



Eyes on the Source! - The Role of Differences in Source Trustworthiness on Lay Persons' Attention to Source Information during the Resolution of Scientific Conflicts

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Attention to Source Information during the Resolution of Scientific Conflicts

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Author Note

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Abstract

This eye-tracking study examined how differences in sources' trustworthiness affect readers' attentional processing when confronted with a scientific conflict. 144 participants were presented with two conflicting scientific claims from two sources. Results show that differences in trustworthiness between the two sources led to increased attention to source information compared to when both sources were of high trustworthiness or of low trustworthiness, which we interpret as an indication for conflict resolution via sourcing.

Keywords: multiple document comprehension, Source information, scientific conflict, eye-tracking

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Attention to Source Information during the Resolution of Scientific Conflicts

Laypersons are frequently confronted with conflicting claims on scientific topics, for instance, when informing themselves about health-related issues on the Internet. However, because of their lack of domain knowledge it can be difficult for laypersons to resolve such conflicts by directly assessing the validity of competing claims (Bromme & Goldman, 2014). According to the Content-Source-Integration (CSI) model by Stadtler and Bromme (2014) an alternative way to resolve such conflicts is to indirectly evaluate the veracity of the claims via the credibility (i.e. via trustworthiness or expertise) of the respective sources (second-hand evaluation). Following this argumentation, it is reasonable to expect deeper processing of source information in the case that the sources which provide conflicting claims differ in their trustworthiness (or expertise) and thus source information can be used for conflict resolution. In line with these assumptions, previous research found that differences in the trustworthiness of two conflicting sources (i.e., one source was neutral, and thus of high trustworthiness and the other potentially biased and thus of low trustworthiness) led to stronger subjective explanation of the conflict via sources' motivations (Thomm & Bromme, 2016), more pronounced differences in agreement with claims as well as longer fixation times on source information (Gottschling et al., 2019) than when sources did not differ in their trustworthiness (i.e., both sources were of high trustworthiness). However, in these studies the presence of differences between sources was confounded with the general presence of an untrustworthy source, which might have resulted in increased processing, due to higher vigilance as a reaction to an untrustworthy source. Thus, the present preregistered study aims to expand the previous findings by investigating whether the observed effects are based specifically on differences in sources' trustworthiness or whether they are rather due to the

presence of a source of questionable trustworthiness. To this end, we extended the experimental design by also including a condition with two untrustworthy sources. This also allowed to better differentiate between processes of conflict explanation and conflict resolution, because in the condition with two untrustworthy sources, source information cannot be used to resolve the conflict, while it might be used to explain it. Furthermore, we assessed readers' behavioral intentions formed based on the conflicting claims in order to get additional insight into the final resolution of the scientific conflict. With regard to the eye-tracking measures, as in Gottschling et al. (2019) we differentiated between first-pass fixation duration and second-pass fixation duration on source information, since the strategic processes connected to conflict resolution should only affect second-pass fixation duration (cf. Hyönä et al., 2003).

Method

Participants

The sample for this eye-tracking experiment consisted of 144 university students with a mean age of 24.18 years ($SD = 4.77$) and encompassed 110 female participants. Participants reported medium interest ($M = 2.91$, $SD = 1.02$) and low prior knowledge ($M = 1.53$, $SD = 0.78$) on the topic of nanotechnology measured by two self-reported items with 5-point Likert scales from 1 (“very low”) to 5 (“very high”).

Materials

The scientific conflict presented to the participants was taken from the field of nanotechnology and consisted of two conflicting claims. One claim (Claim A) stated that titanium dioxide nanoparticles in sunscreen can penetrate the human skin and therefore may cause health risks while zinc oxide nanoparticles are a safe alternative. For the other (Claim B) the two types of

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nanoparticles were switched to provide claims with comparable argumentation and persuasiveness. Both claims were of similar length, structure and reading difficulty.

The source information regarding the claims was manipulated depending on the experimental condition the participants were randomly assigned to. In one condition one claim was said to stem from a professor of nanoscience working at a university while the other claim was said to stem from a professor of nanosafety working for a company (trustworthiness-differences condition). In the other two conditions both sources were names as either professors of nanoscience working at a university (no-differences-high condition) or professors of nanosafety working for a company (no-differences-low condition). The combination of sources and claims, as well as the order of presentation for the claims were counterbalanced.

Procedure

Following a short introduction to the topic, participants could navigate between the two claims, each being presented on a separate html page. During reading participants' eye movements were recorded with an SMI RED250mobile eye-tracking system. After having read the two claims, to examine conflict explanation, participants were asked to rate their agreement with different explanations for the conflict (e.g., differences in the scientists' motivations), based on the Explaining Conflicting Scientific Claims (ECSC) questionnaire (Thomm et al., 2015). Additionally, participants were asked to rate their agreement with each of the two claims and their willingness to use products containing the corresponding nano particles (behavioral intention) as additional indicators for conflict resolution.

Results

The data were analyzed using one-factorial ANOVAs with planned contrasts in R. The eye-tracking data showed longer second-pass fixation times on source information when differences in sources' trustworthiness were present rather than absent, $t(141) = 2.84, p = .005$, without significant differences between the two high or two low trustworthy sources, $t(141) = -0.83, p = .411$. No effects were found for first-pass fixation duration. In addition, for claim agreement, $t(141) = 3.49, p < .001$, as well as willingness to use products with respective nanoparticles, $t(141) = 2.28, p = .024$, participants showed higher differences in their ratings between claims when differences in sources' trustworthiness were present rather than absent. There were no significant differences between the conditions without differences in sources' trustworthiness for these two variables. Finally, with differences in source information present, the conflict was attributed stronger to differences in the scientists' motivations as a subjective explanation of the conflict than when the sources did not differ in terms of trustworthiness, $t(141) = 2.75, p = .007$. However, this effect was only significant when comparing the "trustworthiness-differences" condition and the condition with the two trustworthy sources, but not the condition with the two low trustworthy sources. In contrast, the latter two conditions differed significantly, with higher attribution to differences in scientists' motivations in the condition with two untrustworthy sources than in the condition with two trustworthy sources, $t(141) = -3.66, p < .001$.

Discussion

In conclusion, the findings of this study provide further insights in laypersons' use of source information during the resolution of conflicting scientific claims. When source information

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indicates differences in the trustworthiness of the sources, and thus can be used to resolve the conflict, readers allocate increased visual attention to the source information during second-pass reading. This indicates additional strategic processing of source information when it can be used to resolve the conflict and is therefore in line with the CSI-model (Stadtler & Bromme, 2014). Moreover, it could be shown that the mere presence of untrustworthy sources without differences in sources' trustworthiness does not lead to increased visual attention on source information, while it still affects subjective conflict explanation of the readers. This indicates that the increased allocation of visual attention is linked to conflict resolution but not necessarily to conflict explanation. This assumption is also supported by the effect patterns for claim agreement and willingness to use. For these variables, which are linked to conflict resolution, the effects are similar to those of the second-pass fixation duration, with increased differences between the ratings for the two claims when differences in trustworthiness of the sources were present compared to absent and no significant differences between the groups with both sources being of high or both sources being of low trustworthiness. Taken together the results of this study indicate how different aspects of source information affect the way they can be used by lay persons during the explanation and resolution of scientific conflicts. While relevant source information (like low trustworthiness of both sources) can already help to inform subjective explanations for the conflict, more strategic processing and conflict resolution may in fact rely on differences in this relevant source information between the sources.

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