



**UvA-DARE (Digital Academic Repository)**

**Getting the word out on Twitter: the role of influentials, information brokers and strong ties in building word-of-mouth for brands**

Araujo, T.B.; Neijens, P.C.; Vliegenthart, R.

*Published in:*  
International Journal of Advertising

*DOI:*  
[10.1080/02650487.2016.1173765](https://doi.org/10.1080/02650487.2016.1173765)

[Link to publication](#)

*Citation for published version (APA):*

Araujo, T., Neijens, P., & Vliegenthart, R. (2017). Getting the word out on Twitter: the role of influentials, information brokers and strong ties in building word-of-mouth for brands. *International Journal of Advertising*, 36(3), 496-513. <https://doi.org/10.1080/02650487.2016.1173765>

**General rights**

It is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), other than for strictly personal, individual use, unless the work is under an open content license (like Creative Commons).

**Disclaimer/Complaints regulations**

If you believe that digital publication of certain material infringes any of your rights or (privacy) interests, please let the Library know, stating your reasons. In case of a legitimate complaint, the Library will make the material inaccessible and/or remove it from the website. Please Ask the Library: <http://uba.uva.nl/en/contact>, or a letter to: Library of the University of Amsterdam, Secretariat, Singel 425, 1012 WP Amsterdam, The Netherlands. You will be contacted as soon as possible.

## Getting the word out on Twitter: the role of influentials, information brokers and strong ties in building word-of-mouth for brands

Theo Araujo\*, Peter Neijens and Rens Vliegenthart

*Amsterdam School of Communication Research (ASCoR), University of Amsterdam, Amsterdam, The Netherlands*

*(Received 15 September 2013; accepted 29 March 2016)*

Using a sample of over 5300 tweets from top global brands, this study investigated how different types of users can influence brand content diffusion via retweets. Twitter users who influenced followers to retweet brand content were categorized as (1) influentials, because of their above average ability to influence others to retweet their tweets (in general), (2) information brokers, because of their position connecting groups of users or (3) having strong ties, because of their high percentage of friends in common and a mutual friend–follower relationship with the influenced follower. The results indicate that influentials and information brokers are associated with larger number of retweets for brand content. In addition, although information brokers have a larger overall influence on retweeting, they are more prone to do so when influentials are mentioned in the brand tweet, providing support for the strategy that aims to associate the brand with influential users.

**Keywords:** brand content diffusion; retweeting; Twitter brand communication; opinion leaders; influencers; information brokerage

### Introduction

While targeting influential members or opinion leaders is not new within marketing communication, the emergence of social media and large-scale data collection and analysis capabilities – i.e. ‘big data’ – has led to much discussion on renewed opportunities for this aspect of viral marketing. On Twitter, for example, marketers are now able to collect information about user behavior, monitor interactions between consumers and analyze the messages that consumers write about brands. All these data could be used to identify and target influential users, who in turn could help maximize the diffusion of brand-generated information.

Twitter may be considered an ideal space for brands to explore the opportunities afforded by viral marketing, as users actively talk about brands (Jansen et al. 2009) and subscribe to updates from an average of five or more brands (Schreiner 2013). Moreover, one of the key mechanisms of information diffusion on Twitter is the process of retweeting, by which a user passes on, usually without changes, a message written by someone else (Boyd, Golder, and Lotan 2010). Brands can monitor the process of retweeting, and identify not only how many times a given message was retweeted, but also the users who have the highest levels of influence on brand content diffusion.

Understanding how certain users can influence brand content diffusion on Twitter is a particularly pressing subject for several reasons. First, the use of Twitter (and of social

---

\*Corresponding author. Email: [t.b.araujo@uva.nl](mailto:t.b.araujo@uva.nl)

media in general) continues to grow. In the USA, for example, 23% of online adults use Twitter (Pew Research Center 2015). Second, an increasing amount of word-of-mouth (WOM) is taking place online, with over 70% of social media users discussing experiences of products (Nielsen 2012). Third, consumers who retweet brand messages demonstrate higher levels of brand identification, brand commitment, brand trust and community membership intention when compared to those who do not retweet brand content (Kim, Sung, and Kang 2014). Finally, and perhaps most importantly, when consumers decide to retweet the brand content, they help expose the brand message to users who do not receive direct updates from the brand on Twitter and they also associate themselves with the brand message. This association may also increase the credibility of the brand message.

Emerging research on the topic is yet to provide conclusive results on whether and, if so, how marketers can identify influential users who could accelerate the diffusion of brand content via retweets. Although practitioner studies suggest that brands should identify and target influential individuals on social media (Bughin, Doogan, and Vetvik 2010; Harrysson, Metayer, and Sarrazin 2012), the concept of what influential users are, and how they can be identified, are yet to be fully clarified. It is yet also not clear whether such an influence is consistent across time, topics or brands. Academic researchers have also begun to investigate the role of influential users on information diffusion on Twitter (Bakshy et al. 2011; Cha et al. 2010; Kwak et al. 2010; Petrovic, Osborne, and Lavrenko 2011; Weng et al. 2010), but these studies usually analyze all types of messages from all types of users, including news organizations, politicians, celebrities and conversations between regular Twitter users. Such a diverse sample is not specific enough to draw conclusions focused on brand content. Moreover, earlier research generally does not clearly distinguish the scope of influence. Being able to stimulate others to retweet your own message is one thing; being able to stimulate others to retweet a message created by a third party, for example a brand, is another matter. It remains to be seen whether these influential users are actually able to transfer their influence to brand content, and stimulate others to retweet messages created by brands.

This study investigated whether certain types of users influence the diffusion of brand content on Twitter, and if so, how. The specific objective from this study was, therefore, to examine the effect of different types of influential users on retweeting of brand content. For the purposes of our study, we defined 'brand content diffusion' as the process of retweeting a message created by a brand, and 'influence' as the ability of a user to stimulate someone else to retweet a message created by a brand. The objectives and scope of this study fill a series of important gaps in earlier research. First, we focused specifically on the diffusion, via retweets, of messages created by brands, rather than on all messages created by all types of users. This focus allowed us to draw conclusions specifically for brand and marketing communication. Second, we tested whether one's own influence on Twitter is actually transferable to brand content. This is important, as it can help brands focus their efforts on the users who can actually help extend the reach of the brand message. Finally, drawing from electronic word-of-mouth (eWOM) and opinion leadership literature, we distinguished between three types of influence processes, namely: (1) the ability of highly influential users, such as celebrities, to transfer their influence to a brand and stimulate their followers to retweet brand messages; (2) the ability that information brokers have to connect groups and bring novel information to users who may be interested in brand content but do not follow the brand; and (3) the ability that users may have to stimulate close friends to retweet brand content. This advances earlier findings by testing which of the influence processes actually contributes to brand content diffusion via retweets.

