2020

Attentional Social Media: Mapping the Spaces and Networks of the Fashion Industry

Ate Poorthuis
Singapore University of Technology and Design, Singapore

Dominic Powers
Stockholm University, Sweden

Matthew Zook
University of Kentucky, zook@uky.edu

Attentional Social Media: Mapping the Spaces and Networks of the Fashion Industry

Digital Object Identifier (DOI)
https://doi.org/10.1080/24694452.2019.1664887

Notes/Citation Information
Published in *Annals of the American Association of Geographers*, v. 110, issue 4.

Attentional Social Media: Mapping the Spaces and Networks of the Fashion Industry

Ate Poorthuis,[*] Dominic Power,[†] and Matthew Zook[‡]

[*]*Humanities Arts and Social Science, Singapore University of Technology and Design*
[†]*Department of Human Geography, Stockholm University*
[‡]*Department of Geography, University of Kentucky*

In this article we use big data methods to analyze the attention paid to the fashion industry on social media. The article argues that for the fashion industry, like many industries, the core product is a form of knowledge that is dependent on gaining and holding people's attention. To understand this attentional economy, social media offers a unique window because it is increasingly a central space within which fashion knowledge is created and shared. Using long-term, geotagged big data from Twitter, we analyze the hitherto difficult-to-explore spaces and places of the global fashion industry. The article suggests that the data confirm the ideas that there are a series of global fashion capitals that are especially important to the industry and that attention paid to fashion is highly uneven and varied across industry functions, national origins, and companies. Evidence is presented that attention to fashion is a global phenomenon that does not always directly link to where fashion products are sold. Attention to fashion is both a market-making mechanism for the industry as well as an indicator of wider social and cultural processes of tastemaking and identity formation within which fashion is entwined. The article concludes by suggesting that such data offer geographers new ways of looking at and linking economic, social, and cultural spaces and geographies and that social media analysis can help bridge boundaries that divide geographers. *Key Words: attention economy, big data, economic geography, fashion industry, social media.*

在本文中，我们使用大数据方法来分析社交媒体对时尚行业的关注。作者认为，时尚行业和其他许多行业一样，核心产品就是某种形式上吸引人们的注意力的知识。社交媒体提供了一个独特的窗口，帮助我们理解这种注意力经济，因为它正逐步发展成为创建和共享时尚知识的中心空间。我们采用来自 Twitter 带有标签的长期大数据，分析了全球时尚行业迄今为止从未探索过的空间和领域。本文认为，这些数据证明了为什么会有对时尚业起主导力量的全球时尚之都。还阐述了这样一个现象：该行业各职能领域、不同国家和公司中，人们对时尚关注的高度不平衡和差异。有证据表明，对时尚的关注是一种全球现象，与时尚产品的销售地并没有直接联系。对时尚的关注既是该行业占据市场的关键环节，在广义上也是一个重要方向标，体现了将时尚元素融合到社会和文化品味之中的身份形成过程。本文得出的结论是，这些数据为地理学家提供了分析经济、社会、文化空间和地理学之间联系的新方法。此外，分析社交媒体还可以帮助解决地理学家之间的分歧。*关键词：注意力经济，大数据，经济地理学，时尚行业，社交媒体。*

En este artículo usamos métodos de big data para analizar la atención prestada a la industria de la moda en los medios sociales. En el artículo se arguye que, para el caso de la industria de la moda, como ocurre en otras industrias, el producto central es una forma de conocimiento que depende de ganar la atención de la gente, y de conservarla. Para entender esta economía atencional, los medios sociales son un ventanal único, ya que es ahí donde los medios crecientemente funcionan como un espacio central dentro del cual se crea y se comparte el conocimiento de la moda. Usando big data georreferenciados de Twitter, analizamos a largo plazo los espacios y lugares de la industria de la moda, hasta ahora difíciles de explorar. El artículo sugiere que los datos confirman las ideas de que hay una serie de capitales globales de la moda que tienen especial importancia para la industria, y que la atención que se dispensa a la moda es muy desigual y variada a través de las funciones de la industria, orígenes nacionales y compañías. Se presenta evidencia de que la atención a la moda es un fenómeno global, no siempre enlazado directamente con los lugares donde sus productos son vendidos. La atención que se presta a la moda es tanto un mecanismo que crea mercado para la industria como un indicador de procesos culturales y sociales más amplios de construcción de gusto y formación de identidad dentro de los cuales se entrama la moda. El artículo concluye sugiriendo que tales datos ofrecen a los geógrafos nuevos modos de mirar la vinculación de geografías y espacios económicos, sociales y culturales, y que el análisis de los medios sociales puede ayudar a tender puentes entre las fronteras que dividen los geógrafos. *Palabras clave: big data, economía de la atención, geografía económica, industria de la moda, medios sociales.*

Annals of the American Association of Geographers, 110(4) 2020, pp. 941–966
Initial submission, April 2018; revised submissions, October and March 2019; final acceptance, March 2019
Color versions of one or more figures in the article can be found online at www.tandfonline.com/raag

This article analyzes the spaces and networks of the global fashion industry through one of its most fundamental inputs, attention to fashion knowledge, trends, fads, and brands. Using a novel indicator of the manifestation of fashion attention—mentions in social media—we offer a case study of how big data can be successfully leveraged to map parts of an important global industry that hitherto has been extremely difficult, if not impossible, to study. Although the moods of fashion are dynamic and changeable, this does not mean that global networks of fashion attention are also dynamic and changeable. Fashion actors and firms are involved in trying to build stable geographies of attention, using the constant change in fashion designs and fads as a means to maintain the attention of followers. Paralleling patterns of fashion production and retailing found in other studies, our analysis shows a global, but uneven, geography of attention varying across industry function, national origin, and company. A particularly innovative part of this approach is the ability to highlight networks of attention between places and how these vary by brand and origin. As such, we do not simply offer a case study but propose a new strategy for future research within economic geography using big data sources and methods. Not only can this focus on the geographies of attention help counter the long-standing productionist and supply-side bias in economic geography but it also allows researchers to understand how these processes differentially extend across space, connecting certain cities and sublocations of cities and bypassing others. Beyond fashion, this approach is relevant for analyzing other sectors of the economy where consumer sentiment and interest are crucial factors in product uptake and the global value networks that serve consumption.

Fashion, Knowledge, and Economies of Attention

The fashion industry is composed of a varied set of actors with extremely different outputs (e.g., clothing, accessories, cosmetics), and as an industry it has evolved tremendously over the last century from its origins as a highly localized craft-based industry (McRobbie 1998; Aspers 2001). Globally, it is one of the largest and oldest export industries (Gereffi 1999). Research on the fashion industry in geography has provided critical insights into the global chains characterizing garment production (Scott 2006; Weller 2007), geographies of fashion branding (Power and Hauge 2008; Pike 2009; Jansson and Power 2010; Tokatli 2013), geographies of fashion retail and consumption (Crewe and Beaverstock 1998; Crewe 2000; Gilbert 2000), and the role of agglomeration in fashion (Scott 1996; Barrera 2002; Rantisi 2002, 2004a, 2004b; Segre Reinach 2006; Currid 2007; Hauge 2007; Hauge, Malmberg, and Power 2009). Today, fashion industries differ across many dimensions, including production (small-scale craft production to large-volume, high-technology methods), aesthetics (avant garde to traditional classic styles), pricing (extreme premium or luxury pricing to low-cost fast fashion), organization (fiercely independent firms to deeply integrated, large transnational corporations), and retail (big-box chain retailers to small-scale individual stores). What unites all of these different types of actors and activities is that they are engaged in selling fashion. The fashion industry, and all of its related subsectors and crossovers, is built on what Weller (2007) called "fashion knowledge"; this knowledge involves a particular geography but not necessarily the same geography as the industry's locational geography of production and retail.

Fashion Knowledge as a Key Industry Input

Although the market for fashion is typically based on material artifacts, like shirts and skirts, fashion itself is a form of knowledge that is highly subjective and volatile: Everyone has his or her own perspective on what is fashionable or desirable in fashion products; wear and tear, combined with our changing tastes, means that fashion ideas tend to have short life spans. These aspects of fashion mean that the fashion industry is one in which "the transmission and translation of different forms of knowledge across space and time are increasingly important" (Weller 2007, 39). The production of fashion knowledge is, at least partly, dependent on a global industrial network that creates, disseminates, and attempts to negotiate with consumers what is fashionable. This negotiation process is a difficult and fraught one, because fashion knowledge's value is in the eye of the beholder and is highly contested and changeable (Power and Hauge 2008), meaning that unlike many markets, there is a considerable degree of co-construction and the involvement of actors and spaces that are not only industrial or firm based. As Karpick (2010, referred to in Hutter 2011) suggested,

to understand fashion and the artifacts it rests on, we must shift emphasis from neoclassical notions of "decision, which is based on logic and calculation, to judgment, which is a qualitative choice, combining value and knowledge" (41). Judgment integrates a plurality of criteria, it is "an art of doing, a practice" (43). For products or parts of the economy that are difficult or impossible to compare or find substitutes for and for which quality is uncertain and subjective, we need to investigate how judgments are made and the regimes, spaces, and contexts within which judgment is formed (Power 2010).

Fashion knowledge is often tied to some form of brand, reputation, or a recognizable aesthetic that can be leveraged to sell a wide variety of products. Indeed, for many companies in the contemporary global fashion industry, clothing is not their only product. For several decades, it has been conventional for fashion firms to sell clothing as well as footwear, accessories, cosmetics, and perfumes. Increasingly, fashion companies are further diversifying into areas such as interiors, real estate, hotels, and more. This diversity of products is based on fashion firms' abilities to attract consumers to the signs, symbols, and aesthetics they create. To this end, fashion firms spend large amounts of time and money on advertising and other marketing efforts such as sponsorship and activities such as fashion shows. For example, LVMH (LVMH Moët Hennessy Louis Vuitton SE), the luxury goods conglomerate that owns many of the world's most visible fashion brands, spent over €4.2 billion on advertising in 2016. Although the largest share of fashion's advertising spending currently goes to print and TV advertising, digital channels and social media are rapidly increasing their share of fashion's advertising budget.

The establishment of fashion knowledge is never simply a supply-side-driven matter of marketing: It is not simply an act of expert knowledge transmitted and received by a passive public. As Bancroft (2012) suggested, "Fashion is, perhaps, primarily concerned with innovation in the surface decoration of the body, and the wider social and cultural responses to this innovation. It would follow, then, that it is the wearer, and the act of wearing, that are in fact central to fashion" (2). Fashion knowledge, then, is at least equally a bottom-up or street-up process where the formation and shaping of fashion knowledge occur in spaces and arenas outside the control of firms and commerce. Creativity is a raw material in these processes that also requires critics to evaluate and judge and executives and media to scout for, promote, and distribute fashion ideas. In short, fashion is a negotiated form of knowledge, and those who achieve outsized power in this negotiation—the superstar designers as well as the gate-keeping executives and the media channels where fashion knowledge is assembled and channeled—are able to profit tremendously. The fashion industry is not simply about selling clothing or design but the ability to capture and monetize "fashion knowledge." Moreover, unlike some types of knowledge protected by patents and copyrights, fashion knowledge needs to gather attention to provide the means for profit.

Producing Fashion Knowledge by Curating Attention

The reliance on fashion knowledge and the sheer scale of fashion products available makes attracting attention a key process in the fashion industry. Attracting and selling attention has long been central to the efforts of many businesses (Wu 2017), but for cultural businesses and activities, garnering attention can be considered paramount to the creation of value. After all, it is only when people see, recognize, and engage with cultural products—in other words, when they access fashion knowledge—that demand is generated; otherwise, cultural products can easily remain hidden and markets unopened. People's attention, however, is a limited resource. This scarcity means that attracting, creating, and processing attention is not simply a cultural or social process; it is a central and inherent part of the cultural economy. As a result, cultural producers (and fashion industry actors more specifically) compete intensely in the attention economy to curate awareness for their particular aesthetic or brand to maintain existing and open new markets.

Fashion firms, even the largest and most widely known, cannot be certain of sufficient local or domestic demand and increasingly attention curation operates at the global scale. The world, however, is a big and uneven place, and it is difficult for even the largest firms to fully understand and track existing patterns of attention, let alone judge where receptive publics, near and far, are available and evaluate their efforts (e.g., marketing) to enter new markets. Nor can even the largest firms marshal the resources, talents, and channels needed to interact with culture or consumers. The attention economy is not a simple interaction between the supply and

demand sides. It is one where third parties provide and control crucial spaces of interaction, dissemination, and negotiation. Indeed, Wu (2017) argued that these third parties, what he called "attention merchants," are at the center of a longer term industrialization and monetization of human attention. In particular, multiple forms of media—print, broadcast, events, cultural institutions, cultural and subcultural forums, and social—are spaces where attention practices and devices come to being to "dissipate the opacity of the market" (Karpick 2010, 44). Importantly, this landscape is characterized by a multiplicity of actors and processes at work and multiple directions of innovation as well as dissemination.

