

# The Influence of Trust Cues on the Trustworthiness of Online Reviews for Recommendations

Catalin-Mihai Barbu  
University of Duisburg-Essen  
Duisburg, Germany  
catalin.barbu@uni-due.de

Guillermo Carbonell  
University of Duisburg-Essen  
Duisburg, Germany  
guillermo.carbonell@uni-due.de

Jürgen Ziegler  
University of Duisburg-Essen  
Duisburg, Germany  
juergen.ziegler@uni-due.de

## ABSTRACT

In recent years, recommender systems have started to exploit user-generated content, in particular online reviews, as an additional means of personalizing and explaining their predictions. However, reviews that are poorly written or perceived as fake may have a detrimental effect on the users' trust in the recommendations. Embedding so-called "trust cues" in the user interface is a technique that can help users judge the trustworthiness of presented information. We report preliminary results from an online user study that investigated the impact of trust cues—in the form of helpfulness votes—on the trustworthiness of online reviews for recommendations.

## CCS CONCEPTS

• **Information systems** → **Recommender systems**; *Personalization*; • **Human-centered computing** → *User centered design*.

## KEYWORDS

Recommender systems, Trustworthiness, Trust cues, Online reviews, User study

## 1 INTRODUCTION AND MOTIVATION

User-generated content, such as online reviews, represents a rich source of contextual information. When presented in combination with factual data, e.g., product attributes and standardized ratings, it can provide supplementary background evidence to support users in their decision-making process. Moreover, some researchers have argued that, since user feedback is more difficult to manipulate, it may be perceived as more trustworthy compared to vendor-provided information [13]. For these reasons, reviews are used increasingly as a further means of explaining recommendations [4]. However, showing reviews may also have a detrimental outcome, for example, if users perceive them as untrustworthy [5]. In an effort to avoid negative effects, various recommender systems (RS) have started embedding *trust cues* in recommendations. Trust cues are interface elements, such as visual glyphs or textual information, that help users ascertain the reliability of presented material [10]. In particular, trust cues could help customers distinguish between legitimate and fake reviews.

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In this paper, we investigate whether providing simple trust cues for online reviews influences users' perceived trustworthiness of the recommendations. As an initial step, we considered two types of trust cues, namely: 1) *verified purchase*, i.e. a visual indication that a reviewer has bought the product she is reviewing; and 2) *helpfulness votes*, i.e. an integer value representing the number of people who found the review helpful. For our experiment, we eventually selected helpfulness votes (e.g., "Ten people found this review helpful.") as a trust cue, since it is encountered frequently on e-commerce sites [2]. At the same time, this allowed us to show two levels of the cue (i.e. low or high) while minimizing the difference in design between the respective study conditions.

## 2 RELATED WORK

Whether a user ultimately decides to follow a recommendation depends, in part, on the perceived trustworthiness of the system [8]. Consequently, users' trust in RS is an active area of research [6, 14]. Prior work has shown that providing explanations for recommendations is one aspect that may help foster trust in RS [11]. However, despite the fact that topics on recommendation explainability have been gaining momentum in recent years—for instance, both [12] and [9] provide good overviews—user studies that investigate the trustworthiness of online reviews are not very common in the literature [13]. Filieri [5] conducted qualitative interviews in order to identify review characteristics that customers consider trustworthy. Results showed that length and writing style, among others, have a positive influence on the perceived trustworthiness of a review.

The trust model developed by Corritore et al. [3] states that trust cues can originate either from the design of a system or from its content. Furthermore, the authors argue that increasing users' trust in automated systems, such as RS, is reliant on increasing their transparency. Reviews can improve the transparency of RS by indicating which factors led to a recommendation being shown to users [4]. More recently, trust cues have been proposed as an additional dimension for personalizing recommendations with the aim of increasing trust [1]. Their presence could help users determine more precisely how trustworthy an aspect of a recommendation, e.g., reviews, is. In this sense, trust cues may be regarded as an additional means of explaining recommendations.

## 3 MEASURING THE EFFECT OF TRUST CUES IN ONLINE REVIEWS

We conducted an exploratory online study in which we asked participants to evaluate reviews about several recommended products on a mockup e-commerce platform. Our hypothesis was that reviews associated with a high number of helpfulness votes (i.e. "high trust cue" condition) increase the perceived trustworthiness of a

S. Richter – 21 days ago  
 It boots quickly and is ready-to-use for the most applications.  
 22 people found this information helpful.

(a)

B. Schäfer – 20 days ago  
 It takes only 10 SECONDS to boot, really unbelievable!! :o  
 21 people found this information helpful.

