

Why people spread rumors on social media: developing and validating a multi-attribute model of online rumor dissemination

Multi-attribute
model of online
rumor
dissemination

1227

Yung-Cheng Shen

*Graduate Institute of Management, National Taiwan Normal University,
Taipei, Taiwan*

Crystal T. Lee

Business School, Shantou University, Shantou, China

Ling-Yen Pan

*Research Center for Humanities and Social Sciences, Academia Sinica,
Taipei, Taiwan, and*

Chung-Yuan Lee

*Graduate Institute of Management, National Taiwan Normal University,
Taipei, Taiwan*

Received 11 September 2020
Revised 26 February 2021
Accepted 15 March 2021

Abstract

Purpose – Dealing with online rumors or fake information on social media is growing in importance. Most academic research on online rumors has approached the issue from a quantitative modeling perspective. Less attention has been paid to the psychological mechanisms accounting for online rumor transmission behavior on the individual level. Drawing from the theory of stimulus–organism–response, this study aims to explore the nature of online rumors and investigate how the informational characteristics of online rumors are processed through the mediation of psychological variables to promote online rumor forwarding.

Design/methodology/approach – An experimental approach to this issue was taken; the researchers investigated how the informational characteristics of online rumors and the psychological mediators promote online rumor transmission.

Findings – Four information characteristics (sense-making, funniness, dreadfulness and personal relevance) and three psychological motivators (fact-finding, relationship enhancement and self-enhancement) promote online rumor-forwarding behavior.

Originality/value – Because any online rumor transmitted on social media can go viral, companies may eventually encounter social media-driven crises. Thus, understanding what drives rumor-forwarding behavior can help marketers mitigate and counter online rumors.

Keywords Online rumor, Social media, Rumor transmission behavior, Information characteristics

Paper type Research paper

1. Introduction

The outbreak of the pandemic COVID-19 has made social media an important channel for people to discuss and exchange information about the pandemic. The term “infodemic” (information and pandemic) is coined to describe the rapid and far-reaching spread of both accurate and inaccurate information (Apuke and Omar, 2021). Rumors pertaining to the

Funding: This work was supported by the Shantou University STU Scientific Research Initiation Grant [STF20010] and by the Natural Science Foundation of Guangdong Province, Guangdong Basic and Applied Basic Research Foundation Grant [2021A1515012259].

The authors would like to thank anonymous referees of this journal for their constructive comments, and the Editor for her support and encouragement.



pandemic are frequently found on the internet during this time of global panicking. For example:

- (1) “Bill Gates is planning to use a microchip in the vaccine to track people’s movements and to identify people who have been tested for COVID-19.”
- (2) “Only 1% of COVID-19 patients will die from the disease, but the vaccine has a fatality rate higher than that.”
- (3) “The big pharmaceutical companies that develop these vaccines are just trying to make money by paying doctors to proclaim their products are safe.”
- (4) “People who have already contracted the COVID-19 virus do not need the vaccine” ([County of Los Angeles Public Health, 2020](#)).

These pandemic rumors would not only mislead users, hinder pandemic prevention and control, but also may endanger lives.

Because anyone can be an author on social media, information from unverified sources can be created and disseminated easily ([Liang and Yang, 2015](#); [Sharma et al., 2020](#)). Social networking services (SNSs) have become a main source of political news, dramas, crime stories and celebrity news and gossip, with just under half (45%) of Americans obtaining news on Facebook ([Shearer and Gottfried, 2017](#)). Research suggests that users are concerned about the rumors that infiltrate the online environment, with one survey reporting that 73% of users think that social media is most responsible for rumor dissemination ([eMarketer, 2018](#)). In another survey, 49% of social media users reported that they had shared news online that they later found was made up. However, 10% of surveyed adults admitted that they have deliberately published hoaxes and misleading information online ([Watson, 2020](#)).

A number of terms have been used to describe this more or less overlapping concept of online rumors, including internet rumors, netlore and fake news. As a specific form of online rumor, fake news on the internet has become a focus of attention in recent years. Fake news and hoax stories may cause an existential crisis for social media, such as public criticism, reduced stock prices and volatility in companies’ profit margins and reputations ([Shinal, 2017](#)). Controversies surrounding fake news are still much debated today. Thus, understanding what drives rumor-forwarding behavior can help marketers take actions against harmful online rumors ([Pal et al., 2017, 2020](#)).

The present study investigated the phenomenon of rumor-forwarding behavior on social media. Academic research on rumors has mostly employed a quantitative modeling approach to the issue. From this perspective, researchers have studied issues such as online rumor spreading patterns in social network structures ([Borge-Holthoefer et al., 2013](#); [Dong et al., 2018](#); [Xu et al., 2019](#); [Zhu et al., 2019](#)); analyses of specific rumors on social media ([Chua and Banerjee, 2018](#); [Zhang et al., 2015](#)); individual differences in the intention to spread rumors ([Al-Garadi et al., 2016](#); [Qian et al., 2015](#)); and rumor detection, control and debunking strategies ([Pal et al., 2017, 2020](#); [Wen et al., 2014](#); [Zhang et al., 2019](#)).

Despite this abundance of literature, little research has examined the psychological issues of how the information characteristics of online rumors interact with psychological factors to influence rumor-forwarding behavior. Different from previous studies, the present study takes an experimental approach of information processing to address how online rumors are spread as a function of their information characteristics. This information processing approach can complement the literature and provide a more complete understanding of online rumors. Drawing from the stimulus–organism–response (S-O-R) model ([Mehrabian and Russell, 1974](#)), this study proposes an integrated model of rumor spreading on SNSs. We examined the effects of a set of empirically determined information characteristics of the online rumors (stimuli) that affect the rumor receivers’ motivations (organism) and the rumor dissemination behavior (response).

2. Literature review and research hypotheses

2.1 *Online rumors*

Rumors are “unverified and instrumentally relevant information statements in circulation that arise in contexts of ambiguity, danger, or potential threat, and that function to help people make sense and manage risk” (DiFonzo and Bordia, 2007, p. 23). Empirical semantic network analyses of online rumor transmissions and corrections have been the focus of these studies. Other research has attempted to identify features of online rumors and propose systems to detect, correct and analyze the impact of online rumors (Kwon *et al.*, 2013; Resnick *et al.*, 2014; Zhao *et al.*, 2015). A growing body of research relates to rumors on the internet in general and on social media in particular (Allcott and Gentzkow, 2017; Kwon *et al.*, 2016; Oh *et al.*, 2016; Starbird *et al.*, 2014; Zubiaga *et al.*, 2018). Some of this research has involved empirical analysis of rumor transmissions related to specific incidents, such as fake news during the 2016 US Presidential Election (Allcott and Gentzkow, 2017), North Korean saber rattling (Kwon *et al.*, 2016), the Boston marathon bombing (Starbird *et al.*, 2014), the 2010 Haiti earthquake (Oh *et al.*, 2010) and COVID-19 (Apuke and Omar, 2021).

A review of the relevant literature reveals that most studies have approached the issue by analyzing the semantic networks of online rumor transmission at the group level (Chua and Banerjee, 2017; Goh *et al.*, 2017; Kim and Bock, 2011; Liu *et al.*, 2014; Oh *et al.*, 2016), revealing that although numerous topics related to online rumors have been addressed, relatively little attention has been directed toward the specific informational characteristics of online rumors themselves that influence recipients' rumor-forwarding behavior. The present study attempts to fill this gap by providing a model of online rumors that relates to the informational characteristics of online rumors and recipients' motivational characteristics to explain online rumor-forwarding behavior.

2.2 *Stimulus–organism–response theory*

In the S-O-R theory, the stimulus represents environmental or situational variables, the organism represents internal cognition and emotions, and the response represents behavioral or psychological outcomes (Mehrabian and Russell, 1974). The theory has been widely adopted in research of online information and social media. For example, Bigne *et al.* (2020) proposed a revised the S-O-R model to provide a comprehensive understanding of pictorial content in online reviews. They observed online review credibility, informativeness, persuasiveness and helpfulness as stimuli, empathy, pleasure, arousal and trust as organisms, and intention to visit the restaurant as responses. Another study proposed that the emotions of pleasure, arousal and control (organism) that are triggered by online advertorial attributes (stimuli, i.e. perceived informativeness, credibility, irritation and entertainment) play a mediating role in affecting user acceptance and purchase intentions toward products promoted in online advertisements (response; see Chang *et al.*, 2018). On the basis of the S-O-R process, the communication quality of virtual travel communities as stimuli (accurate, up-to-date, useful and understandable) affected online commitment and trust (organisms) and online stickiness (response; see El-Manstrly *et al.*, 2020). Another recent study investigated online rumor rebuttals that used perceived message properties of rebuttal (informativeness, credibility and persuasiveness) as stimuli and perceived hedonic and utilitarian value as organisms, both of which affected intention to believe and share rumor rebuttals as response (Pal *et al.*, 2020).

