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Text-belief consistency effects in L2 readers

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Accepted for publication in the journal *Discourse Processes* (2021)

Author Note

This research was supported by a Fellowship for Experienced Researchers awarded by the Alexander von Humboldt Foundation to Mohammad N. Karimi.

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Abstract

Readers are expected to construct balanced mental representations of socio-scientific issues discussed across controversial documents. However, readers tend to be biased towards documents that present belief-consistent perspectives and tend to refute documents that argue against their stance (text-belief consistency effect). Published studies on text-belief consistency effects have used imbalanced designs with all participants typically endorsing one standpoint in the controversy. The present experiment used a balanced design to examine the text-belief consistency in Iranian students of English as a foreign language (EFL) and to investigate the extent that prior knowledge moderates the effect. Eighty-two students read two texts on an applied linguistics issue (native vs. non-native speakers as EFL teachers). Based on their performance on a prior beliefs measure, the participants were assigned to three groups that varied in agreement to the stance of the texts. A recognition task was used to measure their situation-model strength and text-base strength. The results revealed a large text-belief consistency effect. Participants constructed stronger situation models for the text that communicated belief-consistent information compared with those who read the text that communicated belief-inconsistent information. No difference was found for text-base representation. Although prior knowledge was found to exert a significant positive effect on the strength of participants' situation-model representations, it did not moderate the text-belief consistency effect.

Keywords: Prior beliefs, L2 texts, prior knowledge, validation

Introduction

Present knowledge societies are characterized by the abundance of information sources readily accessible to readers (Stang Lund, Bråten, Brandmo, Brante, & Strømsø, 2019), provided largely through the World Wide Web. Like students in any other field, students of English as a foreign language (EFL) also routinely face a wide array of information sources that present various accounts of socio-scientific issues. This abundance of information sources and the relatively easy access to them creates a new literacy context for EFL students (Karimi, 2015). Often in such literacy contexts, the standard practice is to synthesize information across a number of sources (Britt & Rouet, 2011). More often than not, these information sources present divergent perspectives and standpoints on a single topic or issue. Therefore, the primary consequence of reading in such a context is that students are required to evaluate the evidentiary value, relevance, and veracity of the, at times, conflictual positions presented across the documents (Bråten, McCrudden, Stang Lund, Brante, & Strømsø, 2018). In an ideal case, readers would select and process the information from the sources in an unbiased and objective fashion, but ample evidence has shown that they often fail to construct sound mental representations inclusive of overlapping and competing perspectives (Britt, Perfetti, Sandak, & Rouet, 1999).

A sound inclusive mental representation requires readers to develop an effective situation model for each text and integrate these situation models to form a coherent and balanced documents model of the situation described across the texts containing all divergent perspectives and their argumentative interconnections (Abendroth & Richter, 2020a). However, a well-established phenomenon is the bias from strongly held beliefs that affects comprehension and subsequent mental representation of a text (Knobloch-Westerwick & Meng, 2011; Wiley, 2005). Readers tend to hold fast to their beliefs even in the face of

perspectives that discredit them (Greitemeyer, Fischer, Frey, & Schulz-Hardt, 2009; Limon & Mason, 2002; Maier, Richter, & Britt, 2018). Driven by congeniality bias, readers have a propensity to gather support for the beliefs they feel committed to and to avoid information that invalidates them (Hart et al., 2009). Therefore, readers are generally predisposed to rate the information that conforms to their prior beliefs as more plausible and tend to overlook or shallowly process the information that conflicts with their beliefs. According to Richter and Maier (2017), this is the default predisposition when readers are not specifically motivated, epistemically curious, or do not pursue reading goals that call for adequate processing of conflicting information. Consequently, in the context of reading multiple documents that present opposing viewpoints on the same topic, readers tend to be biased towards the argumentative stance that they endorse more (text-belief consistency effect; Maier & Richter, 2013). Strongly held beliefs appear to function as knowledge structures guiding the selection, interpretation, and processing of textual information (Richter & Maier, 2017).

To date, studies of text-belief consistency effects have been mainly conducted in the context of reading texts that are written in the participants' native (first) languages (L1). This study, however, investigates the text-belief consistency effect when reading multiple documents written in the readers' second language (L2), with the documents presenting opposing standpoints on a controversial issue in applied linguistics—the superiority of native or non-native speakers as L2 teachers.

We will argue why an investigation of text-belief consistency effects is warranted and worthwhile in the context of L2 readers, given the typical differences between reading comprehension in L1 and L2. We then discuss relevant theory and research on the text-belief consistency effect. Both lines of argumentation inform the hypotheses and research questions examined in the present experiment.

Characteristics of Situation Model Construction in Reading in a Second Language

Reading in L1 and L2 differs in the cognitive resources spent on lower- and higher-order reading processes, which are involved in constructing text-base and situation-model representations, respectively. A text-base representation involves the "mental representation of the concepts in the text organized consistent with the text structure" (Wolfe, Tanner, & Taylor, 2013, p. 460), which is based on such processes as lexical access, syntactic parsing, and proposition formation (Morishima, 2013). By contrast, the situation-model representation is defined as "a mental model that includes the basic knowledge of what the text says, inferences generated during or after comprehension, any opinions or affective responses to the content, and relevant prior knowledge that has been activated" (Wolfe, et al., 2013, p. 460). Situation-model representations are based on higher-order integration processes such as elaborative inferencing, relevant knowledge associations and inhibition of irrelevant knowledge associations, and comprehension monitoring (Raudszus, Segers, & Verhoeven, 2019). Research on L2 reading converges on the finding that the less routinized character of lower-level processes involved in the construction of surface and text-base representations in L2 reading leaves less cognitive resources available for higher-order strategic processing, such as knowledge associations and inferences (Horiba, 1996; Morishima, 2013; Shaw & McMillion, 2008).

Extending this research on differences between L1 and L2 readers, Pritchard and O'Hara (2008) found that proficient Spanish-English bilingual readers used more monitoring strategies and more inter-sentential connecting strategies when reading L1 texts than when reading L2 texts. This finding has direct implications for text-belief consistency effects. Elaborative processing of belief-inconsistent information is described as a resource-intensive step that hinges on readers' higher-order integration processes and strategic resolution of inconsistencies. Accordingly, if L2 readers are not as efficient as L1 readers in their strategic

approach to texts, they might conceivably show large text-belief consistency effects when reading controversial texts in their second language.

