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Yang, Xiaodong; Chen, Liang; Ho, Shirley S.

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**Does Media Exposure Relate to the Illusion of Knowing in the Public Understanding of
Climate Change?**

Xiaodong Yang
Shandong University, China

Liang Chen
Sun Yat-sen University, China

Shirley S. Ho
Nanyang Technological University, Singapore

Author Note

Correspondence concerning this article should be addressed to Liang Chen, School of Communication and Design, Sun Yat-sen University, Guangzhou 510006, China.
Email: ch0087ng@ntu.edu.sg.

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Abstract

By acknowledging that people are cognitive misers, this study proposes that people may rely on the illusion of knowing as cognitive devices for attitudinal or behavioral change, in addition to factual knowledge. Accordingly, this study shifted the focus of inquiry from assessing media effects in increasing factual knowledge to assessing how media consumption relates to the illusion of knowing. Using a nationally door-to-door survey in Singapore ($N = 705$), the results revealed that individuals' attention to media messages about climate change and elaboration of these messages were positively related to the illusion of knowing. Furthermore, elaboration had moderating effects on the relationship between media attention and the illusion of knowing. These findings suggest that media consumption of climate change messages could drive the illusion of knowing, which is speculated to account for pro-environmental behaviors in addressing climate change. Theoretical and practical implications were discussed.

Keywords: elaboration, media attention, the illusion of knowing

Does Media Exposure Relate to the Illusion of Knowing in the Public Understanding of Climate Change?

1. Introduction

Science communication scholars have traditionally relied on the scientific literacy model to explain the influence of knowledge on attitude and subsequent behavioral change. Congruent with the model, concerned political institutions worldwide endeavor to improve the public's factual knowledge on the causes and consequences of climate change (Gupta, 2010). However, several studies examining the influence of factual knowledge on behavioral change yield negligible effects (Fabrigar et al., 2006; Laroche et al., 2001).

To explain these null results, scholars in recent years have increasingly argued that people are “cognitive misers” with the tendency to rely on cognitive heuristics rather than factual knowledge to act as a perceptual filter in forming opinions and making decisions (Fiske and Taylor, 1991; Ladwig et al., 2012). Although self-perception of knowledge serves as a cognitive heuristic, it is susceptible to personal preferences or psychological factors (Park et al., 1988). In particular, a large body of social cognition literature points out that self-serving bias is a salient factor affecting individuals' assessment of self-attributes (Heider, 1958; Taylor and Brown, 1988). The self-serving bias skews self-perception of knowledge, leading to an overestimation of one's perceived knowledge (Ladwig et al., 2012; Park et al., 1988). This phenomenon is defined as the illusion of knowing, referring to instances when people misperceive themselves as well informed while in fact they are not (Park, 2001).

In this regard, people may rely on the illusion of knowing rather than on an accurate perception of knowledge as a cognitive heuristic in generating attitude and subsequent behavior. Thus, the illusion of knowing may be an alternative route to attitude or behavioral change in addition to factual knowledge. To the best of our knowledge, very few communication studies have shed any light on the phenomenon of the illusion of knowing.

This study is therefore examining the illusion of knowing in the context of climate change, aiming to address how individuals' media consumption of climate change messages relates to their illusion of knowing about this topic.

The illusion of knowing about climate change

The line of cognitive miser reasoning—that people rely on the illusion of knowing for attitude formation or behavioral change—is well suited to the context of climate change. As climate change lies beyond most people's life-world and biographical horizons, it is hard for people to have a direct observation of the phenomenon (Lorenzoni et al., 2007). Besides, unlike other natural disasters, such as hurricanes, climate change is not a single hazard. It can cause multiple linked hazards.

The physical complexity of climate change makes it difficult for people to have a whole picture of the issue. Thus, people may find it hard to fully understand this issue. As people tend to employ heuristic procedures to simplify the evaluation when faced with complex problems (Tversky and Kahneman, 1992), it is possible that they would not make an accurate evaluation of their knowledge regarding this issue. For instance, people may believe they are knowledgeable of climate change even though they lack factual knowledge. Consequently, the illusion of knowing may serve as cognitive heuristic devices in their decision-making related to climate change.

Why the illusion of knowing matters in addressing climate change

The implication of the illusion of knowing as a cognitive heuristic is largely understood in terms of the positive illusion model (Taylor and Brown, 1988). In essence, this model maintains that people tend to hold unrealistic positive views regarding themselves, instead of making accurate assessments. It further argues that an illusion in self-evaluation generates positive outcomes, such as enhancing motivation or intention to take effective action. Taylor and Brown (1994) reasoned that self-enhancing perception reflects

exaggerated beliefs in behavior control and self-efficacy, which are associated with higher motivation, greater persistence, and more effective action.

The literature on Dunning–Kruger effect proposes that ignorance and overconfidence in self-assessment could be both an advantage and a disadvantage, depending on when the overconfidence occurs (Dunning, 2011). In particular, overconfidence may be deadly in the planning and preparation phase, as it tends to increase resistance to correct information (Dunning, 2012; Kruger and Dunning, 1999). But this overconfidence could be beneficial in the phase of executing plans or performing behavior, as it is taken to be an energizer that spurs people on to their goals, helping them to achieve even unrealistic ones (Dunning, 2011). Hence, the illusion of knowing could be beneficial in promoting behavior, despite its negative effects.

