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Exploring the influence of perceived message attractiveness and quality on belief in fake news during COVID-19

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Abstract

During COVID-19, fake news on social media seriously threatened society. As a solution to this problem, this study examined how message factors influence people deeply harmed by fake news. Based on the Theory of Heuristic and Systematic Information Process, this study investigated the impact of perceived message attractiveness and quality on belief in fake news through the mediating roles of heuristic processing and systematic processing. This study utilised convenience sampling and surveyed 421 social media users in China. The data were analysed using least partial squares structural equation modelling (PLS-SEM). The results show that perceived message attractiveness and quality positively influence heuristic and systematic processing and belief in fake news. This study provides theoretical and empirical contributions to reducing people's belief in fake news.

Keywords: belief in fake news, information overload, perceived uncertainty, heuristic processing, systematic processing.

1. Introduction

Fake news is an issue of concern in today's society (Jankowski, 2018). The Internet and new media technology contribute to the proliferation of fake news (Humprecht, 2019). In recent years, fake news has become more prevalent on social media (Sadiku et al., 2018). Fake news refers to the deliberate presentation of (typically) false or misleading claims as news, where the claims are misleading by design (Gelfert, 2018). A global crisis has provided a breeding ground for fake news. At the beginning of 2020, the COVID-19 pandemic infected many people worldwide. COVID-19 has sparked the phenomenon of an "infodemic", where fake news related to COVID-19 spreads globally (Rodrigo et al., 2022). The WHO has warned that we are not just fighting an epidemic; we are also fighting an infodemic. As dangerous as the virus is, fake news spreads quickly and easily (Tedros, 2020).

The problem of fake news in China is tricky. There is a vast amount of fake news on social media in China during COVID-19. The Annual Fake News Research Group (2021) found that since 2020, fake news has increased in China. In addition, Chinese people are vulnerable to fake news. According to Willnat et al. (2018), more than 90% of Chinese people encountering fake news on social media will believe it. However, once people believe in fake news, they are prone to behaviour that is harmful to individuals and society. For example, fake news about a COVID-19-infected person trying to hide his location led to the infected person suffering Internet violence in China (Cui, 2021). Therefore, exploring the factors influencing people's belief in fake news is essential.

Researchers have tended to explore the influence of message factors on belief in fake news to answer the question of what kind of fake news people are more likely to believe (Bryanov & Vziatysheva, 2021; Tandoc Jr, 2019).. Prior research has investigated factors that influence people's belief in fake news, including the message's source (Sterrett et al., 2019), format (Sundar et al., 2021), and feature (Juez & Mackenzie, 2019). However, the influence of message attractiveness and quality on belief in fake news has been neglected. As Montañez et al. (2020) highlight, message attractiveness and message quality, which reflect the attacker's effort, significantly impact the attacker's success.

In addition, the way information is processed is considered at the root of people's belief in fake news. For example, Ali and Zain-ul-abdin (2021) analysed the 18 most popular fake news during the 2016 US election. They argued that the propaganda elements of fake news inspire people's heuristic information processing, making people more likely to believe fake news. Kahan (2017) demonstrated that people believe fake news through systematic processing when their political bias aligns with the fake news stance. However, how perceived message attractiveness and quality influence belief in fake news through information processing is unknown. Based on this, this study explores the influence of perceived message attractiveness and perceived message quality on belief in fake news from the perspective of information processing.

2. Literature review

Theory of Heuristic and Systematic Information Processing

Information processing is critical to influencing people's belief in fake news, and credibility may depend on how the information is processed (Kaye & Johnson, 2021). Cognitive psychology indicates the simultaneous existence of two cognitive processes of information processing in each individual (Lin, 2019). Specifically, the Theory of Heuristic and Systematic Information Processing posits that the two ways humans process information are intuitive, reflex-driven heuristic processing and deliberate, more analytical systemic processing.

