Korean and Chinese Webpage Content: Who Are Talking About What and How?

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This paper examines how China and Korea communicate through the Internet. LexiURL Searcher was used to retrieve data from Yahoo!, *and select 800 random webpages to examine their authorship, subject topic, and website format. The results indicate some similarities and differences between Chinese and Korean webpages. Most of the webpages were owned by firms, and their content fell into 3 categories: "related links," "education, scholarship, and research," and "business, economy, finance, and industry." However, there is an important difference in the webpage format between Korean and Chinese pages: Korean webpages were more interactive than Chinese ones. This difference may be due in part to differences in the organizational culture between the 2 countries. Other potential causes are discussed in detail.*

Key words: Korea, China, Webometrics, International Information Flow, Content Analysis, Hyperlink Analysis.

South Korea (hereafter "Korea") and China are geographically close and share a similar cultural background. The relationship between Korea and China can be traced back to as early as the 6th century. In 1992, Korea and China established official diplomatic relations, which made communication between the two countries possible. China quickly became a major export market for Korea. Further, there has been an extensive exchange of culture, entertainment, education, and science, among others. The number of visitors between Korea and China has steadily increased since 1998. However, the number of Koreans visiting China has exceeded that of Chinese visitors to Korea.

Given the rapid development and decreasing cost of information and communication technologies (ICTs), using cost-effective ICTs tools for self-promotion and for reaching a wider audience has become a common practice worldwide. Web 2.0 applications have made the Internet more accessible and interactive. An individual can easily create a webpage (hereafter "page") by using a Web 2.0 service (e.g. blogs) and to increase his or her visibility online by hyperlinking with more established websites. A website (hereafter "site") can represent an individual, an organization, or any other sort of

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entity. A hyperlink to any site can indicate the sender's recognition, acknowledgement, or suggestion (Park, 2003, 2010). Any changes in the connection between two parties may imply a change in the relationship or disapproval between them. Thus, a decision on creating a link to a site requires careful consideration.

This study examines what Korean and Chinese people communicate over the Internet and addresses the following questions: Who initiates online communication from Korea to China and what type of information is communicated through what types of sites? Who initiates online communication from China to Korea and what type of information is communicated through what types of sites? To what extent do characteristics of online communication between Korea and China reflect the sociocultural relations between the two countries? This paper investigates the current structure of the information flow between Korea and China by examining the hyperlink structure and identifies the types of information communicated between the two countries through the Internet. We explore some possible factors that may influence the current setting of the online communication environment between the two countries.

International Information Flow Using Hyperlink Networks

Studies of hyperlink patterns of the Internet emerged in the mid-1990s. Webometrics, coined by Almind and Ingwersen (1997), applies bibliometric and informetric techniques to investigate the Internet. Some topics for Internet researchers have included the following: the longitudinal structure/pattern of web links (Hsu & Park, 2011); web-based citation analysis (Kim, Park, & Thelwall, 2006); web impact factors in terms of online visibility (Lim & Park, 2011); and e-science network mapping (Park, 2010). The Internet is assumed to contain certain structural properties that can be systematically analyzed. Similar to traditional academic citation, hyperlinks between sites are not created randomly. Instead, these relations imply certain types of affiliations, recognition, and identities. These studies have provided sufficient reasons for us to believe that such methods may be meaningful for our purposes.

Furthermore, the concepts and techniques of social network analysis (SNA) are instructive for the analysis of hyperlink networks. SNA can be traced back as early as the 1930s, and assumes that the pattern of one's social relations has important consequences for one's behavior (Freeman, 2004). Typically, the creation of such an online network is not random in that computer networks and tends to reflect the social relationship between computer users who may have similar characteristics, such as their geographical location, funding, and political leaning (Marres & Rogers, 2005). Park (2003) referred to hyperlink network analysis (HNA), which was derived from communication studies. In a hyperlink network, actors are sites belonging to individuals, organizations, or others, and two individual nodes are connected by hyperlinks. One may argue that changes in communicative patterns between nodes may reflect changes in choices, agendas, or relations of owners because "hyperlinks are not merely connectives between texts, but rather mediators of a wide range of associative relations between producers of Web materials" (Foot, Schneider, Dougherty, Xenos, & Larsen, 2003). By analyzing these linking patterns, we may capture a socially constructed perspective of the relationship within and between a group of actors who have a common interest or agenda.

