THE MICRO-DYNAMIC NATURE OF TEAM INTERACTIONS

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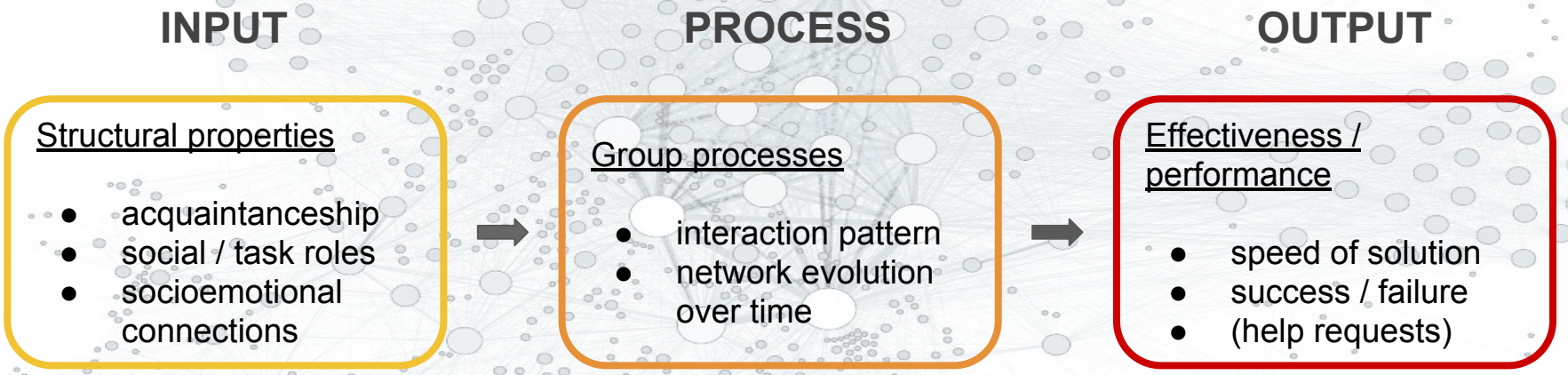
Why?

- teams are ubiquitous
- issues with research so far
- focus on group dynamics (“chemistry”)
- groups as intact, complex, adaptive, task-performing systems
- new approaches in organisational and managerial studies

Reinterpreted I-P-O model of teams

(Hackman, 1975)



Input - Process

- interplay between team roles and network structure
- rigidity of role structure - network dynamics

Process - Output

- interaction pattern of project teams
- collaboration network evolution

  in terms of successfulness

Research context

- **Escape rooms (2)**
  - laboratory / field experimental setting
  - controlled environment
- **Task**
  - non-routine (search, decipher codes, open locks)
  - poorly-structured, cooperation-demanding
  - exploration, information exploitation, collaboration, communication

- no prior knowledge is required competence
- clearly-defined goal
- time pressure (1 hour)
- groups ⟹ teams

work characteristics

&

organizational environment of project teams

Conceptualization

Project team: “an organized task-focused group” *(Forsyth, 2009:352)*

Input: who is linked to whom through underlying pattern of roles
(Easley & Kleinberg, 2010.)

Process: network as a set of occurring interactions

Output: speed of solution, binary variable of successfulness (&help?)

Data

Video recording*

- overt observation
  - avoid biases
  - avoid the feeling of being watched
  - real-time, ongoing

