Network Theories

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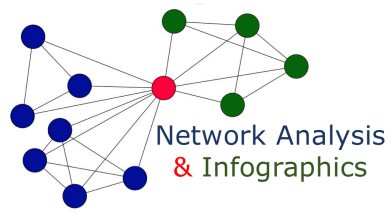


Week 10

Learning Outcomes

	Learning outcome	Assessment mode
1	Explain the concept of network and list the main network indicators	ESS
2	Describe and apply the major techniques for the collection of network data and their statistical analysis	ESS, GPN + GWS
3	Identify the main characteristics of networks by means of network measures	ESS, GPN + GWS
4	Employ network analysis techniques to produce network data-based infographics	GPN + GWS

Note: ESS: Essay; GPN: Group Presentation; GWS: Group Written Submission

Overview

1. Network theorising
2. Social capital theory
3. Strength of weak ties (SWT)
4. Structural holes (SH)
5. SWT vs. SH, and other theories

Network theorising

Network theorising

Network analysis is not a theory *per se*, but it is a methodological tool to support the development of theories [Borgatti and Halgin, 2011]

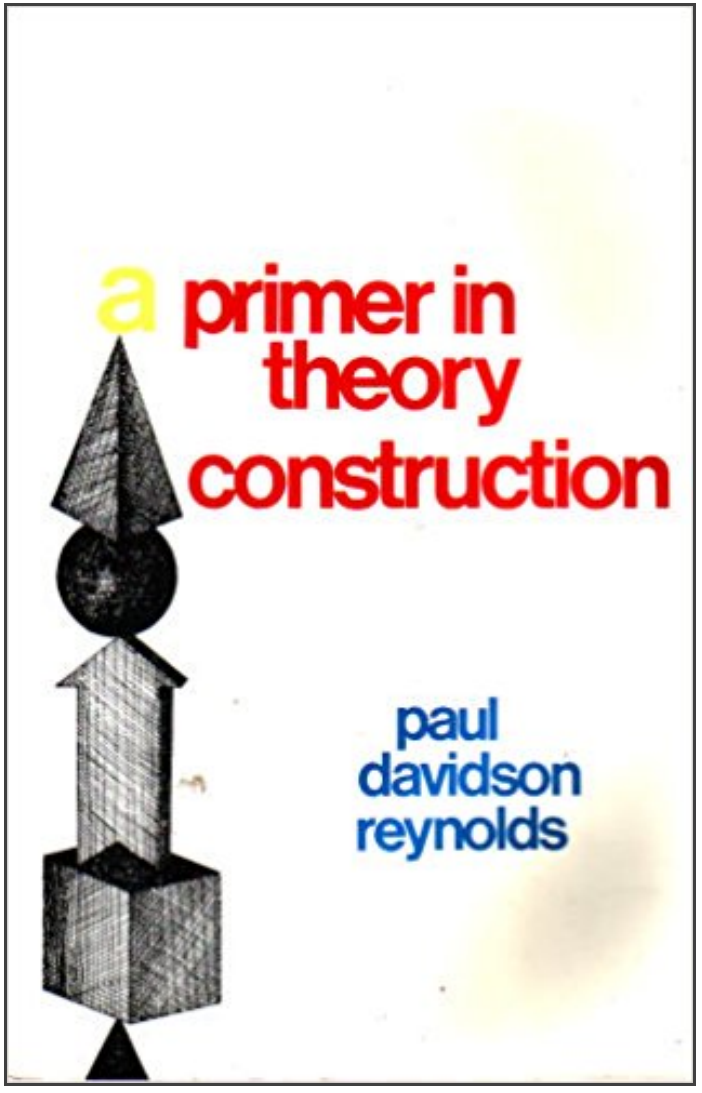
What is a theory?

Network theorising

What is a theory?

A theory can be defined as

- A set of laws that are empirically supported
- A set of interrelated definitions, axioms, and propositions
- A set of descriptions of casual processes



[Reynolds, 1971]

Network theorising

Why do we need theories?

Network theorising

Why do we need theories?