## Literature review and theoretical background

### *Brand-related activities on Twitter*

Brands often establish a presence in social media, creating online profiles and promoting them on the brand website (Araujo and Neijens 2012). They regularly engage with consumers on Twitter (Kwon and Sung 2011): most Fortune 500 companies have established a dialogue with consumers and stakeholders on their activities (Rybalko and Seltzer 2010). Brand-related information, links and, to a lesser extent, product-related information are the most common types of information that brands publish on Twitter (Kwon and Sung 2011).

Brand-related activities on Twitter are initiated not only by brands. Consumers also create, share and contribute to brand-related content in social media (Muntinga, Moorman, and Smit 2011). Consumers seek social interaction, incentives and information from their preferred brands (Kwon et al. 2015) and often mention brands in their messages (Jansen et al. 2009).

Consumers not only create messages about brands on Twitter, but also retweet messages created by brands. This process of brand content diffusion helps extend the reach of the brand, as consumers expose the brand message to new audiences. Research has shown that message characteristics influence the retweeting of brand messages: when a brand message is highly informational and combined with emotion, consumers are more likely to retweet it (Araujo, Neijens, and Vliegenthart 2015). Our study advanced this line of research by investigating whether certain types of users are also able to stimulate others to retweet messages created by brands.

### *Word-of-mouth and opinion leadership processes*

Viral marketing is based on the premise that targeting influential members of networks can trigger higher levels of information diffusion and product adoption (Kempe, Kleinberg, and Tardos 2003). One of the earliest studies to deal with the concept of interpersonal influence and its relevance to information diffusion was conducted by Katz and Lazarsfeld (2006; originally published in 1955). The study identifies the existence of opinion leaders, positioning them as information brokers between the mass media and the general population, and as active participants in WOM processes. Opinion leaders influence others because they have expertise (Brooks 1957) and a strategic social location within the community (Katz 1957).

The role of strategic social location is also found in innovation diffusion research (for a comprehensive overview, see Rogers 2003), the aim of which is to explain why certain new products or ideas are adopted quicker or more widely than others. Influencers or opinion leaders have generally been described in diffusion literature as people who are able to influence others because of their central position in communication networks (Rogers 2003). This line of research not only discusses the individual characteristics that may turn someone into an opinion leader, but also highlights the importance of communication networks, and their use by opinion leaders, in influencing someone's decision to adopt an innovation or new idea.

Moving to online environments, several studies have investigated the role of opinion leadership in eWOM. In general terms, these studies have adopted two main approaches: (1) investigating individual characteristics of opinion leaders, often relying on self-reported data, and (2) exploring the influence of communication network characteristics, and how they influence eWOM and information diffusion.

When it comes to exploring opinion leadership in eWOM by focusing on individual characteristics, earlier research indicates that opinion leaders demonstrate higher levels of innovativeness and consider themselves to be more knowledgeable than non-leaders (Lyons and Henderson 2005) and are also more likely to participate in eWOM groups (Okazaki 2009). Opinion leaders have also been found to be positively associated with the diffusion of information online (Sun et al. 2006), considering that concern for others and social benefits are among the main motivations for engaging in eWOM in the first place (Hennig-Thurau et al. 2004; Bronner and de Hoog 2010).

Other studies, however, have focused not on the individual characteristics of opinion leaders, but rather on the position that certain users occupy in communication networks. This line of research has either relied on computer simulations (Goldenberg, Libai, and Muller 2001; Watts and Dodds 2007) or analyzed empirical data from discussions in online communities (Huffaker 2010) and email networks (Iribarren and Moro 2011; Leskovec, Adamic, and Huberman 2007), and demonstrated that the relationship between the sender and the receiver of the messages as well as the position that certain users occupy in communication networks influences their ability to trigger product-related information diffusion, eWOM and product adoption.

Our study extended this line of research by testing how different types of users influence others to retweet brand content. Drawing from eWOM and emerging research on Twitter general information diffusion, we proposed three types of users who may influence the diffusion of brand content via retweeting: (1) influentials, (2) information brokers and (3) users with strong ties. These users are discussed below.

### ***Meaning transfer and the role of influentials***

Brands associate themselves with other people, places, events or experiences via marketing communications (Keller 2009). These associations help establish brand image, which is defined as the consumer's perceptions of a brand reflected by the brand associations in the consumer's memory (Keller 1993). One common way to build brand image and differentiate the brand is to use endorsements by celebrities or public figures (Erdogan 1999). Celebrities or public figures acquire powerful symbolic meanings from their roles – in show business, military, sports or other careers – and transfer these meanings when they endorse products or brands through the process of meaning transfer (McCracken 1989).

Research has shown that celebrities can influence purchase intention, brand attitudes and attitudes towards an advertisement depending on their level of trustworthiness, expertise and attractiveness (Amos, Holmes, and Strutton 2008). Moreover, celebrity endorsements in advertisements also influence WOM intentions, for example with sports brands (Bush, Martin, and Bush 2004). Recent research into Twitter indicates that celebrities with a large number of followers can influence consumer's purchase intentions and brand attitudes when they tweet about brands (Jin and Phua 2014).

For Twitter in particular, a stream of empirical studies also suggest that a small number of users have an extraordinary amount of influence and are able to stimulate several others to retweet content by endorsing that content (e.g. Cha et al. 2010; Kwak et al. 2010). These highly influential users are often news media, celebrities or public figures (Cha et al. 2010), and they select links or content that they recommend to their followers – often by retweeting – to 'provide value to their fan base and to emphasize commonalities between the practitioner and his or her followers' (Marwick and Boyd 2011, 147).

Drawing from these earlier findings, we adopted the term ‘influentials’ to categorize people with extraordinary influence, such as public figures or celebrities, and proposed that, due to their status, they are able to influence others to retweet brand content. We also proposed that someone could be influenced by influentials in two separate processes on Twitter: by receiving a brand message (1) retweeted by an influential or (2) in which an influential is mentioned. In the first process, the influential retweets the brand message, effectively endorsing it. In the second process, the brand makes a reference to the influential by mentioning him or her in the brand message itself. In both cases, the followers of the influential attach meaning to the brand message in accordance with the image of the endorser, and are more likely to retweet the brand message. We proposed the following two hypotheses to test these processes.

**H1:** the greater the number of influentials who retweet the brand content, the greater the number of retweets the brand content receives.

**H2:** brand messages that mention influentials will receive a higher number of retweets compared to brand messages that do not mention influentials.

### *Bridging influence and the role of information brokers*

A second type of influence comes from users who are characterized not by their status as celebrities, but by their position in the network and their ability to act as information brokers between two groups, and thus enable eWOM. In summary, structural holes appear when members of one group are generally not connected to members of another group (Burt 2000). Because of these structural holes, people in these two groups have access to different types of information and circulate different types of ideas. Information brokers have relationships with members of both groups and are able to bridge the structural hole between both groups and enable the circulation of information. This bridging influence does not necessarily stem from their unique or exceptional interpersonal influence or credibility, but rather from their unique position in the network (Bakshy et al. 2012).

