

Continuity of association, freedom to rewire and the dark side of reciprocity

Micro and macro processes in intra-organizational networks of exchange

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- 1 Intro
- 2 Intra-organizational reciprocation modeling
- 3 Methodology
- 4 Results
- 5 Conclusions

Intro

Organizational behaviour

the study of human behavior in organizational settings, the interface between human behavior and the organization, and the organization itself

Three study levels

- micro → individuals in organizations
- meso → work groups
- macro → how organizations behave

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Knowledge-based organizations

Characteristics

- knowledge-intensive production processes
- joint effort of individuals with very specific know-how

Issues

- **supervisor dilemma** information asymmetry between supervisors and employees
- **human creativity** difficult to standardize into contracts

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Results

- relaxation of authority-based control mechanisms
- hierarchy flattening
- organizations as integrators of individual efforts by molding the way in which employees interact

Knowledge-based productive processes

- peer-to-peer networks in which tasks execution implies exchange among workers
- governed by unspecified personal obligations, intrinsic rewards and trust occupying the '*middle ground between pure calculation of advantage and pure expression of love*'

FOCUS



dynamics of individual exchange behavior
as the antecedent of group formation

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**dynamics of individual exchange behavior
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Main contributions

- 1 modeling of intra-organizational reciprocation by exploring
 - ▶ continuity of association ← *social exchange theory*
 - ▶ freedom to walk away ← *cooperative theory*
- 2 to show that they may be considered two dimensions of a space of possible exchange networks that influence
 - ▶ effort reciprocation
 - ▶ co-workers' selection
- 3 to build four idealtypes of exchange network as conceptual devices to study how
 - ▶ different intra-organizational networks of exchanges (micro-level)
 - ▶ differently activate *integration* or *segregation* of employees (macro-level)

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Intra-organizational reciprocation modeling

Social exchange theory → continuity of association

A dyadic exchange relationship

- to be established a 'starting mechanism' is necessary
- is maintained if it is mutually rewarding

Reciprocation

- based on concept of reinforcement
- requires continuity of association (*necessary, but not a sufficient condition*)

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Social exchange theory → continuity of association

Emerging of cooperation

is facilitated by the continuity of a longitudinal exchange relationship between two partners whose behavior tend to converge either for

- fear of retaliation
- or moved by sentiment of fairness and balance

Cooperation theory → freedom to walk away

Agents that can

- navigate a social network
- connecting with different partners
- starting and terminating exchange relations

Social plasticity

the ability of an agent to **select** partners by changing their neighborhood as time goes by

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Emerging of cooperation

is facilitated by the **social plasticity** and **unilateral tie cutting**
reinforces local cooperation

Emerging of cooperation

continuity of association → reciprocation by convergence

freedom to walk away → reciprocation by selection

two dimensions that define agents' mobility
within exchange networks

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Methodology

Computer simulation by agent-based model

- agents → knowledge-based organization **employees**
- action rules → micro-processes of
 - ▶ effort reciprocation
 - ▶ co-workers' selection
- macro parameters → role of organization in order to calibrate
 - ▶ continuity of association among colleagues
 - ▶ freedom to rewire, freedom to unilaterally terminate dyadic tie

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CopNet – Cooperation of peers Network

- 300 agents split into 10 groups
- Each group is characterized by a starting effort E

$$E = \{5, 10, \dots, 50\}$$

- Agent maximum degree $D_{max} = 5$
- Peersim package (Peer-to-peer Simulator – UNIBO)

1 Play

- ▶ effort reciprocation
- ▶ last according to continuity of association $C \in [1, 50]$

2 Drop

- ▶ co-workers selection
- ▶ depends on freedom to rewire $F \in [0, 1]$

3 Rewire

- ▶ new partners among other employees whose $D_{max} < 5$

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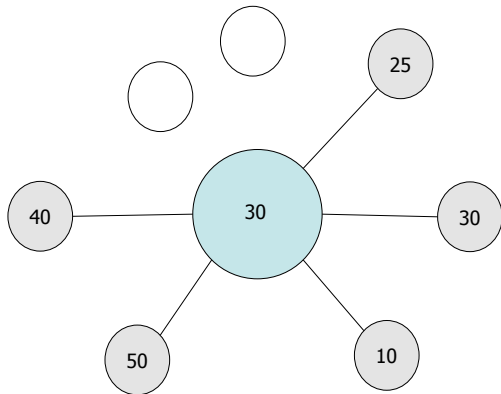
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Play phase