[Reynolds, 1971]

- To predict the outcomes of processes
- To explain processes (sense of understanding)
- To control processes

Network theorising

Independent variable	Dependent variable: Nonnetwork variable as outcome	Dependent variable: Network variable as outcome
Nonnetwork variable as antecedent	(Nonnetwork theory)	Theory of networks
Network variable as antecedent	Network theory	Network theory of networks

Source: [Borgatti and Halgin, 2011]

Network theory
Mechanisms and processes that interact with network structures to produce certain outcomes for individuals, groups, and organisations (e.g. firms' performance, individuals' creativity)

Theory of networks
Mechanisms and processes that explain why networks have certain structures (i.e. antecedents of network properties)

Social capital theory

Social capital theory

Social capital is "the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit"

[Nahapiet and Ghoshal, 1998]

Social capital theory

Core idea

- Others (e.g. friends, acquaintances) tend to have goodwill towards us
- This goodwill is a valuable resource
- Benefits and risks
  - Access to information (quality, relevance, timeliness)
  - Influence, control, and power (brokerage opportunities)
  - Time and resources to establish and maintain relationships
  - Overembeddedness – "the ties that bind can also become the ties that blind" [Powell and Smith-Doerr, 1994]

Social capital theory
Impact

Social capital [Adler and Kwon, 2002]

- influences career success and executive compensation
- supports the job seeking process
- facilitates the exchange of resources and product innovation in organisations
- supports the creation of intellectual capital
- stimulates entrepreneurship and the formation of start-up companies
- strengthens inter-organisational learning
- ...

Social capital theory

Dimensions of social capital [Nahapiet and Ghoshal, 1998]

- Structural: properties of the network of relations
  - presence/absence of ties
  - network-level measures (e.g. density)
  - node-level measures (e.g. centrality)
- Relational: type of relations between individuals
  - friendship
  - emotional attachment to other actors
  - trust, obligations, expectations
- Cognitive
  - shared representations
  - interpretations

Social capital theory

Within social capital theory

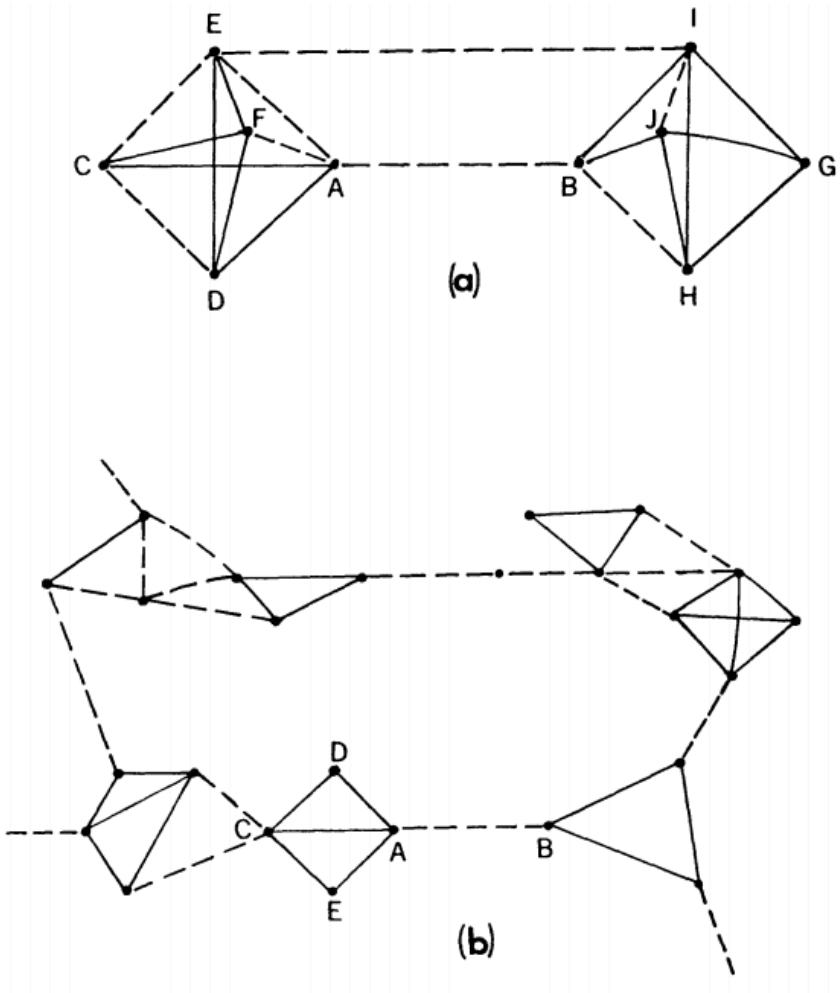
- Strength of weak ties (SWT) [Granovetter, 1973]
- Brokerage and structural holes (SH) [Burt, 1992]