(b)

**Figure 1: Example reviews with a high trust cue, concerning the boot time of a laptop. Left: The review is written in a factual and neutral style. Right: The review is written in an emotional style.**

recommendation. In contrast, reviews that have fewer helpfulness votes (i.e. “low trust cue” condition) lead to a decrease in the users’ perceived trustworthiness.

### 3.1 Study Design

As per our study scenario, we asked users to imagine that they are looking to purchase a new laptop after their old one broke. They were further instructed to presume that all the laptops they were about to see fulfilled their technical requirements and were within their budget. Afterwards, participants were shown 5 laptop recommendations, each complemented by 4 reviews. In other words, each user had to read 20 appraisals in total. Out of these, half were written in an emotional style (i.e. gushy language characterized by subjective opinions, the presence of superlatives, words spelled in all caps, excessive punctuation, and emoticons), whereas the other half used factual (i.e. objective) language. Each recommended laptop had two emotional and factual reviews. To distinguish between conditions (i.e. the combination of writing style and trust cue level), participants were randomly and evenly assigned to one of two survey versions upon clicking a link. Thus, half of the participants saw, e.g., a factual review with a high cue, whereas the other half saw the same factual review with a low cue.

The reviews used for the study were based on real user feedback mined from e-commerce sites. The writing style was assessed in a pre-study, thus ensuring that the two review categories differed significantly (i.e. one category was considered more emotional and subjective compared to the other). Furthermore, we excluded from the main study five emotional comments with the lowest perceived emotionality as well as five factual reviews with the highest perceived emotionality. Below each review we embedded a trust cue representing the number of readers who had found that review useful (see Figure 1 for an example). The value displayed was either high (21–25 votes) or low (1–5 votes). Participants were then prompted to rate, on a 6-point Likert scale: 1) how trustworthy they considered the review; 2) whether they believed the review was fake; and 3) how likely they were to follow the recommendation based on the information contained in the review.

After completing the main task, participants were asked to fill out two questionnaires on online trust. For this, we adapted two subscales of the *Trust Questionnaire* introduced by McKnight et al. [8], namely those concerning *institution-based trust* and *trusting beliefs*, respectively. The former subscale measures users’ overall trust in the Internet and consists of 15 items (e.g., “I am comfortable making purchases on the Internet”). The latter represents users’ trust in the RS and comprises 11 items (e.g., “I believe that the

Online Shop would act in my best interest”). We adapted the trusting beliefs subscale to our research topic by replacing the name “LegalAdvice.com”—originally used by McKnight et al. [8]—with the more generic “Online Shop”.

### 3.2 Study Results

The study was published online in April 2018 and ran for two weeks. Participants were recruited through various social networks (e.g., Facebook), research platforms (e.g., SurveyCircle), and via word-of-mouth. A total of 124 participants (28.2% female; mean age of 33.87 years,  $SD=13.03$ ) completed the study in its entirety. Out of all respondents, 53 (42.7%) were employed and 37 (29.8%) were students. In terms of their educational background, 54 (43.5%) had completed at least a form of higher education. As monetary incentive, subjects who reached the end of the study were offered a chance to participate in a raffle, in which they could win gift vouchers redeemable in many popular shops.

A repeated-measures ANOVA test with three measures (perceived trust, perceived fakeness, and purchase intention; see Tab. 1) and two levels (high and low trust cues, respectively) was performed. After applying Greenhouse-Geisser corrections, we found no significant differences for the comparison between perceived trust  $F(1, 123) = .139, p = .710$ , perceived fakeness  $F(1, 123) = .017, p = .898$ , or purchase intention  $F(1, 123) = .121, p = .728$  in the two conditions.

**Table 1: Descriptive statistics**

|                    | Min  | Max  | M    | SD   |
|--------------------|------|------|------|------|
| Emotional reviews  |      |      |      |      |
| Trust              | 1.10 | 6.00 | 2.96 | 0.95 |
| Fakeness           | 1.00 | 5.80 | 3.43 | 1.04 |
| Purchase intention | 1.00 | 5.20 | 2.34 | 0.92 |
| Factual reviews    |      |      |      |      |
| Trust              | 2.00 | 6.00 | 4.23 | 0.88 |
| Fakeness           | 1.00 | 4.40 | 2.30 | 0.77 |
| Purchase intention | 1.00 | 6.00 | 3.19 | 1.00 |
| High trust cues    |      |      |      |      |
| Trust              | 1.40 | 6.00 | 3.60 | 0.78 |
| Fakeness           | 1.00 | 5.10 | 2.86 | 0.75 |
| Purchase intention | 1.00 | 4.60 | 2.75 | 0.90 |
| Low trust cues     |      |      |      |      |
| Trust              | 1.50 | 6.00 | 3.58 | 0.84 |
| Fakeness           | 1.00 | 4.70 | 2.87 | 0.81 |
| Purchase intention | 1.00 | 5.50 | 2.77 | 0.90 |