International Communication, World-Systems Theory, and Alternatives

Individuals are positioned in a connected global network that, with the assistance of the Internet, provides "a venue for the global village" (Harasim, 1993), creating new opportunities for people from different backgrounds to interact with one another. The underlying idea behind this study builds on previous research on the international communication flow, a topic of special interest in research on international communication (Barnett, Chung, & Park, 2011).

World-Systems Theory (WST)

Wallersteirn (1974) examined WST, which has been cited in previous research on the international communication flow, by considering capitalism and the global division of labor. WST posits that the development of nations depends mainly on the relative position of individual nations within "a larger network of material, capital, and information" (Barnett, Jacobson, Choi, & Sun-Miller, 1996) and emphasizes the relationship between resource-rich and resource-poor countries. Nation-states are classified as center, semiperiphery, or periphery based primarily on the relative economic power and structural equivalence of individual states. In their study, industrial and high-tech countries such as the U.S. were at the core, whereas low-valued, labor-intensive economies in Africa, Asia, and Latin America were at the periphery. WST also implies a centralized structure among countries because there are interactions between the central hub and the periphery along the spokes but not along the rim from one periphery nation to another (Galtung, 1971).

However, activities across borders are not exclusively economic in nature. Transnational interactions now involve various types of activities as well as the dissemination of information. Moreover, the widespread use of the Internet has intensified the flux of cross-border activities, which indicates a need for re-examining WST. Such views are based on the increasing diversification of the information flow, the underlying assumption of which is that international communication, to a certain extent, is influenced by the "geographical, social, or cultural homophily" (Park, Barnett, & Chung, 2011) that possesses specific and unique characteristics. Barnett and Park (2005) incorporated bilateral bandwidth capacity into their data and found that the Internet infrastructure plays an important role in understanding the globalized and networked world system. Other studies of hyperlink patterns of international communication have revealed that subgroups can be identified in terms of their geography (Barnett, Chon, & Rosen, 2001; Kim & Barnett, 2007), religion (Barnett et al., 2001), or culture (Barnett & Sung, 2005).

Electronic Colonialism Theory (ECT)

Electronic colonialism, proposed by McPhail (1981), applies the notion of cultural imperialism, which argues the dominance of one culture over another via diverse mechanisms such as economic or technology superiority or well-planned policies. New media conglomerates based in the West seek to influence international audiences through collective images, resulting in the blurring of national identities and the "unbalanced, biased flow of information that ignores the rights of the [dominated] world to be heard" (Venkatesan & Nambiar, 2003). The consequences of this global phenomenon are not limited to less developed countries. Industrialized countries such as Canada, Australia, and France have raised concerns about the potential negative effects of this "Empire of the Mind" (McPhail, 2006). Cukier (1999) used the case of FranceNet SA to demonstrate the effects of the U.S.-centric Internet on the regional deployment of the Internet. With well-planned and carefully executed international marketing strategies, cultural products as well as social and political information from sending countries, which are normally located in the core region of WST, can spread to other countries and replace local lifestyles. This may have profound effects on the cultural sovereignty, media system, and national uniqueness of receiving countries.

