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69.1 Brief History of Social Network Analysis

Social Network Analysis (SNA) originated from the social sciences work of Simmel and Durkheim who provided its theoretical grounding. More formally, SNA emerged in the 1930s under the name “sociometry,” developed by Jacob Moreno. He described sociometry as an application of methods that inquired into the evolution and organization of groups and the position of individuals within them (Moreno, 1934). During the period between 1940 and 1960, relatively little work was done to advance research into Social Network Analysis as a method (Zhang, 2010); but Harvard-based Harrison White began research into SNA in the 1970–1990s with the production of a number of important contributions (blockmodeling, structural equivalence) to social network theory (Freeman, 2004). Computers played a key role in moving SNA into a recognized method as these programs allowed researchers to analyse large sets of data in an efficient fashion (Freeman, 2004). As Freeman stated in 2004,

Social Network Analysis is finally succeeding in providing an alternative to the traditional individualism of most mainstream social research. Network analysis is booming, and the tendency of social scientists to ignore structure is diminishing . . . The study of social structure has come of age. (p. 167)

During the 1970s, the International Network for Social Network Analysis was founded with an academic journal and newsletter, confirming the growth in the SNA field (Freeman, 2004).

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69.2 Method of Social Network Analysis

Social Network Analysis aims at understanding the network structure by description, visualization, and statistical modeling (van Duijn, & Vermunt, 2006). From this description, one can see that SNA often expresses itself as a mixed method approach to inquiry. SNA is typically presented in a graph form illustrating a series of nodes and ties with nodes representing individuals or groups and the ties representing the relationships that connect them but can also be expressed as sociographics or sociograms depicting the qualitative descriptions of these nodes and connections. Social network analysts typically look for patterns in these visualizations which may for example include ‘density,’ ‘centrality,’ and ‘diameter’ (Medina, 2014). Density is calculated as the number of connections within the network compared to the total number of possible connections (Medina, 2014). Centrality is used to detect leadership roles in social networks through degree, closeness and betweenness (Medina, 2014). Diameter measures the longest path between two nodes or individuals (Medina, 2014). In Medina’s example, a SNA on Islamist terrorist networks using centrality revealed global leadership to be coming from the al-Qaeda branch of the network (2014). Other researchers have used SNA to identify and map “energizing” persons within the social network.

69.3 What Social Network Analysis Can Be Used to Study?

SNA can be used in situations where research is desired on the relationships between nodes (individuals or groups) and other nodes and nodes and their environment (Carrington et al., 2005; Jackson, 2010). This means that the applications of SNA expand to numerous areas of study. In the private sector for example, businesses use SNA to support activities such as customer interaction and analysis, information systems development, marketing and business intelligence needs (Aram & Neumann, 2015). Public sector researchers might include the development of leader engagement strategies and community-based problem solving. Additionally, Richard Medina (2014) showed that SNA can be used in the fields of counterterrorism through an evaluation of the Islamist terrorist networks.

69.4 Why Use Social Network Analysis?

There is good value to be obtained from specific populations by simply identifying how individuals or groups (nodes) are connected to each other. An example of why SNA may be preferred lies in coefficients like ‘Social Networking Potential’ or (SNP) that are derived from SNA (Anger & Kittl, 2011). In the case of commercial marketing, targeting is essential in being effective and understanding individuals or groups with high SNP can allow for greater efficiency in resource-spending.

69.5 Sample Domains for Social Network Analysis Use

The SNA method has been used in numerous domains including Anthropology, Communications, Criminology, Education, Nursing, Organizational Studies, Biology/Epidemiology, Chemistry, Geography, Political Science, History, Sociology, Commerce and many others.

69.6 Process for Social Network Analysis

Step 1. Identify the Network. Defining the network will include defining the boundaries for the analysis itself as well as the members (individuals or groups) that are in the network. Identifying of members can be done through several approaches that may include surveys or questionnaires (Springer & Steiguer, 2011). The network might be the adults in a school or the human professionals who intersect with a particular set of patients, clients or sub-set of students.

Step 2. Collect Social Interaction Data. Social network analyses can examine several types of interactions among individuals, such as transactions, communication, authority and power, kinship and descent (Knoke & Yang, 2008). Collection by survey or questionnaire can facilitate this as participants are asked to detail types of interactions and frequencies related to the analysis. This information should then be computed to visualize the network typically using software (Springer & Steiguer, 2011). For example, perhaps a researcher is interested in describing the social nature of interface between a city's arts community and that of a university community.

