A comparison of Said, Wegman, Sharabati and Rigsby, *Social networks of author–coauthor relationships*, Computational Statistics & Data Analysis 52 (2008) 2177 – 2184 (Section 1)

and *Unattributed Sources on Social Networks (Wikipedia, Wasserman & Faust and De Nooy, Mrvar & Batagelj)*

Regular font indicates substantially close wording between the two sources, *italic* represent paraphrased sections, **bold** represents significant departures of Said et al from sources, and ***bold italic*** represent points of outright contradiction between the two. Paragraphs have been reformatted for easy comparison.

Said et al – 1. Introduction, p. 2177-8

Para 1

A social network is an emerging tool frequently used on quantitative social science to understand how individuals or organizations are related. The basic mathematical structure for visualizing the social network is a graph. A graph is a pair *(V ,E)* where *V* is a set of nodes or vertices and *E* is a set of edges or links.

Social network analysis (also called network theory) has emerged as a key technique and a topic of study in modern sociology, anthropology, social psychology and organizational theory.

The shape of the social network helps determine a network's usefulness to its individuals. Smaller, tighter networks can be less useful to their members than networks with lots of loose connections (weak ties) to individuals outside the main network. More "open" networks, with many weak ties and social connections, are more likely to introduce new ideas and opportunities to their members than closed networks with many redundant ties. See Granovetter (1973).

[General definition, no antcedent sought]

Wikipedia article – Social Networks (January 2, 2006 version)

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[Table of Contents omitted]

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[Note: Attribution of this paragraph in Wikipedia is now to John Scott *Social Network Analysis.* (1991, London, Sage).There was no attribution in 2006, although Granovetter is usually credited with originating the idea of "weak ties" and associated benefits.]

Said et al – 1. Introduction, p. 2177-8 cont.

Para 2

Social network analysis is concerned with understanding the linkages among social entities and the implications of these linkages. The social entities are referred to as actors **that are represented by the vertices of the graph.** Most social network applications consider a collection of actors that are all of the same type. These are known as one-mode networks.

Social ties link actors to one another. The range and type of social ties can be quite extensive. A tie establishes a linkage between a pair of actors. Linkages are represented by edges of the graph. Examples of linkages include the evaluation of one person by another (such as expressed friendship, liking, respect), transfer of material resources (such as business transactions, lending or borrowing things), association or affiliation (such as jointly attending the same social event or belonging to the same social club), behavioral interaction (talking together, sending messages), movement between places or states (migration, social or physical mobility), physical connection (a road, river, bridge connecting two points), formal relations such as authority and biological relationships such as kinship or descent.

A linkage or relationship establishes a tie at the most basic level between a pair of actors. The tie is an inherent property of the pair. Many kinds of network analysis are concerned with understanding ties among pairs and are based on the dyad as the unit of analysis.

Stanley Wasserman and Katherine Faust, Social Network Analysis: Methods and Applications. New York, Cambridge University Press, 1994.
Section 1.3 – Fundamental Concepts in network analysis (p. 17-20)

Actor. … [S]ocial network analysis is concerned with understanding the linkages among social entities and the implications of these linkages. The social entities are referred to as actors. …Further, most social network applications focus on collections of actors that are all of the same type …. We call such collections one·mode networks…

Relational tie. Actors are linked to one another by social ties. …[T]he range and type of ties can be quite extensive. The defining feature of a tie is that it establishes a linkage between a pair of actors. Some of the more common examples of ties employed in network analysis are:

- Evaluation of one person by another (for example expressed friendship, liking, or respect)
- Transfers of material resources (for example business transactions, lending or borrowing things)
- Association or affiliation (for example jointly attending a social event, or belonging to the same social club)
- Behavioral interaction (talking together, sending messages)
- Movement between places or statuses (migration, social or physical mobility)
- Physical connection {a road. river, or bridge connecting two points}
- Formal relations (for example authority)
- Biological relationship (kinship or descent)

Dyad. At the most basic level, a linkage or relationship establishes a tie between two actors. The tie is inherently a property of the pair… Many kinds of network analysis are concerned with understanding ties among pairs. All of these approaches take the dyad as the unit of analysis

Said et al – 1. Introduction, p. 2177-8 cont.
Para 3
A social network consists of a finite set or sets of actors and the relation or relations defined on them. The presence of relational information is a significant feature of a social network.

A partition of a network is a classification or clustering of the vertices in the network so that each vertex is assigned to exactly one class or cluster.

Partitions may specify some property that depends on attributes of the vertices.

Partitions divide the vertices of a network into a number of mutually exclusive subsets. That is, a partition splits a network into parts.

Partitions are also sometimes called blocks or block models. These are essentially a way to cluster actors together in groups that behave in a similar way.