Nowhere is this truer than in social media, where, despite the existence of several dominant platform providers, there is a very diverse set of actors and processes at work on fashion knowledge. For cultural producers in the attention economy, the digital realm—particularly social media channels such as Twitter or Instagram—offers multiple and intensely competitive spaces in which attempts can be made to create, curate, and track attention. As Imran Amed (founder and CEO of the Web site Business of Fashion) noted, both fashion companies and fashion curators "live in the attention economy. You have a limited amount of time in the day, you have a limited real estate on someone's phone. So that's the way I think about it: there is no single competitor" (Lewis 2018). For consumers, social media spaces are increasingly the means by which they learn about and share new culture and where new ideas, trends, and products are first experienced, launched, and managed. This makes it imperative for researchers to track the iterations of attention on social media to gain insight into the numerous, far-off, and often surprising places that particular fashion knowledge grabs people's attention. Earlier efforts to track attention (Crewe and Lowe 1995) were confounded by the scale and scope at which these geographies operated. New big data sources such as social media, however, make it possible to study attention at the global level and map a globalizing network of fashion knowledge production and distribution in ways that were simply impossible previously.

Social Media and the Spaces and Networks of Attention

Given the novel nature of social media data used in this case study, it is important to review the nature and practices of social media in general terms and the role that social media have specifically for the attention economy. Although the technology and content of social media share similarities across platforms—Twitter, Instagram, and Facebook all allow users to share combinations of text, images, and video—the evolution of practices and foci of each service are influenced by company policies and user preferences. In short, each form of social media develops particular cultures and norms that differ between and within platforms, making it challenging to definitively interpret the meaning of a social medium (Crampton et al. 2013). For example, does a social media posting mean approval, disapproval, ironic sarcasm, lifestyle aspiration, straightforward consumption, a façade hiding the reality of everyday life, or aspects of all of these things? Disentangling the multiple meanings of a single social media post is difficult and becomes even more problematic as the numbers scale up. Therefore, in this article we do not interpret meaning beyond the observation that social media postings represent attention, positive, negative, or neutral, at a particular point in space and time. Although seemingly ignoring possible richer interpretations—there are many studies that code meaning or sentiment either qualitatively or algorithmically (Kouloumpis, Wilson, and Moore 2011)—the simplicity of this basic understanding allows us to track fashion attention with less concern about misinterpretation of the data.

Using this definition of what social media indicates, we aggregate and normalize individual postings to map the locations of spaces of attention to fashion. This is akin to many studies within economic geography that measure the amount of economic activity—ranging from extraction (tons of coal mined) to production (millions of cars assembled) to knowledge (number of patents filed)—to identify and differentiate locations central to particular industries. The primary difference here is that within spaces of attention we are measuring digital utterances and virtual actions rather than physical products or activities. In short, rather than geographies of industrial districts, we are looking at the geographies of attentional districts. This use of a novel metric allows us to analyze previously unknowable patterns and highlight the largest concentrations of attention to fashion. Therefore, we would expect our maps to prominently feature the well-known fashion capitals of Milan, Paris, London, or New York; after all, as Weller (2007) noted, "the transmission of fashion

ideas consolidates rather than diminishes the power of key sites of expert knowledge" (39). Whereas a superficial reading might see these maps as merely showing what is already known, this analysis is a crucial check in this case study. Precisely because social media constitute an imperfect measure, a key first goal of this project is confirming that the patterns we find are indeed what we would expect. If these patterns withstand basic sanity checks, we can then have higher confidence in the validity of unexpected patterns.

In addition to the geography of the spaces of attention, it is also important to understand how these locations are interconnected. In other words, how is attention to fashion originating in a particular location (e.g., a fashion capital such as Paris) distributed globally? These networks of attention represent the flows of fashion knowledge and like any network can jump and skip over space rather than operate under the distance decay constraints characterizing the production and distribution of physical goods. Although fashion knowledge can be embedded in physicality—pieces of clothing or objects—social media, with an emphasis on the visual, works particularly well as a distribution infrastructure for the attention economy.

An additional useful aspect of using social media to track networks of attention is the ability to use indicators of communication power—number of followers, number of likes or reposts, and so on—to gauge the relative importance of connections. It is important to recognize that not all postings on social media are equal, because users themselves are a very diverse group of people and avatars, groups, or corporate identities. For example, some Twitter accounts have a very high number of followers; the legendary Parisian fashion store Colette had more than a half-million followers, which meant that a single tweet by them had an enormous impact. It is not simply a question of numbers, however, because postings from trusted sources or tastemakers with few followers can have important effects, including the forwarding (retweeting in Twitter parlance) of their messages. Thus, accounting for this follower effect can also provide important insights, albeit in this case primarily on the networks of fashion knowledge.

Although we are only using a basic reading of social media posts (i.e., a tweet as a sign of attention at that point in space and time), we are still able to powerfully map the spaces and networks of attention within the fashion industry. Although the apparel and fashion industries have been studied extensively, previous work has largely focused on supply-side and production questions; studies of geographies of consumption have remained relatively sparse. Moreover, what is commonly "known" bears rechecking for validity and new patterns and thus we argue that this approach offers a novel and extremely important avenue for new research on these topics.

Using Social Media to Study the Attentional Economy

To analyze the geographies of attention associated with the global fashion industry, we use data derived from the social media platform Twitter.[1] Just as one might measure electrical consumption to gauge the size of the aluminum industry or count shipping containers to measure trade, mentions of fashion on social media are an indicator of the attentional dimension of the fashion industry. Although an unconventional data source within economic geography, the interactions between consumers and the fashion industry on social media offer insight to a key input in this sector that has been extremely difficult, if not impossible, to gain otherwise. Moreover, it builds on a decade-long expansion of related crowd-sourced data sources for geographical research, most prominently within GIScience with its use of volunteered geographical information (Goodchild 2007).

The Relevance of Twitter to Fashion Research

As one of the most widely used social media platforms, Twitter is primarily about publicizing and publishing opinion and information, which provides researchers an opportunity to gauge the world's attention across a wide range of topics. Tweets are short and quick to formulate and get online, meaning that they are ideal for airing all sorts of information and opinion quickly and widely. Furthermore, because Twitter is predominantly a text-based medium (in contrast to image-focused Instagram), its content is searchable, making it a useful and global metric of attention. Twitter (and social media more generally), however, is not without its drawbacks. First, Twitter is not a representative sample (as compared to the U.S. Census's Annual Survey of Manufactures), which means that the spaces and networks of attention highlighted in this article

reflect a part of, but not all of, the attentional activity around the fashion industry. Rather, Twitter data can be an indicator of connections and awareness—exceedingly difficult metrics to operationalize, despite their importance to the fashion industry—and lack of this indicator in a particular location does not necessarily mean complete disconnection from the industry.

A related issue of particular importance for global studies is that social media practices differ between countries. Perhaps most visible in the case of China where the state blocks most Western social media services, this also extends to national preferences rooted in culture, custom, or history. For example, Twitter is quite popular (and sees high use rates) in Brazil and Indonesia, especially relative to countries such as Germany (Poorthuis and Zook 2017). Thus, although Twitter is used globally and is the site for active discussions of and attention to fashion, other social media platforms could also be used to similar effect. These alternative sources, such as Instagram or Facebook, come with their own strengths, weaknesses, and biases; therefore, it is essential that we are cautious in our research questions, analysis, and interpretations of the results.

Building a List of Fashion Icons

The data for this article are drawn from a corpus of all geotagged tweets sent from July 2012 to August 2016 as archived by the DOLLY database at the University of Kentucky (Poorthuis and Zook 2017). Approximately 2 to 3 percent of all tweets are reliably geotagged, yielding an initial data set of approximately 12 billion tweets. Although quantitatively substantial, this clearly is only a partial record of the universe of social media postings and the attention to and knowledge of cultural producers, including the fashion industry.

Collecting, processing, and analyzing the data for this project begins with generating a set of search terms that represent the global fashion industry (see Figure 1). We chose to use a prominent and respected independent fashion Web site specializing in the industrial and business side of the global fashion industry called Business of Fashion (BoF). BoF is well known within the industry and represents the most globally comprehensive data source on the myriad of ever-evolving players within the industry. In 2013, BoF launched its first annual list of 500 individuals it considered the most important to the fashion industry (Smith 2013). "The BoF 500 is a professional index of the people shaping the global fashion industry, based on hundreds of

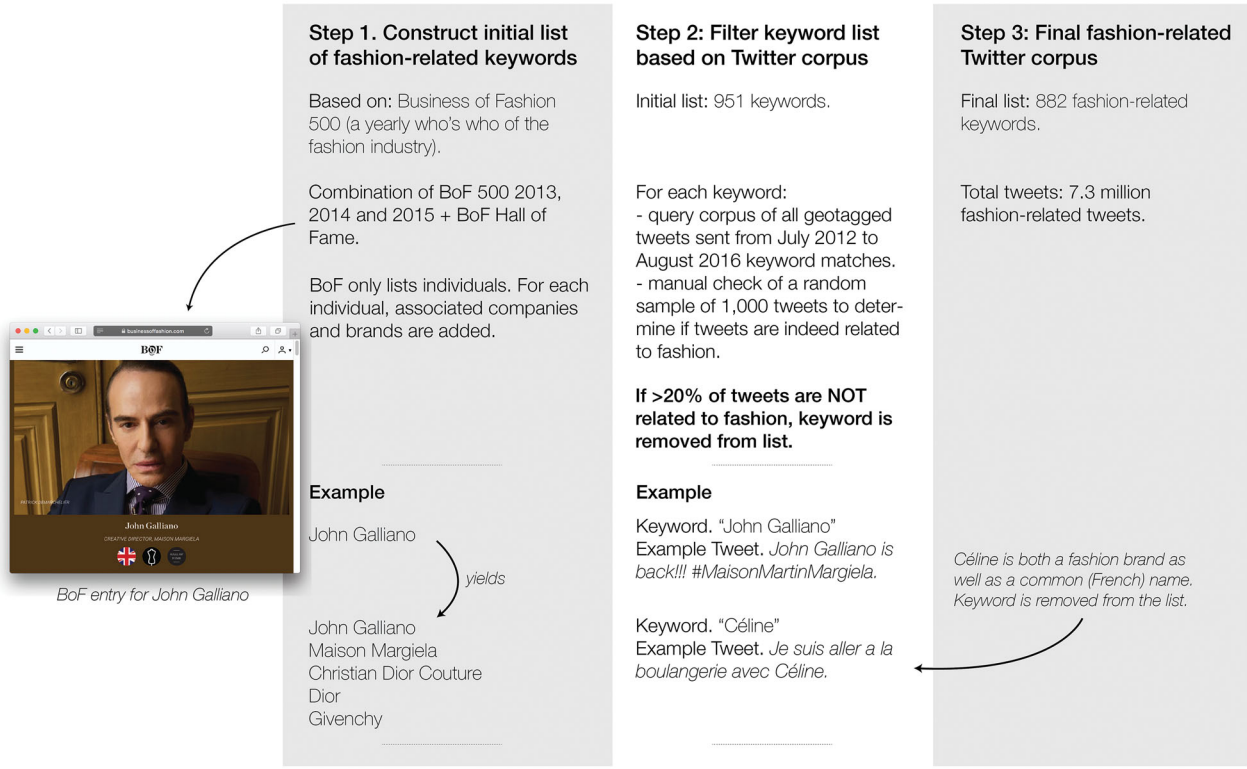

Figure 1. Overview of the keyword search procedure. BoF = Business of Fashion.

nominations received from current members of the BoF 500, data analysis and months of research to unearth names from all corners of the globe" (BoF 2015).

In addition to its ambition to give a comprehensive picture of fashion's key actors, it is unusual in that its focus went beyond designers and included a range of other actors important in the fashion industry: from investment company directors to runway makeup artists. Moreover, it lists individuals outside the core garment industries such as those in fashion media or technological design. This allows us to compare subsectors of the fashion industry such as the creative talent, management and control, and marketing and media. We also value BoF's industry insider definition based on tacit knowledge and norms, as what can be considered fashion or merely clothing is a slippery issue.