$C = 3$

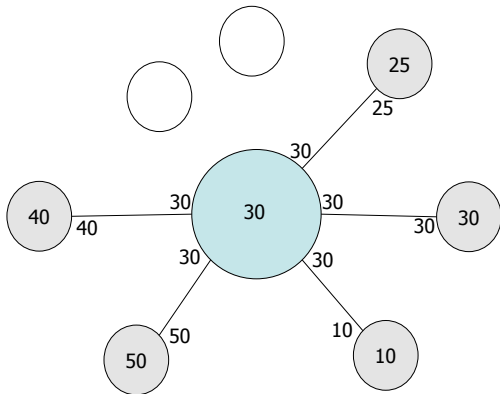
Step 1 of 3



Play phase

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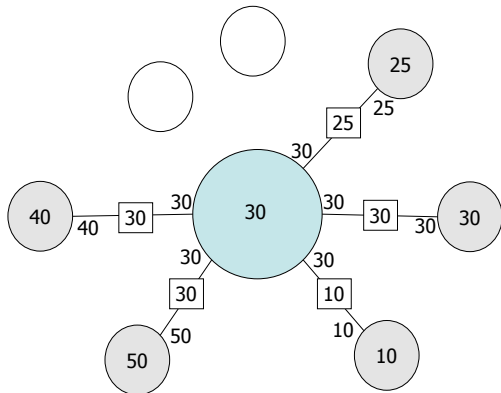
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Play phase

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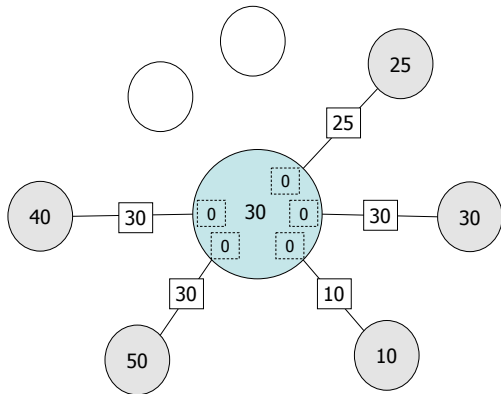
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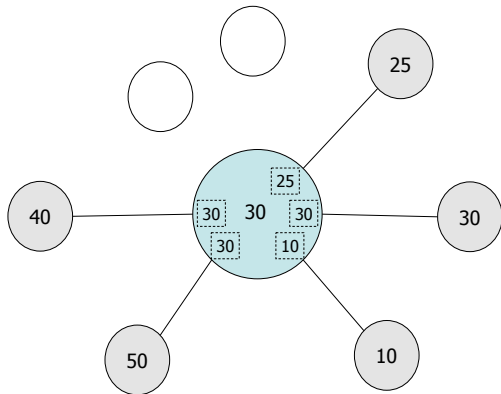
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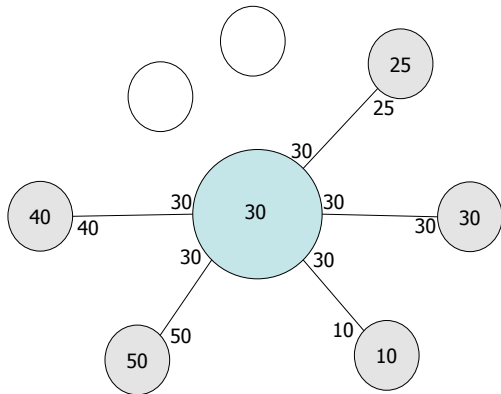
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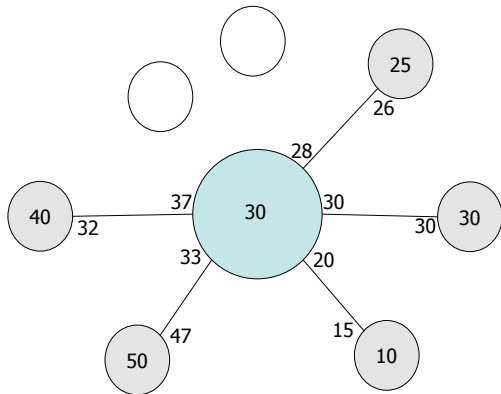
Step 2 of 3



