



Full length article

Does micro-blogging make us “shallow”? Sharing information online interferes with information comprehension[☆]Tonglin Jiang^a, Yubo Hou^{a, **}, Qi Wang^{b, *}^a Peking University, China^b Cornell University, USA

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ABSTRACT

Micro-blogging sites such as Twitter and its Chinese equivalent Weibo are characterized by fragmentation in information communication (FIC). Yet little is known about information comprehension in the micro-blogging context and the mechanism underlying any possible influence. Using E-Prime[®] to simulate information communication at Weibo, we conducted two experiments to investigate the effect of Weibo's structural features, namely, irrelevant information interference and feedback, on information comprehension. We found that participants' online information comprehension was negatively affected after browsing (reposting and passing) Weibo messages through the feedback function, and that this negative effect further extended to an offline reading task. Furthermore, mediation analysis showed that cognitive overload mediated the negative effect of reposting on information comprehension. The findings provide important insights into the influence of Internet technology on reading and learning.

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The rise of Web 2.0 has introduced new ways of information communication. In particular, micro-blogging sites such as Twitter and its Chinese equivalent Weibo push out news updates every second. Technological advances make access to information as easy as lifting a finger. According to CNNIC (China Internet Network Information Center), by June 2014, the number of Weibo users had reached 275 million. As Weibo and other micro-blogging sites become the primary source for people to receive information and follow news updates, information communication in the Internet age has taken the characteristics of quantitative explosion and qualitative fragmentation (Carr, 2010; CNNIC, 2014a, b; Zhang, 2011). However, do people indeed “get” what they receive? We conducted two experiments to examine information comprehension in the context of micro-blogging.

One important topic in the study of personal information

management in the technological era concerns fragmentation in information communication (FIC). With the advance of technology, the information people receive is often fragmented by physical locations (i.e., different devices or different tools used to store the information), which makes it difficult for people to comprehend the information and to make decisions resourcefully and efficiently (Karger & Jones, 2006). Things become even more complicated when it comes to micro-blogging, where information may be fragmented not just by physical locations but also through a number of interrelated processes. In particular, two inherent structural features of micro-blogging, namely, irrelevant information interference and feedback function, may result in FIC and interfere with information comprehension.

Micro-blogging sites such as Twitter and Weibo strictly limit each message to a maximum number of words (e.g., 140 Chinese characters at Weibo). This may not only result in a lack of logic in the organization of the essential information, but also allow irrelevant or trivial information swamp onto the screen, making the target information fragmented and difficult to access. According to the disruption hypothesis (Mayer, Griffith, Jurkowitz, & Rothman, 2008), irrelevant information competes with the target information for the limited cognitive capability during information processing. Especially when irrelevant information is highly

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interesting, the processing and comprehension of the target information suffers. In addition to increasing cognitive burden, irrelevant information may further make it difficult for viewers to build connections among pieces of relevant information and thus to fully understand the information. Research has shown that people can learn more efficiently in multimedia learning tasks when irrelevant information is kept minimum or uninteresting (Mayer, Bove, Bryman, Mars, & Tapangco, 1996; Mayer et al., 2008).

Furthermore, unlike traditional media, micro-blogging sites are more than a simple information dissemination network. They serve as an interactive platform equipped with the feedback function, where people can comment on, repost or like a post. At Weibo, for instance, 4.8% users contribute more than 80% of the original posts, whereas the majority users primarily comment on or repost others' messages (Fu & Chau, 2013). Similarly, more than half of Twitter users never post a message, whereas the top 10% most active users contribute to over 90% of all content (Kaplan & Haenlein, 2011). Thus, the vast amount of information on micro-blogging sites is mainly a cluster of interactive communications made possible by the feedback function. The feedback function may fragment information by obscuring the authorship and disrupting the coherence of the target information (Boyd, Golder, & Lotan, 2010; Mayer, Bryman, Mars & Tapangco, 1996). Furthermore, reposting or "retweeting" messages may create cognitive overload in viewers and shorten their time in reflecting on and digesting the information they receive (Bergman, Beyth-Marom, & Nachmias, 2006).