Studies into Twitter (Bakshy et al. 2011; van Liere 2010) and YouTube (Liu-Thompkins and Rogerson 2012) argue that information brokers are the most important type of user for information diffusion in social media. Even if an information broker has average or below average influence, targeting a large set of users in a bridging position allows information to reach larger sets of people (Bakshy et al. 2011). We adopted the term ‘information brokers’ for individuals who facilitate information diffusion by their ability to connect two groups in the network, and proposed the following hypothesis.

**H3:** the greater the number of information brokers who retweet the brand content, the greater the number of retweets the brand content receives.

### *The role of strong ties*

Empirical research into social media has also suggested that the strength of the relationship between two users may influence information diffusion or the adoption of new behavior (Bakshy, Karrer, and Adamic 2009; Bakshy et al. 2012). On Facebook, for example, people are more likely to be influenced to share content by individuals with whom they have stronger ties – defined as a high number of friends in common and a high frequency of contacts – although such an influence happens less often on social network sites because weak ties are more frequent (Bakshy et al. 2012). This is aligned with

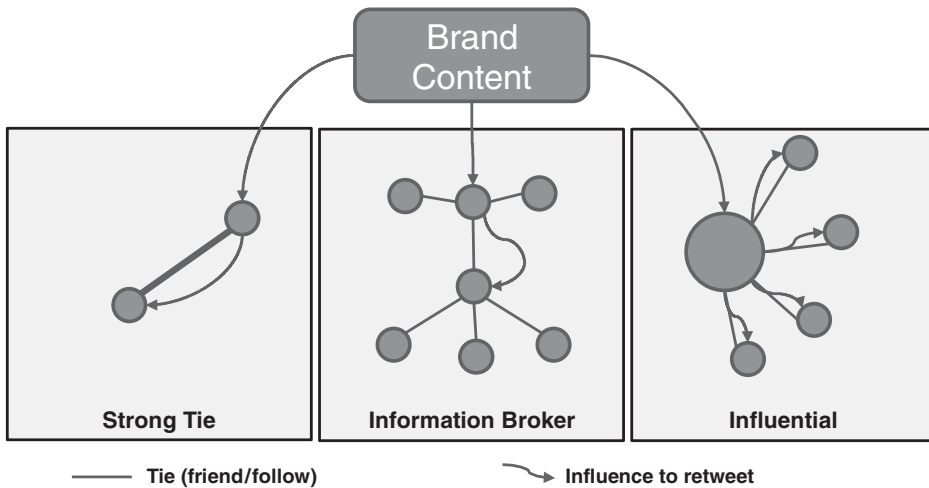


Figure 1. Types of influence.

earlier findings from WOM research that indicate that people with whom one has strong ties are more influential in decision making (Brown and Reingen 1987). Moreover, earlier research on viral advertising and eWOM indicates that consumers are more willing to open and disseminate email messages (Chiu et al. 2007; Phelps et al. 2004), and are more influenced by viral SNS campaigns (van Noort, Antheunis and van Reijmersdal 2012) when they come from close personal sources.

The effect of opinion leadership processes due to tie strength between users had not yet been tested for Twitter, so we adopted the term ‘strong ties’ to define individuals who influence other users with whom they have strong relationships, and proposed the following hypothesis.

**H4:** the greater the number of individuals with strong ties who retweet the brand content, the greater the number of retweets the brand content receives.

The different types of influence are summarized in [Figure 1](#).

## Methods

### Sample

We selected 30 top global brands according to an annual brand ranking<sup>1</sup> and covered 10 market segments (three brands per market segment). This sampling strategy was adopted to allow for the investigation of influence processes across various market segments and thus provide more generalizable results. The selection of top brands ensured similar levels of brand equity in the sample, minimizing the effects of consumers’ knowledge of the brand or of drastic variations in brand equity. The brands are shown in [Table 1](#).

We analyzed the messages posted by the main official profile of each brand. When a brand had more than one profile, we selected the profile that (1) had just the brand name (rather than the name of a product from the brand), (2) had the largest number of followers compared to the brand’s other profiles and (3) was preferably a verified profile (i.e. had a confirmation from Twitter that it belonged to the brand). Brands not on Twitter were replaced by the next top brand in the same segment to ensure each segment had three

Table 1. Brands included in the sample.

Brand	Segment	Brand	Segment
Adidas	Apparel	McDonald's	Restaurants
American Express	Financial services	Mercedes Benz	Automotive
BMW	Automotive	Microsoft	Technology
Coach	Luxury	Nescafé	Beverages
Coca-Cola	Beverages	Nestlé	Cons. packaged goods
General Electric	Diversified	Nike	Apparel
Gillette	Cons. packaged goods	Pepsi	Beverages
Google	Technology	Philips	Diversified
Gucci	Luxury	Ralph Lauren	Apparel
H&M	Retailing	Siemens	Diversified
IBM	Technology	Starbucks	Restaurants
Ikea	Retailing	Subway	Restaurants
L'Oreal Paris	Cons. packaged goods	Toyota	Automotive
Louis Vuitton	Luxury	Visa	Financial services
MasterCard	Financial services	Walmart	Retailing

brands. We selected brand profiles in the English language. While there was no focus on a particular country, most brand data came from the United States.

The sample consisted of the latest 200 tweets published from each brand profile. Because not all brand profiles had 200 tweets, the total sample was 5995 tweets. From those tweets, 607 were messages that the brands had retweeted from other users, that is, not messages written by the brand itself. These 607 messages were removed from the sample, leading to 5388 unique messages. The oldest tweet collected was from 31 August 2011 and the most recent was from 19 February 2013. For each tweet, we collected the number of retweets, along with additional information such as date posted, whether it was a reply to another user or an original message, etc. Finally, we collected data on each user who had retweeted each brand tweet. Twitter limits this data to the first 100 users who retweeted each tweet. In total, we identified 46,055 Twitter users, of which data could be retrieved for 45,810 users. The data included the latest tweets from the user, along with the number of retweets, who followed the user and who the user followed on Twitter. The data collection steps are summarized in [Figure 2](#).