Play phase

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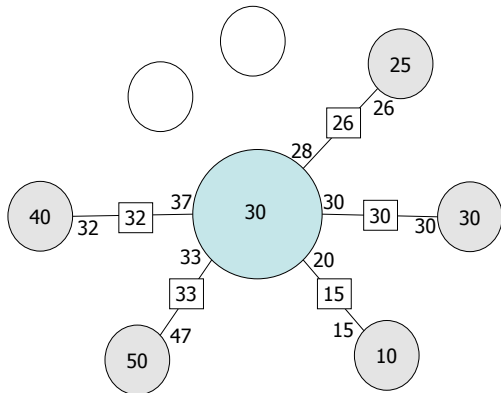
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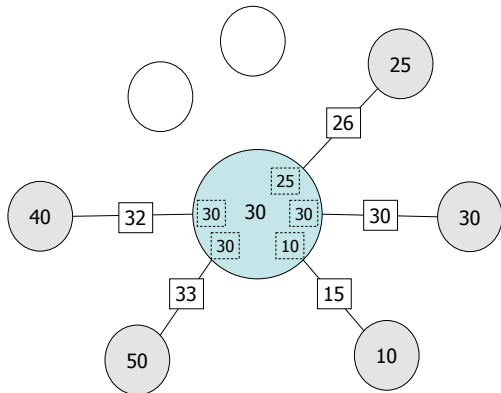
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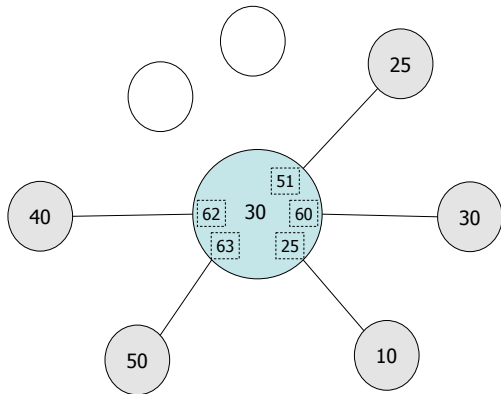
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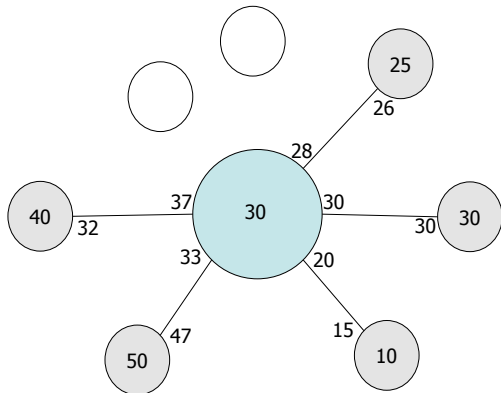
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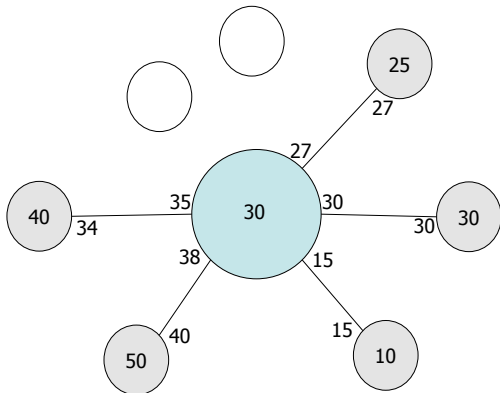
Step 3 of 3