According to the S-O-R theory, it is postulated that information characteristics (as stimuli) would influence online rumor-forwarding (as responses) through the mediation of psychological factors (as organism). The actual information characteristics in the present study were determined empirically through a qualitative pilot study in which participants classified online rumors based on their perceived commonalities. The result of the pilot study

concluded with four major information characteristics: sense-making, funniness, dreadfulness and personal relevance. Then, the key research hypotheses were developed accordingly to describe how these informational characteristics affect psychological mediators, which in turn affect the rumor-forwarding behavior. The following sections provide a detailed description of the rationale of the research hypotheses.

2.3 Stimuli: information characteristics of online rumors

2.3.1 Sense-making. Sense-making refers to the degree to which online rumors are perceived to be truthful or believable. To believe that specific information is true implies that the information receivers must find facts to verify that information. That is, rumor information that varies in its degree of sense-making would motivate online rumor receivers to find factual information about the online rumors. This relationship is particularly salient, given [DiFonzo and Bordia's \(2007\)](#) description of rumors as “unverified and instrumentally relevant information statements in circulation that arise in contexts of ambiguity, danger, or potential threat, and that function to help people make sense and manage risks.”

[Cavazza and Guidetti \(2014\)](#) observed that in both positive and negative online reviews, false information that does not make sense can induce suspicion, thereby reducing the global attitudinal evaluation of the attitudinal object (restaurants in this case). [Criss et al. \(2015\)](#) found that pregnant women used the internet to retrieve pregnancy-related information and considered it reliable. If the information appeared to make sense and was considered reliable but was rarely discussed with their clinician, pregnant women would search online to help validate the information. Finally, in an effort to measure rumor transmission during the Great Japan Earthquake (the Fukushima earthquake and tsunami) in 2011, [Tanaka et al. \(2012\)](#) found that the accuracy rate was higher in the rumor criticism condition than in the rumor condition, and the difference in the accuracy rate between the rumor condition and the criticism condition was greater in the self-accuracy condition (participants' self-assessment of the accuracy of the rumor) than in the others' accuracy condition (participants' predictions of other people's assessment of the accuracy of the rumor). Rumor criticism behavior can be viewed as the act of finding facts about the rumor ([Tanaka et al., 2012](#)). Therefore, it is predicted that the sense-making of online rumor information may positively influence fact-finding:

H1. Sense-making is positively associated with fact-finding.

Information that appears to make sense or sounds truthful or believable may also be related to self-enhancement. Telling truthful or sense-making information that appears to make sense may help boost people's self-image. Research has suggested that people may prefer to tell truth in part because they want to maintain a positive self-image ([Bénabou and Tirole, 2002](#); [Fischbacher and Föllmi-Heusi, 2013](#)). Self-enhancement is positively correlated with many positive personality traits, including prosocial behavior, generosity and truth-telling ([Ellingsen and Johannesson, 2004](#); [Gneezy et al., 2012](#)). Therefore, it is hypothesized that online rumor information that makes sense may help enhance people's self-image:

H2. Sense-making is positively associated with self-enhancement.

2.3.2 Funniness. Funny or humorous messages influence self-enhancement. Individuals' perceptions of humorous and funny messages are a reflection of who they are, how they perceive themselves and how other people see them. In studying the role of self-enhancement in sharing online messages, [Taylor et al. \(2012\)](#) obtained evidence to support the hypothesis that the entertainment value of electronic word-of-mouth (eWOM) messages positively influences self-enhancement. Evidence from additional studies also supports the idea that disparaging humor functions to enhance one's social identity ([Meyer, 2000](#); [Ruscher, 2001](#)).

Finally, the meaning approach of information processing suggests that the interpretation and construction of “the meanings of messages entails the concepts of the self, of the family, of status, of the nation, and of the world” (McCracken, 1987, p. 121). The construction of humorous or funny meanings of messages may accordingly reflect one’s self identity. Based on the relevant literature, a hypothesis is proposed regarding the relationship between the funny characteristics of online rumors and the self-enhancement motivation:

H3. Funniness is positively associated with self-enhancement.

Abundant literature has established the positive relationship between humor and interpersonal relationships (Robert *et al.*, 2016; Zhao *et al.*, 2014). For example, humor or funny information can facilitate liking and closeness in interpersonal relations (Cann and Matson, 2014; Treger *et al.*, 2013). A sense of humor enables people to socially connect with others (Mireault and Reddy, 2016; Wisse and Rietzschel, 2014). Humor is also thought to contribute to sexual attraction (Mireault and Reddy, 2016; Wilbur and Campbell, 2011). Cann and Matson (2014) also found that different humor styles are related to social desirability or undesirability. Therefore:

H4. Funniness is positively associated with relationship enhancement.

2.3.3 Dreadfulness. Research showed that the fear emotions out of the dreadful rumors would drive people to look for additional information or factual knowledge. Dedeoglu and Ventura (2017) showed that in response to the fear of the swine flu news, people would collect information from scientific sources to alleviate the fear emotion and to improve rational responses. Moreover, dreadful rumors associated with the fear emotion imply possible risks or uncertainties that would drive people to seek factual knowledge of information to help with their coping strategies (Keller *et al.*, 2020; Chowdhury *et al.*, 2011). Past research has shown that the fear appeal would elicit appraisals of uncertainty and situational controls (Lerner *et al.*, 2003; Roskos-Ewoldsen *et al.*, 2004). Lerner *et al.* (2003) showed that the fear emotion aroused as a result of the terrorist attack would induce risk perception. The fear-arousing stimuli can lead people to perceive threat (Roskos-Ewoldsen *et al.*, 2004) and uncertainty (Lerner *et al.*, 2003). The risk and/or uncertainty perception, in turn, would drive people to seek information or factual knowledge to help reduce the risky or uncertain perception and to make decisions (Keller *et al.*, 2020; Chowdhury *et al.*, 2011) and/or to engage in the danger control process (Roskos-Ewoldsen *et al.*, 2004) by collecting factual knowledge to improve rational responses (Dedeoglu and Ventura, 2017). In sum, upon facing risks or uncertainties, people would seek information that would help with their decisions. Therefore, it is hypothesized that dreadful rumors would bring in risk or uncertainty perception that would prompt people to find factual knowledge or information to reduce the risk perception and improve decision-making:

H5. Dreadfulness is positively associated with fact-finding.

Dreadfulness is also predicted to enhance an individual’s social relationships for several reasons. DiFonzo and Bordia (2007) suggested that people may disseminate rumors of a horrific nature as a warning to others to be aware of potentially unfortunate events. In addition, scholars suggested that people disseminate rumors not to reduce anxiety but to attract attention and thus enhance their social relationships, and dreadful or horrific information tends to generate strong feedback in the form of attention (Guerin *et al.*, 2004; Guerin and Miyazaki, 2006). Thus:

H6. Dreadfulness is positively associated with relationship enhancement.

2.3.4 Personal relevance. It is a natural human tendency to process personally relevant or important information with scrutiny. The elaboration likelihood model asserts that

consumers with high involvement take the central route to process product-relevant information with significant cognitive effort (Petty *et al.*, 1983). A similar conceptualization of customer involvement can also be found in the systematic-heuristic processing model (Chaiken and Eagly, 1989). To make important or personally relevant choices, individuals often collect factual information, knowledge or evidence to support their decisions (Beverland and Farrelly, 2009; Hung and Li, 2007). Thus, it follows that personally relevant online rumor information may prompt people to find relevant facts about that information as the basis for their subsequent decisions. Therefore:

H7. Personal relevance is positively associated with fact-finding.