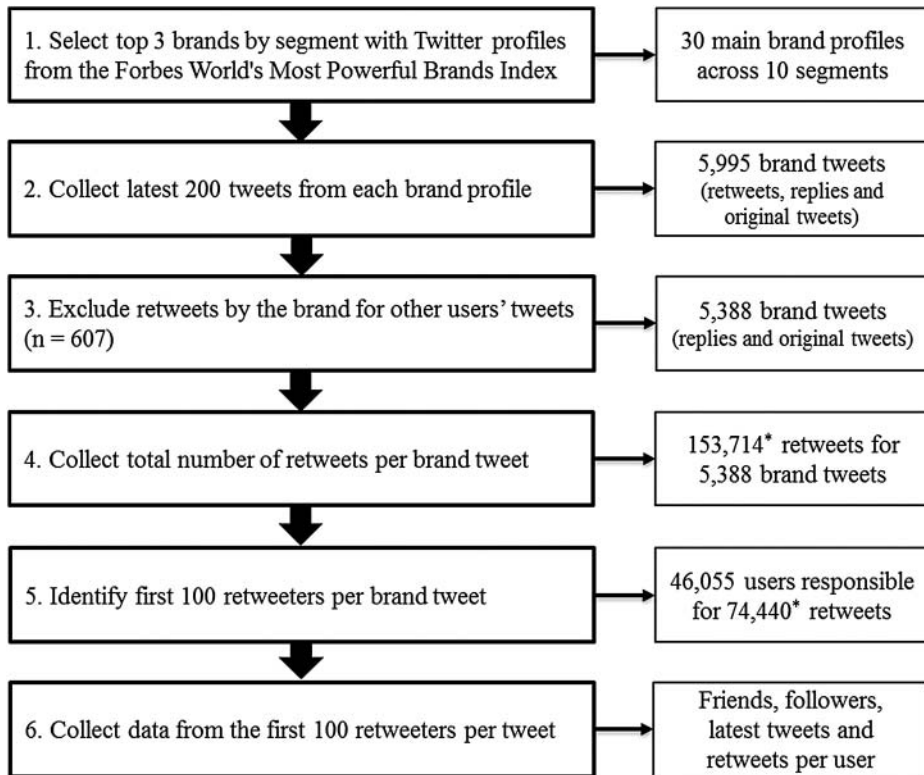
### ***Dependent variable***

The dependent variable was the number of retweets each brand tweet received. We collected this number when extracting the last 200 messages from the brand on Twitter, and updated it two weeks after the initial data collection. This ensured that all brand tweets, even the most recent, had an accurate number of retweets.

### ***Independent variables***

The main model of this study included, as independent variables, the number of influentials, information brokers and strong ties who retweeted each brand tweet, and whether the brand tweet mentioned an influential.<sup>2</sup> We removed all advertising agencies and other profiles of the brand on Twitter from the list of users.





\* The 5,388 brand tweets received a total of 153,714 retweets. Twitter however only makes available personal data of the first 100 retweeters per tweet that had public profiles. This limitation allowed the study to extract detailed information of 46,055 users responsible for a total of 74,440 retweets. Only 5% of the 5,388 brand tweets had over 100 retweets and would therefore be affected by the limitation.

Figure 2. Data collection process.

The first step was to identify the influentials. In line with earlier research, we defined influentials as users with above average ability to stimulate retweets to their own messages (Cha et al. 2010; Kwak et al. 2010; Petrovic, Osborne, and Lavrenko 2011). A user was considered influential if the average number of retweets of his or her own tweets was three standard deviations above the mean number of retweets of all other users in the sample who had been able to influence someone else to retweet brand content. The mean retweets per post from each user who had at least one follower retweeting brand content was 2.32 (SD = 17.23). Seventeen users were considered influentials.

Of the 17 influentials, 82% had verified accounts, indicating that they are famous enough to receive a special verification from Twitter. Most of the influentials could be considered celebrities, as four of them were associated with sports, three of them with acting and modeling, two with music and two with television shows. The accounts of the White House, an astronaut, two social media applications and two non-verified regular users completed this group. This led to the first independent variable, namely the number of influentials. This variable measured the number of influentials who retweeted a brand tweet, and was used for H1.

We identified a second group of influentials by extracting every user mention made by the brands in their tweets. Of the 2897 users mentioned in brand tweets, 77 met the same

criteria used for the first group of influentials. This led to the second independent variable: mentions of influentials. This variable indicates which of the brand tweets mentions influentials in the text, and was used for H2.

The next step was to identify information brokers and users with strong ties. Information brokers were defined as users who connect the group of the influenced follower with another group of users, and strong ties were defined as users who have the majority of their friends in common with the influenced follower. While the identification of influentials focused on the intrinsic characteristic of someone being able to generate a lot of retweets of their own content, the analysis for strong ties or information brokers focused on the relationship between the user and the follower who was influenced. This means that a user can be an information broker with one influenced follower, and have strong ties with another influenced follower. In other words, the same user could have influenced follower A because of strong ties, and follower B because of information brokerage.

We considered a user to have strong ties with an influenced follower if: (1) the user had mutual ties with the follower (i.e. the user also subscribed to updates from the follower on Twitter) and (2) the percentage of friends in common with the follower was above 50%. A total of 66 users met the criteria of having strong ties with at least one of their followers. User–follower relationships that did not meet these criteria were then tested to check whether they belonged to the information broker’s category.

Information brokerage was measured by creating a network containing all the friends and followers of both the user and the influenced follower, and measuring the betweenness centrality of the user. Betweenness centrality is a measure that is often used to identify brokerage in social networks, as it indicates how often a given person is in the shortest path connecting two other users (Bruggeman 2008). We used the NetworkX package from Python to perform the analysis, and selected only users who had betweenness centrality measures two standard deviations above the mean of all other users.<sup>3</sup> A total of 669 users qualified as information brokers in relation to at least one of their followers.

### ***Control variables***

We controlled for the presence of links or hashtags in the brand message, to account for differences in message characteristics that also influence retweeting behavior (Araujo, Neijens, and Vliegenthart 2015; Suh et al. 2010). We also included the number of followers and the brand value of each brand as control variables, to account for the possibility that brands may have a higher number of retweets simply because their audience is larger or because they have higher brand equity.

### ***Types of brand tweets***

Brand tweets were divided into two groups: original tweets (messages created by the brand aimed at all Twitter users) and replies (public responses from the brand to specific users). We analyzed original tweets and replies separately because of the large differences in the number of retweets that each type of message received. Original tweets were retweeted, on average, 40.74 times (SD = 70.77), while replies were retweeted, on average, 0.54 times (SD = 1.97). Table 2 shows the descriptive statistics for the main variables.

### ***Analytical strategy***

To summarize, our unit of analysis was the brand tweet. The dependent variable was the number of retweets each brand tweet received, and the independent variables were the

Table 2. Descriptive statistics: dependent and independent variables.

