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The Retransmission of Rumor and Rumor Correction Messages on Twitter

Alton Y. K Chua¹, Cheng-Ying Tee¹, Augustine Pang¹, and Ee-Peng Lim²

Abstract

This article seeks to examine the relationships among source credibility, message plausibility, message type (rumor or rumor correction) and retransmission of tweets in a rumoring situation. From a total of 5,885 tweets related to the rumored death of the founding father of Singapore Lee Kuan Yew, 357 original tweets without an “RT” prefix were selected and analyzed using negative binomial regression analysis. The results show that source credibility and message plausibility are correlated with retransmission. Also, rumor correction tweets are retweeted more than rumor tweets. Moreover, message type moderates the relationship between source credibility and retransmission as well as that between message plausibility and retransmission. By highlighting some implications for theory and practice, this article concludes with some limitations and suggestions for further research.

Keywords

rumor, rumor correction, retransmission, Twitter, retweetability

Introduction

Rumoring has been viewed as a way to alleviate social tension and solve collective crisis in uncertain situations (Oh, Agrawal, & Rao, 2013). With the advent of Twitter, the spread of rumor is now greatly expedited. On the positive note, the same retweet function that allows rumor messages to spread with a single click can also be used to

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spread messages that debunk those rumors. Hence, examining message retweetability offers a clue to better understand the retransmission of rumors and rumor corrections on Twitter.

Prior research has identified variables related to source credibility such as experience and connectivity to be associated with rumor retransmission. Variables related to message plausibility such as the presence of images in a message has also been shown to be related to rumor retransmission (Liu, Burton-Jones, & Xu, 2014). However, previous works tend to focus on negative emotions in the message, such as fear and anxiety (Heath, Bell, & Sternberg, 2001) but have neglected positive emotions including gratitude and hope.

Compared with rumor retransmission which has been well studied, rumor correction has just begun to attract attention. For example, one of the emerging themes is to detect rumor and rumor correction using modelling and automated methods (Mendoza, Poblete, & Castillo, 2010; Takayasu et al., 2015). Another theme compares the message plausibility between rumor and rumor correction. In particular, correction tweets were found to contain more original content but less URL than rumor tweets (Maddock et al., 2015; Starbird, Maddock, Orand, Achterman, & Mason, 2014). While source credibility and message plausibility are related to rumor retransmission, little is known whether they are also at play in the retransmission of rumor correction.

Meanwhile, users have shown the proclivity to respond to rumor tweets by circulating rumor corrections tweets (Mendoza et al., 2010; Procter, Vis, & Voss, 2013). This self-correcting phenomenon points to the collective discernment on Twitter. In other words, a message sent by an experienced user or a message bearing the characteristics for retweetability may not necessarily attract high retransmission if it is deemed spurious. Hence, depending on whether it is a rumor or a correction, message type could affect not only retransmission but could moderate the relationship between source credibility and retransmission, as well as that between message plausibility and retransmission. Yet extant literature has not shed any light on such propositions.

For these reasons, this article seeks to examine the relationships among source credibility, message plausibility, message type (rumor or rumor correction), and retransmission of tweets in a rumoring situation through the following three research questions:

Research Question 1: How do source credibility and message plausibility correlate with retransmission?

Research Question 2: How does message type correlate with retransmission?

Research Question 3: How does message type moderate the relationships between source credibility and retransmission, as well as message plausibility and retransmission?

The data set was drawn from the case of the rumored death of Lee Kuan Yew, a political figure in Singapore, prior to his actual death. In particular, we focus on rumor and rumor correction messages on Twitter. This case was selected because it has attracted a sizeable volume of retweets in a short time and drew local and international attention.

This article has implications for both theory and practice. On the theoretical front, it examines how source credibility and message plausibility could contribute to rumor and rumor correction retransmission, as well as the role of message type as a moderator in these relationships. On the practical front, it provides insights for organizations to deal with rumor.

The remainder of this article is organized as follows. The next section provides an overview of the literature on rumor, rumor correction, and other related theories. Next, the research model is presented. Then, the methodology and the results of the analysis are explained. This is followed by the discussion of the main findings. Finally, the article concludes with research and practical implications, as well as limitations and possible areas for future research.

Literature Review

Rumor and Rumor Correction

A rumor can be defined as unverified information that arises during uncertainties to help people make sense of the situations (DiFonzo & Bordia, 2007). Hence, rumor mongering is sometimes regarded as a form of collective problem solving which involves providing, exchanging, and evaluating information (Shibutani, 1966). In addition to rumoring behaviors, corrective behaviors are increasingly recognized as an integral part of the rumor life cycle. Therefore, rumor research which traditionally centered on the spread of rumor has begun to focus on rumor correction.

A variety of rumor control strategies such as ignoring, confirmation, rebuttal, and denial have been proposed (DiFonzo, Bordia, & Rosnow, 1994). Of these, one of the most effective ways is for an authoritative source to issue a statement to quell the rumors (Takayasu et al., 2015). While Internet use has contributed to more widespread of rumors, users could respond to rumor messages by circulating rumor correction messages (Garrett, 2011; Procter et al., 2013). In other words, the same conduit used for rumor mongering has also been used to spread rumor corrections. In fact, rumor corrections could sometimes spread even more rapidly than rumors in the context of Twitter (Zeng, Starbird, & Spiro, 2016). However, the influence of source credibility and message plausibility on retweetability of rumor and rumor correction tweets has received little attention. It would therefore be interesting to examine the retransmission of both types of tweets in a given rumoring situation.