Finally, research has established that people pay attention to personally relevant information that may influence their self-enhancement (Reed and Aspinwall, 1998; Sedikides, 1993). Other studies have revealed cultural differences, in which people in individualistic cultures tend to pay more attention to positive self-relevant information that positively influences their self-enhancement, whereas people in collective cultures tend to pay more attention to negative self-relevant information that may negatively influence their self-enhancement (Heine *et al.*, 2001). Other researchers have disagreed, arguing instead that self-enhancement is a universal phenomenon, but its manifestation is strategically sensitive to cultural context (Gaertner *et al.*, 2008; Sedikides *et al.*, 2007). In either case, the personal relevance of information is related to self-enhancement motivation. Thus:

H8. Personal relevance is positively associated with self-enhancement.

2.4 Organism: psychological motivations for rumor dissemination

2.4.1 Fact-finding. Research has indicated that factual information promotes information sharing and dissemination (Ashford and Black, 1996; Berger, 1987; Berger and Bradac, 1982; DiFonzo and Bordia, 2007). Huang *et al.* (2011) observed that word-of-mouth information perceived to be authentic positively influenced acceptance and resending of the WOM information. Hautz *et al.* (2014) determined that user-generated online videos have a positive impact on the perception of expertise, which in turn may positively influence the intention to share such videos with others. Moreover, DiFonzo and Bordia (2007) argued that several variables may influence fact-finding motivation, such as uncertainty, anxiety, lack of control and importance. Individuals are motivated to search for knowledge to reduce uncertainty and the resulting anxiety of the situation (Ashford and Black, 1996; Berger, 1987; Berger and Bradac, 1982; DiFonzo and Bordia, 2007). On the internet, engaging in fact-finding activities to resolve uncertainty and restore control of a situation requires people to exchange information with each other, which promotes online rumor transmission behavior. Therefore:

H9. Fact-finding is positively associated with online rumor forwarding.

2.4.2 Self-enhancement. Self-enhancement as a motivational factor in the transmission of rumors to achieve the self-serving goal is another motivational factor that was less noticed and has received relatively little attention in the literature (DiFonzo and Bordia, 2007). In one study, self-enhancement was observed to positively influence eWOM participation through the mediation of intrinsic motives (Yoo *et al.*, 2013). In addition, rumors may be transmitted to attain outcomes that are favorable to an individual's self-interest (Mihanovic *et al.*, 1994). This could be achieved by spreading malicious rumors to obtain tangible gains (Kapferer, 1987; Rosnow *et al.*, 1988; Turner, 1993). Transmitting rumors to boost one's self esteem by boosting one's social identity is another approach to self-enhancement that motivates rumor transmission (DiFonzo and Bordia, 2007). Alternatively, rumors can also be transmitted to

rationalize one's self-enhancing attitude, providing aid to the process of justification construction (DiFonzo and Bordia, 2007; Kunda, 1999). Thus:

H10. Self-enhancement is positively associated with online rumor forwarding.

2.4.3 Relationship enhancement. Relationship enhancement is the third motivational factor promoting online rumor transmission (DiFonzo and Bordia, 2007). Huang *et al.* (2011) observed that relational commitment positively influenced intentions of passing-along emails through the mediation of social interaction ties. Individuals who felt obliged to maintain the social relationship would often forward emails containing useful information to others. Additionally, people were more likely to transmit positive than negative rumors, fearing that negative rumors may have a negative effect on the rumor recipient and thus hurt the relationship (Kamins *et al.*, 1997). Although research has revealed that negative rumors were more likely to be transmitted in the context of a close relationship if the negative information was believed to avert the negative consequences for a close friend (Weenig *et al.*, 2001), relationship enhancement is the motivational factor behind the rumor transmission behavior in both cases. Thus:

H11. Relationship enhancement is positively associated with online rumor forwarding.

3. Method

3.1 Pilot study

Two pilot studies were first conducted to construct materials for experiment stimuli. The first pilot study was a focus group discussion in which eight participants were assembled to discuss the phenomenon of online rumors. They were given the definition of online rumors and were asked to recall and write down as many online rumors as they could recall encountering in the past. They were then instructed to classify the rumors based on the similarities of major attributes among these online rumor stories. Four major characteristics emerged: sense-making, funniness, dreadfulness and relevance.

The purpose of the second pilot study was to select online rumor materials for use in the main study, based on the result of the first pilot study. Online stories were selected from four websites concerning online rumors, including (1) Urban Legends (<http://www.urbanlegends.about.com>), (2) Snopes.com (<http://www.snopes.com>), (3) the internet rumors encyclopedia (<http://www.liuyanbaike.com>) and (4) Eastern News online rumor tracking page (<http://www.ettoday.com.tw/etrumour/index.htm>). A factorial combination of four factors with two levels in each factor (i.e. high vs low) yielded 16 versions of online rumor stories. An initial selection produced 32 online rumor stories with two replications for each of the 16 conditions. These online rumor stories were then given to 30 participants for further screening. Participants were asked to rate each story in terms of four information characteristics (sense-making, funniness, dreadfulness and personal relevance).

The results were analyzed to select qualified online rumor stories for the main study. Statistical analyses supported the choices, in that the designated high/low mean value was significantly higher/lower than the low/high mean value on a given characteristic. The range of mean values was 4.10–5.80 for high sense-making, and 1.60–2.73 for low sense-making (with *p*-values testing the differences between high and low sense-making all < 0.001). The range of mean values was 4.50–5.73 for a high level of funniness, and 1.50–2.80 for a low level of funniness (with *p*-values all < 0.001). The range of mean values is 4.27–5.90 for high dreadfulness, and 1.57–3.00 for low dreadfulness (with *p*-values all < 0.001). The range of mean values is 3.45–5.60 for high personal relevance, and 1.53–2.58 for low personal relevance (with *p*-values all < 0.001). The factorial combinations of the four information characteristics with two levels of values (high vs low) for each characteristic yielded 16

conditions of online rumor stories. Sixteen online rumor stories were chosen accordingly for use in the main studies.

3.2 Participants

A total of 461 participants were recruited from the website MTurks (<http://www.mturks.com/>) and participated in the experiment, among them were 182 males and 279 females. In terms of age, 51.8% of participants were aged 21–30 years, and 28.4% of participants were aged 31–40 years.

3.3 Procedure and measures

The study employed a 2 (sense-making: high vs low) \times 2 (funniness: high vs low) \times 2 (dreadfulness: high vs low) \times 2 (personal relevance: high vs low) full between-subject design, in which each participant read only one of the 16 online rumor stories. They were given a story randomly chosen from the pool of 16 articles. The questionnaire was uploaded to the website. Participants were required to register and log in to enter the survey pages. The survey started with the instructions, describing the project as a study concerning people's perception of online articles. They were then instructed to read the article at their own pace. After reading the online rumor story, they proceeded to answer questions measuring the dependent, independent and mediating variables. The dependent variable of the intention to forward online rumors was measured with questions adapted from Harrison-Walker (2001) and Sun *et al.* (2006).

The three motivational variables, namely, fact-finding, relationship enhancement and self-enhancement, were measured with items adapted from DiFonzo and Bordia (2007) and Sudhir and Unnithan (2013). Furthermore, a set of manipulation check questions was administered following the measurements of the dependent and mediating variables. Participants were asked to rate the level of the four information characteristics for the online rumor story they received. The measurement of sense-making was adopted from Carrington and Tayles (2011). Funniness was measured with items adapted from Igbaria *et al.* (1995) and Teo *et al.* (1999). Dreadfulness was measured with items adapted from Dahl *et al.* (2003). Personal relevance was measured with items adapted from Cline and Kellaris (2007). Finally, participants filled out demographic questions, including those on gender, age level, education and occupation. Then, they were given due credit, thanked and dismissed.

4. Result

4.1 Manipulation check

The manipulation check examines whether the perceived characteristics of online rumors matches the designated experimental design. Statistical analyses reveal that the designated high/low mean value is significantly higher/lower than the low/high mean value on a given characteristic. The range of mean values is 4.03–5.47 for high sense-making, and 1.59–3.31 for low sense-making (with *p*-values testing the differences between high and low sense-making ranging between < 0.004 and < 0.001). The range of mean values is 4.07–5.24 for high funniness, and 1.55–3.37 for low funniness (with *p*-values ranging between < 0.006 and < 0.001). The range of mean values is 4.08–5.36 for high dreadfulness, and 1.61–3.28 for low dreadfulness (with *p*-values ranging between < 0.003 and < 0.001). The range of mean values is 3.88–5.27 for high personal relevance, and 1.41–3.37 for low personal relevance (with *p*-values ranging between < 0.02 and < 0.001). Thus, the manipulation check confirms the validity of the data.

