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# Exploring the Dynamics of Justification in the Wake of a Rumor Outbreak on Social Media

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## ABSTRACT

This paper explores the dynamics of justification in the wake of a rumor outbreak on social media. Specifically, it examines the extent to which the five types of justification—descriptive argumentation, presumptive argumentation, evidentialism, truth skepticism, and epistemological skepticism—manifested in different voices including pro-rumor, anti-rumor, and doubts before and after fact-checking. Content analysis was employed on 1,911 tweets related to a rumor outbreak. Non-parametric cross-tabulation was used to uncover nuances in information sharing before and after fact-checking. Augmenting the literature which suggests the online community's susceptibility to hoaxes, the paper offers a silver lining: users are responsible enough to correct rumors during the later phase of a rumor lifecycle. This sense of public-spiritedness can be harnessed by knowledge management practitioners and public relations professionals for crowdsourced rumor refutation.

## KEYWORDS

Crowdsourced Rumor Refutation, Fact-Checking, Justification, Knowledge Management, Online Rumor, Social Constructivism, Social Media

## INTRODUCTION

The constructivist discourse in knowledge management (KM) contends that knowledge is always in a state of flux. Enmeshed within a given social context, knowledge not only shapes but also is being shaped by the ongoing interactions among individuals (Holford, 2018; Jackson & Webster, 2007; Jakubik, 2011).

When there are disagreements with the status quo, the amorphous nature of knowledge becomes most apparent. In the quest for the truth, individuals engage in what is known as justification where they argue their positions, assess the merits of others' views, refine their thinking, and eventually settle on the newly created knowledge (Annis, 1978, 1986; Bankowski, 1981). The cycle repeats whenever fresh evidence and insights emerge to challenge what had been accepted. Justification

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is thus an iterative process of the social construction of knowledge based on reasons and available evidence relative to an issue within a given context (Annis, 1986; Peters *et al*., 2010).

Justification is also at play in the event of a rumor outbreak on the Internet when users operate in the absence of facts and struggle to free themselves from the uncomfortable state of doubts (Annis, 1986). The iterative process of offering, evaluating, interpreting and seeking information occurs against the backdrop of shifting ground sentiments and speculations (Fung *et al.*, 2016; *Oh et al.*, 2013; Wood, 2018). The cacophony of voices that arise from mass participation reflects the sense of anxiety along with the need to cope with uncertainty. As a rumor makes its way on social media, justification is presented in the forms of claims and counter-claims. Eventually, when the truth comes to light through fact-checking—the mechanism of verifying a claim objectively (Brandtzaeg *et al.*, 2018; Mena, 2019), the rumor becomes accepted or is quelled.

On social media, rumors are prevalently shared along with truthful content. As the form of unsubstantiated information, rumors could potentially wreak more chaos to the already fragile situation. This is why factors driving rumor mongering have been a well-trodden research area (Oh *et al.*, 2013; Starbird et al., 2016; Zubiaga *et al.*, 2016). However, the dynamics of information sharing in a rumor outbreak, starting from the point in time when a rumor first emerges on social media until it is officially debunked through fact-checking, has yet to be widely explored. Given that online rumors spread faster and wider than offline rumors, the former is more prone to exposure than the latter. For this reason, online rumors offer greater scope for arguments, counter-arguments, fact-checking and justification. Scholarly understanding is limited in terms of how users argue their positions, assess the merits of others' views, refine their thinking, and eventually settle on the newly created knowledge in the quest for the truth.

Prior works on knowledge epistemology and argumentation scheme (Goldman, 2009; Mucchi-Faina & Cicoletti, 2006; Walton *et al.*, 2008) have identified five types of justification, namely, descriptive argumentation, presumptive argumentation, evidentialism, truth skepticism, and epistemological skepticism. Descriptive argumentation involves making assertions. Presumptive argumentation relies on inferences while evidentialism uses evidence to buttress a position. Truth skepticism reasons by asking questions while epistemological skepticism does so by criticizing the plausibility of a particular line of reasoning.

The primary theme of this paper, which is the notion of justification, is central to KM. Since knowledge has been widely recognized as justified true beliefs (Rai, 2011; Rusly *et al.*, 2012), the dynamics of justification is an apt description of the social construction of knowledge: how an idea is presented, debated, refined, and either embraced or abandoned. Although justification is inherent in times of confusion and uncertainty, there is little research to shed light on how it pans out during an online rumor outbreak. This paper is therefore intended to fill this gap in KM research.