Based on the reviewed evidence, L2 readers are likely to display (large) text-belief consistency effects when reading multiple controversial documents. However, given that all previous studies have been based on L1 readers, the assumption still needs to be tested.

Prior Beliefs and Text Comprehension: Theory and Empirical Evidence

The role of beliefs in text comprehension, and more specifically the text-belief consistency effect, is directly or indirectly addressed by a number of theoretical models of multiple-text comprehension. In their Multiple Documents – Task-Based Relevance Assessment and Content Extraction (MD-TRACE) model, Rouet and Britt (2011) view multiple-document comprehension as a goal-directed activity and emphasize the role of diverse cognitive resources that readers draw upon to fulfill their reading goals (Rouet, Britt, & Durik, 2017). Of particular note among the cognitive resources are the prior knowledge and beliefs readers bring to the task. In line with this assumption, previous research has provided substantial evidence that readers tend to favor information aligned with their beliefs more than information that is at variance with their beliefs (e.g., Bohn-Gettler & McCrudden, 2018; Hart et al., 2009; Kardash & Scholes, 1996; Wiley, 2005). For example, Kessler, Braasch and Kardash (2019) examined how readers' beliefs are affected after being exposed to a text refuting misconceptions about child vaccinations. The results revealed belief-consistency effects: Readers' prior beliefs on the topic of the texts—whether accurate or inaccurate—positively predicted counterpart post-reading beliefs, measured at both immediate and delayed time points. In a different context of reading from multiple websites, van Strien, Brand-Gruwel, and Boshuizen (2014) examined how prior attitudes affected participants' processing and use of attitude-inconsistent information scattered across a number of websites. The results indicated that participants holding strong preexisting

attitudes favored arguments from attitude-consistent websites compared with participants holding weaker prior attitudes.

Additionally, support for the text-belief consistency effect also comes from the concept of benefit-cost ratio analysis in the RESOLV model of multiple-text comprehension (Rouet, Britt, & Durik, 2017), as an extension to the MD-TRACE model. The model specifically "assumes that readers will optimize the amount of text information to be processed and the depth of processing as a function of benefit-cost analysis" (Rouet et al., 2017, p. 203). This assumption is consistent with accounts of the text-belief consistency effect in terms of the parsimonious regulation of cognitive resources during comprehension—with less cognitive resources being extended to less plausible information.

In their Two-Step Model of Validation, Richter and Maier (2017) proposed an explanation of the text-belief consistency effect in terms of *validation* or *epistemic monitoring*, which is believed to be a routine process during language comprehension (Isberner & Richter, 2014; O'Brien & Cook, 2016). The consensus in the literature is that through passive memory-based processes, prior knowledge and beliefs are activated, and the incoming information is validated against them (Piest, Isberner, & Richter, 2018; Singer, 2013; see also the special issue of *Discourse Processes* on comprehension and validation, Richter & Rapp, 2014). When readers possess strong prior beliefs regarding a contentious topic, this mechanism spontaneously generates implicit plausibility judgements leading to a stronger mental representation for belief-consistent information compared with belief-inconsistent information (Richter & Maier, 2018). Plausibility is, however, different from objective truth judgements in that the former is based on the consistency of the information with readers' prior beliefs and may vary from one reader to another, according to the degree of fit between the textual information and the content of the readers' situation model of the text (Abendroth & Richter, 2020b). This often subjective, passive, and involuntary process of

plausibility assessment regulates comprehension in a way that belief-consistent information from the text is attended to and processed preferentially (Richter & Maier, 2018). Richter and Maier (2018) explained the function of this step as a heuristic that assists readers in regulating their cognitive resources in that they tend to expend less cognitive resources on less plausible information, thus leading to a belief-consistency bias in comprehension.

Support for this validation-driven consistency bias has been provided by Maier and Richter (2013) who found a stronger situation-model representation for the belief-consistent information. Conversely, the text-base representation was found to be stronger for belief-inconsistent texts compared with belief-consistent texts, which Maier and Richter attributed to the cognitive mechanism that belief-inconsistent information stands out and gets tagged as unusual in the representation of the text itself. Thus, text-belief consistency may exert differential effects on different levels of comprehension.

The text-belief consistency bias may also serve as a defensive mechanism used by readers to promote cognitive consistency and reduce cognitive dissonance. This hypothesis was supported in Maier, Richter, Nauroth and Gollwitzer (2018). The authors investigated how readers' prior beliefs and level of identification with a social group affect readers' comprehension of controversial documents. The results of the study revealed a text-belief consistency effect in the situation-model representation for high identifiers—irrespective of whether the information was socially affirming or threatening. The authors argued that the belief-consistency effect that results from a belief-protection mechanism is likely to be stronger than the need to avoid information that is socially threatening.

Apart from the routine validation process, a second strategic step (*elaborative processing*) is called into action when the reader attempts to resolve an inconsistency between prior held beliefs and the information encountered in the epistemic monitoring step (Richter & Maier, 2017). Readers might, for example, search for alternative justifications for

the information they find implausible (Richter & Maier, 2018). Thus, in this second step, readers choose to process the inconsistencies by engaging in strategic elaboration processes to construct a more defensible and justifiable situation-model representation of an issue (Abendroth & Richter, 2020a). This second process is self-driven and goal-oriented, and only under certain circumstances will readers engage in the process to reduce the text-belief consistency effect (Richter, 2015). Examples of specific reading goals and task instructions that may guard against the text-belief consistency effects are the rationale task instructions used by McCrudden and Sparks (2014). Moreover, intimately associated with reading goals is the concept of standard of coherence, which can have a direct bearing on how deeply inconsistencies in a text are processed (O'Brien & Cook, 2016; van den Broek, Rapp, & Kendeou, 2005), and thus, on text-belief consistency in comprehension. Importantly, however, text-belief consistency effects are the default outcome of automatic processes such as validation that may yield sufficient coherence under general reading goals.

