## Abstract

People rely on heuristic cues to evaluate messages. An increasing number of studies found corrective messages useful in correcting misinformation, and the correction effect varies on heuristic cues. Existing studies, however, mostly focus on correction effects in the Western context. This study aims to compare the effects of corrective messages with different heuristic cues in an authoritarian society. We focused on the cues that suggest government authoritativeness. Using an online experiment, we compared the impacts of correction sources (official vs. professional vs. layperson) and tones (formal vs. conversational) on the believability of the correction. The results indicated corrections from a government source and delivered in a formal tone were more believable in China. In addition, we examined the moderating role of attitude congruence.

*Keywords:* misinformation, correction, science, authoritarian, China

**Correcting Science Misinformation in an Authoritarian Country: An Experiment from China**

The spread of misinformation, which refers to incorrect information (Tandoc, Lim, et al., 2018), has become a salient problem in global societies. Science misinformation is a type of misinformation, referring to incorrect information about science (Williams Kirkpatrick, 2021). In recent years, the dissemination of science misinformation has raised many concerns about science education and development (Farrell et al., 2019; Williamson, 2016). Belief in science misinformation can lead to unwise decisions and behaviors. For example, during the early outbreak of COVID-19 in China, misinformation about virus prevention was shared virally on social media and misled people into excessive prevention behaviors (Chen, 2020).

Corrective messages is considered as one of the most important tools to combat misinformation, and its effect has been examined by massive studies (Bode & Vraga, 2018; Hameleers & van der Meer, 2020; Kim, 2018; Luo et al., 2020; Mena et al., 2020; Vraga & Bode, 2017). Meta-analyses of empirical studies suggest that corrective messages are generally useful in countering misconceptions, but their effects vary by the cues of the correction, for example, message source (Chan et al., 2017; Walter et al., 2020; Walter et al., 2019; Walter & Murphy, 2018; Walter & Tukachinsky, 2020).People often rely on simple cues to make evaluation of the messages because of the information overload in the current media environment (Malhotra, 1984). The simple judgment in information processing is called heuristic processing (Eagly & Chaiken, 1993). Therefore, how to use heuristic cues to enhance the persuasion power of messages correcting science misinformation has become an important topic, which has attracted

much attention from scholars.

Most of the studies comparing correction effects were conducted in Western societies, especially the U.S. (Benegal & Scruggs, 2018; Bode & Vraga, 2015, 2018; Dai et al., 2021; van der Meer & Jin, 2020). Persuasion effects, however, tend to vary greatly across cultures (Aaker & Maheswaran, 1997; Pornpitakpan & Francis, 2000; Uskul et al., 2009). The existing research on science correction lacks empirical evidence from diverse backgrounds, while persuasion messages should be customized based on cultural contexts. To explore the effects of science correction in a different context, this study examined the perceived believability of science correction in China. With 927 million internet users, China has the largest internet population in the world (Lin, 2020), but not many studies have investigated online science persuasion in China. Correcting science misinformation is challenging. Although the Chinese government has enacted laws to regulate misinformation, science misinformation remains prevalent on the internet. According to one study, the most popular topics involving misinformation on Chinese social media are health, medicine, and food safety (Lu et al., 2020). In addition to the direct effects of misinformation, the dissemination of science misinformation has led to a decreasing faith in science (Gu et al., 2018). The current study aims to provide suggestions for correcting science misinformation in an authoritarian context.

**Science Misinformation and Its Correction in China**

In democratic societies, especially those with a bi-party system (such as in the U.S.), science issues are often politicalized, and the discussions of science are influenced by political ideology (Blank & Shaw, 2015; Lynch et al., 2010). Existing studies on science misinformation and correction, which mostly focus on Western democratic

societies, found that political identity is the most important predictor of science beliefs. For example, most of the scientists in the world agree that anthropogenic global warming is happening, but many Republicans in the U.S. choose to believe the opposite (Dunlap et al., 2016; Fielding et al., 2012; Zia & Todd, 2010). An increasing number of studies focus on finding ways of correcting partisan science misbeliefs. Studies have found that partisan sources speaking against their partisan interest are more likely to convince people to accept the facts of global warming (Benegal & Scruggs, 2018), while education does not decrease the polarization of controversial science topics (Drummond & Fischhoff, 2017; Zia & Todd, 2010).

However, findings from democratic societies can hardly be generalized to science persuasion in other contexts. A cross-national survey found that the ideological divide of climate change in the U.S. does not exist in the former Communist countries in Europe, due to the low political salience of climate change and the different meaning of left-right identification in these countries (McCright et al., 2016). China is an authoritarian country, and thus scientific beliefs vary little across political identities. The government censors the media, and the internet blocks speech that questions its legitimacy (Tai, 2014; Xu & Albert, 2014). Therefore, news media in China usually has to be consistent with the government on science issues, rather than providing opposing opinions to the public (Du & Rachul, 2012; Wu, 2006).

Despite censorship, different voices on controversial science topics are being expressed on social media; for example, there is heated discussion about genetically modified organisms (GMO). People who distrust government policy on science often criticize the government on social media (Chow, 2019; Jiang & Fang, 2019; Li et al.,

2019). In other words, in this context, the debate over science often happens between the government authority and the opposing public, instead of between different political parties. Unfortunately, the opposing public's online discussions about science are often influenced by misinformation (Jiang & Fang, 2019; Wang & Song, 2020).

In an authoritarian context, the presence of government authority has a heavy impact on people's processing of scientific information. Against this background, this study aimed to examine factors that can improve the believability of science correction on social media. Among all the cues in social media posts (e.g., time, source, comments, tone, number of likes), source and tone were specifically examined because of their relation to presenting government authority.

**Heuristic Processing of Corrective Messages**

Human information processing involves two strategies: heuristic route and systematic route (Chaiken, 1980). Systematic processing is conceptualized as analytic processing and careful scrutiny of messages. In contrast, heuristic processing involves making judgments based on simple cues such as source and social ties (Chaiken & Maheswaran, 1994; Kaiser et al., 2018). When people engage in heuristic processing, they consider only a few cues in the message that "enable them to use simple decision rules or cognitive heuristics to formulate their judgments and decisions" (Eagly & Chaiken, 1993, p. 327).

The proliferation of internet and social media aggravates the problem of information overload, and people are exposed to more information than they can process (Rodriguez et al., 2014). While the amount of information available on social media keeps expanding, the human processing capacity remains limited. As a result, individuals

frequently adopt heuristic rather than systematic processing when exposed to information on social media. Empirical studies have indicated how heuristic cues, such as group-based opinions and the popularity of the topic, play a significant role in people's believability of messages (Metzger et al., 2010; Sundar et al., 2007).

Although heuristic cues can tempt people into trusting misinformation (Kim, 2018; Swire et al., 2017), it can also increase the believability of corrective messages (Bode & Vraga, 2018; Hameleers & van der Meer, 2020). This study compares different the effects of heuristic cues on science misinformation correction in China.

***The influence of source on correcting science misinformation***

Source has been an important heuristic cues in persuasion because people will transfer the credibility of source to the credibility of the messages correlated with that source (Mondak, 1993). Moreover, people unable to form an opinion on an issue usually rely on source to form their evaluation (Mondak, 1993). Scholars have identified some sources that can increase the power of messages that correct science misinformation in the Western context. For example, expert sources are perceived as more believable than laypersons when rebutting health misinformation (Vraga & Bode, 2017). Also, government agencies and news media sources are found to be more believable than social peers (van der Meer & Jin, 2020). The current study compared three types of sources that have made (or have the potential to make) contributions to correcting science misinformation in China.

Governmental institutions are usually responsible for science literacy education, and therefore, they actively engage in the combat against science misinformation on social media. In China, government sources are considered official sources (He, 2009;

Shen & Wang, 2013), which possess political authority. The media are also considered an official source due to its alignment with the government (He, 2009; Shen & Wang, 2013). The Chinese mass media has made a great effort to combat science misinformation, but journalists have to toe the line with the government on controversial science topics due to strict censorship (Du & Rachul, 2012; Wu, 2006).