The Theory of Heuristic and Systematic Information Processing proposes that the Principles of Least Effort and Adequacy determine the types and degrees of information processing (Chaiken, 1980, 1987, 1989). Guided by the Principle of Least Effort, individuals prefer heuristic processing over systematic processing because the latter requires more time and effort. Therefore, heuristic processing is the default choice.

However, individuals seeking confidence in their judgments want more than the least effort. The Theory of Heuristic and Systematic Information Processing suggested that the Principle of Adequacy guides individuals and that they are sometimes motivated to make an additional cognitive effort to develop a certain level of judgmental confidence. For example, to fully evaluate the accuracy of fake news, it is necessary to be more thoughtful (Bronstein et al., 2019; Pennycook & Rand, 2020).

Perceived message attractiveness

Message attractiveness refers to the image of a message, which is expressed through message design elements and linguistic abstraction (degree of visual aid), such as videos and pictures (Sarkar et al., 2022). In information communication, images or text emphasizing attractive features are more likely to garner a positive response from an audience than technical content (Cozzio et al., 2020). For example, when people receive messages with vivid adjectives, they act as instructed (Zhou et al., 2019). According to prior research, attractiveness plays a critical role in persuasion as a trait of messages (Gierl & Huettl, 2010). Visually appealing messages capture the audience's attention and interest and convey additional meaning and emotion (Liu et al., 2014; Sarkar et al., 2022).

Although message attractiveness has not been measured in research in the field of fake news, the effect of message attractiveness on the spread of rumours has been measured in previous studies. For example, according to Chua et al. (2016), message attractiveness is positively associated with the spread of rumours. In Liu's (2014) rumour-forwarding model, message attractiveness leads to people's sharing behaviour. In addition, T.-C. Lin et al.'s (2021) rumour model state that message attractiveness makes a rumour more convincing and increases credibility. These studies inform the present research investigating the effects of perceived message attractiveness on belief in fake news.

Perceived message quality

Message quality refers to a message's ability to effectively produce a change in the variables that it was designed to change (Jin et al., 2020). Message quality expresses the richness of the message, including content aspects such as the language used and the depth of information covered in the message (Mazzarol et al., 2007). Messages with high-quality attributes and characteristics, such as the extent to which the message explicitly acknowledges, articulates, legitimises, contextualises, and demonstrates the objectivity of the argument, have a more significant impact on people (Bodie et

al., 2012). For example, Ormond and Warkentin (2015) found that perceived message quality had a more significant impact than quantity on whether an individual perceived the message as honest and ultimately led to the individual's attitude.

It has been found that social media messages are of uneven quality, with high-quality messages having logical arguments. In contrast, low-quality messages tend to contain less logic and more vague language (Phang et al., 2014). Research has shown that message quality affects perceptions of the credibility of online messages (Cheung et al., 2009). According to Bordia et al. (2005), a high-quality denial message does reduce the trust associated with rumours. However, contrary to previous findings, Kim et al. (2020) study found that message quality did not significantly affect trust in rumours and fake news. Therefore, this study investigates the influence of perceived message quality on belief in fake news to clarify previously contradictory opinions.

Hypothesis development

Message attractiveness in communication contexts refers to the appeal of a message's format and style, which is usually reflected through message design elements and linguistic abstractions (Sarkar et al., 2022; Wang & Lehto, 2020). Researchers have shown that persuasiveness depends heavily on the design elements of the message, and that manipulation of the format and style of the message affects consumer responses (Pérez, 2019). Todorov et al. (2002) state that people form judgments based on simple cues such as the elements in a message, without analyzing the message in depth. Message attractiveness is a non-content-related heuristic cue for people to perceive (Sarkar et al., 2022). Therefore, this study hypothesized that:

H1a: Perceived message attractiveness significantly influences heuristic processing.