The Two-Step Model also implies that specific individual factors may modulate the text-belief consistency effect by affecting the likelihood that readers engage in elaborative processing of belief-inconsistent information. For example, cognitive flexibility, open-mindedness, motivation (e.g., accuracy motivation as opposed to defense motivation), and belief basis (e.g., evidence-based as opposed to affect-based) have been reported to promote the tendency to engage in elaborative processing of belief-inconsistent information (Hart et al., 2009; Kessler et al., 2019; Stanovich & West, 1997; Wolfe et al., 2013). Readers' prior knowledge could also moderate the text-belief consistency effect as a condition that enables readers to engage in elaborative processing. Abendroth and Richter (2020a) argue that "knowledge-based comprehension processes such as elaborative and bridging inferences to reason about belief-inconsistent information" (p. 7) may work against belief-biases in comprehension. However, empirical evidence for this assumption is both scarce and

inconclusive, partly because the level of prior knowledge about the topics in the experimental texts may also differ between samples of participants employed in different studies (for example, Abendroth & Richter, 2020a; Wiley, 2005).

Native vs. Non-Native L2 Teacher Controversy

To study the text-belief consistency in L2 readers with a balanced design, we chose a decades-old controversy in applied linguistics on the superiority of native speakers vs. non-native speakers as L2 teachers (Aslan & Thompson, 2017). A majority of EFL students subscribe to one or the other side of the issue, and a third group also takes a neutral stance on it. The persistent tendency towards dichotomizing native vs. non-native speakers in L2 education has been fueled by various discourses. As a case in point, one main assumption is that foundational constructs in language acquisition, such as native speaker competence (i.e., the mental knowledge native speakers have about their language) and target language pragmatic norms (i.e., the rules governing language use as employed by the native speakers) have accorded native speakers an ostensible authority in language education (Aneja, 2016), which has now been consolidated into an undisputed norm (Braine, 2012). This assumed authority is believed to have spread beyond the theoretical boundaries of academia into a wide array of professional contexts, including hiring practices and recruitment criteria (Aneja, 2016; Aslan & Thompson, 2017). Nonetheless, given the globalized spread of English and the emergence of many indigenized varieties of the language and also the emergence of hybrid communicative practices in today's highly mobile and linguistically super-diverse communities (Galloway & Numajiri, 2020; Wei, 2018), ongoing discussions indicate that even non-native speakers can be legitimate users of the language. Therefore, their language competence and pragmatic norms should be recognized in language education.

Differentially affected by these arguments, EFL students, and by extension, a large majority of those involved in language education are divided in their stance on the native vs.

non-native teacher dichotomy. Proponents of the superiority of native language teachers assume that they could be ideal sources of authentic input, providing learners with "more real unhampered natural language" (Reve & Medgyes, 1994, p. 360). They further argue that native teachers can readily establish a more credible image of themselves as teachers, mostly in virtue of their 'perfect' command of the language, and thus can be effective "role models, … success stories, … and real images of what students can aspire to be" (Thomas, 1999, p. 12). In contrast, those adopting the opposite stance assume that although non-native teachers might be linguistically more deficient compared with their native counterparts, they have equally significant qualifications such as more insights into the language and better metacognitive awareness of the grammar (Arva & Medgyes, 2000). Aside from these two opposing groups, many students and professionals take a neutral stance on the advantages and disadvantages associated with each group.

The Present Study

Ample evidence has shown that readers' comprehension of controversial texts is biased towards information that conforms to their prior beliefs—labelled text-belief consistency effect (Abendroth & Richter, 2020a; Maier & Richter, 2013, 2014). Most of the previous studies conducted on the text-belief consistency effect were based on imbalanced designs, with participants who typically endorsed one stance in the controversy and opposed the other stance. This type of design cannot rule out alternative explanations that hinge on the fact that different texts are used as belief-consistent and belief-inconsistent texts. Therefore, the present experiment used a balanced design, with participants on each side of the controversy and one neutral group with no preference for either side of the controversy.

The experiment tested two hypotheses and two exploratory research questions. As Hypothesis 1, we predicted that participants would show a text-belief consistency effect at the situation-model level when reading texts in English, i.e. their second language. Statistically,

the text-belief consistency effect would manifest as an interaction between text stance and participant stance. The magnitude of this effect would be reflected in the difference between situation-model strengths for the belief-consistent and the belief-inconsistent texts. Lack of such differences in the situation-model strengths of both texts would be regarded as a failure to find text-belief consistency effects.

As an exploratory research question, we also investigated how participants' text-base strength varies across belief-consistent and belief-inconsistent texts, which would also manifest as an interaction of text stance and participant stance. We could not form a hypothesis because of the inconclusive empirical evidence in previous research and competing theoretical assumptions about the text-belief consistency effect at the text-base representation level. Maier and Richter (2013) found memory for belief-inconsistent information to be higher, but this finding was not replicated in the control condition in Maier and Richter (2014) and later studies on the text-belief consistency effects (for an overview, see Richter, Münchow, & Abendroth, 2020). Moreover, competing theories about the interaction of beliefs at the text-base representation level exist, suggesting that formulating a hypothesis would be premature. For example, based on the predictions of the schema-pointer-plus-tag model (Graesser, 1981), atypical items are likely to be tagged in the memory trace and represented through a distinct memory code (Cohen, 1982). Given the atypical nature of belief-inconsistent information, it might be recalled more easily. Additionally, the reverse coherence effect (McNamara, Kintsch, Songer, & Kintsch, 1996) predicts that understanding a text may not necessarily proceed equally well at the text-base and situation-model levels. When comprehension proceeds satisfactorily at the text-base representation level, it may complicate readers' self-monitoring behaviors such that the reader is likely to register good-enough progress at the text-base level and thus fail to work towards a sophisticated situation-model representation. Parallel theoretical ideas also support the assumption that reading is

primarily bottom-up and that constructing a sophisticated situation model based on a poorly constructed text-base model might not be possible. In sum, both perspectives are theoretically justified.

As Hypothesis 2, we predicted that situation-model strength would be positively affected by participants' prior knowledge of the topic; this effects would manifest as a main effect of prior knowledge. No such prediction was made for text-base strength because it is text-bound and less dependent on prior knowledge compared with the situation-model representation. Additionally, there is theoretical support for the moderating effect of prior knowledge on text-belief consistency at the level of situation-model representation. For example, based on the predictions of the Two-Step Model of Validation, the availability of prior knowledge is a major condition by which readers engage in elaborative processing of belief-inconsistent information (Richter & Maier, 2017). However, empirical evidence for this assumption is scarce, inconclusive, or even contradictory, as discussed above (see studies by Abendroth & Richter, 2020a; Wiley, 2005). Therefore, as another exploratory question, we examined how prior knowledge would moderate the text-belief consistency effect at the situation-model representation level. This effect would manifest as a three-way interaction of prior knowledge with text stance and participant stance.

