Web visibility of scholars in media and communication journals

Chung Joo Chung · Han Woo Park

Abstract   This paper examines the Web visibility of researchers in the field of communication. First, we measured the Web visibility of authors who have recently published their research in communication journals contained in the Social Science Citation Index (SSCI) provided by the Web of Science. Second, we identified a subset of authors based on their publication outlets and summarize those researchers with the highest Web presence. Lastly, we determined the factors affecting their Web visibility by using a set of national and linguistic variables of the individual researchers. Web data were collected by using a Bing.com advanced search tool based on the API. Web presence is defined as the number of Web (co-) mentions of each researcher. We identified the most solely-visible scholars in the entire communication webosphere and scholars with the most networked visibility based on co-mentions. There is a weak but statistically significant correlation between researchers' Web visibility and their SSCI publication counts. Further, US-based and/or English-speaking scholars were more noticeable than others on cyberspace.

Introduction

As the rapid growth of the Web is changing the circumstances and consequently the structures and processes of scholarly communication, there is renewed interest to see how it is being transformed, what the similarities or differences between the new formats of

C. J. Chung
Department of Journalism & Mass Communication, Kyungpook National University,
Taegu, South Korea
e-mail: cjchung@knu.ac.kr

H. W. Park (✉)
Department of Media and Information, WCU Webometrics Institute,
YeungNam University, Gyeongsan, Gyeongbuk, South Korea
e-mail: hanpark@ynu.ac.kr

communication and the traditional ones might be, and how the new formats facilitate or inhibit the scholarly communication process (Borgmann and Furner 2002; Cronin 2001; Zhao 2005).

It has been accepted for many years that academic research groups have a Web presence which may be just a webpage listing all university or departmental research groups. In other cases, however, there may be a multiple-page website with its own domain name and affiliated pages and sites for members, related projects, and resources. The World Wide Web is a key method of publicizing researchers, perhaps third in importance behind formal publications, such as journal articles or books, and conference presentations (Thelwall et al. 2008). The Internet is used not only from the perspective of information queries but also from that of an information publication, thus becoming one of the main available sources of both direct and indirect information (Espadas et al. 2008). The presumably huge international expenditure of time and money spent on websites describing research reflects a widespread belief either in the efficacy of Web publishing or the dangers of being without a Web presence (Thelwall et al. 2008). The former seems more likely, especially in an era where literature searches are occurring increasingly online in many disciplines, and where Google Scholar or search engines can find scientific content even if it is outside the traditional publishers' databases (Jasco 2005).

Content that is available online is used more than those that are not (Borgmann 2007). As Heimeriks and Vasileiadou (2008) point out, a scientist's visibility does not rely exclusively on the number of publications and their citations but can increasingly result from a well-designed and well-linked homepage providing scientific content. Placing academic content online and allowing it to be freely used by others is referred to as open access publishing. Borgmann (2007) has argued that enhanced visibility is one of the main motivations for open access. However, how the visibility of individual researchers is related to their impact as scholars is still unclear (Barjak et al. 2007; Meyer and Schroeder 2009). Considering that there have not been systematic studies on this issue, the current research examines the structure of communication scholars through both Web occurrence and co-occurrence analysis. The relationship between Web visibility and characteristics of scholars such as publications, language uses, and countries of affiliation will be explored next.

Literature review

Scholars in information science have already been discussing the possibility of a Web mention being comparable to a research citation for evaluating the impact of academic activity (Aaltojärvi et al. 2008; Kousha and Thelwall 2007; Vaughan and Shaw 2003). The link structure of the Web can provide evidence of work in progress and the normative constraints of peer review publishing do not apply. Additional information can be delivered after checking the amount of Web visibility rate per co-authored paper (Kretschmer et al. 2007). The Web-indicators of the current study are visibility of scholars and co-occurrence of them on the WWW.

The Web is made up of billions of individual webpages, typically organized into more or less coherent collections called websites. Links between websites allow different collections of information to interconnect between scholars (Park and Thelwall 2006). In academia, links amongst websites make it easier to access others' published data and more general information resources, including published papers and preprints (Lawrence and Giles 2004). Moreover, there are examples of distributed hypertexts, which are coherent collections of webpages that are hosted on different sites and interlink.