Researchers think that message attractiveness is a cue for heuristic processing, attractive sources can reduce the careful processing of messages and influence attitudes (Ray & Huntsinger, 2017). However, the opposite scenario has been overlooked. According to Guyer et al. (2019), message attractiveness can also increase people's thinking about the message to influence attitudes. For example, the attractiveness of a message makes people think more about it when they get threatening anti-attitude messages (Clark et al., 2012). Therefore, this study hypothesized that:

H1b: Perceived message attractiveness significantly influences with systematic processing.

Message quality is a factor when people make judgments about the content of a message (Metzger, 2007). According to Smith et al. (2017), heuristic processing involves making inferences based on superficial cues, with perceived message quality being one of the cues. For example, Ali and Zain-ul-abdin (2021) argue that fake news often uses abstract terms to make it appear higher quality and more persuasive, which triggers the affect heuristic. Researchers also suggested that people use the expectation violation heuristic to quickly judge information, i.e., they may expect social media news to have the same level of lexical complexity and argument quality as offline news (Ali et al., 2022). As fake news mimics offline news quality, people affect credibility through heuristic processing (Horne & Adali, 2017). Therefore, this study hypothesizes that:

H2a: Perceived message quality significantly influences heuristic processing.

In addition, according to previous research, perceived message quality has been identified as the primary antecedent of message impact in systematic processing (Zhang & Watts, 2008). Messages with strong arguments are more persuasive than messages with weak arguments in highly

elaborated (system processing) situations. System processing leads people to perceive the strength of the argument or the quality of the message in terms of how likely they are to accept the message (Kang et al., 2006). O'Donnell and Willoughby (2017) argue that the systematic processing of messages is more affected by the quality of the message. Therefore, this study hypothesizes that:

H2b: Perceived message quality significantly influences systematic processing.
Information processing influence whether a receiver believes targeted information. Studies show that, people believe fake news after processing information (Bago et al., 2020; Bronstein et al., 2019; Koh & Sundar, 2010). Researchers generally agree that belief in fake news is a result of heuristic processing. According to Michael and Sanson (2021), people tend to rely on heuristic cues when faced with the difficult task of determining whether news headlines are true news or fake news, which in turn leads to more people believing fake news. Ali and Zain-ul-abdin (2021) proves that the propaganda elements of fake news content stimulate people's heuristic processing, leading to people having to believe fake news. Therefore, this study hypothesizes that:

H3a: Heuristic processing significantly influences belief in fake news.
Other researchers have stated that systematic processing can rely on self-interest, religion, and conspiracy theories (Pennycook et al., 2015). For example, researchers have shown that partisan-motivated reasoning is a powerful bias influencing how citizens process information (Vegetti & Mancosu, 2020). People accept information based on their partisan preferences, which leads them to believe fake news (Anthony & Moulding, 2019; Enders & Smallpage, 2019). Therefore, this study hypothesizes that:

H3b: Systematic processing significantly influences belief in fake news.

Method

This study used an online survey method. This method is popular in fake news research and is efficient and inexpensive (Rampersad & Althiyabi, 2020). A specific inclusion criterion for this study was that the respondents had to be active social media users. This study uses a convenience sampling technique to collect data based on the WenJuanXing questionnaire platform. Finally, 421 valid questionnaires were collected, which is sufficient for this study.

Procedure

The survey was entered into WenJuanXing software as provided and hosted. Respondents were given a link in which they could access the survey readily and easily via their mobile phone or computer. When they first clicked on the link, they were shown a consent form, wherein the details of their participation and the study were explained. Respondents who agreed to the informed consent were subsequently presented with the actual questionnaire on the following pages. The online survey took about 10 min to complete. Data collection spanned two weeks in May 2023.

Measures

All measures in this study were adopted or adapted from previous research. The perceived message attractiveness scale was adapted from Lin et al. (2021). The perceived message quality scale was adapted from Le et al. (2020). The heuristic and systematic processing scales were adapted from Yang et al. (2014). The belief in fake news was adapted from Tandoc et al. (2021), and it

contains 12 randomly selected latest news headlines (7 true and 7 fake) on fact-checking platform in China. All items in this study were scored on a 7-point Likert scale.

