Googling the World:
Global and Regional Information Flows in Google Trends

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As people increasingly rely on online information, they conduct many searches about foreign countries for tourism, shopping, news, and entertainment purposes. This study identifies central countries in the international search network using Google Trends data on international searches. It also offers economic, social, and historical explanations for their centrality. Findings show that users often search for information related to countries in their regions. Still, economically leading countries are being searched significantly more worldwide. The flow of people as measured by migration and tourism accounts for the searching of other countries. Finally, several regional centers in Africa, Asia, and the Americas serve as information gateways, connecting more peripheral countries in their regions with former colonial powers in Europe. The diversity of country-related searches and the availability of public data on these searches provide a new way to study global and regional patterns in our online information flows today.

Keywords: global, regional, information flows, Google Trends, country searches, search engines, network analysis

The term *global information flows* has been used extensively to refer to the various ways in which information is produced, spread, and consumed, often unequally, around the globe (Mowlana, 1985). This includes the global flow of information (international news, film and television products, radio programs, music, mail, telephone, and telecommunications), knowledge (educational, artistic, and cultural exchange), people (tourism, travel and migration, and diplomatic and political channels), and products and services (trade, finance, and shipping of goods).

Two main forces—centralization and regionalization—can theoretically explain the global structure of information flows. First, information flows from the centers, or the more powerful and influential hubs

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Date submitted: 2017–08–10

such as the United States, to the more peripheral countries (Wallerstein, 1974). Second, information flows within regional and local boundaries. The rise of regional hubs of media production in Africa, Asia, Latin America, and the Middle East (Thussu, 2006; Tunstall, 2008) and language and culture barriers (Huntington, 1996; Norris & Inglehart, 2009) encourage regional flows while limiting global flows.

Studies on the global flows of telecommunications (Barnett, 2001; Louch, Hargittai, & Centeno, 1999), the linking patterns of Web pages (Barnett & Sung, 2005), the international flow of online news (Segev, 2016a), and even global interaction on social media (Hawelka et al., 2014) provide empirical evidence for the unequal information flow from core countries and leading economies to semi-peripheral or poorer countries.

On the other hand, the growing production of local content suggests that regional contraflows may challenge global hierarchies. Smaller and more peripheral actors increasingly mobilize through digital technologies and elevate their position. Thus, for example, it was found that user-generated place markers in Google Maps reflected the local and regional flow of people (Zook, Devriendt, & Dodge, 2011). Still, in line with many other studies on global information flow, there were clear indications for global hierarchies, with the economically leading countries being mentioned more frequently in user-generated place markers in general.

The following study offers another direction to explore aspects of global information flows through analysis of online searches in Google for other countries. Many studies on international flows often focus on global production or the top-down "information push," but this study, similar to that of Zook et al. (2011), examines the user side, or the bottom-up "information pull" (Cybenko & Brewington, 1999) as appears in online searches. The question addressed in this article is whether international searches would further reflect the top-down hierarchical global flows or reveal more regional bottom-up trends. In other words, do people tend to search more about large and leading economies such as the United States or about their own regions?

The answers to these questions are crucial in a globalized world, in which many international interactions involve online searches to facilitate trade, travel, migration, education, and the acquisition of news and entertainment. Thus, international searches can reveal both users' interests in various opportunities available abroad and some of the actual interactions between people from different countries. Google Trends data have been found particularly useful in revealing peoples' interests and actual interactions with politics (Whyte, 2016), travel (Choi & Varian, 2012), shopping (Vosen & Schmidt, 2011), and science (Segev & Baram-Tsabari, 2012). Online searches can further shape peoples' interactions with their environment (Graham, De Sabbata, & Zook, 2015). The current study similarly employs Google Trends to analyze international searches from more than a decade, between 2004 and 2016. It maps the network of international interests and interactions, identifies central countries in the network, and reveals some underlying patterns based on the economic, social, cultural, and geopolitical factors found in previous studies.

What Do People Search About Other Countries and Why?

Together with the growing use of the Web for various purposes, the thematic context of searches has evolved. In a longitudinal study, Spink, Jansen, Wolfram, and Saracevic (2002) found that between 1997 and 2001, the variety of search topics increased dramatically. At the beginning most searches dealt with entertainment and sex, but beginning in 2000 there were also many more searches for commerce, travel, employment, people, places, and general information. This shift reflects the expansion of online content available and the increasing number of users from different age groups around the world. A decade later, Segev and Ahituv (2010) found that top searches were still social and entertainment related, including searches for social media sites, music, games, sports, television programs, and films. Some countries, however, also displayed economic and political topics among their top searches.

Although there have not yet been any studies directly focusing on searches related to foreign countries, many of the search topics mentioned above are associated with foreign countries. Countries are frequently searched as tourist destinations (Artola, Pinto, & de Pedraza Garcia, 2015; Matsumoto, Matsumura, & Shiraki, 2013), the origin of some products and services (Vosen & Schmidt, 2011), or as possible destinations for immigration (Vicéns-Feliberty & Ricketts, 2016). Similarly, as will be demonstrated, the prominence of certain countries in international news triggers searches for news-related information. Finally, entertainment, and particularly music and films coming from larger global and regional media hubs (e.g., American films or Japanese anime) are of great interest for worldwide users.