We first extracted all the names from the BoF 500 for the years 2013, 2014, and 2015, and the Business of Fashion Hall of Fame. The lists build on individuals' names and we considered this focus on individuals (rather than firms or brands) a more robust way of getting at the fashion business, which uses multiple and fast-changing labels and firm monikers as well as a confusing and constantly changing ecology of multiple brands, lines, and labels. The focus on individuals is also an approach that lends itself to the ways in which fashion is discussed on Twitter. It must be noted that an individual name does not guarantee that it is the individual tweeting. It is common practice that many names in fashion employ others to manage and create tweets, just as Twitter has been rife with automated processes (e.g., advertising bots). Although these types of activities complicate the nature of authorship, we argue that these kinds of hybrid activity, what Rose (2017) named "posthuman agency," are important parts of social media strategies in the industry and geography of attention, and cleaning the data of such tweets would weaken rather than strengthen our analysis.

For each individual, we generated keyword search terms that included their names but also encompassed the principal firm and brand names they worked with; for example, the designer John Galliano's name was included, as were search terms for the associated brands Maison Margiela, Christian Dior Couture, Dior, and Givenchy. We chose to include primary affiliations in our analysis but filtered out affiliations that were not predominantly fashion oriented, such as investment funds that had very diverse portfolios or retailers that were not widely identified with fashion as their key area. This filtering was carried out by the authors based on their long-standing knowledge of the fashion industry and ensured that the lists of keywords—an initial 951 terms—reflected the full breadth of the activity of each fashion actor listed by the BoF.

These keywords formed the initial query of the DOLLY database returning all tweets containing a text string matching a keyword controlling for differences in spelling and character difference that might be used in one language but not others. The entire result set was then reviewed independently by each of the authors to identify search terms that were either overly restricted and needing wildcard truncation (these were generally personal names) or that returned search results not related to fashion. To aid in this evaluation we manually checked a random sample of tweets for keywords identified as potentially problematic and excluded those in which more than 20 percent of tweets were not related to fashion. This meant that some names or brands that are very important in the industry were impossible to control for in tweets; for example, *Elle* magazine is impossible to distinguish from the use of the French word *elle*; equally, the fashion house Chloe and Parisian fashionista store Colette are very common names; and terms such as Iman, Zara, or Coach had to be excluded, because they are common in tweets unrelated to fashion. This resulted in a final set of 882 fashion keywords representing individuals, firms, and brands (see Table 1) also coded by their country of origin and industry subsector.

Table 1. Initial and final set of keywords by country

	Initial set of keywords		Final set of keywords	
Nationality	No.	%	No.	%
U.S.	220	23	198	22
UK	150	16	136	15
France	111	12	104	12
Italy	102	11	97	11
China	49	5	43	5
India	30	3	30	3
Japan	30	3	26	3
Australia	26	3	24	3
Brazil	24	3	24	3
Germany	23	2	23	3
Canada	19	2	19	2
Russia	16	2	16	2
Belgium	11	1	9	1
Sweden	10	1	9	1
Spain	9	1	9	1
Other	121	13	115	13
Total	951		882	

Aggregating, Analyzing, and Visualizing Tweets

Queried against the full 12 billion geotagged tweets in the DOLLY database, these keywords produced a final data set of attention to the global fashion industry containing 7.3 million individual tweets. Each record included the location from which the tweet was sent and the total number of followers receiving it, allowing us to analyze the locations of attention to the fashion industry as well as the potential ability to share this attention with others.

In the analysis, we chose to aggregate data from all periods: The search terms are yearly and Twitter data are timed to the minute. Although this might be critiqued as missing the dynamic and seasonal nature of fashion as well as the real-time features of social media, it also reflects that efforts to build attention are ongoing rather than one-time events. It is important to note that the fashion industry and its key figures and leaders are relatively stable, anointed through "cyclical" (Power and Jansson 2008) events like media exposure and fashion weeks. Entwistle and Rocamora (2006) suggested that events and media interactions in fashion are aimed at reproducing and materializing the fashion field: They are involved in attempting to convert attentional and social capital to economic capital. Morever, because the primary purpose of the article is to address questions about the fashion industry's global geography, we made a choice to create a more static and easily read picture of the industry by combining data over the entire period and amalgamating all of the search terms and data points over the period. The fashion industry does indeed change rapidly, and there are many drop-in and drop-out names in our search terms. Nonetheless, the majority of search terms appear year after year and the highest volume search terms appear in all years. This is perhaps unsurprising given that fashion is a large global industry with high barriers to entry and large investment cycles, meaning that entry to the global level takes time; once there, people and firms tend to stay at the top (at least for a number of years). This is reflected in the number of household names and large capital firms and brand names that occur each year and dominate the overall Twitter traffic studied.

The large number of data observations makes analysis and visualization difficult, and this article uses hexagonal binning—aggregating individual tweets to a grid of scale-dependent polygons—allowing for efficient data aggregation and analysis. The hexagonal bins do not use national or other official boundaries, reflecting that social media use (and the fashion industry itself) does not entirely respect borders but rather represents a constantly evolving process as the industry and social media users interact with and move through different cultures, topics, and places. At the global scale, we choose a hexagon size of 250 by 250 km, whereas at the city scale we use hexagons of 2.5 by 2.5 km. Although this size is somewhat arbitrary,[2] the sizes we have chosen strike a balance between detail and legibility of the final analysis and maps. Once a grid of hexagonal cells is created, we count the number of tweets that have been sent from within the borders of each hexagon. To ensure that the attention we measured was societal rather than just by a single individual, we excluded any hexagons from our analysis with fewer than ten tweets about fashion. Although the hexagon binning makes the final patterns more legible, it does not completely remove all oddities in the resulting data, and "peaks" in attention happen in unexpected places, sometimes caused by a handful of very active users or a temporary industry event. Because these are, in a way, also representative of the attention to fashion, we have chosen not to filter out such outliers.

Once aggregated to hexagonal bins, the data set can be filtered by keyword, industry subsector, or country of origin for analysis. The two primary metrics for attention we use are *counts* or the absolute number of tweets in a particular bin, and the odds ratio, a measure of the intensity of attention to fashion within Twitter relative to other topics:

$$\frac{p_i/p}{r_i/r},$$

where p_i is the number of tweets related to fashion in hexagon i, p is the total tweets related to fashion in all hexagons, r_i is the number of tweets related to other topics in hexagon i, and r is the total number of tweets related to other topics in all hexagons. For the latter, we use a random sample of 400,000 tweets sent during the same time period.

Counts are useful to measure the volume of attention, and all things being equal we would expect fashion capitals and urban areas with large numbers of Twitter users interested in fashion to score highly on this metric. The odds ratio helps control for

size—in a similar manner as a location quotient—and locations with higher scores contain much more attention to fashion than would be expected given their overall volume of tweets[3] (Poorthuis et al. 2016). Combined with selective filters on the 7.3 million tweets within the data set, this will provide unique insight into the spaces and networks of attention within the fashion industry.

Spaces of Attention within the Fashion Industry

Fashion as an industry attracts enormous interest in social media as individual users discuss opinions and tastes in style, design, and clothing. This section reviews the geography of attention to fashion and demonstrates that it is very uneven, certain key countries and places are where fashion generates large volumes of social media attention, and certain places disproportionately produce information flows relating to fashion.[4]

The first step in the analysis is reflected in Figure 2, which shows the number of tweets per bin for the overall metric of attention to fashion (all 7.3 million tweets). A key finding is that the four global "fashion capitals" (cf. Breward and Gilbert 2006)—London, Milan, New York, and Paris—all exhibit a high level of attention in terms of absolute counts. Given the novel nature of these data, this is an important check, because it shows that this methodology can produce results consistent with widely held assumptions. Figure 2 is also consistent in showing that large urban areas with smaller fashion reputations but with large Twitter populations—Los Angeles, Dallas, Rio de Janerio, Sao Paolo, Moscow, and Djakarta—also score well in terms of counts. There is a lot of attention to fashion in these locations, but given their overall Twitter activity, this is to be expected.

One of the advantages of hexagonal binning from point data is that it is relatively simple to shift scales by changing the size of the bins. As shown in Figure 3, the spaces of fashion attention are also observable at the urban scale,[5] in the heavy concentration of attention within both the fashion districts of the fashion capitals and also in cities not known for fashion. For example, Cape Town, Minneapolis, and Warsaw have much sparser and more scattered attention to fashion within their Twitter space. Again, these findings show that Twitter data correspond to expected real-world patterns even with shifting scales.

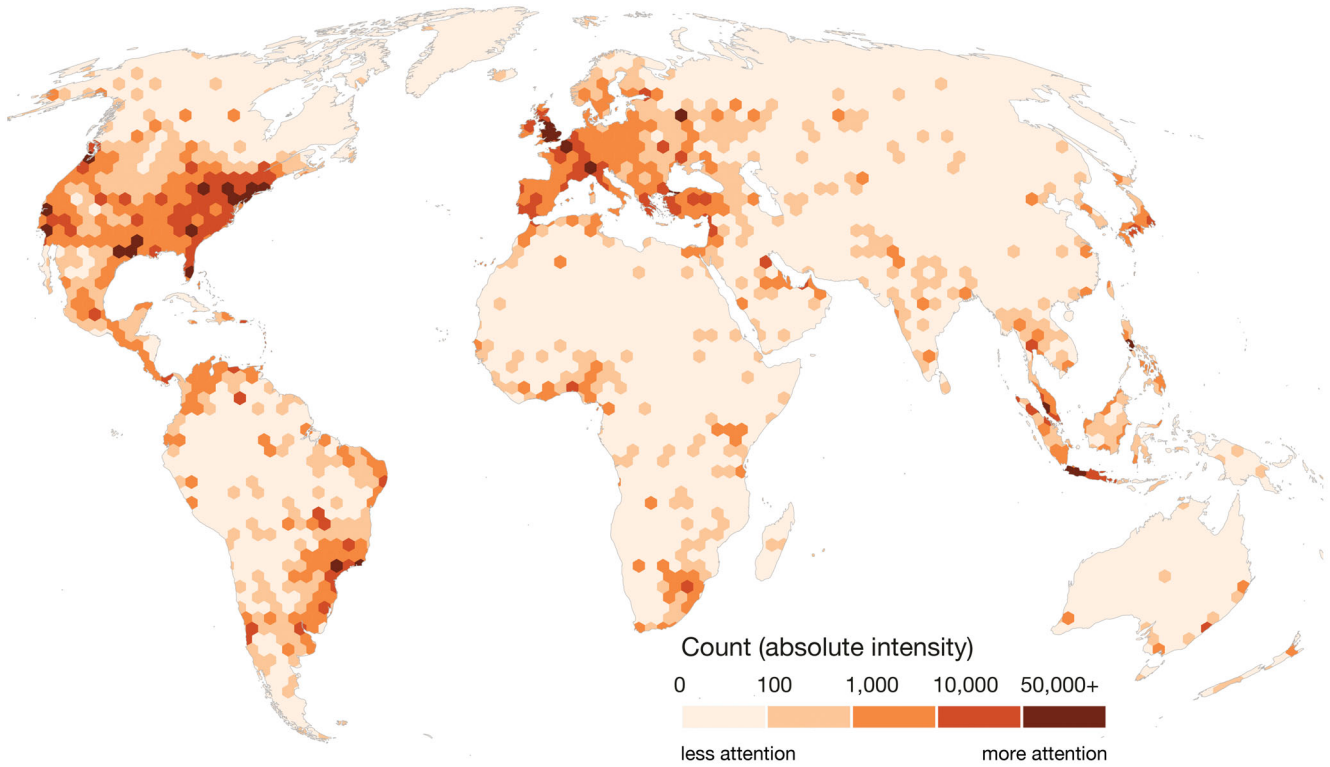

Figure 2. Total attention to fashion (absolute counts for all keywords).

Figure 3. Total attention in selected urban locations (absolute counts and odds ratio).

Absolute counts, however, privilege locations with large populations of Twitter users and activity. To obtain more nuanced understandings of the spaces of attention to fashion, we use odds ratios to measure the intensity of attention to fashion relative to other topics on Twitter. In Figure 4, one can see the continued importance of the four fashion capitals (also evidenced in the city-scale maps in Figure 3), all exhibiting odds ratios greater than two, meaning that attention to fashion in these locations is large not only in absolute terms (see Figures 1 and 3) but also relatively. By this measure there are also new spaces of attention such as clusters within western and southern Africa as well as the Indian subcontinent. Although these regions have relatively lower volumes of Twitter activity (making it possible for a small number of fashion-related tweets to produce a high odds ratio), we control for this in two ways. First, each bin must have tweets from at least ten Twitter users; second, these maps only use the lower bound of the 95 percent confidence interval (Poorthuis et al. 2016).