Empirically, many scholars have canvassed the positive expectations of self-serving perceptions in their studies. They pointed out that optimistic self-beliefs are beneficial in individuals' behavioral change, because of their operative power that helps to set goals, initiate actions, and maintain motivation. For example, Felson (1984) reported that positive perception of the self was associated with working harder on tasks. Davidson and Prkachin (1997) found that unrealistic optimism in risk perception of health problems could predict changes in exercise behaviors.

Similarly, individuals' illusion of knowing about climate change, which reflects exaggerated beliefs in behavior control and self-efficacy, is expected to enhance their behavioral intention to mitigate climate change. Utilizing the illusion of knowing as a cognitive heuristic could bring about positive effects, even if factual knowledge fails. This potential functional value of illusion of knowing in promoting the public's intention to engage with climate change makes the illusion of knowing a worthy focus of inquiry.

Context of study-climate change in Singapore

With the increasing number and frequency of extreme climate events around the world, there are now wide concerns that the climate change rate will continue or accelerate. Singapore, a low-lying island, is directly influenced by the rising sea level caused by climate change. The Singapore government has publicly attributed the unusual and repeated episodes of flash floods and heavy rains to climate change. Other dangers of climate change in Singapore include the loss of water resources, higher rate of recurrence of the annual haze, and resurgence of tropical diseases (National Climate Change Secretariat (NCCS), 2018). Considering the severe effects of climate change, the exigent need to mitigate and adapt to climate change is becoming a vital item on the public agenda in Singapore.

However, a recent survey of 3530 Singaporeans reported that the citizens' knowledge of climate change is insufficient, though they express concern about climate change. For instance, while a majority believe that burning fossil fuels leads to climate change, they know little about other causes of climate change (Milieu, 2019). Moreover, a study on Singapore students' knowledge of climate change reported misconceptions (Chang and Pascua, 2014). These studies show that Singaporeans are not fully aware of climate change. Thus, it is important to examine Singaporeans' illusion of knowing, as the illusion of knowing could serve as an alternative route to motivate the citizens to take action against climate change, if factual knowledge fails.

2. Research framework

Despite extensive research studying the illusion of knowing in social psychology and social cognition domains, the illusion of knowing remains largely unexplored in communication studies. Following the scientific literacy model, a primary component of communication studies underscore the role of media consumption in enhancing factual understanding of climate change. Although several studies have implied that media exposure

could lead to a discrepancy between actual and perceived knowledge, they failed to identify this discrepancy as the illusion of knowing (Hollander, 1995; Mondak, 1995). As such, this research shifts the focus of inquiry from assessing media effects in increasing factual knowledge to assessing how individuals' media consumption relates to their illusion of knowing.

In examining media effects, communication scholars note that audiences are powerful in their relation to media content, because audiences exercise considerable influence in interpreting media content (Katz et al., 2017; Mills, 1963). In particular, media effects depend on how people process the information (Eveland, 2001). Numerous findings demonstrate that elaboration—an information processing strategy—not only affects factual knowledge learning from the media (Eveland, 2001; Eveland et al., 2003), but also affects their perception of knowledge (Yang et al., 2017). Moreover, given the complex nature of climate change, in-depth information processing, such as elaboration, is indispensable for people to learn about this issue. Although plenty of studies have examined the effects of elaboration on knowledge acquisition, there is a dearth of research on the relationship between elaboration and the illusion of knowing. This study therefore examines how elaboration is related to the illusion of knowing about climate change. Moreover, this study proposes to examine the moderating effects of elaboration on the relationship between media attention and the illusion of knowing.

Findings from this study contribute to the theoretical literature of science communication by examining the illusion of knowing rather than factual knowledge as the outcome of media consumption. Practically, aside from alerting science and environment communicators about the potential function of the illusion of knowing in enhancing behavioral intention, our findings offer specific suggestions on message tailoring. More details on these theoretical and practical implications are given later in the discussion. Figure

1 shows the research framework of this study.

[Insert Figure 1 about here.]

3. Literature review

Two dimensions of the illusion of knowing about climate change

Like much science communication research, factual knowledge in our study refers to what individuals actually know (Brucks, 1985). While factual knowledge represents individuals' factually stored information, the illusion of knowing is a combination of knowledge and self-confidence, which reflects individuals' evaluation of their own competence (Park and Lessig, 1981). Specifically, the illusion of knowing occurs when people overestimate their knowledge level in self-evaluation/perception.

Although prior communication studies have given an overview of the illusion of knowing, they merely examine it in terms of how media attention is related to factual knowledge and self-reported perceived knowledge, respectively (Chen, 2015; Park, 2001). In this case, the illusion of knowing is considered in terms of the discrepancy between factual knowledge and how they rate their knowledge. The illusion happens when one reports a high level of self-perceived knowledge but scores low on a factual knowledge test.

