Ranking versus Reputation: Perception and Effects of Search Result Credibility

Alexander Haas & Julian Unkel

LMU Munich

Author Note

Alexander Haas, Department of Communication Studies and Media Research, LMU Munich, Oettingenstr. 67, 80538 Munich, Germany. Phone: +49 89 2180-9403. E-mail: haas@ifkw.lmu.de.

Julian Unkel, Department of Communication Studies and Media Research, LMU Munich, Oettingenstr. 67, 80538 Munich, Germany, and Munich Center for Internet Research, Bavarian Academy of Sciences and Humanities, Alfons-Goppel-Str. 11, 80539 Munich, Germany. Phone: +49 89 2180-9432. E-mail: unkel@ifkw.lmu.de.

Correspondence concerning this article should be addressed to Alexander Haas.

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Abstract

Search engines play a key role for Internet users when searching for information. The vast majority of users are heavily influenced by the given ranking on the search engine results page (SERP). In this study, $N = 222$ university students were tasked to inform themselves about the working conditions in South Asia on the basis of given SERPs. Besides the ranking on the SERP, two credibility cues—the type of the website (news site, corporate website, research institute, private blog) and the primary source of information mentioned in the search result (scientific study vs. corporate spokesperson)—were varied.

   Two research objectives were examined: the influence of the ranking and the credibility cues on the evaluation of search results; and the effect of both ranking and credibility cues on the selection. Credibility cues had a strong influence on the perception of the search results' credibility. Students rated the credibility higher if search results linked to reputable websites or mentioned a neutral primary source of information. We also find an interaction effect between the type of website and the primary source of information. However, participants' selection was mainly influenced by the ranking. Reasons for this discrepancy are discussed.

   Keywords: search engine, information retrieval, heuristic evaluation, credibility, quantitative observation

Ranking versus Reputation: Perception and Effects of Search Result Credibility

Search engines play a key role for the visibility of information when people search the Internet for information about illnesses, consumer goods, politics, etc. They function as a sort of 'gatekeeper' (Machill, Beiler, and Zenker 2008, 591) and are one of the most frequently used Internet services (Purcell, Brenner, and Rainie 2012). However, most users only take top-ranked search results on the first search engine results page (SERP) into account (e.g., Pan et al. 2007). Therefore, the ranking of search results has a huge impact on the potential influence of information. This ranking can influence the evaluation of sources in the field of health issues (e.g., Kammerer and Gerjets 2012a; Mager 2009), consumer choices (e.g., Ghose, Ipeirotis, and Li 2014), or even voting behaviour (e.g., Epstein and Robertson 2015).

Certainly, the ranking of search results should not be mistaken as an indicator for credibility, even if some users might think so (cf. Hargittai et al. 2010; Mager 2009). Companies and other groups put great efforts in search engine optimization. Top-ranked search results do not necessarily link to credible pages (Lewandowski 2012), as there is no editorial control of search results. A content analysis of top search results from different search engines on the topic of HPV vaccine showed a relevant amount of inaccurate information on the corresponding websites (Madden et al. 2012). Thus, the credibility of sources and information should be evaluated by the users (Metzger et al. 2003, 294). Otherwise, they risk reading wrong and possibly harmful information with potentially far-reaching effects on decisions concerning their health or finances (Schwarz and Morris 2011). Providing people with manipulated results pages against vaccinations can, for example, foster increased concerns about side effects (Allam, Schulz, and Nakamoto 2014).

Although users normally tend to select only few top-ranked search results, there are situations in which other factors than the ranking become more important, for example, when users have a higher prior knowledge of or are somehow involved with an issue (Salmerón, Kammerer, and García-Carrión 2013; Wirth et al. 2016). In such situations, users both have the ability and are more likely to evaluate the credibility of search results. However, this evaluation is hindered by the fact that search engines like *Google* display rather few information. A search result usually is composed only of a headline, the URL, and a small text excerpt from the website. Still, these few words can contain some credibility cues for users to evaluate. The website operator (*mediating source*) is always displayed in the URL. Furthermore, the origin of some of the information on the corresponding website (*primary source*) can be indicated in the text excerpt (e.g., by naming a person, an authority, etc.). We focus on these two different types of sources.

Our study extends the state of research in two ways: First, we analyse the competing effect of two different source-related credibility cues and the ranking both on the evaluation as well as on the selection of search engine results in an observational study. Second, we systematically combine two different reference objects for the evaluation of search engine results' credibility: the mediating source (news site, corporate website, research institute, private blog) and the primary source (scientific study vs. corporate spokesperson).

Literature Review

Previous research has shown that individual credibility perceptions of online content can be influenced by a large number of website features, such as characteristics of the source, the message, or the design of the website (for an overview, see Choi and Stvilia 2015; Kakol, Nielek, and Wierzbicki 2017). We define credibility cues as all kinds of markers or signals that may

influence credibility perceptions by triggering an associated heuristic. For example, the information about the website author's credentials may trigger a 'expertise' heuristic, while the presence of ads may trigger a 'commercial intentions equal untrustworthiness' heuristic, which both in turn can influence credibility perceptions (cf. Sundar 2008). Some current studies analyse how such credibility cues influence search engines users, both in their evaluations of search results and in turn in their selection behaviour (e.g., García Rodicio 2015; Kammerer and Gerjets 2012b, 2014; Knobloch-Westerwick et al. 2015; Salmerón, Kammerer, and García-Carrión 2013; Authors 2017). These studies have provided valuable insight into the impact of different credibility cues such as biased wordings in the snippet, the type of the linked website, or information about the author of the linked website.