Strength of weak ties (SWT)

Strength of weak ties (SWT)

Strength of weak ties

An actor's weak ties are more likely to be source of novel information than the actor's stronger ties



[Granovetter, 1973]

Strength of weak ties (SWT)
Rationale

Premise 1: The stronger is a tie between two actors the more likely the 'social worlds' of these will overlap

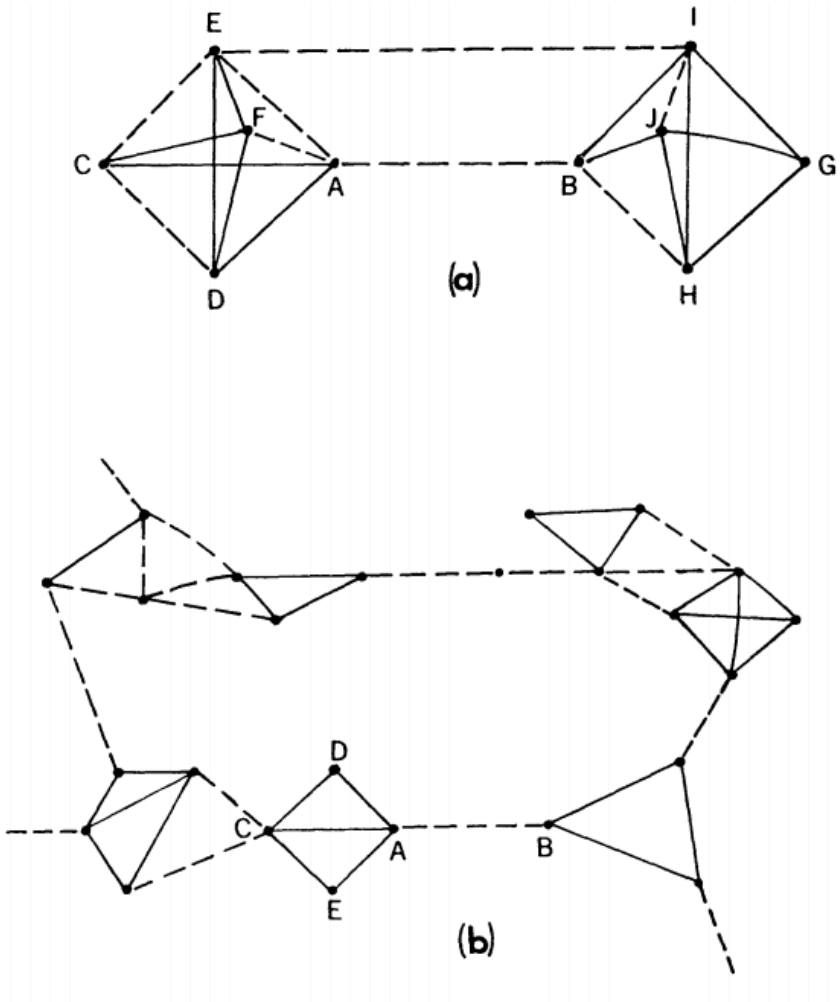
- Transitivity: $A \leftrightarrow B$, $B \leftrightarrow C$ are strong $\Rightarrow A \leftrightarrow C$ is at least weak
- Homophily: individuals tend to be homophilous (i.e. they establish stronger ties with individuals that are similar to themselves) [McPherson et al., 2001]

Source: Matrix Revolution

Strength of weak ties (SWT)
Rationale

Premise 2: Bridging ties are potential sources of novel ideas

- Bridging ties link individuals not connected through friends
- Access to information that is not circulating among close contacts