The present experiment adds to the previous literature on the text-belief consistency effect in several ways. First, unlike previous studies, the present study was conducted in the context of L2 multiple-text reading, which removes one major shortcoming of this line of research—the constrained generalizability of the findings. Previous research has focused entirely on L1 reading contexts and in specific populations (mostly in selective samples of participants from a psychology background in Germany and the U.S.). Participants in the present study came from different disciplinary backgrounds—language education and English studies, and they were Iranian students. We believed that results from such a student

population that is seldom examined will also advance the extant research on belief effects in text comprehension. Furthermore, this line of research has mostly used imbalanced designs with all participants endorsing one side of a controversy over another, which creates a confound of text-belief consistency and specific standpoints in the controversy and the text(s) representing this standpoint. Therefore, more research is needed to cross-validate the findings of this line of research while removing the associated shortcomings.

Method

Participants and Prior Beliefs Assessment

Eighty-two post-graduate students (25 males, 57 females) from two universities in Central Iran and one from Northern Iran and majoring in three English-related disciplines (EFL Education, Translation Studies, and English Literature) took part in the study. The participants' average age was 28.76 (*SD* = 5.98). Most of the participants were studying in their first and third semesters (*n* = 74) and a minority (*n* = 8) were working on their theses or dissertations. Although the participants' proficiency was not assessed on a standard measure, their general proficiency can be described as corresponding to B2 (a minority also to C1), according to the Common European Framework of Reference for Languages (CEFR). English was the language of their studies at the university for the participants.

Five weeks prior to the experiment proper, the original sample of 119 participants received a prior beliefs measure that included 10 items rated on a five-point Likert scale ranging from 1 = *strongly disagree* to 5 = *strongly agree*. Five of the statements were used to assess the participants' beliefs regarding the superiority of native speakers as L2 teachers whereas the other five statements were used to assess participants' beliefs regarding the advantages of non-native speakers as L2 teachers. The participants' responses to each section of this measure were used to define text-belief consistency.

Based on their scores on the prior beliefs measure, three groups were formed showing three different belief profiles. Initially, the general means for pro-native (M = 2.93) and pro-non-native (M = 3.08) stances were computed. Participants whose pro-native stance scores fell above the computed mean score for this stance and whose pro-non-native stance scores fell below the computed mean score for this stance were selected as the Pro-Native Group (n = 24). These participants strongly subscribed to the stance of the text arguing for the superiority of native speakers as L2 teachers. Participants whose pro-non-native stance scores fell above the computed mean score for this stance and whose pro-native stance scores fell below the computed mean score for this stance formed the Pro-Non-Native Group (n = 34). These participants strongly agreed with the stance of the text arguing for the superiority of non-native speakers as L2 teachers. Finally, a third group of participants, whose scores for the two stances in the measure were either identical or varied by maximally 0.2 points, were categorized as the Neutral Group (n = 24). The participants in this group displayed no bias towards either of the above-mentioned stances. We should point out that adopting theoretical midpoint of the belief scale as a sample-independent cut-off criterion for the grouping resulted in the same groupings.

Twenty-three participants also did not meet the criteria for inclusion in any of the groups. These participants' scores for the two sets of beliefs fell either above or below both or one of the general sample's means. In addition, fourteen participants were excluded because they either failed to appear for the experiment or had provided incomplete information on the prior beliefs measure. The data from the remaining 82 participants were included in the analyses.

Materials and Measures

Text Material

Two texts debating the advantages and disadvantages associated with native-speaker and non-native-speaker L2 teachers were used as experimental texts. This topic was selected because it is one of the controversies in language education. Applied linguistics students, and by extension, the majority of those involved in language education strongly subscribe to one argumentative position and disagree with the opposing argumentative position, and a number of people equally subscribe to either argumentative position. Based on preferences for one side of this controversy, we constructed a text, which was clearly consistent with the beliefs of those who agree with the superiority of native speakers as L2 teachers and another text, which was clearly consistent with the view of those who strongly endorse the position that non-native speakers make better L2 teachers. The texts were constructed based on excerpts from textbooks, academic journal articles, and materials accessible on the Internet.

The texts were similar in the rhetorical structure. Both started with a brief introduction to the basic claim of the text followed by five key arguments that were presented under separate headings, consisting of a minor claim followed by a series of supporting statements. The five minor claims presented cumulative evidence for the major claim. A brief sentential conclusion was presented at the end of the text, which functioned as a reference to the basic claim of the text presented in the introductory paragraph(s) and as a clincher to the text.

The average length of the two texts was 803 words. Additionally, the average readability of both texts was 40.45 (determined with the Flesch Reading Ease formula; Flesch, 1948), which indicates that the texts were moderately difficult. To further ensure the comparability of the texts, they were pilot-tested with an independent sample of students (n = 30) with the same composition as the target sample. They rated both texts in terms of understandability, perceived plausibility, interestingness, the number of arguments presented in each, and clarity of stance (Table 1). Additionally, multiple t tests were run to detect likely differences across the texts. The results, even after adjusting for multiplicity of testing using

the Holm-Bonferroni method (Holm, 1979), revealed no significant differences between the two texts on the text characteristics.

Comprehension Measure

Participants' comprehension of the texts was measured using a modified version of Schmalhofer and Glavanov's (1986) recognition task. The measure included 24 statements for each text, including eight paraphrase items, eight inference items, and eight distractor items. Participants were instructed to judge whether the information in the test items represented information provided by the text. To construct a paraphrase, the key lexical items in a sentence were replaced with synonyms and the syntactic arrangement of the words in the sentence was altered. As a consequence, each paraphrase bore a semantic resemblance to a specific statement in the text, but the syntactic and lexical similarity was reduced. In contrast, an inference item contained information that was not directly stated in the text but had to be inferred from the content of the text to build an adequate mental representation of the situation described in the text. Finally, distractor items were neither explicitly stated in the text nor could be sensibly inferred from the content of the text. However, they had some informational overlap with the text (see Appendix for sample items).