Step 3. Data Analysis. Data can be examined visually through sociograms and statistically through a variety of metrics. Sociograms are graphical representations of social interactions that conceptualize individuals or organizations as points, called "nodes," and their relationships as lines between the nodes, which are called "ties." Two individuals with a relationship receive a tie between them in the sociogram; whereas, two nodes without a tie indicate that a relationship does not exist. Nodes can be symbolized by colour, size, and shape according to individual level characteristics. Similarly, ties can be symbolized by any characteristic of the relationship such as frequency of communication or strength of the relationship (Springer & Steiguer, 2011).

69.7 Strengths of Social Network Analysis

SNA can demonstrate which members or nodes have the most influence in a network through metrics like social networking potential (SNP). The visual mapping of SNA can provide insight into how information may flow in a network. Using the SNP example, we can see that in certain instances, researchers may be able to make assumptions that nodes with high SNP will disseminate information more

quickly versus those with lower SNP, thus revealing potential flows that could be utilized commercially. SNA also serves as a powerful tool for the identification of changes in a pattern of group structure (Knoke & Yang, 2008). While traditionally quantitative, SNA provides opportunity to complement well with qualitative analysis. Easton (1995) explains that qualitative analysis can handle the sometimes complex and dynamic nature of the networks in question since similar contexts are commonly studied using qualitative methods (Schepis, 2011). Network information is not typically explicit, which means that investigation is required, especially in determining the core network structure which would require several indices if quantitative design is applied (Carpentier & Ducharme, 2007). Qualitative analysis can help to derive more representative meaning from data, through negotiating the difficulties in distinguishing between meaning created by the researcher and that created by the respondent (Easton, 1995).

69.8 Limitations of Social Network Analysis

A criticism of network research is that it is “static” or “ignores dynamics”. Underlying these criticisms are a number of different ideas, such as: (1) network research focuses too much on consequences of network properties and too little on antecedents; (2) network data are often cross-sectional rather than longitudinal; (3) what flows through links may be under-studied; (4) by measuring properties like centrality and using these to predict outcomes, we might implicitly be assuming that networks are static; and, (5) when studying the consequences of network properties, we may fail to take into account that nodes or individuals have urgency and are constantly changing their ties and positions in the network (Borgatti et al., 2014). Social network structure has received criticism for focusing on the structure to the exclusion of the content of the ties in the network. This can mean the type of tie and what flows through the tie (Borgatti et al., 2014).

Engagement Activities

1. You have been asked by a superintendent of education to provide advice to her on the state of the professional learning community of a large urban high school which seems to have a toxic culture. You want to get a sense of the faculty and staff key actors and influencers in school and get a sense for how the good, the bad and the ugly “travels” in this setting. How might you do an inventory of this using SNA?

2. Take a piece of paper and put a circle in the middle with your initials in the circle. Think of the people in your workplace who are closest to you (similar tenure, office proximity, friendships outside of work, similar interests). Indicate each of these persons with circles (and initials) in relation to your circle and draw a line between you and them. Place those added circle in relation to others (where you estimate they have strong connections indicate this by the thickness of the line; where they don't seem connected at all—leave off the line. Now move out from yourself and consider other staff members—where do their circles land and how strong are ties between you and others with each of them? Are there any social isolates? Do you see that some persons (represented by circles) are hubs of relationships?
3. Imagine you hoped to encourage or influence a person with whom you have no tie (see #2 diagram), can you see how people with whom you do have relationship might directly or indirectly connect with the person who is distant from you? We can't have the same level of relationship with everyone but in a well understood constellation or system of networks we can indirectly benefit or give to others.

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Additional Resources

- Introduction Workshop to Social Network Analysis (3 h 03 min)*. <https://www.youtube.com/watch?v=liUDKDXScxI>
- Social network analysis overview (4:44 min)*. https://www.youtube.com/watch?v=fgr_g1q2ikA
- What is social network analysis (3:46 min)*. <https://www.youtube.com/watch?v=xT3EpF2EsbQ>



Keith D. Walker is a Professor in the Department of Educational Administration at the University of Saskatchewan in Canada, where he has served for about 30 years. Dr. Walker's academic interests, expertise, and activity revolve around positive leadership and organizational development, follower and community well-being, research methodologies, governance and decision making together with applied ethics in education, public administration and not-for-profit sectors. Keith most identifies with his roles as husband, father, grand-father, teacher-scholar, apprentice, colleague, mentor and friend. He is married to Viv, who works as a physician (family and palliative medicine). Professor Walker's formal education has been in several disciplines and fields of study, including physical education, theology, philosophy, education and educational administration. Keith has supervised over 100 graduate students to completion and has authored and co-authored over 200 chapters, books, and refereed articles (Personal Website: www.keithdwalker.ca).