Professional sources are usually more convincing than non-professional sources (Maddux & Rogers, 1980). Scientists, who by definition have expertise in science, are found to be more persuasive than the general public in conveying science information (Vraga & Bode, 2017). Another professional source in science discussions is the popular science media, which are usually run by science professionals. Popular science media has earned massive trust in Chinese social media. Dxy.cn, an online health service website, has more than five million followers on Weibo. Another online science media site, Guoke, which was owned by a doctor of neuroscience, has more than 10 million followers on Weibo. By browsing the content of these sites, it is noticeable that one of the most important parts of popular science media's work is to correct science misbeliefs.

Compared to professionals, a layperson does not have expertise in science. The ordinary person has been frequently compared to experts or public figures as a baseline in persuasion studies due to their disadvantages in expertise and social influence (Liang et al., 2019; Sundblad et al., 2009). Experiments found that the ordinary social media users, such as social peers, are less convincing as a source of science messages compared to professional scientists or organizations (van der Meer & Jin, 2020; Vraga & Bode, 2017). However, it should be noted that in reality, self-organized grassroot rumor-debunking practices demonstrate great potential for China's online communities (Zeng et al., 2019).

A social-networking analysis of Weibo found that posts about GMOs from unverified accounts received more reposts and had more layers of information relay than those from verified accounts (Xu et al., 2020). Another type of layperson source that has the potential to correct science misbeliefs is celebrity. Although most celebrities are not professionals in science, they have great social influence, and some of them are active in social discussions. In the U.S., Leonardo DiCaprio and Jane Fonda have publicly called for attention to global warming (Reilly, 2019). In China, the most famous case is Cui Yongyuan, a former TV host of *China Central Television,* who has more than 19 million followers on Weibo. Cui had publicly opposed GMO food and challenged pro-GMO scientists, which quickly raised public concern about GMO food beginning in 2013 (Wang, 2019). However, Cui's science literacy was questioned since he had posted some inaccurate statements about science, for example, that humans have blue venous blood. Although Cui's scientific opinions are controversial, his example indicates that celebrity sources may have great power in influencing others.

Professional and layperson sources can be convincing in science correction given their expertise and social influence; however, people in an authoritarian country might prefer official sources. According to an interview with Chinese internet users, interviewees can perceive censorship and government control in online speech, but when it comes to misinformation correction, they tend to believe official statements (Lu et al., 2020). In addition, although Chinese people can be critical of official sources in public discussions about science (Jiang & Fang, 2019), national and cross-national surveys show that they had a high level of political trust (Edelman, 2020; Wang, 2005; Wong et al., 2011). In a study involving six Asian societies (China, Hong Kong, Japan, Singapore,

South Korea, and Taiwan), political trust in China ranked second following Singapore, and political trust in China was much higher than in the democratic societies (Wong et al., 2011). Therefore, we posited the following hypothesis:

H1: Compared to a message from a professional and layperson source, a correction from an official source will tend to be perceived as having higher believability.

***The influence of tone on correcting science misinformation***

When audiences evaluate the authenticity of news information, some of them rely on the tone of the messages (Tandoc, Ling, et al., 2018) although tones of news messages are becoming more diverse in the social-media era. Message tone activates heuristic processing and affects readers' perceptions of the message by presenting an image of the communicator (Kelleher, 2009; Park & Cameron, 2014). For example, a conversational tone presents a humanized communicator (Kelleher, 2009). Studies on science correction in the Western context have compared the effects of different tones, such as uncivil, affirmative, and humorous (Bode et al., 2020; Brewer & McKnight, 2015, 2017; Vraga et al., 2019). The current study aimed to compare the effects of formal and conversational tones on improving the believability of science corrections in China.

In recent years, the interactive nature of social media has fostered the use of a more conversational tone, a less formal communication style. Following Park and Cameron (2014) and Barcelos et al. (2018), the current study defined conversational tone as a more natural, close, and personal style of online communication, as opposed to a corporate voice that is usually more formal and distant. A conversational tone can build a friendlier and more approachable image of the source (Fullwood & Martino, 2007).

Customers engaged in more humanized communication with the brands perceived more closeness and favorability (Barcelos et al., 2018; Kelleher, 2009). Also, compared with a formal tone, a more conversational and humanized tone can gain more trust (Kelleher, 2009; Park & Cameron, 2014). As a result, a conversational tone has been widely used on social media, even for official accounts.

Some studies, however, found conversational tone to have negative influences on persuasion, such as reducing source credibility and perceptions of expertise (Eisend, 2009; Haberstroh, 2010). Instead, a formal language tone can better present the authority of sources. A formal tone has long been an important part of academic and bureaucratic writing (Chartprasert, 1993; Matsuda & Nouri, 2019) because it is usually correlated with higher levels of education, expertise, and a sense of respect (Fang, 1991; Rosen et al., 2010). Official sources in China, such as political leaders, government authorities, and mass media, still use a formal tone in public announcements. Therefore, we hypothesize the following:

H2: Compared to a corrective message composed in a conversational tone, a correction composed in a formal tone will tend to be perceived as having a higher believability.

**The Moderation Effect of Attitude Congruence**

People are more likely to arrive at conclusions that they want to arrive, and thus they resist the messages that are incongruent with their original opinions. The phenomenon is called motivated reasoning (Kunda, 1990). People usually find messages that are congruent with pre-existing attitudes to be more credible and reliable than other (Jerit & Barabas, 2012; Taber & Lodge, 2006). As a result, rejecting attitude-congruent

messages is found to be less successful than rejecting attitude-incongruent messages (Ecker & Ang, 2019; Kahne & Bowyer, 2017; Thorson, 2016). In fact, corrections that do not fit one's original worldview can even backfire and strengthen misbeliefs (Lewandowsky et al., 2012; Nyhan & Reifler, 2010). Although a few studies failed to find the effects of pre-existing attitudes on correction acceptance (Hameleers & van der Meer, 2020; Swire et al., 2017), meta-analyses conclude that corrective messages are more effective when they are consistent with the audience's pre-existing attitudes (Chan et al., 2017; Walter & Tukachinsky, 2020). The impact of attitude congruence on correction effect has also been supported by evidence from science misinformation (Bode & Vraga, 2018; Vraga et al., 2019).

Based on the theory of motivated reasoning, we hypothesized the following:

H3: Compared to a corrective message congruent with people's attitude, a correction incongruent with people's attitude will tend to be perceived as having a lower believability.

When people were presented with corrections that are incongruent with their pre-exiting attitudes, they tended to defend their beliefs by engaging in attitude bolstering, which refers to reinforcing initial beliefs to reduce conflicting conceptions (Prasad et al., 2009). As a result, although message cues can activate heuristic processing and improve people's evaluation of the messages, the impact of people's pre-exiting attitudes should not be overestimated. A study found logic-based correction to be more credible than humor-based correction, but the logic-based correction is less successful in refuting misinformation among those who agree with the misinformation earlier (Vraga et al.,

2019). In another study, Facebook users who are exposed to correction as related stories following a misinformed post reduced their misconceptions significantly; however, they rated the correction message less favorable when their pre-exiting attitude is consistent with the misinformed post (Bode & Vraga, 2015). Thus, we believe that the positive impact of official source and formal tone in correcting misinformation will be reduced among people who hold an incongruent attitude with the correction.

H4: The positive effect of official source on correction's perceived believability is weaker among people who hold an incongruent attitude with the correction.

H5: The positive effect of a formal tone on correction's perceived believability is weaker among people who hold an incongruent attitude with the correction.

## Method

### *Design and Procedure*

We examine two different topics to ensure internal reliability, in addition to manipulating source and tone. The online survey experiment is a 2 × 6 × 2 between-subject design (topic × source × tone). The examined topics were GMO and 5G. We compared the effects of three types of sources, which were official sources (government and mass media), professional sources (popular science media and scientist), and layperson sources (celebrity and ordinary person). For message tone, we compared formal and conversational tone. Previous studies have confirmed the positive effects of corrective messages on countering misinformation (Chan et al., 2017; Walter et al., 2019; Walter & Murphy, 2018), and this study aims to find out how to further improve the

believability of correction. Thus, we did not set up a control group. The experiment was embedded in a national online survey. First, participants were randomly assigned to one of the 24 groups. Then they were asked to report their attitude towards one of the science topics, depending on which topic they were assigned to. They read a message contained misinformation about the negative influences of one of the science topics. A related correction message showed up right after. After reading the correction message, participants were asked to rate their perceived believability of the correction message.