The rationale for using a recognition task in this study, and by extension in all text-belief consistency effect studies, lies in the fact that it provides the opportunity to assess the strength of both text-base representation and situation model within a single task, despite the different mechanisms underlying these two constructs (Maier & Richter, 2013). Text-base representation is based on participants' responses to paraphrase items for which they simply assess the correspondence between the content of the test item to a specific statement in the text. However, situation-model strength follows a different mechanism based on assessing the correspondence between the information presented in the test item and information in the situation-based representation constructed from the text (Maier & Richter, 2013).

Participants' text-base strength was based on the proportion of correct responses to paraphrase items (hits) to the incorrect responses to distractor items (false alarms). To normalize the distributions of these proportions and avoid negative response values, they were probit-transformed (Cohen, Cohen, West, & Aiken, 2003). The probit-transformed proportions of incorrect responses to distractor items were then subtracted from the probit-transformed proportions of correct responses to paraphrase items. Likewise, participants' situation-model strength was based on the proportion of *yes* responses to inference items (hits) to incorrect responses to distractor items (false alarms). As in the case of the measure for text-base strength, these proportions were also probit-transformed. The probit-transformed proportions of incorrect responses to distractor items were then subtracted from those of the responses to inference items.

Prior Knowledge Measure

Prior knowledge of the participants was measured using 10 multiple-choice questions followed by four response options (one correct response, two distractor options, and one option marking the participants' lack of knowledge of the correct response). Three items referred to the technical terms and concepts directly associated with the topic of the texts (e.g., native speaker fallacy, native speakerism). Other items assessed participants' awareness of the various discourses, paradigms, and notions assumed to underlie or indirectly feed the native-speaker/non-native-speaker dichotomy (e.g., EIL paradigm, linguistic imperialism, the ideological loads of certain terminologies). To compute the score on the measure, one point was awarded to each correct response, and no point was awarded for the distractor option or the option indicating lack of knowledge, resulting in total scores ranging from 0-10. The internal consistency of the measure was barely acceptable (Cronbach's $\alpha = .65$).

Procedure

To prevent carry-over effects from the prior knowledge and prior beliefs measures, they were administered five weeks prior to the experiment proper. Administering these two measures took about 20 min. After excluding participants who did not meet the inclusion criteria, the remaining participants took part in the experiment proper. Participants were given the two texts on in a paper-and-pencil test format. The participants were required to read each text and answer the comprehension measure presented to them after reading. The participants were not allowed to refer back to the texts while responding to the comprehension measure. For each text, two versions of test items (versions A and B – varied with regard to question order) were constructed to control for possible effects of question order. Half of the participants in each group responded to version A of the test items and the other half responded to version B of the test items. Additionally, the presentation order of the texts varied across the participants. Half the participants read the pro-native text first and then the pro-non-native text, and the other half read the two texts in the opposite order. The time allocated to reading the two texts and responding to the comprehension measure was 50 min.

Design

The design of the study was a 2 (text stance: pro-native vs. pro-non-native; varied within-subjects) ×3 (participant stance: pro-native vs. pro-non-native vs. neutral; varied between-subjects) ×2 (level of comprehension: situation-model vs. text-base, varied within subjects) mixed design. Prior critical knowledge (z-standardized) was also treated as a covariate. The four combinations of text orders and question orders were completely counterbalanced across participants.

Availability of Materials and Data

The materials (texts and test items), the data, and the analysis scripts of the present study are available in the repository of the Open Science Framework (OSF, https://osf.io/2s8d9/?view_only=04ececcb2b194fe9a274baeb32eb7f2f).

Results

Manipulation Check for Participants' Text-Belief Consistency

The prior beliefs measure assessed pro-native and pro-non-native stances. The internal consistency for both sections of the measure were found to be acceptable (items measuring pro-native stance: Cronbach's α = .75; items measuring pro-non-native stance: Cronbach's α = .70). Text-belief consistency was defined with reference to participants' agreements to these two stances. The mean agreement to the pro-native stance for the Pro-Native Group (M = 3.68, SD = 0.35) was significantly stronger than their mean agreement to the pro-non-native stance (M = 2.37, SD = 0.28), $t(23) = 13.37$, $p < .001$, Cohen's d = 4.13. The two sets of belief scores for this group also differed significantly from the theoretical midpoint (3.00) of the response scale (pro-native stance: ($t(23) = 9.36$, $p < .001$, d = 1.91; pro-non-native stance: $t(23) = -11.05$, $p < .001$, d = 2.28). Similarly, the mean agreement to the pro-native stance for participants in the Pro-Non-Native Group (M = 2.26, SD = 0.43) was significantly weaker than their agreement to the pro-non-native stance (M = 3.69, SD = 0.37), $t(32) = -13.46$, $p < .001$, d = 3.60. The two sets of belief scores for this group were also found to be significantly different from the theoretical midpoint (3.00) of the response scale (pro-native stance: ($t(32) = -9.96$, $p < .001$, d = 1.74; pro-non-native stance: $t(32) = 10.87$, $p < .001$, d = 1.88). For the Neutral Group, the mean agreement to the pro-native stance (M = 3.02, SD = .51) was not significantly different from their agreement to the pro-non-native stance (M = 3.04, SD = .50), $t(23) = -.82$, $p = .41$.

Investigation of Hypotheses and Research Question

The present study examined text-belief consistency effects in participants' comprehension of controversial L2 documents. Descriptive statistics and intercorrelations of the variables in the study are reported in Table 2. Additionally, the mean proportions of the three item types on the comprehension measure—per experimental condition and overall—

used to compute the comprehension scores are reported in Table 3. All hypothesis tests were based on a Type 1 error alpha probability of .05 (two-tailed). To compute the power for the sample size and the design, a medium effect size (f = .25) and medium correlations (ρ = .5) between the levels of the independent variables were assumed. The power (1−β) was found to be .99 (computed with G∗Power 3.1.9.4 software; Faul, Erdfelder, Lang, & Buchner, 2007). Text presentation order, question order and sub-groupings per experimental condition did not exert significant effects on the participants' comprehension performance at the situation-model and text-base levels. Accordingly, these results are not reported here and these variables were not included in the main analyses. Furthermore, no significant differences were found among the three groups of participants in prior knowledge (pro-native group: M = 4.29, SD = 1.33; neutral group: M = 4.17, SD = 2.28; pro-non-native group: M = 4.53, SD = 2.22), $F(2, 79) = .24$, $p = .785$.