These concentrations of relative attention to fashion are particularly interesting as they occur in lower per capita income locations, particularly when compared to the patterns shown in Figure 1. This relatively high frequency of fashion terms reflects differences in focus, perhaps due to a more elite and wealthier user base or an aspirational element of attention. Unfortunately, the limits of this method prevent a clear resolution of this question, although filtering across subsectors of the fashion industry provides some additional insight. For example, the three maps of Figure 5 compare the odds ratios of attention to BoF-defined categories of *creatives* (the designers and other creative roles), *business* (executives, retailers, associated companies, etc.), and *marketing* (the models, muses, and media channels most important to fashion). This filtering allows us to examine different slices of the fashion industry and review how attention compares to expected patterns.

For example, given that the marketing category represents the models and media and is more public facing, we would expect it to be more widely dispersed as attention to the faces, bodies, and brands used to advertise fashion is of more general interest. In contrast, we would expect attention to the core set of creative designers to be likely confined to a smaller group of users and places such as those directly associated with the fashion industry and capitals. Likewise, we would anticipate that attention to the business aspects of fashion would be more

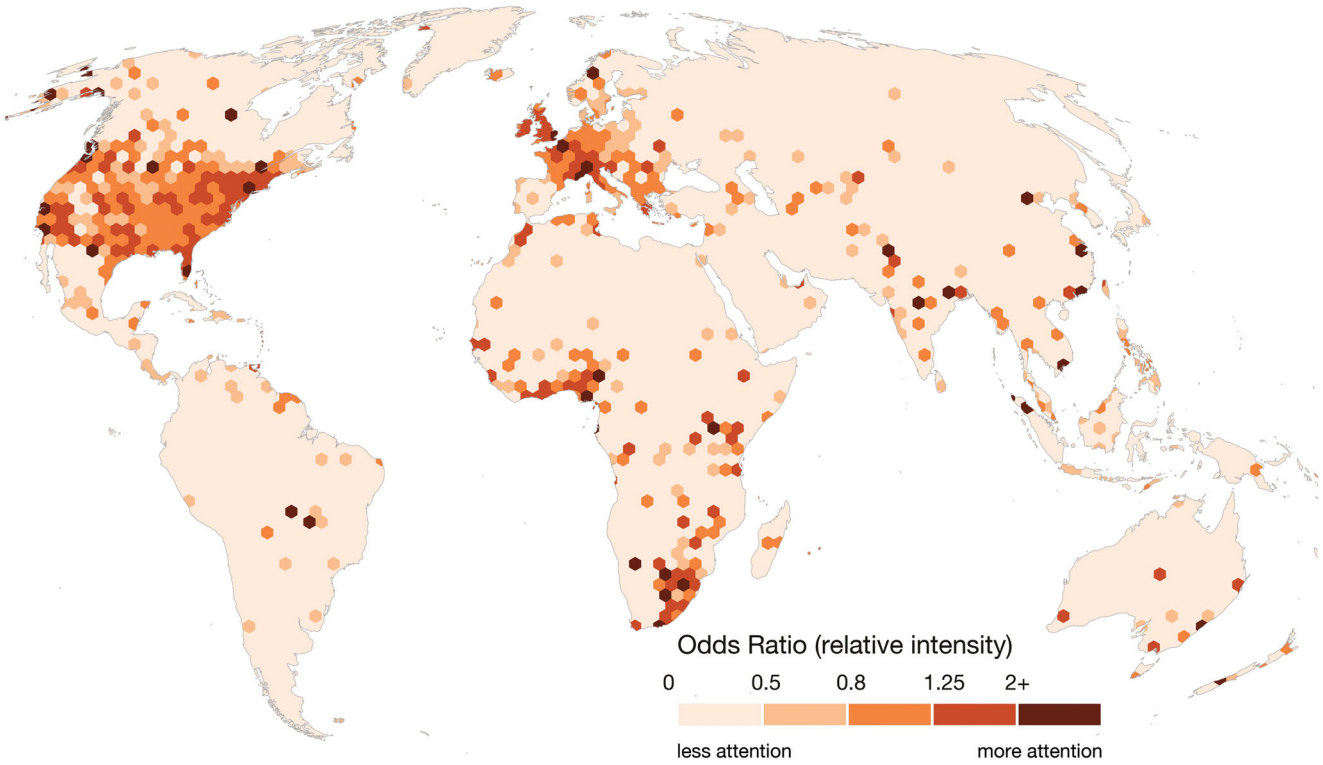

Figure 4. Total attention (odds ratio).

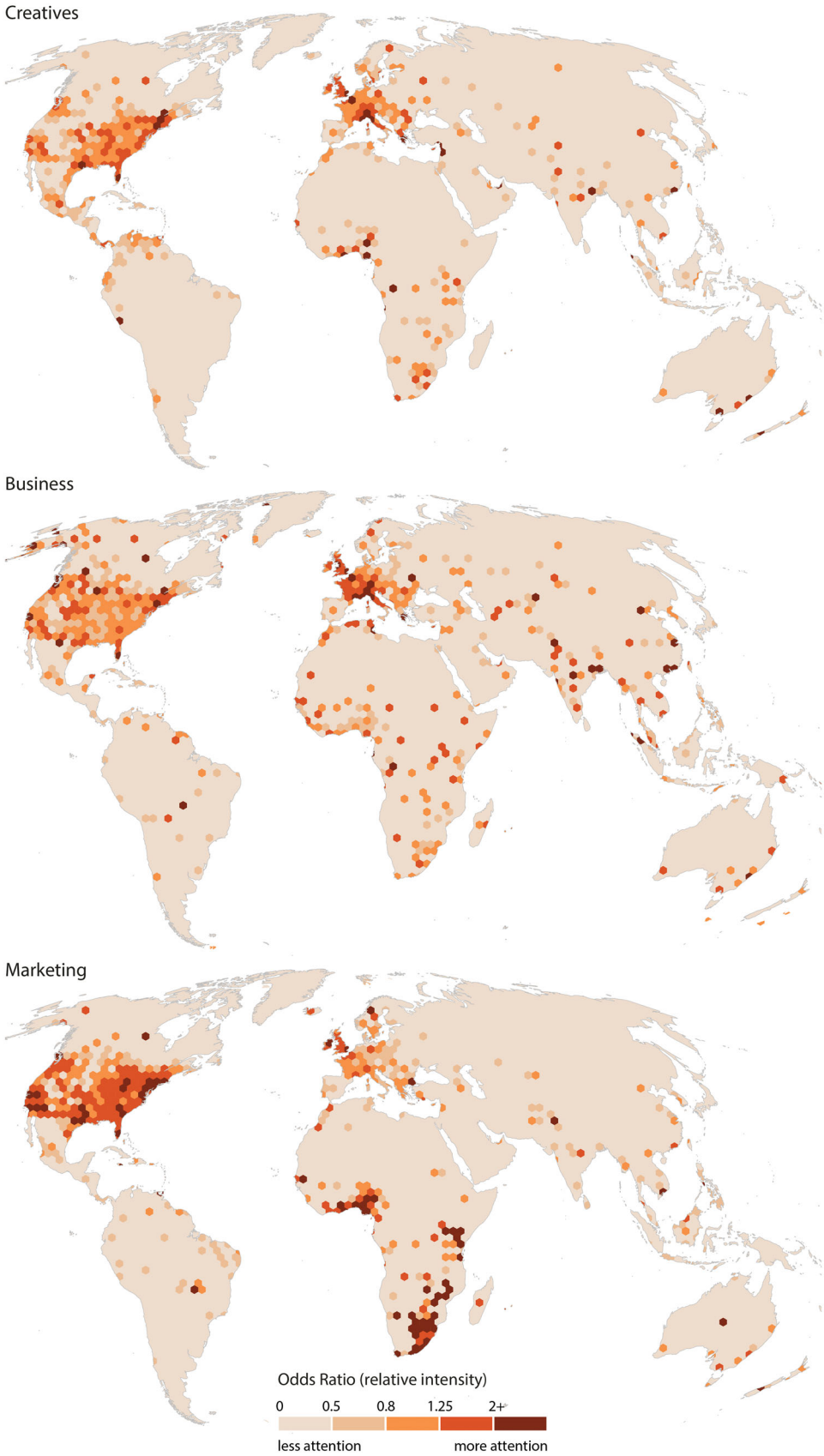

Figure 5. Total attention to "creatives," "business," and "marketing" subsectors of the fashion industry (odds ratio).

spatially constrained to nodes within the industry, although perhaps including production and distribution sites beyond the fashion capitals. The maps in Figure 5 largely conform to these expectations, with attention to creatives limited to the fashion capitals, which are also key locations for attention to keywords associated with the business aspects of fashion. The latter category, however, also has a number of other clusters with high odds ratio in the Indian subcontinent, the coast of China, and the western coast of the United States and Canada. These clusters indicate relatively stronger attention to fashion business figures, perhaps because these are locations for production (India and China) or technological design, such as Silicon Valley.

The differences in attention to marketing aspects of the fashion industry differ even more than the patterns found for total attention. The marketing group includes many of the most prominent outward-oriented fashion faces, such as models and muses, as well as celebrities strongly associated with fashion. The fashion capitals remain, albeit with lower odds ratio scores in general, and new clusters emerge in larger metropolitan regions within North America (Atlanta, Chicago, Houston, Dallas, San Francisco, Los Angeles) and sub-Saharan Africa (Lagos, Accra, Nairobi, Johannesburg, Cape Town). The intensity of attention that the outward faces of fashion attract in sub-Saharan Africa alerts us to the far-flung penetration of fashion knowledge and ideas, as well as the role of aspirational attention. This indicates that fashion knowledge and attention do not simply follow from the production and retail footprints that the industry leaves. Far from a set of uniform patterns, Figure 5 illustrates that attention within the fashion industry can differ considerably between subsectors.

A final useful metric for reviewing differences in attention to fashion is the Shannon diversity index,[6] which is normally applied to studies of ecosystems to evaluate biodiversity (Morris et al. 2014). Applying the same formula to the Twitter data, we can judge the relative diversity in attention to fashion (see Figure 6). This differs from absolute counts (focused on size) and odds ratio (focused on relative attention) and measures the diversity in the fashion terms appearing within each location. Places with a higher, diverse number of fashion keywords appearing within Twitter (e.g., much of western Europe) score high by this metric, whereas areas with a small number of terms (e.g., the vast majority of the United States and Africa) have low diversity scores. We do not wish to push the fashion diversity metaphor too far,

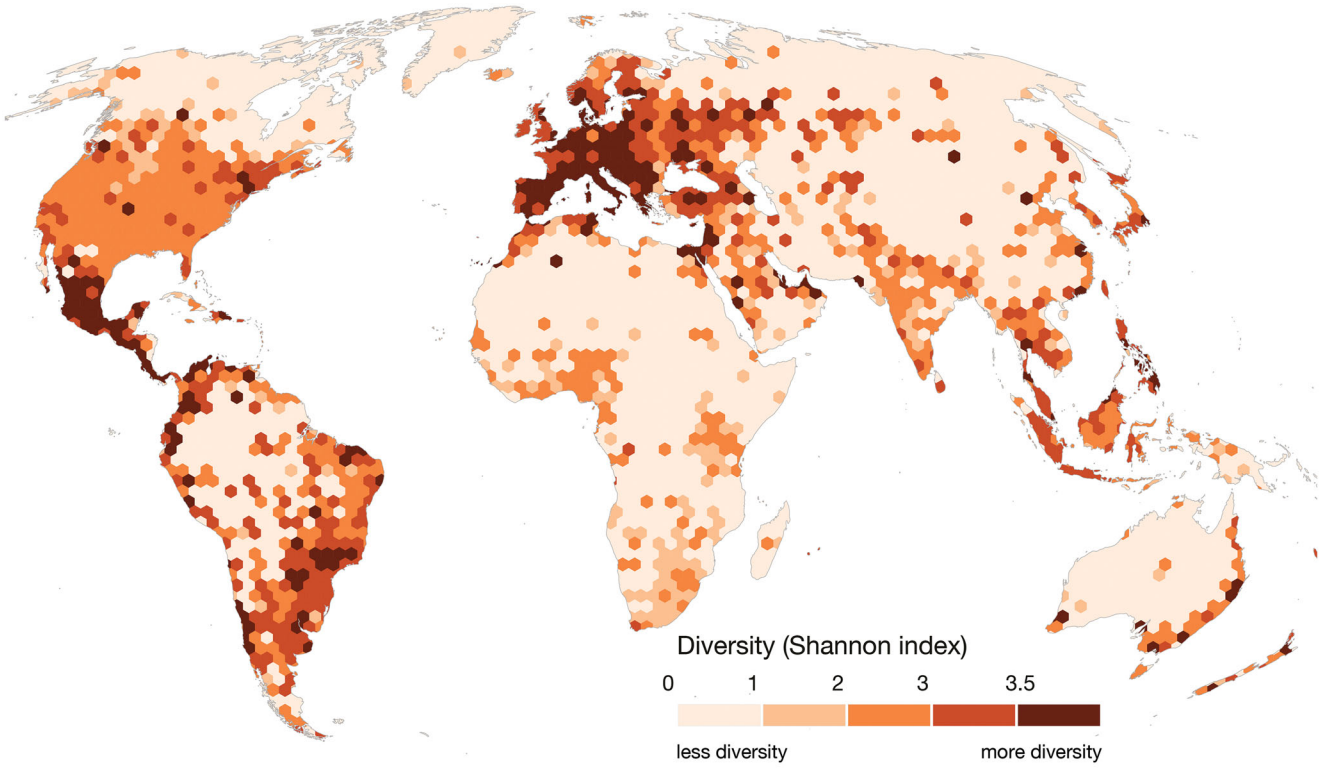

Figure 6. Shannon diversity index of fashion attention.

but Figure 6 demonstrates even within regions with high volumes of fashion attention, this attention is constructed in very different ways. Most notable, western Europe attends to a wide range of brands and trends, whereas the United States has much fewer, likely tied to the power of a few dominant brands run by large companies that have successfully cornered the market on fashion attention.