4.2 Common method bias

Harman's one-factor test (Podsakoff *et al.*, 2003) shows that the first factor explains about 12.065% of the total variance. Because a single factor does not account for most of the

variance, these results suggest that common method bias does not seem to be a significant issue for the data.

4.3 Model validation

The first step of analyzing the data of the main study is to establish the reliability and validity indices of the theoretical model. The Cronbach α values for constructs of the model were calculated. All Cronbach α values are between 0.75 and 0.95, well above the criterion value of 0.7. The composite reliability (CR) values are between 0.84 and 0.95. The range of factor loadings is between 0.70 and 0.95, well above the 0.5 criterion value. All factor loadings are highly significant. The square roots of the average variance explained (AVE) are all greater than the respective inter-correlations among constructs (Fornell and Larcker, 1981). Also, all heterotrait-monotrait (HTMT) ratios are lower than 0.9, as suggested by Henseler *et al.* (2015). Thus, the discriminant validity of the measurement model is also satisfactory for further analyses. The Cronbach α , CR, AVE and R -square are presented in Table 1, while the square roots of the AVE values along with the inter-correlations among constructs and HTMT ratio are presented in Table 2.

4.4 Hypotheses testing

A partial least squares structural equation modeling (PLS-SEM) analysis is applied to the dataset. The standardized root mean residual (SRMR) for the PLS analysis is 0.08, indicating an appropriate model fit (Hair *et al.*, 2017). This study uses age, gender and education as control variables. The four informational characteristics have impacts on the three psychological motivational variables. Sense-making positively impacts on fact-finding ($\beta = 0.22, p < 0.01$), supporting H1. Sense-making also positively influences self-enhancement ($\beta = 0.34, p < 0.001$). Therefore, H2 is also supported. Funniness also positively impacts on self-enhancement ($\beta = 0.23, p < 0.001$), supporting H3. Funniness also has a positive effect on relationship enhancement ($\beta = 0.34, p < 0.05$), supporting H4 as well.

Dreadfulness has a significant positive effect on fact-finding ($\beta = 0.28, p < 0.001$), therefore supporting H5. Similarly, dreadfulness also has a positive impact on relationship enhancement ($\beta = 0.27, p < 0.001$). Thus, H6 is also supported. Finally, personal relevance also has a positive impact on fact-finding ($\beta = 0.23, p < 0.01$), supporting H7. Personal relevance also positively impacts on self-enhancement ($\beta = 0.17, p < 0.01$). Therefore, H8 is also supported by the empirical data.

As for the effects of the three psychological motivational variables on rumor-forwarding behavior, fact-finding is found to have a positive impact on the forwarding behavior ($\beta = 0.23, p < 0.001$), supporting H9. Self enhancement also has a positive effect on the forwarding behavior ($\beta = 0.31, p < 0.001$). Hence H10 is also supported. Finally, relationship enhancement also positively impacts on the forwarding behavior ($\beta = 0.39, p < 0.001$), supporting H11. The result of the analyses is presented in Figure 1.

4.5 Mediation analysis

Following the procedure by Nitzl *et al.* (2016), a mediation analysis was conducted. The results show that fact-finding and self-enhancement partially mediated the relationship between sense-making and forwarding. For funniness, self-enhancement and relationship enhancement are full mediators. For dreadfulness, fact-finding and relationship enhancement are full mediators. Last, fact-finding and self-enhancement are complementary mediators for personal relevance. The results of the mediation analysis are shown in Table 3.

Item	Factor loading
<i>Fact-finding</i> ($\alpha = 0.95$, CR = 0.96, AVE = 0.80)	
I would intend to verify whether this article is true or not	0.86
I would like to check out the whether this article is true or not	0.93
I need to check out the truthfulness of this article	0.92
I am motivated to figure out whether this article is true or false	0.94
I am motivated by a desire to see if this article was true or false	0.79
I am motivated to find out if this Web article is true or not	0.94
<i>Relationship enhancement</i> ($\alpha = 0.81$, CR = 0.89, AVE = 0.73)	
I will share this article to be in touch with others	0.92
Sharing this article will make others want to talk to me more often	0.91
Sharing this article will help me communicate with others	0.71
<i>Self-enhancement</i> ($\alpha = 0.75$, CR = 0.84, AVE = 0.64)	
Sharing this article will make me feel good about myself	0.76
I will be able to influence others by sharing the article	0.78
Sharing this article will help others know about my interests	0.84
<i>Intention to forward</i> ($\alpha = 0.94$, CR = 0.95, AVE = 0.80)	
The article is worth sharing with others	0.90
I will recommend the article to others	0.92
I tend to forward my friends the article	0.91
I like to forward my friends' emails containing information or opinions of the article	0.87
I like forwarding the article from one group of my friends to another	0.88
<i>Sense-making</i> ($\alpha = 0.89$, CR = 0.93, AVE = 0.82)	
I think this article makes sense	0.95
I concur with the content of this article to be sense-making	0.92
I think the messages in this article are reasonable	0.85
<i>Funniness</i> ($\alpha = 0.91$, CR = 0.94, AVE = 0.84)	
This article is exciting	0.86
This article is pleasing	0.94
This article is enjoyable	0.95
<i>Dreadfulness</i> ($\alpha = 0.88$, CR = 0.93, AVE = 0.81)	
This article is shocking	0.81
This article is scary	0.94
This article is frightening	0.94
<i>Personal relevance</i> ($\alpha = 0.89$, CR = 0.93, AVE = 0.76)	
This article relates well	0.89
This article fits well	0.92
This article corresponds well	0.90
This article is important to me	0.77

Table 1.

Measurement items

Note(s): All the factor loadings are significant at $p < 0.001$

5. Discussion

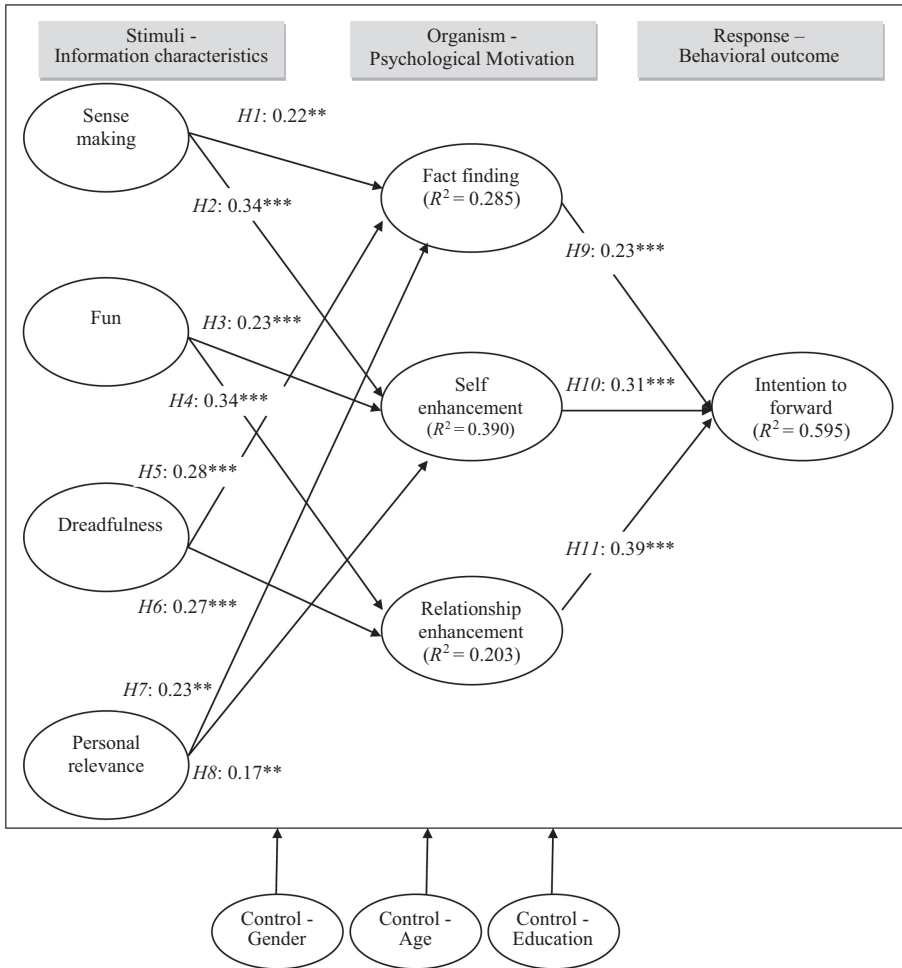
5.1 Summary of findings

An empirical study was conducted to investigate the effects of four online rumor characteristics and three motivational mediators on online rumor-forwarding behavior. The results support the hypotheses that the set of informational characteristics of online rumors affect forwarding behavior through the mediation of three psychological variables.