Thus, the analysis of the online linkages between scholars shows their relational structure on the WWW. In addition, social stratification, the probability of personal contacts (e.g., friendship or cooperation between similar scholars) in a discipline, can be proven (Kretschmer 2004). Here, academic communication and similarity or disparity among scholars, relate to various characteristics, such as affiliation location (Lee and Park 2012), main language use (Lee and Park 2012; Thelwall et al. 2003), the productivity of scientific knowledge (Thelwall and Harries 2004), and digital infrastructure (Ingwersen 1998).

The Web visibility similarity or disparity might be formed by geographical distance (Lee and Park 2012). For example, this trend is evident in a majority of US and European universities. The higher number of Web mentions for US universities is not surprising since they are located in one country. Considering the linguistic and cultural diversity, the high number of Web mentions for European universities is an interesting phenomenon.

The clustering of Web mentions among European cases might be associated not only with their geographical proximity but also with language. That is, the language of instruction in universities might be associated with Web mentions (Lee and Park 2012). For example, UK universities might tend to cluster away from European universities in non-English speaking countries. In the similar say, universities in Korea or Japan might be relatively isolated in terms of English-prevalent Web mentions since English is not their language of instruction. Thelwall et al. (2003) argued that such polarization resonates with English as a dominant language, linking European websites and the multilingual character of websites within European countries.

The indicators of the international visibility and Web positioning of research groups are recognized online impact measures for the Web (Aguillo et al. 2006), hyperlink statistics for a large number of websites, and links contributing directly to the Web visibility of a research group (Thelwall et al. 2008). Although several search engines have been developed to help users to find information, there has been little research in terms of comparisons and relationships between link-mediated networks among communication scholars and traditional ones (Park and Thelwall 2008).

Research questions

Based on the literature review above, the current study addresses the following research questions.

RQ1: Who are the most productive scholars in SSCI communication journal publication?
RQ2: Who are the most visible scholars on the WWW?
RQ3: What is the structure of communication scholars through the Web co-occurrence? What are the major countries' individual co-occurrence networks of scholars?
RQ4: Do affiliation location, main language use, and productivity of scholars influence their overall publications and Web visibility?

Methods

Scientometrics data

To address these research questions, this study examined recent articles in 63 of the 69 SSCI journals listed in the Web of Science database's Communication subject category,

from January of 2008 to April of 2011. This research excluded six journals due to the use of only non-English (Comunicacion Y Sociedad, Comunicar, Estudios Sobre El Mensaje Periodistico, Tijdschrift Voor Communicatiewetenschap), magazine style journal (Public Culture), and online inaccessibility (Journal of the SMPTE: Society of Motion Picture and Television Engineers).

A total of 576 scholars with at least three publications were found. More than 80 % of the scholars (475 scholars, 82.5 %) had an affiliation in English-based countries, such as the US (410), Australia (30), the UK (17), Canada (10), New Zealand (7), South Africa (2), and Ireland (1). Along with the US, Australia, the UK, and Canada, two non-English based countries have ten or more scholars with at least three SSCI communication journal publications during this period: Korea (14) and the Netherlands (14).

Web data collection

The current research gathered the number of times that each author (576 communication researchers) was (co-)mentioned on websites. Both Web occurrence and co-occurrence data were collected in July 2011 using Bing.com. Authors acknowledge that Google has held a leading position among Web search engines (Aaltojärvi et al. 2008; Notess 2003; Sullivan 2006). The choice of Bing.com is that thousands of search queries can be automatically submitted to Bing's database free of charge and the results are organized via Webometric Analyst, whereas other search engines including Yahoo and Google do not.

Webometric Analyst, formerly known as LexiURL Searcher, automatically analyses the online impact of actors, issues, and organizations, and creates network diagrams of collections of actors (Thelwall 2011; Thelwall and Sud 2011). It automatically submits queries to search engines, in this case, Bing.com, and process the results. The search query used in this paper was "author name AND institutional affiliation." For example, "Abbey B. Levenshus AND University of Maryland" was used in order to measure his online presence. In a case of co-occurrence data, this research identified those author names occurring in pairs, resulting in a total of 165,600 pairs (576*575/2). Based on a co-mention matrix of 576 authors, this study calculated several network-based indicators (e.g., in-degree and out-degree).