The economy is a particularly important driving force behind the global information flow. When it comes to online commerce, countries could serve as either the product themselves (e.g., in the case of a tourist destination) or as the national producers of certain products and services. Long before people shopped online, studies revealed that products coming from developed countries would be evaluated more favorably than those coming from developing countries, a principle known as the "hierarchy of biases" (Bilkey & Nes, 1982; Jaffe & Nebenzahl, 2001; Schooler, 1971). Search queries provide a unique opportunity for researchers to study international trade. Google Trends data were found useful in explaining and sometimes predicting product consumption (Carrière-Swallow & Labbé, 2013; Vosen & Schmidt, 2011), global trading behaviors, and even financial crises (Preis, Moat, & Stanley, 2013). These studies, however, focused on users' searches for specific products, brands, or economic conditions (e.g., "crisis") rather than on searches for country names.

Tourism is the case in which foreign countries are considered the target product and are therefore being specifically searched. Around three quarters of Europeans were reported to have traveled abroad in 2010, and almost half of them used the Internet as a major information source for travel (European Commission, 2011; Eurostat, 2014). Europe is also a center of inbound tourism. Several studies indicate that European countries were among the most frequently visited travel destinations around the world (Smith & Timberlake, 1995; Zook & Brunn, 2005). Google Trends data have been used to explain historical and predict future trends of inbound and outbound tourism in specific places such as Hong Kong (Choi & Varian, 2012), Dubai (Saidi, Scacciavillani, & Ali, 2010), Barbados (Jackman & Naitram, 2015), Japan (Matsumoto et al., 2013), and Spain (Artola et al., 2015).

Whereas global flows of tourists mainly originate from richer countries, global migration may take the opposite path. People from poorer countries would seek to improve their economic conditions in richer countries. Abel and Sander (2014) observed a clear tendency of people to migrate from less developed countries to more developed countries. Still, they reveal that the largest migration flow appeared within neighboring countries and regions. It is therefore expected that poorer countries would display more searches for visa requirements and information about the living conditions in the richer neighboring countries. Among the few studies to date that have employed Google Trends data in the field of migration, Vicéns-Feliberty and Ricketts (2016) identified the economic and personal interests of Puerto Ricans to migrate to specific states in the United States based on their Google search trends.

The countries' economic power has also been found to be a major factor in explaining their world news prominence. Studies have revealed a significant correlation between the mentions of a country in the news and its GDP (Segev, 2016a). Other important factors are countries' geographic proximity and political or economic deviance (Segev, 2016b). It has also been found that news can trigger online searches in other contexts (Segev & Baram-Tsabari, 2012; Whyte, 2016). As many online searches are news related, it is expected that countries frequently appearing in the news would also be searched more frequently by those in other countries. Likewise, a shared language and historical colonial ties were found as important factors in explaining the global and regional patterns of information flows between countries.

Finally, entertainment has been one of the major search topics throughout the years (Segev, 2010). People continuously search for videos, television programs, and music online. Internationally, there is growing competition between the global reach of American media products and the rise of regional media hubs in Asia, South America, the Middle East, and Africa (Tunstall, 2008). It is therefore expected that searches for popular media would be driven by dominant global flows (e.g., American films, music, and news channels) but also by transnational and regional contraflows (e.g., Indian, Japanese, Korean, and Turkish films and music channels). Google searches for countries seem to be especially relevant in sports. Recent studies show a significant increase in searches for foreign football clubs over time (Mutz, 2015), particularly among users from lower rather than higher income countries.

To summarize, the broader literature on global information flow and more recent studies on Google searches offer five spheres to explain why some countries could be more frequently searched than others: These are the economic sphere (including financial flows such as international trade), the social sphere (including people flows such as migration and tourism), the media sphere (including information flows such as popular media products and news), the technological sphere (including infrastructure and information use such as Internet and Google penetration), and finally, the historical sphere (including the physical and political control of one country over others, such as colonial relationships between countries).

Given that economic inequalities were found to be crucial in explaining global hierarchies in the general information flow (Louch et al., 1999; Mowlana, 1985) and, more specifically, in explaining the centrality of certain countries in the news (Segev, 2016a), social media (Hawelka et al., 2014), or travel flows (Zook & Brunn, 2005), it is expected that:

H1:   *Richer countries will attract more worldwide searches (in-degree centrality) than poorer countries.*

At the same time, richer countries, particularly those with high outbound tourism, are also expected to display a greater diversity of country-related searches (Artola et al., 2015; Choi & Varian, 2012; Jackman & Naitram, 2015; Saidi et al., 2010). The second hypothesis is, therefore:

H2:   *Countries with high outbound tourism will display searches for more countries (out-degree centrality) than countries with low outbound tourism.*

Finally, bearing in mind the growing regionalization of media production (Thussu, 2006; Tunstall, 2008) and language and cultural barriers (Norris & Ingelhart, 2009), it is also likely to observe regional trends in which people from one country might search for information from other countries with similar lingual or cultural attributes. It is expected that regional hubs would both attract more searches from other countries and display a greater diversity of searches. The last hypothesis is, therefore:

H3:   *Large and powerful countries in a region will both attract more search attention from their neighboring countries and display searches for more countries (betweenness centrality).*

Method

Google Trends offers data related to the regions and countries from which a search term was conducted. A search term could be a country name as an exact term but also as an entity. The former is limited to the language of the search and its spelling, but the latter includes derivations of the country name (e.g., *United States* or *USA*) and searches in other languages (e.g., *Estados Unidos*). Both searches, however, include queries that contain the country name but also other words (e.g., *USA visa*). Hence, Google Trends data on country names as entities enable a broader examination of international searches in all languages.

