Which Social Networks Are Balanced?

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Social balance theory (Heider, 1946; Cartwright, 1956)

- Signed social networks tend to be *balanced*
- Balanced triads:
  my friend's friend is my friend, my friend's enemy is my enemy, etc.
- Imbalanced triads:
  my friend's friend is my enemy, friend's enemy is my friend, etc.

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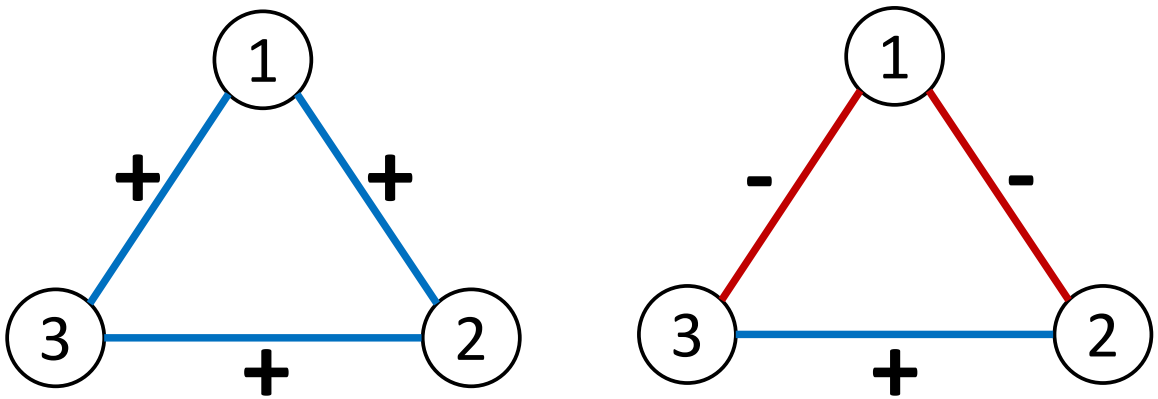

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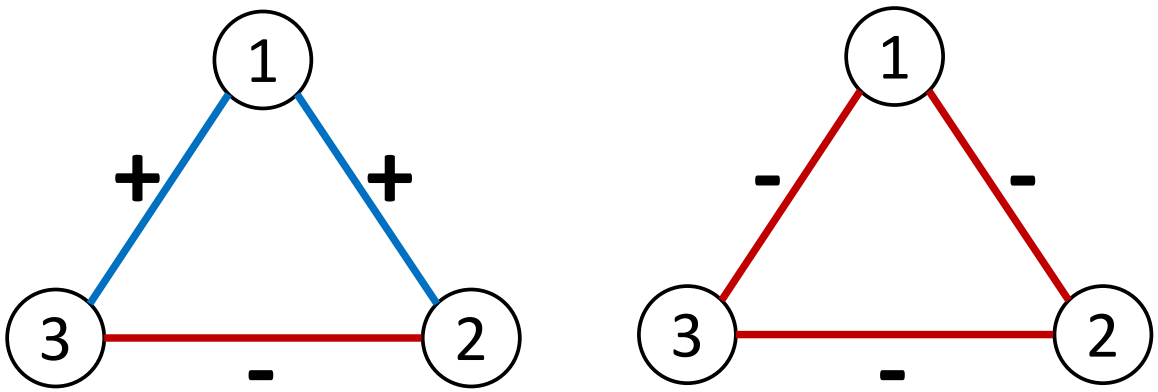

The model

- Previous models: *centralized* dynamic model of relationship configurations on networks

Problem: some agents can be **forced** to change their relationship, and it may increase the number of imbalanced triads

- Our model: *decentralized* dynamic model of relationship configurations on networks

$T \in \mathbb{R}_+$: the degree to which agents try to maintain balanced triads

$\varepsilon \sim$ logistic dist: the impact of exogenous factors that affect the relationship