In addition to illusions in self-reported perceived knowledge, the illusions that people develop in knowledge comparisons with others should be taken into account as well. The literature on illusion in self-assessment denotes that it is often difficult for people to separate reality from illusion when evaluating personal attributes (Taylor and Brown, 1988). Instead of making an accurate assessment, people tend to hold unrealistic positive views toward themselves (Alicke, 1985). On one hand, people's expectation of themselves is often an overestimation of reality, as they hold inflated beliefs in estimating personal attributes (Metcalf, 1998). On the other hand, people expect themselves to be better than most others (Brown, 1986). Correspondingly, illusion of knowing should include two dimensions: one is

that people believe that they are knowledgeable but actually this is not so, the other is that people believe that they are more knowledgeable than others but that is not actually the case. In particular, the positive illusion model suggests that illusion in comparison with others could bring about good outcomes, as the better-than-others belief in self-assessment increase individuals' good feeling, self-esteem, and self-confidence (Taylor and Brown, 1988).

Moreover, according to self-evaluation maintenance model, the comparison process is an important component of self-evaluation in addition to the self-rating process (Tesser, 1986, 1988). That is, people evaluate themselves not only via self-rating but also through engaging in comparisons with others. Being subject to a self-serving bias, this comparison process could lead to the illusion of knowing in knowledge comparisons with others.

More importantly, the logic of collective action in addressing climate change issues gives rise to the tendency of engaging in knowledge comparisons with others. Unlike other issues, preventing climate change is a public good that will benefit the whole society; thus, it requires not only individual effort but a collective effort as well (Aldy et al., 2001). The collective interest model assumes that individuals consider others' performance in decision-making of engaging in collective action (Olson, 1970). In particular, the worry about free-rider effects in collective actions drives people to compare themselves with others before taking any action (Adger, 2003; Lubell, 2002). Given the collective action nature of fighting climate change, there is a likelihood that people evaluate their knowledge level through the comparisons with others. Thus, the illusion of knowing about climate change should be examined in terms of how people compare their own knowledge levels with others'.

Taken together, this study examines two dimensions of illusion of knowing. One is the illusion in self-reported perceived knowledge, which concerns the discrepancy between how much people believe that they know and how much they actually know. The other is the illusion in perceived knowledge differential in the comparison, which concerns how one's

perceived knowledge differential between self and others is different from the actual knowledge differential.

Media attention and the illusion of knowing

Many studies have confirmed that media are important information sources for climate change (Boykoff, 2011; Sampei and Aoyagi-Usui, 2009). However, various surveys on climate change have indicated that people generally had limited factual knowledge on the causes, consequences, or potential solutions to climate change (Stamm et al., 2000). They have suggested that people not only have limited understanding of climate change but also develop the illusion of knowing (Stoutenborough and Vedlitz, 2014). Specially, many people believe that they are knowledgeable about climate change, while they know very little about it.

Perceived knowledge merely reflects the amount that a person thinks he or she knows, which is distinctive from what factual knowledge captures (Stoutenborough and Vedlitz, 2014). Thus, self-reported perceived knowledge does not necessarily reflect any concrete knowledge (Hollander, 1995). As media consumption increases, people may increasingly learn to recognize publicized events as familiar without actually gaining any knowledge (Park, 2001). Due to the complexity of climate change, attention to media messages about this topic may not increase factual knowledge as well as it increases perceived knowledge. Thus, we expect that media attention would be positively associated with the illusion of knowing in self-reported perceived knowledge. Accordingly, we postulate the following hypothesis:

H1a. Individuals' attention to media messages on climate change is positively associated with the illusion of knowing in self-reported perceived knowledge of this issue.

As aforesaid, people's beliefs tend to be skewed by the self-enhancement bias in comparison with others. This bias also occurs in people's evaluation of how media affect themselves and others (Davison, 1983). For example, the third-person perceptions indicate that people have a tendency to enhance a positive self-image after their exposure to media messages (Gunther and Mundy, 1993).

With regard to the media effects on an individual's evaluation of one's own knowledge compared with that of others, a similar self-enhancement bias is expected. Consuming media messages increases the audiences' familiarity with the publicized events (Slater and Rasinski, 2005). The nature of media coverage on climate change is informational, educational, and beneficial to the receivers. Singaporeans show concerns over climate change and regard fighting climate change as socially desirable behavior (Rosenthal et al., 2013). Driven by the motivation of maintaining a positive self-image, people tend to believe that they learn more about the climate change issue than others from the media. Such belief leads to an illusory superiority in knowledge.

Regarding the climate change issue, prior studies have demonstrated that the more attention people pay to media messages on climate change, the likelier they believe that they are becoming more knowledgeable about this issue (Zhao, 2009). Being influenced by the self-serving bias in estimating media effects, people believe that they have learned more from the media than have others. That is, the more attention people pay to media messages on climate change, the more the illusion of knowing they will develop in knowledge comparisons with others. Therefore, we propose the following hypothesis:

H1b. Individuals' attention to media messages about climate change is positively associated with the illusion of knowing in knowledge comparisons with others.

Elaboration and the illusion of knowing

Questions on how media influence their audiences underlie much of communication research. To answer these research questions, the processes of media effects have been extensively studied. Treating audiences as passive recipients, many studies employ media-centric approaches in exploring media effects, although audiences also play critical roles in the process (Vallone et al., 1985). Recognizing audiences' role in interpreting media effects, the active processes of audiences' response to media content is receiving increasing attention (McQuail, 2001).