3. Results

Descriptive statistics

This study included 219 male and 202 female respondents. The average age is 34 years. In terms of education, with 50.1% being bachelor's degree, 19.5% are master's degree, and 4.2% had a doctorate. (see Table 1). Nearly 74% have a bachelor's degree or higher, while some 18% were in tertiary education and 8% were in either primary or secondary school (see Table 1).

Table 1. Respondents' demographics profile (n=421).

Breakdown of respondents' demographics	Items	Sample	Percentage (%)
Gender	Male	219	52.0
	Female	202	48.0
Age	18-20	76	18.1
	21-30	193	45.8
	31-40	97	23.0
	41-50	42	10.0
	51-60	11	2.6
	61-65	2	0.5
Education	Doctor	18	4.2
	Master	82	19.5
	Bachelor	211	50.1
	Associate college	76	18.1
	High school or below	34	8.1

Measurement model assessment

Three crucial benchmarks—convergent validity, internal consistency reliability, and discriminant validity—were carefully examined to determine the measurement model's validity and reliability. The evaluation of the measurement model according to the convergent validity and internal consistency reliability criteria is summarized in Table 2. Utilizing the Fornell- Larker and HTMT evaluation procedures, the discriminant validity was evaluated. The HTMT technique was chosen above other approaches, as suggested by Hair et al. (2021), because of its better level of sensitivity in recognizing any potential measurement model discriminatory flaws. Tables 3 and 4 show the outcomes of the Fornell-Larker and HTMT discriminant validity assessments, respectively. The findings suggested that the measurement model had successfully passed the discriminant validity assessment because the AVE's square root values were higher than those of other constructs' correlations, all HTMT values were lower than 0.85, and none of the latent variables had values that fell within the confidence interval. It can be concluded that the created questionnaire is valid and trustworthy and is prepared for further examination in the structural model evaluation process given that the measurement model's assessment criteria were met to an acceptable quality.

Table 2. Constructs validity and reliability.

Constructs	Items	Outer	Cronbach's	Composite	AVE

		loading	Alpha	Reliability	
Perceived message attractiveness	PMA1	0.908	0.924	0.952	0.817
	PMA2	0.845			
	PMA3	0.852			
Perceived message quality	PMQ1	0.935	0.968	0.973	0.873
	PMQ2	0.805			
	PMQ3	0.808			
	PMQ4	0.797			
	PMQ5	0.815			
	PMQ6	0.797			
	PMQ7	0.801			
	PMQ8	0.790			
Heuristic processing	HP1	0.922	0.954	0.965	0.879
	HP2	0.817			
	HP3	0.801			
	HP4	0.797			
	HP5	0.790			
Systematic processing	SP1	0.925	0.947	0.959	0.912
	SP2	0.832			
	SP3	0.823			
	SP4	0.826			
	SP5	0.815			
Belief in fake news	BFN1	0.922	0.977	0.979	0.871
	BFN2	0.792			
	BFN3	0.803			
	BFN4	0.790			
	BFN5	0.760			
	BFN6	0.789			
	BFN7	0.796			
	BFN8	0.805			
	BFN9	0.797			
	BFN10	0.797			
	BFN11	0.781			
	BFN12	0.762			

Note: AVE: average variance extracted.

Table 3. Discriminant validity using Fornell-Larcker.

	Belief in fake news	Heuristic processing	Perceived message attractiveness	Perceived message quality	Systematic processing
Belief in fake news	0.894				
Heuristic processing	0.485	0.919			
Perceived message	0.466	0.470	0.932		

attractiveness					
Perceived message quality	0.430	0.488	0.462	0.905	
Systematic processing	0.500	0.480	0.458	0.480	0.909

Table 4. Discriminant validity using HTMT.

