19th Max Planck Advanced Course on the Foundations of Computer Science

13 - 17 August 2018, Saarbrücken, Germany



Fine-Grained Complexity and Algorithms



Ramamohan Paturi

UC San Diego

Foundations of Fine-grained Complexity



Amir Abboud

IBM Almaden

Hardness in P



Danupon Nanongkai

KTH

Dynamic graphs: algorithms, conditional lower bounds, and complexity classes