Related Theories

Source credibility is an important notion which is traditionally tied to the study of influential users. The two-step flow theory, for example, proposes that influential individuals are able to sway opinions of the masses due to their high source credibility (Katz & Lazarsfeld, 1955). Likewise, the diffusion of innovation theory confers high source credibility on influential users who promulgate innovative ideas in a social network (Rogers, 2003). However, with the advent of social media, ordinary users

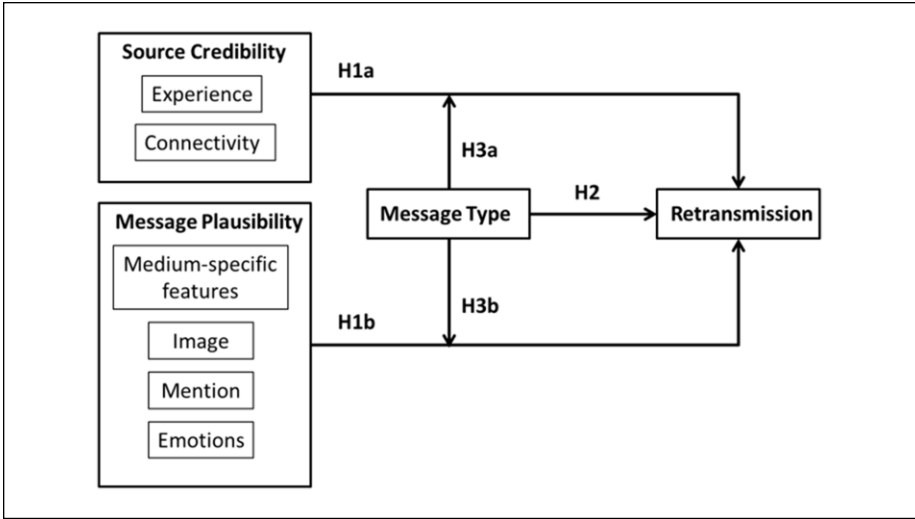


Figure 1. Research model.

now have the opportunity to influence others. On Twitter, users' influence is commonly measured in terms of users' experience and connectivity (Chen, 2011). Experience is associated with the trust between users and the probability of users' tweets being read by others (Lua, Chen, & Cai, 2011). Connectivity refers to users' position and relationships on the social media (Resnick, Kuwabara, Zeckhauser, & Friedman, 2000). In general, active and highly connected users are perceived as credible.

Social media users are often described as prosumers because of their ability to create, consume, and distribute content. Moreover, the uses and gratification theory proposes that users' media choice stems from the extent to which their needs can be gratified (Katz, Blumler, & Gurevitch, 1974). Users find resonance particularly in social media messages that feed their specific needs such as emotional release or social interaction. In the context of Twitter, such messages are most likely to be retweeted. Hence, examining the characteristics of message plausibility including medium-specific features (hashtags and URLs), the presence of image, the use of "@" sign to direct message to others, and expressions of emotions in tandem with message retweetability may provide a better understanding of the rumor and rumor correction retransmission.

Research Model

Following the theoretical considerations described above, we developed a research model as shown in Figure 1. It comprises four constructs, namely, source credibility, message plausibility, type, and retransmission. Each construct is discussed in the ensuing subsections.

Source Credibility

In Twitter studies, the focus of source credibility has been on user's experience and connectivity (Chen, 2011). Experience encompasses the seniority and activity level of Twitter users. While there is a significant positive relationship between seniority and message retweetability (Suh, Hong, Pirolli, & Chi, 2010), findings on the activity level and message retweetability have been inconsistent (Castillo, Mendoza, & Poblete, 2011; Stieglitz & Dang-Xuan, 2013).

Connectivity refers to user relationships in a network. Individuals gain influence through the relationships they build (Resnick et al., 2000). On Twitter, the number of followers and friends is thus good proxies for a user's influence. However, on whether these indicators lead to retweeting decisions, findings appear conflicting (Bastos, Raimundo, & Travitzki, 2013; Suh et al., 2010). More empirical investigation is thus needed. This article proposes Hypothesis 1a as follows:

Hypothesis 1a: Source credibility, namely experience and connectivity, are correlated with retransmission.

Message Plausibility

Extant works have found a strong relationship between message plausibility and retransmission (Lee, Agrawal, & Rao, 2015; Suh et al., 2010). Most of these works examine message plausibility in terms of medium-specific features such as usage of hashtags and URLs in tweets. However, since the emotional and social aspects embedded in the message may also influence retweeting decisions, this article expands the conceptualization of message plausibility to include four characteristics, namely, medium-specific features, image, mention, and emotions.