Given the two inherent features of micro-blogging that fragment information, information comprehension may be negatively affected. We test this question using Weibo as the platform. We examined the effect of Weibo's structural features, in terms of irrelevant information interference and feedback (i.e. asking participants to make "repost" or "next" responses), on information comprehension. We expected that in an online information comprehension test, an interference group would score lower than a no-interference group and a feedback group would score lower than a no-feedback group. Furthermore, we expected the negative effect of micro-blogging to spread from online to offline, whereby in an offline information comprehension test, the negative effects of irrelevant information interference and feedback would remain significant.

In addition, we propose that a key mechanism underlying the negative effect of micro-blogging on information comprehension is cognitive overload. Although each micro-blogging message consists of a maximum number of 140 words or characters, viewers are facing virtually an unlimited number of messages in processing information. Furthermore, in the micro-blogging context, the vast amount of interactive information is often characterized by uncertainty, diversity, ambiguity, novelty, and complexity, all of which can contribute to cognitive overload and in turn, compromise information comprehension (Eppler & Mengis, 2004; Paas, van Gog, & Sweller, 2010; Schneider, 1987). Thus, we predicted that cognitive overload would mediate the effect of the structural features of

micro-blogging on information comprehension (see Fig. 1).

Notably, although there is known Chinese state censorship of online activity, including micro-blogging, we were interested in how people process and comprehend online information accessible to them, namely, information after censorship. Our experiments therefore resembled real-life contexts where the majority of micro-blogging users read and share existing posts (Fu & Chau, 2013; Kaplan & Haenlein, 2011), and the findings should have real-world applicability.

1. Experiment 1

1.1. Participants

Eighty undergraduate students (31 males) at Peking University, China, participated and each received 10 Yuan. Their average age was 21.23 years ($SD = 2.56$). Participants were recruited through psychology courses and were from diverse academic disciplines.

1.2. Procedure

The experiment was built through the software E-Prime[®] with a 2 (interference vs. no interference) X 2 (feedback vs. no feedback) between-subject design. There were a total of 50 messages adapted from Sina Weibo, all in Chinese. Of the 50 messages, 40 concerned the topic of helping or not helping a tumbled elderly, a topic that had aroused fierce debate in China throughout the year of 2013.¹ In the interference group, the remaining 10 messages were statements irrelevant to the target topic, also adapted from Sina Weibo. In the no-interference group, the 10 messages were replaced with the statement "This message has been deleted," in combination with some meaningless Chinese characters to keep the amount of information consistent between the two groups. After reading each message, participants in the feedback group had to make a choice between "repost" and "next" and the computer would respond with "reposted" or "next" accordingly. Participants in the no-feedback group simply pressed "next" after reading a message to move on to the next one. The 50 messages were randomly presented and each message remained on screen for 300 ms. Participants were randomly assigned to one of the 4 groups ($N = 20$ per group). They were told that the study concerned people's use of Weibo and that they should respond as they usually would.

After participants finished the message-viewing task, an online information comprehension test was administered. Ten items were selected from the 40 target messages in a pretest, all with excellent discrimination values. Participants were asked to take a multiple-choice test of the 10 items based on the information they just read. Their scores on the test (0–10) were used as the index of information comprehension.

2. Results and discussion

A 2 (interference vs. no interference) x 2 (feedback vs. no feedback) analysis of variance (ANOVA) on the online information comprehension score revealed a significant main effect of feedback, $F(1, 76) = 30.74, p < .001, d = 1.24$. As predicted, participants in the feedback group ($M = 3.28, SD = 1.60$) performed worse than those in the no-feedback group ($M = 5.23, SD = 1.54$) for their online (Weibo) information comprehension. However, there was no difference in performance between the interference group ($M = 4.25,$

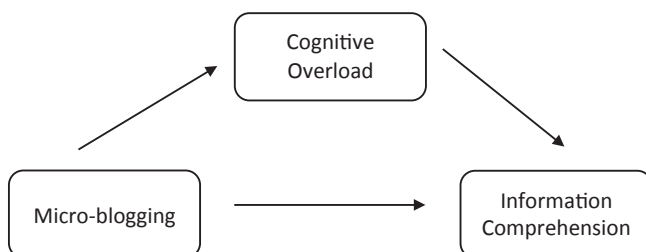


Fig. 1. Mediation model.

¹ In 2013, there were many news reports in China about cases where people were sued after helping a tumbled elderly. As a result, "to help or not to help" became the hottest topic of the year.

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