Variable	Only original tweets ( <i>N</i> = 2623)			Only replies ( <i>N</i> = 2757)		
	<i>M</i>	SD	Range	<i>M</i>	SD	Range
Retweets per brand tweet	40.74	70.77	0–913	0.54	1.97	0–67
Influentials per brand tweet	0.01	0.11	0–2	0.0004	0.02	0–1
Information brokers per brand tweet	0.25	1.24	0–34	0.02	0.2	0–5
Strong ties per brand tweet	0.03	0.26	0–6	0.002	0.07	0–3
Mentions of influentials	5.49%	1.27%				
Brand tweets with Hashtag	56%	23%				
Brand tweets with URL	81%	17%				
Brand profile followers	660,029	1368M	426–5589M	657,872	885,667	426–3419M
Brand equity (USD, billions)	20.11	13.53	4.9–54.7	18.58	12.82	4.9–54.7

Notes: Frequency reported for binary variables (e.g. mentions of influentials). A total of eight brand tweets were considered outliers as they had over 1090 retweets (three standard deviations above the mean retweets from the sample), and were removed. The numbers of influentials, information brokers or strong ties shown above are the average number of each of these users that retweeted each tweet. Brand equity measured as the brand value indicated by the ranking of the world's most valuable brands used for this study.

number of times that (1) an influential, (2) an information broker and (3) a user with strong ties had retweeted the brand tweet, and whether the message (4) mentioned an influential. For each brand tweet, we also included as control variables: (5) the number of followers of the brand profile, (6) the brand equity and whether the brand tweet contained (7) hashtags and (8) links.

We used multilevel regression models to analyze the data, given that our unit of analysis, the brand tweets, could be clustered into groups, namely the brands to which each tweet belongs. Multilevel models are the recommended approach for this type of data, as they are able to distinguish the influence of individual level characteristics from the influence of group level characteristics (Rabe-Hesketh and Skrondal 2008). For the models included in this study, the brand sending each tweet was set as the group or contextual level. This approach ensured that brand differences would be controlled for, given that multilevel models allow for splitting the variance of the dependent variable between (1) the individual characteristics of each tweet – namely the number of influentials, information brokers and strong ties, along with the control variables – and (2) group characteristics (contextual level), in this case differences among brands.

Because of the differences in the number of retweets, the data were analyzed in two models: the first model considered only original tweets from the brand, and the second model only considered replies from the brand to other users.

We were able to retrieve the total number of retweets that each brand tweet received but, because of Twitter restrictions, we were only able to gather data on the first 100 retweeters of each brand tweet. To ensure our results were consistent, we performed an additional check by re-running all the models with brand tweets that had received 100 or fewer retweets ( $n = 5100$ ) and found the same relationships between the independent and dependent variables.

Finally, we also investigated whether influentials had any additional influence on the retweeting behavior of information brokers. To do so, we conducted an analysis of covariance (ANCOVA) with the number of retweets by information brokers as the dependent variable, and tested the differences between brand tweets that mentioned influentials and

brand tweets that did not mention influentials. We included as covariates the number of retweets by influentials as well as the control variables (number of followers, brand equity, presence of URL and presence of hashtags).

## Results

The outcome of the analysis, which is summarized in Table 3, supports or partially supports the hypotheses associated with influentials. H1 was fully supported by the data: influentials (individuals with above average ability to trigger higher levels of retweeting of their own tweets) were also found to have the same influence as regards retweeting brand content, both for original brand tweets and for replies from the brand to other users. This means, for example, that each influential who retweeted an original tweet was associated with 20.25 additional overall retweets for the same tweet. H2 – namely that mentioning influentials in the brand message leads to higher levels of retweeting – was supported only in the case of replies, which were associated with 1.4 additional retweets when an influential was mentioned.

H3 – that information brokers are associated with higher levels of retweeting – was also supported by the data. For example, each information broker who retweeted an original tweet was associated with 13.12 additional overall retweets for the same tweet. H4, however, was not supported: users with strong ties were not significantly associated with higher levels of retweeting original tweets or all types of content, and actually seemed to be associated with significantly lower levels of overall retweeting of replies (where the brand is having a conversation with another user).

Table 3. Multilevel models for influence type and number of retweets.

	Only original tweets ( $N = 2623$ )			Only replies ( $N = 2757$ )		
	$B$	$SE B$	$\beta^a$	$B$	$SE B$	$\beta^a$
Fixed effects						
Intercept	26.52	19.79	28.29	2.49	1.85	3.02
Number of influentials	20.25*	10.04	1.53*	3.37*	1.57	0.26**
Mentions of influentials	-1.64	4.83	-0.29	1.4**	0.27	0.25**
Number of information brokers	13.12**	1.03	11.85**	3.77**	0.18	3.4**
Number of strong ties	-4.39	4.89	-0.83	-2.89**	0.5	-0.54**
Random parameters						
Var (intercept $e_{0j}$ )	53.5(0.74)	1.52(0.02)				
Var ( $u_j$ )	58.21(8.6)	5.01(0.73)				
Rho	0.54(0.07)	0.92(0.02)				
$-2 \times \log$ likelihood	28,446.26	10,287.18				

Notes: A total of eight brand tweets were considered outliers as they had over 1090 retweets (three standard deviations above the mean retweets from the sample), and were removed. Control variables (brand equity, presence of hashtag, presence of URL and brand profile followers) included in the models, but not reported.

\* $p < .05$ , \*\* $p < 0.01$ .

<sup>a</sup>To report  $\beta$ 's, influentials, information brokers and strong ties were standardized: each case value was subtracted from the mean of the original variable, and then divided by one standard deviation of the original variable to determine relative importance of each type of influence.

We also investigated which type of influence had the strongest overall effect on levels of retweeting. While both influentials and information brokers were associated with higher levels of retweeting, it was important to establish which of these two types of users has the strongest influence on brand content diffusion. We therefore standardized the number of influentials, information brokers and users with strong ties, as well as mentions of influentials. The results, also available in [Table 3](#), indicate that information brokers are relatively more important to the diffusion of brand content than influentials. For original tweets, for example, the increase of information brokers by one standard deviation is associated with 11.85 additional retweets, versus 1.53 for influentials.

Finally, we investigated whether information brokers and influentials might somehow be connected, considering that both groups were found to significantly influence the number of overall retweets of brand tweets. The ANCOVA results (between-subjects factor: mention of influentials (present or not present); covariates: retweets by influentials, number of followers, brand equity, presence of URL and presence of hashtags) confirmed that original brand tweets that mention an influential were retweeted by significantly more information brokers compared to tweets that do not mention an influential, even when considering the covariates. The mean number of retweets by information brokers is significantly higher when influentials are mentioned in an original brand tweet ( $M = 1.01$ ,  $SD = 2.99$ ) compared to when an influential is not mentioned ( $M = 0.21$ ,  $SD = 1.04$ ),  $F(1,2616) = 48.81$ ,  $p < 0.001$ . Among the covariates, there were no significant effects for retweets by influentials ( $F(1,2616) = 0.37$ ,  $p = 0.544$ ), brand equity ( $F(1,2616) = 2.10$ ,  $p = 0.147$ ) and presence of URL ( $F(1,2616) = 0.47$ ,  $p = 0.492$ ). All other covariates, including number of followers ( $F(1,2616) = 36.33$ ,  $p < 0.001$ ) and presence of hashtags ( $F(1,2616) = 6.53$ ,  $p < 0.05$ ), had significant effects on the number of retweets by information brokers on original brand tweets.