A significant body of research suggests that media effects depend on how people interpret media content (Kim and Rubin, 1997; Perse, 1990). In particular, individuals' information processing exerts a great influence (Eveland, 2001). As an information processing strategy, elaboration refers to one's inclination to think about a message. Specifically, it involves "the process of connecting new information with other pieces of information stored in memory, including prior knowledge, personal experiences, or the connection of two new bits of information together in new ways" (Eveland, 2001: 573).

Regarding the effects of elaboration, numerous studies have highlighted its role in increasing both perceived knowledge and factual knowledge (Eveland and Cortese, 2004; Wei et al., 2008). By engaging elaboration, individuals will connect new information with stored information, resulting in a higher level of actual knowledge (Eveland, 2001) and familiarity with the topic (Yang et al., 2017). However, how elaboration affects the discrepancy between familiarity and actual knowledge remains unexamined. The effects of elaboration on the illusion of knowing in self-reported perceived knowledge is unclear, and thus we propose to address it empirically as the following research question:

RQ1. Will elaboration of media messages about climate change magnify or lessen the illusion of knowing in self-reported perceived knowledge of this issue?

Prior research suggests that assessing the effects of the media on oneself and others involves a complicated cognitive process (McLeod et al., 2001). Cognitive information processing variables, such as elaboration, could influence the magnitude of the difference between perceived media effects on oneself and others (Wei et al., 2010). Thus, elaboration may exert media effects on the perceived knowledge differential between oneself and others.

In particular, a greater familiarity occurs when individuals engage in elaborative processing of media messages (Lee and Ho, 2015). Because of self-enhancement bias in social comparison, individuals are motivated to enhance their own positive image (Brown, 1986). Accordingly, people develop beliefs that they are more knowledgeable than others, irrespective of the reality. In this case, the illusion of knowing occurs in their knowledge comparisons with others. Nevertheless, there are different opinions on how elaboration affects the perceptual difference between oneself and others. For instance, Wei et al. (2010) reported a negative effect of elaboration on the perceptual discrepancy. Given the unclear relationship between elaboration and self–other perceptual difference, we propose to explore it and postulate the following research question:

RQ2. Will elaboration of media messages about climate change magnify or lessen the illusion of knowing in knowledge comparisons with others?

Moderating effects of elaboration

As mentioned above, people generally engage in information processing to interpret media messages (Eveland, 2001). Nevertheless, they spend different levels of cognitive effort in information processing. Eveland (2001) suggested that people either engage in high or low elaboration in their information processing. Prior research suggested that one of the prominent determinants of elaboration motivation is involvement, which refers to the degree of personal interest or perceived importance of the information (Petty et al., 1983; Xue, 2008).

Typically, people with high elaboration are likely to perceive the information as important and are motivated to devote more attention and consideration to it (Wu and Wang, 2012). In this regard, the influence of information will be stronger among people who engage in high elaboration. Similarly, the effects of paying attention to media messages about climate change will be stronger among people with high elaboration as compared to those with low elaboration, suggesting an existence of moderating effects of elaboration. Thus, we expect that elaboration might serve as a moderator among the relationship between media attention and the illusion of knowing. In particular, the relationship between media attention and the illusion of knowing will be stronger among people who engage in high elaboration than those who engage in low elaboration. Due to a lack of empirical examination, the moderating effects of elaboration on the relationship between media attention and the illusion of knowing are addressed as Research Questions 3 and 4.

RQ3. How will elaboration moderate the effects of media attention on the illusion of knowing in self-reported perceived knowledge?

RQ4. How will elaboration moderate the effects of media attention on the illusion of knowing in knowledge comparisons with others?

4. Methods

Data collection

This research adopted a nationally representative door-to-door survey in Singapore. To achieve a sample that is representative of the population, a stratified sampling procedure was performed in this study. This survey used the next birthday technique to randomly select respondents from each household. This technique has been extensively applied in social research and has been demonstrated to be effective in obtaining randomly representative samples (Link et al., 2008).

Finally, we obtained a valid sample of 705 respondents. The response rate was 46.6% based on American Association for Public Opinion Research (AAPOR) formula 3. The margin of error was approximately $\pm 3\%$ at the 95% confidence level. The age, gender distribution, education, and household income of the sample were comparable with those of the general population.

Measurement

Control variables. Demographic items were used as control variables and they included age ($Mdn = 40$, $M = 41.73$, $SD = 14.83$); gender (51% of the respondents were female); education (ranged from “1” = “No formal education” to “9” = “Postgraduate,” $Mdn = 7$, $SD = 2.02$); and monthly household income (ranged from “1” = “SGD 1000 and below” to “13” = “above SGD 12,000,” $Mdn = 4$, $M = 5.01$, $SD = 3.22$).

Attention to media message about climate change. This variable was measured by using items adopted from previous studies (Chaffee and Schleuder, 1986; Liao et al., 2016). Respondents were asked to indicate how much attention (1 = *no attention at all*, 7 = *very close attention*) they paid to pro-environmental messages and environmental crisis messages related to climate change in four media channels: newspapers (including print and digital edition), television, Internet, and social media ($M = 4.64$, $SD = 1.13$, Cronbach’s $\alpha = .82$).