Globalization

A major frame of reference in international communication research is globalization (Shim, 2006). To some extent, the perspective of globalization is similar to WST. The main difference is that globalization focuses more on the power of culture among countries. Thanks to new communication technologies, interactions between people in different countries result in the blurring of geographical boundaries

and ''cultural convergence'' (Barnett, 2001). The influence of globalization and the Internet on society has been discussed from various perspectives such as telecommunications (Barnett & Salisbury, 1996) and academic information issues (Park & Thelwall, 2006). Shumate and Dewitt (2008) examined the local and global linkages of a hyperlink network of HIV/AIDS NGOs and argued that proponents of globalization have overestimated the market-driven force for breaking boundaries. Barnett and Sung (2005) used hyperlinks to examine the relationship between culture and the Internet and explored potential consequences for globalization and cultural homogenization. Although a nation's economy remains critical in terms of its position among other nations, Barnett and Sung found that certain elements of culture are important determinants of the structure of the Internet.

Regionalism

Regionalism has been regarded as a reaction to globalization. Scholars consider geographical closeness as the standard criterion for defining ''regionalism.'' Alagappa (1995) saw it as an exclusive group whose members are geographically close to one another and continuously collaborate with one another to create win-win situations. The most cited definition of regionalism is that regionalism is ''a limited number of states linked together by a geographical relationship and by a degree of mutual interdependence'' between economic growth and national security, among others (Nye, 1986). In other words, regionalism is ''the formation of interstate groupings on the basis of regions'' (Nye, 1986). New regionalism reflects a multifaceted approach. For example, new regionalism focuses more on formal and informal market relationships, economic power relations at various levels, and noneconomic relationships.

In addition, technology is a vital element of regionalism. Harvey (2001) assessed the relationship between regionalism and the decrease in the digital divide in the Caribbean and Southern Africa by using various variables, including the Internet infrastructure and the number of Internet users/hosts. Freund and Weinhold (2000) argued that the Internet stimulates trade, which in turn promotes regional cooperation (Kelegama & Adhikari, 2002). Although regional cooperation has gained popularity among countries within specific regions, it has also led to changes in the linking patterns of the Internet. Scholars (Barnett & Park, 2005; Townsend, 2001) have found few direct connections between countries within specific regions, but Rosen, Barnett, and Kim (2011) recently identified some regional, cultural, and linguistic groupings.

Since the mid-1990s, East Asian countries have embraced media content from Korea. This is often referred to as the ''Korean Wave'' that means the enthusiastic consumption and enjoyment of Korean popular culture in the Asian region. The proliferation of Korean films, music, and television programs has generated numerous studies of media consumption behavior and cultural transformation in Asia (Shim, 2006). Some studies have examined the structural connections in the transnational Asian cyberspace. Ciolek tracked the Asia Web in 1998 and examined the relationship between various components of the global cyberspace (Ciolek, 2001). Studies by Park and Thelwall (2006) have often been cited in this field, but they have focused mainly on the online information flow between universities from the perspective of information science. Ducke (2007) examined the 2001 history textbook controversy between Korea and China in cyberspace. However, her research emphasized civic and advocacy organizations' use of the Internet for this particular issue. In other words, previous studies have not fully analyzed the online Asian/Korean information flow as transnational cultural exchange.

Since the mid-1990s, the Internet has rapidly shifted from its coordinates in English-speaking countries to become an essential medium in Asia (Park et al., 2011). It plays an important role as an information channel and a platform for the wider diffusion of the Korean Wave in Asia (Hjorth, 2009). The present study is particularly appropriate for understanding the online Korean Wave in that it explores the bilateral relationship between Korea and China.

Data Collection and Analysis

We employed hyperlink analysis and content analysis to identify the types of pages interconnected in the Korean-Chinese cyberspace, and to understand the type of information communicated between the two countries.