The paper explores the dynamics of justification in the wake of an organizational rumor outbreak on social media. Specifically, it examines the extent to which the five types of justification emerged differently before and after fact-checking. The fact-checking event is an inflection point in the rumor lifecycle as it demarcates between the time window when speculations were rife and when the facts were established. Related to an organizational rumor outbreak, data were collected from Twitter. Some 1,911 tweets were harvested and analyzed using qualitative content analysis followed by non-parametric cross-tabulation analysis.

## THEORETICAL BACKGROUND

### Knowledge and Justification

According to the KM literature, there are three major viewpoints of knowledge: exogenic, endogenic and social constructivism (Fitzgerald, 1992). According to the exogenic viewpoint, knowledge is a set of absolute and static facts that exists independent of the knower. The endogenic viewpoint considers

knowledge as a set of dynamic and changeable facts, which can be subjective and depends on the knower. Based on social constructivism—a more recent and widely embraced viewpoint (Nosek, 2004), knowledge is neither exogenic nor endogenic. Instead, knowledge is continuously emerging (Holford, 2018; Jakubik, 2011), and is dependent on the interactions of the knower with the world within a knowledge system (Fitzgerald, 1992; Nosek, 2004).

This paper embraces the social constructivism view of knowledge, which is particularly apt in situations of ambiguity such as rumor outbreaks (Yates, 2016). The social construction of knowledge inevitably entails justification which not only shapes how individuals make sense of a given situation but also allows them to rationalize their decision-making (de Kwaadsteniet *et al.*, 2007; Oh *et al.*, 2013). Justification further helps conceptualize abstract dichotomies of the relations including cause and effect, truth and falsehood. When a claim is in doubt, justification reduces uncertainty by using evidence and reasoning (Morton, 2003; Peters *et al.*, 2010). However, the KM literature is still silent on how justification pans out in the social construction of knowledge during a rumor outbreak on social media.

## Rumors on Social Media

With the advent of social media, rumors have grown tremendously in terms of speed and reach (Arif *et al.*, 2017; Ma *et al.*, 2016). The ubiquitous mobile phone installed with social media applications becomes not only a convenient conduit of information but also an amplifier of rumors. During a rumor, users engage in collective sensemaking by offering, evaluating and interpreting available information amid confusion (Arif *et al.*, 2017; Oh *et al.*, 2010).

When a rumor first emerges, three types of voices can be heard. Pro-rumor voices fuel speculations and amplify the level of anxiety (Kwon & Rao, 2017), while anti-rumor voices categorically call out and debunk the rumor (Arif *et al.*, 2017). Instead of making either stand, some people recognize the inherent ambiguity and express their doubts in the form of questions (Zhao *et al.*, 2015). The interactions among these voices represent the process of collective sensemaking (Arif *et al.*, 2017; Oh *et al.*, 2010).

## Justification During Rumor Outbreak

At a deeper level, the different voices in rumor-mongering reflect how individuals justify their positions. Taking cues from the literature on knowledge epistemology and argumentation scheme (Goldman, 2009; Mucchi-Faina & Cicoletti, 2006; Walton *et al.*, 2008), this paper identifies five types of justification, namely, descriptive argumentation, presumptive argumentation, evidentialism, truth skepticism, and epistemological skepticism.

Descriptive argumentation involves making assertions (Walton *et al.*, 2008; Nussbaum, 2011). It provides narrative descriptions about an event or situation but without offering any concrete evidence. These descriptions could be argued either in favor of the rumor or against the rumor. To explain the situation, descriptive argumentation could involve providing available information through individuals' commentaries (D'Errico, 2016).

Presumptive argumentation relies on inferences (Atkinson & Bench-Capon, 2007; Walton, 2001; Walton *et al.*, 2008). It could be driven by individuals' knowledge epistemology where a presumption can be made without the aid of proof. Stated otherwise, presumptive arguments occur in the sense of logically going beyond their premises (Annis, 1978; Audi, 1995; Verheij, 2016). Individuals tend to formulate reasoning by drawing inferences based on available information. Obviously, any inference made in the absence of evidence may not always be correct.