Elaboration. Three items adapted from Eveland (2001) were used to measure individuals’ elaboration. Respondents were asked to state their agreement with the following statements on a scale from 1 (*strongly disagree*) to 7 (*strongly agree*). After I encounter information about climate change, (a) “I am likely to stop and think about it,” (b) “I carefully analyze the information to understand it better,” and (c) “I often relate what I learnt from the information to other things I know” ($M = 4.87$, $SD = 1.23$, Cronbach’s $\alpha = .83$).

The illusion of knowing in self-reported perceived knowledge. This variable is defined as the discrepancy between individuals’ actual knowledge level and their perceived

knowledge level (Weber and Koehler, 2017). In particular, the illusion of knowing in self-perceived knowledge refers to the case in which the perceived knowledge level is greater than the actual knowledge level.

For perceived knowledge, respondents were asked to rate how much they thought they currently know about climate change using a 10-point scale (0 = *knowing nothing* and 10 = *knowing everything*). For actual knowledge, 12 items were adapted from previous studies (Dijkstra and Goedhart, 2012). Respondents were asked to answer if the statements were 1 = “true,” 2 = “false,” and 0 = “don’t know”¹. The statements were as follows: (a) “The hole in the ozone layer is the primary cause of global warming. (F),” (b) “The average temperature of the Earth has increased significantly in the last 100 years. (T),” (c) “China is the largest emitter of carbon dioxide (the greenhouse gas that has been linked to global warming) in the world. (T),” (d) “The output from the Sun contributes to global warming more than greenhouse gases produced by people. (F),” (e) “Reducing human emissions of greenhouse gases will have an immediate effect on global warming with average global temperatures dropping in just a few years. (F),” (f) “Climate change is happening, and is mostly caused by human activities. (T),” (g) “Climate change is only defined as the rising of temperature of the earth’s surface. (F),” (h) “Climate change is partly caused by the increase in the emission of heavy metals. (T),” (i) “Rise in sea level and drought are some of the consequences of climate change. (T),” (j) “The ocean can absorb CO₂ emitted by humans. (T),” (k) “Because of climate change, the water in sea and oceans will expand. (T),” and (l) “Because of climate change, certain plants and animals may become extinct. (T).” “T” or “F” indicates the correct answer to the statements. The mean of the 12 responses was computed as the scale for actual knowledge ($M = .55$, $SD = .20$, Kuder–Richardson Formula [KR]-20 = .60), which represents the percentage of correct answers that people have for all 12 items.

¹ In our data analysis, the respondents who reported don’t know or chose the wrong answer were recoded as 0, and only those who chose the correct answer were recoded as 1.

As actual knowledge and perceived knowledge were measured using different scales, a transformation of the measurements had to be done before performing the subtraction. The score for perceived knowledge was transformed into a percentage, which refers to the percentage of knowledge that people believe they have. Finally, the scores for actual knowledge were subtracted from the perceived knowledge to measure the illusion of knowing in self-perceived knowledge ($M = .02$, $SD = .22$).

The illusion of knowing in knowledge comparisons between self and others. Illusion represents what is perceived in a manner different from the way it is in reality (Taylor and Brown, 1988). From this definition, the illusion in knowledge comparisons between oneself and others is conceptualized as the situation in which individuals' perception of the knowledge differential between oneself and others does not reflect the actual knowledge differential. In particular, the illusion of knowing in knowledge comparisons with others refers to the case in which the perceived knowledge differential between oneself and others is greater than the actual knowledge differential.

To measure the illusion of knowing in knowledge comparisons with others, this research calculated the scores for perceived and actual knowledge differential. Specifically, the perceived knowledge differential between oneself and others is operationalized as the subtraction of perceived others' knowledge from perceived self-knowledge. For perceived others' knowledge, the respondents were asked to rate how much they think other people currently know about climate change using a 10-point scale (0 = *knowing nothing*, 10 = *knowing everything*). Perceived others' knowledge was transformed into a percentage as well. Then the score of perceived self's knowledge was subtracted from the score of perceived others' knowledge to measure the differential.

The actual knowledge differential between oneself and others is operationalized as the subtraction of others' actual knowledge from each respondent's actual knowledge. The mean

value of all respondents' actual knowledge in the sample of this study was calculated to denote others' actual knowledge score. In this case, the score is expressed as a percentage, enabling us to compare the actual with the perceived knowledge differential. The illusion of knowing in knowledge comparisons with others was calculated by subtracting the actual knowledge differential from the perceived knowledge differential between oneself and others. This measurement is a continuum of score ($M = .08$, $SD = .22$).

5. Results

Tables 1 and 2 are the results from the ordinary least squares (OLS) regression analyses on the illusion of knowing. The results revealed positive relationships between media attention and the illusion of knowing in both self-reported perceived knowledge ($\beta = .11$, $p < .05$), and in knowledge comparisons with others ($\beta = .12$, $p < .05$), which supported H1a and H1b.

[Insert Tables 1 and 2 about here.]

RQ1 and RQ2 consider the relationship between elaboration and the illusion of knowing. Results indicated that elaboration was positively associated with the illusion of knowing in self-reported perceived knowledge ($\beta = .11$, $p < .05$), while it had no significant relationship with the illusion of knowing in knowledge comparisons with others.