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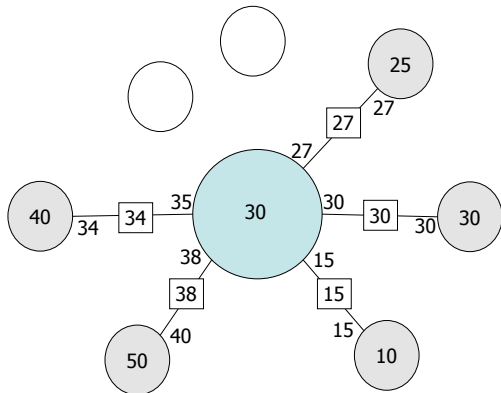
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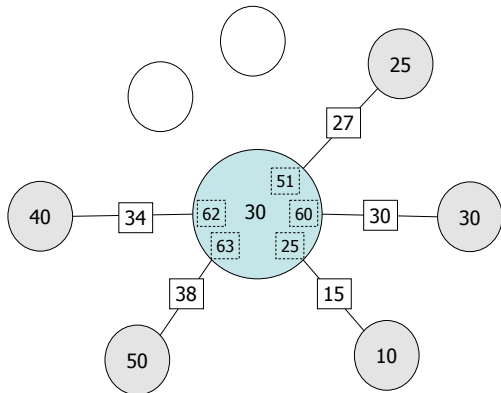
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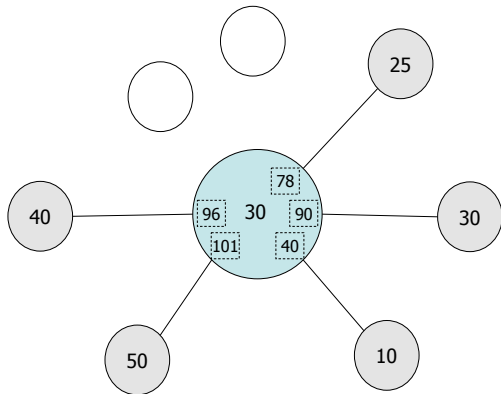
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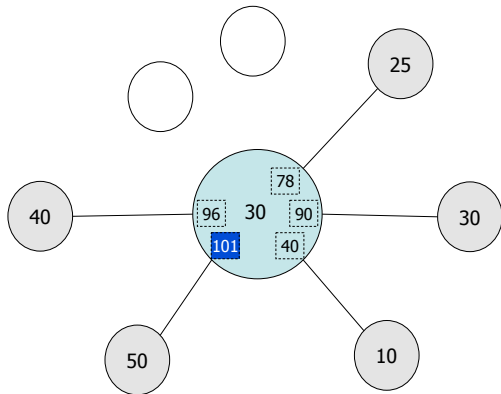
Step 3 of 3



Drop phase

$$F = 0.8$$

$$U_{max} = 101$$

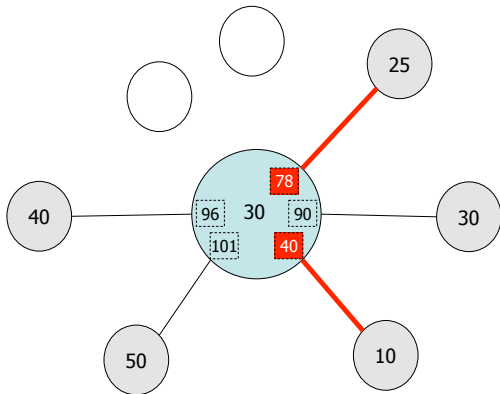


Drop phase

$$F = 0.8$$

$$U_{max} = 101$$

$$U_{cut} = F * U_{max} = 80$$

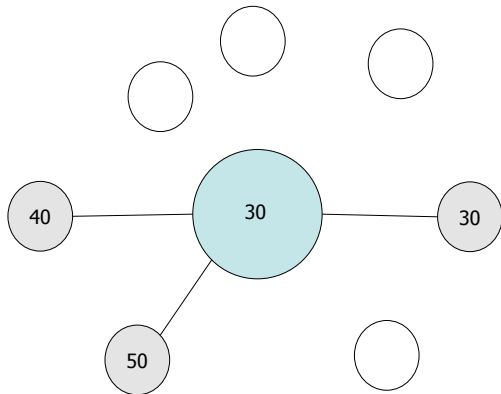


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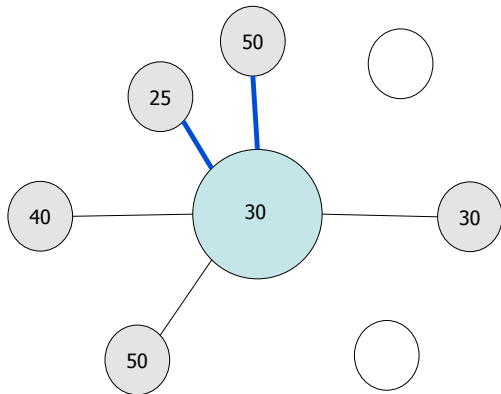
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Rewire phase