## Discussion

Our study investigated how different types of users can influence brand content diffusion via retweets. Drawing from research on information diffusion and eWOM, as well as from emerging literature on Twitter, we tested which types of users are actually able to stimulate others to retweet messages created by brands. One of the key strengths of our study is that we investigated the diffusion of real brand messages by actual consumers. We collected and analyzed data on over 5300 messages from 30 top global brands across 10 market segments, and then reviewed the details of about 46,000 users who retweeted these brand messages. We set strict criteria to investigate this process as, unlike most earlier research, we focused only on messages created by brands and only considered cases when people who do not follow the brand were influenced to retweet by a certain user. These criteria distinguish our study from earlier studies on general content diffusion, as the criteria ensure that the results are relevant to and valid for brand content diffusion.

Our results indicate that certain types of users are able to stimulate others to retweet messages created by brands. In particular, the greater the number of influentials who retweet the brand content, the greater the number of retweets this content receives from other users. This was found for all types of content, including original tweets and replies. These results demonstrate that highly influential users, who so far have been identified by their above average ability to trigger retweets of messages that they themselves created, are also able to stimulate retweets of messages created by brands. Moreover, the mere mention of an influential in the brand tweet triggered higher levels of retweeting in the case of replies.

Furthermore, the results indicate that information brokers are also associated with higher levels of retweeting of brand content. Even though one information broker may have average or below average ability to trigger retweets of his or her own tweets, all information brokers combined stimulate more users to retweet brand content than influentials.

It is striking, however, that influentials exert a dual type of influence when it comes to brand content. First, influentials are associated with higher levels of overall retweeting when they retweet brand content. Second, information brokers retweet brand tweets more frequently when the brand tweets mention an influential. These findings shed a different light on the diffusion processes on Twitter for brand content. When an influential retweets a brand tweet, this content is associated with higher levels of overall retweeting. When a brand mentions an influential in its tweet, this content is associated with higher numbers of information brokers retweeting, which in turn is associated with higher levels of overall retweeting.

Finally, contrary to our hypothesis, users with strong ties were not found to be associated with higher levels of retweeting. If anything, these users were associated with significantly lower levels of retweeting of replies from the brand to other users. This indicates that information diffusion via retweets might not follow the same mechanism that it does on Facebook, where strong ties are predictors of information sharing for general content (Bakshy et al. 2012), or for viral SNS campaigns (van Noort, Antheunis and van Reijmersdal 2012). One explanation may be that users assume that all their friends will have seen the brand message when a very close friend has already retweeted, and therefore decide not to retweet the message again. Even though our hypothesis was not supported, this finding is relevant to future research on the influence of homophily and strong ties on information diffusion, and also to brands wanting to prioritize their marketing communication strategies on Twitter. Further research should also consider other measures for identifying strong ties, beyond the ones used in this study.

### ***Theoretical implications and recommendations for future research***

The results provide evidence that an association with influentials, such as celebrities or public figures, can stimulate brand content diffusion on Twitter. This extends earlier research on advertising, specifically on celebrity endorsement, by demonstrating how the association with celebrities can also provide benefits for the brand regarding eWOM and brand content diffusion. These findings also extend emerging literature on brand-related activities on Twitter: not only do celebrities influence brand attitudes when they tweet about brands (Jin and Phua 2014), but they also stimulate brand content diffusion simply by retweeting the brand message or by being mentioned by the brand. Future research should investigate this mechanism further, especially to understand how consumers perceive the celebrity who is retweeting the brand message, the impact on brand attitudes of seeing the retweet, and whether consumers consider this activity a paid advertisement or simply a recommendation from the celebrity or public figure.

As indicated by the results of this study, the concept of bridging influence, as proposed by Burt (1999, 2000) and Granovetter (1973), is a relevant mechanism for brand content diffusion on Twitter via retweets. Information brokers are responsible for most of the influence on brand content diffusion on Twitter, which corroborates earlier results on the diffusion of general content (Bakshy et al. 2011). Moreover, the linkage between influentials and information brokers found by this study extends earlier research, demonstrating that information brokers are more likely to retweet a brand message when an

influential is mentioned. Future studies should explore this linkage further, and especially understand the motivations that information brokers have to retweet messages that mention influentials.

In summary, these findings fill a series of important gaps in the literature, helping extend viral marketing and eWOM research in several ways. First, the focus adopted by this study – investigating only the diffusion of brand messages – ensures that the findings are relevant to brand communication. This is as an important aspect, as earlier research has usually included all types of messages from all types of users in its analyses. Second, these findings expand the focus of eWOM research, which has mostly focused on consumer-to-consumer communication to date. The results from our study demonstrate how influence processes usually associated with eWOM also take place when the message is created by brands, instead of by consumers. Third, the findings do demonstrate that one's influence on Twitter is actually transferrable to brand content, which also demonstrate the effectiveness of some brand strategies, such as celebrity endorsements, in generating eWOM and information diffusion online. Moreover, considering that these results are based on the analysis of actual retweeting behavior of each influenced user, they help overcome some of the potential limitations inherent to self-reported behavior, such as recall issues by respondents, or social desirability of responses.

Finally, this study demonstrates how data extracted directly from social media such as Twitter can provide new and relevant insights for research on advertising and marketing communication. Brand content diffusion can now be measured and observed, and therefore be investigated in greater detail, complementing and validating data that so far were only available from experiments and surveys. Large-scale data collection and analysis processes are now within reach of academic research. Our study, for example, not only collected data from brand profiles and about 46,000 users who retweeted brand content, but also identified which users they followed (26 million) and which users followed them (87 million). Future studies should consider these capabilities when investigating brand content diffusion, advertising and marketing communication, and use these capabilities to investigate how brand content diffusion may differ across cultures, languages or types of brands.

### ***Managerial implications***

Some of the largest brands have millions of followers on Twitter, and these followers receive updates and messages from the brand. While this community of followers already provides a powerful space to communicate with consumers, brands should also consider the potential that certain types of users have to extend the reach of the brand message beyond the limits of this community. As indicated by our results, brands can achieve this in various ways. First, they can identify and target influentials. These influentials can be celebrities or public figures, who acquire symbolic meaning through their roles in society, or they can be highly influential Twitter users who create content that is also often retweeted. Second, brands can also interact with the fan base of celebrities or public figures by mentioning them in brand messages, and thus draw the attention of users who do not belong to the brand community on Twitter. Finally, brands can continuously measure and analyze brand content diffusion on Twitter and determine which type of brand-specific information is retweeted the most by information brokers, and prioritize these types of messages in future marketing communications on Twitter.