Regarding the moderation analyses, the results revealed that the moderating effects of elaboration on the relationship between media attention and the illusion of knowing in self-reported perceived knowledge was significant ($\beta = .10$, $p < .01$). As shown in Figure 2, among individuals who had high elaboration, those who paid more attention to media messages about climate change were significantly more positively illusory than those who paid less attention, while such a difference was smaller among individuals who had low elaboration. That is, elaboration magnified the impacts of media attention on the illusion of knowing in self-reported perceived knowledge. Thus, RQ3 is answered.

[Insert Figure 2 about here.]

With respect to the interaction between elaboration and media attention on the illusion of knowing in knowledge comparisons with others, the result was also significant ($\beta = .10, p < .05$). As shown in Figure 3, among individuals who engaged in highly elaborative processing, those who paid more attention to media messages about climate change had remarkably more illusion of knowing than those who paid less attention, whereas such a difference was much smaller among those who had low elaboration. RQ4 is answered, as elaboration magnified the effects of media attention on the illusion of knowing in knowledge comparisons with others.

[Insert Figure 3 about here.]

6. Discussion

Consistent with the cognitive miser model, this study notes that people are cognitive misers who rely on the illusion of knowing for attitude formation and behavioral change. By acknowledging the illusion of knowing as cognitive heuristics, this study offered a distinct perspective on factors that shape individuals' behavior in addition to factual knowledge. Moreover, instead of considering the illusion of knowing as a negative phenomenon, this study stresses its positive effects in enhancing motivation and promoting behavioral change, as the positive illusion model suggested. Given a dearth of studies looking at the illusion of knowing as a media effect, this study explored the factors relating to the illusion of knowing from a communication perspective.

The findings revealed that media attention was positively associated with the illusion of knowing. The results showed that when people paid more attention to media messages about climate change, they tended to believe that they were becoming more knowledgeable about this issue when in fact they may not gain substantial factual understanding. This is consistent with previous research, which reported that media work better in increasing

audiences' perceived knowledge than in increasing their factual knowledge (Hollander, 1995; Mondak, 1995; Park, 2001). As an impersonal issue, climate change lies beyond one's physical life and rarely exerts any direct effect on one's life (Kahlor et al., 2006). Thus, when paying attention to information about climate change, one tends to learn basic facts about it rather than making an effort to figure out its underlying mechanism. Driven by the need to maintain a positive self-image, people are led by a self-serving bias to perceive that they are becoming knowledgeable about an issue after paying attention to media messages, though they do not gain factual understanding. Thus, the more attention people pay to media messages about climate change, the more illusion of knowing they would develop.

Also, this study found that media attention was positively related to the illusion of knowing in knowledge comparisons with others. When people paid more attention, they tended to perceive that they knew much more about climate change than others. This is consistent with what is suggested by self-enhancement bias in social comparison (Alicke, 1985). To maintain good feelings about the self, one tends to develop illusory superiority in social comparisons. With the need of maintaining a positive self-image, people tend to amplify the benefits of the media in increasing one's self-knowledge than in increasing the knowledge of others. The more attention one pays to media messages, the more the effects of this amplification would be developed in one's perception. This finding matters in the context of climate change, as people tend to compare themselves with others in the decision-making of engaging in collective action, such as fighting climate change. Overconfidence in the comparison would enhance individuals' self-efficacy and motivation to take action (Taylor and Brown, 1988).

Unlike other studies emphasizing factual knowledge, this study recognized the functional value of the illusion of knowing. Our empirical findings regarding the positive relationship between media attention and the illusion of knowing offer a new angle to look at

the role of media in climate change communication². The media have been criticized for not adequately promoting factual knowledge (Park, 2001; Tichenor et al., 1970). Although the media may not be very efficient in increasing the public's factual knowledge about climate change, they could promote public engagement with climate change by bringing about the illusion of knowing. The complex nature of climate change makes it difficult for laymen to acquire factual knowledge. In this particular case, the illusion of knowing may serve as an alternative route for promoting public engagement with climate change. Practically, policy makers and practitioners should take advantage of the media's role in bringing about the illusion of knowing to promote public action on climate change. For those who have difficulties in acquiring factual knowledge, the illusion of knowing would be a useful device.

This study also provides empirical evidence for the positive relationship between elaboration and the illusion of knowing. First, people tend to have more illusion of knowing in self-reported perceived knowledge when they elaborate media messages about climate change. As suggested by prior studies, elaborative processing of media messages contributes to both factual and perceived knowledge acquisition (Eveland, 2001; Lee and Ho, 2015). It is possible that gaining factual knowledge would enhance one's confidence about one's expertise. Thus, people would develop the illusion of knowing. Second, the results indicated that the more people elaborated the information about climate change, the more illusory superiority they would develop. As discussed, gaining factual understanding from elaboration would possibly increase one's confidence in cognition. Driven by the need to maintain the confidence, people are motivated to exhibit self-enhancement bias in social comparison. Thus, people would possibly develop illusory superiority, which in turn would give rise to the false perception that they are more knowledgeable than others.