For example, when searching for Japan as an entity, Google Trends presented top related searches not only in Japanese but also in Cambodian, Thai, Indonesian, Russian, and English, reflecting the various countries from which searches related to Japan were conducted. Although the actual content of searches was not the subject of the current study, top and rising searches related to a country could help to validate the use of the entity approach. Thus, top and rising searches from Thailand for Japan as an entity were all relevant to Japan and included a variety of topics including tourist destinations, food recipes, adult films, music, celebrities, games, toys, shopping, and television programs. Likewise, top searches from Australia related to Japan included tourist destinations, currency conversion rates, news, translation services, social media sites, and the time in Japan. More generally, a search for a country as an entity in Google Trends typically includes the country name in various languages together with other words (e.g., flights to Japan), cities, and Web domains (e.g., yahoo.co.jp). This means that various topics such as tourism, sports, shopping, news, and media products from different countries would all be part of country-related searches.

It is worth mentioning that the polysemy of searches may pose a methodological challenge when studying Google searches. For example, people could search for *France* not only in relation to the country but also when referring to a famous singer or politician with this name. One way to make sure that search queries are relevant could be a random analysis of the related searches appearing in Google Trends. When it comes to searches for country names as entities, related searches appear particularly clean. A manual content analysis of about 10,000 top and rising search queries of countries as entities revealed that 94% of them were relevant and directly related to the countries being searched (Ingenhoff, Segev, & Chariatte, 2018).

A complete list of 241 country names and dependent territories was obtained from the United Nations Statistics Division. Country names were searched in Google Trends as entities for the longest period available from January 2004 until August 2016. A list of all countries from which users searched for each entity was extracted. For example, during this period, users from six countries (Pakistan, Ghana, Iran, Bangladesh, Nepal, and the United Arab Emirates [UAE]) appeared to search relatively more for *Afghanistan*. For the comparative analysis, only countries with high enough relative searches were included. That is, as the results in Google Trends are standardized relative to the country from which the percentage of searches was the highest (scored as 100 units), only countries from which the relative share of searches was 1 unit or more were included.

A directed weighted network of 229 countries and dependent territories in total was constructed based on these data using Visone software version 2.16 (Brandes & Wagner, 2004). Weighting the edges in the network is another methodological challenge, as Google Trends does not reveal the actual volume of searches. The weighted network in this case incorporated an estimation of the relative volume of searches each country performed on other countries. Google Trends provides the relative share of searches from countries for any given search term. This measurement, however, is not comparable, as some countries are searched more than others. For example, when comparing the share of global searches related to the United States with those related to Japan, Google Trends displays an average of 59 and 23 units respectively, indicating that the share of global searches for the United States is about 2.5 times larger than that for Japan. To get a more accurate estimation of the relative international searches, each country's share of global searches country was compared with that of the United States as a reference point (which also had the highest share of global searches).

The weighted link between the searching country, *X*, and the searched country, *Y*, was then calculated based on the relative share of searches from country *X* among all searches to country *Y*, the global share of searches of country *Y* relative to the United States, the number of online users in country *X* in 2010 (as obtained from the World Bank [Sup Lee, 2010] is at the middle of the sampling period), and the share of Google users in country *X* in 2010 (as obtained by cross-referencing two independent sources: Net Market Share and StatCounter Global Stats). Thus, for example, the directed link between Indonesia (searching) and Japan (searched) was weighted based on the relative share of Indonesia's searches for Japan compared with the searches for Japan by other countries (53 vs.100) × the global share of searches for Japan relative to the United States (23 vs. 59) × the number of online users in Indonesia in 2010 (25,941,256) × the market share of Google in Indonesia in 2010 (96.5%). The weighted edges between countries were then standardized between 0 and 1. The Indonesia–Japan tie was

thus 0.17 unit, ranked in 21st place. The edge with the highest relative volume of searches was India to the United States.

First, a cluster analysis using the Louvain modularity enabled identification of the regionality among country searches, as it measures the density of edges inside communities (Blondel, Guillaume, Lambiotte, & Lefebvre, 2008). Second, three unweighted and two weighted centrality measurements were calculated for each country. The unweighted measurements allowed me to represent and study more equally the international searches, as they included all the countries searching for other countries (apart from self-searches). In this way peripheral and smaller countries that exhibit country-related searches could be accounted for in the analysis. The unweighted measurements were of in-degree (the number of countries from which searches were carried out), out-degree (the number of countries that were searched for), and betweenness (the extent of being in between other countries). The two weighted centrality measurements were for in-degree and out-degree for each country based on the accumulated standardized global searches for and from each country. Other centrality measurements were calculated but are not reported, as they displayed similar patterns to another measurement already mentioned.