Data Collection

In January 2010, we used LexiURL Searcher, a computer program designed to gather data from search engines via their application programming interfaces (APIs) for webometric purposes, to retrieve data from the Yahoo! database (Thelwall, 2009). Through LexiURL Searcher, we queried Yahoo! by using the commands "linkdomain:.cn site:.kr" and "linkdomain:.kr site:.cn" to gather hyperlinks between Korean and Chinese sites. We used country code top-level domains (ccTLDs) to search the links but excluded general top-level domains (gTLDs). We chose ccTLDs because they are two-letter top-level domains (i.e., .kr and .cn) especially designated so that a particular country or an autonomous territory can service its community or represent the nation-state in cyberspace. We used NodeXL (Hansen, Shneiderman, & Smith, 2010) to visualize the Korea-China online networks.

Data Analysis

Social Hyperlink Network Analysis

The networks in this study were two-mode networks (Wasserman & Faust, 1994) in which the data sets included two sets of objects. One set of objects consisted of Chinese pages, and the other contained Korean ones. We transformed the 2 two-mode networks (i.e., the Korean-targeted Chinese and Chinese-targeted Korean networks) into 4 one-mode valued networks (Korean, targeted Chinese, Chinese, and targeted Korean). The relationship between a pair of pages (e.g., Korean pages) indicated the number of pages (e.g., targeted Chinese pages) that they had in common.

We examined the Korean and Chinese pages by using SNA indicators. Density reflects the extent to which network members are connected to one another, and it is possible to determine the cohesiveness of a network. The higher the level of density, the more cohesive the network is. The indicator is degree centrality (Wasserman & Faust, 1994). Degree centrality addresses the number of pages a page is directly linked to. The more a page is connected directly to other pages in the network, the more central the page is. We used the degree centrality of each page to determine the topics that attracted Chinese and Korean netizens' attention.

Content Analysis

Given that hyperlink data and SNA results do not speak for themselves and the data should be interpreted, we conducted a content analysis to analyze web data. Content analysis is an established methodology in social sciences and one of the first methodologies used in web analysis (Herring, 2010). Content analysis helps one to identify the symbolic content and semantic themes of communication and to understand the hidden context at the time of the creation of web content. We used LexiURL to randomly identify 400 pages that were linked from China to Korea and another 400 from Korea to China. We employed two coders to examine these pages manually. The 800 pages were grouped into different categories. First, the coders examined the type of authorship and classified the pages into the university, firm, government, nonprofit organization (NPO), and personal site categories. Second, page content was checked and classified into 13 categories: art/humanities; business; trade; education; entertainment; health; news and media; recreation; religion; science and technology; society; links; and others. Finally, the coders determined the types of individual pages as regular homepages, blogs,

forums, or files. The categories were determined during the manual examination of the pages, which is a method that has been widely used in previous studies (Barnett et al., 2011).

Results

Hyperlink Analysis

We found that commercial pages formed the biggest group in the network (243 pages, 60.8%) in Korea; 11.3% (45 pages) were NPOs (ending in .or or .kr), 10.5% (42 pages) were academic pages, 1.5% (6 pages) were personal (ending in .pe or .kr), 1% (4 pages) were research organizations, and 0.8% (3 pages) were government pages. In terms of Chinese pages, 33.3% (133 pages) were commercial, 10.3% (41 pages) were academic, 5.3% (21 pages) were NPOs, 3.8% (15 pages) ended in .net or .cn, and 3.5% (14 pages) were governments.

We examined the interconnections between Korean pages (blue) and their targeted Chinese pages (red) (See Figure 1 in the supporting information online). The network consisted of 2,167 nodes (i.e. pages) and 2,507 links. Of the Korean pages, seven were identified as top pages, that is, they sent the highest number of links to Chinese pages. Among the seven pages, five were by firms, one belonged to a NPO, and the other was a personal one. Interestingly, the top page was that of a plastic surgery clinic. This finding to a certain extent confirms that Korea is famous for plastic surgery in East Asia. Further, the popularity of plastic surgery extended to China (and to the rest of the world) through the Internet and the spread of the Korean Wave. Chinese people provide the latest boost to Korea's "beauty industry," and the number of Chinese clients spiked nearly fivefold from 2009 to 2010 (Ford, 2011).