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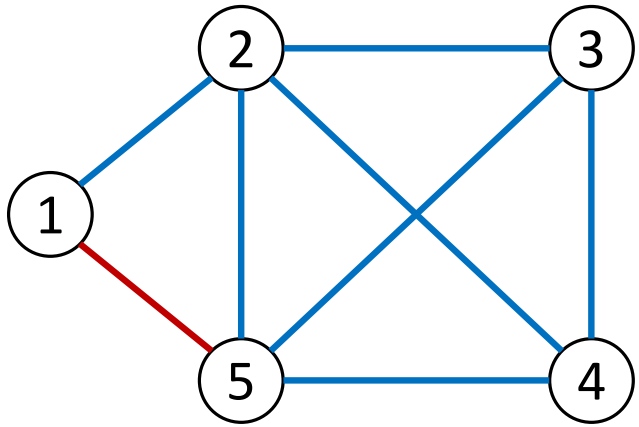

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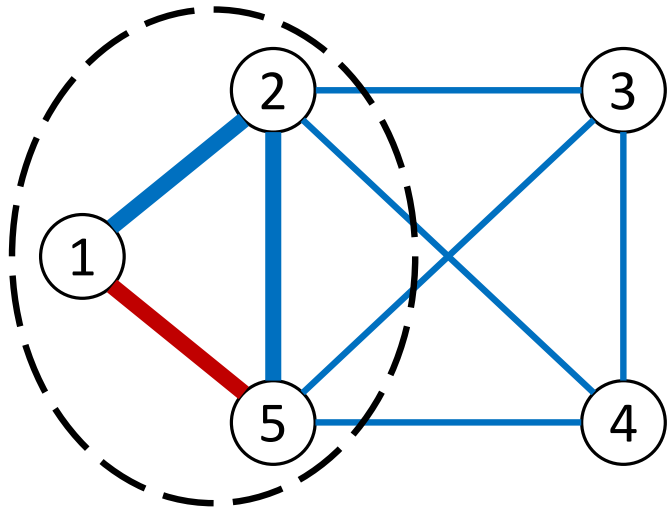

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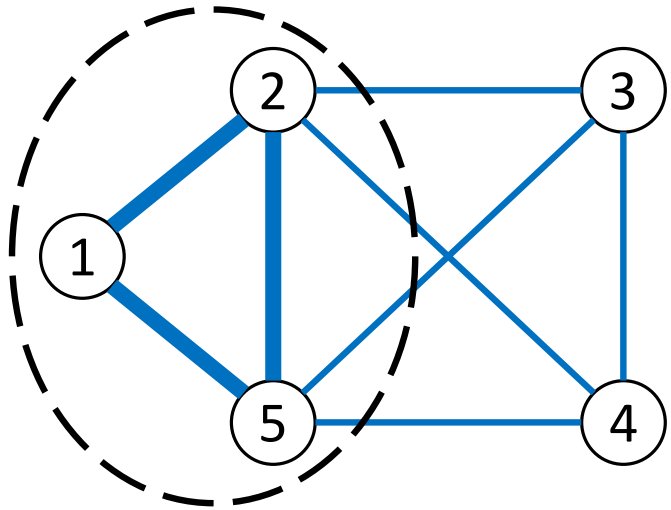

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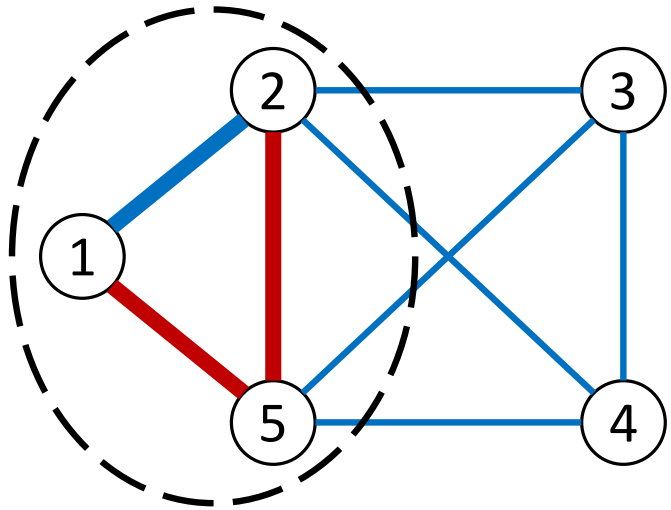