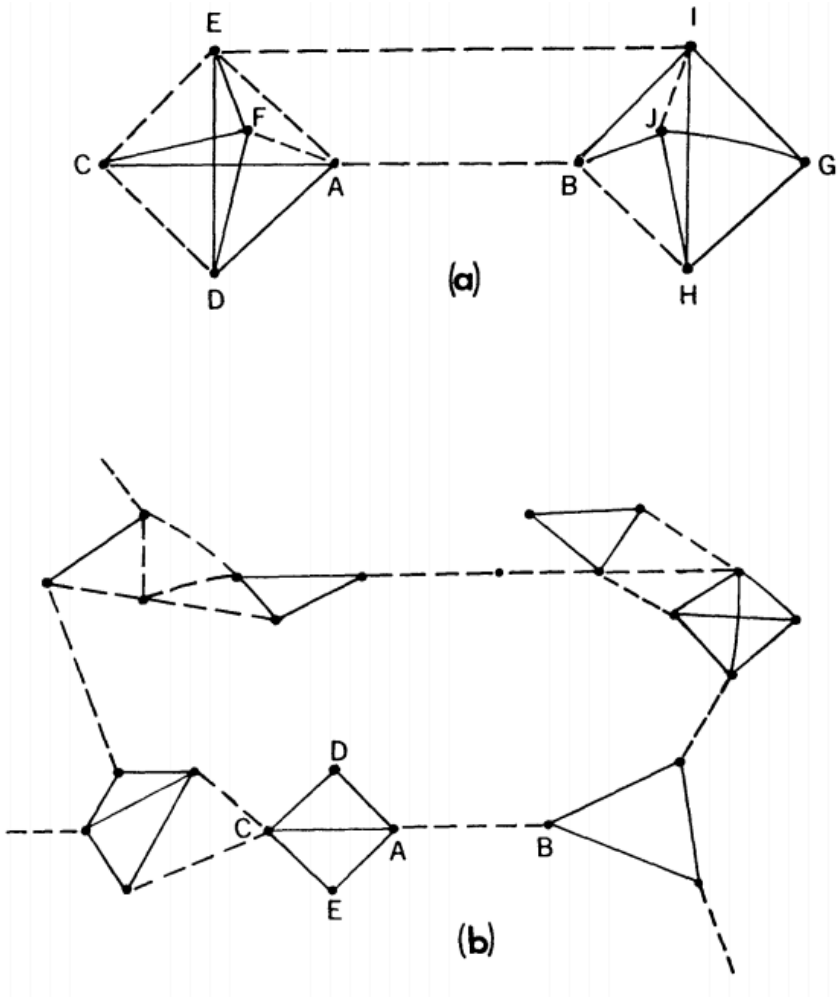


[Granovetter, 1973]

Strength of weak ties (SWT)
Rationale

Premise 1 + Premise 2: Strong ties are unlikely to be source of novelty

- Bridging ties are unlikely to be strong ties ($A \leftrightarrow B$ is strong, $B \leftrightarrow D$ should be at least weak)
- Weak ties are more likely to be bridging ties
- Weak ties are more likely to provide access to novel information
- *Empirical evidence: weak ties provide better job opportunities*



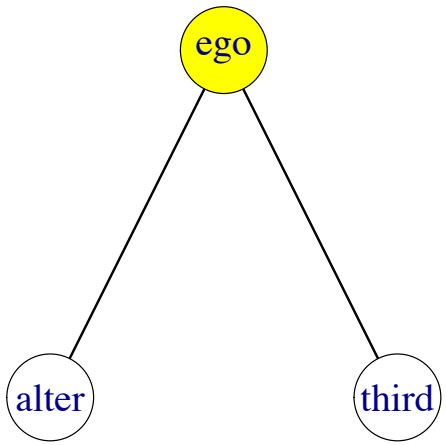
[Granovetter, 1973]