Hypothesis 1 predicted that the participants' situation model for the text communicating belief-consistent information would be stronger compared with that for the text communicating belief-inconsistent information. In a General Linear Model analysis, a three-way interaction of text stance, participant stance, and level of comprehension emerged, $F(2, 76) = 12.73$, $p < .001$, $\eta_p^2 = 0.25$. In line with Hypothesis 1, the follow-up analyses revealed an interaction of text stance and participant stance at the situation-model level, $F(2, 76) = 23.43$, $p < .001$, $\eta_p^2 = 0.38$ (Figure 1a). As predicted, the participants' situation-model representations were stronger for the text communicating information consistent with their stance compared to the text communicating information inconsistent with their stance. For the Pro-Native group, the situation model for the pro-native text was stronger (M = 2.36, SE = 0.11) than the model for the pro-non-native text (M = 1.71, SE = 0.09), $t(23) = 4.89$, $p < .001$, Cohen's d = 1.21. In contrast, for the Pro-Non-Native group, the situation model for the pro-non-native text was stronger (M = 2.36, SE = 0.07) than the model for the pro-native text (M

= 1.82, *SE* = 0.09), *t*(33) = -4.09, *p* < .001, *d* = 0.98. Finally, in the Neutral group, no significant difference was found in the strength of the situation model for the pro-native text (*M* = 2.09, *SE* = 0.11) and the model for the pro-non-native text *(M* = 2.08, *SE* = 0.09), *t*(33) = 0.05, *p* = .960. Thus, a clear, strong and symmetric text-belief consistency effect was found in participants' situation models for the two texts.

In the analysis on the text-base level, the interaction of text stance and participant stance was not significant, *F*(2, 76) = .52, *p* = .594 (Figure 1b). No other effects involving participant stance or text stance were significant (for all effects, *p* > .110). Thus, as an answer to our exploratory question, no evidence was found for a text-belief consistency effect on the level of the text-base representation.

Hypothesis 2 predicted that situation-model strength would be positively affected by participants' prior knowledge of the topic. In line with this hypothesis, prior knowledge exerted a strong positive main effect on the strength of the situation-model representation of the participants, *F*(1, 76) = 44.58, *p* < .05, η_p^2 = 0.37. The correlation of prior knowledge and situational model strength was .43 across all conditions. Additionally, as another exploratory question, we examined whether prior knowledge would moderate the text-belief consistency effect at the level of situation-model representation. No evidence was found for a moderating role of prior knowledge for the text-belief consistency effect at the situation-model level, *F*(2, 76) = 0.19, *p* = .825.

Discussion

The present study extends prior research on text-belief consistency in two ways. First, the text-belief consistency effect was investigated in an under-represented population—readers reading texts in their L2 English—within the tradition of research on multiple-documents comprehension in general and more specifically on text-belief consistency effects. Given the differences in the efficiency with which L2 readers, compared with L1 readers,

engage in strategic text processing and the indispensable role of such processing in resolving belief-information inconsistencies, the present study was conducted with L2 readers. The study also provides a major theoretical contribution to text-belief consistency research because a symmetrical text-belief consistency effect with a balanced design was established for the first time.

The study specifically examined how the situation-model strength and text-base strength might vary across participants with differing stances on a controversial applied linguistics issue—native vs. non-native speakers as L2 teachers. Additionally, the study examined the extent that prior knowledge affects the strength of the situation-model representations. Furthermore, as an exploratory question, we investigated whether prior knowledge would moderate the text-belief consistency effect. The results revealed that participants' situation model of the controversy presented in the texts was biased towards the text that communicated belief-consistent information. However, this text-belief consistency effect was not found for the propositional text-base representation. Prior knowledge was also found to exert a strong effect on comprehension at the situation-model level but was not found to moderate the text-belief consistency effect.

The reported bias towards information conforming to a reader's stance is in line with the established assumption in comprehension research that readers generally opt for a message representation which best suits their purpose and is often attained with minimal cognitive effort (Ferreira, Bailey, & Ferraro, 2002). Readers' prior beliefs tend to act as schematic knowledge structures, which bias selection, interpretation, and integration of textual information into their mental representation (Maier & Richter, 2013). Readers opt for belief-consistent information during comprehension in an attempt to minimize the strain on their cognitive resources. They accomplish this goal by allocating less attention to the information that they find less plausible—information that conforms less to their prior beliefs

(Richter & Maier, 2018). In essence, they tend to expend less-than-required cognitive resources to integrate belief-inconsistent information into their situation models of controversies. This biased representation of belief-congruent information could fuel a general implicit process known as confirmation bias, defined as "unwitting selectivity in the acquisition and use of evidence" (Nickerson, 1998, p. 175). Beliefs seem to lead to an overrepresentation of belief-consistent information and an underrepresentation of belief-inconsistent information in readers' mental representation of the controversy—as shown in the situation models of the two groups equipped with pro and contra stances on the issue. In contrast, the neutral participants display a more balanced representation of both belief-consistent and belief-inconsistent information in their situation models.

The results, however, did not reveal a belief bias in the text-base representation. The reverse coherence effect assumed by McNamara, et al. (1996) holds that if the comprehension proceeds satisfactorily at the level of text-base representation, it complicates the self-monitoring mechanisms during comprehension. Consequently, the reader automatically registers good-enough progress and fails to strive for constructing a better situation model. In contrast, low-coherence texts more or less force readers to engage in constructive processes that lead to a sophisticated situation model of the text, provided that sufficient prior knowledge is available to engage in such processes (McNamara, et al., 1996). In this light, opposite effects on text-base and situation-model representations can occur in specific situations in which "the impact of knowledge-based processes … strengthens the situation model but, at the same time, weakens the propositional text base" (Maier & Richter, 2013, p. 153). Additionally, belief-incongruent information is thought to have a greater likelihood of receiving a tagged status in the text-base representation (Graesser, 1981). The present study did not provide evidence for these assumptions because no significant difference was found in the readers' text-base representations as a function of their stance.

The findings suggest that it would be less likely to construct a satisfactory situation model based on a poorly developed text-base model. In principle, comprehension could be regarded as "primarily a bottom-up process" (Surber & Schroeder, 2007, p. 486) in which the text-base model provides a basis for a representation at the situation model level.