Various country-level variables were constructed based on the literature mentioned above to predict why users from some countries are searching more other countries (out-degree), being searched more by other countries (in-degree), or located in a mediating position between other countries (betweenness). These variables were inspired by the previous studies representing the five spheres of international searches mentioned above. To generate a more comprehensive list of possible factors, a bottom-up approach was also taken as well after examining the results of the most central countries.

The initial list contained 41 variables representing the economic sphere (GDP, GDP per capita, imports, exports, total international trade), the social sphere (outbound and inbound tourism, population size, foreign-born population in each country, and emigration from each country, including their relative share of the country's population; various measurements of ethnic diversity, cultural diversity, and linguistic diversity; various measurements of religious diversity; and religious majority status), the media sphere (news prominence; audio-visual exports; film exports; CD, DVD, and tape exports; new media exports; recorded media exports; video game exports; total media exports; and various measurements of press freedom), the technological sphere (Internet penetration, Google share, and Google users), and finally, the historical sphere (former colonies, under colonial control, and various measurements of length of independence).

Ucinet software version 6.647 was employed to conduct a node-level regression analysis in which node centrality was the dependent variable and the various country traits mentioned above were the independent variables. By default, Ucinet uses 1,000 permutation tests to overcome possible autocorrelations within the network centrality measurements (Borgatti, Everett, & Freeman, 2002). A Python algorithm was written to examine all possible combinations of two and three variables out of all independent variables in a multiple regression model. This method allowed me to overcome some of the limitations of a traditional stepwise regression approach, as it enabled an inspection of all possible combinations and provided more control over the exclusion of variables. In total, 820 combinations of two variables and 10,660 combinations of three variables were considered. Centrality measurements and

some of the skewed independent variables were log transformed. After testing for multicollinearity, the regression models with the highest R^2 values were identified (see Table 2 for the final combinations of variables and their VIF values). The Durbin-Watson statistic was calculated to test the independence of errors, and residuals were tested for normality using the Shapiro-Wilk test. The normal probability plots further confirmed that the residuals displayed close to normal distribution. Of the entire list of potential variables, seven were found to be particularly significant in predicting the centrality of countries in international search networks, as detailed below.

Countries' GDPs were obtained from the World Bank, as were data on international outbound tourism, measured by the number of departures from the resident country to any other country. Foreign population (immigration) and emigration data were obtained from the United Nations Statistics Division, and these reflect the number of foreign-born persons living in a country and the number of native-born persons living in other countries, respectively. These variables were obtained for the year 2010, which is the median of the Google Trends sampling period, from 2004 to 2016. Countries' news prominence was obtained from longitudinal analyses on popular news sites around the world for most of the sampling period (Segev, 2016a). Finally, the number of colonies of a country is the current number of countries that it formerly controlled since 1900. This variable was constructed based on data from the CIA World Factbook cross-referenced with other sources (Dorigny, Klein, Peyroulou, Singaravelou, & de Suremain, 2015; Ferro, 1997).

Results

Figure 1 depicts the network of country searches on Google. Countries are the nodes, and Google searches are the directed links between them. For example, when analyzing all searches related to Russia between 2004 and 2016, Google Trends listed 77 countries apart from Russia itself. In contrast, when analyzing all searches related to Rwanda, it listed only eight countries. The size of the nodes indicates their in-degree value (the number of countries from which searches were carried out). The color of nodes is automatically assigned using a cluster analysis based on the Louvain method (Blondel et al., 2008).

The clustering of countries based on the Louvain method reveals six main subnetworks clearly corresponding to six main regions from west to east: Americas, the Caribbean, Europe and Central Asia, Africa, the Middle East, and Eastern Asia and Oceania. Of the countries in cluster 1, 80% are in the Americas; in cluster 2, 75% of the countries are in the Caribbean; in cluster 3, 95% of the countries are in Europe and Central Asia; in cluster 4, 100% of the countries are in Africa; in cluster 5, 80% of the countries are in the Middle East; and in cluster 6, 100% of the countries are in Eastern Asia and Oceania. In other words, users tend to search more for information from the surrounding or nearby countries. The very high and significant chi-square correlation between the network clusters and the country region, $\chi^2(28) = 537.75$, $p < .0001$, further emphasizes the considerable impact of geography on country searches.