Networks of Attention and Fashion Knowledge Distribution

Attention to fashion is concentrated in certain places, but it also attracts widespread attention globally, and this project also seeks to understand how attention is networked across spaces. This shift from stocks to flows of attention helps illuminate how fashion knowledge moves across the globe, popularizing ideas and brands from a particular place, such as one of the fashion capitals (Weller 2007), in distant and often unexpected locations. Social media is both an important channel and indicator of this process, and this section uses a variety of approaches—number of followers and specific examples of attention paid to national fashion industries as well as specific companies—to highlight the diversity of the networks of attention.

One of the potentially most useful tools for studying networks is metrics on the relative importance or strength of connections often defined as frequency or volume. In the case of social media, a possible indicator is the number of followers or friends that receive any particular posting. Although our Twitter data do include the number of followers for each user at the time a tweet is sent, the DOLLY database does not include additional information about these followers (e.g., location or demographics). This is due to the collection constraints of the archive. To query and gather information of this sort would increase the processing and storage needs exponentially, in addition to creating a number of tricky analytical problems. Therefore, we can only map the number of followers based on the location from which a tweet was sent. This is similar to Figures 2 and 4, but rather than using the number of tweets, we sum the number of followers for each tweet. For example, if User A sent a tweet to 200 followers and User B sent a tweet to 3,000 followers, Figure 2 would count this as two tweets and Figure 7 would count this as 3,200 followers. Thus, locations with Twitter users with large numbers of followers would receive higher scores, because they represent the locales exporting fashion knowledge. Such places could be considered especially important as influencers propagating fashion knowledge and aspiration beyond their locale.

The resulting visualization of absolute counts (Figure 7A) is similar to the regular tweet density map (Figure 2) in that the fashion capitals are sources of tweets received by many followers. This, however, also extends quite broadly within the North American and western European regions in which most of the more densely populated areas—the Eastern seaboard in the United States, the European industrial core, and so on—emerge as key locations. This extends to other continents, including high scores for population centers within South America, sub-Saharan Africa, southwestern Asia, and the non-Chinese areas of East and Southeast Asia.

Shifting to an odds ratio analysis of followers, we see a decidedly different pattern, with clusters emerging in Africa, India, Canada, and East Asia. These locations are places where users tweeting about fashion have relatively much higher numbers of followers than other local users. This means that the volume of attention to fashion being produced in these places is considerably larger than attention to other topics within Twitter. Although our data do not allow us to determine why this is the case, one might view these users as acting in the role of influencers within the region but also as important points for people from around the world to "look into" far-off places. The combination of intense discussion and the fact that users in these places attract many followers might indicate that these places are centers for influential consumers, or as Porter (1990) might put it, "sophisticated consumers." People engaged in fashion discussion on social media in such hotspots attract attention well beyond their local region and, due to their larger number of followers, are likely to be particularly important knowledge creators, curators, or transmitters.

Given the challenges in interpreting data on followers, a second way of evaluating networks of attention is examining the distribution of mentions for specific nationally defined parts of the global industry. For example, where are people discussing French or Italian or Indonesian fashion? By limiting the database to these country-defined categories—similar to looking at attention to creative, business,

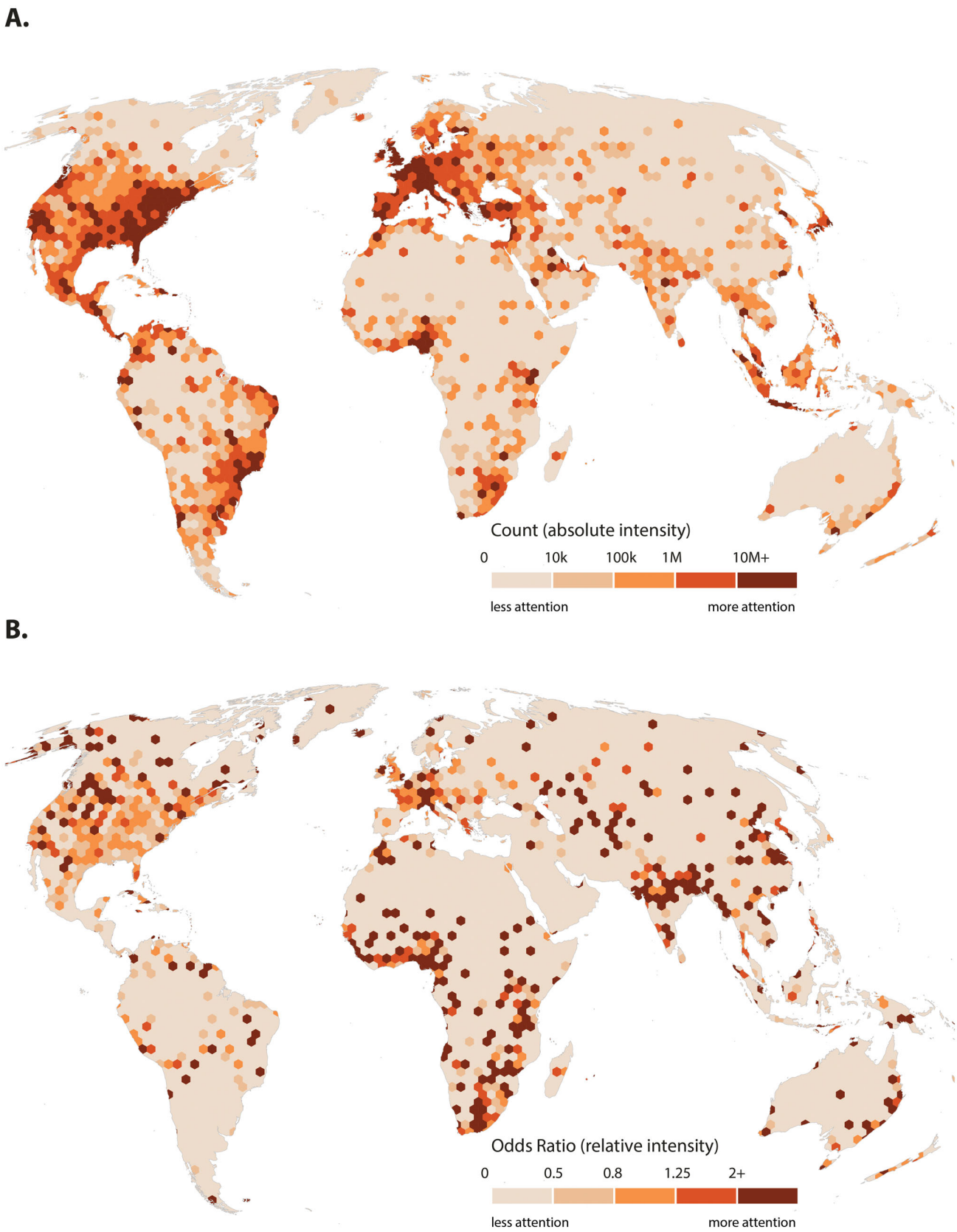

Figure 7. Total attention by number of followers. (A) Absolute counts for all keywords and (B) odds ratios for all keywords.

or marketing subsectors—we can compare and contrast how the embedded fashion agglomerations of countries connect to the rest of the world. Granted, the nature of the fashion industry transcends national borders, but policymakers and academics persist in the use of country categories in reviewing the fortunes of the industry.

Networks of Attention to Italian Fashion

There are more than sixty countries represented within the BoF data set, and rather than review this entire set, we present a single case study of Italian fashion, one of the countries deeply embedded in the global industry. Figure 8 illustrates the counts and odds ratio for the approximately 100 BoF-derived keywords for Italian fashion and, as expected, shows global attention. The search terms include a wide range of people and types and sizes of business, including large firms and household names such as Gucci, Versace, and Prada and less well-known designers like Barbara Nicoli or Francesca Bellettini. Overall, the top ten search terms account for well over half of Italian fashion's global Twitter traffic.

Italian fashion attracts attention in the entire eastern half and west coast of the United States and Canada, western Europe, Turkey and the eastern Mediterranean, the urban areas of the Gulf States, and many locations within East and Southeast Asia, as well as Australia. In short, attention to the Italian fashion industry is both widespread and large. Perhaps unsurprising given the premium price points for much of the fashion exported by Italy, attention is concentrated in higher income urban areas.

Shifting to odds ratios, however, provides a different understanding of these networks of attention. The high volumes in much of western Europe drop off when normalized by total amount of Twitter activity, although a localized pattern of relatively intense attention remains centered around Milan, the center of the Italian fashion industry. In the United States, the high volumes likewise do not stand up to normalization, with much of this region exhibiting less attention relative to other things. In contrast, some places—west and southern Africa, northern India, and others—are characterized by relatively more intense interest. Thus, these locations represent a particularly specialized knowledge within its Twitter user base, namely, an interest in Italian fashion.

These strong networks of attention, connecting Italy with places on the Indian subcontinent and western and southern Africa, might suggest that the Italian fashion industry has large markets in such places, but export and company sales figures do not back this up. Therefore, a more likely interpretation of these attention clusters is that certain national fashion industries have managed to create and disseminate a pantheon of symbolic markers associated with Western luxury and aspirations that have global audiences and warrant discussion in social media regardless of whether the products themselves are being sold. In other words, the consumption of the symbolic dimensions of fashion has spread far further than the consumption of fashion products themselves with globalization and new media.

Similar analysis of social media attention for other countries reveals that attention to some national industries is predominantly domestic, whereas others generate regional or even international attention, but this approach is hindered by its generality. Although useful categories for thinking about the fashion industry from policy perspectives, the national scale masks considerable difference between firms within the industry, combining both exclusive boutique venues and larger fashion houses. The resulting findings are thus relatively unsatisfying, because the reasons for a particular pattern of attention clustering are difficult to pin down.

For this reason, we take a more specific approach in studying the networks of attention via studies of three specific companies based in Italy, France, and the United States.[7] Although the specific contours of a geography are unique to each firm, these companies illustrate larger patterns common to many other enterprises from those countries. We selected the three case studies based on prominence both in terms of name recognition and in the volume of activity on Twitter: Each company received 100,000 or more hits within our final database. This provides us with robust visualizations as well as ready access to understanding larger firm strategies influencing the networks of attention shown here.

