



# Social Influence of **Committed Minorities** in a Two-party System

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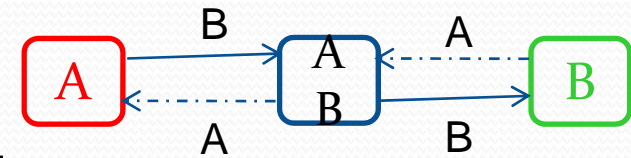
Troy, New York 12180

Question: With certain **fraction of committed nodes**, can the **minority** opinion takes over?

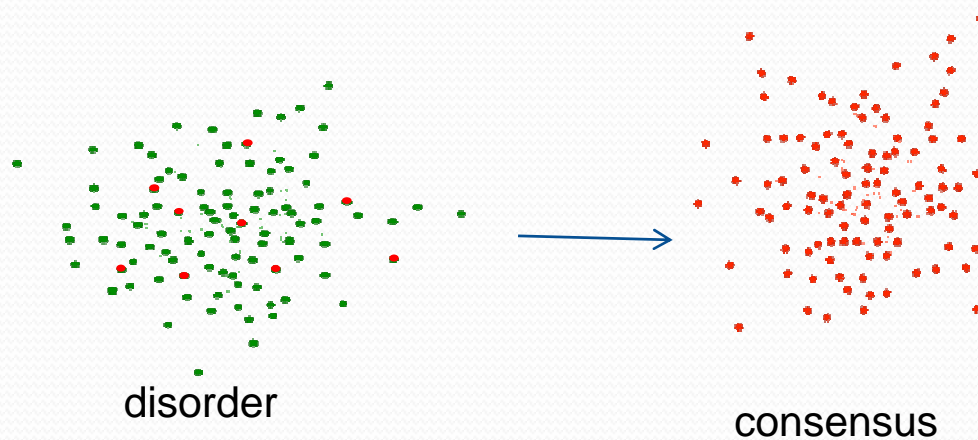
□ **2-word** Naming Game model

A speaker sends an opinion to a listener,

- The listener adds this opinion if it does not have;
- Otherwise, both keep only this opinion (i.e., bidirectional).

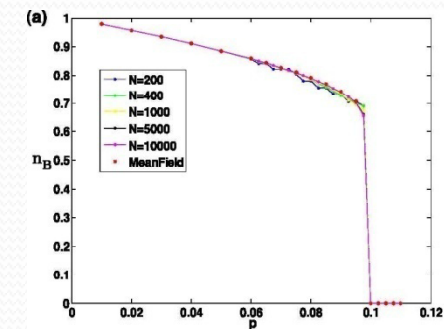


□ One type of committed opinion case<sup>1</sup>



$$p_c \approx 0.10$$

First order transition



1. J. Xie, S. Sreenivasan, G. Korniss, W. Zhang, C. Lim, B. K. Szymanski, "Social Consensus through the Influence of Committed Minorities", Physical Review E. 2011

# Two Committed Opinions NG in the Mean-field

## ▀ Dynamics of the game

$$\frac{dn_A}{dt} = -n_A n_B + n_{AB} n_{AB} + n_{AB} n_A + \frac{3}{2} p_A n_{AB} - p_B n_A$$

$$\frac{dn_B}{dt} = -n_A n_B + n_{AB} n_{AB} + n_{AB} n_B - p_A n_B + \frac{3}{2} p_B n_{AB}$$