The interconnections between Chinese pages (red) and their targeted Korean pages (blue) were also studied (see Figure 2 in the supporting information online). The network was smaller and contained 787 nodes and 519 links. Of the eight Chinese pages that sent the highest number of links to Korean pages, five were university pages, one was a government page, and two were by firms. The top page, which sent the highest number of links to Korea pages, was by the Department of New Media Art of the China Academy of Art. This finding reflects the increasing number of Chinese students in Korean universities and indicates that Chinese universities use the Internet to provide more information on Korean education for their students interested in pursuing advanced studies in Korea. In addition, one page was by the China International Electronic Commerce Center, a government agency that develops electronic information projects. This implies that the strength of Korea's information industry has drawn considerable attention from Chinese government agencies responsible for the development of ICTs in China.

Analysis of "Shared Interest" Networks

The Korea-China networks described above were two-mode networks in which two sets of pages were included. We transformed the networks into 4 one-mode networks and identified them as "shared interest networks" because the relationship between any pair of pages was determined by whether they had the same links to or from other pages. For example, in the Korean "shared interest" network, the relationship between two Korean pages was determined by whether they sent links to the same set of targeted Chinese page(s).

The basic properties of the four shared interest networks were examined (see Table 1 in the supporting information online for the details). The size of the network formed by targeted Chinese pages was much larger than that of the other three networks. It contained 1,920 pages and approximately 210,000 lines. Its density was 0.11, indicating that approximately 11% of all possible lines were present in the network. On average, a single page had the same interest as the other 217 pages. Its degree centralization (42.68%) was the densest, indicating that some targeted Chinese pages received more

attention than others. In this section, we focus on targeted networks. We applied degree centrality, and identified the pages that had the highest number of neighbors. In other words, such pages attracted most attention from the source country, suggesting that they contained topics of particular interest in the bilateral communication between the two countries.

For each country, we selected 17 pages that had the highest number of neighbors. Among the 17 Chinese pages, 7 were by hospitals in Shanghai and Zhejiang. Shanghai is ranked second for health and medical services and Korea plays an active role in providing medical equipment and technologies. Three pages from Chinese and Korean steel, machinery, and manufacturing industries indicate active interactions between the industries. Industrial cities such as Shenyang, Qingdao, and Hefei have increasingly focused on China-Korea communication. Some conferences on China-Korea industrial communication were held in these cities in recent years. The prevalence of these pages reflects the fact that machinery, electronics products, and medical equipment are the main products that Korea exports to China. (MOFCOM, 2010)

Consistent with the findings in the previous section, there was considerable interest in social and cultural exchanges. The Korean government has actively promoted tourism through programs such as the 2010-2012 Visit Korea Year Campaign by employing a Korean Wave marketing strategy and by establishing Korean centers in various countries. As of March 2011, Chinese tourists accounted for 20% of all tourists visiting Korea (Korea Tourism Organization, 2011), and Koreans represent the largest tourist group in China (CNTA, 2011). Moreover, Korea and China have collaborated in various tourism projects in coastal areas (China Internet News Center, 2010). The countries expressed their support for the tourism strategic plan of the Association of Southeast Asian Nations and are expected to cooperate more closely to develop their tourism industries in coming years.

Content Analysis

Two coders were engaged for analyzing the content of 400 Korean and Chinese pages. The disagreement between the coders for the ''authorship,'' ''page content,'' and ''site type'' of the 400 Korean pages was 25.75% (103 pages), 58.25% (223 pages), and 20.25% (81 pages), respectively. For the 400 Chinese pages, the disagreement was 33.25% (133 pages), 57% (228 pages), and 16.5% (66 pages), respectively. The results indicate Chinese and Korean pages have similar characteristics. In terms of authorship, the majority of the pages from both countries were by firms (83.84% for Korea and 85.77% for China), followed by universities (11.78% for Korea and 8.99% for China). In terms of page content, the focus was on ''related links'' (16.95% for Korea and 23.26% for China) pages, education-related (15.25% for Korea and 22.67% for China) pages, and business-related (11.86% for Korea and 21.51% for China) pages. As shown in this and later parts of the present study, the coders disagreed on the page content in particular. We consider that the main reason for this difference may due to the fact that many of the pages provided information related to various topics, which made the coders difficult to decide the most suitable category. Thus, we restricted our discussion to those web pages agreed.

