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Analyzing Users' Trust for Online Health Rumors

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Abstract

This paper analyzes users' trust for online health rumors as a function of two factors: length and presence of image. Additionally, two types of rumors are studied: pipe-dream rumors that offer hope, and bogie rumors that instill fear. A total of 102 participants took part in a 2 (length: short or long) x 2 (presence of image: absent or present) x 2 (type: pipe-dream or bogie) within-participants experiment. A repeated-measures analysis of variance suggest that pipe-dream rumors are trusted when they are short and do not contain images whereas bogie rumors are trusted when they are long and contain images.

Keywords: online health information, rumor, virality, trust

Introduction

Users widely seek health information on the Internet. One in every three American adults seeks online health information, while almost half of them rely on such sources to decide if they need medical attention [1]. Seeking online health information often elevates tension, which creates a fertile breeding ground for rumors [2]. Some rumors turn out to be true, while others are eventually busted. Regardless of their veracity however, rumors influence public opinion [3]. In the context of health, repercussions can be serious if the basis of users' trust for rumors is not judicious.

Prior studies suggest that rumors must be short to become viral [2]. However, overly sketchy information could thwart trustworthiness [4]. Besides, rumors with images could inspire greater confidence than text-only entries [5]. However, the advent of sophisticated image editing software complicates the situation [6]. Moreover, rumors are of two types depending on whether they offer hope or instill fear. They are known as pipe-dream rumors and bogie rumors respectively [2, 7]. The former mirrors optimism as in "You can cure cancer by taking Vitamin C," whereas the latter reflects pessimism as in "You can get cancer by using a microwave" [8]. Analyzing nuances in users' trust for pipe-dream and bogie rumors as a function of length and presence of image has not attracted much scholarly attention thus far.

Therefore, this paper seeks to investigate the extent to which the length of rumors, and presence of image in the entries are related to users' trust. To delve deeper, the investigation is carried out for pipe-dream rumors and bogie rumors separately. In particular, rumors in the context of health information are used as the test case for investigation. The significance of the results is highlighted thereafter.

Literature Review

This paper is motivated by the signalling theory [9], and the warranting theory [10]. The signalling theory—originally developed in the disciplines of economics [11] as well as biology [12] and later extrapolated to social networking sites [9]—explains the role of signals as indicators of trustworthiness. Given that any human interaction entails motivation for deception, the theory suggests that the cost of being deceived determines the use of signals as cues for trustworthiness. Seeking online health information clearly is a task in which the cost of being deceived is substantial. Therefore, the length of information may serve as a signal to inform users' willingness to trust.

The warranting theory suggests that individuals reduce uncertainty in determining information trustworthiness by relying on cues that are difficult to manipulate [10]. In validating the theory, [13] found that auctions containing product images not only attract high bidding interest but also receive high sales price in websites such as eBay.com. Perhaps, product images promote trust intention among bidders. In the context of health-information seeking, it therefore seems that presence of image in rumors might prompt users to trust the entries.

Even though length and the presence of images could apparently shape trust, prior research has not yet widely investigated how these two factors are related to users' perception of online health rumors. With respect to rumor length, two contrasting viewpoints exist. The first suggests that short rumors are

more likely to be trusted than long ones [2]. This is because the prospect of a rumor becoming viral is constrained by human memory [14]. However, the Internet minimizes reliance on human memory for rumors to permeate. This leads to the second viewpoint, which suggests that lengthy rumors are trusted more than short ones. Lengthy information could serve to signal trustworthiness, thereby inspiring confidence [9]. Sketchy information however might thwart trustworthiness [4], especially in the context of health [8].

Additionally, image in rumors could warrant their veracity. This is because images are perceived by users as cues that are difficult to manipulate [10, 15]. This is vestige of images' iconicity—ability to depict real objects and individuals by assigning them a documentary value [5, 16]. However, the advent of sophisticated image editing software facilitates creating realistic fictitious images, thus blurring the lines between truth and fiction [6, 17]. Therefore, investigating how the presence of images in health rumors relates to users' trust intention represents a significant scholarly undertaking. Regardless of length and presence of images, rumors are of two types: pipe-dream and bogie [7]. Mirroring hopes and optimism [2], pipe-dream rumors invoke anticipated consequences. They are often trusted arising from the wish that they would be materialized [18]. In contrast, reflecting fears and pessimism [2], bogie rumors invoke disappointing consequences. They are often trusted with the fear that the most horrific claims are likely to be translated into reality [18]. In an offline setting, bogie rumors were found more abundant and more likely to be trusted than pipe-dream rumors [7]. This sets an interesting context to study differences in users' trust for the two types of rumors in an online setting.

Methods

A 2 (length: short or long) x 2 (presence of image: absent or present) x 2 (type: pipe-dream or bogie) within-participants web-based experimental design was used to study users' trust for online health rumors. The experimental stimuli included a total of eight rumors (2 x 2 x 2), in which, the three independent factors were induced.

For designing the experimental stimuli, entries were drawn from liuyanbaike.com, a Chinese website that contains some 800 health rumors. Randomly-selected entries from the website were coded as either pipe-dream or bogie, and translated into English by three research associates, who were graduate students of Information Systems, and effectively bilingual in English and Chinese. All translated entries were jointly checked to ensure accuracy. A few rounds of random-selection followed by coding and translation yielded an initial pool of 24 rumors uniformly distributed across the three independent factors. Thereafter, from each set of three, one rumor was randomly selected to obtain a total of eight entries evenly spread across the three independent factors—length, presence of image, and type of rumor.