** Consent form filled by all participants in accordance with the GDPR*

Data

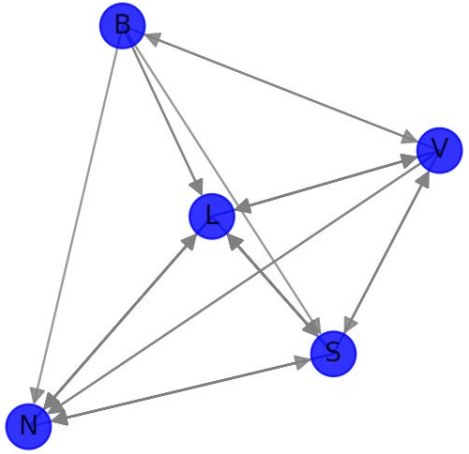
Questionnaire

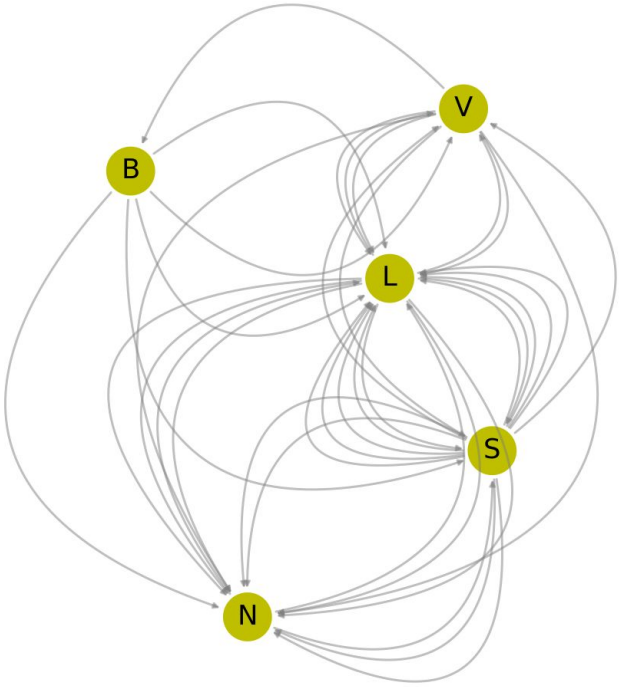
- on the initial role structure
  - members’ perception of intragroup roles
  - emotional roles - task roles
  - structural and basic demographic info

Methodology

	start t	end t	send	rec	cont	sec	min	dur(s)
113	10:47:04	10:47:05	B	L	poz	121	3	2
114	10:47:04	10:47:05	B	V	poz	121	3	2
115	10:47:04	10:47:05	B	S	poz	121	3	2
116	10:47:04	10:47:05	B	N	poz	121	3	2
117	10:47:05	10:47:07	V	B	poz	122	3	3
118	10:47:07	10:47:07	L	N	neut	124	3	1
119	10:47:07	10:47:11	S	N	neut	124	3	5
120	10:47:07	10:47:11	S	L	neut	124	3	5
121	10:47:11	10:47:16	L	N	neut	128	3	6
122	10:47:12	10:47:13	N	S	neut	129	3	2
123	10:47:14	10:47:19	S	L	neut	131	3	6
124	10:47:19	10:47:21	L	N	neut	136	3	3

T27 W2 M3





Krippendroff alpha: 0.67-0.78 (content - sender)

Metrics

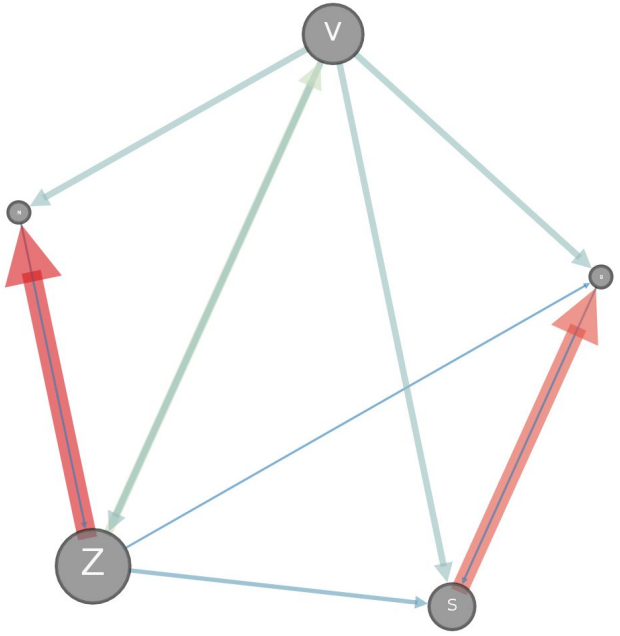
Graph density: $D = \frac{|E|}{|V|(|V|-1)}$,