Tracing Aggregate Network Behavior

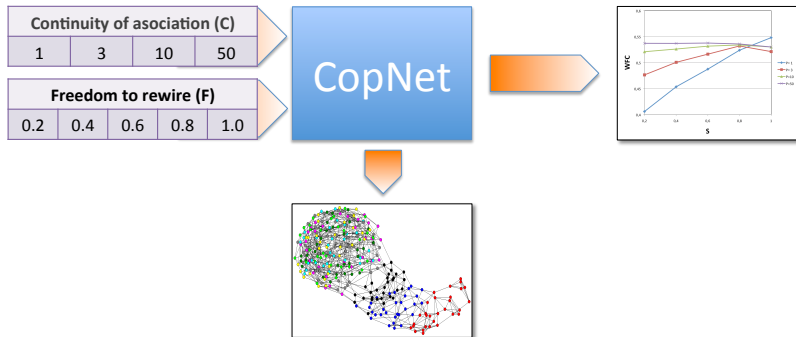
WFC welfare from collaboration

$$WFC = \frac{\sum_{i=0}^N WFC_i}{N}$$

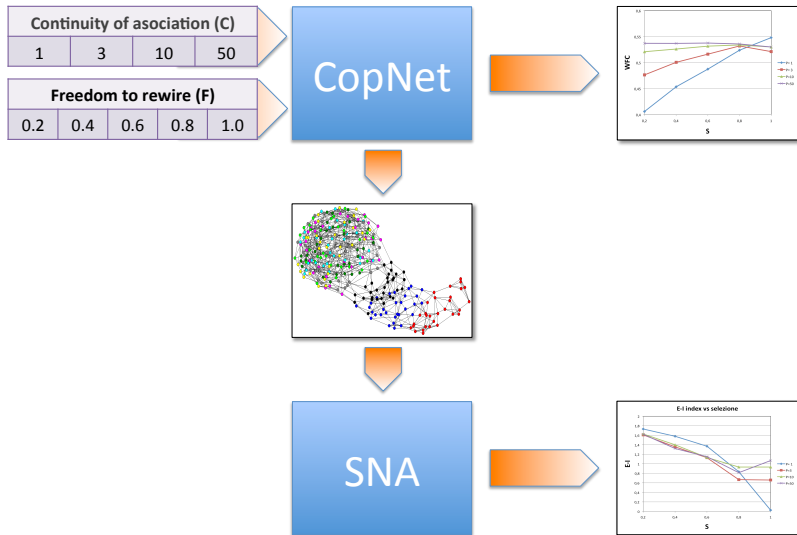
$$WFC_i = \frac{U_T}{C * D_{max} * E_{max}} \in [0, 1]$$