In contrast, when comparing emotional vs. factual reviews, we found that the mean differences are statistically significant for the perceived trust  $F(1, 123) = 201.655, p < .001$ , fakeness perception  $F(1, 123) = 135.992, p < .001$ , and purchase intention measures  $F(1, 123) = 127.952, p < .001$ . Pairwise comparisons also showed significant differences ( $p < .001$ ) for the three pairs, namely perceived trust, fakeness perception, and purchase intention for the three measures. These results are consistent with those obtained by Filieri [5], in that reviews written in a factual manner are considered more trustworthy, less fake, and leading to a higher purchase intention compared to reviews written in an emotional style.

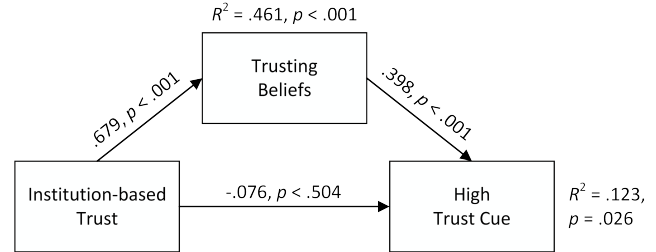
We propose several explanations for this lack of significant differences in the different trust cue conditions: First, our participants might not have been paying sufficient attention to the trust cues. On many online platforms, highly-rated reviews are typically displayed on top. Given that we showed only four (randomized) reviews in our experiments, participants might have considered all of them as being highly relevant. Second, the strength of the cues might not have been high enough to influence the participants' decision-making process. Additional trust cues (e.g., displaying a label such as "top reviewer" or "verified purchase") might be needed for a measurable effect. Third, it is conceivable that some participants noticed the trust cue, but the content of the review was uninteresting for them. Therefore, the value of the trust cue was of no consequence.

Lastly, we performed a mediation analysis to test if there is a mediating effect of trusting beliefs in the relation between institution-based trust and the perceived trust of reviews with high cues (Figure 2). Our model showed an excellent fit with the data ( $CFI = 1.00, TLI = 1.00, SRMR < .001, RMSEA < .001$  with  $p < .001, \chi < .001$  with  $p < .001$ ). We found no direct effect between institution-based trust and the perceived trust in high cues ( $\beta = -.076, SE = .114, p < .504$ ). However, there is a direct effect of institution-based trust on the mediating variable, i.e. trusting beliefs ( $\beta = .679, SE = .048, p < .001$ ). Additionally, trusting beliefs also have a direct effect on the perceived trust of high-cued reviews ( $\beta = .398, SE = .110, p < .001$ ). Thus, we conclude that the relationship between institution-based trust and trust in high cues was mediated by trusting beliefs ( $\beta = .271, SE = .079, p < .001$ ) with a full mediation effect, which explained 12.3% of the variance of the dependent variable.

Based on these results, users' trust on relevant cues in recommendations could depend on how trustworthy they perceive the RS and on their general trust in the Internet. Our findings suggest that the combination of these trust stances results in a higher perceived trustworthiness of reviews with a high trust cue. However, further validation of these results using a fully developed RS is needed.

### 3.3 Limitations and Future Work

As an initial experiment on the influence of trust cues for the online reviews used to explain recommendations, our study has certain limitations that we plan to address in the future. First, the recommended items are too specific (i.e. only laptops). Second, asking users to imagine that all laptop recommendations fulfill their technical requirements and are within budget may lower the realism of the proposed scenario. We also plan to investigate trust levels in a setting where only one group receives the trust cues, whereas the other (i.e. a control group) does not.



**Figure 2: Results of the structural equation model with institution-based trust as independent variable, trusting beliefs as mediator, and high trust cue as dependent variable.**

Our work could lead to practical implications on the design and placement of trust cues within user interfaces for RS. Although the importance of trust cues has been recognized in prior work [13], our results suggest that further research is needed to maximize their effect and salience. This topic is particularly relevant for RS, which have been historically regarded by users as "black boxes" [7]. By improving the design of trust cues and personalizing their usage and placement (as suggested, e.g., in [1]), the overall transparency of RS could also be improved.

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