Ranking of Search Results

Search engines confront users with a large numbers of options to choose from. These options seem relatively similar at first sight. Only little information is displayed on the SERP (Kammerer and Gerjets 2014). Usually, only the title, the URL, and a small excerpt from the website are shown. Thus, most users will try to gain sufficient information without investing too much time and cognitive effort. They will process the information 'in a rather heuristic way' (Kammerer and Gerjets 2014, 178). The dominant heuristic cue regarding SERPs is the ranking of the search results (Kammerer and Gerjets 2014; Metzger, Flanagin, and Medders 2010; Wirth et al. 2007). Thus, previous research can briefly be summarized with one main finding: A search result's rank on the SERP is the major factor influencing users' selection. Most users tend to primarily select results from the top of the SERP (Agichtein et al. 2006), only few visit the second SERP (Lorigo et al. 2006). The percentage of users that only pays attention to the first SERP even grew larger over time (Jansen and Spink 2006), indicating that many users developed

some kind of trust in the given ranking. While several different notions of what a high ranking

implies exist among search engines users (e.g., relevance, credibility, popularity/click-through

rate, etc.; Nakamura et al. 2007), most users seem to have adopted a 'high ranking equals good

content' heuristic. This 'top-rank heuristic' can even be identified when the SERP was

manipulated and results with little or no relevance for the given task were ranked on top (Keane,

O'Brien, and Smyth 2008; Pan et al. 2007; Salmerón, Kammerer, and García-Carrión 2013).

Following this frequently proven heuristic, we propose that:

H1: The higher the rank of the search result, the higher the probability to select it.

However, we already briefly outlined why search engine users should not ignore the

credibility of sources. There is a large and rapidly growing body of research about how people

judge the credibility of web content, how they process the presented information when doing so,

and when those judgments become relevant (for an overview, see Choi and Stvilia 2015; Metzger

and Flanagin 2015; Rieh and Danielson 2007).

Credibility Online

Despite the heterogeneity of conceptualizations, there is consensus about the quality of

credibility in that it is not to be seen as a characteristic of a medium, a message, or a source.

Rather, it is an attribution made by the recipients (Self 2009). This attribution has at least two

underlying dimensions: trustworthiness and expertise. Both dimensions have had already been

identified by Hovland and colleagues (1953; 1951). Following their work, a number of additional

dimensions like dynamism, objectivity, and goodwill have been discussed (e.g., Berlo, Lemert,

and Mertz 1969; McCroskey and Teven 1999; Whitehead 1968), but expertise and

trustworthiness still are the 'key dimensions' of credibility (Choi and Stvilia 2015, 3).

For both traditional media coverage and online information there are three different reference objects for the evaluation of credibility: the mediating medium, the primary source of information, and the message itself (Rieh and Danielson 2007). Again, because of the little information displayed on a SERP we focus on the reputation of two sources: The website that provides some information (*mediating source*) and the source of that information (*primary source*). We name such information about the sources displayed on the SERP source reputation cues. Source reputation cues represent one type of credibility cues (cf. Winter and Krämer 2014).

Users' evaluations of the credibility of the website itself as well as of the source of information can be influenced by own experience, by some kind of image, or by endorsement by third parties. However, the likelihood that users can recall past experience and that they already have formed an image should vary between different mediating sources.

Mediating sources: Types of websites. The main body of research on effects of website types on the credibility of the content focusses on the credibility of news. Most studies identify an influence of the website operator both on the perceived expertise and trustworthiness of information, authors, etc. The question of whether a website is linked to a well-known and respected (offline) news organization has the strongest influence on the perception of a website's expertise (Fogg et al. 2001, 64). The credibility of articles from news sites, as well as the credibility of the website itself, is rated higher than the credibility of blog-posts and the blog itself (Meyer, Marchionni, and Thorson 2010). Furthermore, users seem to distinguish between different types of news sites. They rate the trustworthiness and expertise of mainstream news sources higher than those of independent or index type (e.g., Google News) news sources (Chung, Nam, and Stefanone 2012). The credibility of news depends on the reputation of the 'supplier brand' (Gunter et al. 2009, 192). For most users, well-known news sites seem to have a

high level of credibility and therefore, a high reputation. Flanagin and Metzger (2007) found similar results: The credibility of the website operator as well as the credibility of a message were perceived highest for news sites compared to other types of websites. Furthermore, they point out the importance of the users' familiarity with a website operator for the credibility evaluation. In the field of health communication, a study draws a connection between the familiarity and the selection of the website as an information source (cf. Zhang 2014).

Furthermore, search results linking to websites of official institutions or media—especially if they are specialized in the topic of the search—are seen as most trustworthy by the users. In contrast, search results linked to a company's website or a private website are seen as less trustworthy (Kammerer and Gerjets 2014, 181). Information from a company having a (commercial) interest in the topic is rated as less trustworthy, especially from persons with good knowledge about the topic (Bråten, Strømsø, and Salmerón 2011). Therefore, we propose that the evaluation of a search result is influenced by the reputation of the corresponding website.

H2a: Search results representing mediating sources with high reputation (well-known news sites, websites of private research institutes) are perceived as more credible than search results representing mediating sources with low reputation (blogs, corporate websites).

H2b: Search results representing mediating sources with high reputation are more likely to be selected than search results representing mediating sources with low reputation.

Primary sources. Apart from the website, users can evaluate the original information source. In order to do this, users will think about whether an author or other kinds of sources (e.g., research institutions) are trustworthy and an authority on the subject (Jessen and Jørgensen 2012). Information sources are more likely to be seen as credible when third parties have already assigned credibility to them. Official titles (e.g., Doctor) increase the credibility (Tseng and Fogg

1999, 42). The same is true if an article is based on a scientific study (Michal and Radoslaw

2015). Therefore, mentioning a scientific study as the source of information should lead to a

higher evaluation of the sources' expertise and therefore to a higher evaluation of the credibility.