We then analyzed the pages targeted by the 800 pages (i.e., 400 Korean and 400 Chinese pages). We conducted a content analysis to determine the ''authorship,'' ''content,'' and ''type'' of those pages linked at least twice. A total of 207 Chinese pages were linked from Korea; 60 (28.99%) were unavailable. The disagreement between the coders for the ''authorship,'' ''page content,'' and ''site type'' of these pages was 10.2% (15), 44.22% (65), and 7.48% (11), respectively. A total of 40 Korean pages were linked from China, one of which was unavailable. The disagreement between the coders for the ''authorship,'' ''page content,'' and ''site type'' of these 39 pages was 15.38% (6), 48.72% (19), and 5.13% (2), respectively. Most of the Korean (60.6%) and Chinese (92.42%) pages were by firms, and a few (9 Chinese and 10 Korean pages) were by universities, government agencies (1 Chinese and 2 Korean pages), and NPOs (1 Korean page). All of the Korean pages and 98.53% of the Chinese ones were regular homepages (i.e.,

Web 1.0). The content of the Chinese sites were business (64.63%), health (15.85%), news and media (8.54%), education (6.10%), science and technology (3.66%), and recreation (1.22%). By contrast, the Korean pages focused on education (50%), business (30%), entertainment (10%), and religion (5%).

Several targeted Korean pages were classified into the "religion" category. In general, the Chinese government discourages religious activity, and the proliferation of religion in China has been limited by the government's restrictive policies. Regardless of the government's rigid control over religion, Chinese society tends to be multicultural. By multicultural, we referred to the diversity of ethnic groups within the Chinese territory. In recent years, China has developed rapidly and became more open to foreigners. Further, Chinese people have had access to a wider range of information, and their use of the Internet has increased. We examined six pages related to religion. There were more pages related to Christianity. This suggests that because Christianity is widely practiced in Korea, Chinese people may be looking to Korea for useful information on Christianity, which is known for establishing human networks.

Additional Analysis Based on Traffic to Popular Sites in Korea and China

One problem in the above analysis is the exclusion of gTLDs. To compensate for this weakness, following Chung, Barnett, and Park (2011), we analyzed the online relationship between Korea and China based on world traffic between the two countries' most popular sites (including .com sites). As of July 19, 2010, Alexa.com, a web information provider, provided a list of one million top sites by combining the average number of daily visitors with that of page views. For each site, Alexa.com provides the percentage of Internet users worldwide who visited the site, the average number of visitors over the previous three months, and the percentage of users from all countries representing greater than 0.5% of the site's traffic.

We identified those Chinese and Korean sites that ranked among the top sites worldwide on Alexa.com to customize the Alexa data for the purpose of the present study. As a result, we selected the top 80 sites (40 Chinese sites and 40 Korean sites) and determined their worldwide ranking. As of July 2010, Baidu.com (China) ranked first among the 80 sites and attracted an average of 9.68% of the world's Internet users to the site daily in the previous 3−month period (95.9% of the visitors were from China, and 0.6% were from Korea). The worldwide ranking of a site for a given country is likely to depend on the size of the country's population. Naver.com, the most popular Korean site, attracted 15.6% of its total traffic from outside Korea but was not one of the world's top 200 sites, whereas Baidu.com, which ranked sixth worldwide, attracted only 4.1% of its traffic from outside China.