Evidentialism, as the name suggests, uses evidence to buttress a position (Fantl & McGrath, 2002; McCain, 2014). It is the strongest way of justification in which individuals use contextually available evidence to lend support to their stance in a rumoring phenomenon. The evidence often comes in the forms of pictures, videos and/or references to external resources (Castillo *et al.*, 2013).

Truth skepticism reasons by asking questions to fill the information gap (Littlejohn, 2012). It emerges specifically when situations are perceived as ambiguous, when information is unavailable or inconsistent, as well as when people feel insecure in their own epistemic positions (Starbird *et al.*, 2016). Under such circumstances, people actively engage in information seeking as a part of the social process of collective sensemaking (Oh *et al.*, 2013).

Epistemological skepticism reasons by criticizing the plausibility of a particular line of reasoning (Cornman, 2012; Moser, 2012). It is the way of questioning the epistemic status of a given claim by highlighting the logical fallacy in its arguments. Epistemological skepticism could be related to the suspension of judgement (Brueckner, 1994). The central issue raised by epistemological skepticism is whether the claim satisfies the standards of knowledge in the specific context (Feldman, 1999). The five types of justification are summarized in Table 1.

**Table 1. Types of justification**

| Justification types | Descriptions with hypothetical examples |
|---|---|
| Descriptive argumentation | Descriptive argumentation involves making assertions<br>(e.g., "*The person X has disappeared for a long time*") |
| Presumptive argumentation | Presumptive argumentation relies on inferences<br>(e.g., "*When a person has disappeared for a long time and there is no evidence that the person is still alive, the person is presumed to be dead*.") |
| Evidentialism | Evidentialism uses evidence to buttress a position<br>(e.g., "*The person (X) died in an accident and his dead body as shown in the PICTURE <<as evidence>> has been found by the police*.") |
| Truth scepticism | Truth skepticism reasons by asking questions<br>(e.g., "*is the person (X) really dead?*") |
| Epistemological skepticism | Epistemological skepticism reasons by criticizing the plausibility of a particular line of reasoning<br>(e.g., "*I have a doubt about the integrity of the police investigation in recognizing the identity of X who had disappeared for a long time*") |

Informed by the literature (Annis, 1986; Goldman, 2009; Mucchi-Faina & Cicoletti, 2006; Walton *et al.*, 2008), the difference voices that emerge during a rumor can be mapped to the five types of justification as follows: Pro-rumor and anti-rumor voices, given their assertive nature (Arif *et al.*, 2017; Oh *et al.*, 2010; Liao & Shi, 2013), lend themselves readily to either (i) descriptive argumentation, (ii) presumptive argumentation, or (iii) evidentialism. In contrast, doubtful voices, due to their equivocality (Arif *et al.*, 2017; Oh *et al.*, 2010), seem poised to leverage (iv) truth skepticism and/or (v) epistemological skepticism. However, how such voices with different types of justification manifest before and after fact-checking during a rumor has yet to be empirically investigated.

## RESEARCH METHODS

### Data Collection

On 12 June 2015, circulating widely on social media was a rumor that a Kentucky Fried Chicken (KFC) outlet in California in the United States had served a deep-fried rat to a customer. The message was accompanied by images of a piece of meat that resembled a rodent. To manage the crisis, an independent DNA test was conducted. The results came back on 22 June to confirm that the meat was indeed chicken. News spread quickly and the rumor died down after 27 June.

This rumoring phenomenon was chosen for investigation because it characterizes the lifecycle of a rumor with clear points of inception and demise. Moreover, it attracted a sizeable volume of tweets both before and after fact-checking.

This paper relies on Twitter for data collection (Oh *et al.*, 2013; Zubiaga *et al.*, 2016). The search terms included various hashtags (e.g., #kfcrat, #kfcfriedrat) and keywords (e.g., kfcfriedrat, friedrat) to retrieve relevant tweets. A total of 1,934 tweets was retrieved. After removing 23 non-English tweets, the remaining 1,911 were arranged chronologically. Given that the rumor eventually saw a closure, the tweets were divided into two phases demarcated by the announcement of the DNA testing results. The system timestamp of the first occurrence of the rebuttal (22 June, 13h:14m:37s) based on the outcome of the lab test was used as the demarcation point to divide the tweets into the two phases: Before fact-checking phase (n = 1053 tweets) and after fact-checking phase (n = 858 tweets).