	Belief in fake news	Heuristic processing	Perceived message attractiveness	Perceived message quality	Systematic processing
Belief in fake news					
Heuristic processing	0.502				
Perceived message attractiveness	0.498	0.500	0.932		
Perceived message quality	0.442	0.507	0.488		
Systematic processing	0.519	0.504	0.488	0.502	

Structural model assessment

The research hypotheses were subjected to verification through the utilization of a Partial Least Squares (PLS) algorithm in combination with a bootstrapping method that employed 1000 resamples. The results of the data analysis (see Table 5) show that the relationship between perceived message attractiveness and heuristic processing was statistically significant (β=0.148, t=4.486, p=0), and H1a was supported. The relationship between message attractiveness and systematic processing was statistically significant (β=0.143, t=4.087, p=0), and H1b is supported. Perceived message quality positively influences heuristic processing (β=0.166, t=5.240, p=0), and H2a was supported. Perceived message quality positively influences systematic processing (β=0.172, t=5.029, p=0), and H2b was supported. Regarding the results of H3a, the relationship between heuristic processing and belief in fake news was significant (β=0.227, t=6.635, p=0), and H3a was supported. Systematic processing positively influences belief in fake news (β=0.277, t=8.475, p=0), and H3b was supported.

Table 5. Structural model assessment.

	Path	Beta (β)	M	SD	t	p
H1a	PMA -> HP	0.148	0.148	0.033	4.486	0.000
H1b	PMA -> SP	0.143	0.143	0.035	4.087	0.000
H2a	PMQ -> HP	0.166	0.167	0.032	5.240	0.000
H2b	PMQ -> SP	0.172	0.172	0.034	5.029	0.000
H3a	HP -> BFN	0.227	0.227	0.034	6.635	0.000

H3b	SP -> BFN	0.277	0.277	0.033	8.475	0.000

4. Discussion

During COVID-19, the proliferation of fake news on social media and its misleading people posed a danger to both individuals and society. The negative impact of fake news peaked on social media compared to other media (Wu & Mustafa, 2023). People who believe in fake news on social media can easily create violence, challenging China's social order (Zhang, 2022). Despite surveys showing that over 90% of Chinese people are likely to choose to believe fake news when they encounter it (Willnat et al., 2018), there is little research in China that explores how and why people believe in fake news. Considering the problem of fake news in China, this study investigated the influence of perceived message attractiveness and perceived message quality on belief in fake news from information processing perspective.

The results of this study show that perceived message attractiveness positively influences heuristic processing and that H1a is supported. This is consistent with previous findings that message attractiveness is a simple cue for information processing. When cues such as the design, pictures, and videos of a message act as objects that attract attention, people use these cues as tools and direct information processing efforts almost unconsciously (Bellur & Sundar, 2014). This means that people use the characteristics of the message (e.g., form, color, source) as a criterion for judging that attractiveness equals accuracy.

In contrast to previous research, the present study also supports that perceived message attractiveness positively influences systemic processing. That is, H1b is supported. The reason for this may be that previous studies have ignored the case of simultaneous processing of both information processing types. Message attractiveness allows both information processing modes to work together to support persuasive results (Skalski & Tamborini, 2007). Attractive messages lead to more positive thoughts about the message, facilitating systematic processing (Kergoat et al., 2017). Attractive messages may cause social media users to give them more thought and attention than a passive experience (Ziegler et al., 2005).

For perceived message quality, the results of this study showed that perceived message quality positively influenced heuristic processing, and H2a was supported. This is consistent with the results of previous studies. For example, Hitt et al. (2016) argue that perceived message quality is a heuristic processing cue. Perceived message quality is a judgment of the validity of a message in terms of its expected outcome in advance, guiding people's decisions through a simple rule (Smith et al., 2017).