Medium-specific features on Twitter such as hashtags and URLs are commonly used by users. Hashtags refer to user-generated keywords prefixed by a hash symbol (#; Cislaru, 2015). They make tweets more easily searchable and hence more retweetable. URLs are links pointing to external information sources to overcome the 140-character length constraint on Twitter (Honeycutt & Herring, 2009). A message with URL is enriched with meanings and feelings, which in turn could increase its retweetability.

Image refers to the presence of an image in a message. All else being constant, a message carrying an image will appear more compelling than one which does not. Since visual appeal has been identified as an important cue for rumor retransmission (Liu et al., 2014), it is conceivable that presence of image in a tweet enhances retweetability.

Mention is the use of @ sign to direct messages to others. Twitter users use mentions to address and converse with others (Honeycutt & Herring, 2009). In a rumoring situation characterized by ambiguity and fear, users find solace by sharing information and maintaining relationships with each other. Hence, the use of mention could be correlated with the retransmission.

Emotions are invariably at play in rumor diffusion (Rosnow, 1988). This is why urban legends were found more likely to be passed along if they evoked greater disgust (Heath et al., 2001). Moreover, rumors tend to be more emotional than nonrumors (Kwon, Bang, Egnoto, & Rao, 2016). When the emotional overtones embedded in a message resonate with the receiver, the message is likely to be retransmitted (Stieglitz & Dang-Xuan, 2013). This article proposes Hypothesis 1b as follows:

Hypothesis 1b: Message plausibility, namely medium-specific features, image, mention, and emotions, are correlated with retransmission.

Message Type

Message type refers to the content of the tweet, whether it is a rumor or a rumor correction message. Situations marked by uncertainty are often fertile grounds for rumor-mongering. Sometimes, Twitter users respond by sending correction tweets (Procter et al., 2013). Hence, in a rumor situation, both rumor messages and rumor correction messages could be swirling in Twitter.

Past studies have sought to compare between rumor tweets and correction tweets. For example, URLs were found more prevalently in rumor tweets than in correction tweets. The URLs in rumor tweets were often linked to social media sites such as Instagram, while those in correction tweets point to news media sites such as CNN. Moreover, rumor tweets were found to have less original content than correction tweets did (Maddock et al., 2015; Starbird et al., 2014). However, in terms of their effect on retransmission, the differences between rumor and correction tweets are still relatively unexplored. Therefore, this article proposes Hypotheses 2 and 3 as follows:

Hypothesis 2: Message type is correlated with retransmission.

Hypothesis 3a: Message type moderates the relationship between source credibility and retransmission.

Hypothesis 3b: Message type moderates the relationship between message plausibility and retransmission.

Retransmission

Retransmission on Twitter is enabled by the function of retweeting. A user retweets another user's tweet by typing "RT" at the beginning of the message, followed by username of the original author in @username format.

Informed by previous studies, this article conceptualizes retransmission as the number of times a message was retweeted (Stieglitz & Dang-Xuan, 2013; Sutton et al., 2015). As a signal of the interest generated by a message in the network, it is likely to hold a significant relationship with source credibility and message plausibility (Suh et al., 2010).

Methodology

Data Collection

Lee Kuan Yew, a well-respected political figure in Singapore, passed away on March 23, 2015. As the founding father of Singapore, information about his health was of national interest. After news of his worsening condition was announced on March 17, 2015, rumors about his death flooded the social media. On March 18, 2015, many, including the foreign media were taken in by a doctored screenshot of the Prime Minister's Office announcing his demise. On Twitter, there was a huge number of retweets and a spike was observed that night. To contain the situation, the Prime Minister's Office issued a statement to correct the rumor and made a police report about the fake screenshot. The sizeable retweet volumes of both rumor and rumor correction tweets make this a suitable case for analysis.

A total of 5,885 tweets from March 18, 2015 were collected by applying filters of #lky and #leekuanYew on all tweets generated by about 150,000 Twitter users who declare Singapore as their profile location and share their tweets publicly. The Singapore user set was established by first selecting a seed set of well-known Singapore Twitter users, and applying snowball sampling to include their Singapore-based followers and friends repeatedly until the user set cannot be further expanded. We next collected all tweets from these users using the Twitter's Streaming API. Among the tweets collected, we focus on those covering the major events of Lee's rumored death, from the spread of a doctored screenshot to the official statement from the Prime Minister's Office. The relevant tweets were downloaded along with time stamp and other user-related information, including username, number of followers, number of friends, and the actual message.

This study focuses only on the retweetability of original tweets. Hence, of the 5,885 tweets collected, some 5,000 tweets prefixed with "RT" which represented retweets were removed. After excluding non-English and noisy tweets (i.e., nonrumor-related), a total of 357 original tweets were admitted as the data set for analysis.

Variables

The source credibility and message plausibility were divided into nine variables as shown in Table 1. Experience was operationalized as Seniority and Status, while connectivity was operationalized as Followers and Friends. Seniority refers to the number of days since the user's Twitter account was created. Status refers to the number of tweets posted by the user. Followers is the number of people who follow the user, while Friends is the number of people the user follows.