	1	2	3	4	5	6	7	8
1. Sense-making	<i>0.9</i>							
2. Funiness	0.39 (0.42)	<i>0.92</i>						
3. Dreadfulness	0.06 (0.07)	-0.12 (0.13)	<i>0.9</i>					
4. Personal relevance	0.77 (0.86)	0.5 (0.54)	0.13 (0.14)	<i>0.87</i>				
5. Fact-finding	0.41 (0.44)	0.25 (0.27)	0.32 (0.35)	0.43 (0.46)	<i>0.9</i>			
6. Self-enhancement	0.56 (0.58)	0.45 (0.48)	0.16 (0.16)	0.55 (0.57)	0.48 (0.51)	<i>0.8</i>		
7. Relationship enhancement	0.58 (0.63)	0.32 (0.35)	0.23 (0.27)	0.58 (0.64)	0.45 (0.49)	0.62 (0.64)	<i>0.85</i>	
8. Forwarding	0.71 (0.78)	0.44 (0.47)	0.18 (0.2)	0.73 (0.79)	0.55 (0.57)	0.66 (0.68)	0.68 (0.75)	<i>0.9</i>

Note(s): The values on the diagonal (in italic) are the square root of AVE for each construct; The value in parentheses is HTMT ratio

Table 2.
Discriminant validity



Note(s): $***p < 0.001$

$**p < 0.01$

$*p < 0.05$

Figure 1.
The PLS analysis

5.2 Academic implications

The contributions of the current study are multifold. First, the majority of academic research on online rumors has focused on mathematical modeling of rumor transmission. Relatively little attention has been paid to the psychological information processing of rumor dissemination behavior. The current study addresses this gap by providing experimental evidence that informational characteristics of online rumors can trigger rumor forwarding behavior through the psychological mediators under the S-O-R framework (Mehrabian and Russell, 1974), which provides an overarching paradigm linking the information characteristics of online rumors (stimuli), psychological motivations (organism) and rumor dissemination (response). The results of the current study complement the extant literature of

Paths	Effect size	<i>t</i> -statistics (O/STDEV)	<i>p</i> -values	95% biased-corrected confidence intervals (CI)	
				2.5%	97.5%
Direct effect (P_3)					
Sense-making - > Forwarding	0.23	4.56	0.00	0.13	0.33
Fun - > Forwarding	0.06	1.75	0.08	-0.01	0.13
Dreadfulness - > Forwarding	0.01	0.35	0.72	-0.05	0.07
Personal relevance - > Forwarding	0.24	4.75	0.00	0.14	0.34

Paths	Effect size	<i>t</i> -statistics (O/STDEV)	<i>p</i> -values	95% biased-corrected confidence intervals (CI)		Type of mediation
				2.5%	97.5%	
Indirect effect (P_1P_2)						
Sense-making - > Fact-finding - > Forwarding	0.03	2.69	0.01	0.01	0.07	Partial mediation
Sense-making - > Self-enhancement - > Forwarding	0.06	3.40	0.00	0.03	0.09	Partial mediation
Fun - > Self-enhancement - > Forwarding	0.04	2.97	0.00	0.02	0.07	Full mediation
Fun - > Relationship enhancement - > Forwarding	0.07	4.04	0.00	0.04	0.11	Full mediation
Dreadfulness - > Fact-finding - > Forwarding	0.04	3.83	0.00	0.03	0.07	Full mediation
Dreadfulness - > Relationship enhancement - > Forwarding	0.06	3.69	0.00	0.03	0.09	Full mediation
Personal relevance - > Fact-finding - > Forwarding	0.04	2.56	0.01	0.01	0.07	Partial mediation
Personal relevance - > Self-enhancement - > Forwarding	0.03	2.15	0.03	0.01	0.06	Partial mediation

Table 3. Significance analysis of the direct and indirect effect

mathematical modeling (Chua and Banerjee, 2017; Goh *et al.*, 2017; Kim and Bock, 2011; Liu *et al.*, 2014; Oh *et al.*, 2016) by improving our understanding of people’s behavior of transmitting online rumors.

Second, most research on rumors in general and intent rumors in particular tends to focus on either the study of individual rumor cases or contextual factors that influence rumor transmission. Relatively little attention has been paid to the a more systematic and general theoretical framework (as opposed to individual rumor cases) of how informational characteristics of the rumor can facilitate the online rumor-spreading behavior. Research in other non-rumor contexts has explored this possibility. For instance, McKnight *et al.* (2002) revealed that perceived message credibility is positively related to the message receivers’ willingness to accept information from a website. Cheung *et al.* (2009) demonstrated that the perceived message credibility of eWOM has a positive effect on the eWOM review adoption. In terms of the online rumor context, the current study is among the first to provide analogous insights into how informational characteristics affect rumor transmissions.

Last, the mediational roles of the three psychological motivations in online rumor transmissions also contribute to the extant literature. The mediational analysis revealed the full mediation of self-enhancement and relationship enhancement for funny and dreadful

rumors. One possible insight of these findings is that disseminating online rumors could serve the psychological functions of self-presentation and impression management. Additionally, research has indicated that forwarding messages considered personally relevant to others is considered an altruistically motivated behavior (Ho and Dempsey, 2010). The present finding that personally relevant rumors can trigger fact-finding and self-enhancement motivations seems to indicate that, in addition to altruism, a self-image management or personal growth motivation may be involved in the rumor dissemination behavior.

5.3 Managerial implications

Our findings also bear significant implications for brand/product managers of social media. First, the present results could be used to develop a social listening system that allows companies to monitor social conversations to understand areas of vulnerability and potential triggers of rumors, as well as take pre-emptive actions when necessary. Given the likelihood of information with the four informational characteristics being rumors, conversation contents with the four informational characteristics as key themes may be flagged for further inspections of their rumor nature. Companies can, thus, conduct social listening strategies, incorporate network analytics and sentiment analysis to analyze consumers' comments, and thus identify rumors, rumor participants as well as influencers. Our framework can help build an early detection system for potential brand product related rumor crises. Companies can detect vulnerabilities and take pre-emptive actions to debunk rumors by providing fact-checking information in a timely manner to help deter people from sharing rumors on social media.

Second, our research identifies fact-finding, relationship enhancement and self-enhancement as three important psychological motivations for rumor sharing. Companies can make use of this finding to encourage consumers to debunk rumors. On the one hand, companies can use the data collected by machine learning algorithms to build a collaborative platform (similar to Wikipedia). In this way, every consumer can be encouraged to become a rumor buster or a debunking helper, thereby enhancing their fact-checking, self-enhancement and relationship-enhancement motivations. On the other hand, consumers usually spread rumors without knowing the false nature of the information. Companies or public policy makers can, thus, educate consumers to verify the validity of the information before disseminating, because only disseminating verified authentic information would reinforce their self-image, social relationships and fact-finding motivations, whereas disseminating rumors would only hurt these motivations.

5.4 Limitations and future directions

Despite its potential contributions to academia and industries, the present study is not free of limitations. One possible limitation is the completeness of the informational characteristics. Although four characteristics were studied in the present research, these do not represent an exhaustive list of the informational characteristics that online rumors could have. Other characteristics not included in the present research may be important to online rumor-forwarding behavior. For instance, the information management literature focuses on the role of informational characteristics such as credibility, argument strength and issue relevance (Kim and Bock, 2011; Liang and Yang, 2015; Pal *et al.*, 2017). Future research might examine this possibility and search for these and/or other viable informational characteristics that bear implications for online rumor-forwarding behavior. In addition, the theoretical framework employed in the current study does not exclude the possibilities of other mediators at work. Other motivational variables, such as altruism and reputation (Chang and Chuang, 2011), or socializing and status seeking (Lee and Ma, 2012) might also mediate the

relationship between the informational characteristics of online rumor-forwarding behavior. Future research should also explore this possibility. The final limitation is that our study recruited participants from the USA. Future research can extend the proposed relationship in our model across cultures.

