Information, Communication & Society

ISSN: 1369-118X (Print) 1468-4462 (Online) Journal homepage: https://www.tandfonline.com/loi/rics20

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To cite this article: Andrew J. Flanagin, Stephan Winter & Miriam J. Metzger (2018): Making sense of credibility in complex information environments: the role of message sidedness, information source, and thinking styles in credibility evaluation online, Information, Communication & Society, DOI: 10.1080/1369118X.2018.1547411

To link to this article: https://doi.org/10.1080/1369118X.2018.1547411

Published online: 27 Nov 2018.

INFORMATION, COMMUNICATION & SOCIETY
https://doi.org/10.1080/1369118X.2018.1547411

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Taylor & Francis Group

Making sense of credibility in complex information environments: the role of message sidedness, information source, and thinking styles in credibility evaluation online

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ABSTRACT

An experiment using a representative sample of US. Internet users in the context of online encyclopedias is conducted to understand how the type of information source (expert-generated, user-generated, or hybrid [both expert- and user-generated]) and message sidedness (one- versus two-sided) affect perceived information credibility. Additionally, individual differences in cognitive styles, including need for cognition and flexible thinking, are hypothesized to moderate these relationships. Results showed that expert-generated messages are regarded as most credible, whereas two-sided messages were only perceived as more credible than one-sided messages when originating from a hybrid source. Moreover, the effect of message sidedness is stronger among people with higher flexible thinking, but not among those with high need for cognition. This study extends knowledge of source type to include the diversity of possibilities available online today, clarifies how message sidedness and type of information source affect the perceived credibility of online information, and offers new insight into how individual psychological differences affect the evaluation of online information credibility, including the identification of flexible thinking as an important variable in this domain. Results of this study help to clarify how people navigate the wide diversity of information options available today in efforts to locate credible information to guide their attitudes and behaviors.

ARTICLE HISTORY
Received 28 February 2018
Accepted 8 November 2018

KEYWORDS
Information credibility; user-generated information; information balance; flexible thinking; digital literacy; trust; expertise; message sidedness

Individuals cope with the variety of information sources, the assortment of information venues, and the unevenness of information quality online in a number of ways as they attempt to locate credible information. Among the most prominent strategies for divining credibility in a resource-rich information environment is to invoke heuristic approaches, which serve to distinguish information sources and messages from one another in a relatively efficient manner (Metzger, Flanagin, & Medders, 2010). In the context of web-based information, heuristics may take a wide range of forms, whereby people focus on particular cues in their efforts to locate credible information.

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This study examines two prominent cues – the type of information source and message sidedness – as heuristic indicators of key dimensions of perceived credibility. Although information source is traditionally conceived in terms of the degree to which a message originates from a credentialed expert, the contemporary information environment affords tremendous flexibility in this regard. A central contribution of this study is thus to extend the understanding of source expertise by conceiving of it in a fashion that better reflects the diversity of possibilities available today (specifically, the degree to which information originates from expert-generated, user-generated, or a mixture of both, i.e., hybrid sources). Additionally, message sidedness (i.e., whether messages are one-sided or two-sided) is posited as a key factor in credibility assessment. While research finds two-sided messages are often deemed more credible because they provide a comprehensive overview on debated issues (e.g., Mayweg-Paus & Jucks, 2017; Winter & Krämer, 2012), one-sided messages can sometimes be perceived as more credible due to the confirmation bias in information processing (e.g., Metzger, Hartsell, & Flanagin, 2015). Another goal of the study is therefore to consider the role of message sidedness in perceptions of credibility, particularly in conjunction with information source.

Individual differences in cognitive style are also theorized to moderate the relationships between message source and sidedness on credibility evaluations. A final contribution of this study is thus is to explore personality differences that preclude fixating on only one side of complex issues, including need for cognition (Cacioppo & Petty, 1982) and the novel and important consideration of flexible thinking (Stanovich & West, 1997), which helps to clarify the conditions under which one- or two-sided messages are judged as more credible. To achieve these aims, an experiment was conducted on a representative sample of US. Internet users in the context of online information repositories (specifically online encyclopedias). Results are leveraged to understand the influence of information source, message sidedness, and individual differences on the evaluation of online information credibility.