At the same time, the evaluation of the trustworthiness of a source is affected by thoughts

about the neutrality. This often-proven connection still holds true in the Internet (Choi and Stvilia

2015, 6). Therefore, a direct connection to a company should affect the trustworthiness of a

source (Kammerer and Gerjets 2014), especially if the topic of the search is linked to the

companies field of activity (Bråten, Strømsø, and Salmerón 2011). These effects should lead to a

measurable difference of naming the source of information as a scientific study or as a corporate

spokesperson regarding the evaluation of credibility and the selection of search results.

H3a: Search results that mention a primary source with high reputation (scientific study)

are perceived as more credible than search results that mention a primary source with low

reputation (corporate spokesperson).

H3b: Search results that mention a primary source with high reputation are more likely to

be selected than search results that mention a primary source with low reputation.

However, the effect of the primary source should vary depending on the mediating

source. Many users will have own positive or negative past experiences with well-known news

sites. Therefore, judgments about the credibility of such sites should be less influenced by the

primary source. For corporate sites, this may not be true for the website itself. However, many

users will already have formed an opinion about the trustworthiness of the company that is the

website operator. For less-known mediating sources credibility judgments have to be based on

other factors, for example the primary source of the presented information.

H3c: The effect of the primary source is higher for unfamiliar (blogs, websites of private research institutes) than for well-known mediating sources (news sites, corporate websites).

Method

An experimental observation study served to test the hypotheses. It was conducted in a computer laboratory of a large German university in December 2014.

Procedure

The participants were instructed to inform themselves about working conditions in the textile industry in South Asia with a given SERP. For five minutes, they could navigate the SERP and open as many (or as little) search results as they wanted. This is an adequate amount of time for web searches for a defined information search task (Wirth et al. 2016). We decided on a time limit to enhance the comparability between participants. The participants were not able to change the search query. However, they were able to manually end the research task before the five-minute period was over. The participants were evenly assigned to one out of eight manipulated SERPs of the search engine *Google* (see Figure 1 and below).
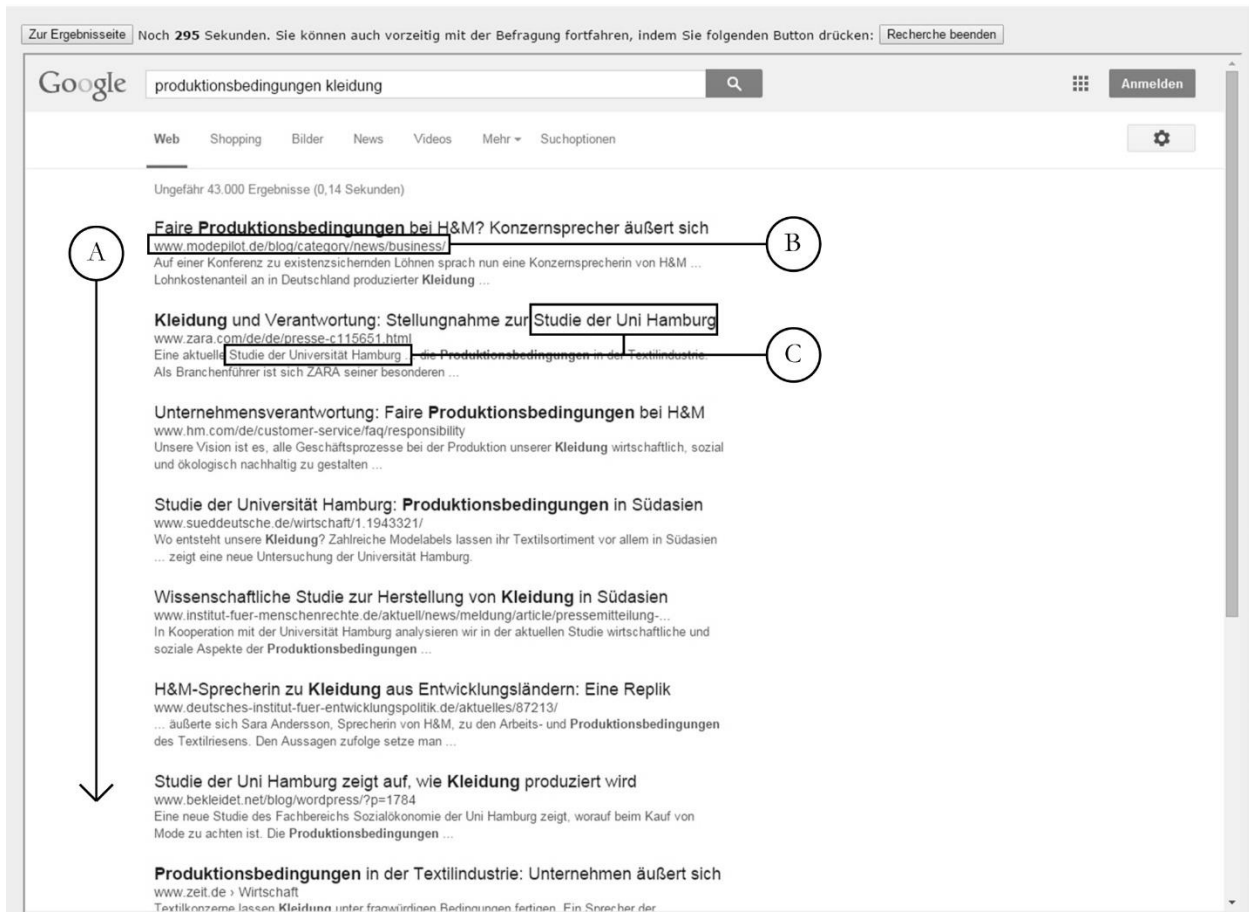
Figure 1. Stimulus: Manipulated SERP built into the questionnaire with eight relevant search results. Eight versions of the SERP were created among which the *ranking* (A) of the search results rotated. *Mediating sources* (B) could be identified via the displayed URL. The *primary source* (C) was mentioned once each in headline and text excerpt of each search result.