Results

The most productive scholars among the SSCI communication journal publications since 2008 are Brian L. Quick (12), Claes H. de Vreese (12), Joseph B. Walther (12), Timothy R. Levine (12), Hye-Jin Paek (11), Patti M. Valkenburg (11), Andrew M. Ledbetter (10), Hee Sun Park (10), Lijiang Shen (10), Ron Tamborini (10), and Thomas H. Feeley (10).

Moon J. Lee (43,800,000) ranked first in single mention on the WWW, followed by Thomas J. Johnson (36,800,000), Carolyn A. Lin (33,600,000), Young Mie Kim (30,200,000), Edward W. Miles (29,800,000), Sun-A Park (27,200,000), H. Denis Wu (24,100,000), John M. Hamilton (23,800,000), Kevin Real (23,300,000), and Brian D. Till (22,700,000). Excluding Francis L. F. Lee, there are no scholars of non-English based affiliations in top hundred scholars of single mention Web visibility.

The mean for degree centrality of the co-mentions between scholars on the Web is 87,616,602.98. Carolyn A. Lin (1,629,693,952) ranks first, followed by Deborah S. Chung (1,143,767,040), H. Denis Wu (1,096,280,960), Edward W. Miles (963,368,896), and Thomas J. Johnson (953,941,312).
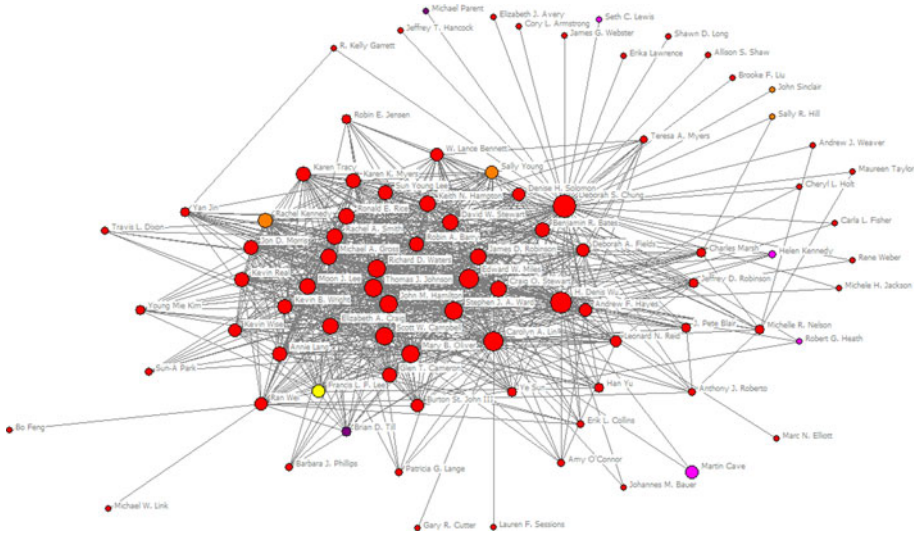
Fig. 1 Co- mention network of scholars. *Note*: The size of the *concentric circles* indicates the degree centrality among scholars. Only those ties exhibiting greater than six million single mentions are shown. All isolates have been removed from the figure

Figure 1 shows scholars' co-mention networks resulting from the links and their connection density among the nodes and the relative strengths of connections among the scholars. Scholars in the U.S are located in the center of the network while a few scholars in Australia, the UK, Canada, and Hong Kong are in the periphery. Most scholars are from English-based universities. Figure 2 shows six countries' individual co-mention networks with at least ten scholars each.

As shown in Table 1, the Spearman correlation coefficient between the SSCI journal publication in Communication and single mentions Web visibility on the WWW is significant ($p < 0.05$) and positive (0.098). The correlation coefficient between publication and degree centrality is also significant ($p < 0.05$) and positive (0.095). As expected, the correlation coefficient between Web visibility and degree centrality is significant ($p < 0.01$) and highly positive (0.965).

One way-ANOVAs are conducted to test the mean differences of overall publications, single mentions on the Web, and degree centrality between America based scholars and non-America based scholars. There is a statistically significant difference between them in overall publication, $F(1, 575) = 6.160$, $p < .05$, in single mentions on the WWW, $F(1, 575) = 18.043$, $p < .001$, and degree centrality, $F(1, 575) = 19.812$, $p < .001$. One way-ANOVAs are conducted to test the mean differences of overall publications, single mentions, and degrees between scholars of English-based affiliations and scholars of non-English-based affiliations. While there is a statistically significant difference between them in single mentions, $F(1, 575) = 18.272$, $p < .001$, and degree, $F(1, 575) = 20.733$, $p < .001$, there is no statistically significant difference in Publications between scholars of English based affiliations and scholars of non-English based affiliations (see Table 2).