Figure 1 also features the most central countries based on several network measurements (marked by larger nodes and labels). It shows countries that either attracted more international search attention (in-degree and weighted in-degree) or displayed relatively more searches about other countries (out-degree and weighted out-degree). These countries are the United States in the American cluster; the

United Kingdom, Germany, the Netherlands, and Switzerland in the European cluster; China and Japan in the Asian cluster; Nigeria and South Africa in the African cluster; the UAE in the Middle Eastern cluster; and Jamaica in the Caribbean cluster. Two other central countries, Spain and the Dominican Republic, were attached to the American cluster even though they geographically belong to the European and Caribbean clusters respectively because of the many international searches they share from and to other American countries.
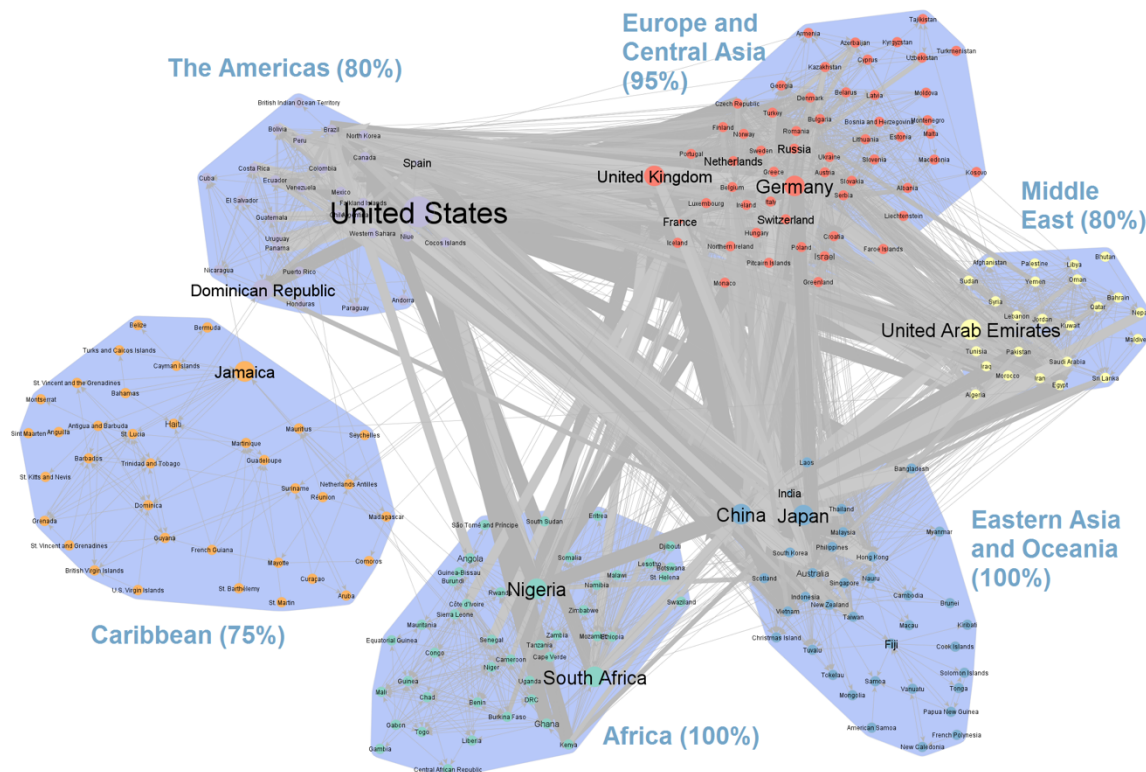

Figure 1. Network of country searches on Google (N = 229). The size of nodes and labels reflects their weighted in-degree. Larger labels also show countries with high out-degree and betweenness. The width and brightness of ties reflect their relative weight. Clusters are calculated and presented based on the Louvain method. Numbers in brackets are the percentages of countries in a cluster from the indicated region. Visualization is based on Visone 2.16 (Brandes & Wagner, 2004). The raw data of the network can be downloaded at https://tinyurl.com/InternationalSearches.

Finally, Figure 1 displays the relative volume of searches between countries based on the weight of their ties. It shows that the greatest volume of international searches is shared between three central

clusters: the Americas, Europe, and Asia. Middle Eastern countries, particularly the UAE, share international searches with Europe and to a lesser extent with China and Japan. African countries share some international searches with Europe. The Caribbean countries, however, share many fewer international searches with countries of other regions.

Table 1 summarizes the in-degree, out-degree, and betweenness levels of the top 10 countries. It shows that countries that attracted searches from many other countries (those with high in-degree) were often different from countries in which users conducted searches on many other countries (those with high out-degree). Both are often different from countries that appeared in between clusters of the international search network (those with high betweenness).

Table 1. Top 10 Network In-Degree, Out-Degree, and Betweenness by Country.