## Data Coding and Analysis

Qualitative content analysis was employed. The coding was done at two levels. First, tweets were coded as pro-rumor, anti-rumor, and doubts—the three voices that commonly emerge during a rumor outbreak (Arif *et al.*, 2017; Oh *et al.*, 2010; Liao & Shi, 2013). While pro-rumor voices included tweets confirming or repeating the rumor, anti-rumor voices included tweets that deny or refute the rumor. Tweets that expressed ambiguity or sought clarification were coded as doubts (Oh *et al.*, 2013). Tweets that made no reference to the rumor were coded as unrelated. The coding definitions are summarized in Table 2.

**Table 2. Coding scheme to identify different voices during a rumor**

| Voices | Code descriptions | Examples |
|---|---|---|
| Pro-rumor | 1 if tweets confirm or repeat the rumor;<br>0 otherwise | "*…customer claims he got a fried rat instead of a chicken meal*" |
| Anti-rumor | 1 if tweets deny or refute the rumor;<br>0 otherwise | "*DNA Test shows it's #chicken, not 'fried #rat'…*" |
| Doubts | 1 if tweets express ambiguity or seek clarification;<br>0 otherwise | "*Did a man really find a 'deep fried rat'… Or is it a piece of chicken?*" |
| Unrelated | 1 if tweets are not related to the rumor;<br>0 otherwise | "*The line at KFC is so long on the 15th, i even asked if there's guestlist*" |

After the first level of coding, 66 unrelated tweets were removed. The remaining 1,845 tweets (988 before fact-checking + 857 after fact-checking) were admitted to the second level of coding in which the entries were coded based on the types of justification. Pro-rumor and anti-rumor voices reflected descriptive argumentation, presumptive argumentation, and evidentialism whereas those that expressed doubts reflected truth skepticism and epistemological skepticism. Although each tweet was allowed to be coded into multiple types of justification, no such occurrence was detected in the entire coding process. Tweeters' tendency to express freely could have been constrained by the then-140-character limit.

For pro-rumor voices, tweets contained descriptive argumentation if they were involved in making assertions in favor of the rumor. Tweets contained presumptive argumentation if they were involved in making inferences in favor of the rumor. Next, tweets exemplified evidentialism if they were involved in showing contextually available evidence in the form of picture, video and URL that provided support for the rumor. As shown in Table 3, people echoed pro-rumor voices even after fact-checking. This could be due to two reasons. One, people might be unaware of the veracity of

the rumor. Two, even they have been exposed to the verdict of fact-checking websites, they might not believe its veracity.

**Table 3. Justification in pro-rumor voices**

| Justification | Examples of pro-rumor voices | |
|---|---|---|
| | **Before fact-checking** | **After fact-checking** |
| Descriptive argumentation (Tweets were involved in making assertion in favor of the rumor.) | • "*Somebody found fried rat in their fried chicken*"<br>• "*KFC customer gets gross meal: Rat nicely fried with breading just like chicken*" | • "*… Customer Orders Chicken Tenders, Gets A Deep-Fried Rat*."<br>• "*A man in a Los Angeles KFC apparently found what appeared to be a fried rat inside his chicken strips*." |
| Presumptive argumentation (Tweets were involved in making inferences in favor of the rumor) | • *If it looks and smells like a rat, then it's a rat*.<br>• "*Looks like… added a new item to their menu, deep fried RAT!*" | • "*It still looks like a rat though. And that's still a tail no matter what ya'll say #kfcrat*"<br>• "*After seeing the so called "fried rat" picture from #KFC, I can never eat there again.*" |
| Evidentialism (Tweets were involved in showing contextually available evidence in favor of the rumor) | • "*Disgusting shit ever… even the manager confirmed its a RAT*. [URL]"<br>• "*This is what KFC served a man! A rat!!* [URL]" | • "*Man fumes after buying fried rat…* [PICTURE]"<br>• "*I liked a @YouTube video* [URL]*… fried rat instead of fried chicken*" |

For anti-rumor voices, tweets contained descriptive argumentation if they were involved in making assertion against the rumor. Tweets contained presumptive argumentation if they were involved in making inferences against the rumor. Next, tweets exemplified evidentialism if they were involved in showing contextually available evidence in the form of picture, video and URL that provided reasons to refute the rumor. Table 4 summarizes justification in anti-rumor voices.