Afterwards, a short questionnaire was displayed, including questions on the habitualization of search engine use. To analyse individual credibility perceptions, each participant rated the credibility of three randomly assigned search results from the previously seen SERP. All participants received monetary compensation for taking part in the study.

Stimulus

The starting point of the information task was a pre-set SERP on the query 'kleidung produktionsbedinungen' [clothing production conditions] that was built as a fully functional

HTML website and looked like a typical *Google* SERP. It contained eight search results relevant to the issue. These search results arise from the combination of the two sources: we varied the *mediating source* (i.e., the websites that reports the information) on four levels and the *primary source* (i.e., the original source of the reported information) on two levels. This leads to eight possible combinations of the two sources and therefore eight different search results. Because *Google* typically shows ten search results per SERP, two search results leading to a dictionary and a translation service on the query terms, respectively, were included on rank 9 and 10.

Mediating source. We chose websites that differ in their reputation as well as in terms of their degree of popularity (and thus in the likelihood of past experience or the degree of already existing images). We selected (1) two well-known German news sites that are connected to newspapers with a high reputation (Süddeutsche Zeitung, Die ZEIT). Both offline brands are seen as "quality media" and examples for trustworthy journalism (Trotier 2011). Both sites rank among the most used German news sites with each about 30 million visits per month (IVW 2017). In addition we selected (2) two websites of big fashion companies that are mainly known for cheap clothing (H&M, Zara). Both fashion companies have been mentioned related to reports about bad labour conditions in developing nations. Additionally, we selected two mediating sources most participants would not have known before: (3) websites of private research institutes and (4) private fashion blogs. There should be no or at best little amount of experience with those sources. However, a research institute, although a private one, should be connected with some kind of credibility already by name alone. We did not conduct a pretest to verify these assumptions. However, they are supported by participants' subsequent evaluations of the credibility of the presented search results. Mediating sources were evident by the displayed URL of the search result (see Figure 1).

Primary source. We selected primary sources that should differ in their neutrality. The original source of the information thus was either a scientific study (high neutrality) or a statement of a corporate spokesperson (low neutrality). The mention of a scientific study should increase the credibility, especially for those mediating sources with low popularity. The primary source was mentioned in both the headline and the text excerpt of each search result.

The eight versions of the SERP differed in the *ranking* of the eight relevant search results. Each search result was ranked once on rank 1, once on rank 2 etc. The mean rank of each search result was held constant and two search results were not placed next to each other in more than two of the eight versions. All search results had about the same amount of characters in both headline (60-70) and text excerpt (140-170). To hold perceived relevance constant, all search results contained the two query terms ('kleidung' and 'produktionsbedingungen') once, with one term appearing in the headline and the other term appearing in the text excerpt. All corresponding sites linked in the search results were created as fully functional HTML sites and made to look like their real-world counterparts, with the articles having about the same length (between 486 and 506 words). We compiled a list of facts about the textile industry in South Asia. Each article contained three of these facts in varying combinations and different wordings.

Measures

Observed research behaviour. All research tasks were captured on video via screen capture software and coded by the authors and a student research assistant. All selected search results and the order in which they were selected were coded.

Perceived credibility. Search result credibility was measured using a semantic differential containing six items (adapted from Koch and Zerback 2013; based on and translated from Infante 1980). Used adjective pairs were dishonest–honest, not trustworthy–trustworthy,

and not credible–credible, incompetent–competent, not renowned–renowned, and unqualified–qualified (competence). Each participant saw three randomly assigned search results from the previously seen SERP and rated these adjective pairs on a 7-point differential, with 1 indicating the negative extreme ($\alpha = .93$, $n = 681$, $M = 4.61$, $SD = 1.49$).

Habitualized search engine use. To measure the degree of habitualization of search engine use we used the Self-Report Habit Index (SRHI; Verplanken and Orbell 2003), translated and abridged by the items focusing on identification (cf. Koch 2010), and using a 7-point scale with higher values indicating a higher degree of habitualized search engine use ($\alpha = .71$, $M = 6.12$, $SD = 0.66$).[1]

Sample

A sample of 222 students participated in the study and reported valid data. The majority of the sample is female (61.3%) and young ($M = 22.10$, $SD = 3.21$).

Results

About half of the participants (53.6%) utilized the full five minutes given for the research task. Overall, they took a bit more than three minutes on average ($M = 189.37$ s, $SD = 78.54$). Before their first selection, the participants spent a brief amount of time ($M = 14.50$ s, $SD = 10.86$) on the SERP. On average, they opened 3.44 ($SD = 1.31$) linked sites. Results will be presented in order of the dependent variables (perceptions of credibility, selection decisions).

Perceptions of Search Result Credibility

To analyse the effects of source reputation cues on the perception of search result credibility, we performed a linear mixed effects analysis using the *lme4* package (Bates et al. 2015) for *R*. Mediating sources (4 levels) and primary sources (2 levels) were entered as fixed effects into the model. Because all participants evaluated three randomly selected search results,

we entered random intercepts for the participants as random effects into the model. Likelihood ratio tests were performed to test for significance of the fixed effects. There were significant main effects of both the mediating source, $\chi^2(3) = 310.50$, $p < .001$, and the primary source, $\chi^2(1) = 111.40$, $p < .001$, and a significant interaction effect between the two factors, $\chi^2(1) = 8.50$, $p = .037$. To further test our hypotheses, we used the *lsmeans* (Lenth 2016) package for *R* to calculate post-hoc pairwise comparisons using the Tukey method for p-value adjustment. Unless stated otherwise, all contrasts are significant at $p < .001$.