Gucci: Building Attention in the United States

Founded in 1921 in Florence as a local, family-run firm focused on leather goods and luggage, Gucci is now a global fashion brand with a wide product range and is part of the large French luxury

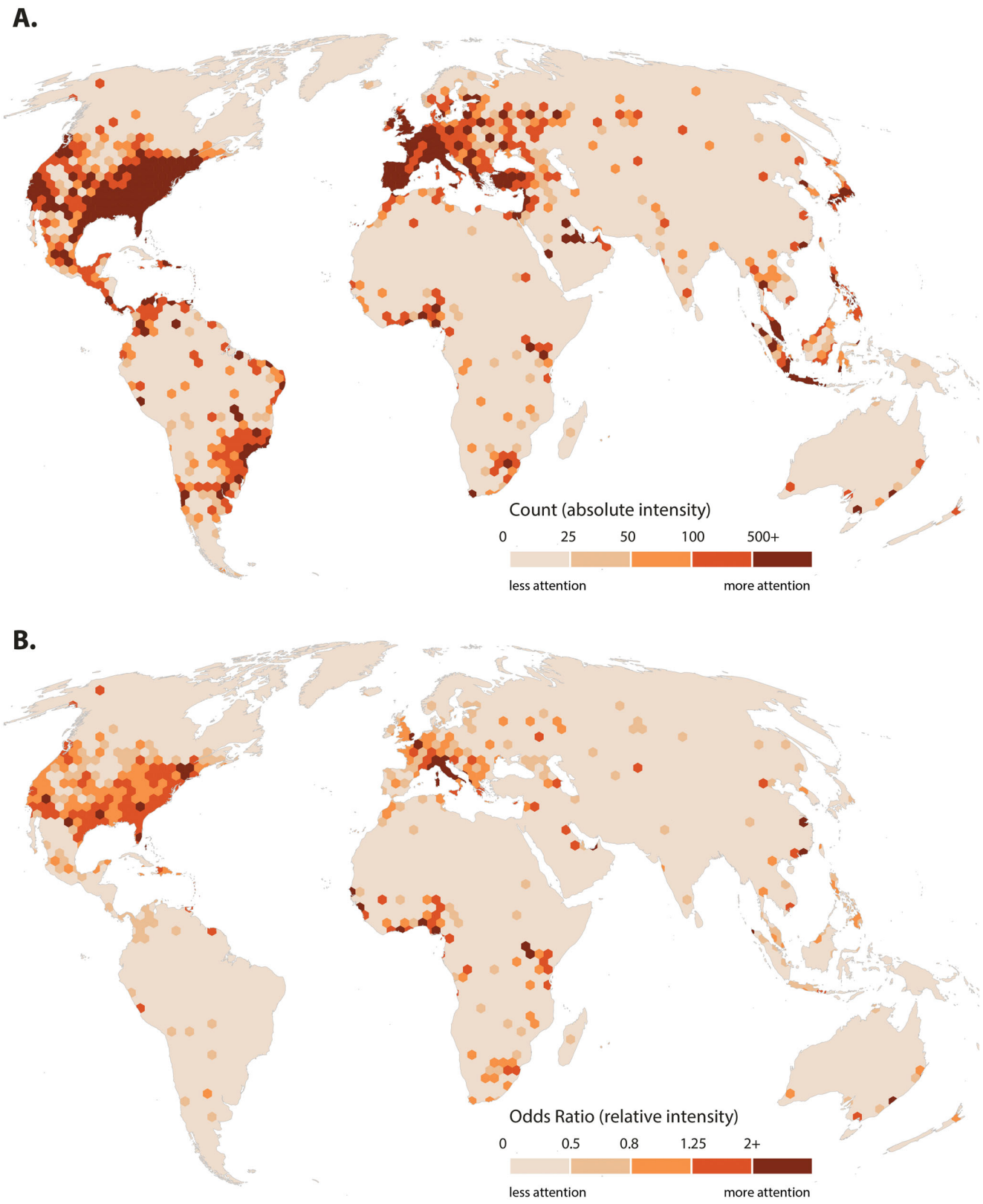

Figure 8. Total attention to Italian fashion. (A) Absolute counts for all keywords and (B) odds ratios for all keywords.

goods conglomerate Kering. After recovering from near bankruptcy in the mid-1980s (Forden 2000; Giannini 2011; Tokatli 2013), the company has become a globally recognized brand synonymous with luxury and decadent high fashion.

As highlighted in Figure 9, attention to Gucci has a very specific set of networks and geography. Although it attracts global attention, Gucci garnered scant interest in Africa, most areas of the Asia-Pacific region, and South America. It exhibits a wide geographic spread of attention in the United States, where it has a strong social media presence, however, in terms of both absolute counts and odds ratios.

It is important to note that Gucci has over a long period commanded a large global advertising budget and strategically works with the geographies of attention, so these patterns are reflective of marketing efforts rather than simply being organic or bottom up. Although, like most fashion brands, most of their advertising spending is still on print media, a growing proportion is on social media. Spending on social media is not merely about the placement of advertisements but also involves various tactics to influence (or hire) "influencers." Especially when we analyze the actions of highly followed tweeters (often referred to as influencers within the industry), it is likely that the motivations behind their postings are at least partly commercial and that their messages might be equivalent to paid advertising and rather less an indicator of attention organically attracted. In addition, we must be aware that both tweeters and followers can be automated or constructed avatars provided to create the impression of attention. Nonetheless, such social media traffic, whether paid for or organic, still creates attention and has particular geographies: in this case, one very skewed toward connecting social media discussions of Gucci to the United States. This active Twitter attention is further amplified by a large set of passive Twitter followers: The global Twitter hashtag @Gucci as of June 2017 had 4.47 million followers (Statista 2018).

This pattern ties into to the argument made by Tokatli (2013) that the company has strategically focused on the United States and in particular leveraged images of and symbolic links to Los Angeles as a way of creating a new identity that is more global and less traditionally Italian in spirit. Tokatli suggests that Gucci's success with appropriating and broadcasting Los Angeles's place image—despite little locational presence in the region—underscores Gucci's once head designer Tom Ford's suggestion that "in fashion what counts is not 'what you actually are' but rather 'what you love and what you aspire to be'" (Tokatli 2013, 243). The social media and attentional geography of Gucci is distant to its geography of design and production (designed in Italy and made in a complex global supply chain) and does not reflect the global spread of its sales: North America accounts for only 21 percent of sales, despite accounting for the majority of its social media traffic (Kering 2018). There seems here as with the other case studies a disjuncture between relational geographies of association and attention and "real" geographies of product production and destination.

Louis Vuitton: A Global Network of Aspirational Consumption

Founded in 1854, Louis Vuitton is a French luxury goods company that is one of the world's most valuable, widely recognized, and widely copied luxury brands. Like Gucci, Louis Vuitton started out as a local, family-run producer of high-quality handcrafted luggage, but since then it has become a luxury price segment fashion company involved in a wide variety of fashion products. It has also evolved from a family-owned, one-label fashion house to become the centerpiece of the world's most valuable (by market capitalization) publicly traded luxury goods conglomerate, LVMH.

In 2016, LVMH global ad spending was €4.2 billion, so it is unsurprising that it attracts social media attention throughout the world. It is also perhaps unsurprising, given that it has its base and design heritage firmly rooted in France, that it is at home that Louis Vuitton attracts the most attention (Figure 10). Both in terms of volume of mentions and in terms of odds ratios, the firm has a high profile domestically. That the firm's home base—Paris—is a global fashion center indicates that we should not treat the strong attention garnered in Paris as merely a sign of strong domestic demand; it underlines the point made earlier that the geography of fashion attention strongly relies on central fashion hubs as attention hotspots and broadcast centers. Louis Vuitton attracts attention throughout Europe, but much of this attention is in areas relatively near

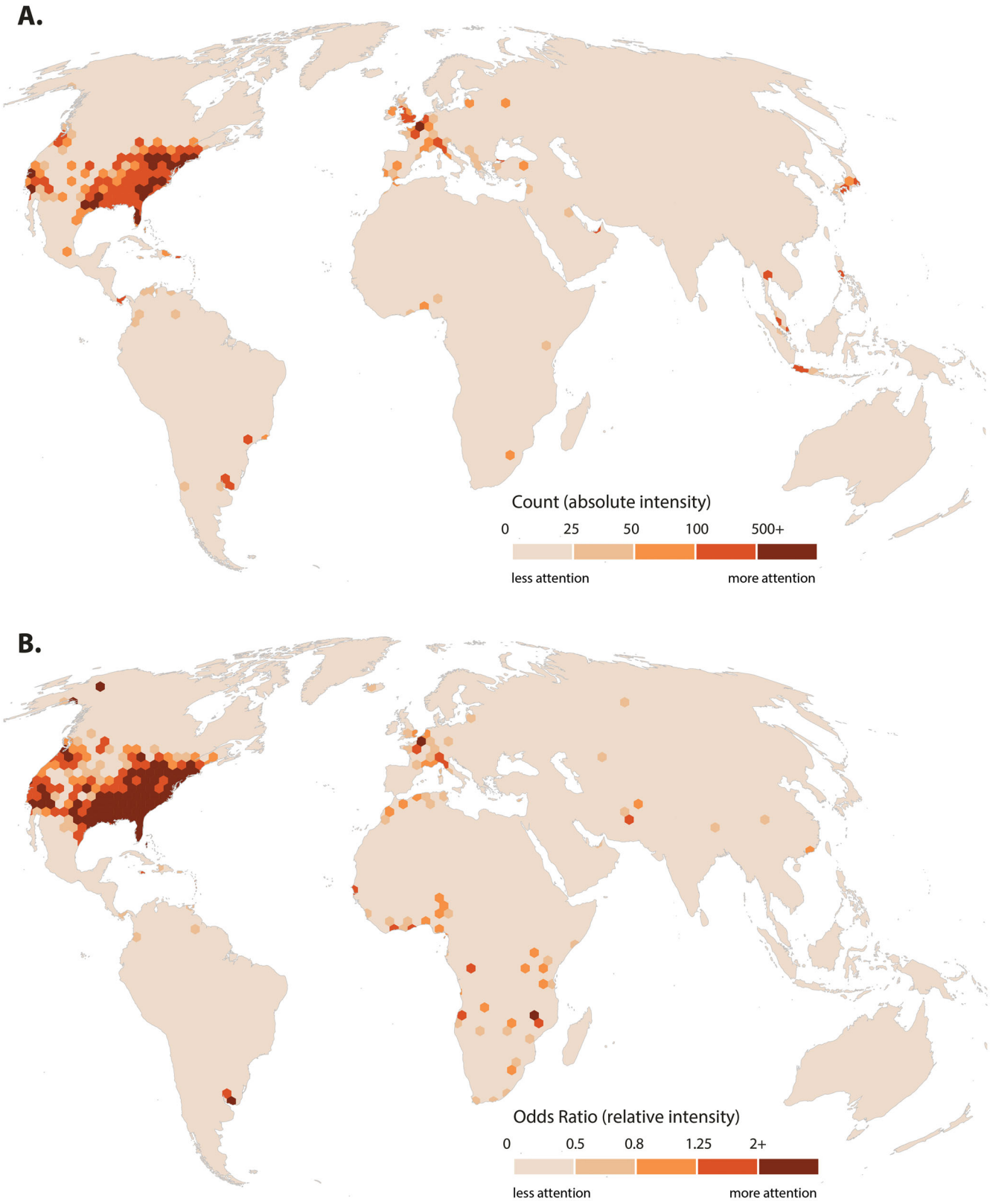

Figure 9. Total attention to Gucci. (A) Absolute counts for all keywords and (B) odds ratios for all keywords.

