



Semantic Networks and Shared Understanding: A Network-Based Approach to Representing and Visualizing Shared Understanding

Paul R. Smart, Winston Sieck, Katia Sycara and Nigel R. Shadbolt

Overview

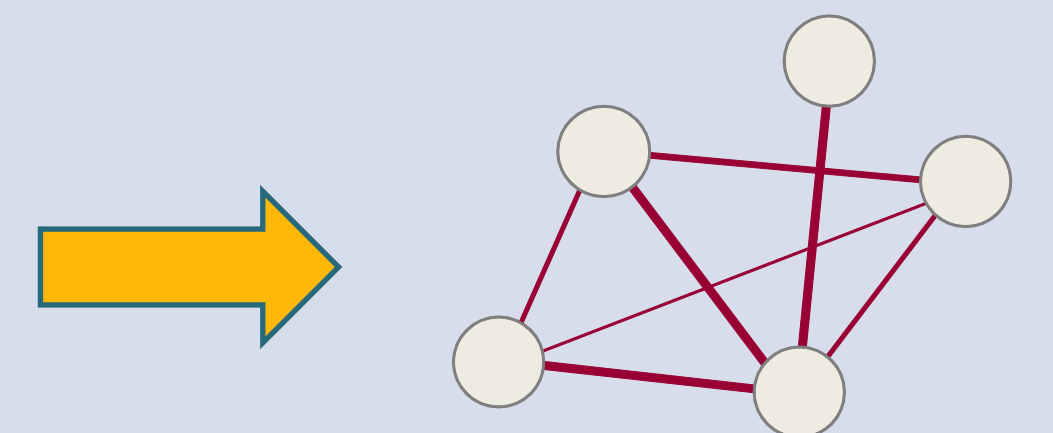
- Semantic networks were developed in the organizational communication literature to provide a means of representing the shared interpretations that people have of organizational message content.
- Semantic networks can also be used to support the representation and visualization of shared understanding in military coalition contexts.
- Semantic networks provide a number of practical benefits when it comes to an analysis of shared understanding.

Semantic Networks

Networks can be used to represent the similarities or differences between things (e.g. agents or information resources). In this case, the inter-nodal links represent the degree of similarity between the things represented by the nodes.

	P1	P2	P3	P4	P5
P1	-	0.4	0.3	1.5	0.2
P2		-	1.0	1.3	0.9
P3			-	0.8	0.6
P4				-	1.5
P5					-

Matrix of inter-agent similarity scores



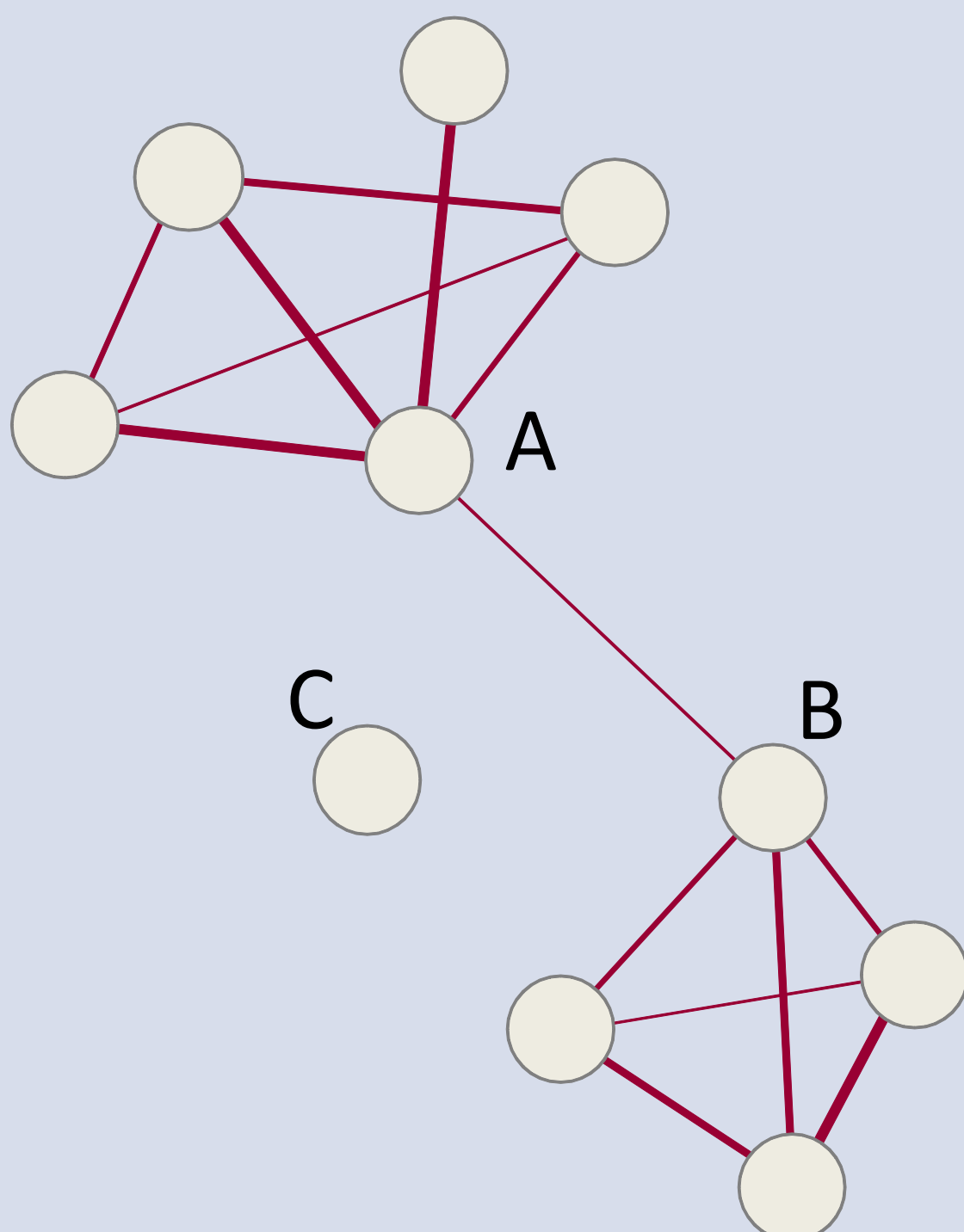
Network representation of inter-agent similarity scores

In the context of the organizational communication literature, such network-based representations are known as *semantic networks*.

Semantic Networks and Shared Understanding

Semantic networks can be used to represent similarities between agents in terms of their *understanding* of something, e.g. commander's intent. Thus, just as semantic networks can be used to represent the shared interpretations that individuals have of message content, they can also be used to represent the shared understanding that individuals (and teams) have of some object of understanding.

Semantic networks can provide important insights in the nature and development of shared understanding within a community. For example:



- The overall connectivity of the network highlights the extent of shared understanding between the agents.
- A cluster or clique represents sub-groups who share similar levels of understanding.
- Isolated nodes (C) are agents whose understanding is at odds with that of others.
- Nodes that connect cliques or clusters act as bridges (A, B); the agents represented by these nodes may act to coordinate understanding across different sub-groups.

Benefits

The benefits of semantic networks include:

1. an ability to use network scientific techniques to analyse changes in shared understanding across time (particularly in response to organizational and technological change),
2. an ability to easily identify individuals who may play special roles in coordinating action and enabling cross-community understanding, and
3. an ability to undertake network science simulations that model how shared understanding is influenced by dynamic structural changes in other types of network (e.g. communication networks).