We assumed that search results representing mediating sources with high reputation are perceived as more credible than results representing sources with low reputation (H2a). The results corroborate this assumption. While there was no difference in the credibility perception of news sites and private research institutes ($\Delta M = 0.22$, $p = .205$), news sites were perceived as being more credible than corporate websites ($\Delta M = 2.23$) and blogs ($\Delta M = 1.15$). Institutes were also perceived as being more credible than corporate websites ($\Delta M = 2.01$) and blogs ($\Delta M = 0.93$). Finally, blogs were perceived as being more credible than corporate websites ($\Delta M = 1.08$). As expected in H3a, a scientific study as the primary source of information was perceived as more credible than a corporate spokesperson ($\Delta M = 0.92$). H3c, which hypothesized a stronger effect of the primary source for unfamiliar than for well-known websites, is only partially supported. The largest differences between naming a scientific study or a corporate spokesperson as a primary source were indeed found for the unfamiliar mediating sources institutes ($\Delta M = 1.11$) and blogs ($\Delta M = 1.14$). However, significant differences were also found for news sites ($\Delta M = 0.85$) and corporate websites ($\Delta M = 0.57$). The results are visualized in Figure 2.
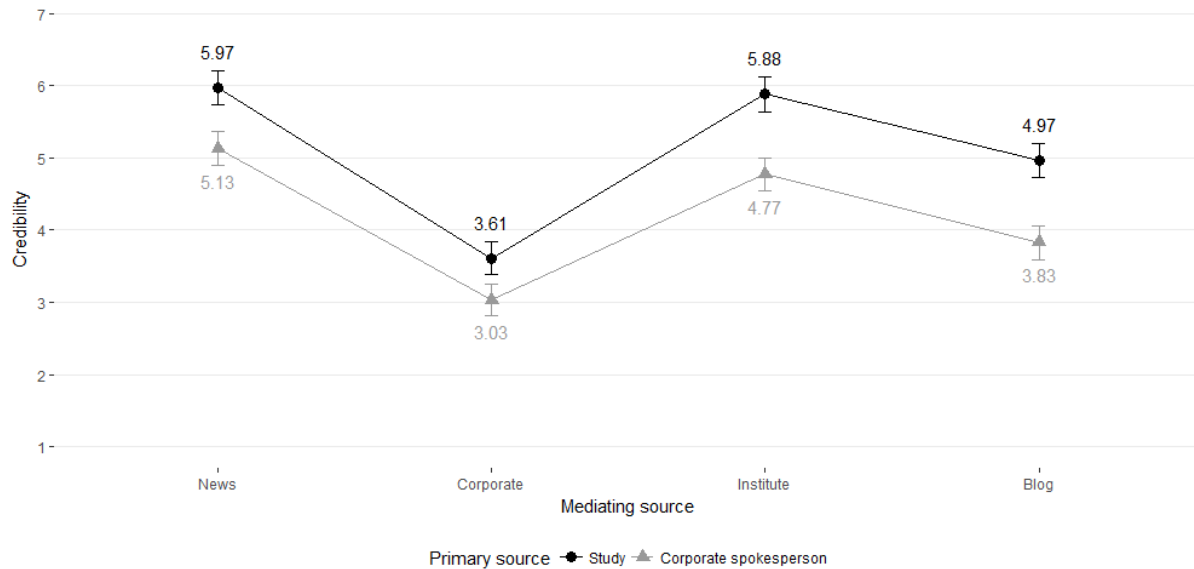
Figure 2. Perceived credibility of search results by mediating and primary source. Scale from 1 (*very low credibility*) to 7 (*very high credibility*). Error bars represent 95 % confidence intervals. $n = 681$.

Effects of Source Reputation Cues on Search Engine Selection Behaviour

As shown above, source reputation cues may lead to highly different perceptions of search results. To investigate whether the same credibility cues are also able to influence selection decisions, the data had to be restructured. With eight relevant search results to choose from, the decision to select one search result was at the same time the decision *not* to select the seven other search results. This lead to a binary dependent variable that differentiated for each search result and each selection decision whether the result was selected (1) or not (0).

Because the first selection decision is of particularly high importance for the search process, two models were calculated. Both models had an acceptable fit (see Table 1).

Table 1

Model fit indices

Model	First selection decisions		Following selection decisions	
	AIC	R^2_{GLMM}	*AIC*	R^2_{GLMM}
0 (Intercept-only)	1340.288	.00	2865.725	.00-.00
1 (*0* + Rank)	1118.458	.17	2779.798	.06-.07
2 (1 + Mediating source + primary source)	1108.711	.18	2694.952	.11-.13
3 (2 + Interaction between sources)	1109.402	.18	2691.395	.12-.14

Note: *AIC* = Akaike information criterion. R^2_{GLMM} = Pseudo-R^2 for generalized linear mixed-effects models as proposed by Nakagawa & Schielzeth (2013). In the following selection decisions model, the first value of R^2_{GLMM} is the marginal $R^2_{GLMM(m)}$ and the second value the conditional $R^2_{GLMM(c)}$. The difference between both values reflects the amount of variability in the random effects. *n* = 1776 (first selection decision), 3276 (following selection decisions).

The first model included only the first selection decisions and the second model included all following selection decisions. In both models, rank was included as a continuous predictor, while mediating source (reference group: blog) and primary source (reference group: corporate spokesperson) were included as dummy-coded categorical predictors. For the first selection decisions, a logistic regression model was calculated. The following selection decisions model, however, differs in important aspects from the first model. First, as most users do not re-open search results selected before, all previously selected search results were excluded in the second model (e.g., for the second selection decisions, only seven search results were included into the analysis—the one result selected and the six search results not selected). Second, as participants were able to select as many search results as they wanted, the number of observations per participant differs. This leads to an unbalanced design where each following selection decision per participant does not contain all factor combinations. Thus, we calculated a generalized mixed effects binomial model using the *lme4* package (Bates et al. 2015) for *R*. As in the model for the

first selection decisions, rank, mediating sources and primary sources were entered as fixed

effects into the model. Furthermore, we entered a random intercept for count of selection

decisions as a random factor into model. Predictor estimates are displayed in Table 2.