These eight entries were further pre-tested to confirm the induction of length, presence of image, and rumor type. For this purpose, 10 participants were selected based on convenience sampling. Five of them were graduate students while the rest were working adults. All of them agreed with three induction checks. Therefore, these rumors were finalized as the experimental stimuli.

The length of the short rumors ranged from 25 words to 70 words. In contrast, the length of the long rumors ranged from 126 words to 145 words. While rumors with images contained colored pictorial illustrations, those without images contained only text. The pipe-dream rumors offered hope whereas the bogie rumors instilled fear.

A total of 102 participants took part in the main study. They were identified based on convenience sampling, and recruited on meeting two eligibility criteria. First, their age was between 21 to 35 years. After all, individuals within this age range are likely to read and browse online health information [19]. Second, all participants had actual experiences of reading online health information in recent past. Thus, they were appropriate for the context of this paper.

The participants were provided the URL for the web-based experiment. After obtaining informed consent, the experiment comprised two parts. The first presented the stimuli of the eight rumors arranged in a random sequence. Each rumor was accompanied by a question asking if participants trusted the information (Yes/No). The second part of the experiment asked demographics questions

such as gender and age group. Of the 102 participants, 54 were female. Participants were requested not to surf the Internet to access other materials during their participation.

The extent to which length (short or long), presence of image (absent or present), and rumor type (pipe-dream or bogie rumors) influenced trust (1 = Yes, 0 = No) was tested using three-way repeated-measures factorial analysis of variance (ANOVA) [20]. Since no independent factor had more than two levels, the sphericity assumption was not violated, thereby obviating Greenhouse-Geisser correction.

Results

Table 1 presents the descriptive statistics of the dataset. The three-way repeated-measures factorial ANOVA indicated a statistically significant interaction (Wilks' Lambda= 0.83, $F(1, 101) = 20.95$, $p < 0.001$, partial $\eta^2 = 0.17$). The underlying two-way interactions—length x presence of images (Wilks' Lambda= 0.68, $F(1, 101) = 48.42$, $p < 0.001$, partial $\eta^2 = 0.32$), length x rumor types (Wilks' Lambda= 0.54, $F(1, 101) = 86.76$, $p < 0.001$, partial $\eta^2 = 0.46$), and presence of images x rumor types (Wilks' Lambda= 0.57, $F(1, 101) = 75.28$, $p < 0.001$, partial $\eta^2 = 0.43$)—were also statistically significant. Even though the simple effect of rumor types was statistically significant (Wilks' Lambda= 0.95, $F(1, 101) = 5.79$, $p = 0.018$, partial $\eta^2 = 0.05$), those of length and presence of images were non-significant.

Table 1. Descriptive statistics (Mean $\pm$ SD) of users' trust for rumors

Rumor Types	Length	Images Absent	Images Present
Pipe-dream rumors	Short	0.86 $\pm$ 0.35	0.27 $\pm$ 0.45
	Long	0.27 $\pm$ 0.45	0.35 $\pm$ 0.48
Bogie rumors	Short	0.14 $\pm$ 0.35	0.27 $\pm$ 0.48
	Long	0.39 $\pm$ 0.49	0.72 $\pm$ 0.45

To better understand the significant relationships, Fig. 1 presents the interaction plots for pipe-dream rumors and bogie rumors as a function of length as well as presence of image. It suggests that short pipe-dream rumors without images, and long bogie rumors with images substantially triggered users' trust.

Fig. 1. Trust for pipe-dream rumors (left) and bogie rumors (right) as a function of length as well as presence of image

Discussion and Conclusion

This paper gleans three findings from the results presented in Section 4. First, pipe-dream rumors are trusted the most when they are short and without images. This is ironic since sketchy information thwarts trustworthiness [4]. Moreover, rumors without images are often deemed less realistic than

those with images [5]. Users seem likely to trust pipe-dream rumors when the entries are cognitively easy to process. Reading long entries with images might have required users to pay closer attention than processing short entries without images.

Second, bogie rumors are trusted the most when they are long and with images. This is consistent with both the signalling theory and the warranting theory. Since the cost of being deceived by a bogie health rumor is substantial, users seem to believe that information volume would correlate with trustworthiness [9]. Also, they perhaps view images as cues that are difficult to manipulate. Arising from the property of iconicity [16], images could be perceived as cues that warrant trustworthiness [10].

Third, length and presence of images enhanced users' trust for bogie rumors but not for pipe-dream rumors. Reading long entries supported with images conceivably requires more cognitive efforts than reading sketchy textual entries. Driven by the "better safe than sorry rationale" [21, p. 145], users perhaps find it worthwhile to invest substantial cognitive efforts for reading bogie rumors but not pipe-dream rumors. This is not too surprising because bogie rumors have often been found to be viewed more seriously compared with their pipe-dream counterparts [7, 21].

This paper is significant on two counts. First, it empirically examines the signalling theory [9] and the warranting theory [10] in the context of online health rumors. Although the theories suggest that length and presence of image could promote trust, this paper finds non-significant simple effects for both. These two factors significantly informed users' trust intention only when their interplay with rumor types—pipe-dream or bogie—was taken into consideration.

Second, this paper has implications for health professionals on ways to share online health information with the youth. Hopeful information might be packaged so that they are easy to process. In contrast, gloomy information could be made detailed with adequate use of visual cues. Additionally, digital libraries could maintain a database of rumors trawled from the Internet. Information professionals together with the user community might be engaged to help ascertain rumor veracity as promptly as possible.

This paper has two major limitations that future research could address. First, since participants were selected using convenience sampling, it is important to exercise caution in generalizing the results. Additionally, more individual differences could have been taken into account. Second, even though the paper analyzed trust, it did not examine users' intention to share rumors. Such a study might have shed greater light on what makes rumors viral.

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