Perceptions of credibility online and the use of cognitive heuristics

Credibility is traditionally defined as the believability of information, and it rests largely on the perceived trustworthiness and expertise of the information source or message (Hovland, Janis, & Kelley, 1953; Rieh & Danielson, 2007). As such, credibility is a subjective perception on the part of the information receiver about its believability (Fogg & Tseng, 1999), which can therefore vary by individual (see Metzger, Flanagin, Eyal, Lemus, & McCann, 2003).

Specific challenges apply to assessing credibility in the contemporary media environment. For instance, although source information is crucial to credibility because it is the primary basis upon which credibility judgments rest (Sundar, 2008), information is increasingly provided by a wide range of sources of often unknown reputation. Indeed, the dramatic rise in 'user-generated content,' where individuals with varying expertise are responsible for generating online information resources, has prompted a number of credibility concerns, based on the potentially tenuous relation between non-expert layperson sources and accurate and reliable information.

To manage this diversity of available information, individuals often invoke resourceful means of information processing to arrive at credibility judgments. For instance, the

Limited Capacity Model of message processing (Lang, 2000) posits that because people do not have unlimited cognitive capacity, they cannot process all aspects of all messages they receive, and so they instead select only some salient features to encode, store, and retrieve. Fogg's (2003) Prominence-Interpretation Theory of web credibility similarly suggests that credibility evaluations are a function of cue prominence and interpretation under constraints such as lack of time. And, dual processing models of information processing and evaluation (Chaiken, 1980; Petty & Cacioppo, 1981) have also been invoked to address how and when people use available credibility cues to evaluate information online (e.g., Metzger, 2007; Sundar, 2008). Dual processing models emphasize the role of motivation and cognitive ability in the depth of information assessment and decision-making.

Common to these perspectives is an emphasis on efficient information processing via cognitive heuristics, or strategies that ignore some information to make decisions more quickly and with less effort than more complex methods, thereby reducing cognitive load during information processing. Indeed, heuristic processing appears to be the default mode, as people tend to 'satisfice' or exert the minimal amount of cognitive effort necessary, unless they are particularly motivated to analyze information systematically, such as when an issue is highly personally relevant and consequential. According to Gigerenzer and Todd (1999, p. 14), heuristics 'employ a minimum of time, knowledge, and computation to make adaptive choices.' While in some views heuristics are thought to lead to biased or faulty information processing (Tversky & Kahneman, 1974), research shows heuristics can serve an important function in helping people cope effectively with the vast quantities of information they encounter every day, and can very often lead to accurate decisions (Gigerenzer & Todd, 1999; Metzger & Flanagin, 2015).

Information source

From this perspective, expertise as an indicator of credibility can efficiently be signaled heuristically by cues manifest in the type of information source. For instance, the 'authority' heuristic finds that 'a major criterion for assigning credibility to a web site is whether the source is an official authority or not' (Sundar, 2008, p. 84). Research shows, for instance, that the degree to which an entity is considered a primary or official source serves as a heuristic means of judging credibility (Hilligoss & Rieh, 2008) and that there are significantly higher trust ratings for sites considered more authoritative (Koh & Sundar, 2010). Similar to this, the reputation of an online source can also serve as a heuristic credibility cue, allowing information seekers to avoid more effortful processing. Indeed, research on persuasion shows that familiar sources are often judged to be more credible than unfamiliar sources, independent of message characteristics such as argument quality (O'Keefe, 1990) and research on credibility heuristics reports several instances of individuals relying on the reputation heuristic, across many different types of online information seeking topics and situations (Metzger et al., 2010).