Table 2

Predictors of selection decisions

Predictor	First selection decision		Following selection decisions	
	b	OR [95 % CI]	b	OR [95 % CI]
Rank[a]	-0.57***	0.57 [0.52; 0.62]	-0.23***	0.80 [0.77; 0.83]
Mediating source[b]				
News	0.64**	1.90 [1.25; 2.90]	1.44***	4.22 [2.79; 6.06]
Corporate	-0.20	0.82 [0.51; 1.31]	0.32	1.38 [0.91; 2.07]
Institute	0.20	1.22 [0.79; 1.90]	0.45	1.57 [1.03; 2.38]
Primary source[b]				
Study	0.15	1.16 [0.85; 1.57]	0.86***	2.35 [1.60; 3.37]
Interactions				
News × study			-0.79**	0.46 [0.29; 0.77]
Corporate × study			-0.63*	0.53 [0.32; 0.93]
Institute × study			-0.26	0.77 [0.45; 1.31]
Intercept	-0.22	0.80 [0.52; 1.22]	-1.20***	0.30 [0.20; 0.49]
Count of selection decisions: Intercept			0.08	

Note: b = regression coefficient, OR = odds ratio, CI = confidence interval; n = 1776 (first

selection decision), 3276 (following selection decisions).

[a]1–8, from top to bottom; [b]Categorial variable, dummy coding.

Confidence intervals for the following selection decisions model are bootstrapped confidence

intervals (basic method, 1000 simulations).

* $p < .05$. ** $p < .01$. *** $p < .001$.

We expected participants to follow the well-known top-rank heuristic (H1; the higher the search

result is ranked, the higher is the selection probability). Indeed, in both models, rank emerged as

the most important predictor. However, the importance decreased in the second model (Figure 3).
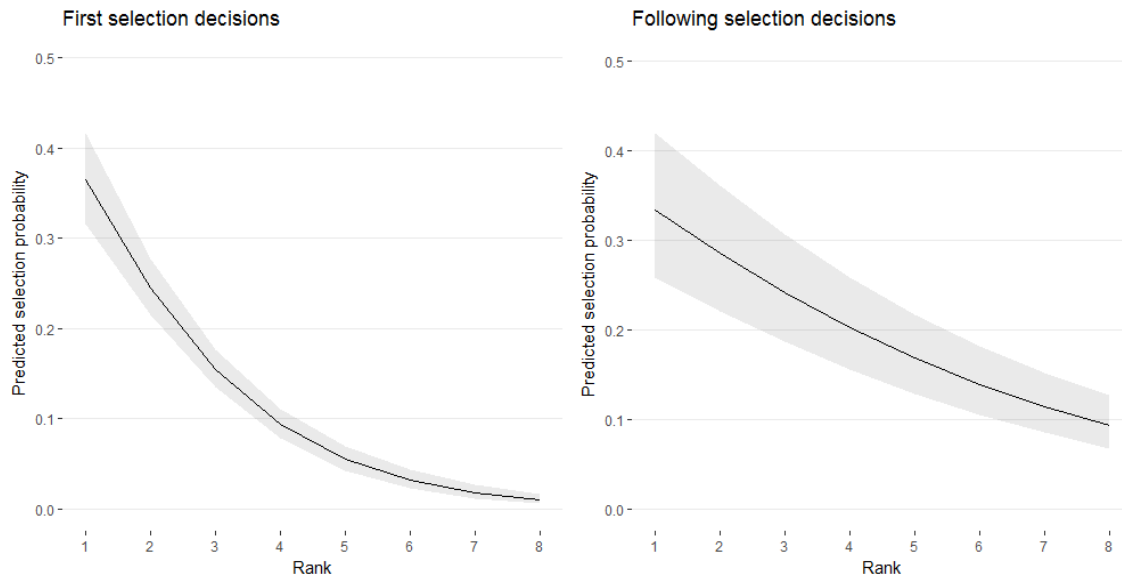

Figure 3. Predicted selection probability by search result rank at average mediating source and primary source. Shaded areas represent 95 % confidence intervals.

Furthermore, we expected that search results representing mediating sources with high reputation are more likely to be selected than search results representing mediating sources with low reputation (H2b). This effect is only partially found, as only news sites led to a significant increase in selection probability (in reference to blogs) in both models, with no higher or lower selection probabilities found for both institutes and corporate websites.

We finally presumed that search results that mention a scientific study as the primary source are more likely to be selected than those that mention a corporate spokesperson (H3b). If a study was referred as a primary source, the search result was selected more often as compared to the referral of a corporate spokesperson only in the second model. Regarding the expected interaction between mediating source and primary source, including the interaction term only led to an increase in model fit in the second model (see Table 2); thus, it was not included in the first model. However, it can be argued that due to the non-linearity and non-additivity of logistic