Fig. 2 Co- mention networks of six major countries' scholars. *Note*: The size of the *concentric circles* indicates the degree centrality among scholars. Only those ties exhibiting greater than six million single mentions are shown for the US. All isolates have been removed from figures

Table 1 Spearman correlation analysis

	Publication	Web visibility
Publication		
Web visibility	.098*	
Degree	.095*	.965**

* p < 0.05, ** p < 0.01

Discussion

The Web is a complex system of interactions bridging online and offline communities in open science in order to discuss the transformation of communication practices within scientific communities. It addresses the problem of mapping the structural linkages of research networks on the Internet for purposes of identifying digital knowledge bases on

Table 2 Mean differences of overall publications and Web visibility

		M	SD
Publications	Scholars in America	4.12	1.68
	Scholars in non-America	3.75	1.36
Web visibility	Scholars in America	2,681,745	5,747,149
	Scholars in non-America	740,629	1,191,118
Degree	Scholars in America	110,873,417	224,978,973
	Scholars in non-America	30,175,074	98,223,289
Publications	Scholars of English-based affiliations	4.03	1.61
	Non-English based affiliations	3.91	1.56
Web visibility	Scholars of English-based affiliations	2,527,765	5,434,478
	Non-English based affiliations	192,438	1,143,263
Degree	Scholars of English-based affiliations	104,741,066	215,068,498
	Non-English based affiliations	6,104,161	53,958,968

electronic networks. Traditional (non-electronic) research networks are likely to have a digital representation (Web presence) whose boundaries and characteristics require a closer investigation (Caldas 2006). The current research identifies particular subsets of these scholar networks whose properties are related to each other.

Results show that Web visibility of scholars is related with their publication performance, places of academic affiliation, and language uses. These imply that Web visibility, Web-based and open access indicator, might replace traditional performance indicators. Interestingly, co-occurrence results represent the academic power of US-based scholars in Communication, which plays as the hub of the discipline. The Communication network in Australia is multi-polarized while the Korean academia shows a non-fixed structure of scholars even though there are two notable scholars in the center of the networks, such as Han Woo Park and Dong Hee Shin, who have conducted World Class University (WCU) programs in the nation.

For formal and informal academic materials to have any impact, they must be visible to their potential audiences. This is one area where the Internet offers much greater potential than the library-based paper publishing system has ever done. Once academic material is on the web, particularly if located in open-access sources indexed by Google and other search engines, other scholars and members of the general public have a chance of finding the material (even if the public audience for most scholarly material is quite limited). By mixing one's academic work in with the other material in the cloud of information that everyone uses on the Internet, it becomes more likely that others may stumble on it than if it is locked away in dusty, little-visited academic libraries.

Although the strategies of this research can remove some of the drawbacks, the current study has several methodological limitations. First, this research investigated only SSCI journals to obtain a list of individual scholars. Beyond co-authored articles registered in SSCI journals, the range of collaborations between scholars are reflected in other publications, such as jointly authored books or manuscripts, etc. Second, the Web-link among scholars can be used for relatively trivial purposes, such as linking to cookery pages or reviews of local restaurants as Thelwall (2001) has argued. Lastly, Web-citation needs to be considered to investigate more specific connection structures of scholars on the WWW.

References

Aaltojärvi, I., Arminen, I., Auranen, O., & Pasanen, H. (2008). Scientific productivity Web visibility and citation patterns in sixteen nordic sociology departments. *Acta Sociologica, 51*, 5–22.

Aguillo, I. F., Granadino, B., Ortega, J. L., & Prieto, J. A. (2006). Scientific research activity and communication measured with cybermetrics indicators. *Journal of the American Society for Information Science and Technology, 57*, 1296–1302.

Barjak, F., Li, X., & Thelwall, M. (2007). Which factors explain the Web impact of scientists' personal homepages? *Journal of the American Society for Information Science and Technology, 58*, 200–211.

