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The role of university students' informal reasoning ability and disposition in their engagement and outcomes of online reading regarding a controversial issue: An eye tracking study

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ABSTRACT

With an online reading context, this study aimed to investigate whether university students' informal reasoning ability and disposition (indicated by counterargument construction) could reduce or even reverse "myside bias" in reading relevant webpages regarding a controversial issue. Also, the association of students' online reading patterns with their progress in counterargument construction and changes in attitude extremity was examined in this study. The participants were sixty-four university students. They were asked to read eight relevant webpages freely (eye movement recorded) and to express their personal opinions about building nuclear power plants. These webpages were edited from various aspects regarding this controversial issue, with half of them presenting supporting and opposing information respectively. Before and after reading the webpages, the participants' counterargument construction performance and attitude extremity toward the controversial issue were assessed. This study revealed that participants who could construct successful counterarguments in the pre-test tended to pay more attention to other-side than to myside webpages. For their counterparts, it was found that those who spent more time viewing other-side webpages either progressed in counterargument construction or neutralized their attitude in the post-test. With different methodology, this study also provides convergent evidences that myside bias was associated with attitude polarization.

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1. Introduction

In the modern society, people have more and more opportunity of encountering a variety of controversial issues, such as nuclear power usage, social welfare and educational policies, resulted from the rapid development of science and technology as well as changes in social structure, financial system and international relationship. These issues often involve supporting and opposing arguments and evidence from multiple perspectives. Although billions of information is available on the Internet, will people pursue attainable online material in a balanced way? Literature has shown that people tend to selectively expose to myside information (i.e., selective exposure, see Frey, 1986; Hart et al., 2009 for review),

critically evaluate other-side information but accept myside information rashly (Edwards & Smith, 1996; Lord, Ross, & Lepper, 1979; Taber & Lodge, 2006; van Strien, Kammerer, Brand-Gruwel, & Boshuizen, 2016), and generate more myside arguments than counterarguments (Kuhn, 1991; Perkins, Farady, & Bushey, 1991). Such biased information processing could lead to attitude polarization (Lord et al., 1979; Stroud, 2010; Taber & Lodge, 2006). In addition, ignoring or even distorting dissenting opinions may result in conflicts and discrimination among citizens in the modern pluralistic society. Based on previous literature, with an online reading context regarding a controversial issue, the present study aimed to investigate how university students' informal reasoning ability and disposition (indicated by counterargument construction against their positions) influenced their online reading pattern and outcomes. Specifically, it was hypothesized that counterargument construction ability could reduce or even reverse myside bias (i.e., paying more attention to myside than other-side information) in this study.

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1.1. Informal reasoning and myside bias

In general, people's reasoning regarding controversial issues could be recognized as the process of informal reasoning, a form of reasoning different from formal reasoning (Wu, 2013). Informal reasoning is often involved in situations in which reasons exist both supporting and against the conclusion, such as making decisions about what to believe or what actions to be taken (Shaw, 1996). It concerns constructing and evaluating arguments from multiple perspectives (Kuhn, 1993). It also implies contrasting what we support and what we don't support (Kuhn, 1991; Perkins et al., 1991).

In the contexts of informal reasoning regarding a controversial issue, the problem is not well defined, but ill-structured. In particular, the premises regarding a controversial issue are seldom explicitly stated, and as a result, the conclusions derived from the arguments in informal reasoning may not be fixed. Consequently, people rely on their informal reasoning ability to solve the controversial issues they encounter in daily life. However, literature has revealed that people tend to process controversial issues in an unbalanced manner. In particular, "myside bias", a kind of reasoning bias, has been found in the following information processing stages:

1.1.1. Receiving information

In the selective exposure research paradigm (e.g., Frey, 1981), after participants made decisions about an issue, they were presented with a list of additional materials consistent or inconsistent with their positions. Participants were instructed to indicate which of the appended materials they would like to read/listen to for further information. These materials might not be provided in some studies, since the research focus was the selection preference. It was generally observed that participants preferred information supporting their decisions, beliefs, etc. (e.g., Frey, 1981; Garrett & Stroud, 2014; Jonas, Schulz-Hardt, Frey, & Thelen, 2001).