WFC_i is the mean payoff obtained by the generic worker i normalized to E_{max}

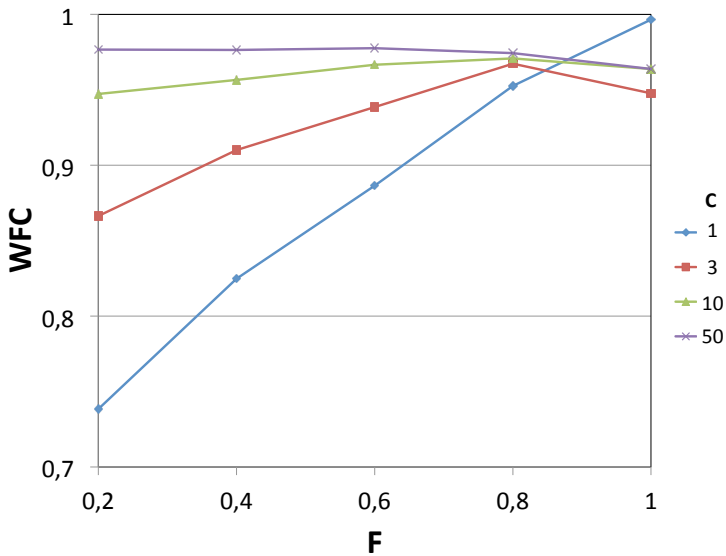
Experiments



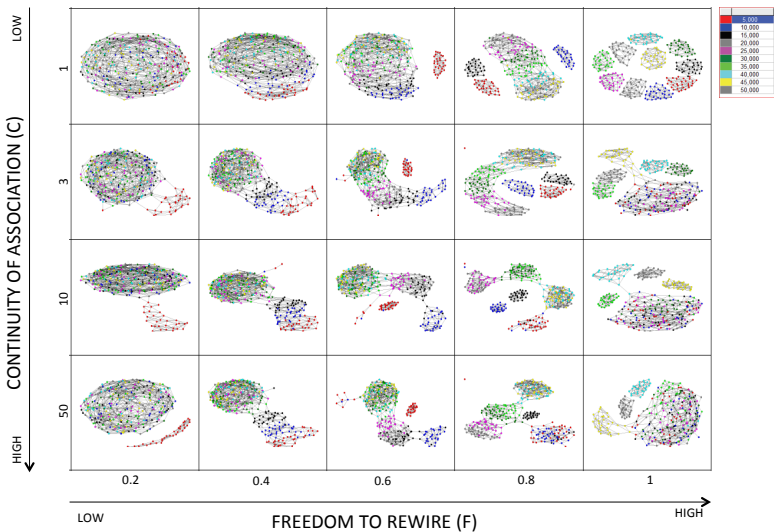
Experiments



Results



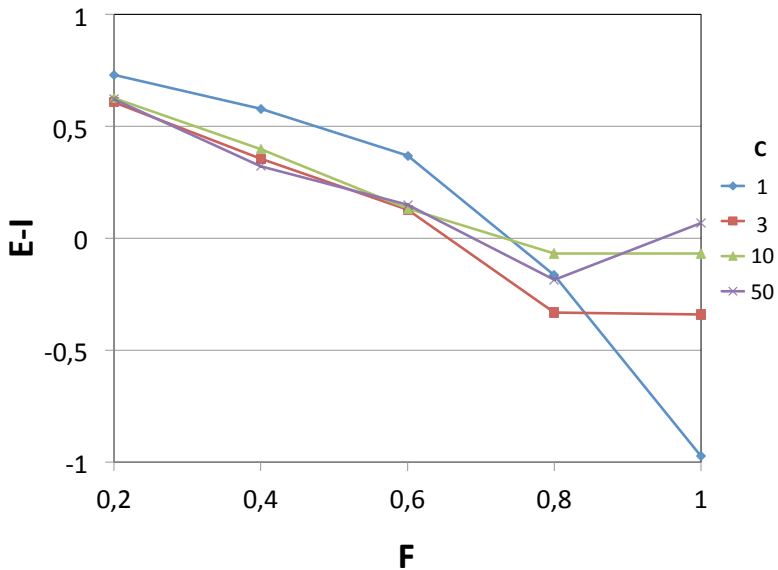
Exchange networks



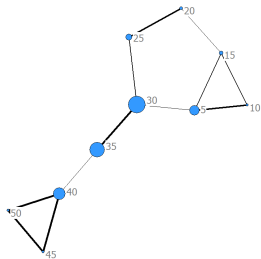
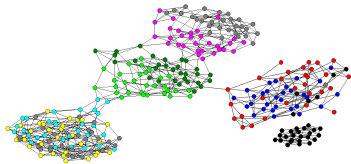
$$EI = \frac{EL - IL}{EL + IL} \in [-1, +1]$$