We examined the content of the top sites. The most popular type of site was search engines/portals (27 sites, 33.75%), followed by news (19, 23.75%) and e-commerce (13, 17.25%) sites. This finding is quite different from our previous results. This might result from different search engine algorithms and the difference in the population size of Korea and China. (The explanation was provided by using additional figures in the next paragraph). In addition, three of the top five Korean sites were related to online news (Chosun.com, Sportsseoul.com, and Joins.com), which indicates that Chinese visitors were more interested in Korean news sites. By contrast, visitors from Korea had a more diverse range of interests, including online news, online videos, and social networking sites. This may be due to the large number of Chinese people living in Korea because these sites are generally popular in China.

According to the data obtained from Yahoo!, the most common form of online communication between Korea and China was e-commerce. However, according to the international communication traffic data from Alexa.com, e-commerce sites did not have a strong presence in comparison with other sites such as search engines/portals. This may be due to differences in algorithms that commercial search engines use in indexing sites. Besides, the performance of search engines has been discussed (e.g., Thelwall, 2008; Vaughan & Thelwall, 2004). In the present study, among Alexa.com's global top

100 popular sites, 16 were from China, and none were from Korea. The most popular Korean site, Naver.com, ranked 206th, and Daum.com ranked 325th. This suggests that differences in the bias of commercial search engines (Vaughan & Zhang, 2007) may influence the worldwide ranking of popular Asian sites. In addition, China has 1.3 billion people, and Korea, 48 million. Thus, this difference in the population size may explain the much lower ranking of Korean famous sites.

Discussion

Using hyperlink data, we examined the characteristics of online communication networks between Korea and China. Korea clearly had a stronger presence on the Internet than China. Korea's network had more actors (2,326 nodes) than that of China (787 nodes). This result indicates that Koreans are more interested in China than vice versa. One explanation for a stronger Korean presence in cyberspace is that Korea has quickly adopted new technologies to improve its standard of living. Because of Korea's high level of broadband penetration, population distribution, and government policies, Koreans have fully embraced online activity (Park & Lee, 2008). Because Korea's view of the rise of China is complex (Lee, 2009), Koreans are likely to use the Internet extensively to obtain information on China and provide relevant hyperlinks on their sites or other sites.

The popularity of Web 2.0 among Korean netizens is consistent with our results. Whereas 89% of Chinese pages were regular homepages, only 52% of Korean ones were regular homepages. However, firms in China were more likely to promote their products through online forums because of the high cost of creating and maintaining a site. Therefore, cultural, social, financial, and other differences should be taken into account when examining the communication styles between the two countries, as suggested by Park et al. (2011), who claimed that the Web may be considered an important indicator of the global social environment.

The results of this study suggest that the theories discussed earlier are not sufficient for explaining the linkages between Korea and China. In terms of economics, China has been incorporated into the global economy and has become a new member of the core. Korea, by 2010, was the 12th largest economy in the world (IMF, 2011), produces important technology products, and outsources most of its labor-intensive businesses to Southeast Asia. As Barnett (2011a) suggested, the core of the world system has been shifting from Europe to East Asia. Korean culture is spreading to other Asian countries through Korean entertainment (Shim, 2006). Under the influence of Korean culture, people in other countries have been adopting new ways of thinking. The popularity of tourism, Korean culture, and popular music can be seen as some of the best examples of the impact of Korean culture (or the Korean Wave) on other societies.

Sociopolitical factors may affect online behavior. In 2007, 71% of people in China's large cities passively consumed online contents the rest produce (Li & Bernoff, 2008). This may be due to the traditional social view of the Internet in China. Previous studies found that Chinese society tends to have a negative view of the Internet because most news on the Internet are not positive (Koch, Koch, Huang & Chen, 2009; Parish & Pan, 2006). Moreover, the government in China has tried to exert strict control over the Internet and may affect the behavior of Chinese users in using interactive functions of the Internet. However, the medium was introduced as a tool for communication and organization, its use in China may not be very different from that in other countries. A study by Zhe and He (2002) reveals the importance of participation in online chatting, and McRoberts, Terhanian, Alldredge, and Keppler (2010) shows that Chinese Internet users are much heavier users of most Internet behaviors, such as researching, communicating, or self-expression through using social media tools, than their counterparts in other countries.