Message plausibility was operationalized as Medium-specific features, Image, Mention, and Emotions. Medium-specific features encompass Hashtag and URL. Hashtag refers the number of hashtags found in the message. The rest of the variables are dichotomous (1 for presence; 0 for absence). URL and Image refer to the presence of URL link and an attached image respectively (Liu et al., 2014). Mention is the

Table 1. Characteristics Contributing to Retransmission of Rumor and Rumor Correction Tweets.

Variable	Description
<i>Source credibility</i>	
Experience	
Seniority	Number of days since the user created the Twitter account.
Status	Number of tweets posted by the user.
Connectivity	
Followers	Number of people who follow the user.
Friends	Number of people the user follows.
<i>Message plausibility</i>	
Medium-specific feature	
Hashtag	Number of hashtags in a Tweet.
URL	A tweet with URL.
Image	A tweet with image.
Mention	A tweet which contains reference to specific user account (@).
Emotions	A tweet which expresses emotions (positive or negative).
<i>Message type</i>	
Type	A Tweet which corrects (or spreads) the rumor.
<i>Retransmission</i>	
Retweet	Number of times a tweet has been retweeted.

reference to a specific user account with a “@” sign (Oh et al., 2013). Emotions refers to the presence of emotional expressions such as fear, anxiety, gratitude, and hope.

Message type was operationalized simply as Type. It refers to the content of the tweet and is dichotomously coded as 1 for rumor correction and 0 for rumor. Retransmission is defined as a Twitter message that has been retweeted by other users. It is the number of times an original tweet has been retweeted.

All variables were coded objectively by extracting directly from the data set, except for Emotions and Type which required qualitative judgment from human coders. A pilot set of 100 tweets was assigned independently to two coders. The Cohen’s Kappa of Emotions and Type were found to be 0.87 and 0.86 respectively, indicating non-chanced agreement. The remaining set was divided equally among them for further coding.

Analysis

Most original tweets attracted a retweet count of 0 and 1, which resulted in an overdispersion of the dependent variable (10.67 ± 83.05). Hence, negative binomial regression was used to analyze the data (Lee et al., 2015; Sutton et al., 2015). To minimize violations of normality assumption, the following variables were log-transformed (Stieglitz & Dang-Xuan, 2013): Seniority, Status, Followers, and Friends.

To address Hypotheses 1 and 2, the following model was developed:

$$\begin{aligned} \log(\text{Retweet}) = & \beta_0 + \beta_1 \log(\text{Seniority}) + \beta_2 \log(\text{Status}) + \beta_3 \log(\text{Followers}) \\ & + \beta_4 \log(\text{Friends}) + \beta_5 \text{Hashtag} + \beta_6 \text{URL} + \beta_7 \text{Image} \\ & + \beta_8 \text{Mention} + \beta_9 \text{Emotions} + \beta_{10} \text{Type} \end{aligned}$$

To address Hypothesis 3, nine interaction terms were created. We first mean-centered the continuous independent variables, then multiplied the nine variables of source credibility and message plausibility (predictor) and Type (moderator) to reduce multicollinearity problem (Krishnan & Teo, 2012). They were then included in the regression model. The statistical analyses were done using SPSS 22.0 software.

Results

The descriptive statistics of the data set are summarized in Table 2. There are more original rumor correction tweets ($n_{\text{correct}} = 190$) than original rumor tweets ($n_{\text{rumor}} = 167$). The average Retweet generated by each correction message (17.31 ± 113.07) is more than that by each rumor message (3.12 ± 11.36).

The most retweeted rumor and rumor correction messages are presented in Table 3. Interestingly, the most retweeted correction message attracted 15 times as many Retweet as that of the most retweeted rumor message.

The results of negative binomial regression analysis are summarized in Table 4. Model 1 shows the direct effects of source credibility, message plausibility, and message type on retransmission ($R^2 = .31$). Model 2 represents the overall model which shows both the direct and indirect effects on retransmission ($R^2 = .33$). The omnibus tests indicate that the models are statistically significant.

Hypothesis 1a is partially supported. For source credibility, connectivity is correlated with retransmission. Followers, $\text{Exp.}(\beta) = 3.66$, $p < .01$, is positively associated with Retweet. Hypothesis 1b is also partially supported. Message plausibility, namely Medium-specific feature (Hashtag), Image, and Mention are correlated with retransmission. Image, $\text{Exp.}(\beta) = 3.70$, $p < .01$, is positively associated with Retweet, but the converse is true for Hashtag, $\text{Exp.}(\beta) = 0.77$, $p < .05$, and Mention, $\text{Exp.}(\beta) = 0.28$, $p < .01$.

Hypothesis 2 is supported. Type has a significant positive relationship with Retweet, $\text{Exp.}(\beta) = 3.57$, $p < .01$. Additionally, Hypotheses 3a and 3b are also supported. Type moderates the relationship between source credibility and retransmission, as well as that between message plausibility and retransmission (Model 2). The moderation effect is negative between four variables and Retweet, namely, Friend, $\text{Exp.}(\beta) = 0.44$, $p < .1$; URL, $\text{Exp.}(\beta) = 0.16$, $p < .01$; Mention, $\text{Exp.}(\beta) = 0.20$, $p < .01$; and Emotions, $\text{Exp.}(\beta) = 0.22$, $p < .01$.