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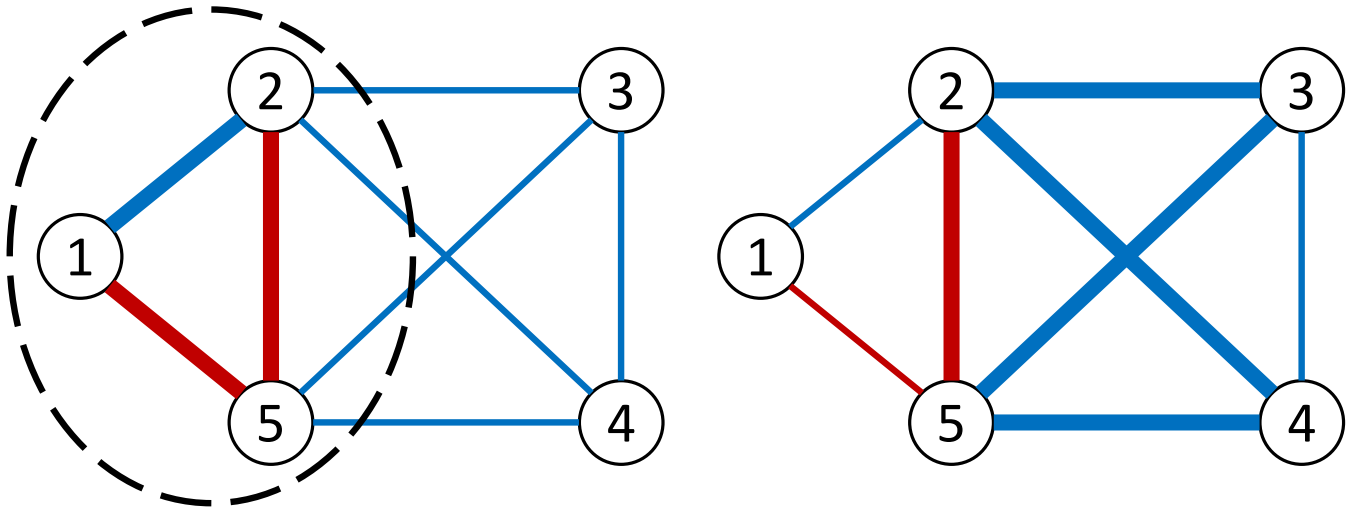

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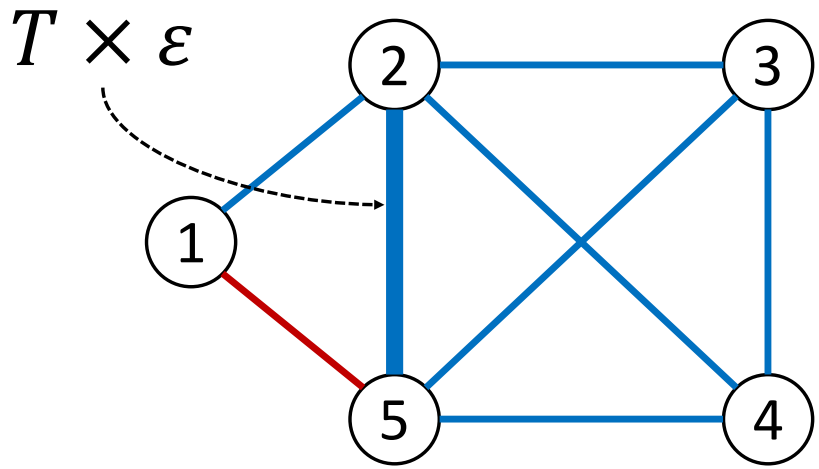