Furthermore, the results of this study also show that perceived message quality positively influences systematic processing, and H2b is supported. Previous studies also supported the results. For example, Ryu and Kim (2015) showed that high-quality messages motivate recipients to examine the information in the message more carefully, so perceived message quality leads to systematic processing. That is, systematic processing is influenced by perceived message quality when evaluating persuasive messages (Oh, 2022).

The results of this study showed that heuristic processing positively influenced belief in fake news, and H3a was supported. This supports part of the previous research that shows people believe in fake news because they are engaged in heuristic processing (Ali et al., 2021). However, this study supported heuristic processing on belief in fake news but did not argue against the effect of systematic processing on belief in fake news, despite most previous research suggesting against it (Pennycook & Rand, 2019). The results of the present study found that systematic processing positively influenced belief in fake news, and H3b was supported. This supports the positive role of motivated reasoning in influencing people to believe in fake news, implying that systematic processing is also responsible for people believing in fake news (Thaler, 2019).

Theoretical implication

This study develops a model of the influence of perceived message attractiveness and perceived message quality on belief in fake news based on information processing perspective. First, this study uncovers relationships that were not realized under a single information processing perspective for the message factors. Specifically, from the single perspective of past research, heuristic processing was a significant cause of fake news influence (Ali & Zain-ul-abdin, 2021; Pennycook & Rand, 2019). As a result, past studies could only be aware of message attractiveness as a cue to influence heuristic processing while ignoring the impact of message attractiveness on systematic processing (Sarkar et al., 2022). This study adds to the knowledge that attractive messages excite people and prompt them to invest more in cognition by measuring the positive relationship between perceived message attractiveness and systematic processing (Clark et al., 2012; Guyer et al., 2019), highlighting the dual influence of perceived message attractiveness on both types of information processing.

Furthermore, past research has indicated that perceived message quality is a cue for systematic processing (O'Donnell & Willoughby, 2017). However, it ignores the fact that perceived message quality as a cue for heuristic processing affects people's trust in fake news. Indeed, when people perceive high-quality news, they automatically assume it is true (Ali et al., 2022). The influence of perceived message quality on heuristic processing from a single information processing perspective isn't present. This is because the researcher argues that perceived message quality already positively influence heuristic processing and that heuristic and systematic processing must be either/or (Pennycook & Rand, 2019).

This study explores the dual influence of belief in fake news through heuristic and systematic processing. Our study explains the contradictory views of past research, in which some scholars have argued that belief in fake news is influenced by heuristics rather than systematic processing (Pennycook & Rand, 2019), while others have claimed that belief in fake news is influenced by systematic processing (Kahan, 2017). This study fills a knowledge gap in previous research and explains previously contradictory views.

Practical contribution

Journalists should be concerned about the positive impact of message factors on people's belief in fake news. Specifically, this study's findings suggest that message attractiveness and quality are reasons why people believe fake news. In other words, fake news on social media is devious. To satisfy the purpose of fake news makers, who deliberately deceive their audiences, fake news is produced in an attractive and high-quality manner (Buchanan, 2020). For example, data is

provided to argue points to give the illusion of high quality, even though the data may be fabricated (Blitz, 2018). This is the difficulty in combating fake news because Chinese social media users lose trust in news organizations (Guo, 2020). Therefore, when telling people what fake news is, journalists need to be specific in stating what the fake part of fake news is (Berkowitz & Schwartz, 2016). This is to increase people's credibility in journalists' statements. In addition, the findings of this study give some insights for journalists when producing news. These insights include focusing on the news's visual appeal and improving its quality to increase its credibility (Metzger et al., 2010).

5. Limitations

This study has limitations. Firstly, although there are cost and time advantages to collecting data through convenience sampling in this study, there is no denying that the sample may not be representative enough (Etikan et al., 2016). Secondly, there may be potential self-reporting bias in our research survey. Future research could conduct longitudinal or experimental studies to validate this study's findings. Also, this study is a China-based study with differences in COVID-19 profiles and social media prevalence rates from other countries or regions. Future studies can continue to investigate in different contexts.

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