To afford a more granular perspective, negative binomial regression analysis was done separately for rumor tweets ($R^2 = .21$) and correction tweets ($R^2 = .31$), as shown in Table 5. For rumor tweets, in terms of source credibility, Followers, $\text{Exp.}(\beta) = 5.03$, $p < .01$, and Friends, $\text{Exp.}(\beta) = 2.18$, $p < .05$, are positively associated with Retweet,

Table 2. Descriptive Statistics of the Data Set ($N = 357$).

Variable	Range	<i>M</i>	<i>SD</i>
<i>Source credibility</i>			
<i>Experience</i>			
Log (Seniority)	1.49-3.48	3.14	0.26
Log (Status)	1.52-5.37	4.05	0.66
<i>Connectivity</i>			
Log (Followers)	0.90-5.64	2.65	0.66
Log (Friends)	0-4.69	2.54	0.49
<i>Message plausibility</i>			
<i>Medium-specific feature</i>			
Hashtag	1-6	1.34	0.76
URL	0-1	0.08	0.27
Image	0-1	0.23	0.42
Mention	0-1	0.30	0.46
Emotions	0-1	0.18	0.39
<i>Message type</i>			
Type	0-1	0.53	0.50
<i>Retransmission</i>			
Retweet	0-1,370	10.67	83.05
Retweet ($n_{\text{rumor}} = 167$)	0-86	3.12	11.36
Retweet ($n_{\text{correct}} = 190$)	0-1,370	17.31	113.07

Table 3. The Most Retweeted Rumor and Rumor Correction Messages.

Message type	Rumor message	Rumor correction message
Source (User ID)	1,115,874,631	37,874,853
<i>Experience</i>		
Seniority (days)	783	2,142
Status (posts)	12,302	144,219
<i>Connectivity</i>		
Followers (people)	50,078	429,290
Friends (people)	45	87
Message	#BREAKING #Singapore's founding father PM #LeeKuanYew was pronounced dead on Wednesday due to pneumonia. http://t.co/8dWPRc68ep	Prime Minister's Office is lodging a police report about fake website announcing death of Mr Lee Kuan Yew. #LeeKuanYew
Retransmission	86	1,370

but Status, $\text{Exp.}(\beta) = 0.59$, $p < .1$, is negatively associated with Retweet. In terms of message plausibility, URL, $\text{Exp.}(\beta) = 2.90$, $p < .05$; Image, $\text{Exp.}(\beta) = 3.58$, $p < .01$; and Emotions, $\text{Exp.}(\beta) = 2.19$, $p < .01$, are positively associated with Retweet.

Table 4. Negative Binomial Regression Results ($N = 357$).

	Model 1			Model 2		
	β	SE	Exp.(β)	β	SE	Exp.(β)
Experience						
Log (Seniority)	0.15	0.27	1.16	0.41	0.56	1.50
Log (Status)	-0.18	0.15	0.84	-0.53*	0.28	0.59
Connectivity						
Log (Followers)	1.30***	0.11	3.66	1.61***	0.23	5.03
Log (Friends)	0.08	0.17	1.08	0.78**	0.37	2.18
Medium-specific feature						
Hashtag	-0.26**	0.10	0.77	0.06	0.16	1.06
URL	0.19	0.28	1.21	1.06**	0.42	2.90
Image	1.31***	0.17	3.70	1.28***	0.29	3.58
Mention	-1.28***	0.16	0.28	-0.003	0.39	1.00
Emotions	0.29	0.20	1.33	0.78***	0.24	2.19
Type	1.27***	0.16	3.57	1.96***	0.22	7.10
Type \times Log (Friend)				-0.81*	0.42	0.44
Type \times URL				-1.85***	0.59	0.16
Type \times Mention				-1.61***	0.43	0.20
Type \times Emotions				-1.53***	0.47	0.22
AICc	1700.04			1667.39		
Pseudo R^2	.31			.33		

Note. β = estimated coefficient; SE = standard errors; Exp.(β) = exponentiated estimated coefficient; AICc = Akaike information corrected criterion.

* $p < .1$. ** $p < .05$. *** $p < .01$.

For rumor correction tweets, in terms of source credibility, Followers, Exp.(β) = 3.67, $p < .01$, is positively associated with Retweet, while Status, Exp.(β) = 0.72, $p < .1$, is negatively associated with Retweet. In terms of message plausibility, only Image, Exp.(β) = 2.84, $p < .01$, is positively associated with Retweet, while the converse is true for Hashtag, Exp.(β) = 0.75, $p < .1$; URL, Exp.(β) = 0.46, $p < .1$; Mention, Exp.(β) = 0.20, $p < .01$; and Emotions, Exp.(β) = 0.47, $p < .1$. It is worthwhile to note that URL and Emotions have opposite effect on Retweet of rumor and rumor correction tweets. Moreover, Status, Followers, and Image are stronger predictors for Retweet in rumor tweets than in correction tweets.

To compare retweetability of rumor and correction tweets, Mann-Whitney test was done. Results indicate that Retweet is greater for correction tweets than rumor tweets ($U = 12,143$, $p < .01$).