Country	In-Degree (%)	Country	Out-Degree (%)	Country	Betweenness (%)
Russia	77 (2.4)	UAE	58 (1.8)	Jamaica	4868.6 (5.3)
China	73 (2.3)	Netherlands	53 (1.7)	South Africa	3065.0 (3.4)
Israel	73 (2.3)	Switzerland	53 (1.7)	France	3041.5 (3.4)
USA	72 (2.3)	UK	51 (1.6)	Nigeria	3007.3 (3.3)
Turkey	70 (2.2)	Germany	49 (1.6)	Spain	2827.8 (3.1)
North Korea	69 (2.2)	Spain	49 (1.6)	Netherlands	2586.0 (2.8)
Germany	69 (2.2)	Sweden	47 (1.5)	Russia	2513.0 (2.8)
Japan	65 (2.1)	Austria	47 (1.5)	Fiji	2387.3 (2.6)
Spain	64 (2.0)	Canada	46 (1.5)	Dominican Republic	2332.8 (2.6)
Sweden	64 (2.0)	Belgium	46 (1.5)	Ghana	2207.1 (2.4)
Country	Weighted In-Degree (%)		Country	Weight Out-Degree (%)	
USA	1.00 (45.3)		India	1.00 (6.9)	
China	0.24 (10.7)		Nigeria	0.83 (5.8)	
Germany	0.15 (6.7)		USA	0.80 (5.6)	
Japan	0.11 (5.1)		Germany	0.73 (5.1)	
United Kingdom	0.08 (3.6)		Brazil	0.69 (4.8)	
Spain	0.07 (3.2)		United Kingdom	0.67 (4.6)	
France	0.07 (3.1)		China	0.65 (4.5)	
India	0.06 (2.8)		Mexico	0.48 (3.3)	
Italy	0.05 (2.4)		Indonesia	0.47 (3.3)	
Turkey	0.05 (2.3)		France	0.46 (3.2)	

Note. N = 229. In-degree is the number of countries from which searches were carried out, out-degree is the number of countries that were searched for, and betweenness is the extent of being in between other countries.

In-Degree and Global Power

Countries with a high in-degree value were searched by users from relatively more other countries. Table 1 indicates that in most cases larger and richer countries attracted more searches worldwide than smaller countries. Global economic differences are reflected even more prominently in the weighted in-degree values of countries, which estimate the relative volume of international searches for these countries. Thus, the United States as an American hub; China, Japan, and India as Asian hubs; the United Kingdom, Germany, and Spain as European hubs; Russia as a central Asian hub; and Turkey as a Middle Eastern hub attracted many more Google searches around the world than other countries. Top searches were related to television and media products, or in some cases to tourism or immigration. As will be further explained, this finding corresponds with H1.

It was found, however, that the economic and geopolitical power of a country was not the only explanation for its overall popularity in worldwide searches. North Korea (searched by users from 69 foreign countries) and Israel (searched by users from 73 foreign countries) were frequently searched in relation to international news. The latter was also searched by users in African and South American countries in religious contexts, and by European countries in relation to tourism. Sweden was searched by users from 64 foreign countries (mainly in Europe) in the context of sports, and by users from Middle Eastern and African countries in the context of immigration.

Out-Degree and Social Proximity

High out-degree indicates that users from a country searched for relatively more foreign countries. Users from the UAE appeared to search for the highest number of foreign countries, reflecting the composition of its population, as 85% of its 10 million inhabitants are expatriates. Top and rising searches from the UAE for India were related to Indian films, television programs, and Internet services such as YouTube and Yahoo! mail in India, revealing the information uses of the very large Indian community there. Likewise, top searches such as telephone country codes of Saudi Arabia and daily Egyptian newspapers indicate the need of UAE expats to keep their ties with their respective home countries. Top and rising searches of UAE users to the larger countries such as the United States, the United Kingdom, Germany, Turkey, and China were mostly related to visa requirements, indicating that many users consider further immigration or travel.

Users from European countries such as the Netherlands, Switzerland, the United Kingdom, Germany, and Spain also appeared to search for a relatively large number of foreign countries. Many top and rising searches from these countries were related to tourism and tourist destinations, mainly in Europe. This is in line with the fact that in many of these countries, the share of the population taking part in tourism abroad is about 80% (Eurostat, 2014). As will be further discussed, this finding corresponds with H2.

Unlike out-degree values, which reflect the variety of international searches from a country, the weighted out-degree values reflect the relative volume of searches for other countries. Naturally, top ranked countries are also highly populated. Still, differences between the weighted in-degree and out-

degree clearly reflect inequality in the volume of global searches. Some countries, such as the United States and China, display both a relatively high volume of searches for and from other countries, whereas India, Brazil, and Indonesia display a high volume of searches only for and not from other countries.

Betweenness and Historical Proximity

Certain European countries, such as France, Spain, and Russia, had high betweenness values. These countries also displayed high in-degree (were frequently searched by users from other countries) and out-degree (users from these countries searched more other countries). Users from former Spanish colonies in South America frequently searched for Spain in relation to online services but also in relation to sports, news, and entertainment. Likewise, users from former French colonies in Africa searched for France for similar purposes. Finally, users from the former Soviet Union searched for Russia in relation to news, television programs, and films. At the same time, users from France, Spain, and Russia searched for a relatively large number of countries in other regions for purposes such as tourism, shopping, news, and so on. This finding corresponds with H3 but appears to add another historical factor to the analysis. The special role of France, Spain, and Russia as information and media hubs for their former colonies on the one hand and worldwide information consumers on the other positioned them as important mediators in the international network of information searches.

Unlike those global hubs, the high betweenness of other countries such as Jamaica, the Dominican Republic, South Africa, and Nigeria is related to their special position as regional hubs. South Africa and Nigeria, for example, serve as a central hub between their own regions and global centers in North America and Europe. Users from these countries searched for a variety of foreign countries around the world for different purposes. On the other hand, Nigeria was mostly searched by users from its neighboring countries. Top and rising searches were related to cultural products such as films and music and to news. South Africa was similarly searched by its neighboring countries. Top and rising searches were mainly related to shopping and sports news. Hence, both Nigeria and South Africa served as regional information providers for the smaller countries in their regions, but at the same time searches from these two countries displayed a much more international outlook and a greater variety of interest topics.