Our data, together with other reports, imply some degree of integration in the region (Barnett, 2011a). Nowadays, education is considered an important industry in Asia because human capital

is a critical growth component for countries, whose economy is typically based on technology and knowledge. Educational exchange, one of the main objectives of communication between China and Korea, are deemed to foster more cooperation. In 2010, China, Japan, and Korea established an official committee for the "Campus Asia" initiative (MEXT, 2010). This government action may represent a catalyst for seeking education information online by students in the three countries. The results of the present study indicate a similar trend. The top shared interests included the sites of two universities in the southern and northern regions of China, which implies an increasing level of interest in higher education in China as well as in Korea.

Conclusion

The results suggest that WST is no longer sufficient for explaining the hyperlink use of Korean and Chinese users because economics is not the only factor influencing the development of a state. The results, consistent with the arguments of globalization and regionalism, show that elements like culture may be more crucial in the digital age. The results also show a growing popularity of Korean culture in Asia, a result of various forms of communication, including programs mediating the cultural exchange (Barnett, 2011b). In terms of web content, Korean and Chinese netizens focused on similar topics. This is consistent with the findings of Ess and Sudweek (2005), who pointed out that because of the globalization process and communicative possibilities, an increasing number of individuals are developing a new "third" identity that may contain elements from at least two national cultures. Straubhaar (2002) called the phenomenon hybridization. Analyzing online behavior from a single cultural aspect is no longer sufficient because of the intercultural flow online. Finally, the results suggest a need for examining WST by using other units of analysis relevant to ICT-related activities in the digital age.

The results demonstrate that combining hyperlink analysis with content analysis can be useful for examining online communication. However, this study has its limitations. Internet researchers use online tools such as commercial search engines to locate and source data. It is often suggested that commercial search engines cover only a small fraction of publicly available web data. Further, certain pages may be unavailable or blocked as a result of the Chinese government's regulations. In this study, Yahoo! returned incomplete results because of the technical constraints of the search engine. Moreover, we included those pages with the domains .kr and .cn, although many pages in Korea and China use TLDs such as .com. The exclusion of gTLDs, one limitation of traditional international hyperlink research, may lead to misleading results (Park et al., 2011). Thus, our data represent only a small fraction of available data, and any generalization of the present findings should be implemented with caution.

The level of disagreement between our coders with respect to the "content" type of page was relatively high. Because the pages analyzed were either in Chinese or Korean, the coders had to possess good knowledge of both languages to pass accurate judgement. Because of limited resources, we employed coders who were both native speakers of Chinese, and studied in Korea. However, because we considered only the pages for which there was agreement between the coders, the reliability of the results is unlikely to be influenced due to the language factor. In this regard, some statistical measures that could improve the reliability of our results are warranted. Classifying web content has always been a key issue. It is a time-consuming process and difficult to classify pages. We encountered three problems with our content analysis of pages. First, some pages were unavailable. Thus, we had to exclude such pages. Second, some Chinese pages contained a large number of Unicode characters and special symbols unrecognizable. Finally, some pages provided information related to a variety of topics, which made their classification more difficult. In this case, we grouped such pages into "others." This indicates that different classification methods can lead to different results. A more refined and robust measure is suggested for category classification for more reliable results in future research.

Acknowledgments

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Supporting Information

Additional supporting information may be found in the online version of this article:

Table 1: ''Shared interest'' network characteristics.

Figure 1: Korea to China (the size of each node reflects the number of its outgoing hyperlinks to Chinese webpages)

Figure 2: China to Korea (the size of each node reflects the number of its outgoing hyperlinks to Korean webpages)

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