**Table 4. Justification in anti-rumor voices**

| Justification | Examples of anti-rumor voices | |
|---|---|---|
| | **Before fact-checking** | **After fact-checking** |
| Descriptive argumentation (Tweets in making assertion against the rumor) | • "*KFC disputes fried rat claim: We currently have no evidence to support this allegation, KFC said in a statement to USA TODAY*"<br>• "*KFC Says This "Fried Rat" Going Viral Is Just A Weird-Looking Piece of Chicken*" | • "*#KFC in the clear as 'fried rat turns out to be chicken after tests*"<br>• "*Lab test proves 'fried rat' is actually chicken*" |
| Presumptive argumentation (Tweets were involved in making inferences against the rumor) | • "*People are trying so hard to sabotage KFC! RT @De_LondzZz: It can't possibly be a rat though ....*"<br>• "*I do not believe this… Some random person fried a rat for attention*." | • "*People r jst determined to bring KFC down! @SibsMacd: KFC says lab test shows 'fried rat' is actually chicken*"<br>• "*Let me have this left over kfc ...perhaps someone tried to sabotage kfc reputation... saying it rat meat*" |
| Evidentialism (Tweets showed contextually available evidence against the rumor) | • "*KFC said that their investigation found no evidence to support this fried rat claim* [URL]"<br>• *RT @TimesLIVE: KFC denies adding rat to the menu* [URL]" | • "*A DNA test confirms that this was NOT a fried rat. See what it actually was:* [URL]"<br>• "*Independent lab test confirms KFC 'fried rat' was chicken* [URL]" |

As shown in Table 5, tweets that expressed doubts included justification in terms of truth skepticism and epistemological skepticism. Tweets carried truth skepticism when they were involved in asking questions for clarifications. On the other hand, tweets carried epistemological skepticism when they were involved in expressing concern on the line of reasoning. Two coders were involved in the coding process at both the levels. The inter-coder reliability at each level exceeded the recommended threshold (Cohen's Kappa > 0.7).

**Table 5. Justification in doubts**

| **Justification** | **Examples of doubts** | |
|---|---|---|
| | **Before fact-checking** | **After fact-checking** |
| Truth skepticism (Tweets asked questions for clarifications) | • "*Was a 'deep fried RAT' found in a meal?*"<br>• "*Is this KFC story a hoax?*" | • "*Seriously, a DNA test to see if KFC served chicken or a fried rat?*"<br>• "*Did a man really find a 'deep fried rat' in his KFC? Or is it a piece of chicken?*" |
| Epistemological skepticism (Tweets expressed doubts by criticizing the plausibility of a particular line of reasoning) | • "*why they serve rat to ruin their own reputation?*"<br>• "*That thing about someone getting a deep fried rat at KFC why has no one thought to pick the batter off and see if it's a rat or not*" | • "*Fried rat at KFC. This is not fake!! They bribed to save reputation*"<br>• "*Also, I want you to know that an independent lab that had to be paid by somebody says that this is not a @kfc rat.*" |

Thereafter, non-parametric cross-tabulation analysis ($\chi^2$) was employed on the data to serve two purposes. One, it helped examine the extent to which the three different voices during a rumor (pro-rumor, anti-rumor, and doubts) emerged differently before and after fact-checking. Two, it helped analyze the degree to which the five types of justification manifested differently before and after fact-checking.

## RESULTS

Table 6 summarizes the volume of tweets for different voices before and after fact-checking. Pro-rumor voices were more dominant before fact-checking ($\chi^2(1, N = 1{,}845) = 570.66$, Cramer's V = 0.56, $p < 0.001$). However, anti-rumor voices were more dominant after fact-checking ($\chi^2(1, N = 1{,}845) = 713.71$, Cramer's V = 0.62, $p < 0.001$). This result typifies the transmission pattern of a false rumor from the start until it was debunked. Unsurprisingly, doubts were more dominant before

**Table 6. Different voices before and after fact-checking in a rumoring phenomenon**

| | **N=1,845** | | | |
|---|---|---|---|---|
| | **Before fact-checking** | **After fact-checking** | **$\chi^2$** | **Cramer's V** |
| Pro-rumor | 64.2% | 9.8% | 570.66*** | 0.56 |
| Anti-rumor | 19% | 81.3% | 713.71*** | 0.62 |
| Doubts | 16.8% | 8.9% | 25.35*** | 0.12 |
| *Total* | *988 (100%)* | *857 (100%)* | | |

Note: ***significant at 0.001

fact-checking ($\chi^2(1, N = 1,845) = 25.35$, Cramer's $V = 0.12$, $p < 0.001$). The laboratory results put to rest any lingering concern about the kind of meat KFC had served.