Factors Predicting Country Centrality

Based on the differences mentioned above, a more systematic regression analysis was carried out in light of the hypotheses. It was found that 65% of the in-degree variance, 82% of the weighted in-degree variance, 69% of the out-degree variance, 79% of the weighted out-degree variance, and 39% of the country betweenness variance could be explained. Table 2 presents the best regression model for each centrality measurement, including the two variables that explained most of its variance. Although more variables could be included, they did not significantly increase the explanatory power of the models. The chosen two variables in each model display well the differences between the measurements, as described in Table 1.

Table 2. Multiple Regression Analysis for Variables Predicting Country Centrality.

Variable	B	SE B	β	Variable	B	SE B	β
				Weighted			
In-Degree[a]				In-Degree[b]			
GDP	.26	.03	.66***	GDP	.94	.04	.69***
News	.55	.15	.16*	News	1.93	.33	.24***
				Weighted			
Out-Degree[c]				Out-Degree[d]			
Outbound tourism	.34	.04	.58***	GDP	1.21	.07	.78***
Foreign population	.18	.04	.31***	Emigrants	.31	.09	.16***
Betweenness[e]							
Foreign population	.66	.08	.50***				
Former colonies	.33	.13	.19**				

*p = .014. **p < .01. ***p < .001.

In support of H1, Table 2 shows that richer countries attract more search attention worldwide than poorer countries. Together with GDP, the prominence of a country in world news explains 65% of its in-degree variance, R^2 = .65, $F(2, 173)$ = 157.64, p < .001, Durbin-Watson d = 2.14, VIF = 2.84, and 82% of its weighted in-degree variance, R^2 = .82, $F(2, 173)$ = 399.42, p < .001, Durbin-Watson d = 2.05, VIF = 2.84. This explains the relatively high in-degree values of the United States, China, and Russia (the economic factor), but also of Israel and North Korea (the media factor). It further appears that global economic inequalities and differences in international news attention are reflected even more in the weighted in-degree centrality, as it accounts for the unequal volume of searches for these countries.

In terms of countries' out-degree, 69% of the variance was explained by social and economic factors, R^2 = .69, $F(2, 162)$ = 178.59, p < .001, Durbin-Watson d = 2.13, VIF = 1.97. In support of H2, outbound tourism is a significant predictor. Together with outbound tourism, however, the size of the foreign population was also included as determinant of countries' out-degree. As demonstrated in Table 1, this means that online users from countries with high outbound tourism such as the Netherlands and Germany, or from countries with many foreigners such as the UAE, tended to search for relatively more countries.

However, the variance of the weighted out-degree, which refers to the relative volume of international searches from a country to other countries, was explained much better by the GDP of a country and its number of emigrants, R^2 = .79, $F(2, 177)$ = 331.50, p < .001, Durbin-Watson d = 2.07, VIF = 1.78. Together with the economic power in countries such as the United States and China, the overall number of emigrants is another important factor of the volume of countries' international searches to other countries. This can explain, for example, the very high weighted out-degree of India and Mexico.

Finally, 36% of the variance of country betweenness was explained by social and historical proximity factors, R^2 = .39, $F(2, 175)$ = 55.48, p < .001, Durbin-Watson d = 2.07, VIF = 1.22. Particularly, the number of foreign colonies explained why France and Spain had relatively high betweenness, as they were often searched by users from many of their former foreign colonies in Africa

and Latin America, respectively. Users from France and Spain, on the other hand, were much more diverse in their international searches, as detailed above. Furthermore, the size of the foreign population explained why relatively smaller countries such as the Dominican Republic scored high in network betweenness. Together with South Africa and Nigeria, these countries were searched mostly by users from their neighboring countries. At the same time, users from these countries often searched for a relatively large number of countries for reasons detailed above. Thus, France and Spain were positioned between their former colonies and the rest of the world, and regional hubs in the Caribbean and Africa were positioned between countries from their regions and the rest of the world. This finding supports H3. Although some of these countries are not global powers, they all play an important informational role in their regions.

Conclusion

This study presented global and regional patterns of information interactions based on online searches related to country names. It appears that international searches reflect a diversity of interests, including tourism and immigration, e-commerce and trade, and information about news, entertainment, and other cultural products. A cluster analysis displayed the limits of global information flows, as it presented a clear division of countries by geographic region in support of regionalization claims (Huntington, 1996; Norris & Ingelhart, 2009). International searches occurred mostly within regional rather than global contexts. This can be explained by the finding that users often search for closer and more affordable travel destinations (Artola et al., 2015; Choi & Varian, 2012; Jackman & Naitram, 2015; Matsumoto et al., 2013; Saidi et al., 2010; Vicéns-Feliberty & Ricketts, 2016), immigration (Vicéns-Feliberty & Ricketts, 2016), and the more familiar and customized cultural products coming from the neighboring regional hubs (Thussu, 2006; Tunstall, 2008).