References

- Al-Garadi, M.A., Varathan, K.D., Ravana, S.D., Ahmed, E., Chang, V. and Lv, Z. (2016), "Identifying the influential spreaders in multilayer interactions of online social networks", *Journal of Intelligent and Fuzzy Systems*, Vol. 31 No. 4, pp. 2721-2735.
- Allcott, H. and Gentzkow, M. (2017), "Social media and fake news in the 2016 election", *Journal of Economic Perspectives*, Vol. 31 No. 2, pp. 211-236.
- Apuke, O.D. and Omar, B. (2021), "Fake news and COVID-19: modelling the predictors of fake news sharing among social media users", *Telematics and Informatics*, Vol. 56, p. 101475.
- Ashford, S.J. and Black, J.S. (1996), "Proactivity during organizational entry: the role of desire for control", *Journal of Applied Psychology*, Vol. 81 No. 2, p. 199.
- Bénabou, R. and Tirole, J. (2002), "Self-confidence and personal motivation", *The Quarterly Journal of Economics*, Vol. 117 No. 3, pp. 871-915.
- Berger, A.A. (1987), "Humor: an introduction", *American Behavioral Scientist*, Vol. 30 No. 3, pp. 6-15.
- Berger, C.R. and Bradac, J.J. (1982), *Language and Social Knowledge: Uncertainty in Interpersonal Relations*, Edward Arnold Publishers, London.
- Beverland, M.B. and Farrelly, F.J. (2009), "The quest for authenticity in consumption: consumers' purposive choice of authentic cues to shape experienced outcomes", *Journal of Consumer Research*, Vol. 36 No. 5, pp. 838-856.
- Bigne, E., Chatzipanagiotou, K. and Ruiz, C. (2020), "Pictorial content, sequence of conflicting online reviews and consumer decision-making: the stimulus-organism-response model revisited", *Journal of Business Research*, Vol. 115, pp. 403-416.
- Borge-Holthoefer, J., Meloni, S., Gonçalves, B. and Moreno, Y. (2013), "Emergence of influential spreaders in modified rumor models", *Journal of Statistical Physics*, Springer, Vol. 151 Nos 1-2, pp. 383-393.
- Cann, A. and Matson, C. (2014), "Sense of humor and social desirability: understanding how humor styles are perceived", *Personality and Individual Differences*, Vol. 66, pp. 176-180.
- Carrington, D. and Tayles, M. (2011), "The mediating effects of sensemaking and measurement of the intellectual capital and performance linkage", *Electronic Journal of Knowledge Management*, Vol. 9, pp. 284-295.
- Cavazza, N. and Guidetti, M. (2014), "Swearing in political discourse: why vulgarity works", *Journal of Language and Social Psychology*, Vol. 33 No. 5, pp. 537-547.
- Chaiken, S. and Eagly, A.H. (1989), "Heuristic and systematic information processing within and", *Unintended Thought*, Vol. 212, pp. 212-252.
- Chang, H.H. and Chuang, S.-S. (2011), "Social capital and individual motivations on knowledge sharing: participant involvement as a moderator", *Information and Management*, Vol. 48 No. 1, pp. 9-18.
- Chang, H.H., Wong, K.H. and Chu, T.W. (2018), "Online advertorial attributions on consumer responses: materialism as a moderator", *Online Information Review*, Vol. 42 No. 5, pp. 697-717.
- Cheung, M.Y., Luo, C., Sia, C.L. and Chen, H. (2009), "Credibility of electronic word-of-mouth: informational and normative determinants of on-line consumer recommendations", *International Journal of Electronic Commerce*, Vol. 13 No. 4, pp. 9-38.
- Chowdhury, S., Gibb, F. and Landoni, M. (2011), "Uncertainty in information seeking and retrieval: a study in an academic environment", *Information Processing and Management*, Vol. 47 No. 2, pp. 157-175.

- Chua, A.Y.K. and Banerjee, S. (2017), "Rumor verifications on Facebook: click speech of likes, comments and shares", *Twelfth International Conference on Digital Information Management*, pp. 257-262.
- Chua, A.Y. and Banerjee, S. (2018), "Intentions to trust and share online health rumors: an experiment with medical professionals", *Computers in Human Behavior*, Elsevier, Vol. 87, pp. 1-9.
- Cline, T.W. and Kellaris, J.J. (2007), "The influence of humor strength and humor—message relatedness on ad memorability: a dual process model", *Journal of Advertising*, Vol. 36 No. 1, pp. 55-67.
- County of Los Angeles Public Health (2020), "Myths about COVID-19 vaccines", available at: <http://www.publichealth.lacounty.gov/media/Coronavirus/docs/about/COVID19VaccineMisinformation.pdf> (accessed 19 February 2021).
- Criss, S., Baidal, J.A.W., Goldman, R.E., Perkins, M., Cunningham, C. and Taveras, E.M. (2015), "The role of health information sources in decision-making among Hispanic mothers during their children's first 1000 days of life", *Maternal and Child Health Journal*, Vol. 19 No. 11, pp. 2536-2543.
- Dahl, D.W., Frankenberger, K.D. and Manchanda, R.V. (2003), "Does it pay to shock? Reactions to shocking and nonshocking advertising content among university students", *Journal of Advertising Research*, Vol. 43 No. 3, pp. 268-280.
- Dedeoglu, A.O. and Ventura, K. (2017), "Consumer responses to swine flu (H1N1) threat and fear arousing communications: the case of turkey", in Campbell, C.L. (Ed.), *The Customer Is NOT Always Right? Marketing Orientations in a Dynamic Business World*, Springer, Cham, pp. 249-258.
- DiFonzo, N. and Bordia, P. (2007), "Rumor, gossip and urban legends", *Diogenes*, Vol. 54 No. 1, pp. 19-35.
- Dong, S., Fan, F.-H. and Huang, Y.-C. (2018), "Studies on the population dynamics of a rumor-spreading model in online social networks", *Physica A: Statistical Mechanics and its Applications*, Vol. 492, pp. 10-20.
- El-Manstrly, D., Ali, F. and Steedman, C. (2020), "Virtual travel community members' stickiness behaviour: how and when it develops", *International Journal of Hospitality Management*, Vol. 88, p. 102535.
- Ellingsen, T. and Johannesson, M. (2004), "Promises, threats and fairness", *The Economic Journal*, Vol. 114 No. 495, pp. 397-420.
- eMarketer (2018), "Who's to blame for fake news ads?", *eMarketer*, 3 January, available at: <https://www.emarketer.com/content/who-s-to-blame-for-fake-news-ads> (accessed 26 May 2018).
- Fischbacher, U. and Föllmi-Heusi, F. (2013), "Lies in disguise—an experimental study on cheating", *Journal of the European Economic Association*, Vol. 11 No. 3, pp. 525-547.
- Fornell, C. and Larcker, D.F. (1981), "Structural equation models with unobservable variables and measurement error: algebra and statistics", *Journal of Marketing Research*, Vol. 18 No. 3, pp. 382-388.
- Gaertner, L., Sedikides, C. and Chang, K. (2008), "On pancultural self-enhancement: well-adjusted Taiwanese self-enhance on personally valued traits", *Journal of Cross-Cultural Psychology*, Vol. 39 No. 4, pp. 463-477.
- Gneezy, A., Imas, A., Brown, A., Nelson, L.D. and Norton, M.I. (2012), "Paying to be nice: consistency and costly prosocial behavior", *Management Science*, Vol. 58 No. 1, pp. 179-187.
- Goh, H.L., Church, A.Y.K., Shi, H., Wei, W., Wang, H. and Lim, E.P. (2017), "An analysis of rumor and counter-rumor messages in social media", *International Conference on Asian Digital Libraries*, pp. 256-266.
- Guerin, B. and Miyazaki, Y. (2006), "Analyzing rumors, gossip, and urban legends through their conversational properties", *Psychological Record*, Vol. 56 No. 1, p. 23.