Table 7 offers insights into the use of the different justifications in different voices during a rumor. Among pro-rumor voices, descriptive argumentation was more dominant before fact-checking ($\chi^2(1, N_1 = 718) = 30.01$, Cramer's $V = 0.20$, $p < 0.001$). In contrast, presumptive argumentation was more dominant after fact-checking ($\chi^2(1, N_1 = 718) = 57.43$, Cramer's $V = 0.28$, $p < 0.001$). Evidentialism did not differ significantly between before and after fact-checking.

**Table 7. Justification in different voices during a rumor**

| Voices | Justification | Before fact-checking | After fact-checking | $\chi^2$ | Cramer's V |
|---|---|---|---|---|---|
| Pro-rumor ($N_1$=718) | Descriptive argumentation | 68.4% | 38.1% | 30.01*** | 0.20 |
| | Presumptive argumentation | 4.6% | 27.4% | 57.43*** | 0.28 |
| | Evidentialism | 27% | 34.5% | 2.11 | 0.05 |
| | *Total* | *634 (100%)* | *84 (100%)* | | |
| Anti-rumor ($N_2$=885) | Descriptive argumentation | 72.4% | 27.7% | 126.39*** | 0.38 |
| | Presumptive argumentation | 25.5% | 2.9% | 107.21*** | 0.35 |
| | Evidentialism | 2.1% | 69.4% | 271.22*** | 0.55 |
| | *Total* | *188 (100%)* | *697 (100%)* | | |
| Doubts ($N_3$=242) | Truth skepticism | 93.4% | 59.2% | 42.42*** | 0.42 |
| | Epistemological skepticism | 6.6% | 40.8% | 42.42*** | 0.42 |
| | *Total* | *166 (100%)* | *76 (100%)* | | |

Note: ***significant at 0.001

Among anti-rumor voices, descriptive argumentation ($\chi^2(1, N_2 = 885) = 126.39$, Cramer's $V = 0.38$, $p < 0.001$) and presumptive argumentation ($\chi^2(1, N_2 = 885) = 107.21$, Cramer's $V = 0.35$, $p < 0.001$) were more dominant before fact-checking. In contrast, evidentialism was more dominant after fact-checking ($\chi^2(1, N_2 = 885) = 271.22$, Cramer's $V = 0.55$, $p < 0.001$). Once the rumor was officially debunked, anti-rumor propagators who earlier had no evidence to substantiate their stance became more vocal by sharing the newly-emerged rebuttal.

With respect to doubts, truth skepticism was more dominant before fact-checking ($\chi^2(1, N_3 = 242) = 42.42$, Cramer's $V = 0.42$, $p < 0.001$). People sought clarification to make sense of the situation. In contrast, epistemological skepticism was more dominant after fact-checking ($\chi^2(1, N_3 = 242) = 42.42$, Cramer's $V = 0.42$, $p < 0.001$). It seems that some people remained unsatisfied with the verdict. They expressed themselves by casting aspersions on the DNA testing procedures.

## DISCUSSION

Two major findings can be gleaned from this paper. The first pertains to voices during the rumor outbreak. Before fact-checking, tweets were more likely to reflect pro-rumor voices and doubts.

Tweets such as "*Disgusting!... Fried Rat Instead of Fried Chicken*" and "*After Taking Bite…, Man Realizes He's Actually Eating A Deep-Fried Rat*" echoed pro-rumor voices. Doubts are reflected in tweets such as "*I'm not sure. So disappointed a rat??? Really???*"

While the presence of doubts before fact-checking is expected, the overwhelming prevalence of pro-rumor voices at this stage of the rumor lifecycle demonstrates people's inclination to be taken in by sensational messages—an imprudent tendency identified in previous research (Lewandowsky et al., 2012). The dearth of verifiable information in a highly connected environment is the perfect breeding ground for hoaxes to gain traction (Arif *et al.*, 2016; Zubiaga *et al.*, 2016).