Moreover, this study examined the interaction between elaboration and media

² In a tentative analysis, we tested the relationship between media attention and factual knowledge of climate change. The results showed that though media attention was positively related to factual knowledge, its relationship was weaker than the relationships between media attention and the illusion of knowing.

attention on the illusion of knowing. We found that elaboration would magnify the positive relationship between media attention and the illusion of knowing. This is consistent with previous studies on elaboration, which suggest that elaborative processing would result in greater media effects (Perse, 1990). In this case, it is possible that elaboration will accelerate the media effects in increasing the illusion of knowing.

Although many studies have confirmed the role of elaboration in increasing factual knowledge, very few have shed any light on its relationship with the illusion of knowing. This study filled in the research gap by empirically investigating the relationship. Besides, a further examination of the moderating effects of elaboration on the relationship between media attention and the illusion of knowing offers more insights, which contributes to the theoretical literature about information processing.

By examining the relationship between elaboration and the illusion of knowing, findings from this study are helpful for communication practitioners to tailor specific media messages. For instance, messages should be tailored to associate with high elaborative processing, due to its positive role in promoting the illusion of knowing about climate change. The information processing literature has specified that elaboration values source credibility and message quality (Chu and Kamal, 2008). Thus, messages should be designed featuring high credibility and quality. Besides, personal interests and involvement promote elaborative processing of media messages (Lee and Kim, 2016). Accordingly, media coverage of climate change should be tailored to engage the audience by triggering their interests and concerns.

In terms of theoretical contribution, this study examined how media consumption relates to inaccurate perceptions. There are many cases where people may make decisions based on perception rather than on reality. Unlike the common sense that perception is unreliable and negative, inaccurate perception may have positive effects (Taylor and Brown,

1988). This suggests that communication researchers have to disregard the limit of focusing on media effects in increasing factual understanding of the reality. Our study offers a new angle to explore media effects. More importantly, we examined two types of the illusion of knowing. By acknowledging the collective action nature of climate change issue, this study proposed that the illusion of knowing in knowledge comparisons with others should be considered in addition to the illusion of knowing in self-reported perceived knowledge. This proposition contributes to the theoretical literature on the illusion of knowing.

As with all studies, this one too has its limitations. First, our research was conducted in a single country in mind, which may limit the generalizability of our findings. In Singapore, the public generally acknowledges the scientific consensus on human-caused climate change. Compared with citizens from the contexts without such a consensus, Singaporeans show much more concern about climate change and are more knowledgeable. Correspondingly, a different pattern of the illusion of knowing about climate change is expected in other contexts. What is more, people in contexts with climate change skepticism may not pay attention to media messages about climate change at all. Thus, future studies based in areas with climate change skepticism are necessary for a comprehensive understanding of the illusion of knowing about climate change.

Second, although we recognized the functional value of the illusion of knowing, we have not examined its attitudinal or behavioral outcomes in this study. Thus, future research is suggested to explore how the illusion of knowing about climate change is related to individuals' pro-environmental behavior. In particular, a thorough examination of the illusion of knowing and factual knowledge jointly would provide much more compelling findings.

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Tables and Figures

Table 1. OLS regression analysis predicting illusion of knowing in self-reported perceived knowledge.

	Zero-order	Model 1	Model 2	Model 3	Model 4
Block 1: Demographic variables					
Age	.13 (.001)	.08 (.066)	.09 (.030)	.08 (.049)	.09 (.039)
Gender	.03 (.369)	.04 (.320)	.04 (.245)	.04 (.267)	.04 (.270)
Education	-.16 (<.001)	-.09 (.058)	-.11 (.019)	-.11 (.021)	-.10 (.023)
Income	-.13 (<.001)	-.08 (.049)	-.10 (.025)	-.10 (.020)	-.10 (.017)
Incremental <i>R</i> (%)		3.6 (< .001)			
Block 2: Media attention variable					
Media attention	.08 (.043)		.14 (<.001)	.09 (.049)	.11 (.017)
Incremental <i>R</i> (%)			1.7 (< .001)		
Block 3: Information processing variable					
Elaboration	.12 (.001)			.09 (.030)	.11 (.017)
Incremental <i>R</i> (%)				1.0 (.030)	
Block 4: Interaction Effects					
Media attention × Elaboration					.10 (.008)
Incremental <i>R</i> (%)					1.0 (.030)
Total <i>R</i> (%)					7.3 (< .001)

OLS: ordinary least squares.

The values in the bracket are the actual *p* value for each coefficient.

Table 2. OLS regression analysis predicting illusion of knowing in knowledge comparisons with others.

	Zero-order	Model 1	Model 2	Model 3	Model 4
Block 1: Demographic variables					
Age	.16 (<.001)	.17 (<.001)	.18 (<.001)	.17 (<.001)	.18 (<.001)
Gender	.06 (.120)	.07 (.054)	.08 (.036)	.08 (.039)	.08 (.040)
Education	-.08 (.030)	.01 (.874)	-.01 (.770)	-.01 (.798)	-.01 (.820)
Income	-.05 (.188)	-.03 (.543)	-.04 (.377)	-.04 (.352)	-.04 (.321)
Incremental <i>R</i> (%)		3.2 (<.001)			
Block 2: Media attention variable					
Media attention	.09 (.017)		.14 (<.001)	.10 (.021)	.12 (.007)
Incremental <i>R</i> (%)			1.7 (<.001)		
Block 3: Information processing variable					
Elaboration	.11 (.003)			.07 (.145)	.07 (.097)
Incremental <i>R</i> (%)				0.3 (.145)	
Block 4: Interaction Effects					
Media attention × Elaboration					.10 (.013)
Incremental <i>R</i> (%)					1.0 (.013)
Total <i>R</i> (%)					6.2 (<.001)

OLS: ordinary least squares.