***Stimuli***

We chose GMO and 5G as the two topics for the experiment materials. In recent years, the government has shown its support for the commercialization of GMO crops and 5G, which has raised the public's attention (Cremer, 2020; Tong, 2020). There have been debates about the negative sides of GMO and 5G on Chinese social media, including discussions based on misinformation (China Daily, 2020; Wang & Song, 2020). The difference between these two topics lies in their levels of familiarity. The development of GMO technologies has started in China since the 1980s, and the long-lasting discussion has divided the public on the approval of GMO crops (Chow, 2019). The commercial use of 5G network only started in China in 2019, which raised a heated social discussion.

We prepared the stimulus material in the format of posts from Sina Weibo, one of the most popular social media platforms in China. The number of monthly active users of Sina Weibo showed an upward trend from 2018 to the second quarter of 2020, ranging between 411 and 523 million (Statista, 2020). Given its large amount of users, many scholars studied Weibo when exploring the public opinion of science topics (e.g., Liu &

Zhao, 2017; Wang & Song, 2020).

The misinformation messages were adapted from real misinformation on social media. The misinformation about GMOs suggested that growing GMO crops caused genetic contamination and made weeds resistant to herbicides, resulting in a reduced output of non-GMO crops in Australia. The correction post that matches it started with a hashtag signaling that news on genetic contamination in Australia is fake news. Then the post explained that herbicide abuse was the real cause of fast-growing weeds. The misinformation about 5G claimed that 5G millimeter waves could penetrate the skin and have bad influences on the human body, for instance, influencing the regeneration of brain cells, leading to problems with concentration and sleeping. The following correction post started with a hashtag signaling that the news about 5G affecting regeneration of brain cells is fake, and then explained that 5G in China does not use millimeter wave technology, and the regular use of 5G smartphone would not affect the human body. The text length of the stimulus materials was controlled to be similar, which was about 130-135 Chinese characters.

For manipulation of message tone, half of the participants read correction messages written formally, and the other half read correction messages in a conversational tone. A conversational tone can be achieved by different expressions, such as showing openness to dialogue, a sense of humor, treating readers like a human (Kelleher, 2009). The goal is to make the content looks more humanized, friendly, and interactive. Using expression strategies such as colloquial languages, emoticons, abbreviations, first-person voice, and onomatopoeias can make the messages sound less official and more casual (Barcelos et al., 2018; McArthur et al., 2018). In our study, we

manipulate the message in a conversational tone with internet emoticons, exclamation marks, and modal particles. To avoid potential side effects, two versions of correction messages, GMO and 5G, presented the same emoticons and modal particles.

The source of the message was shown on the correction message. The profile information of sources (i.e., name and profile picture) looks the same as their real Weibo profiles. For the government source, we chose the Weibo account of China's state council, which indicates national authority. For the scientist, we chose Junshi Chen, a fellow of the China Academy of Engineering. In China, some scientists become prominent and controversial public figures by being endorsed by the government or endorsing the government's choices. To avoid possible side effects, we chose a relatively less known scientist who is a fellow of the China Academy of Engineering presented in his Weibo account. For mass-media source, we did not choose well-known party media outlets such as the *People's Daily*. Instead, we selected *The Beijing News*, a mainstream market-oriented media source. For science media source, we selected Guoke, a famous Chinese science media platform with more than 10 million followers on Weibo. For celebrity source, we chose Huangbo, a well-known Chinese comedian and actor who has never posted about GMOs or 5G before. For the ordinary person, we created an account with a gender-neutral name "abbcc" and a generic user profile image. Following the settings of Sina Weibo, all the sources except for the layperson were tagged with a "V" on its profile image to show verified identity by Sina Weibo. Two examples of correction messages were shown in Figure 1.

[Figure 1 about here]

***Participants***

The participants of the experiment were recruited through a well-known Chinese marketing research company in March 2020. We performed quota sampling based on the Chinese internet user profile (CNNIC, 2019). The sample was representative of Chinese internet users in terms of age, gender, education, and residence (i.e., urban vs. rural). In total, 3,000 participants aged above 18 completed the survey experiment. The demographic characteristics of our respondents were shown in Table 1.

[Table 1 about here]

***Measurement Scales***

*Correction believability*. The believability of correction messages was measured using a 5-point semantic differential scale adapted from previous studies (Kim, 2018; Lee & Oh, 2017). Participants rated how they perceived the correction message along with five adjective pairs: unbelievable/believable, unconvincing/convincing, untrustworthy/trustworthy, inaccurate/ accurate, and uninformative/informative. The average scores form an index of correction believability ($M$ = 3.69, $SD$ = .97, Cronbach's $\alpha$ = .83).

*Attitude Congruence*. For participants assigned to the GMO topic, they were asked to rate the extent to which they support the adoption of GMO technology on medicine, agriculture, and organ transplantation on a 5-point Likert scale, where 1 means "not supportive" and 5 means "supportive". The average scores of these three items form the index of topic attitude, $M$ = 3.82, $SD$ = .95, Cronbach's $\alpha$ = .71. For participants assigned to the 5G group, they were asked to rate the extent to which they support the adoption of 5G technology for smart city, remote medical treatment, and mechanical manufacturing on the same scale. The average scores of these three items form the index,

$M$ = 4.25, $SD$ = .78, Cronbach's $\alpha$ = .85. Those who rated higher than 3 on the index were considered as supporters of GMO/5G technology (n = 2488, coded as "1"). In other words, since the misinformation is about the negative influences of GMO/5G technology, those who support the adoption of the technologies were considered to hold a congruent attitude with the correction message. At the same time, those rated lower than 3 on the index were considered to hold an incongruent attitude with the correction message ($n$ = 252, coded as "0"). For respondents who reported 3, their attitude is neither congruent nor incongruent with the correction messages ($n$ = 260, coded as "2").

## Results

### *Manipulation Check*

The manipulation of sources in social media posts was explicit and has been examined by many studies (e.g., Swire et al., 2017; Vraga & Bode, 2017). But the difference in tones could be more implicit. To examine whether the participants can sense the level of formalness of the tones, we asked respondents to rate the levels of "formal/conversational" for the correction message ($M$ = 3.66, $SD$ = 1.10). Overall, participants read the formal correction ($M$ = 3.71, $SD$ = 1.10) perceived the message as more formal than the participants read the conversational correction ($M$ = 3.60, $SD$ = 1.07), and the difference was statistically significant, $t(2998) = 2.65$, $p < .01$.

### *Hypothesis Testing*

We ran a series of ANOVA tests to examine our research questions and hypotheses. H1 hypothesized that compared to correction from professional and layperson sources, correction from official sources would have higher believability. A statistically significant ANOVA test result was obtained, $F(5, 2965) = 2.92$, $p < .05$.

According to the results from the post-hoc analyses (Fisher's LSD), the believability of government source ($M$ = 3.51, $SD$ = .07) was significantly higher than the professional sources, which are popular science media ($M$ = 3.18, $SD$ = .07) and scientist ($M$ = 3.26, $SD$ = .06). Also, government source was perceived to be more believable than celebrity ($M$ = 3.18, $SD$ = .07) and ordinary person ($M$ = 3.24, $SD$ = .07), the layperson sources. In addition, government source was more believable than mass media ($M$ = 3.22, $SD$ = .07), and the believability of mass media showed no significant difference from that of professional and layperson sources. Therefore, H1 was partially supported, that only one of the official sources, government source, was perceived as more believable than professional and layperson sources. Results of post-hoc pair-wise comparisons are shown in Table 2. In addition, the effect of source did not vary on topics, $F(5, 2965) = 1.21$, $p = .30$.

[Table 2 about here]

H2b was supported by the data, but not H2a. Believability of correction message in a formal tone ($M$ = 3.33, $SD$ = .04) was higher than that in a conversational tone ($M$ = 3.20, $SD$ = .04), and the difference was statistically significant, $F(1, 2965) = 5.85$, $p < .05$. In addition, tone and source did not have a moderation effect on correction believability, $F(5, 2965) = 0.89$, $p = .49$.

Interestingly, message tone had an interaction effect with topic on correction believability, $F(1, 2965) = 9.00$, $p < .01$. Based on the results (see Figure 2), the believability of correction about GMO barely varied by tones. But people tend to perceive higher believability of the correction message about 5G when it was written in a formal tone.