After fact-checking, tweets were more likely to reflect anti-rumor voices. Examples include "*Independent lab test confirms… 'fried rat' was chicken*" and "*Update: KFC 'Fried Rat' Is In Fact Chicken.*" Augmenting the literature which suggests the community's susceptibility to online hoaxes (Arif *et al.*, 2016; Lewandowsky *et al.*, 2012; Zubiaga *et al.*, 2016), the paper offers a silver lining: Users are responsible enough to correct rumors during the later phase of rumor lifecycle. This sense of public-spiritedness can be harnessed by KM practitioners and public relations professionals for crowdsourced rumor refutation.

The second finding is related to the manifestation of different justification types in the social construction of knowledge during the rumor. Descriptive argumentation was consistently more dominant before fact-checking. At the initial stage of a rumor, people are known to provide narrative descriptions in the absence of any concrete evidence (D'Errico, 2016). This is echoed in tweets such as "*That KFC Rat thing really is disturbing.*" Moreover, descriptive argumentation in anti-rumor voices echoed self-correction, which showed the evidence of crowd-refutation. Examples of such tweets include "*Viral Video Claiming Customer Was Served a Fried Rat Is a Hoax*" and "*lover of KFC insists those pics are fake*".

Presumptive argumentation was dominant in pro-rumor voices after fact-checking but anti-rumor voices before fact-checking. Its dominance in support of the rumor even after establishment of the truth suggests that fact-checking may not completely quell the rumor. For one, some Tweeters were ignorant of the fact-checking verdict as evident from tweets such as "*it can be a rat since there is no concrete evidence.*" Moreover, others who were aware of verdict refused to believe the fact-checking information as evident from tweets such as "*It still looks like a rat though. And that's still a tail no matter what ya'll say #kfcrat.*"

The dominance of presumptive argumentation among anti-rumor voices before fact-checking suggests that presumptions are largely based on conventional grounds. Seen in tweets such as "*…I do not believe... Some random person fried a rat for attention*" and "*has to be a hoax*", some people are careful not to jump to conclusions especially when the facts have not been established. Presumptive argumentation could be driven by individuals' knowledge epistemology where beliefs are justified when they cohere with other existing beliefs already held (Annis, 1978; Audi, 1995; Audi & Robert, 1993). Without any concrete shreds of evidence, people make inferences based on the accepted standards of rationality. With limited reasoning resources, they tend to dismiss rumors on the ground of imperfect information.

Evidentialism, as expected, was particularly dominant in anti-rumor voices after fact-checking. As soon as the rebuttal came to light, several tweets shared the evidence by including additional resources (e.g., URLs and pictures) to correct the rumor. This is in line with the literature that suggests adding resources such as URL and picture in tweets lend credence to the information being presented (Vo & Lee, 2018).

Next, truth skepticism was more dominant before fact-checking. It is supposed to reflect a willingness to seek clarifications, a key characteristic of reinforcing critical thinking (Littlejohn, 2012). People can never be absolutely certain of propositions available during the wake of a rumor outbreak. Unsurprisingly, before fact-checking, people tend to fill the information gap by seeking further clarifications. This is reflected in tweets such as "*Was a 'deep fried RAT' found in a meal?*"

and "*Is this story a hoax?*" The extent to which people were engaged in truth skepticism declined after fact-checking.

Finally, epistemological skepticism was more dominant after fact-checking. The central thrust of such a skepticism is questioning whether the standards for believing a proposition is justified (Feldman, 1999). Previous works found individuals with a robust epistemic belief to be more skeptical than those who are epistemologically naïve when processing information online (Kammerer *et al.*, 2013). Rather than accepting a claim uncritically, they tend to challenge its underlying assumptions. Tweets such as "*Also, I want you to know that an independent lab that had to be paid by somebody says that this is not a @kfc rat*" exemplify epistemological skepticism by criticizing the plausibility of reasoning in the fact-checking. Since the mechanism of knowing is derived from a subjective notion of reality, epistemologically robust users readily embrace knowledge only if it comes from multiple sources.