Borgmann, C. L. (2007). *Scholarship in the digital age: Information, infrastructure, and the Internet.* Cambridge, MA: MIT Press.

Borgmann, C. L., & Furner, J. (2002). Scholarly communication and bibliometrics. *Annual Review of Information Science and Technology, 36*, 2–72.

Caldas, A. (2006). On Web structure and digital knowledge bases: Online and offline connections in science. In C. Hine (Ed.), *New infrastructures for knowledge production: Understanding e-Science* (pp. 206–232). London: Sage.

Cronin, B. (2001). Bibliometrics and beyond: Some thoughts on Web-based citation analysis. *Journal of Information Science, 26*, 329–335.

Espadas, J., Calero, C., & Piattini, M. (2008). Web site visibility evaluation. *Journal of the American Society for Information Science and Technology, 59*, 1727–1742.

Heimeriks, G., & Vasileiadou, E. (2008). Changes or transition? analysing the use of ICTs in the sciences. *Social Science Information, 47*, 5–29.

Ingwersen, P. (1998). The calculation of Web impact. *Journal of Documentation, 54*, 236–243.

Jasco, P. (2005). Google Scholar: The pros and the cons. *Online Information Review, 29*, 208–214.

Kousha, K., & Thelwall, M. (2007). Google Scholars citations and Google Web/URL citation: A multi-discipline exploratory analysis. *Journal of the American Society for Information Science and Technology, 58*, 1055–1065.

Kretschmer, H. (2004). Author productivity and geodesic distance in bibliographic co-authorship networks, and visibility on the Web. *Scientometrics, 60*, 409–420.

Kretschmer, H., Kretschmer, U., & Kretschmer, T. (2007). Reflection of co-authorship networks in the Web: Web hyperlinks versus Web visibility rates. *Scientometrics, 70*, 519–540.

Lawrence, S., & Giles, C. L. (2004). Accessibility of information on the Web. *Science, 400*, 107–109.

Lee, M., & Park, H. W. (2012). Exploring the Web visibility of world-class universities. *Scientometrics, 90*, 201–218.

Meyer, E. T., & Schroeder, R. (2009). The World Wide Web of research and access to knowledge. *Knowledge Management Research Practice, 7*, 218–233.

Notess, G. R. (2003). Search engine statistics: Relative size showdown. Retrieved from http://www.searchenginesshowdown.com/statistics/size.shtml.

Park, H. W., & Thelwall, M. (2006). Web science communication in the age of globalization. *New Media and Society., 8*, 629–650.

Park, H. W., & Thelwall, M. (2008). Link analysis: Hyperlink patterns and social structure on politicians' Web sites in South Korea. *Quality and Quantity, 42*, 687–697.

Sullivan, D. (2006). Nielsen Netrating search engine ratings. Retrieved from http://searchenginewatch.com/article/2067079/Nielsen-NetRatings-Search-Engine- Ratings.

Thelwall, M. (2001). Results from a Web impact factor crawler. *Journal of Documentation, 57*, 177–191.

Thelwall, M. (2011). Introduction to Webometric Analyst: A research tool for social scientists. Retrieved from lexiurl.wlv.ac.uk/searcher/IntroductionToWebometricAnalyst2.doc.

Thelwall, M., & Harries, G. (2004). Do better scholars' Web publications have significantly higher online impact? *Journal of the American Society for Information Science and Technology, 55*(2), 149–159.

Thelwall, M., & Sud, P. (2011). A comparison of methods for collecting Web citation data for academic organisations. *Journal of the American Society for Information Science and Technology, 62*, 1488–1497.

Thelwall, M., Tang, R., & Price, L. (2003). Linguistic patterns of academic Web use in Western Europe. *Scientometrics, 56*(3), 417–432.

Thelwall, M., Li, X., Barjak, F., & Robinson, S. (2008). Assessing the international Web connectivity of research groups. *Aslib Proceedings: New Information Perspectives, 60*, 18–31.

Vaughan, L., & Shaw, D. (2003). Bibliographic and Web citation: What is the difference? *Journal of the American Society for Information Science and Technology, 54*, 1313–1322.

Zhao, D. (2005). Challenges of scholarly publications on the Web to the evaluation of science: A comparison of author visibility on the Web and in print journals. *Information Processing Management, 41*, 1403–1418.