[Figure 2 about here]

H3 proposed that attitude congruence has an impact on correction believability. Since H3 only focuses on participants who hold a congruent or incongruent attitude towards the assigned topic, the analysis excluded participants who hold a neutral stance. H3 was supported by our data, $F(1, 2713) = 218.21$, $p < .001$. People who hold a congruent attitude with the correction perceived higher believability of the correction message ($M = 3.84$, $SD = .02$), compared to people who have an incongruent attitude with the correction ($M = 2.85$, $SD = .06$). The effect of attitude congruence was not varied on topics, $F(1, 2713) = .44$, $p = .51$.

Then we proceeded to testing the interaction effect of attitude congruence and our manipulations. Attitude congruence did not affect the impact of source on correction believability, $F(1, 2713) = 1.37$, $p = .23$. However, the effect of tone was moderated by attitude congruence, $F(1, 2713) = 5.18$, $p < .05$. The results of the interaction effect were shown in Figure 3. For people who hold a congruent attitude with the correction, their perceived believability of correction messages barely changed across formal and conversational tones. For those who hold an incongruent attitude with the correction, they tend to perceive higher believability of correction messages written in formal instead of a conversational tone.

[Figure 3 about here]

**Discussions**

The study provides insights into reducing the dissemination of science misinformation by varying heuristic cues in correction messages in an authoritarian context. This study examined how source and tone, message elements that reflect

authority, affected the believability of correcting messages of science misinformation. With a representative sample of internet users from China, the findings shed lights on the impact of different heuristic cues in correcting science misinformation.

***The impact of using government source in combating science misinformation***

First, we compared the effects of three types of sources, which were official sources (government and mass media), professional sources (popular science media and scientist), and layperson sources (celebrity and ordinary person). We found only the government source was different in that the government source outperformed the other sources in correction believability. Although Weibo users have exhibited distrust toward the Chinese government on science issues (Jiang & Fang, 2019), the respondents in this study showed a preference for the government source rather than the others. The high level of government trust in China might explain the results. A longitudinal survey suggests that the trust score in central government among Chinese increases from 3.16 in 2003 to 3.3 in 2016 on a 4-point scale, where 4 means "very satisfied" (Cunningham et al., 2020). The efficient control of the coronavirus further increases Chinese people's trust in the government during the recent pandemic (Wu et al., 2021).

Second, although the mass media in China is supposed to toe the line with the government and thus is also considered an official source (He, 2009; Shen & Wang, 2013), the mass media source was perceived as less believable than the government source in this study. One possible explanation can lie in the decrease in the quality of the mass media, especially the market-oriented media that we examined in this study. After China's economic reform in the 1970s, mass media had to make profits to survive, although it was still under strict censorship (Stockmann, 2013; Zhao, 1998). While the

proliferation of the internet led to a highly competitive media market, mass media, especially the non-party media, has been trying to be as timely as possible to compete with internet sources, resulting in dropping quality in media outlets, or even worse, the spread of misinformation (Guo, 2020).

Third, in the Western context, scientists and popular science media are usually considered as possessing more expertise in science topics. Vraga and Bode's study (2017) showed that an expert source outperformed a layperson in correcting misbeliefs about the Zika virus. However, in our study, the believability of a scientist and popular science media were not significantly different from the believability of a layperson source. A possible explanation is the trend of science popularization. One study found that popularized science articles addressed to lay audiences can make laypeople underrate their dependence on experts (Scharrer et al., 2017). Also, the believability of professional sources was significantly lower than that of the government source. The finding suggests that people in an authoritarian country tend to decide the believability of information based on its political authority, rather than expertise.

There are pros and cons to people's reliance on government sources for science information. On the positive side, an authoritarian government can use its coersive power to promote science information. On the negative side, in authoritarian societies where alternative opinions will be censored, blind trust of government sources over other sources is more likely to lead to misunderstanding about science. Another flaw of having science belief tied-up with government authority is, the support for scientific facts can be highly dependent on public's faith in the government. As a consequence, people who lose faith in the government might resist scientific facts as well.

### *The impact of using formal tones in combating science misinformation*

Correction tone also has an impact on perceived believability. A formal tone obtained higher believability than a conversational tone in the correction of science misinformation in China. In other words, people preferred a more official image of the source instead of a friendly and approachable image in science correction. Furthermore, by comparing effects between the two topics, this study found the effects of using a formal tone can be moderated by attitude congruence and topic. Compared with the long-discussed topic (i.e., GMO), the positive effect of a formal tone was more salient in correcting science misinformation of a less familiar topic (i.e., 5G). Levels of topic familiarity determines people's information processing mode. People who are not familiar with the topic tend to adopt heuristic processing; those who are familiar with the topic tend to adopt systematical processing and therefore they are more difficult to be persuaded by simple cues in the message (Garcia-Marques & Mackie, 2001). The findings provide practical suggestions for practitioners in fact-checking, that it is important to correct misinformation before it gets popular among the public – when heuristic cues are still persuasive to misinformation receivers. If fact-checkers need to correct enduring wrongful perceptions, more in-depth information will be required.

Moreover, although people who held an inconsistent attitude perceived less believability of the corrective messages compared to people who held a consistent attitude with the corrective messages, a formal tone that indicated authority was more useful in improving the perceived believability of the corrective messages than a conversational tone among people who are originally not aligned with the correction. For people who hold a congruent attitude toward the correction, their perceived believability

of the correction is already high, which explains why the difference between a formal and conversational tone was more salient among people holding an incongruent attitude with the correction. This study provides caution to science fact-checkers that in an authoritarian context, a friendly approach might not be the best way to promote a science fact to people from an opposite camp; instead, a formal tone has the potential to change their opinions.

***Limitations and future studies***

One limitation of this study is, the numbers of participants in the congruent attitude group (n = 2488) and the incongruent attitude group (n = 252) are not balanced since attitude congruency was not a manipulated factor in recruiment. We made such a grouping decision because we do not wish to create artificially balanced group sizes by using the mean attitude as the split point. Although the group sizes are not balanced, the group with fewer participants (n = 252) has sufficient statistical power.

Another limitation is, when testing source effects, we only tested one individual or institutional source for each category. Although we have been very careful about choosing the examined sources, it is possible that some individuals or institutions are more credible than others. This is a limitation for all studies that test source effects (e.g., Liang et al., 2019; van der Meer & Jin, 2020). Future studies can replicate the experiment using other sources for validation.

The combination of science misinformation and social media has greatly facilitated the spread of science misconceptions. Therefore, how to promote science factual information has become an important topic in science communication. The findings of this study suggest that to promote the factual science information in the

authoritarian context, the use of heuristic cues should highlight government authority. We therefore argue that science correction should be customized according to specific cultures and contexts in order to improve persuasion effects. As previous studies largely focused on the Western context in general, and specifically, the U.S., future studies can compare the effects of science correction in more societies.

In authoritarian societies, government organizations dominate the mainstream media, and thus government source is considered as believable in science fact-checking when government trust is high. The persuasion effect of government source in authoritarian societies where government is not trusted could be further examined. In democratic societies, scientific topic has often been politicized so that political parties endorse certain scientific arguments to defend their ideologies and interests (Bolsen & Druckman, 2018; Mervis, 2015). For instance, in the US, conservative parties tend to deny global warming while liberal parties think global warming is a real and important issue (McCright & Dunlap,2011). In consequences, people's heuristic processing of science messages is often activated by the partisanship of the message source (Bolsen et al., 2019). Therefore, corrective messages from the in-group party will be preferred. For example, a study found that a message of elite republicans endorsing anthropogenic global warming can reduce misperceptions about global warming among republicans (Benegal & Scruggs, 2018). More work should be done to investigate the ways to reduce partisan bias in science cognitions. Also, people of different political ideologies, (e.g., conservatives vs. liberals), have different preferences in information processing. In the U.S., democrats trust scientist more compared to republicans (Funk et al., 2019). Fact-checkers in democratic societies may want to customize fact-checking messages for

people of different ideologies to improve the persuasion effect of corrective messages. In authoritarian societies, a formal tone often represents authority and thus sound more believable to the general public; thus, a formal tone can be used to promote science facts. In democratic societies, advocates of science issues need to gain public support to promote their ideas, which often requires a favorable image. As a result, in the case of democratic societies, a formal tone might not be as effective. Future studies should compare the correction effect of formal and conversational tone in societies of different political systems.