Given that social media allows for the freedom of expressions, users are reasoning proactively from the perspective of having to defend their opinions. Justification plays a crucial role during a rumor where the line between the truth and false is blur. Social media affordances make knowledge more visible and explicit than ever before. Previous literature suggests that perceived value of knowledge content including usefulness and compatibility are determinants of knowledge sharing and knowledge consumption (Desouza *et al.*, 2006; Pacharapha & Ractham, 2012; Wang & Wang, 2018). The harnessing of crowdsourced knowledge on social media thus has implications for KM practice. The emergence of new media technologies has enabled unprecedented access to the crowd, and the latent power of the crowd has now been acknowledged in KM literature (Meneghello et al., 2020; Noor et al., 2020). However, this paper is the earliest to demonstrate the power of crowdsourcing in refuting rumors.

## CONCLUSION

Uncertainty in crises leads to knowledge gaps which often prompt iterative rounds of justification until the truth comes to light. This paper shows how users on Twitter participated in such a process of collective sensemaking by using whatever information they had to argue their positions, appraise others' opinions, and raise questions in the hope to find answers in the wake of a rumor outbreak (Nosek, 2004; Pacharapha & Ractham, 2012; Peters *et al.*, 2010). The different voices emerging during the rumor—pro-rumor, anti-rumor and doubts (Arif *et al.*, 2017; Oh *et al.*, 2010; Liao & Shi, 2013)—were mapped to the various justification types—descriptive argumentation, presumptive argumentation, evidentialism, truth skepticism, and epistemological skepticism (Annis, 1986; Goldman, 2009; Mucchi-Faina & Cicoletti, 2006; Walton *et al.*, 2008). Nuances before and after fact-checking were also uncovered.

With regard to justification, descriptive argumentation was more dominant before fact-checking regardless of pro-rumor and anti-rumor voices. Presumptive argumentation was dominant in pro-rumor voices after fact-checking but in anti-rumor voices before fact-checking. Evidentialism was particularly dominant in anti-rumor voices after fact-checking. While truth skepticism was more dominant before fact-checking, epistemological skepticism was more dominant after fact-checking.

This research makes both theoretical and practical contributions. On the theoretical front, building on the understanding that knowledge is socially constructed (Fitzgerald, 1992; Holford, 2018; Jakubik, 2011; Nosek, 2004), it represents one of the earliest empirical works to shed light on how the process actually pans out through interactions among members of the online community. In particular, it describes the five different types of justification at play and further enriches the understanding of collective sensemaking during a rumor. Extending previous research on the use of social media for KM purposes during crises (Yates, 2016), the current work suggests a more granular treatment of the notion of justification on social media to inform KM practices. For example, attention ought to be paid to descriptive argumentation during the early stage of the crisis, and evidentialism during the later stage.

On the practical front, this research has implications for KM practitioners and social media administrators seeking to strengthen their response strategies to a rumor. The dynamics of justification resulting in crowdsourced refutation could be leveraged to combat a rumor. In this vein, organizations should provide timely responses with reasonable evidence to debunk rumors effectively. The sooner evidentialism gets enmeshed in the justification process, the quicker can the truth come to light. However, during the initial phase of the rumor lifecycle, if releasing the evidence takes time, it is imperative to control pro-rumor voices by being transparent about the situation and provide regular updates of the developments. The longer it takes for pro-rumor voices to gain traction, the easier it is for the truth to eventually emerge.

To strategic response teams, in firms or governments, the results of this research are increasingly important to understand the role of fact-checking to tackle online rumors. Given that rumors can decrease trust in the capacity of the organization and government to protect the members in the communities (Fine, 2007; Kwon & Rao, 2017), combatting rumors is not just as simple as issuing a refutation. The strategic response should be a result of a process of critically putting knowledge claims to persuade users in fact-checking.

All that said, the findings of this research are constrained by the data collected. For one, while the use of Twitter dataset is a common practice in rumor research (Oh *et al.*, 2013; Starbird *et al.*, 2016), future works could seek to uncover the sentiments and motivations from Twitter users who engage in the justification process during a rumor. In addition, subsequent efforts could be expanded to include several rumoring phenomena from different domains (e.g., health epidemics, natural disasters) while capturing social media data from different platforms. This would not only improve generalizability but also provide a holistic understanding of social media crises from the perspective of justification in knowledge construction. Next, future research can investigate how users perceive fact-checking messages on social media, and examine the 'alternative-fact' concept where statements—even though fact-checked and disproven—are still accepted and treated as if they were true claims (Barrera et al., 2020; Nyhan & Reifler, 2010). This is interesting to study because it will shed light on the extent to which a fact-checked verdict can be mistaken as a rumor.

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