regressions models, they already include implicit interaction effects even if they are not explicitly modelled (Best and Wolf 2010). To inspect both implicit and explicit interaction effects, we generated conditional effects plots for both models using predicted probabilities computed with the *effects* package (Fox 2003) for *R*. As displayed in Figure 4, the expected interaction occured only in the second model. The unfamiliar mediating source blog—and, by trend, also the unfamiliar mediating source institute—had a higher selection probability if it referred to a study as opposed to a corporate spokesperson. No differences were found for the well-known mediating sources news sites and corporate websites.
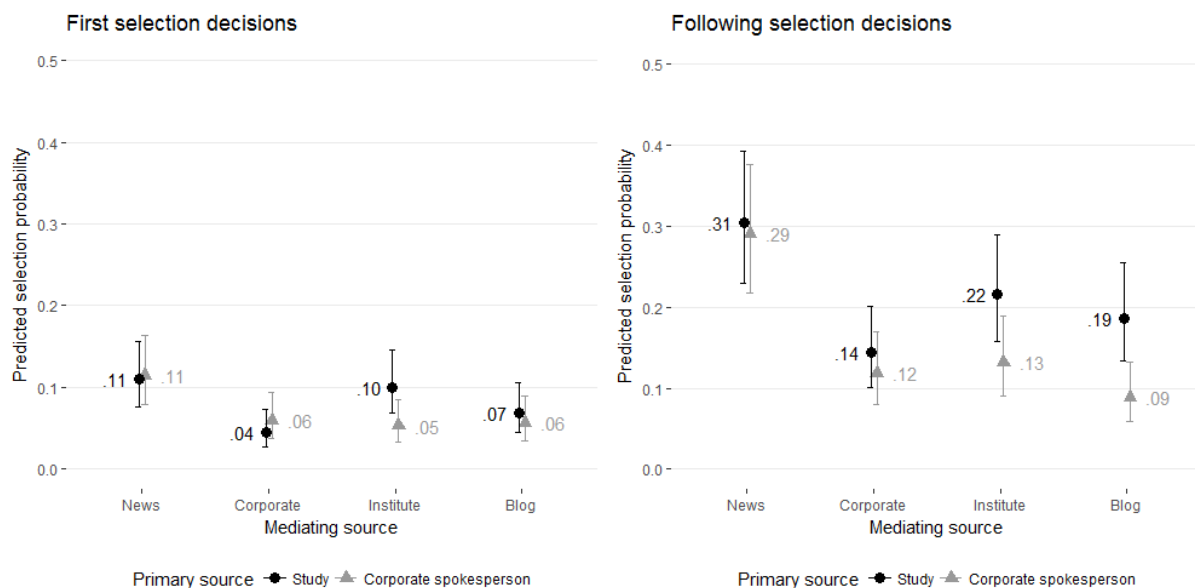

Figure 4. Predicted selection probability by mediating source and primary source at average rank. Error bars represent 95 % confidence intervals. The on average higher selection probabilities in the following selection decisions model are also due to the amount of selectable search results decreasing (and thus an increasing ratio of selected vs. not-selected results), and the selection probabilities for lower ranks increasing (see Figure 3).

In general, these analyses corroborated H1, while H2b, H3b and H3c are only supported with constrictions.

Discussion

Users' evaluations of search results are influenced both by the reputation of mediating sources and by the neutrality of primary sources. In line with previous results, search results corresponding to well-known news sites with a high reputation were perceived as more credible than private blogs and especially as more credible than search results linked to corporate websites (cf. Bråten, Strømsø, and Salmerón 2011; Kammerer and Gerjets 2014). Again in line with previous studies, the mentioning of a scientific study led to higher evaluations of search result credibility compared to the mentioning of a corporate spokesman (cf. Michal and Radoslaw 2015; Tseng and Fogg 1999).

The combination of both source reputation cues reveals an interesting result. The influence of the scientific study on the evaluation of the search results was somehow stronger for mediating sources previously unknown to nearly all participants (i. e., the private blog and the website of a private research institute). However, there is also a nearly as strong effect for the well-known news sites. The evaluation of the corporate website benefited the least from the scientific study. Maybe users think about who might have funded the mentioned study if it is referred to on the corporate website. If, for example, an article is based on 'private studies by a commercial company', this decreases its credibility (Michal and Radoslaw 2015, 303). News sites, on the other hand, still benefit from the inclusion of a study as a source.

Despite these results, there is only a weak influence of both the mediating and the primary source on the selection of search results. In line with previous results, we find a strong influence of the top-rank heuristic (cf. Agichtein et al. 2006; Pan et al. 2007). This is particularly true for the first selection decision. Regarding the mediating source, at least the well-known website operators were selected like expected: participants selected news sites more often while

they selected corporate websites less often. However, the influence of the mediating source and especially of the primary source is rather small compared to the effect of the ranking.

There are at least four explanations for this finding. First, most users might process the information on the SERP in a rather heuristic than systematic way. A large-scale analysis of *Bing* usage showed that about 75 % of the users spend little time on the SERP, click quickly, and select only one search result (Buscher et al. 2012). Dual-processing models have already been suggested to better understand the information processing of online information (e.g., Metzger 2007; Wirth et al. 2007). In a heuristic processing case, users might not even perceive credibility cues like the reputation or neutrality of primary and mediating sources. This would mean that users rely solely on the ranking just because this 'information' can be processed heuristically.

Second, the effect of the ranking might overlay the influence of the credibility cues. Some users even tend to believe that search results are ranked according to their credibility (cf. Hargittai et al. 2010; Mager 2009). Although being recognized by the users, some source reputation cues, like the neutrality of the primary source, may not be able to compete against the influence of the ranking. When rating the credibility of the search results, participants in our study only saw each result by itself. The results were not displayed as part of the SERP. Therefore, it remains unclear if the perception of credibility is also affected by the ranking and how strong its contribution would be compared to the effect of the mediating and the primary source. Future research could address this question.

Third, the specific situation while using a search engine might favour the negligence of the credibility of search results. 'Real' search engine users as well as the participants in our study were able to open as many search results as they wanted. Users do not have to pay for opening search results and can return to the SERP in a few seconds. Therefore, it could be more likely to

find an effect of the source reputation cues on the time spent on the corresponding websites than on the selection itself. García-Rodicio (2015), for example, found that students performing a search task with a given SERP opened more unreliable than reliable websites. However, they did spend more time on the reliable websites.