At the same time, global trends still play an important role in explaining why some countries attract more international searches than others (measured by their network in-degree, and even more prominently, their weighted in-degree). In line with economic and communication-related centralization claims (Mowlana, 1985; Wallerstein, 1974), it was found that a country's GDP is among the most significant predictors for more global searches. This trend partially supports the "hierarchy of biases" (Bilkey & Nes, 1982; Jaffe & Nebenzahl, 2001; Schooler, 1971) when it comes to searching for shopping and travel destinations. Yet together with economic power, an additional factor that was not part of the initial hypothesis was discovered. The news prominence of certain countries such as North Korea and Israel (Segev, 2016a) was found to be another significant predictor for more global searches.

Searching for other countries, as was measured by the network out-degree, was explained mainly by outbound tourism as expected, but also by the size of the country's foreign population. Users from European countries were found to search for travel destinations more than others, a trend that reflects the higher travel rate of Europeans (European Commission, 2011) and the survey results of Eurostat (2014) regarding growing outbound tourism in Europe. Apart from travel needs, countries with a diverse population of immigrants such as the UAE displayed a significantly high interest in many other countries. When the estimated volume of searches was taken into account (countries' weighted out-degree), it was found that countries with large populations such as India and Nigeria initiated many of the searches

for foreign countries. This was further explained by international emigration. In support of Thussu's (2006) theory of transnational and regional contraflows, this finding reflects the international flow of people and people's need to maintain social and cultural ties with their relatives and their homelands.

Betweenness centrality appears to be a particularly instrumental measurement in identifying countries that were positioned in between regions. Countries with high betweenness values were often regional hubs, serving as information gateways for other countries in their regions: Countries in their regions often searched for them, and they searched mainly for the core countries in Europe and the United States. Here the systematic search for possible explanations revealed some unexpected trends. It appeared that historical factors played an important role in predicting the global and regional patterns of country searches. The number of foreign colonies and the extent of foreign population explained why former colonial countries on the one hand, and regional hubs in Central America and Africa on the other, had the highest network betweenness values. As many countries with high betweenness values were found to be leading economies in their regions, they were searched more often by users from other neighboring countries. At the same time, users from these countries exhibited a much greater variety of country searches outside their regions.

Although Google Trends offers valuable data on global and regional searches, it is worth noting some of its limitations. First, it displays only the most popular searches rather than a full list of searches. This was not crucial to the current study, as it focused on the countries and regions from which searches were conducted. Still, the list of most popular queries displayed a remarkable variety of search topics, which should be systematically analyzed and classified in future studies (see also Ingenhoff et al., 2018). Second, despite the global reach of Google search, certain countries such as China and Russia have introduced their own competing search engines. Future studies should examine the differences between competing search engines in this regard. Third, studies that use online search data are limited to users' intentions and needs rather than their actual uses of information. The relationship between online searches and actual uses is an important field for future investigations.

It is also important to note that Google searches have much more to offer when studying international flows online. For example, people search for media products from other countries such as American television programs, Japanese animation, or foreign politicians and celebrities, all of which will not appear in association with country-related searches. Expanding the investigation to other domains is possible, but doing so may decrease the validity of the cross-national comparison. The use of countries as entities offers a balance between the narrow and language-specific data related to a country as an exact query and the very broad possibilities when gathering and translating lists of possible international related keywords.

Notwithstanding these limitations, identifying and mapping the most searched countries (in-degree), searching countries (out-degree), and bridging countries (betweenness) revealed certain patterns in online information flows to advance our understanding in communication and geography. Whereas the centrality of the United States and western Europe was expected and could be theoretically explained as a classic case of unequal global information flows, the importance of regional hubs in the Middle East (the UAE), Africa (Nigeria and South Africa) and the Caribbean (the Dominican Republic and Jamaica) was

much less obvious. As these countries are often searched by the smaller neighboring countries and appear to search more for the American and European hubs, they play a crucial role as second-level gatekeepers in the global diffusion of information. The historical and cultural dimensions seem to be particularly relevant in explaining their position. This finding not only challenges Wallerstein's (1974) simplistic world system view of core-periphery, but also Huntington's (1996) distinction between civilizations. Bearing in mind that global and local information flows are embedded in complex economic, geographic, social, cultural, and historical networks, these findings call for the development of a more integrative model.

To conclude, the international network of country searches in Google unveils some significant aspects of our global information flows. In particular, it appears that the global economy and media production, deriving from people's ambition to expand their control over physical and symbolic resources, are reflected by global searches for the bigger and stronger international hubs. Geographic and cultural factors, on the other hand, are rooted in people's local identities and are reflected by more regional searches, producing a regional contraflow of information. Finally, historical and political processes bridge the regional and the global. The colonial attempts of civilizations to impose their languages and cultures on others as part of their economic expansion have connected geographically distant countries through shared cultural components. This, in turn, is reflected today by more interregional searches. In these information flows regional hubs and global ex-colonial powers play a major role. The diversity of country-related searches can therefore offer a rich and complex map to understand global and regional patterns of our online information flows.

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