Chapter 14
Social Network Analysis Tools to Understand How Research Groups Interact: A Case Study

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ABSTRACT

This research is within the frame of sociometric studies of science, particularly the application of social networks to co-authorship, and patterns of citations among researchers in Psychiatry and Neurosciences, General Psychology, and Experimental Psychology. This chapter applies Social Network Analysis to information retrieval from a multidisciplinary database; subject headings lists are not considered sufficient or sufficiently flexible to describe relationships between the sciences. The aim is also to identify similarities and differences among these areas according to bibliometric and network indicators. Social Network Analysis used to select scientific articles within a discipline overcomes the rigidity of information retrieval based on a preselected set of topics. Network graphs can be used to show working groups that otherwise would remain hidden. It is useful, also, to overlap networks of co-authorship (explicit relations) and patterns of cited references (implicit relations), which allow comparison between individual author or groups and the whole group. Finally, the author highlights the need to adapt assessment indicators from different scientific areas to allow consideration of the characteristics of diverse disciplines, based not only on the productivity of individual authors, but also their capacity to mediate with other actors and works within the research system.

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INTRODUCTION

Social Network Analysis (SNA) represents a revolution in bibliometric studies of scientific activity. The term bibliometrics is used in the statistical literature to conceptualize the application of statistical and mathematical methods to scientific publications to explain the development of scientific disciplines, primarily by counting and analyzing elements (Pritchard, 1969). Following this, other lexical terms have been coined, such as scientometrics, informetrics, cybermetrics, etc. with related clarifications and expansions of and restrictions to their meanings, to expand the scope of and include other elements of scientific communication that might explain scientific enterprise. In this chapter we use the term bibliometrics or bibliometric studies, which are the most popular terms in international science (Jiménez Contreras, 2000).

SNA studies the relationships among elements in a given environment (Wasserman, 1994). Both elements and their relationships can be applied to any of the fields in which they interact. Traditional social analysis studies elements, classified or grouped according to their characteristics (social class stratification, gender, age group, geographic location, etc.); SNA is based on the idea that the structure of the relationships among elements better explains the set, social surroundings and the individual elements than each of these attributes individually.

Bibliometric studies have been transformed by the introduction of SNA. They are less concerned with the scientific production of institutions, than with these institutions' collaborative networks. Similarly, the study of publication quality, based on citations, now focuses on the meaning of citation flows and how they explain the interactions among scientific disciplines. Visualizations provided by SNA have changed bibliometrics based on their power to communicate phenomena whose explanation is difficult using only data.

BACKGROUND

SNA has made a major contribution to the level of analysis of scientific research; it allows meso level examination (groups of researchers as the unit of analysis) even when working with large volumes of data, such as national scientific production (He, Ding & Ni, 2011).

The most widespread applications of bibliometrics to SNA are mapping of science, that is, thematic networks typically built from citations (Boyack, Klavans & Borner, 2005; Iñiguez, Muñoz Justicia, Peñaranda & Martínez, 2006; Leydesdorff, 2004; Leydesdorff & Rafols, 2009; Moya-Anegón, Vargas-Quesada, Herrero-Solana, Chinchilla-Rodriguez, Corera-Alvarez, Munoz-Fernandez, 2004), and studies of scientific collaboration, based on personal networks built from co-authorship of papers (Acedo, Barroso, Casanueva, Galan, 2006; Bozeman & Corley, 2004; Olmeda-Gómez, et al, 2009a; Perianes-Rodríguez, Olmeda-Gomez, Moya-Anegon, 2010). Personal networks based on copresence on dissertation committees (Martín, del Olmo Martínez, Gutiérrez, 2006; Casanueva Roche, Escobar Pérez, Larrinaga González, 2007; Delgado López-Cózar, Torres-Salinas, Jiménez-Contreras & Ruiz-Pérez, 2006; Olmeda-Gómez, et al, 2009b), or competitive examinations panels (Sierra, 2003) are also examined. However, its application to many other information sources are still unexplored.

A visual representation of a network provides the opportunity to analyze its structural properties: "By mapping the structure of interactions, a researcher can identify the channels through which information flows from one node to another and the potential for a corresponding influence of one over another" (Schultz-Jones, 2009, p. 595).

Visualization is the most frequent approach in the literature. In general, most studies in the literature are descriptive their intention is to apply the knowledge generated in science policy to particular scientific areas (Rosas, et al, 2011; Valenciano Valcarcel, Devis-Devis, Villamon,