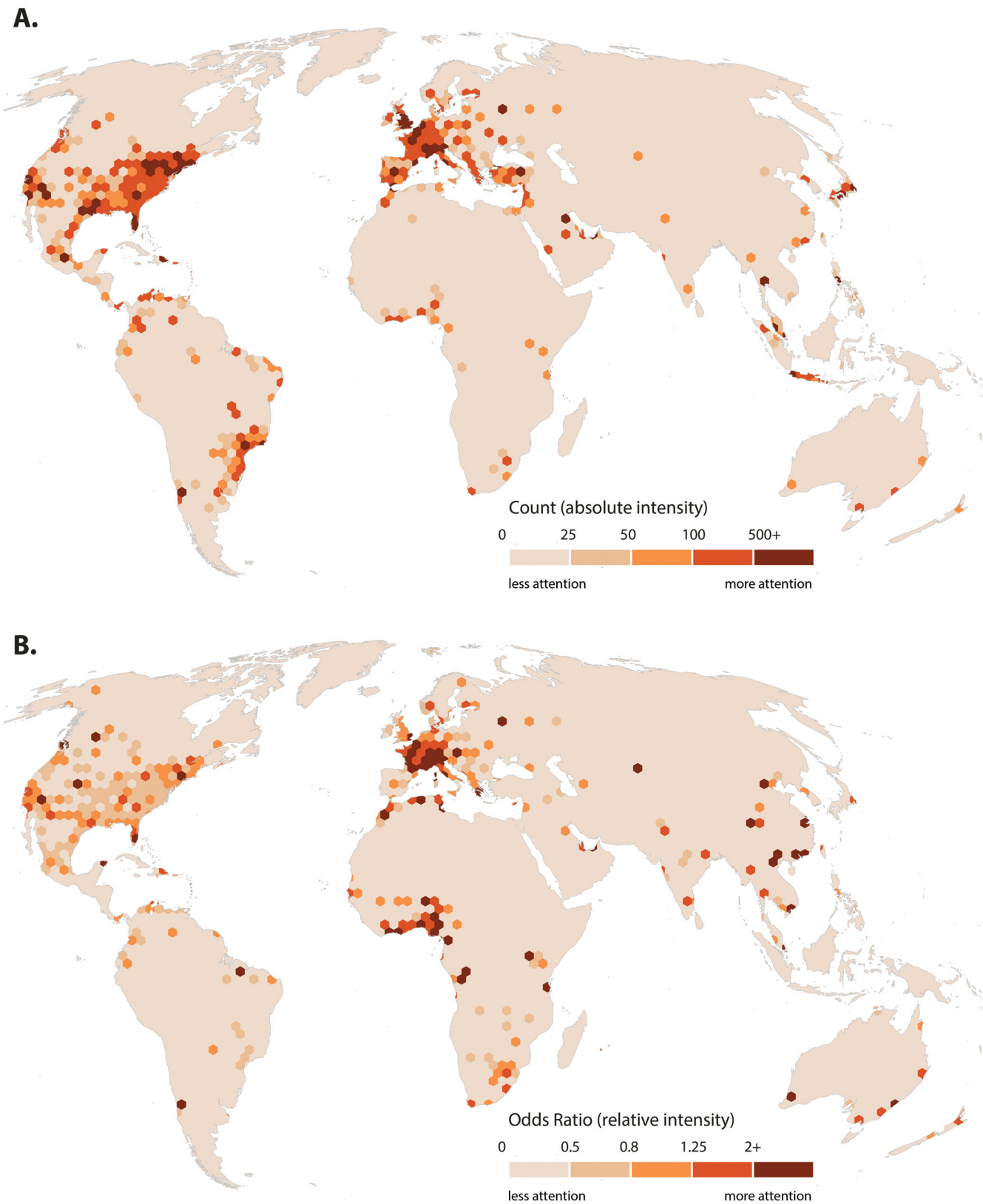

Figure 10. Total attention to Louis Vuitton. (A) Absolute counts for all keywords and (B) odds ratios for all keywords.

France, with the exception of disproportionately high levels of interest in Moscow.

Outside Europe, Louis Vuitton attracts attention across the United States, but measured by odds ratio it is mainly outside the traditional U.S. fashion centers that the firm generates its highest levels of attention. This pattern of active Twitter engagement is backed up by a large set of passive Twitter followers in the United States: As of June 2017, the Twitter hashtag @LouisVuitton_US had 6.32 million followers (Statista 2018). In Asia, both Singapore and Tokyo stand out as centers for the firm's social media mentions. What is perhaps most surprising given the firm's market is the disproportionate levels of attention it attracts in western Africa. The United States, Japan, and Singapore are all strong consumer markets for the company's products, but western Africa provides a scant local consumer demand. Attention to exclusive European fashion brands and imagery in relatively poor countries could indicate a potentially growing consumer base. We suggest, however, that it is more likely to underline how Western fashion brands are central to aspirational social media conversations in many places. Thus, although the actual material products that Louis Vuitton generates its revenue from might not be consumed that heavily in areas such as western Africa, the signs, symbols, and imaginaries it produces are heavily consumed in these places. The penetration and attention paid to such brands indicates how signs and symbols are crucial to aspirational life world building and underlines how certain brands are global and influence globalized aspiration discourses. This spread of attention is both global and uneven, and it is particular to the firm: A very different attentional geography was evident for Gucci.

Ralph Lauren: A Domestic Brand Moving Globally

With the final case study, we shift from Europe to the United States and examine Ralph Lauren's network of attention. Started with a line of men's ties in 1967 by Ralph Lauren, the Ralph Lauren Corporation is now a midcap, publicly listed fashion group directly employing 23,000 people with a product range that spans a variety of different categories—from sportswear to couture, from underwear to fragrances, from interiors to restaurants—sold using both the Ralph Lauren name and other brands.

For a brand that is so heavily connected to ideas of the United States and trades so heavily on various types of upscale Americana, it is no surprise perhaps that Ralph Lauren attracts widespread and strong attention in the United States. Djelic and Ainamo (1999) suggested that the sheer size and scope of the domestic U.S. market has traditionally led to less pressure on U.S. fashion brands to internationalize than for firms from "smaller" markets such as France or Italy. Moreover, they suggest that U.S. fashion firms such as Ralph Lauren have focused on a brand-driven growth strategy that has involved a deliberate decoupling of the brand from product. This implies that a strong and long-term focus on brand building and anchoring in the United States might be a central plank of the firm's branding and attention strategy. As can be seen in Figure 11, the eponymous firm and the designer attract attention in most areas of the United States but particularly in the eastern half of the country

Ralph Lauren is far from a domestic story, though, and the firm has been one of the first U.S. fashion houses to successfully internationalize. In Europe, Ralph Lauren's attentional geography is disproportionately strong in France, the United Kingdom, Sweden, and Norway. In most of South America, Asia, Africa, and Australia, the volume of Twitter activity related to Ralph Lauren is extremely low to nonexistent. Globally, this uneven, and at times relatively small, active engagement is supplemented by 2.1 million "passive" followers of the tag @RalphLauren (Statista 2018). In ways different from the two previous examples, Ralph Lauren has managed to spread its message and gather attention far beyond its place of origin and its main markets. Again, this example underlines luxury brands' abilities, and strategic work and spending, to penetrate discussions and attract the eyes of people around the globe; by using novel data such as social media data, we can understand these geographies in a way that the normal techniques applied to firm analysis cannot.

Conclusions

This article makes two key contributions: first, deepening our understanding of the geographies of attention within the global fashion industry and, second, presenting a potential new strategy for

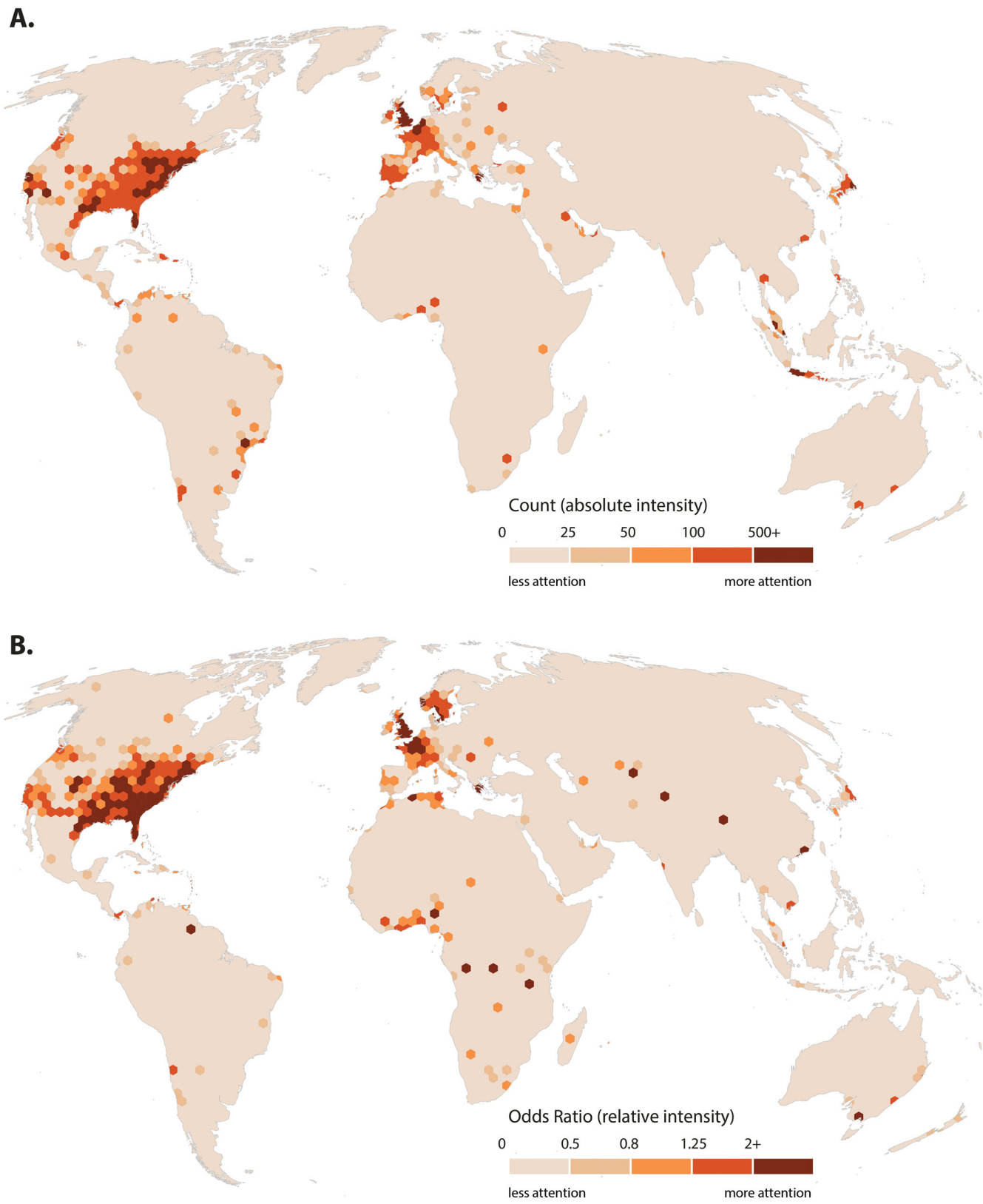

Figure 11. Total attention to Ralph Lauren. (A) Absolute counts for all keywords and (B) odds ratios for all keywords.

leveraging social media data to ask and answer research questions of interest to human geography.

Turning first to our specific findings on the geography of the global fashion industry, our data provide evidence for the key geographic patterns within the fashion industry that are often talked about but seldom evidentially proven. In particular, the data strongly support the widely held idea of four global fashion capitals (London, Milan, New York, Paris). In terms of volume of social media output, the diversity of attention paid, and the mix of industry-specific as well as consumer-oriented and consumer-side traffic, these four cities stand out from the rest of the world as especially important locales. Moreover, when analyzed with more nuance for industry sector and function, we see that geographies of attention vary greatly: The attentional geography for the business sides of fashion are very different than the marketing and consumer-oriented sides. Equally, geographies of attention vary widely across nationality and firm.

Such global analysis offers important documentation and insights into the networked dimensions of fashion knowledge and attention and how physically distant places and people are differentially connected. It is particularly noteworthy to show how regions such as sub-Saharan Africa, Indonesia, or India, which are generally both unrecognized by the fashion industry and are only very small markets, are nevertheless connected to the industry in terms of attention. These types of attention might correlate not to market size, consumption of products, or industry locations but to the ability of fashion to insert itself into and be appropriated into global as well as highly local aspirational and tastemaking discourses and world building.

These last points underline the notion that fashion itself is a highly contested form of knowledge subject to negotiation by actors both within the fashion system and many from far beyond what can be considered luxury fashion industry or consumer groups. The results underscore our argument that for industries such as those reliant on fashion knowledge, the attentional economy is of paramount importance. This echoes the arguments of the likes of Levitt (1960, 1980), who suggested that we should be careful to think that commodities exist and instead take seriously the idea that all products are differentiated and that the dynamics and geographies of differentiation are central to the economic fortunes and patterning we see around us.

Beyond the specific findings for the fashion industry, a second area of conclusions is tied to the data and methodology employed for this article. Although ideal for this industry study, we argue that tracking attention via social media represents a fruitful strategy for research within human geography and social science in general. This approach, however, must be integrated in long-standing research standards; that is, big data, like any data source, cannot speak for themselves. This article demonstrates this in multiple ways: Our data cleaning and refining relied on our situated knowledge of the fashion industry and, likewise, our interpretation of resulting patterns of Twitter data was based on our experience and reading of trends and strategies within the fashion industry. Such experience suggests to us that future research would greatly benefit from supplementary research using qualitative methods. More generally, the intertwining of big data analysis with qualitative study is desirable not only for better explanations of quantitative research, but it could also provide valuable foundations and directions for qualitative research. We feel, though, that it is important to stress and understand that there are a series of representational challenges to using specific social media platforms: In the case of Twitter, how representative is Twitter or a tweet? What does a tweet really represent? What is the longevity of these representations? We chose the most basic interpretation that tweets represented attention, but more nuanced categorization of social media—via sentiment analysis or qualitative coding—is also possible. Qualitative coding to more fully understand the utterances and conversations that unfold across space, and dynamically over time, via social media seems a particularly promising direction for further work (Jung and Moro 2014; Shelton, Poorthuis, and Zook 2015).