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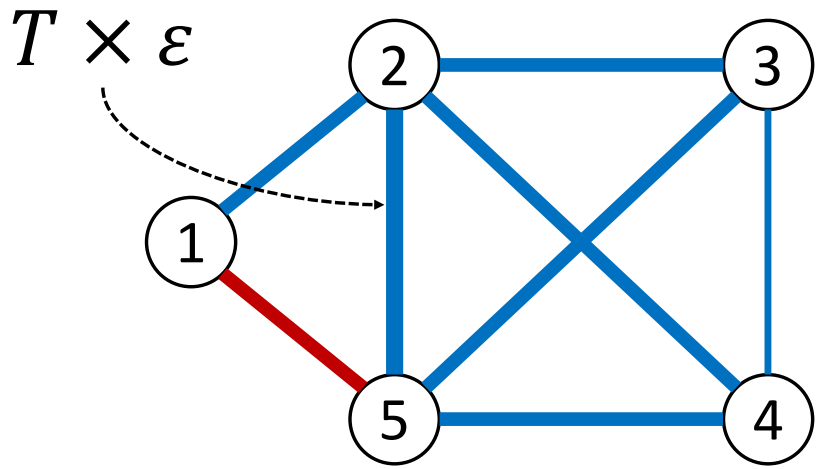

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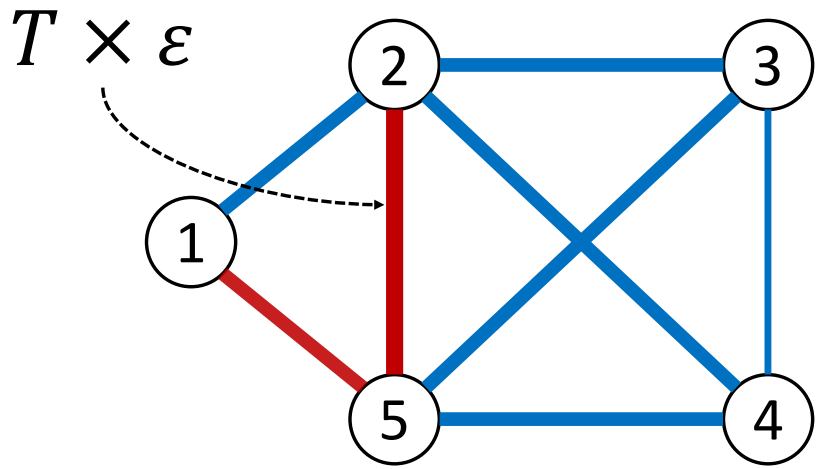

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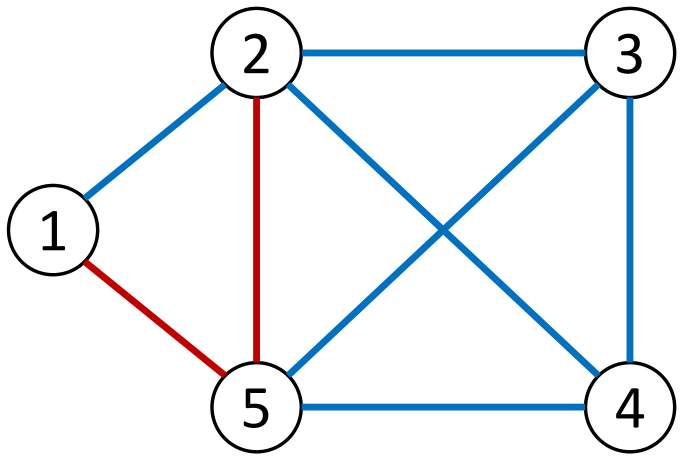

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- We propose a new dynamic model of social balance
- The model has a Markov chain representation
- The Markov chain has a unique stationary distribution
- The method of maximum likelihood uniquely estimates T
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