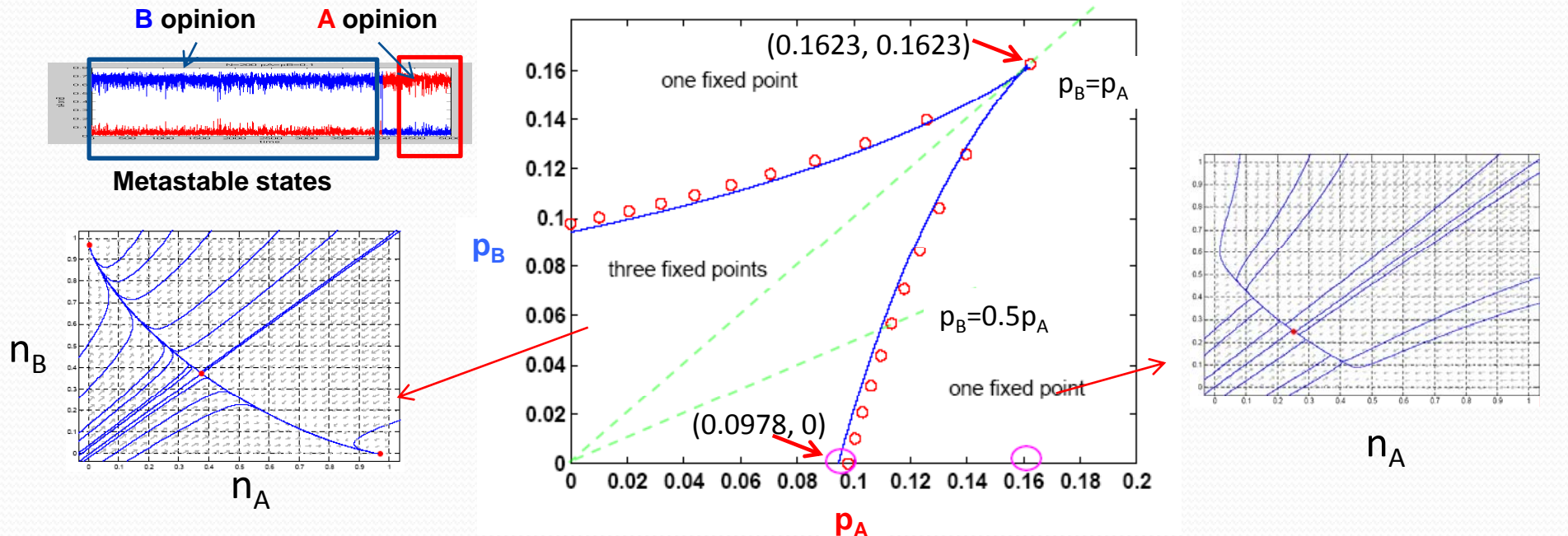
Where

$n_{A(B)}$ : the fraction of **non-committed** nodes with opinion A (B)

$p_A$ : the fraction of nodes **committed** to opinion A

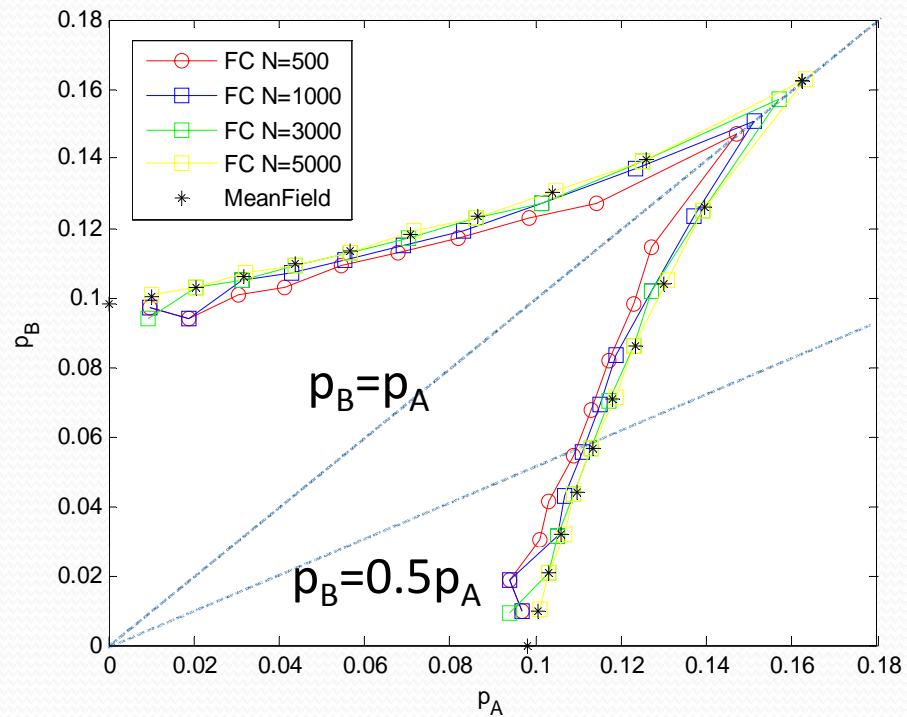
$p_B$ : the fraction of nodes **committed** to opinion B

- when  $p_A > 0$  and  $p_B > 0$ , **no** consensus.
- when  $p_A$  or  $p_B$ , reduces to one committed opinion case.

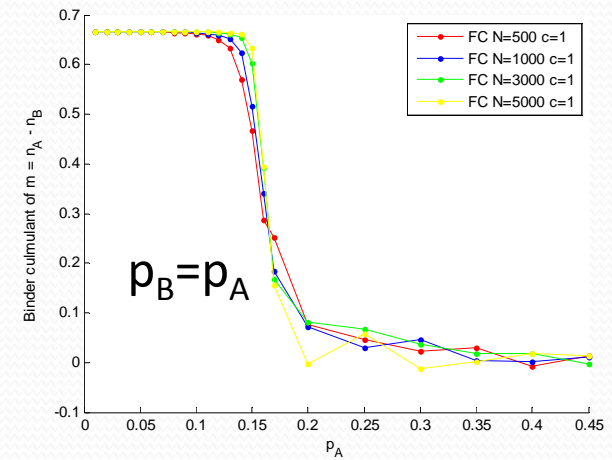


# Transition in Finite Size System

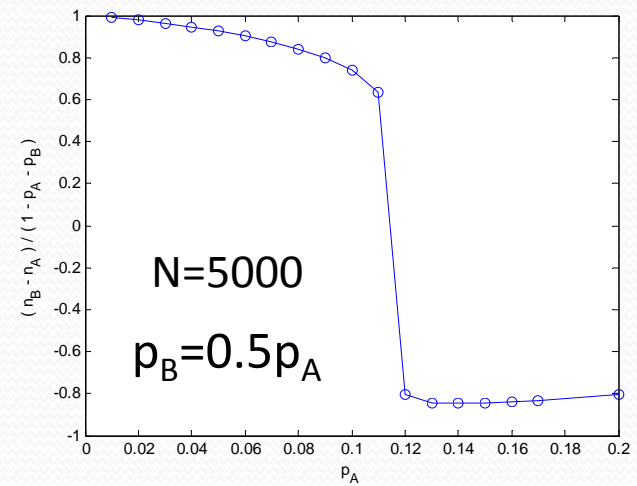
## Fully connected networks



## Second order transition



## First order transition





Thank you!