Applied to the information seeking context considered in this study – online encyclopedias – this suggests that expertise as a credibility indicator can be signaled heuristically by authority and reputation cues about the information source and its method of information provision. More specifically, online information repositories in the form of encyclopedias vary widely in their reputations and their modes of information provision. Indeed, the content of online encyclopedias can be viewed on a continuum ranging

from user-generated to expert-vetted based on their models of content generation. For example, Wikipedia exemplifies user-generated content since anyone can anonymously contribute or alter information on the site.[1] At the other extreme, Encyclopædia Britannica signifies expert-generated information, which has been provided for 250 years by recognized experts worldwide. A hybrid model is best represented by Citizendium, the online encyclopedia founded by Wikipedia co-founder Larry Sanger, whose entries are provided by volunteers identified by their real names, and where entries are in turn confirmed by experts prior to being made public.

Accordingly, research demonstrates that 'perceptions of credibility are strongly anchored in the idea of expert-generated (or vetted) content, as shown by [people's] apparent singular focus on the method of information provision' (Flanagin & Metzger, 2011, p. 371). Indeed, people are often distrusting of Wikipedia, for instance, since its information originates from an open-editing model with multiple authors, rather than from vetted experts (Lucassen & Schraagen, 2011; Metzger et al., 2010). Wikipedia is therefore often viewed as a dubious source of information (Blikstad-Balas, 2016), particularly in contrast to renowned sources such as Encyclopedia Britannica (Flanagin & Metzger, 2011; Kubiszewski, Noordewier, & Costanza, 2011). Overall, then, research suggests that people are likely to believe expert sources, and especially those whose name they recognize, as most credible compared to less familiar sources and those that rely upon information provided by non-experts. Thus:

> H1: Information attributed to sources in which the content is expert-generated will be perceived as more credible than information attributed to sources that use a hybrid of expert- and user-generated information, which will in turn be perceived as more credible than information attributed to sources whose content is exclusively user-generated.

Message sidedness

Trustworthiness, long theorized as a core dimension of credibility (Hovland et al., 1953), signals a lack of bias and the capacity to trust information as forthright, truthful, and honest. Whereas expertise is primarily assessed by examining the qualifications of the information source, trustworthiness is often prominently evident in message characteristics. In the context of online information where source indicators can be confusing or even missing, Internet users may be especially likely to turn to message features when attempting to evaluate information credibility (Hong, 2006).

Trustworthiness at the message level is often viewed in terms of *message sidedness*, or the extent to which a message advances a single position (one-sided) or includes arguments about both sides of a position (two-sided). According to Allen (1991), two-sided messages give the appearance of being more honest and fair-minded, thereby increasing trustworthiness. Research evidence shows that people are more likely to select more 'balanced' (two-sided) science blog content (Winter & Krämer, 2012); enhanced balance in online reviews (i.e., both positive and negative information) increases reviewer credibility (Jensen, Averbeck, Zhang, & Wright, 2013); and experts invoking balanced arguments in a discussion are viewed as more trustworthy (Mayweg-Paus & Jucks, 2017). Indeed, two-sided messages are perceived as more credible than one-sided messages in many contexts (e.g., Block & Keller, 1995; Eisend, 2006; Faison, 1961; Kamins, Brand, Hoeke, & Moe, 1989;

Keller & Lehmann, 2008; Pechmann, 1992; Zhao & Capella, 2008), in spite of the fact that two-sided messages do not necessarily result in normatively equal or 'balanced' arguments.

That said, there are instances where one-sided messages might be considered more credible, such as in the realm of partisan news. Selective exposure studies, for example, find that people often prefer attitude congruent one-sided messages, in part because such messages are easier to process heuristically since they support one's beliefs (e.g., Fischer, Jonas, Frey, & Schulz-Hardt, 2005; Stroud, 2008; Westerwick, Johnson, & Knobloch-Westerwick, 2017). Confirmation bias, or the tendency to prefer information consistent with preexisting attitudes, has been advanced to account for this phenomenon (Schwind & Buder, 2012). Similar types of confirmation biases have been observed in credibility evaluation as well (e.g., Metzger et al., 2010), such that people tend to perceive attitude-consistent information as more credible than attitude-inconsistent information (Metzger, Hartsell, et al., 2015).