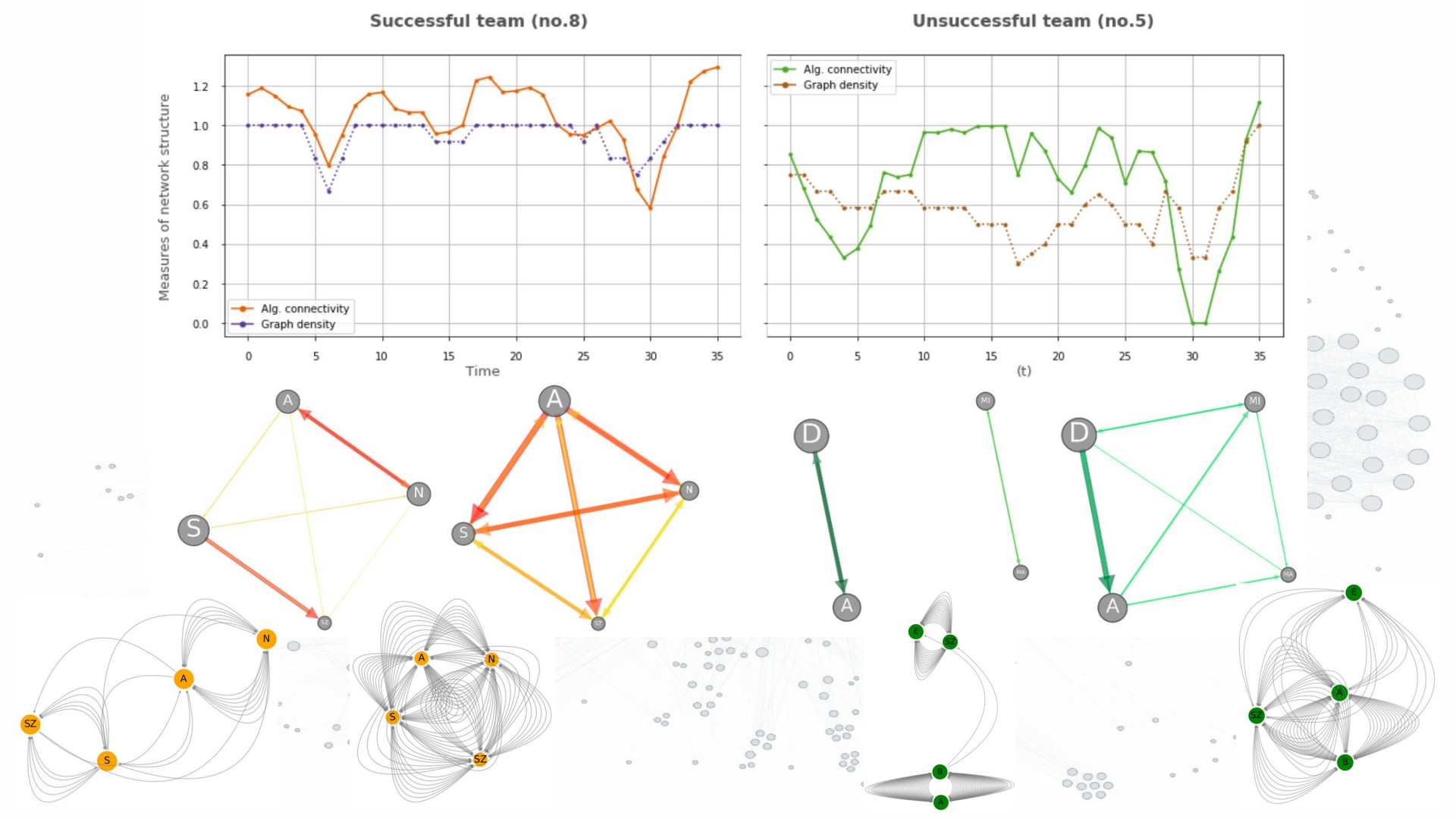
Algebraic connectivity:

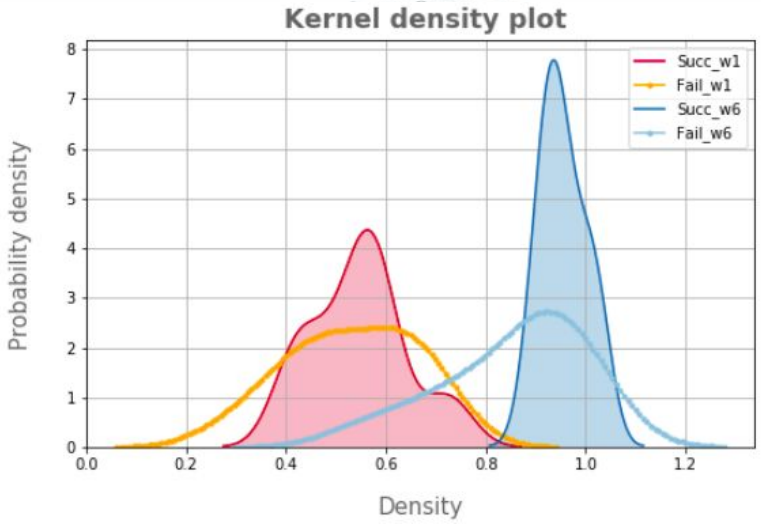
$$\mathcal{L}_a = \mathbf{I} - \frac{\Phi^{1/2}\mathbf{W}\Phi^{-1/2} + \Phi^{-1/2}\mathbf{W}^T\Phi^{1/2}}{2}$$