The results also revealed a strong main effect of prior knowledge on participants' comprehension at the situation-model level. This finding is in line with previous research establishing that prior knowledge affects comprehension of multiple documents (e.g., Bråten, Anmarkrud, Brandmo & Strømsø, 2014; Strømsø, Bråten, & Britt, 2010). Relevant models of single and multiple-text comprehension highlight the pivotal role of prior knowledge. For example, in their MD-TRACE model, Rouet and Britt (2011) underscored prior knowledge among the permanent cognitive resources brought to bear on multiple-text comprehension. In her Model of Domain Learning, Alexander (2005) also proposed that domain knowledge is central to lifelong reading development. Prior knowledge affects situation-model representation by helping "readers focus their effort on 'gap-filling' inferential processing that creates interconnection and coherence in complex, divergent text materials" (Bråten, et al., 2014, p. 11). Similarly, Kintsch's (1998) construction-integration model assumes that the situation model constantly develops while processing a text. In this process, the new information from the text gets integrated into the reader's current situation model, the already read information from the text, and readers' prior knowledge, creating a connection between new information and prior knowledge and eventually forming a systematic episodic memory representation of textual information (Abendroth & Richter, 2020a).

No evidence was found for a moderating effect of prior knowledge on text-belief consistency. Based on the predictions of the Two-Step Model of Validation, prior knowledge should guard against text-belief consistency because it promotes elaborative processing of belief-inconsistent information (Richter & Maier, 2017). One explanation for this finding

might relate to the measure used for assessing prior knowledge, which consisted of multiple-choice items. Although the participants had the liberty to indicate lack of knowledge, guessing might have played a role in the participants' responses, causing some error variance in the assessment of participants' prior knowledge. The barely acceptable internal consistency of the measure also implies that participants might have had some basic knowledge of specific aspects of the topic while being unaware of other aspects. Moreover, the generally low level of participants' prior knowledge, and hence the low variance in this variable, might have prevented finding a moderating effect of prior knowledge for text-belief consistency. Finally and most importantly, the Two-Step Model posits that the availability of prior knowledge benefits elaborative processing of belief-consistent information, but it is not a sufficient condition for the effect to occur. High prior knowledge paired, for example, with a receptive reading goal (e.g., a goal that is directed at memorizing information), would usually not lead to elaborative processing.

Limitations

The present study, like any other study, has shortcomings and the results should be interpreted in light of these shortcomings. First, the study was conducted with only two experimental texts on one specific controversy. A higher number of texts about the topic and using different topics could have added to the informativeness and generalizability of the findings. Second, the recognition task focused on individual texts only. Although this focus suited the particular research questions and was in line with previous research on text-belief consistency effects, widening the focus and combining the study of text-belief consistency effects with an investigation of information integration across texts, which is one of the major topics in other areas of multiple-document research, could reveal promising results. Finally, to capture the participants' prior knowledge, a multiple-choice measure was employed, whereas an open-ended measure might have provided a more accurate measure of

participants' prior knowledge. Future research should consider removing these limitations when designing similar experiments.

Conclusions

The results of the present study suggest that readers, using beliefs to serve as epistemic gatekeepers (Richter & Maier, 2018), tend to construct biased representations of topics, situations, or events by filtering the incoming information in accordance with their beliefs. This tendency seems to be even more pronounced with L2 readers as evidenced by the large text-belief consistency effect found in this study. Relying heavily on beliefs, readers engage in routine, non-strategic validation of information without judging the evidentiary value of alternative perspectives, largely endorsing the perspective compatible with their own stance and ignoring the perspective(s) that seem(s) to discredit their initial beliefs. Failure to appreciate information independently of beliefs can interfere with sound reasoning (McCrudden & Barnes, 2016) and often leads to a distorted partisan representation of an issue or situation described within a document or across a number of documents. Given that situation models "serve the extra-linguistic purpose to enable comprehenders to interact with the world" (Schroeder, Richter, & Hoever, 2008, p. 237), it follows that constructing bias-proof, balanced, referential representations of issues and events would be extremely important. For this purpose, instructional programs are advised to raise text-belief consistency awareness in readers and caution against its effects on the construction of situation models (see also Richter et al., 2020).

Funding:

The research reported in this study was funded by the Alexander von Humboldt Foundation, Germany.

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Table 1

Characteristics of the Experimental Texts

Text	*Argumentative Stance*	*Length*[a]	*Readability*[a]	*Plausibility*[c] *M(SEM)*	*Understandability*[c] *M(SEM)*	*Number of Arguments*[c] *M(SEM)*	*Clarity of Stance*[c] *M(SEM)*	*Interestingness*[c] *M(SEM)*
Text 1	Pro-Native	797	40.40	4.53 (.17)	5.49 (.10)	4.95 (.10)	5.67 (.11)	4.30 (.23)
Text 2	Pro-Non-Native	809	40.50	4.79 (.13)	5.43 (.09)	4.78 (.11)	5.47 (.12)	4.57 (.26)

Note. [a]Number of words in the text. [b]Determined with the Flesch Reading Ease Formula. [c]Pilot-test results from ratings by an independent sample of 30 participants. The plausibility scale consisted of six items (Cronbach's α = .82/.81); the understandability scale consisted of nine items (Cronbach's α = .87/.80); number of arguments, clarity of stance, and interestingness each assessed through a single item. All response categories ranged from 1 to 6, except for the number of arguments which was assessed through an open-ended question.

Table 2

Descriptive Statistics and Intercorrelations of Participant Stance and Dependent Variables

Variable	*M*	*SD*	1	2	3	4	5	6	7
1 Participant Stance (Contrast-Coded, 2 = Pro-Native; -1 = Neutral; -1 = Pro-Non-Native)	-0.12	1.37	1						
2 Participant Stance (Contrast-Coded, 0 = Pro-Native; 1 = Neutral; -1 = Pro-Non-Native)	-0.12	0.83	.09	1					
3 Situation-model Strength (Pro-Native Text)	2.05	0.62	.30**	.17	1				
4 Situation-model Strength (Pro-Non-Native Text)	2.08	0.55	-.45**	-.28*	.05	1			
5 Text-base Strength (Pro-Native Text)	2.05	0.63	-.11	.02	.51**	.35**	1		
6 Text-base Strength (Pro-Non-Native Text)	2.17	0.61	-.14	-.10	.24*	.38**	.47**	1	
7 Prior Knowledge (*z*-Standardized)[a]	4.35	2.00	-.02	-.07	.48**	.42**	.33**	.37**	1

Note. $N = 82$. Situation-model strength: Probit-transformed proportion of yes-responses to inference items; Text-base strength: Probit-transformed proportions of yes responses to paraphrase items. [a] *M* and *SD* for prior knowledge are based on raw scores. Participant stance (a nominal variable with three levels) was contrast-coded twice.