Discussion

Three major insights emerge from the analysis. First, source credibility and message plausibility were found to have statistically significant relationship with retransmission

Table 5. Negative Binomial Regression Results of Rumor and Rumor Correction Tweets.

	Rumor ($n_{\text{rumor}} = 167$)			Rumor correction ($n_{\text{correct}} = 190$)		
	β	SE	Exp.(β)	β	SE	Exp.(β)
Experience						
Log (Seniority)	0.41	0.56	1.50	0.02	0.31	1.02
Log (Status)	-0.53*	0.28	0.59	-0.33*	0.19	0.72
Connectivity						
Log (Followers)	1.61***	0.23	5.03	1.30***	0.14	3.67
Log (Friends)	0.78**	0.37	2.18	-0.03	0.21	0.97
Medium-specific feature						
Hashtag	0.06	0.16	1.06	-0.29*	0.16	0.75
URL	1.06**	0.42	2.90	-0.79*	0.41	0.46
Image	1.28***	0.29	3.58	1.04***	0.21	2.84
Mention	-0.003	0.39	1.00	-1.62***	0.18	0.20
Emotions	0.78***	0.24	2.19	-0.75*	0.41	0.47
AICc	630.18			1037.35		
Pseudo R^2	.21			.31		

Note. β = estimated coefficient; SE = standard errors; Exp.(β) = exponentiated estimated coefficient; AICc = Akaike information corrected criterion.

* $p < .1$. ** $p < .05$. *** $p < .01$.

as shown in Model 1 of Table 4 ($R^2 = .31$). For source credibility, Followers is positively correlated with Retweet. Moreover, in Model 2, Status and Friends also appear to have negative and positive relationships with Retweet, respectively. This shows that well-connected Twitter users with large number of followers and friends are seen as more credible and thus, their messages are more likely to be retweeted (Stieglitz & Dang-Xuan, 2013; Suh et al., 2010). However, experience does not necessarily lead to more retweets. High posting rate might cause information overload, thereby curtailing users' motivation to retweet (Stieglitz & Dang-Xuan, 2013). The results also suggest that source credibility is a composite concept comprising different variables which may be at odds with each other in the process of retransmission.

For message plausibility, consistent with prior research, Image is positively correlated with Retweet (Liu et al., 2014). Model 2 also shows that tweets with URL and Emotions are more likely to be retweeted (Suh et al., 2010; Sutton et al., 2015). In the context of this study, tweets related to the death hoax of Singapore's founding father could have motivated users to follow the links to acquire more information, and stirred users' emotions, which fuelled retweeting decisions. This confirms that rumors circulate within a specific social and political context (Bernardi, Cheong, Lundry, & Ruston, 2012). However, contrary to prior literature (Stieglitz & Dang-Xuan, 2013; Suh et al., 2010), the results show the use of Hashtag and Mention actually reduce retweetability. This could imply that in an inauspicious scenario involving the rumored death of a

well-respected figure, Twitter users are more compelled by the simplicity and succinctness of the message. Furthermore, they have little interest in using Twitter as a conversational tool (Kwak, Lee, Park, & Moon, 2010).

Second, message type was found to have statistically significant relationship with retransmission as shown in Model 1 of Table 4, $\text{Exp.}(\beta) = 3.57, p < .01$. Moreover, Retweet of rumor correction tweets was statistically significantly higher than that of rumor tweets ($U = 12,143, p < .01$). A possible explanation might be that in a society where the authorities enjoy high perceived credibility, statements issued from official sources to debunk rumors are taken as definitive and tend to motivate corrective behaviors (Fine, 2007). The death hoax was started with a doctored screenshot. Rumor tweets gained momentum initially but soon gave way to correction tweets following a statement from the Prime Minister's Office. This suggests that Twitter users not only look to the government as the source for information veracity but are motivated to serve as the mouthpiece to correct falsehood (Mendoza et al., 2010; Procter et al., 2013).

Third, message type influences the patterns in which source credibility and message plausibility are related to retransmission. In particular, the negative moderating effect on Friends shown in Model 2 of Table 4 becomes more apparent in Table 5. Friends is associated with Retweet of rumor tweets, $\text{Exp.}(\beta) = 2.18, p < .05$, but not with that of correction tweets. On the other hand, a larger number of followers has a stronger relationship with Retweet of rumor tweets, $\text{Exp.}(\beta) = 5.03, p < .01$, than with correction tweets, $\text{Exp.}(\beta) = 3.67, p < .01$. This suggests that when a rumor tweet first merges, users make credibility assessment based on sender's connectivity. However, when correction tweets appear, users tend to rely less on that in making retweeting decisions.