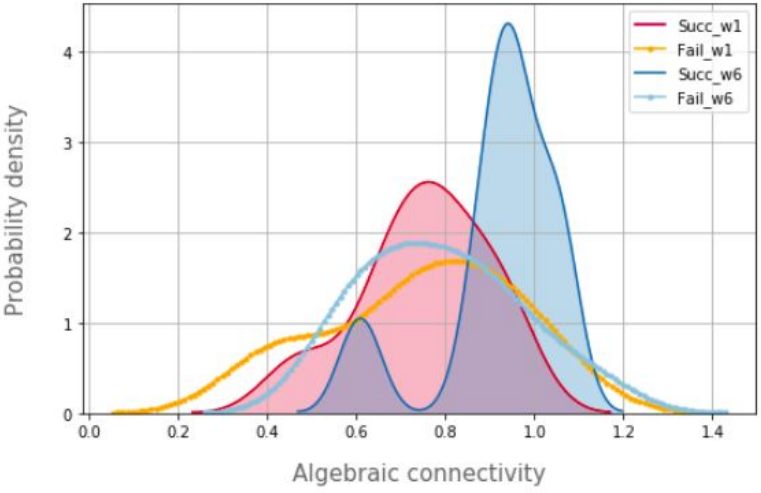
- relates opinion dynamics to structure
- the amount of idea flowing from i to j in a small interval of time and topology on the speed of reaching consensus *(Friedkin & Johnsen, 2011)*

TEAM 6 *(win: 6, min: 6)*
Density: **0.55**
Algebraic connectivity: **0.17**



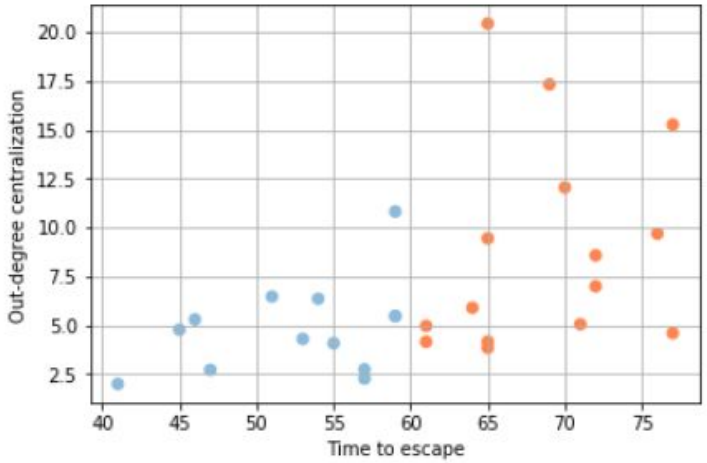

Successful team (no.8)
Unsuccessful team (no.5)
Measures of network structure
Time
(t)
Alg. connectivity
Graph density
A
N
S
SZ
D
MI
E
B