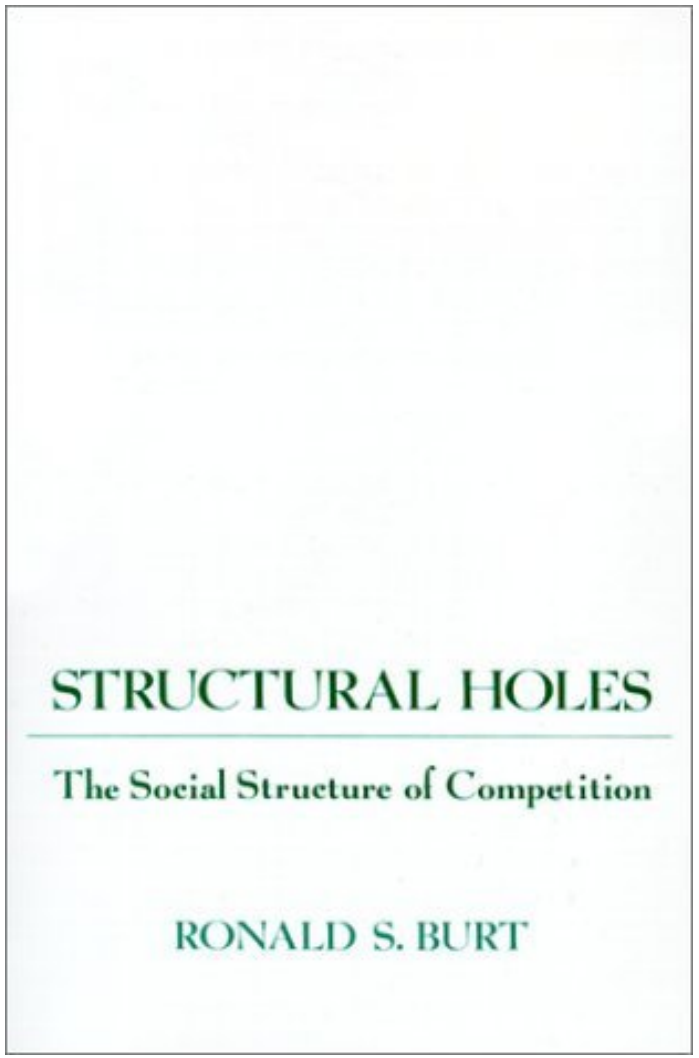
Structural holes (SH)

Structural holes (SH)

Structural holes

Structural holes in a node's ego network are likely to provide the node with novel information



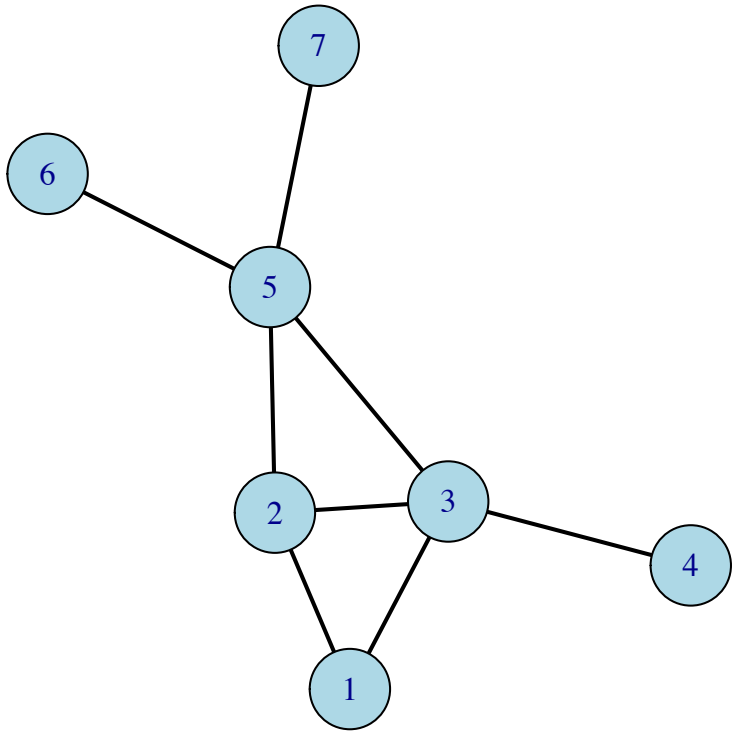


[Burt, 1992]

Structural holes (SH)

From Lecture 5

- For each triad we can evaluate the presence of structural holes
- To identify the number of triads we can count the number of possible ties, which is $(N-1)(N-2)/2$ in an undirected network
- Example: 6 triads and 5 structural holes