## References

Aaker, J. L., & Maheswaran, D. (1997). The effect of cultural orientation on persuasion. *Journal of Consumer Research, 24*(3), 315-328. https://doi.org/10.1086/209513

Barcelos, R. H., Dantas, D. C., & Sénécal, S. (2018). Watch your tone: How a brand's tone of voice on social media influences consumer responses. *Journal of Interactive Marketing, 41*, 60-80. https://doi.org/10.1016/j.intmar.2017.10.001

Benegal, S. D., & Scruggs, L. A. (2018). Correcting misinformation about climate change: the impact of partisanship in an experimental setting. *Climatic Change, 148*(1-2), 61-80. https://doi.org/10.1007/s10584-018-2192-4

Blank, J. M., & Shaw, D. (2015). Does Partisanship Shape Attitudes toward Science and Public Policy? The Case for Ideology and Religion. *The ANNALS of the American Academy of Political and Social Science, 658*(1), 18-35. https://doi.org/10.1177/0002716214554756

Bode, L., & Vraga, E. K. (2015). In Related News, That Was Wrong: The Correction of Misinformation Through Related Stories Functionality in Social Media. *Journal of Communication, 65*(4), 619-638. https://doi.org/10.1111/jcom.12166

Bode, L., & Vraga, E. K. (2018). See Something, Say Something: Correction of Global Health Misinformation on Social Media. *Health Communication, 33*(9), 1131-1140. http:/doi.org/10.1080/10410236.2017.1331312

Bode, L., Vraga, E. K., & Tully, M. (2020). Do the right thing: Tone may not affect correction of misinformation on social media. *Harvard Kennedy School Misinformation Review*. https://doi.org/10.37016/mr-2020-026

Bolsen, T., & Druckman, J. N. (2018). Do partisanship and politicization undermine the impact of a scientific consensus message about climate change? *Group Processes & Intergroup Relations*, *21*(3), 389-402. https://doi.org/10.1177/1368430217737855

Bolsen, T., Palm, R., & Kingsland, J. T. (2019, 2019/08/01). The Impact of Message Source on the Effectiveness of Communications About Climate Change. *Science Communication*, *41*(4), 464-487. https://doi.org/10.1177/1075547019863154

Brewer, P. R., & McKnight, J. (2015). Climate as comedy: The effects of satirical television news on climate change perceptions. *Science Communication, 37*(5), 635-657. https://doi.org/10.1177%2F1075547015597911

Brewer, P. R., & McKnight, J. (2017). "A statistically representative climate change debate": Satirical television news, scientific consensus, and public perceptions of global warming. *Atlantic Journal of Communication, 25*(3), 166-180. https://doi.org/10.1080/15456870.2017.1324453

Chaiken, S. (1980). Heuristic versus systematic information processing and the use of source versus message cues in persuasion. *Journal of Personality and Social Psychology*, *39*(5), 752. https://doi.org/10.1037/0022-3514.39.5.752

Chaiken, S., & Maheswaran, D. (1994). Heuristic processing can bias systematic processing: effects of source credibility, argument ambiguity, and task importance on attitude judgment. *Journal of Personality and Social Psychology*, *66*(3), 460. https://doi.org/10.1037/0022-3514.66.3.460

Chan, M.-p. S., Jones, C. R., Hall Jamieson, K., & Albarracín, D. (2017). Debunking: A meta-analysis of the psychological efficacy of messages countering misinformation. *Psychological Science*, *28*(11), 1531-1546. http://doi.org/10.1177/0956797617714579

Chartprasert, D. (1993). How bureaucratic writing style affects source credibility. *Journalism Quarterly, 70*(1), 150-159. https://doi.org/10.1177/107769909307000117

Chen, Q. (2020, 1 February ). Coronavirus rumors trigger irrational behaviors among Chinese netizens. *Global Times*. https://www.globaltimes.cn/content/1178157.shtml

China Daily. (2020, 29 July, 2020). Is metal strip in medical masks 5G antenna? *China Daily*. http://global.chinadaily.com.cn/a/202007/29/WS5f20c9c0a31083481725cb44.html

Chow, E. K. (2019, 21 May). China's GMO Paradox. *The Diplomat*. https://thediplomat.com/2019/05/chinas-gmo-paradox/

CNNIC. (2019). *The 44th statistical report on internet development in China*. Retrieved June 12 from https://cnnic.com.cn/IDR/ReportDownloads/201911/P020191112539794960687.pdf

Cremer, J. (2020, 23 January). China moves toward commercialization of GMO corn and soy. *Alliance for Science*. https://allianceforscience.cornell.edu/blog/2020/01/china-moves-toward-commercialization-of-gmo-corn-and-soy/

Cunningham, E., Saich, T., & Turiel, J. (2020). Understanding CCP Resilience: Surveying Chinese public opinion through time. *Harvard Kennedy School Center for Democratic Governance and Innovation*. Available at: https://ash harvard edu/files/ash/files/final_policy_brief_7, 6, 2020.

Dai, Y., Yu, W., & Shen, F. (2021). The Effects of Message Order and Debiasing Information in Misinformation Correction. *International Journal of Communication*, 15, 21.

Drummond, C., & Fischhoff, B. (2017). Individuals with greater science literacy and education have more polarized beliefs on controversial science topics. *Proceedings of the National Academy of Sciences, 114*(36), 9587-9592. https://doi.org/10.1073/pnas.1704882114

Du, L., & Rachul, C. (2012, 2012/06/08). Chinese newspaper coverage of genetically modified organisms. *BMC Public Health, 12*(1), 326. https://doi.org/10.1186/1471-2458-12-326

Dunlap, R. E., McCright, A. M., & Yarosh, J. H. (2016, 2016/09/02). The Political Divide on Climate Change: Partisan Polarization Widens in the U.S. *Environment: Science and Policy for Sustainable Development, 58*(5), 4-23. https://doi.org/10.1080/00139157.2016.1208995

Eagly, A. H., & Chaiken, S. (1993). *The Psychology of Attitudes*. Harcourt brace Jovanovich college publishers.

Ecker, U. K., & Ang, L. C. (2019). Political attitudes and the processing of misinformation corrections. *Political Psychology, 40*(2), 241-260. https://doi.org/10.1111/pops.12494

Edelman. (2020). *Edelman Trust Barometer 2020*. Retrieved June 12 from https://www.edelman.com/sites/g/files/aatuss191/files/2020-01/2020%20Edelman%20Trust%20Barometer%20Global%20Report_LIVE.pdf

Eisend, M. (2009, 2009/06/01). A meta-analysis of humor in advertising. *Journal of the Academy of Marketing Science*, *37*(2), 191-203. https://doi.org/10.1007/s11747-008-0096-y

Fang, I. (1991). *Writing Style Differences in Newspaper, Radio, and Television News. Monograph Series No. 1*. ERIC.

Farrell, J., McConnell, K., & Brulle, R. (2019). Evidence-based strategies to combat scientific misinformation. *Nature Climate Change, 9*(3), 191-195. https://doi.org/10.1038/s41558-018-0368-6

Fielding, K. S., Head, B. W., Laffan, W., Western, M., & Hoegh-Guldberg, O. (2012, 2012/09/01). Australian politicians' beliefs about climate change: political partisanship and political ideology. *Environmental Politics, 21*(5), 712-733. https://doi.org/10.1080/09644016.2012.698887

Fullwood, C., & Martino, O. I. (2007). Emoticons and impression formation. *Applied Semiotics*, *19*(7), 4-14. https://doi.org/10.1016/j.apergo.2006.06.002

Funk, C., Hefferon, M., Kennedy, B., & Johnson, C. (2019). *Trust And Mistrust In Americans' Views Of Scientific Experts*. Pew Research Centre. https://www.pewresearch.org/science/2019/08/02/partisanship-influences-views-on-the-role-and-value-of-scientific-experts-in-policy-debates/

Garcia-Marques, T., & Mackie, D. M. (2001). The Feeling of Familiarity as a Regulator of Persuasive Processing. *Social Cognition*, *19*(1), 9-34. https://doi.org/10.1521/soco.19.1.9.18959

Gu, Z., Badger, P., Su, J., Zhang, E., Li, X., & Zhang, L. (2018). A vaccine crisis in the era of social media. *National Science Review, 5*(1), 8-10. https://doi.org/10.1093/nsr/nwx098

Guo, L. (2020). China's "Fake News" Problem: Exploring the Spread of Online Rumors in the Government-Controlled News Media. *Digital Journalism*, 1-19. https://doi.org/10.1080/21670811.2020.1766986

Haberstroh, S. (2010). College counselors' use of informal language online: Student perceptions of expertness, trustworthiness, and attractiveness. *Cyberpsychology,*

*Behavior, and Social Networking*, *13*(4), 455-459. https://doi.org/https://doi.org/10.1089/cyber.2009.0280

Hameleers, M., & van der Meer, T. G. (2020). Misinformation and polarization in a high-choice media environment: How effective are political fact-checkers? *Communication Research, 47*(2), 227-250. https://doi.org/10.1177/0093650218819671

He, Z. (2009). Political communication in dual discourse universes. *Political Communication in Asia*, 43-71.