1.1.2. Evaluating arguments

Previous research has revealed that when being asked to evaluate the strength of arguments, or the convincingness and adequacy of research reports, people tend to give higher ranks for those they supported than those they opposed. For instance, Lord et al. (1979) observed that participants who supported capital punishment rated research providing pro-deterrent evidence as more convincing and adequate than anti-deterrent studies; vice versa for participants who opposed capital punishment. Consequently, participants' attitude still polarized after the balanced presentation of both sides. Furthermore, in the study of Edwards and Smith (1996), participants listed more reputational than supporting thoughts for incompatible arguments, and vice versa for compatible arguments after they rated the strength of these arguments. The total amount of thoughts was also larger for incompatible than compatible ones. Moreover, the pattern of differential strength-evaluation and thought-listing was intensified by prior attitude extremity and emotional conviction. Similarly, Taber and Lodge (2006) revealed that, even though even-handed instruction was given, participants with sophisticated political knowledge and strong attitude were biased in argument evaluation polarized considerably.

1.1.3. Generating arguments

Regarding generating arguments about everyday issues, Perkins and colleagues (summarized in Perkins et al., 1991) found that individuals (from high school to graduate students and adults) typically generated biased, one-sided and incomplete arguments. That is, they produced fewer other-side than myside arguments and fewer arguments from either side than they could. Especially,

arguments challenging their own positions were generally lacking. In the context of informal reasoning tasks, Kuhn (1991) further revealed that it was more difficult to generate counterarguments, which argued directly against their supporting arguments (success rate across three issues was 41—52%), than alternative theories, which were probable arguments from other aspects (with 58—69% success rate). This difference presumably indicated that counterarguments posed a greater challenge to the beliefs that participants held than alternative theories. About one quarter of participants could not generate any successful counterarguments for any of the three issues. Furthermore, analyses of the following requests for rebuttals showed that participants were more likely to generate rebuttals than counterarguments. Similar to the difference in success rate for counterarguments and alternative theories, generating arguments against others' views (rebuttals) were easier than those against participants' own views (counterarguments).

1.2. Theoretical framework

The tri-process theory proposed by Stanovich (2009) was adopted as the theoretical framework of the present study. In a series of experiments, Stanovich, West and colleagues (e.g., Stanovich & West, 2007, 2008; Stanovich, West, & Toplak, 2013) found that thinking disposition (such as actively open-minded thinking, need for cognition; Stanovich & West, 1998, 2007) contributed more than cognitive abilities to the extent of myside bias. Stanovich thereby extended the dual-process theory (see Evans, 2008; for a review) into tri-process theory which includes both an algorithmic and a reflective mind. The common features of the dual-process theories are that reasoning processes involve a fast, intuitive and heuristic process (system 1 or type 1 process) and a slow, analytic and cognitively demanding process (system 2 or type 2 process). System 1 could determine behavior unless system 2 inhibits the response in time. Stanovich proposed that the original system 2 should be partitioned into an algorithmic mind and a reflective mind because of the difference between being able (cognitive abilities) and being inclined (thinking disposition) to inhibit the autonomous system 1. He suggested that the inhibition of the autonomous mind by the algorithmic mind is initiated by the reflective mind. Nevertheless, both the algorithmic and reflective minds are necessary for rational behavior. Without the reflective mind, algorithmic mind might not be activated to detect non-normative response determined by the autonomous mind. Short of algorithmic cognitive abilities, the reflective mind might not effectively inhibit the autonomous mind.

Based on Stanovich's (2009) tri-process theory and Kuhn's (1991) research findings regarding informal reasoning, the current study assumed that the ability and disposition to construct counterarguments exhibit the operation of both the algorithmic and reflective minds. Kuhn found that reasoners who believed that arguments could be subject to evaluation and comparison with each other were more successful in constructing counterarguments than those who thought that knowledge was certain and absolute (so that it could not be challenged) and those who held that arguments were equally plausible (so that contrast among arguments was not necessary). In other words, the disposition to scrutinize each argument including supporting ones led to successful counterargument production. Therefore, we hypothesized that participants who succeed in generating counterarguments would be more fair-minded than those who fail. That is, myside bias would be reduced for the former group of participants.

As one of the initial attempts, the present study aimed to apply Stanovich's (2009) tri-process framework to investigate myside bias during online reading regarding a controversial issue. Also, based on Kuhn's (1991) findings concerning informal reasoning,