Finally, users might select search results even without expecting to find trustworthy information on the corresponding websites. Most participants started with the selection of one of the top-ranked results. Clearly, that does not necessarily mean that they somehow trusted the information. For example, curiosity could cause users to open search results. This raises the question of which information users would take into account when deciding about what opinion to favour, what product to buy, etc. The selection of a search result, at least on its own, may not the best operationalization for search engine usage behaviour. One could think about additional dependent variables. It could be observed which websites participants would bookmark to use it for a summary on the search task (cf. Salmerón, Kammerer, and García-Carrión 2013), or information received from which websites they would actually use for such a summary.

Conclusion

Limitations and future research

Some limitations of this study should be considered when interpreting the results. First, participants in our study had no <u>real</u> information needs. Depending on their information needs, actual search engine users will—in most cases—search for reliable and trustworthy sources. Therefore, source reputation cues might actually guide users´ selection to a greater degree than in our study. Second, we instructed participants to select results from a given SERP without giving them the opportunity to alter the search term. However, that is exactly what most users would do when not being satisfied with the displayed results. They would rather alter the search request

than take a look at the second SERP (Flavián, Gurrea, and Orús 2012). Future studies should allow participants to do so. This would also allow analysing whether the absence of credibility cues can lead to more frequent modifications of the search terms. Both limitations are due to the experimental setting. In return, this allowed us to systematically combine both source reputation cues and compare the effect of those two source cues with the effect of the ranking.

Third, our study did not include attitude-consistency as a factor influencing the evaluation and selection of search results. Cognitive dissonance has been frequently analysed as a reason for selective exposure to online content (for an overview see Knobloch-Westerwick, Westerwick, and Johnson 2015). Especially the causal mechanisms between attitude-consistency and credibility are still to be clarified (e.g., Johnson and Kaye 2013; Metzger, Hartsell, and Flanagin 2015). Fourth, search engine users differ in respect of knowledge and involvement regarding the search topic. Those who have more knowledge about an issue or are somehow involved with the topic should be more likely to process the information systematically (Bråten, Strømsø, and Salmerón 2011; Wirth et al. 2016). Thus, they should be more likely to be influenced by other cues than the rank (Wood et al. 2016). These factors should be considered for future studies.

Finally, all participants were students. Nearly all of them were frequently using search engines in a highly habitualized way.[2] Therefore, habitualized search engine use was not included as a moderator in the models. Because of their habitualized usage, participants in our study may be more susceptible for the top-rank heuristic than less frequent users. However, by now, search engines are frequently used by the majority of Internet users (Purcell, Brenner, and Rainie 2012), so a high degree of habitualization should be found in almost all user segments.

Thus, future research could examine internal and external factors that lead users to reconsider this 'ranking equals good content' assumption. For example, when search results are ordered in a grid matrix (and not in a list) the effect of the rank disappears. Instead, perceived trustworthiness emerges as the main predictor (Kammerer and Gerjets 2014). Of course, market leader *Google* will not alter the list-style display of search results and advertisements anytime soon. Many users trust the ranking, some of them even perceive it as an indicator of credibility (Hargittai et al. 2010; Mager 2009). In this case, the display of a textual disclaimer on the algorithmic composition of the ranking—comparable to disclaimers Wikipedia presents for certain substantial topics[3]—could influence the selection decisions. Another idea might be to focus on social information as cues for relevance or credibility. Those cues do have an influence on the evaluation of news articles (Winter and Krämer 2014). Especially young users do not necessarily need information about an author or source if some kind of social rating is apparent (Jessen and Jørgensen 2012). Especially when there is a high volume of ratings, an influence of this social cue on the perceived credibility of some information is likely (Flanagin and Metzger 2013). Therefore, aggregated user rankings might also have an influence on the evaluation and selection of search results (Zhitomirsky-Geffet, Bar-Ilan, and Levene 2016).

Implications of the study

Search engines have become important gatekeepers for the visibility of information. There is a growing body of research on factors influencing users' selection. The role of judgements about the credibility of search results for the selection and the factors that influence users' perceptions of search results are still partly undisclosed.

Our observational study extends the state of research by systematically combining two source reputation cues: the reputation of the website that reports some information and the

reputation of the primary source of information. We built Google SERPs that contained all possible combinations of these two cues. Simultaneously, we varied the rank of the search results in order to be able to analyse the competing effect of two source reputation cues and the ranking on the evaluation <u>as well as</u> on the selection of search engine results.

The results of our study show that these factors influence the perception and the selection of search results in different ways. Users' evaluations of search results are influenced by both source reputation cues. However, both cues only have minor effects on the actual selection of search results. We discussed possible reasons for this disparity and illustrated some directions for future research.

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Footnotes

[1] Participants were asked to provide their general usage of search engines (SE) on a 7-point scale (1 = *does not apply at all*, 7 = *does absolutely apply*). Item wording (translated from German): I use SE for a long time; I often use SE unconsciously; I use SE regularly; It would be demanding not to use SE; When searching for something I do not have to consciously remind myself to use a SE; I use SE automatically; It would be hard not to use SE; SE are part of my daily or weekly Internet-usage-routine; I do not have to think about how to use SE; I use SE without contemplating about it.

[2] Nearly all participants showed high degrees of habitualized search engine usage ($M = 6.12$, $SD = 0.66$ on a 7-point scale).

[3] For example, the German Wikipedia displays a short disclaimer and links a longer one on all articles focusing on health information which states that 'single mistakes, obsolete or incomplete information, or possibly harmful content cannot be ruled out' (https://de.wikipedia.org/wiki/Wikipedia:Hinweis_Gesundheitsthemen, translation by the authors). A similar disclaimer is also displayed for articles on legal information.