Jerit, J., & Barabas, J. (2012). Partisan Perceptual Bias and the Information Environment. *The Journal of Politics*, *74*(3), 672-684. https://doi.org/10.1017/s0022381612000187

Jiang, S., & Fang, W. (2019). Misinformation and disinformation in science: Examining the social diffusion of rumours about GMOs. *Cultures of Science, 2*(4), 327-340. https://doi.org/10.1177/209660831900200407

Kahne, J., & Bowyer, B. (2017). Educating for democracy in a partisan age: Confronting the challenges of motivated reasoning and misinformation. *American Educational Research Journal, 54*(1), 3-34. https://doi.org/10.3102/0002831216679817

Kaiser, J., Keller, T. R., & Kleinen-von Königslöw, K. (2018). Incidental news exposure on Facebook as a social experience: The influence of recommender and media cues on news selection. *Communication Research*, 0093650218803529. https://doi.org/10.1177/0093650218803529

Kelleher, T. (2009). Conversational voice, communicated commitment, and public relations outcomes in interactive online communication. *Journal of Communication, 59*(1), 172-188. https://doi.org/10.1111/j.1460-2466.2008.01410.x

Kim, J. W. (2018). Rumor has it: The effects of virality metrics on rumor believability and transmission on Twitter. *New Media & Society, 20*(12), 4807-4825. https://doi.org/https://doi.org/10.1177/1461444818784945

Kunda, Z. (1990). The case for motivated reasoning. *Psychological Bulletin, 108*(3), 480. https://doi.org/https://doi.org/10.1037/0033-2909.108.3.480

Lee, H., & Oh, H. J. (2017). Normative mechanism of rumor dissemination on Twitter. *Cyberpsychology, Behavior, and Social Networking, 20*(3), 164-171. https://doi.org/https://doi.org/10.1089/cyber.2016.0447

Lewandowsky, S., Ecker, U. K., Seifert, C. M., Schwarz, N., & Cook, J. (2012). Misinformation and its correction: Continued influence and successful debiasing. *Psychological Science in the Public Interest, 13*(3), 106-131. https://doi.org/https://doi.org/10.1177/1529100612451018

Li, Y., Luo, C., & Chen, A. (2019). The evolution of online discussions about GMOs in China over the past decade: Changes, causes and characteristics. *Cultures of Science, 2*(4), 311-325. https://doi.org/10.1177/209660831900200406

Liang, J., Liu, X., & Zhang, W. (2019, Nov). Scientists vs laypeople: How genetically modified food is discussed on a Chinese Q&A website. *Public Underst Sci, 28*(8), 991-1004. https://doi.org/https://doi.org/10.1177/0963662519876782

Lin, L. (2020). *Number of internet users in China from 2017 to 2023*. Statista. Retrieved July 16 from https://www.statista.com/statistics/278417/number-of-internet-users-in-china/

Liu, J. C.-E., & Zhao, B. (2017). Who speaks for climate change in China? Evidence from Weibo. *Climatic Change, 140*(3-4), 413-422. https://doi.org/http://doi.org.10.1007/s10584-016-1883-y

Lu, Z., Jiang, Y., Lu, C., Naaman, M., & Wigdor, D. (2020). *The Government's Dividend: Complex Perceptions of Social Media Misinformation in China* Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems, Honolulu, HI, USA. https://doi.org/10.1145/3313831.3376612

Luo, M., Hancock, J. T., & Markowitz, D. M. (2020). Credibility Perceptions and Detection Accuracy of Fake News Headlines on Social Media: Effects of Truth-Bias and Endorsement Cues. *Communication Research*, 0093650220921321. https://doi.org/https://doi.org/10.1177/0093650220921321

Lynch, M. J., Burns, R. G., & Stretesky, P. B. (2010). Global warming and state-corporate crime: The politicalization of global warming under the Bush administration. *Crime, Law and Social Change, 54*(3-4), 213-239.

Maddux, J. E., & Rogers, R. W. (1980). Effects of source expertness, physical attractiveness, and supporting arguments on persuasion: A case of brains over beauty. *Journal of Personality and Social Psychology, 39*(2), 235. https://doi.org/10.1037/0022-3514.39.2.235

Malhotra, N. K. (1984). Reflections on the Information Overload Paradigm in Consumer Decision Making. *Journal of Consumer Research*, *10*(4), 436-440. http://doi.org/10.1086/208982

Matsuda, P. K., & Nouri, M. (2019). Informal Writing and Language Learning. *The Handbook of Informal Language Learning*, 75-84.

McArthur, T., Lam-McArthur, J., & Fontaine, L. (2018). *Oxford companion to the English language*. Oxford University Press.

McCright, A. M., & Dunlap, R. E. (2011). The politicization of climate change and polarization in the American public's views of global warming, 2001–2010. *The Sociological Quarterly*, *52*(2), 155-194. https//doi.org/10.1111/j.1533-8525.2011.01198.x

McCright, A. M., Dunlap, R. E., & Marquart-Pyatt, S. T. (2016). Political ideology and views about climate change in the European Union. *Environmental Politics, 25*(2), 338-358. https://doi.org/10.1080/09644016.2015.1090371

Mena, P., Barbe, D., & Chan-Olmsted, S. (2020). Misinformation on Instagram: The Impact of Trusted Endorsements on Message Credibility. *Social Media+ Society,*

*6*(2), 2056305120935102. https://doi.org/https://doi.org/10.1177/2056305120935102

Mervis, J. (2015, February 25). Politics, science, and public attitudes: What we're learning, and why it matters. *American Association for the Advancement of Science*. https://www.sciencemag.org/news/2015/02/politics-science-and-public-attitudes-what-we-re-learning-and-why-it-matters

Metzger, M. J., Flanagin, A. J., & Medders, R. B. (2010). Social and heuristic approaches to credibility evaluation online. *Journal of Communication*, 60(3), 413-439. https://doi.org/10.1111/j.1460-2466.2010.01488.x

Mondak, J. J. (1993). Public opinion and heuristic processing of source cues. *Political Behavior*, *15*(2), 167-192. http://doi/ 10.1007/BF00993852

Nyhan, B., & Reifler, J. (2015). Does correcting myths about the flu vaccine work? An experimental evaluation of the effects of corrective information. *Vaccine, 33*(3), 459-464. https://doi.org/10.1016/j.vaccine.2014.11.017

Park, H., & Cameron, G. T. (2014). Keeping it real: Exploring the roles of conversational human voice and source credibility in crisis communication via blogs. *Journalism & Mass Communication Quarterly, 91*(3), 487-507. https://doi.org/10.1177/1077699014538827

Pornpitakpan, C., & Francis, J. N. (2000). The effect of cultural differences, source expertise, and argument strength on persuasion: An experiment with Canadians

and Thais. *Journal of International Consumer Marketing, 13*(1), 77-101. https://doi.org/10.1300/J046v13n01_06

Prasad, M., Perrin, A. J., Bezila, K., Hoffman, S. G., Kindleberger, K., Manturuk, K., & Powers, A. S. (2009). "There must be a reason": Osama, Saddam, and inferred justification. *Sociological Inquiry, 79*(2), 142-162. https://doi.org/10.1111/j.1475-682X.2009.00280.x

Reilly, K. (2019). *Celebrity Activists Fighting The Climate Change Crisis*. REFINERY29. Retrieved 30 October from https://www.refinery29.com/en-us/2019/09/8467975/celebrities-climate-change-activist

Rodriguez, M. G., Gummadi, K., & Schoelkopf, B. (2014, May). Quantifying information overload in social media and its impact on social contagions. In *Eighth International AAAI Conference on Weblogs and Social Media*.