- EL external link
- IL internal link

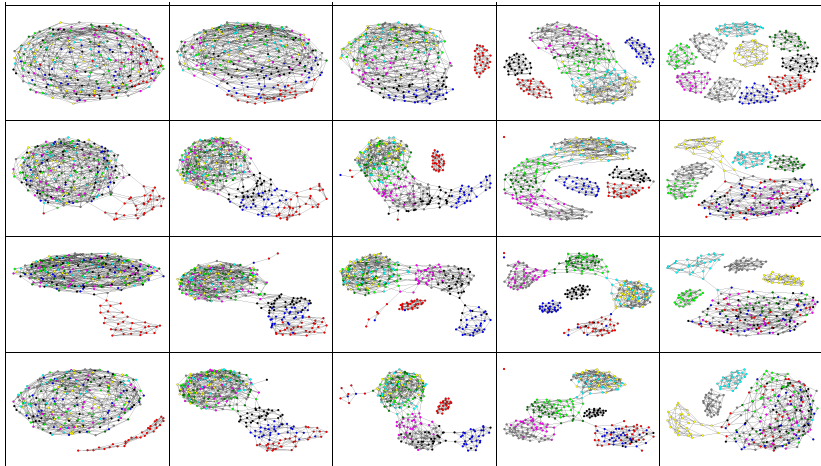
External-Internal index



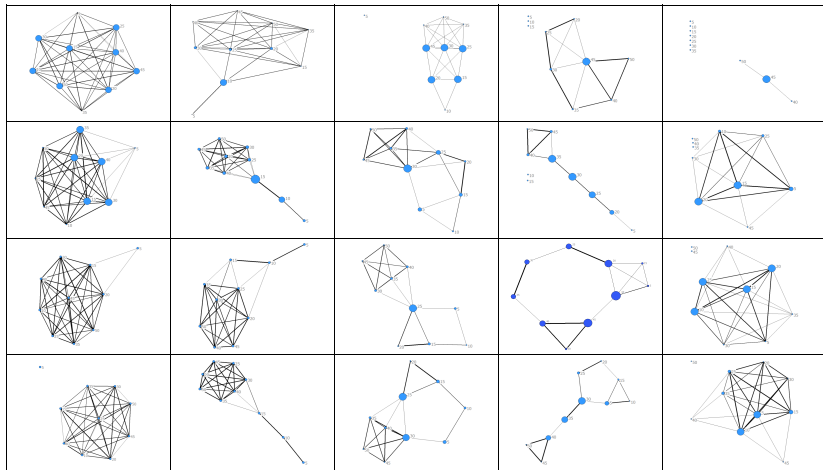
Homophile network reduction



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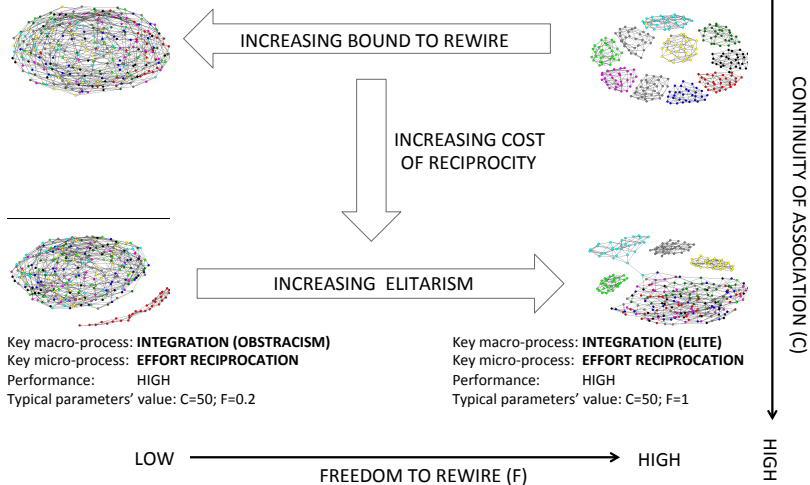
Homophile network reduction



Results synoptic

Key macro-process: **NULL**
Key micro-process: **NULL**
Performance: **VERY LOW**
Typical parameters' value: C=1; F=0.2

Key macro-process: **SEGREGATION**
Key micro-process: **PARTNER SELECTION**
Performance: **VERY HIGH**
Typical parameters' value: C=1; F=1



Conclusions

Four idealtypes of intra-organizational exchange networks

- two idealtypes differently tackle the problem of weakening hierarchical mechanisms by
 - ▶ fostering integration and effort reciprocation among colleagues
 - ▶ encouraging network segregation and homogeneous partner selection
- two idealtypes advice that
 - ▶ segregation is effective only if organizational contexts or tasks' structure do not hinder freedom to rewire
 - ▶ integration gives its best results when it is able to contain formation of self-segregated elites

- To be useful, idealtypes not necessarily need to have a place in reality, yet, their usefulness is as theoretical terms that guide empirical research
- further research to empirically investigate whether the components of our idealtypes play a role in real organizations to mold emerging structures of intra-organizational exchange networks



Thank you