### **Limitations**

The restrictions imposed by Twitter restricted the data collection to the first 100 retweeters of each brand tweet, therefore limiting the generalizability of these results. Even though the same relationships between the independent and dependent variables were found when running an additional analysis with brand tweets that had received 100 or fewer retweets, future studies could devise additional data collection procedures to overcome Twitter's limitations and gather all the retweeters from brand tweets and further investigate the complete retweeting cascade. For example, it would be interesting to understand whether the distance between the user and the brand (measured by the number of people unconnected to the brand who had retweeted the brand tweet before it reached the user) influences the user's decision to continue the cascade and retweet the brand tweet. Second, the sample was restricted to the top three global brands for each market segment. While this helped reduce concerns about differences in brand equity or brand awareness affecting the results at a general level, future studies could compare smaller with larger brands to determine whether these processes vary depending on brand equity or awareness factors.

Finally, this study used real brand tweets to measure retweeting behavior. While this in itself is an advantage due to the usage of observational data, it was not possible to ask retweeters why they retweeted the brand tweet, or how much influentials, information brokers or strong ties influenced their decision to retweet. Future studies should investigate this further using experiments or surveys.

Notwithstanding these limitations, this study provided a strong set of findings about the relative importance of three different influence processes to brand content diffusion on Twitter. By investigating these processes specifically for brand content diffusion on Twitter, these findings also extend earlier literature and provide insights based on the actual retweeting of brand content.

### **Notes**

1. Forbes World's Most Powerful Brands 2012, <http://www.forbes.com/powerful-brands/list/>, accessed on 8 February 2013.
2. To be considered an influential, information broker or strong ties, at least one follower of the user must have retweeted the brand content after the user, and this follower must not have been a follower of the brand.
3. The criterion of two standard deviations was selected to ensure that only users with higher levels of betweenness centrality would be considered information brokers, without, however, being too restrictive. If three standard deviations above the mean had been selected, only one user would have been considered an information broker.

### **Disclosure statement**

No potential conflict of interest was reported by the authors.

### **References**

- Amos, C., G. Holmes, and D. Strutton. 2008. Exploring the relationship between celebrity endorser effects and advertising effectiveness: A quantitative synthesis of effect size. *International Journal of Advertising* 27, no. 2: 209–34.
- Araujo, T., and P.C. Neijens. 2012. Friend me: Which factors influence top global brands participation in social network sites. *Internet Research* 22, no. 5: 626–40.



- Araujo, T., P.C. Neijens, and R. Vliegenthart. 2015. Please RT! The impact of informational, emotional and traceability cues on brand content pass-along behavior on Twitter. *Journal of Advertising Research* 55, no. 3: 284–95.
- Bakshy, E., J.M. Hofman, W.A. Mason, and D.J. Watts. 2011. Everyone's an influencer: Quantifying influence on Twitter. In *Proceedings of the Fourth ACM International Conference on Web Search and Data Mining*, 65–74. New York: ACM.
- Bakshy, E., B. Karrer, and L.A. Adamic. 2009. Social influence and the diffusion of user-created content. In *Proceedings of the Tenth ACM Conference on Electronic Commerce*, 325–34. New York: ACM.
- Bakshy, E., I. Rosenn, C. Marlow, and L.A. Adamic. 2012. The role of social networks in information diffusion. In *Proceedings of the 21st International Conference on World Wide Web*, 519–28. New York: ACM.
- Boyd, D., S., Golder, and G. Lotan. 2010. Tweet, tweet, retweet: Conversational aspects of retweeting on Twitter. In *2010 43rd Hawaii International Conference on System Sciences (HICSS)*, 1–10. New York: IEEE.
- Bronner, F., and R. de Hoog. 2010. Vacationers and eWOM: Who posts, and why, where, and what? *Journal of Travel Research* 50, no. 1: 15–26.
- Brooks, R.C. 1957. Word-of-Mouth' advertising in selling new products. *The Journal of Marketing* 22, no. 2: 154–61.
- Brown, J.J., and P.H. Reingen. 1987. Social ties and word-of-mouth referral behavior. *Journal of Consumer Research* 14, no. 3: 350–62.
- Bruggeman, J. 2008. *Social networks: An introduction*. New York: Routledge.
- Bughin, J., J. Doogan, and O.J. Vetvik. 2010. A new way to measure word-of-mouth marketing. *McKinsey Quarterly* 3, no. 2. [https://www.mckinseyquarterly.com/A\\_new\\_way\\_to\\_measure\\_word-of-mouth\\_marketing\\_2567](https://www.mckinseyquarterly.com/A_new_way_to_measure_word-of-mouth_marketing_2567).
- Burt, R.S. 1999. The social capital of opinion leaders. *The Annals of the American Academy of Political and Social Science* 566, no. 1: 37–54.
- Burt, R.S. 2000. The network structure of social capital. *Research in Organizational Behavior* 22: 345–423.
- Bush, A.J., C.A. Martin, and V.D. Bush. 2004. Sports celebrity influence on the behavioral intentions of generation Y. *Journal of Advertising Research* 44, no. 1: 108–18. doi:10.1017/S0021849904040206.
- Cha, M., H. Haddadi, F. Benevenuto, and K.P. Gummadi. 2010. Measuring user influence in Twitter: The million follower fallacy. In *Proceedings of the Fourth International AAAI Conference on Weblogs and Social Media*, 10–17. Menlo Park: The AAAI Press.
- Chiu, H.C., Y.C. Hsieh, Y.H. Kao, and M. Lee. 2007. The determinants of email receivers' disseminating behaviors on the Internet. *Journal of Advertising Research* 47, no. 4: 524–34.
- Erdogan, B.Z. 1999. Celebrity endorsement: A literature review. *Journal of Marketing Management* 15, no. 4: 291–314. doi:10.1362/026725799784870379.
- Goldenberg, J., B. Libai, and E. Muller. 2001. Talk of the network: A complex systems look at the underlying process of word-of-mouth. *Marketing Letters* 12, no. 3: 211–23.
- Granovetter, M.S. 1973. The strength of weak ties. *American Journal of Sociology* 78, no. 6: 1360–80.
- Harrysson, M., E. Metayer, and H. Sarrazin. 2012. How 'social Intelligence' can guide decisions. *McKinsey Quarterly*, (November). [https://www.mckinseyquarterly.com/How\\_social\\_intelligence\\_can\\_guide\\_decisions\\_3031](https://www.mckinseyquarterly.com/How_social_intelligence_can_guide_decisions_3031).
- Hennig-Thurau, T., K.P. Gwinner, G. Walsh, and D.D. Gremler. 2004. Electronic word-of-mouth via consumer-opinion platforms: what motivates consumers to articulate themselves on the internet? *Journal of interactive marketing* 18, no. 1: 38–52.
- Huffaker, D. 2010. Dimensions of leadership and social influence in online communities. *Human Communication Research* 36, no. 4: 593–617. doi:10.1111/j.1468-2958.2010.01390.x.
- Iribarren, J.L., and E. Moro. 2011. Affinity paths and information diffusion in social networks. *Social Networks* 33, no. 2: 134–42. doi:10.1016/j.socnet.2010.11.003.
- Jansen, B.J., M. Zhang, K. Sobel, and A. Chowdury. 2009. Twitter power: Tweets as electronic word of mouth. *Journal of the American Society for Information Science and Technology* 60, no. 11: 2169–88. doi:10.1002/asi.21149.
- Jin, S., and J. Phua. 2014. Following celebrities' tweets about brands: The impact of Twitter-based electronic word-of-mouth on consumers' source credibility perception, buying intention, and