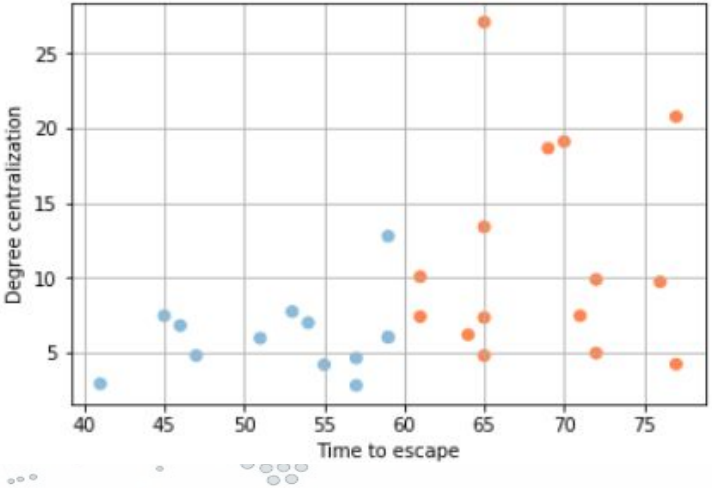




Spearman's
rho=0.522
p=0.004

rho=0.422
p=0.025





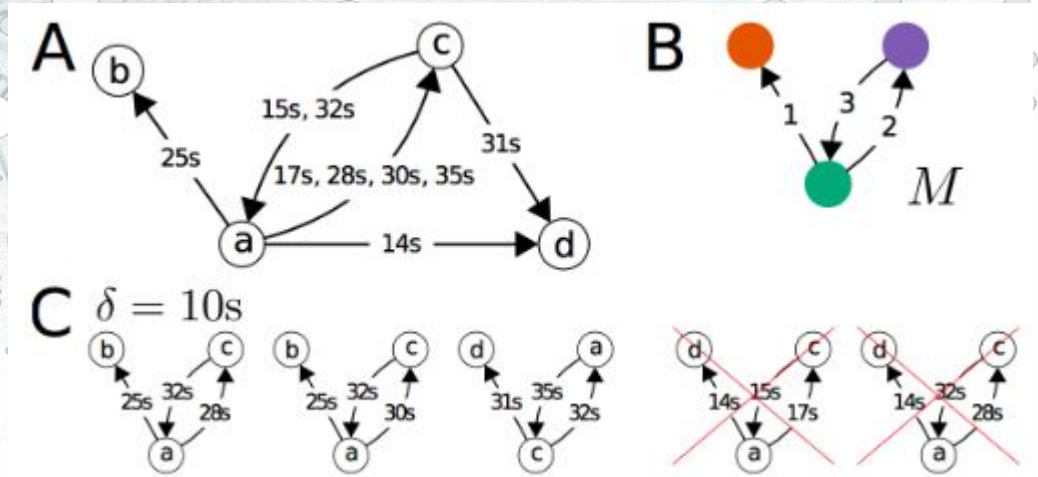
Metrics

Temporal motifs: small subgraph patterns

- functions and underlying mechanisms in network dynamics *(Kovanen et al., 2011.)*
- ordered interaction sequences

conversation rules

role differentiation



(Gibson, 2003.)

(Kovanent et al., 2011.)

Input factor

Two setups

1. Random composition:

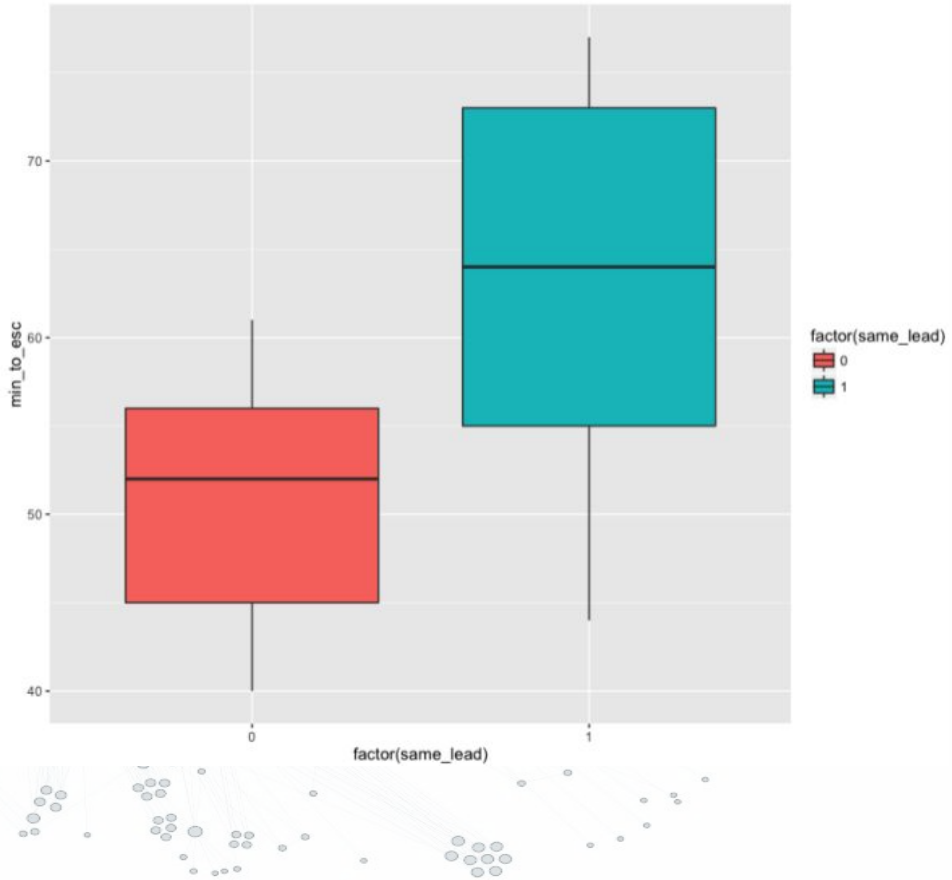
- participants do not know each other
- collaboration & robust role differentiation for dominance