Moreover, message type has a negative moderating effect on URL, $\text{Exp.}(\beta) = 0.16, p < .01$; Mention, $\text{Exp.}(\beta) = 0.20, p < .05$; and Emotions, $\text{Exp.}(\beta) = 0.22, p < .01$. Further analysis in Table 5 sheds more light on these moderating relationships. Specifically, URL is positively associated with Retweet in rumor tweets, $\text{Exp.}(\beta) = 2.90, p < .05$, but negatively associated with Retweet in correction tweets, $\text{Exp.}(\beta) = 0.46, p < .1$. This shows that a tweet with URL appears to be more attractive when users are seeking information about the rumor. However, it would quickly be replaced by tweets with clear corrective message without URL. While positive relationship between Emotions and Retweet was found in rumor tweets, negative relationship was found in correction tweets. Consistent with prior research (Rosnow, 1988), viral rumor messages are invariably laden with emotional content. As for rumor correction messages, users do not seem to be moved by expressions of emotions. Also, Image is more strongly associated with Retweet of rumor tweets, $\text{Exp.}(\beta) = 3.58, p < .01$, than with that of correction tweets, $\text{Exp.}(\beta) = 2.84, p < .01$. This stems from the fact that users tend to respond readily to visual cues in rumor tweets in the absence of any verification mechanism (Petty & Cacioppo, 1986).

Conclusion

This article investigates the relationships among source credibility, message plausibility, message type, and retransmission in a rumoring situation. In relation to Research

Question 1, it was found that source credibility and message plausibility are correlated with retransmission. Specifically, in terms of source credibility, Follower has a significant positive relationship with Retweet. In terms of message plausibility, Image is positively related to Retweet, Hashtag, and Mention are negatively related to Retweet. In relation to Research Question 2, it was found that rumor correction tweets were retweeted more than rumor tweets. In relation to Research Question 3, message type negatively moderates the relationship between four variables and Retweet, namely, Friend, URL, Mention, and Emotions.

The findings of this article offer implications for both theory and practice. On the theoretical front, it extends uses and gratification theory by showing that some of needs underpinning media choice such as emotional release are applicable to the study of rumor retransmission. It also extends current rumor studies by highlighting the role of positive emotions in message retransmission. While past research identified the differences between rumor and correction tweets, this article examines the differences in terms of their retweetability. In the context of a society where authorities enjoy high perceived credibility and who act fast to issue definitive statements to quell rumors, correction tweets are more likely to be retransmitted than rumor tweets.

On the practical front, this study holds a few implications for organizations including government agencies and businesses. First, due to the influence of source credibility on retransmission, organizations should regularly monitor messages posted by users who have many followers. In particular, they need to be watchful for rumor content that bear images and are laden with emotions because such content has the potential to turn viral quickly. Next, rumors must be managed through carefully crafted correction messages. The findings advocate the use of simple, rational message without making reference to a specific user account. Furthermore, correction messages can be sent to those with larger numbers of follower to enhance retweetability.

Three limitations inherent in this article should be acknowledged. One, the analysis is based on one single case study about the rumored death of a political figure. Caution needs to be exercised while making generalizations from the results. Two, this article focuses only on Twitter data. Messages from other popular platforms such as Facebook and Instagram were excluded. Finally, as with any research using Twitter, sampling bias could not be eliminated (Procter et al., 2013). Besides, a Twitter account may not necessarily belong to a unique individual with only one account. Without access to actual users, there is limited data richness.

For the future, several research directions can be identified. One possible direction would be to investigate the relationship between these factors and retransmission speed. This helps deepen our understanding of retweeting behaviors on Twitter. Another possible area would be to extend the analysis to other incidents to strengthen the robustness of the proposed model. Future research could examine the rumor life cycle to understand the spread of rumor and rumor correction and evaluate their impact. Carrying out interviews with actual users would also help enrich the study.

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References

- Bastos, M., Raimundo, R., & Travitzki, R. (2013). Gatekeeping Twitter: Message diffusion in political hashtags. *Media, Culture & Society, 35*, 260-270.
- Bernardi, D., Cheong, P., Lundry, C., & Ruston, S. (2012). *Narrative landmines: Rumors, Islamist extremism, and the struggle for strategic influence*. New Brunswick, NJ: Rutgers University Press.
- Castillo, C., Mendoza, M., & Poblete, B. (2011, March). *Information credibility on twitter*. Paper presented at the Proceedings of the 20th International Conference on World Wide Web, Hyderabad, India.
- Chen, G. (2011). Tweet this: A uses and gratifications perspective on how active Twitter use gratifies a need to connect with others. *Computers in Human Behavior, 27*, 755-762.
- Cislaru, G. (2015). Emotions in tweets: From instantaneity to preconstruction. *Social Science Information, 54*, 455-469.
- DiFonzo, N., & Bordia, P. (2007). *Rumor psychology: Social and organizational approaches*. Washington, DC: American Psychological Association.
- DiFonzo, N., Bordia, P., & Rosnow, R. (1994). Reining in rumors. *Organizational Dynamics, 23*(1), 47-62.
- Fine, G. (2007). Rumor, trust and civil society: Collective memory and cultures of judgment. *Diogenes, 54*(1), 5-18.
- Garrett, R. (2011). Troubling consequences of online political rumoring. *Human Communication Research, 37*, 255-274.
- Heath, C., Bell, C., & Sternberg, E. (2001). Emotional selection in memes: The case of urban legends. *Journal of Personality and Social Psychology, 81*, 1028-1041.
- Honeycutt, C., & Herring, S. (2009, January). *Beyond microblogging: Conversation and collaboration via Twitter*. Paper presented at the Proceedings of the 42nd Hawaii International Conference on System Sciences, Waikoloa, Big Island, HI, USA.
- Katz, E., Blumler, J., & Gurevitch, M. (1974). Utilization of mass communication by the individual. In J. G. Blumler & E. Katz (Eds.), *The uses of mass communications: Current perspectives on gratifications research* (pp. 19-32). Beverly Hills, CA: Sage.
- Katz, E., & Lazarsfeld, P. (1955). *Personal influence: The part played by people in the flow of mass communications*. Glencoe, IL: Free Press.