Rosen, L. D., Chang, J., Erwin, L., Carrier, L. M., & Cheever, N. A. (2010, 2010/06/01). The Relationship Between "Textisms" and Formal and Informal Writing Among Young Adults. *Communication Research, 37*(3), 420-440. https://doi.org/10.1177/0093650210362465

Scharrer, L., Rupieper, Y., Stadtler, M., & Bromme, R. (2017). When science becomes too easy: Science popularization inclines laypeople to underrate their dependence on experts. *Public Understanding of Science, 26*(8), 1003-1018. https://doi.org/https://doi.org/10.1177/0963662516680311

Shen, F., & Wang, N. (2013). Dualistic discourse universes and opinion expression in online versus offline communities. *Communication and community*, 189-205.

Statista. (2020, 28 September). *Number of monthly active users of Sina Weibo from 4th quarter 2017 to 2nd quarter 2020*. China Internet Watch. Retrieved 29 October from https://www.statista.com/statistics/795303/china-mau-of-sina-weibo/

Stockmann, D. (2013). *Media commercialization and authoritarian rule in China*. Cambridge University Press.

Sundar, S. S., Knobloch-Westerwick, S., & Hastall, M. R. (2007). News cues: Information scent and cognitive heuristics. *Journal of the American Society for Information Science and Technology*, *58*(3), 366-378. https://doi.org/https://doi.org/10.1002/asi.20511

Sundblad, E.-L., Biel, A., & Gärling, T. (2009). Knowledge and confidence in knowledge about climate change among experts, journalists, politicians, and laypersons. *Environment and Behavior, 41*(2), 281-302. https://doi.org/https://doi.org/10.1177/0013916508314998

Swire, B., Berinsky, A. J., Lewandowsky, S., & Ecker, U. K. (2017). Processing political misinformation: comprehending the Trump phenomenon. *Royal Society open science, 4*(3), 160802. https://doi.org/https://doi.org/10.1098/rsos.160802

Taber, C. S., & Lodge, M. (2006). Motivated Skepticism in the Evaluation of Political Beliefs. *American Journal of Political Science*, *50*(3), 755-769. https://doi.org/10.1111/j.1540-5907.2006.00214.x

Tai, Q. (2014). China's Media Censorship: A Dynamic and Diversified Regime. *Journal of East Asian Studies, 14*(2), 185-210. https://doi.org/10.1017/S1598240800008900

Tandoc, E. C., Lim, Z. W., & Ling, R. (2018). Defining "fake news" A typology of scholarly definitions. *Digital Journalism*, *6*(2), 137-153. https://doi.org/10.1080/21670811.2017.1360143

Tandoc, E. C., Ling, R., Westlund, O., Duffy, A., Goh, D., & Zheng Wei, L. (2018). Audiences' acts of authentication in the age of fake news: A conceptual framework. *New Media & Society, 20*(8), 2745-2763. https://doi.org/https://doi.org/10.1177/1461444817731756

Thorson, E. (2016, 2016/07/02). Belief Echoes: The Persistent Effects of Corrected Misinformation. *Political Communication*, *33*(3), 460-480. https://doi.org/10.1080/10584609.2015.1102187

Tong, S. (2020, 8 October). China charges forward into 5G wireless future, despite pandemic, weak economy. *Marketplace*. https://www.marketplace.org/2020/10/08/china-charges-forward-5g-wireless-future-despite-pandemic-weak-economy/

Uskul, A. K., Sherman, D. K., & Fitzgibbon, J. (2009). The cultural congruency effect: Culture, regulatory focus, and the effectiveness of gain-vs. loss-framed health messages. *Journal of Experimental Social Psychology, 45*(3), 535-541. https://doi.org/https://doi.org/10.1016/j.jesp.2008.12.005

van der Meer, T., & Jin, Y. (2020). Seeking Formula for Misinformation Treatment in Public Health Crises: The Effects of Corrective Information Type and Source. *Health Communication, 35*(5), 560-575. https://doi.org/https://doi.org/10.1080/10410236.2019.1573295

Vraga, E. K., & Bode, L. (2017). Using Expert Sources to Correct Health Misinformation in Social Media. *Science Communication, 39*(5), 621-645. https://doi.org/https://doi.org/10.1177/1075547017731776

Vraga, E. K., Kim, S. C., & Cook, J. (2019, 2019/07/03). Testing Logic-based and Humor-based Corrections for Science, Health, and Political Misinformation on Social Media. *Journal of Broadcasting & Electronic Media, 63*(3), 393-414. https://doi.org/10.1080/08838151.2019.1653102

Walter, N., Brooks, J. J., Saucier, C. J., & Suresh, S. (2020). Evaluating the Impact of Attempts to Correct Health Misinformation on Social Media: A Meta-Analysis. *Health Communication*, 1-9. https://doi.org/10.1080/10410236.2020.1794553

Walter, N., Cohen, J., Holbert, R. L., & Morag, Y. (2019). Fact-Checking: A Meta-Analysis of What Works and for Whom. *Political Communication, 37*(3), 350-375. https://doi.org/https://doi.org/10.1080/10584609.2019.1668894

Walter, N., & Murphy, S. T. (2018). How to unring the bell: A meta-analytic approach to correction of misinformation. *Communication Monographs, 85*(3), 423-441. https://doi.org/https://doi.org/10.1080/03637751.2018.1467564

Walter, N., & Tukachinsky, R. (2019). A Meta-Analytic Examination of the Continued Influence of Misinformation in the Face of Correction: How Powerful Is It, Why Does It Happen, and How to Stop It? Communication Research, 47(2), 155-177. https://doi.org/10.1177/0093650219854600

Wang, X. (2019, 26 January). Meet Cui Yongyuan, chat show host: China's unlikeliest whistle-blower (just ask Fan Bingbing). *South China Morning Post*. https://www.scmp.com/week-asia/opinion/article/2183678/meet-cui-yongyuan-chat-show-host-chinas-unlikeliest-whistle-blower

Wang, X., & Song, Y. (2020). Viral misinformation and echo chambers: the diffusion of rumors about genetically modified organisms on social media. *Internet Research, 30*(5), 1547-1564. https://doi.org/https://doi.org/10.1108/INTR-11-2019-0491

Wang, Z. (2005). Political trust in China: Forms and causes. *Legitimacy: Ambiguities of political success or failure in East and Southeast Asia, 114*.

Williams Kirkpatrick, A. (2021). The spread of fake science: Lexical concreteness, proximity, misinformation sharing, and the moderating role of subjective knowledge. *Public Understanding of Science*, *30*(1), 55-74. https://doi.org/10.1177/0963662520966165

Williamson, P. (2016). Take the time and effort to correct misinformation. *Nature, 540*(7632), 171-171. https://doi.org/http://doi.org/10.1038/540171a

Wong, T. K.-y., Wan, P.-s., & Hsiao, H.-H. M. (2011). The bases of political trust in six Asian societies: Institutional and cultural explanations compared. *International*

*Political Science Review, 32*(3), 263-281. https://doi.org/10.1177/0192512110378657

Wu, C., Shi, Z., Wilkes, R., Wu, J., Gong, Z., He, N., Xiao, Z., Zhang, X., Lai, W., Zhou, D., Zhao, F., Yin, X., Xiong, P., Zhou, H., Chu, Q., Cao, L., Tian, R., Tan, Y., Yang, L., He, Z., Fairbrother, M., Mews, J., & Nicola Giordano, G. (2021). Chinese Citizen Satisfaction with Government Performance during COVID-19. *Journal of Contemporary China*, 1-15. https://doi.org/10.1080/10670564.2021.1893558

Wu, M. (2006). Framing AIDS in China: A Comparative Analysis of US and Chinese Wire News Coverage of HIV/AIDS in China. *Asian Journal of Communication, 16*(3), 251-272. https://doi.org/10.1080/01292980600857781

Xu, B., & Albert, E. (2014). Media censorship in China. *Council on Foreign Relations, 25*, 243.

Xu, Q., Song, Y., Yu, N., & Chen, S. (2020). Are you passing along something true or false? Dissemination of social media messages about genetically modified organisms. *Public Understanding of Science*, 0963662520966745. https://doi.org/https://doi.org/10.1177/0963662520966745

Zeng, J., Burgess, J., & Bruns, A. (2019). Is citizen journalism better than professional journalism for fact-checking rumours in China? How Weibo users verified information following the 2015 Tianjin blasts. *Global Media and China, 4*(1), 13-35. https://doi.org/https://doi.org/10.1177/2059436419834124

Zhao, Y. (1998). *Media, market, and democracy in China: Between the party line and the bottom line* (Vol. 148). University of Illinois Press.