*$p < .05$ (two-tailed), **$p < .01$ (two-tailed)

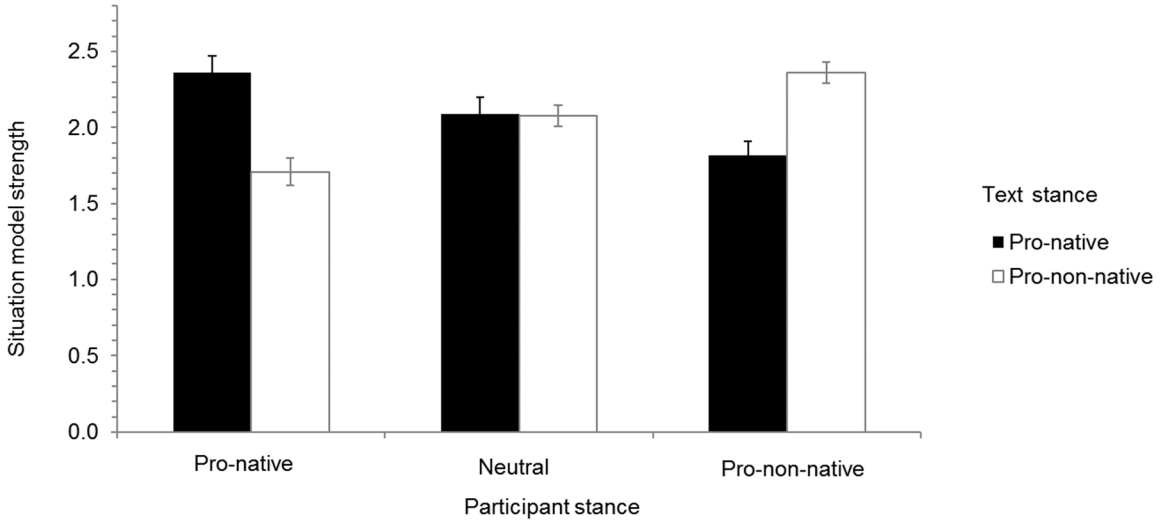
Table 3

Mean Proportions (with Standard Errors) of Yes Responses in the Comprehension Measure for Inference, Paraphrase, and Distractor Items

Measure	Inference Items	Paraphrase Items	Distractor Items
Pro-Native Text			
Pro-Native Group[a]	.89 (.02)	.78 (.02)	.14 (.02)
Neutral Group[a]	.78 (.02)	.80 (.02)	.11 (.02)
Pro-Non-Native Group[b]	.71 (.02)	77 (.02)	.10 (.02)
Total	.78 (.01)	.78 (.01)	.11 (.01)
Pro-Non-Native Text			
Pro-Native Group[a]	.72 (.03)	.82 (.02)	.15 (.02)
Neutral Group[a]	.79 (.02)	.82 (.02)	.11 (.02)
Pro-Non-Native Group[b]	.81 (.02)	.78 (.02)	.05 (.01)
Total	.78 (.01)	.80 (.01)	.10 (.01)

Note. [a] $n = 24$, [b] $n = 34$

a)



b)

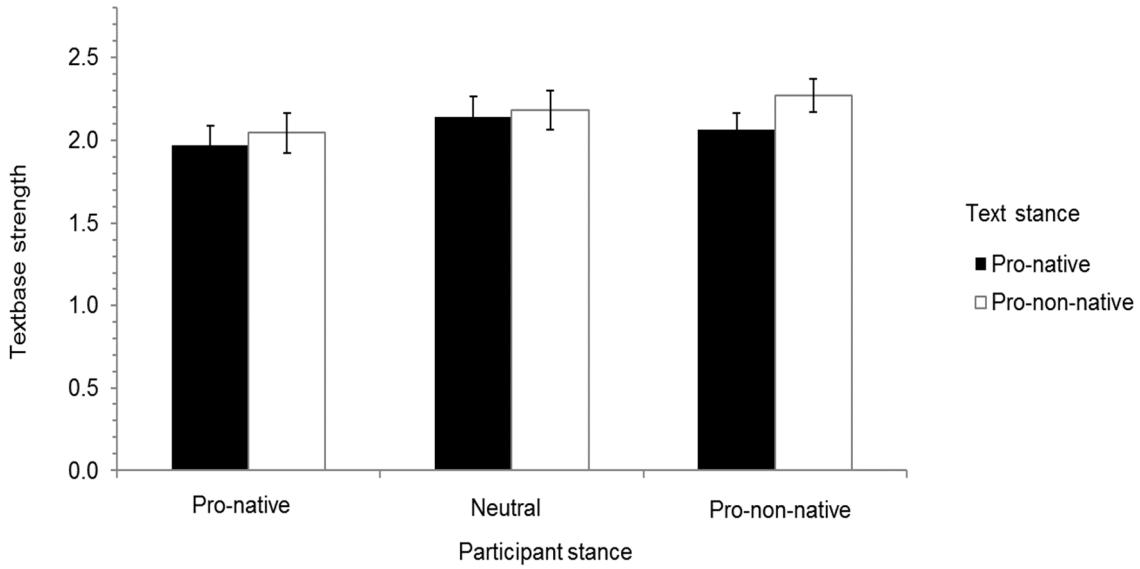


Figure 1. Situation-model strength (a) and text-base strength (b) by participant stance and text stance. Error bars represent +/– 1 SE_M.

APPENDIX

Sample Test Items:

Original: Non-natives might also lack communicative competence as they often use English only in classroom contexts.

Paraphrase: Because non-native teachers use language only in classroom contexts, they lack communicative competence.

Inference: Comparatively speaking, the marked linguistic weaknesses associated with non-native speakers points to the superiority of native speakers as L2 teachers.

Distractor: Becoming an L2 teacher requires a commitment to the self and the community.