- Krishnan, S., & Teo, T. (2012). Moderating effects of governance on information infrastructure and e-government development. *Journal of the American Society for Information Science and Technology*, 63, 1929-1946.
- Kwak, H., Lee, C., Park, H., & Moon, S. (2010, April). *What is Twitter, a social network or a news media?* Paper presented at the Proceedings of the 19th International Conference on World Wide Web, Raleigh, NC, USA.
- Kwon, K, Bang, C., Egnoto, M., & Rao, H. (2016). Social media rumors as improvised public opinion: Semantic network analyses of twitter discourses during Korean saber rattling 2013. *Asian Journal of Communication*, 26, 201-222.
- Lee, J., Agrawal, M., & Rao, H. (2015). Message diffusion through social network service: The case of rumor and non-rumor related tweets during Boston bombing 2013. *Information Systems Frontiers*, 17, 997-1005.
- Liu, F., Burton-Jones, A., & Xu, D. (2014, June). *Rumors on social media in disasters: Extending transmission to retransmission*. Paper presented at the Proceedings of the Pacific Asia Conference on Information Systems, Chengdu, China.
- Lua, E., Chen, R., & Cai, Z. (2011, December). *Social trust and reputation in online social networks*. Paper presented at the Proceedings of the 17th International Conference on Parallel and Distributed Systems, Tainan, Taiwan.
- Maddock, J., Starbird, K., Al-Hassani, H., Sandoval, D., Orand, M., & Mason, R. (2015, March). *Characterizing online rumoring behavior using multi-dimensional signatures*. Paper presented at the Proceedings of the 18th ACM Conference on Computer Supported Cooperative Work & Social Computing, Vancouver, Canada.
- Mendoza, M., Poblete, B., & Castillo, C. (2010, July). *Twitter under crisis: Can we trust what we RT?* Paper presented at the Proceedings of the First Workshop on Social Media Analytics, Washington, DC, USA.
- Oh, O., Agrawal, M., & Rao, H. (2013). Community intelligence and social media services: A rumor theoretic analysis of tweets during social crises. *MIS Quarterly*, 37, 407-426.
- Petty, R., & Cacioppo, J. (1986). *Communication and persuasion: Central and peripheral routes to attitude change*: New York, NY: Springer.
- Procter, R., Vis, F., & Voss, A. (2013). Reading the riots on Twitter: Methodological innovation for the analysis of big data. *International Journal of Social Research Methodology*, 16, 197-214.
- Resnick, P., Kuwabara, K., Zeckhauser, R., & Friedman, E. (2000). Reputation systems. *Communications of the ACM*, 43(12), 45-48.
- Rogers, E. (2003). *Diffusion of innovations* (5th ed.). New York, NY: Free Press.
- Rosnow, R. (1988). Rumor as communication: A contextualist approach. *Journal of Communication*, 38(1), 12-28.
- Shibutani, T. (1966). *Improvised news: A sociological study of rumor*. Indianapolis, IN: Bobbs-Merrill.
- Starbird, K., Maddock, J., Orand, M., Achterman, P., & Mason, R. (2014, March). *Rumors, false flags, and digital vigilantes: Misinformation on twitter after the 2013 Boston marathon bombing*. Paper presented at the Proceedings of the iConference Berlin, Germany.
- Stieglicz, S., & Dang-Xuan, L. (2013). Emotions and information diffusion in social media: Sentiment of microblogs and sharing behavior. *Journal of Management Information Systems*, 29, 217-248.
- Suh, B., Hong, L., Pirulli, P., & Chi, E. (2010, August). *Want to be retweeted? Large scale analytics on factors impacting retweet in Twitter network*. Paper presented at the Proceedings

of the 2010 IEEE Second International Conference on Social Computing, Minneapolis, MN, USA.

Sutton, J., Gibson, C., Spiro, E., League, C., Fitzhugh, S., & Butts, C. (2015). What it takes to get passed on: Message content, style, and structure as predictors of retransmission in the Boston Marathon bombing response. *PLoS ONE*, *10*, e0134452. doi:10.1371/journal.pone.0134452

Takayasu, M., Sato, K., Sano, Y., Yamada, K., Miura, W., & Takayasu, H. (2015). Rumor diffusion and convergence during the 3.11 earthquake: A twitter case study. *PLoS ONE*, *10*, e0121443. doi:10.1371/journal.pone.0121443

Zeng, L., Starbird, K., & Spiro, E. (2016, January). *Rumors at the speed of light? Modeling the rate of rumor transmission during crisis*. Paper presented at the Proceedings of the 49th Hawaii International Conference on System Sciences (HICSS), Koloa, HI, USA.

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