The values in the bracket are the actual *p* value for each coefficient.

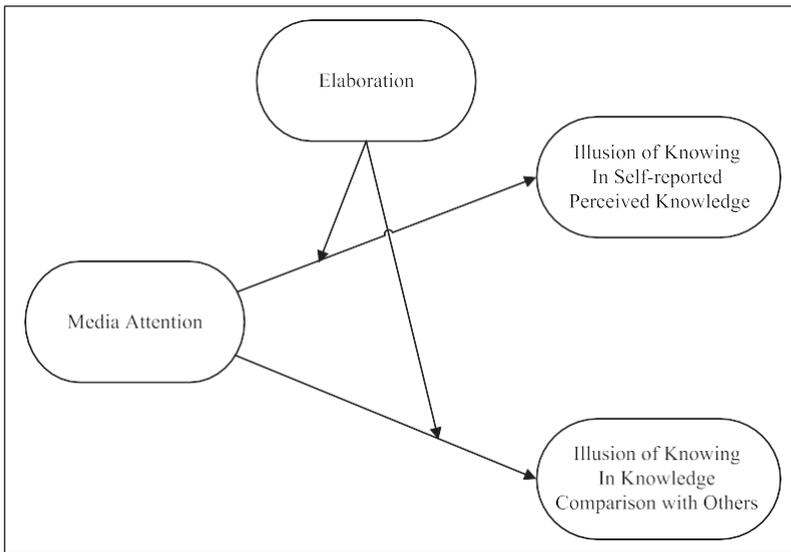


Figure 1. Conceptual model.

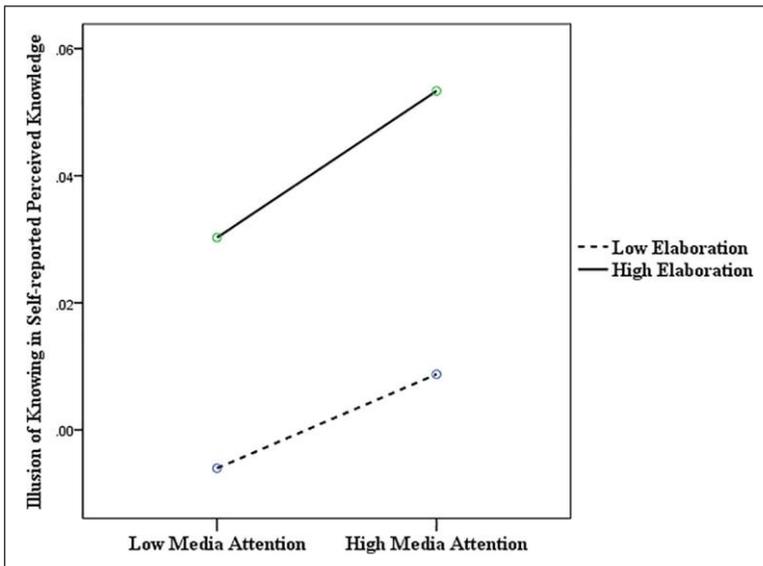


Figure 2. The illusion of knowing in self-reported perceived knowledge by elaboration and attention to media messages about climate change. In this figure, media attention and elaboration were transformed from continuous variables into categorical ones, using median split procedure. This procedure was only done to plot figures for moderating effects.

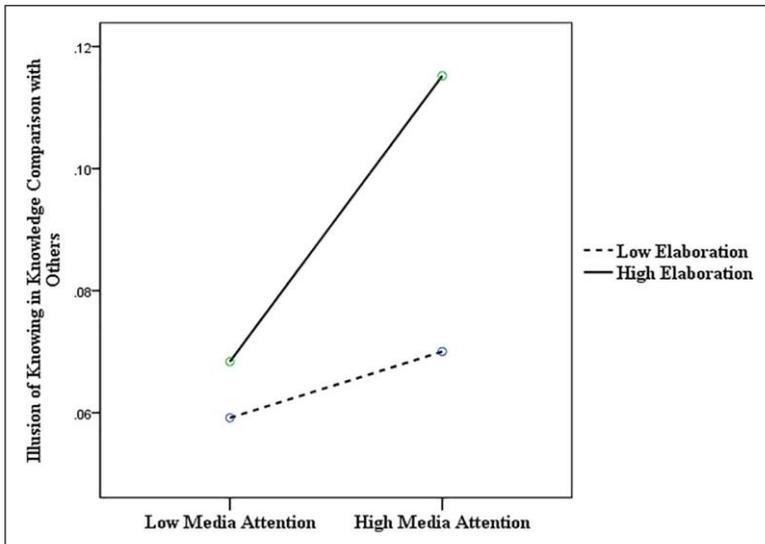


Figure 3. The illusion of knowing in knowledge comparisons between self and others by elaboration and attention to media messages about climate change. Median split procedure was used to plot interaction effects in this figure as well.