- social identification with celebrities. *Journal of Advertising* 43, no. 2: 181–95. doi:10.1080/00913367.2013.827606.
- Katz, E. 1957. The two-step flow of communication: An up-to-date report on an hypothesis. *The Public Opinion Quarterly* 21, no. 1: 61–78.
- Katz, E., and P.F. Lazarsfeld. 2006. *Personal influence: The part played by people in the flow of mass communications*. 2nd ed. New Brunswick, NJ: Transaction Pub.
- Keller, K.L. 1993. Conceptualizing, measuring, and managing customer-based brand equity. *Journal of Marketing* 57, no. 1: 1–22.
- Keller, K.L. 2009. Building strong brands in a modern marketing communications environment. *Journal of Marketing Communications* 15, no. 2-3: 139–55. doi:10.1080/13527260902757530.
- Kempe, D., J. Kleinberg, and E. Tardos. 2003. Maximizing the spread of influence through a social network. In *Proceedings of the Ninth ACM SIGKDD International Conference on Knowledge Discovery and Data Mining*, 137–46. New York: ACM.
- Kim, E., Y. Sung, and H. Kang. 2014. Brand followers' retweeting behavior on Twitter: How brand relationships influence brand electronic word-of-mouth. *Computers in Human Behavior* 37 (August): 18–25. doi:10.1016/j.chb.2014.04.020.
- Kwak, H., C. Lee, H. Park, and S. Moon. 2010. What Is Twitter, a social network or a news media? In *Proceedings of the 19th international conference on World wide web*, 591–600. New York: ACM.
- Kwon, E.S., E. Kim, Y. Sung, and C.Y. Yoo. 2015. Brand followers: Consumer motivation and attitude towards brand communications on Twitter. *International Journal of Advertising* 33, no. 4: 657. doi:10.2501/IJA-33-4-657-680.
- Kwon, E.S., and Y. Sung. 2011. Follow me! Global marketers' Twitter use. *Journal of Interactive Advertising* 12, no. 1: 4–16.
- Leskovec, J., L.A. Adamic, and B.A. Huberman. 2007. The dynamics of viral marketing. *ACM Transactions on the Web* 1, no. 1: 1–39.
- Liu-Thompkins, Y., and M. Rogerson. 2012. Rising to stardom: An empirical investigation of the diffusion of user-generated content. *Journal of Interactive Marketing* 26, no. 2: 71–82. doi:10.1016/j.intmar.2011.11.003.
- Lyons, B., and K. Henderson. 2005. Opinion leadership in a computer-mediated environment. *Journal of Consumer Behaviour* 4, no. 5: 319–29.
- Marwick, A., and D. Boyd. 2011. To see and be seen: Celebrity practice on Twitter. *Convergence: The International Journal of Research into New Media Technologies* 17, no. 2: 139–58. doi:10.1177/1354856510394539.
- McCracken, G. 1989. Who is the celebrity endorser? Cultural foundations of the endorsement process. *Journal of Consumer Research*, 310–21.
- Muntinga, D.G., M. Moorman, and E.G. Smit. 2011. Introducing COBRAs: Exploring motivations for brand-related social media use. *International Journal of Advertising* 30, no. 1: 13. doi:10.2501/IJA-30-1-013-046.
- Nielsen. 2012. *State of media: The social media report 2012*. <http://www.nielsen.com/us/en/insights/reports-downloads/2012/state-of-the-media-the-social-media-report-2012.html>.
- Okazaki, S. 2009. Social influence model and electronic word of mouth: PC versus mobile internet. *International Journal of Advertising*, 28, no. 3: 439–72.
- Petrovic, S., M. Osborne, and V. Lavrenko. 2011. RT to win! Predicting message propagation in Twitter. In *Fifth International AAAI Conference on Weblogs and Social Media*, Barcelona, Spain.
- Pew Research Center. 2015. *Social media update 2014*. <http://www.pewinternet.org/2015/01/09/social-media-update-2014/>.
- Phelps, J., R. Lewis, L. Mobilio, D. Perry, and N. Raman. 2004. Viral marketing or electronic word of mouth advertising: Examining consumer responses and motivations to pass along email. *Journal of Advertising Research* 44, no. 4: 333–48.
- Rabe-Hesketh, S., and A. Skrondal. 2008. *Multilevel and longitudinal modeling using Stata*. 2nd ed. Texas: Stata Press.
- Rogers, E.M. 2003. *Diffusion of innovations*. 5th ed. New York, NY: Free Press.
- Rybalko, S., and T. Seltzer. 2010. Dialogic communication in 140 characters or less: How fortune 500 companies engage stakeholders using Twitter. *Public Relations Review* 36, no. 4: 336–41.
- Schreiner, T. 2013. New compete study: Primary mobile users on Twitter. Twitter Advertising Blog. <https://blog.twitter.com/2013/new-compete-study-primary-mobile-users-on-twitter>.

- Suh, B., L. Hong, P. Pirolli, and E.H. Chi. 2010. Want to be retweeted? Large scale analytics on factors impacting retweet in twitter network. In *Proceedings of the International Conference on Social Computing*, 177–84. New York: IEEE.
- Sun, T., S. Youn, G. Wu, and M. Kuntaraporn. 2006. Online word-of-mouth (or mouse): An exploration of its antecedents and consequences. *Journal of Computer-Mediated Communication* 11, no. 4: 1104–27.
- Van Lieere, D. 2010. How far does a tweet travel?: Information brokers in the Twitterverse. In *Proceedings of the International Workshop on Modeling Social Media*. New York: ACM.
- Van Noort, G., M.L. Antheunis, and E.A. van Reijmersdal. 2012. Social connections and the persuasiveness of viral campaigns in social network sites: Persuasive intent as the underlying mechanism. *Journal of Marketing Communications* 18, no. 1: 39–53.
- Watts, D.J., and P.S. Dodds. 2007. Influentials, networks, and public opinion formation. *Journal of Consumer Research* 34, no. 4: 441–58. doi:10.1086/518527.
- Weng, J., E. Lim, J. Jiang, and Q. He. 2010. Twitterrank: Finding topic-sensitive influential twitterers. In *Proceedings of the Third ACM International Conference on Web Search and Data Mining*, 261–70. New York: ACM.