Zia, A., & Todd, A. M. (2010). Evaluating the effects of ideology on public understanding of climate change science: How to improve communication across ideological divides? *Public Understanding of Science, 19*(6), 743-761. https://doi.org/10.1177/0963662509357871

Table 1. Demographic Characteristics of Respondents

Demographic Characteristics of Respondents ($N$ = 3,000)

| Variable | Frequency | Percentage (%) | CNNIC, 2019 (%) |
|---|---|---|---|
| Age | | | |
| 18-29 | 975 | 32.50 | 32.50 |
| 30-39 | 882 | 29.40 | 29.40 |
| 40-49 | 645 | 21.50 | 21.50 |
| 50-59 | 249 | 8.30 | 8.30 |
| Above 60 | 249 | 8.30 | 8.30 |
| Sex | | | |
| Male | 1,572 | 52.40 | 52.40 |
| Female | 1,428 | 47.60 | 47.60 |
| Education | | | |
| Primary school or below | 540 | 18.00 | 18.00 |
| Secondary school | 1,142 | 38.10 | 38.10 |
| High school | 713 | 23.80 | 23.80 |
| College | 315 | 10.50 | 10.50 |
| University or above | 290 | 9.70 | 9.70 |

| | | | |
|---|---|---|---|
| Region | | | |
| Rural | 302 | 39.20 | 26.30 |
| Urban | 122 | 60.80 | 73.70 |

Table 2. The results of post-hoc pair-wise comparisons.

| | Mean difference | 95%CI Low bound | Upper bound | *p* |
|---|---|---|---|---|
| Government-Mass media | .22 | .003 | .444 | .047 |
| Government-Popular science media | .19 | -.020 | .406 | .076 |
| Government-Scientist | .29 | .090 | .490 | .004 |
| Government-Celebrity | .24 | .030 | .450 | .025 |
| Government-Layperson | .22 | .006 | .432 | .044 |
| Mass media-Popular science media | -.03 | -.250 | .189 | .782 |
| Mass media-Scientist | .07 | -.139 | .273 | .523 |
| Mass media-Celebrity | .02 | -.200 | .233 | .882 |
| Mass media-Layperson | .00 | -.223 | .214 | .968 |
| Popular science media- Scientist | .10 | -.101 | .297 | .336 |
| Popular science media-Celebrity | .05 | -.159 | .254 | .655 |
| Popular science media-Layperson | .03 | -.185 | .237 | .807 |
| Scientist-Celebrity | -.05 | -.246 | .145 | .613 |
| Scientist-Layperson | -.07 | -.269 | .126 | .478 |

| | | | | |
|---|---|---|---|---|
| Celebrity-Layperson | -.02 | -.228 | .187 | .844 |

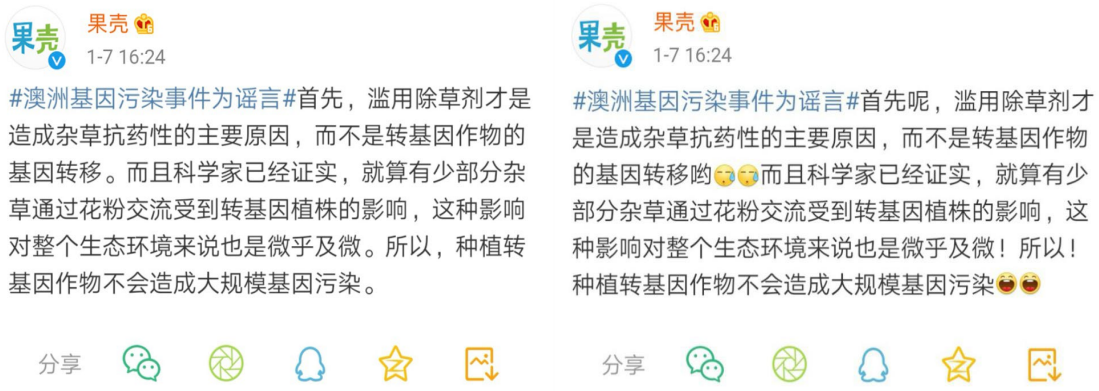


Figure 1. Examples of correction messages from popular science media, Guoke (left: formal tone; right: conversation tone).

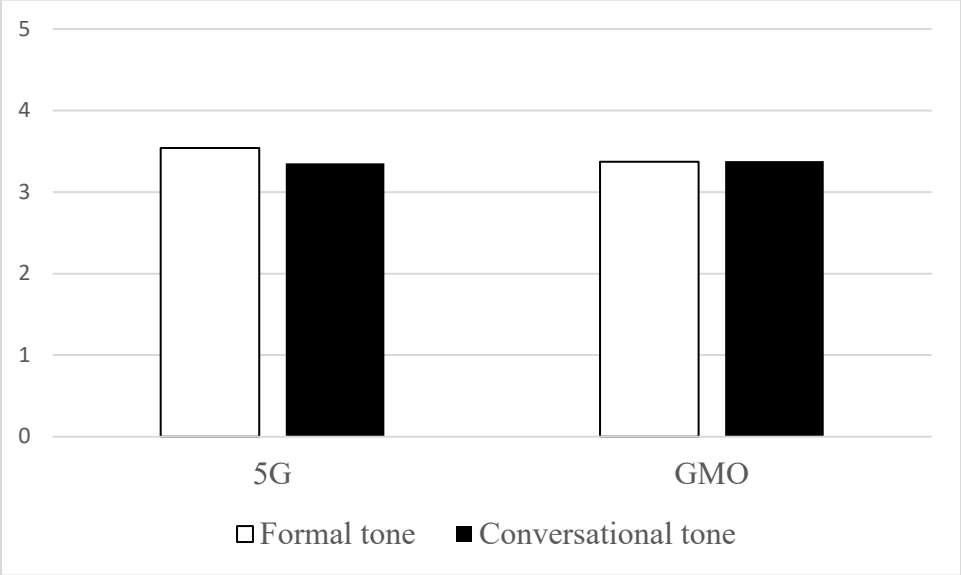


Figure 2. The interaction effect of topic and tone on the believability of correction message.

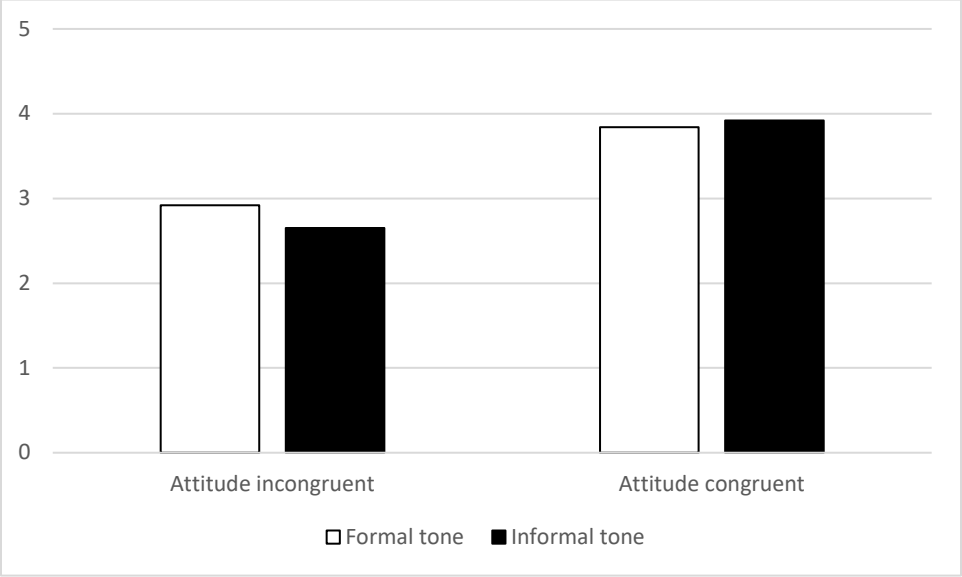


Figure 3. The interaction effect of tone and attitude consistency on the believability of correction message.