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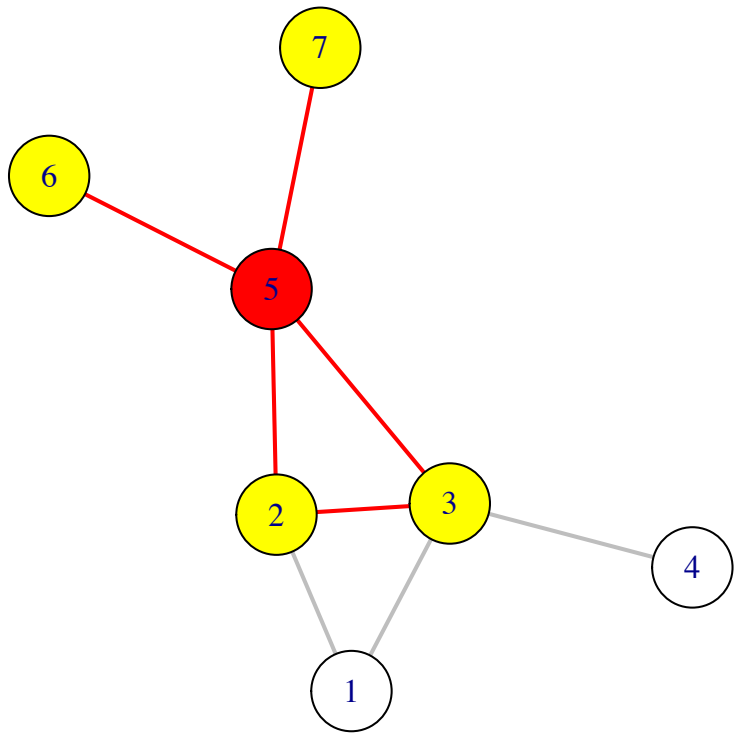


Structural holes (SH)

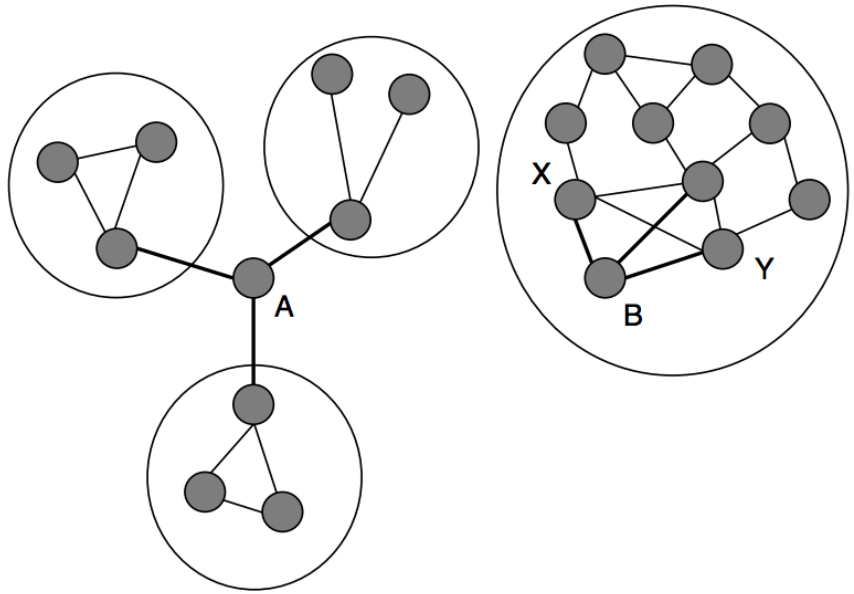
From Lecture 6

[Burt, 1992] measures of brokerage

- Effective Network Size and Efficiency
- Constraint

Structural holes (SH)
Rationale

- A and B have the same number of ties (degree)
- A is more likely than B to access novel information (redundancy)
- As a result, A may perform better than B



Source: [Borgatti and Halgin, 2011]

SWT vs. SH, and other theories

SWT vs. SH, and other theories

	SWT [Granovetter, 1973]	**SH** [Burt, 1992]
Assumption	networks distribute information (flow model)	
Focus	networks provide access to novel information	
Network	whole network	ego network
Agency	serendipitous world in which actors accidentally forms ties	strategic/instrumental (ego's attributes are neglected)
Mechanisms	tie strength	tie strength and redundancy
Seminal evidence	getting a job	getting promoted

Questions

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