- Guerin, B., Guerin, P.B., Diiriye, R.O. and Yates, S. (2004), "Somali conceptions and expectations concerning mental health: some guidelines for mental health professionals", available at: <http://dspace2.flinders.edu.au/xmlui/bitstream/handle/2328/13584/2006017138.pdf?sequence=1>.
- Hair, J., Hollingsworth, C.L., Randolph, A.B. and Chong, A.Y.L. (2017), "An updated and expanded assessment of PLS-SEM in information systems research", *Industrial Management and Data Systems*, Vol. 117 No. 3, pp. 442-458.
- Harrison-Walker, L.J. (2001), "The measurement of word-of-mouth communication and an investigation of service quality and customer commitment as potential antecedents", *Journal of Service Research*, Vol. 4 No. 1, pp. 60-75.
- Hautz, J., Füller, J., Hutter, K. and Thürridl, C. (2014), "Let users generate your video ads? The impact of video source and quality on consumers' perceptions and intended behaviors", *Journal of Interactive Marketing*, Vol. 1 No. 28, pp. 1-15.
- Heine, S.J., Kitayama, S. and Lehman, D.R. (2001), "Cultural differences in self-evaluation: Japanese readily accept negative self-relevant information", *Journal of Cross-Cultural Psychology*, Vol. 32 No. 4, pp. 434-443.
- Henseler, J., Ringle, C.M. and Sarstedt, M. (2015), "A new criterion for assessing discriminant validity in variance-based structural equation modeling", *Journal of the Academy of Marketing Science*, Vol. 43 No. 1, pp. 115-135.
- Ho, J.Y. and Dempsey, M. (2010), "Viral marketing: motivations to forward online content", *Journal of Business Research*, Vol. 63 Nos 9-10, pp. 1000-1006.
- Huang, M., Cai, F., Tsang, A.S. and Zhou, N. (2011), "Making your online voice loud: the critical role of WOM information", *European Journal of Marketing*, Vol. 45 Nos 7/8, pp. 1277-1297.
- Hung, K.H. and Li, S.Y. (2007), "The influence of eWOM on virtual consumer communities: social capital, consumer learning, and behavioral outcomes", *Journal of Advertising Research*, Vol. 47 No. 4, pp. 485-495.
- Igbaria, M., Iivari, J. and Maragahh, H. (1995), "Why do individuals use computer technology? A Finnish case study", *Information and Management*, Elsevier, Vol. 29 No. 5, pp. 227-238.
- Kamins, M.A., Folkes, V.S. and Perner, L. (1997), "Consumer responses to rumors: good news, bad news", *Journal of Consumer Psychology*, Vol. 2 No. 6, pp. 165-187.
- Kapferer, J.-N. (1987), "Rumors", *Recherche*, Vol. 18 No. 187, pp. 468-475.
- Keller, A.M., Taylor, H.A. and Brunyé, T.T. (2020), "Uncertainty promotes information-seeking actions, but what information?", *Cognitive Research: Principles and Implications*, Vol. 5, p. 42.
- Kim, J.H. and Bock, G.W. (2011), "A study on the factors affecting the behavior of spreading online rumors: focusing on the rumor recipient's emotions", *Pacific Asia Conference on Information Systems, Pacis 2011: Quality Research in Pacific Asia*, Brisbane, 7-11 July, p. 98.
- Kunda, Z. (1999), *Social Cognition: Making Sense of People*, MIT Press, Cambridge, MA.
- Kwon, S., Cha, M., Jung, K., Chen, W. and Wang, Y. (2013), "Prominent features of rumor propagation in online social media", *IEEE International Conference on Data Mining*, pp. 1103-1108.
- Kwon, K.H., Bang, C.C., Egnoto, M. and Rao, H.R. (2016), "Social media rumors as improvised public opinion: semantic network analyses of twitter discourses during Korean Saber rattling 2013", *Asian Journal of Communication*, Vol. 26 No. 3, doi: [10.1080/01292986.2015.1130157](https://doi.org/10.1080/01292986.2015.1130157) (accessed 7 June 2018).
- Lee, C.S. and Ma, L. (2012), "News sharing in social media: the effect of gratifications and prior experience", *Computers in Human Behavior*, Vol. 28 No. 2, pp. 331-339.
- Lerner, J.S., Gonzalez, R.M., Small, D.A. and Fischhoff, B. (2003), "Effects of fear and anger on perceived risks of terrorism: a national field experiment", *Psychological Science*, SAGE Publications Sage CA: Los Angeles, CA, Vol. 14 No. 2, pp. 144-150.
- Liang, J. and Yang, M. (2015), "On spreading and controlling of online rumors in we-media era", *Asian Culture and History*, Vol. 7 No. 2, pp. 42-46.

- Liu, F., Burton-Jones, A. and Xu, D. (2014), "Rumors on social media in disasters: extending transmission to retransmission", available at: http://www.researchgate.net/publication/286129508_Rumors_on_social_media_in_disasters_Extending_transmission_to_retransmission (accessed 7 June 2018).
- McCracken, G. (1987), "The history of consumption: a literature review and consumer guide", *Journal of Consumer Policy*, Vol. 10 No. 2, pp. 139-166.
- McKnight, D.H., Choudhury, V. and Kacmar, C. (2002), "Developing and validating trust measures for e-commerce: an integrative typology", *Information Systems Research*, Vol. 13 No. 3, pp. 334-359.
- Mehrabian, A. and Russell, J.A. (1974), *An Approach to Environmental Psychology*, The MIT Press, Cambridge, MA.
- Meyer, J.C. (2000), "Humor as a double-edged sword: four functions of humor in communication", *Communication Theory*, Vol. 10 No. 3, pp. 310-331.
- Mihanovic, M., Jukic, V. and Milas, M. (1994), "Rumours in psychological warfare", *Socijalna Psihijatrija*, Vol. 22, pp. 75-82.
- Mireault, G.C. and Reddy, V. (2016), "An overview of humor", in *Humor in Infants: Developmental and Psychological Perspectives*, Springer, Cham, pp. 1-9.
- Nitzl, C., Roldan, J.L. and Cepeda, G. (2016), "Mediation analysis in partial least squares path modeling: helping researchers discuss more sophisticated models", *Industrial Management and Data Systems*, Vol. 116 No. 9, pp. 1849-1864.
- Oh, O., Kwon, K.H. and Rao, H.R. (2010), "An exploration of social media in extreme events: rumor theory and twitter during the Haiti earthquake 2010", *International Conference on Information Systems, ICIS 2010*, Saint Louis, December, p. 231.
- Oh, O., Agrawal, M. and Rao, H.R. (2016), "Community intelligence and social media services: a rumor theoretic analysis of Tweets during social crises", *MIS Quarterly*, Vol. 37 No. 2, pp. 407-426.
- Pal, A., Chua, A.Y.K. and Goh, D.H.-L. (2017), "An analysis of rumor and counter-rumor messages in social media", *International Conference on Asian Digital Libraries*, pp. 256-266.
- Pal, A., Chua, A.Y.K. and Hoe-Lian Goh, D. (2020), "How do users respond to online rumor rebuttals?", *Computers in Human Behavior*, Vol. 106, p. 106243.
- Petty, R.E., Cacioppo, J.T. and Schumann, D. (1983), "Central and peripheral routes to advertising effectiveness: the moderating role of involvement", *Journal of Consumer Research*, Vol. 10 No. 2, pp. 135-146.
- Podsakoff, P.M., MacKenzie, S.B., Lee, J.-Y. and Podsakoff, N.P. (2003), "Common method biases in behavioral research: a critical review of the literature and recommended remedies", *Journal of Applied Psychology*, Vol. 88 No. 5, p. 879.
- Qian, Z., Tang, S., Zhang, X. and Zheng, Z. (2015), "The independent spreaders involved SIR rumor model in complex networks", *Physica A: Statistical Mechanics and its Applications*, Vol. 429, pp. 95-102.
- Reed, M.B. and Aspinwall, L.G. (1998), "Self-affirmation reduces biased processing of health-risk information", *Motivation and Emotion*, Vol. 22 No. 2, pp. 99-132.
- Resnick, P., Carton, S., Park, S., Shen, Y. and Zeffer, N. (2014), "RumorLens: a system for analyzing the impact of rumors and corrections in social media", *Presented at the Computational Journalism Conference*, ACM, New York.
- Robert, C., Dunne, T.C. and Iun, J. (2016), "The impact of leader humor on subordinate job satisfaction: the crucial role of leader-subordinate relationship quality", *Group and Organization Management*, Vol. 41 No. 3, pp. 375-406.
- Roskos-Ewoldsen, D.R., Yu, J.H. and Rhodes, N. (2004), "Fear appeal messages affect accessibility of attitudes toward the threat and adaptive behaviors", *Communication Monographs*, Taylor & Francis, Vol. 71 No. 1, pp. 49-69.
- Rosnow, R.L., Esposito, J.L. and Gibney, L. (1988), "Factors influencing rumor spreading: replication and extension", *Language and Communication*, Vol. 8 No. 1, pp. 29-42.