For human geographers, social media offer us windows into the attentional economy wherein new types of spaces and networks, cultural, symbolic, aesthetic, and economic values are cocreated and spread and offer us a mirror that partially reflects the sorts of discourses and conversations that happen around those values in specific places. Thus, we argue that social media analysis can be an important aid in helping us understand the diversity of spaces and actors involved in shaping the contemporary economy and contemporary aspirations, tastes, and cultures. Social media analysis offers geographers access to important contemporary spaces and networks where knowledge and value are cocreated and

spread. Moreover, all sorts of economic, social, political, and cultural attention and discourses come together and flow through social media spaces and networks. This allows us a unique vantage point from which we can view the complex relations, interrelations, and negotiations that bind, for instance, the cultural with the economic or the aesthetic with the commercial. Such spaces and data analysis can help us go beyond the analytic boundaries that divide geographers and present more nuanced and diverse pictures of the uneven geographic processes that surround us.

ORCID

Ate Poorthuis https://orcid.org/0000-0002-3808-7493
Dominic Power http://orcid.org/0000-0002-8341-0050
Matthew Zook https://orcid.org/0000-0002-6034-3262

Notes

1. This article uses Twitter data because it is a popular venue for discussion and attention to fashion and because the authors have access to a large corpus of tweets that enabled a broad, deep, and rigorous data query. Other social media platforms (e.g., Instagram or Facebook) could have been used instead in a similar manner, although the users' practices and customs would vary from those discussed here.
2. Different sizes might yield slightly different results. Because the size of the hexagons can be easily varied, future work could look at the specific impact of the modifiable areal unit problem on the analysis at hand.
3. An odds ratio of exactly 1 indicates that there are just as many fashion tweets as expected given the total number of tweets based on overall tweeting volume for an area. Likewise, a value greater than 1 means more fashion tweets than expected. Although there is no exact point at which an odds ratio becomes significant, in our analysis we highlight locations (particularly clusters) with odds ratios greater than 2, indicating that they have twice as many fashion tweets relative to the overall level of Twitter use.
4. We are limited in the number of maps we can include in this article, but visualizations of the full range of search terms used for this article are available in an interactive format at https://github.com/atepoorthuis/geography-of-fashion.
5. Although it would be possible to view any of the maps at the urban scale, the rest of this article focuses on the global level given space constraints.
6. The Shannon diversity index, often denoted as H, is calculated according to the following formula:

$$H = -\sum_{i=1}^{S} p_i \ln p_i,$$

where S is the total number of species (i.e., fashion brands/names) and p_i is the proportion of species i (i.e., fashion brand X) relative to all occurrences of species in that location.
7. The full range of maps for all keywords in the study is available at https://github.com/atepoorthuis/geography-of-fashion.

References

Aspers, P. 2001. *Markets in fashion*. Stockholm: City University Press.
Bancroft, A. 2012. *Fashion and psychoanalysis: Styling the self*. New York: I. B. Tauris.
Barrera, T. 2002. Enterprise clusters and industrial districts in Colombia's fashion sector. *European Planning Studies* 10 (5):541–63. doi: 10.1080/09654310220145323.
Breward, C., and D. Gilbert. 2006. *Fashion's world cities*. New York: Berg.
Business of Fashion. 2015. BoF 500: The people shaping the global fashion industry. Accessed August 29, 2018. https://www.businessoffashion.com/community/bof500/2015.
Crampton, J., M. Graham, A. Poorthuis, T. Shelton, M. Stephens, M. W. Wilson, and M. Zook. 2013. Beyond the geotag: Situating "big data" and leveraging the potential of the geoweb. *Cartography and Geographic Information Science* 40 (2):130–39. doi: 10.1080/15230406.2013.777137.
Crewe, L. 2000. Geographies of retailing and consumption. *Progress in Human Geography* 24 (2):275–90. doi: 10.1191/030913200670386318.
Crewe, L., and J. Beaverstock. 1998. Fashioning the city: Cultures of consumption in contemporary urban spaces. *Geoforum* 29 (3):287–308. doi: 10.1016/S0016-7185(98)00015-3.
Crewe, L., and M. Lowe. 1995. Gap on the map? Towards a geography of consumption and identity. *Environment and Planning A: Economy and Space* 27 (12):1877–98. doi: 10.1068/a271877.
Currid, E. 2007. *The Warhol economy: How fashion art and music drive New York City*. Princeton, NJ: Princeton University Press.
Djelic, M.-L., and A. Ainamo. 1999. The coevolution of new organizational forms in the fashion industry: A historical and comparative study of France, Italy, and the United States. *Organization Science* 10 (5):622–37. doi: 10.1287/orsc.10.5.622.
Entwistle, J., and A. Rocamora. 2006. The field of fashion materialized: A study of London Fashion Week. *Sociology* 40 (4):735–51. doi: 10.1177/0038038506065158.
Forden, S. 2000. *The house of Gucci: A sensational story of murder, madness, glamour, and greed*. New York: Morrow.
Gereffi, G. 1999. International trade and industrial upgrading in the apparel commodity chain. *Journal of*

International Economics 48 (1):37–70. doi: 10.1016/S0022-1996(98)00075-0.
Giannini, F. 2011. *Gucci: The making of*. New York: Rizzoli.
Gilbert, D. 2000. Urban outfitting, the city and the spaces of fashion culture. In *Fashion cultures*, ed. S. Bruzzi and P. Church-Gibson, 7–24. London and New York: Routledge.
Goodchild, M. 2007. Citizens as sensors: The world of volunteered geography. *GeoJournal* 69 (4):211–21. doi: 10.1007/s10708-007-9111-y.
Hauge, A. 2007. *Dedicated followers of fashion: An economic geographic analysis of the Swedish fashion industry*. Uppsala, Sweden: Uppsala University.
Hauge, A., A. Malmberg, and D. Power. 2009. The spaces and places of Swedish fashion. *European Planning Studies* 17 (4):529–47. doi: 10.1080/09654310802682073.
Hutter, M. 2011. Review symposium. Lucien Karpik: *Valuing the unique: The economics of singularities*. Princeton, Princeton University Press, 2010. *Socio-Economic Review* 9:787–800.
Jansson, J., and D. Power. 2010. Fashioning a global city: Global city brand channels in the fashion and design industries. *Regional Studies* 44 (7):889–904. doi: 10.1080/00343400903401584.
Jung, J., and M. Moro. 2014. Multi-level functionality of social media in the aftermath of the Great East Japan Earthquake. *Disasters* 38 (Suppl. 2):S123–43. doi: 10.1111/disa.12071.
Karpick, L. 2010. *Valuing the unique: The economics of singularities*. Princeton, NJ: Princeton University Press.
Kering. 2018. Brands key figures. Accessed January 1, 2018. http://www.kering.com/en/finance/group/brands-key-figures.
Kouloumpis, E., T. Wilson, and J. D. Moore. 2011. Twitter sentiment analysis: The good the bad and the omg! In *Proceedings of the Fifth International AAAI Conference on Weblogs and Social Media*, 538–41. Barcelona, Spain: AAAI Press.
Levitt, T. 1960. Marketing myopia. *Harvard Business Review* 38 (4):45–56.
Levitt, T. 1980. Marketing success through differentiation—Of anything. *Harvard Business Review* 58 (1):83–92.
Lewis, T. 2018. Imran Amed: Meet fashion's most influential man. *The Observer*, September 9. Accessed September 12, 2018. https://www.theguardian.com/global/2018/sep/09/imran-amed-business-of-fashion-interview-is-this-fashions-most-influential-man?.
McRobbie, A. 1998. *British fashion design: Rag trade or image industry?* London and New York: Routledge.
Morris, E., T. Caruso, F. Buscot, M. Fischer, C. Hancock, T. S. Maier, T. Meiners, et al. 2014. Choosing and using diversity indices: Insights for ecological applications from the German Biodiversity Exploratories. *Ecology and Evolution* 4 (18):3514–24. doi: 10.1002/ece3.1155.
Pike, A. 2009. Geographies of brands and branding. *Progress in Human Geography* 33 (5):619–45. doi: 10.1177/0309132508101601.
Poorthuis, A., and M. Zook. 2017. Making big data small: Strategies to expand urban and geographical research using social media. *Journal of Urban Technology* 24 (4):115–35. doi: 10.1080/10630732.2017.1335153.
Poorthuis, A., M. Zook, T. Shelton, M. Graham, and M. Stephens. 2016. Using geotagged digital social data in geographic research. In *Key methods in geography*, ed. N. Clifford, M. Cope, T. Gillespie, and S. French, 3rd ed., 248–68. London: Sage.
Porter, M. 1990. *The competitive advantage of nations*. New York: The Free Press.
Power, D. 2010. The difference principle? Shaping competitive advantage in the cultural product industries. *Geografiska Annaler: Series B, Human Geography* 92 (2):145–58. doi: 10.1111/j.1468-0467.2010.00339.x.
Power, D., and A. Hauge. 2008. No man's brand—Brands, institutions, fashion. *Growth and Change* 39 (1):123–43. doi: 10.1111/j.1468-2257.2007.00408.x.
Power, D., and J. Jansson. 2008. Cyclical clusters in global circuits: Overlapping spaces in furniture trade fairs. *Economic Geography* 84 (4):423–48. doi: 10.1111/j.1944-8287.2008.00003.x.
Rantisi, N. 2002. The competitive foundations of localized learning and innovation: The case of women's garment production in New York City. *Economic Geography* 78 (4):441–62. doi: 10.2307/4140798.
Rantisi, N. 2004a. The ascendance of New York fashion. *International Journal of Urban and Regional Research* 28 (1):86–106.
Rantisi, N. 2004b. The designer in the city and the city in the designer. In *Cultural industries and the production of culture*, ed. D. Power and A. Scott, 91–109. London and New York: Routledge.
Rose, G. 2017. Posthuman agency in the digitally mediated city: Exteriorization, individuation, reinvention. *Annals of the American Association of Geographers* 107 (4):779–93. doi: 10.1080/24694452.2016.1270195.
Scott, A. 1996. The craft, fashion, and cultural-products industries of Los Angeles: Competitive dynamics and policy dilemmas in a multisectoral image-producing complex. *Annals of the Association of American Geographers* 86 (2):306–23. doi: 10.1111/j.1467-8306.1996.tb01755.x.
Scott, A. 2006. The changing global geography of low-technology, labor-intensive industry: Clothing, footwear, and furniture. *World Development* 34 (9):1517–36.
Segre Reinach, S. 2006. Milan: The city of prêt-à-porter in a world of fast fashion. In *Fashion's world cities*, ed. C. Breward and D. Gilbert, 123–34. Oxford, UK: Berg.
Shelton, T., A. Poorthuis, and M. Zook. 2015. Social media and the city: Rethinking urban socio-spatial inequality using user-generated geographic information. *Landscape and Urban Planning* 142:198–211. doi: 10.1016/j.landurbplan.2015.02.020.
Smith, M. 2013. Selecting the Fashion 500. *New York Times*, September 26. Accessed August 29, 2018. https://www.nytimes.com/2013/09/27/fashion/Business-of-Fashion-Chooses-500-Industry-Leaders.html.
Statista. 2018. Leading luxury brands with the most followers on Twitter as of June 2017. Accessed August 29, 2018. https://www.statista.com/statistics/693784/luxury-brands-follower-twitter/.
Tokatli, N. 2013. Doing a Gucci: The transformation of an Italian fashion firm into a global powerhouse in a "Los Angeles-izing" world. *Journal of Economic Geography* 13 (2):239–55. doi: 10.1093/jeg/lbs050.

Weller, S. 2007. Fashion as viscous knowledge: Fashion's role in shaping trans-national garment production. *Journal of Economic Geography* 7 (1):39–66. doi: 10.1093/jeg/lbl015.

Wu, T. 2017. *The attention merchants: From the daily newspaper to social media, how our time and attention is harvested and sold*. London: Atlantic.

ATE POORTHUIS is an Assistant Professor in the Humanities, Arts and Social Sciences at Singapore University of Technology and Design, Singapore 487372, Republic of Singapore. E-mail: ate_poorthuis@sutd.edu.sg. His research explores the possibilities and limitations of big data, through quantitative analysis and visualization, to better understand urban processes.

DOMINIC POWER is Professor of Human Geography in the Department of Human Geography at Stockholm University, SE-106 91 Stockholm, Sweden. E-mail: dominic.power@su.se. His research is concerned with the interrelations between culture and economy and the economic geography of culture and the cultural industries.

MATTHEW ZOOK is a University Research Professor of Digital and Economic Geography in the Department of Geography at the University of Kentucky, Lexington, KY 40506. E-mail: zook@uky.edu. His research focuses on the production, practices, and uses of big geodata and the ways in which algorithms, space, and place interact in finance as well as everyday lived geographies.