Status differentiation: “Certain individuals acquire authority by laying claim to a position of greater status and by having their claim accepted by the other members of the group.” *(Forsyth, 2009:161)*

Input factor

2. Initial social structure

- emerging leader *(max. out-degree)* & pre-established leader *(questionnaire)*
- roles as clusters of communication relations



Collaboration & smooth idea sharing

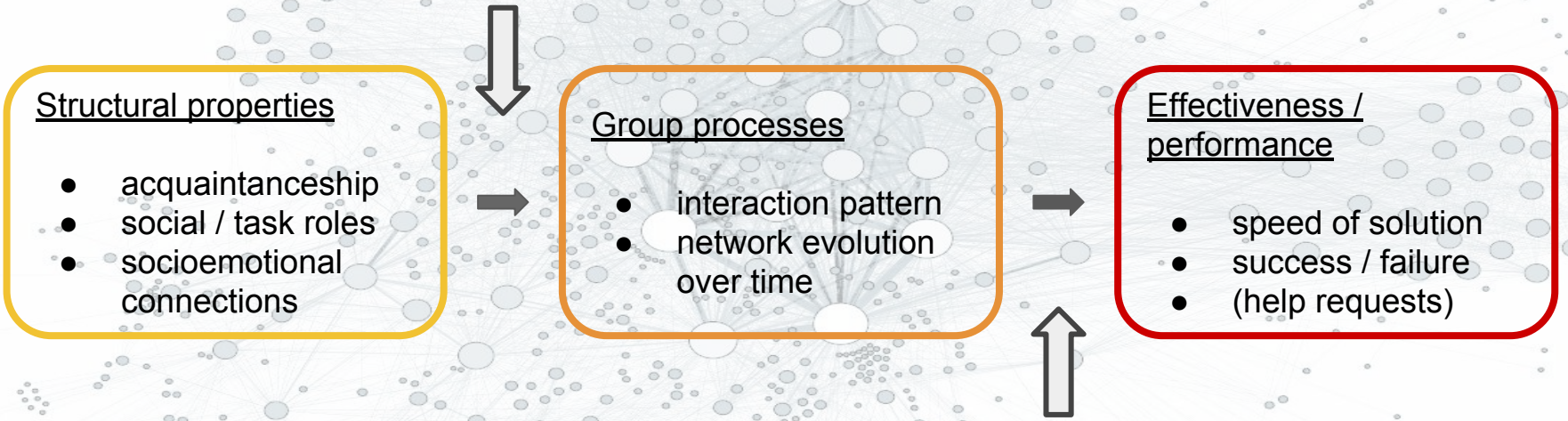
- Hierarchy / **rigid** role structure (cannot dissolve):
    - ‘appropriate’ vs. ‘permitted’ behavior - implicit behavioral constraints
- No hierarchy / **flexible** role structure (can dissolve):
    - widely accepted behavioral latitude of intra-group interactions

⇒ elevated situation - liberated thinking during exploration processes

⇒ disengagement from the strong perceptions of well-defined roles

Hypotheses

(1) Non-hierarchical teams are more likely to do better in problem-solving (flexibility of role structure allows constant adjustment of collaborative exploration practices)



(2) Homogeneous distribution of interaction ties across team members and time of group exercise tend to foster successful task performance

Points for elaboration

- content of interactions -> signed graphs
- temporal network motifs -> sequence analysis
- other statistics (~ logistic regression)
- validation

THANK YOU FOR YOUR ATTENTION!

Questions
&
Comments