- Ruscher, J.B. (2001), *Prejudiced Communication: A Social Psychological Perspective*, Guilford Press.
- Sedikides, C. (1993), "Assessment, enhancement, and verification determinants of the self-evaluation process", *Journal of Personality and Social Psychology*, Vol. 65 No. 2, p. 317.
- Sedikides, C., Gaertner, L. and Vevea, J.L. (2007), "Inclusion of theory-relevant moderators yield the same conclusions as Sedikides, Gaertner, and Vevea (2005): a meta-analytical reply to Heine, Kitayama, and Hamamura (2007)", *Asian Journal of Social Psychology*, Vol. 10 No. 2, pp. 59-67.
- Sharma, M.K., Anand, N., Vishwakarma, A., Sahu, M., Thakur, P.C., Mondal, I., Singh, P., *et al* (2020), "Mental health issues mediate social media use in rumors: implication for media based mental health literacy", *Asian Journal of Psychiatry*, Elsevier.
- Shearer, E. and Gottfried, J. (2017), "News use across social media platforms 2017 | pew research center", 7 September, available at: <http://www.journalism.org/2017/09/07/news-use-across-social-media-platforms-2017/> (accessed 27 May 2018).
- Shinal, J. (2017), "Facebook says costs will rise to go after fake news", 1 November, available at: <https://www.cnbc.com/2017/11/01/facebook-says-costs-will-rise-to-go-after-fake-news.html> (accessed 26 May 2018).
- Starbird, K., Maddock, J., Orand, M., Achterman, P. and Mason, R.M. (2014), "Rumors, false flags, and digital vigilantes: misinformation on twitter after the 2013 Boston marathon bombing", *ISchools*, doi: 10.9776/14308.
- Sudhir, S. and Unnithan, A.B. (2013), "Rumor sharing in the marketplace: what motivates the consumer?", available at: <http://dspace.iimk.ac.in/handle/2259/741>.
- Sun, T., Youn, S., Wu, G. and Kuntaraporn, M. (2006), "Online word-of-mouth (or mouse): an exploration of its antecedents and consequences", *Journal of Computer-Mediated Communication*, Vol. 11 No. 4, pp. 1104-1127.
- Tanaka, Y., Sakamoto, Y. and Matsuka, T. (2012), *Transmission of Rumor and Criticism in Twitter after the Great Japan Earthquake*, Annual Meeting of the Cognitive Science Society, p. 2387.
- Taylor, D.G., Strutton, D. and Thompson, K. (2012), "Self-enhancement as a motivation for sharing online advertising", *Journal of Interactive Advertising*, Vol. 12 No. 2, pp. 13-28.
- Teo, T.S., Lim, V.K. and Lai, R.Y. (1999), "Intrinsic and extrinsic motivation in Internet usage", *Omega*, Elsevier, Vol. 27 No. 1, pp. 25-37.
- Treger, S., Sprecher, S. and Erber, R. (2013), "Laughing and liking: exploring the interpersonal effects of humor use in initial social interactions", *European Journal of Social Psychology*, Vol. 43 No. 6, pp. 532-543.
- Turner, B.S. (1993), *Citizenship and Social Theory*, Vol. 24, Sage.
- Watson, A. (2020), "Online sharing of fake news U.S. 2019", *Statista*, 16 July, available at: <https://www.statista.com/statistics/657111/fake-news-sharing-online/> (accessed 18 July 2020).
- Weenig, M.W., Groenenboom, A.C. and Wilke, H.A. (2001), "Bad news transmission as a function of the definitiveness of consequences and the relationship between communicator and recipient", *Journal of Personality and Social Psychology*, Vol. 80 No. 3, p. 449.
- Wen, S., Jiang, J., Xiang, Y., Yu, S., Zhou, W. and Jia, W. (2014), "To shut them up or to clarify: restraining the spread of rumors in online social networks", *IEEE Transactions on Parallel and Distributed Systems*, Vol. 25 No. 12, pp. 3306-3316.
- Wilbur, C.J. and Campbell, L. (2011), "Humor in romantic contexts: do men participate and women evaluate?", *Personality and Social Psychology Bulletin*, Vol. 37 No. 7, pp. 918-929.
- Wisse, B. and Rietzschel, E. (2014), "Humor in leader-follower relationships: humor styles, similarity and relationship quality", *Humor*, Vol. 27 No. 2, pp. 249-269.
- Xu, H., Li, T., Liu, X., Liu, W. and Dong, J. (2019), "Spreading dynamics of an online social rumor model with psychological factors on scale-free networks", *Physica A: Statistical Mechanics and its Applications*, Vol. 525, pp. 234-246.

-
- Yoo, C.W., Sanders, G.L. and Moon, J. (2013), "Exploring the effect of e-WOM participation on e-Loyalty in e-commerce", *Decision Support Systems*, Vol. 3 No. 55, pp. 669-678.
- Zhang, Z., Zhang, Z. and Li, H. (2015), "Predictors of the authenticity of Internet health rumours", *Health Information and Libraries Journal*, Vol. 32 No. 3, pp. 195-205.
- Zhang, P., Bao, Z., Niu, Y., Zhang, Y., Mo, S., Geng, F. and Peng, Z. (2019), "Proactive rumor control in online networks", *World Wide Web*, Vol. 22 No. 4, pp. 1799-1818.
- Zhao, J., Wang, Y. and Kong, F. (2014), "Exploring the mediation effect of social support and self-esteem on the relationship between humor style and life satisfaction in Chinese college students", *Personality and Individual Differences*, Vol. 64, pp. 126-130.
- Zhao, Z., Resnick, P. and Mei, Q. (2015), "Enquiring minds: early detection of rumors in social media from enquiry posts", *International Conference on World Wide Web*, pp. 1395-1405.
- Zhu, L., Zhao, H. and Wang, H. (2019), "Partial differential equation modeling of rumor propagation in complex networks with higher order of organization", *Chaos: An Interdisciplinary Journal of Nonlinear Science*, Vol. 29 No. 5, p. 053106.
- Zubiaga, A., Aker, A., Bontcheva, K., Liakata, M. and Procter, R. (2018), "Detection and resolution of rumours in social media: a survey", *ACM Computing Surveys*, Vol. 51 No. 2, p. 32.

About the authors

Yung-Cheng Shen (PhD, Columbia University, USA) is a Professor in the Graduate Institute of Management, National Taiwan Normal University, Taiwan. His research focuses on consumer behavior in e-commerce and e-marketing. His research paper has been published in the *International Journal of Electronic Commerce*, *Journal of the American Society for Information Science and Technology*, *Psychology and Marketing*, *Journal of Advertising Research*, *Information Research* and other journals.

Crystal T. Lee (PhD, National Chengchi University, Taiwan; corresponding author) is an Associate Professor in the Business School, Shantou University, China. Her research focuses on consumer behavior, mobile marketing and social media. Her work has appeared in *Telematics and Informatics*, *Journal of Service Theory and Practice*, *Journal of Marketing Management* and *Journal of product and brand management*. Crystal T. Lee is the corresponding author and can be contacted at: crystal.ty.lee@gmail.com

Ling-Yen Pan (PhD, National Taiwan University, Taiwan) is Postdoctoral Fellow at Academic Sinica, Taiwan. Her current research interests include communication research, fake news, digital and social media marketing. Her work has been published in *Behaviour and Information Technology*.

Chung-Yuan Lee received an MBA degree at the Graduate Institute of Management, National Taiwan Normal University, Taiwan. His master's thesis research focuses on e-commerce.