Allegiance measures the support that an actor provides for the structure of his block. An actor supports his block by having internal block edges. A measure of this is the total number of edges that an actor has internal to his block. An actor supports his block by not having external edges from the block to other actors or blocks. A measure of this is the total number of possible external edges minus the total number of existing external edges. The allegiance for a block is a weighted sum of a measure of internal allegiance and a measure of external allegiance. The overall allegiance for a social network is the sum of the allegiances for the individual blocks. If the overall allegiance is positive then a good partition was made. The partitioning continues recursively until a new partition no longer contributes to a positive allegiance.

Wasserman & Faust (cont.)

Social Network. …A social network consists of a finite set or sets of actors and the relation or relations defined on them. The presence of relational information is a critical and defining feature of a social network.

Wouter de Nooy, Andrej Mrvar and Vladimir Batagelj; Social Network Analysis with Pajek; Cambridge University Press, 2005.

Section 2.3, p. 31
… A partition of a network is a classification or clustering of the vertices in the network such that each vertex is assigned to exactly one class or cluster…

Partitions may specify a structural property …. We call the latter attributes of vertices.

Section 2.4, p. 36
Partitions divide the vertices of a network into a number of mutually exclusive subsets. In other words, a partition splits a network into parts.

[Antecedent not found]

[This passage on the concept of “allegiance” is based on original work of co-author John Rigsby]

Said et al – 1. Introduction, p. 2177-8 cont.

Para 4
Centrality is one of the oldest concepts in network analysis. Most social networks contain people or organizations that are central. Because of their position, they have better access to information, and better opportunity to spread information. This is known as the ego-centered-approach to centrality. The network is centralized from socio-centered perspective. The notion of centrality refers to the positions of individual vertices within the network, while centralization is used to characterize an entire network. A network is highly centralized if there is a clear boundary between the center and the periphery. In a highly centralized network, information spreads easily, but the center is indispensable for the transmission of information.

Para 5
There are several ways to measure the centrality of vertices and the centralization of networks.

The concepts of vertex centrality and network centralization are best understood by considering undirected communication networks. If social relations are channels that transmit information between people, central people are those people who have access to information circulating in the network or who may control the circulation of information, **i.e., they play a brokerage role.**

Para 6
The accessibility of information is linked to the concept of distance. If you are closer to the other people in the network, the paths that information has to follow to reach you are shorter, so it is easier for you to acquire information. If we take into account direct neighbors only, the number of neighbors (the degree of a vertex in a simple undirected network) is a simple measure of centrality. If we also want to consider other indirect contacts, we use closeness centrality, which measures our distance to all other vertices in the network. The closeness centrality of a vertex is higher if the total distance to all other vertices is shorter.

De Nooy, Mrvar and Batagelj

Section 6.1, p. 123
[W]e present the concepts of centrality and centralization, which are two of the oldest concepts in network analysis. Most social networks contain people or organizations that are central. Because of their position, they have better access to information and better opportunities to spread information. This is known as the ego-centered approach to centrality. Viewed from a sociocentered perspective, the network as a whole is more or less centralized. Note that we use centrality to refer to positions of individual vertices within the network, whereas we use centralization to characterize an entire network. A network is highly centralized if there is a clear boundary between the center and the periphery. In a highly centralized network, information spreads easily but the center is indispensable for the transmission of information.

In this chapter, we discuss several ways of measuring the centrality of vertices and the centralization of networks…

Section 6.5, p. 133
The concepts of vertex centrality and network centralization are best understood by considering undirected communication networks. If social relations are channels that transmit information between people, central people are those who either have quick access to information circulating in the network or who may control the circulation of information.

The accessibility of information is linked to the concept of distance: if you are closer to the other people in the network, the paths that information has to follow to reach you are shorter, so it is easier for you to acquire information. If we take into account direct neighbors only, the number of neighbors (the degree of a vertex in a simple undirected network) is a simple measure of centrality. If we also want to consider indirect contacts, we use closeness centrality, which measures our distance to all other vertices in the network. The closeness centrality of a vertex is higher if the total distance to all other vertices is shorter.

Para 6 cont.

The importance of a vertex to the circulation of information is captured by the concept of betweenness centrality. From this perspective, a person is central if he or she is a link in more information chains between other people in the network. High betweenness centrality indicates that a person is an important intermediary in the communication network. Information chains are represented by geodesics and the betweenness centrality of a vertex is simply the proportion of geodesics between other pairs of vertices that include the vertex. The centralization of a network is higher if it contains very central vertices as well as very peripheral vertices.

Section 6.5, p. 133 cont.

The importance of a vertex to the circulation of information is captured by the concept of betweenness centrality. In this perspective, a person is more central if he or she is a link inmore information chains between other people in the network. High betweenness centrality indicates that a person is an important intermediary in the communication network. Information chains are represented by geodesics and the betweenness centrality of a vertex is simply the proportion of geodesics between pairs of other vertices that include the vertex. The centralization of a network is higher if it contains very central vertices as well as very peripheral vertices.

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