Absent preexisting attitudes that serve to anchor one's beliefs, however, message sidedness is likely to trigger relevant credibility heuristics, such as persuasive intent and expectancy violations. The persuasive intent heuristic is the tendency to feel that information that may be biased is not credible. Metzger et al. (2010) found that the presence of advertising (a signal of persuasive intent) on noncommercial websites where it is unexpected can elicit an immediate defense mechanism that leads people to mistrust information without further scrutiny. One-sided messages with implied persuasive intent may thus cue people to believe that they are being manipulated, which then leads to information mistrust. In many cases, people note this is a primary cue that they use to determine credibility, often using it as a heuristic 'stopping rule' for credibility judgments (Metzger et al., 2010). Yet, such negative arousal can be mitigated by two-sided messages that might 'significantly enhance the perceived credibility of the source and reduce negative cognitive responses' (Eisend, 2006, p. 194).

In the specific case of reference information originating from encyclopedias, which is likely to be viewed as normatively neutral or non-biased, the expectancy violation heuristic might also affect information credibility assessment. Fogg's (2003) Prominence-Interpretation Theory of credibility suggests that violations will be noticed and used to (negatively or positively) appraise credibility. As such, expectancy violations operate as heuristics in that they enable quick judgments of credibility without much consideration of message arguments, source qualifications, and other more effortful methods of information evaluation. Metzger et al. (2010), for example, found that typos appearing on professional websites serve as a negative credibility heuristic because they are unexpected for that type of site. Given people's expectation for even-handed information in encyclopedias, one-sided (versus two-sided) information in an encyclopedia entry might similarly trigger expectancy violations that could diminish perceived credibility. Accordingly, the discounting hypothesis (Allen & Stiff, 1989) argues that a message that is inconsistent with an audience's perception of a source will force a reevaluation of that source and a possible discounting of the message.

Evidence thus suggests that two-sided encyclopedia entries will be perceived as more credible than one-sided entries, independent of the expertise of the source, as stated in H2:

> H2: Two-sided messages will be perceived to be more credible than one-sided messages, regardless of information source.

The interaction of information source and message sidedness

Expectations about information source and message sidedness likely interact with heuristic cues invoked to assess credibility online. For instance, authority and reputational cues favorable to highly respected information sources providing expert-generated information might be even further enhanced – and further distinguished from less reputable sources relying on user-generated models of information provision – by the presence of two-sided (versus one-sided) messages that signal low persuasive intent consistent with reputable sources. This might bolster perceived credibility among such sources. Moreover, if expert sources exhibit bias (via one-sided information presentation) this may have only marginal negative effects compared to other source types, since people may rationalize that sources with high expertise may be correct or justified in their lack of balance. Put another way, these sources may be less susceptible to the negative impact of the discounting hypothesis.

At the same time, however, two-sided messages may serve to boost the perceived credibility of less reputable sources that rely on user-generated information. One reason that information can be judged to be low quality is because it is biased (e.g., one-sided). Thus, two-sided information from a source that is suspected to be biased or low quality could result in enhanced credibility judgments, since expectancy violations can also positively affect credibility. Indeed, the potential increase in credibility might actually be *higher* for such sources relative to more authoritative sources, given the potential for improvement in perceived credibility and the already high credibility of the authoritative sources (which implies a ceiling effect). In fact, perhaps message sidedness is critically important for unvetted sources because the potential for bias is so great. For example, two-sided online reviews are seen as more credible due to the positive expectancy violations of individual users who are anticipated to merely proclaim their personal opinions (Jensen, Averbeck, Zhang, & Wright, 2013).

In essence, compelling arguments can be made that *both* highly respected information sources providing expert-generated information *and* less reputable sources that rely on user-generated information may stand to (a) benefit more from presenting two-sided messages and (b) suffer less from decreased message sidedness. Hybrid information sources may also reap similar benefits, although there is little research to guide specific predictions. Therefore, the following research question is proposed:

> RQ1: Is the effect of message sidedness on perceived credibility stronger for user-generated, hybrid, or expert-generated information sources?

Individual differences in online credibility evaluation

Individual differences naturally impact users' credibility evaluations (Del Giudice, 2010; Flanagin & Metzger, 2013; Hong, 2006), in part by making certain cues more salient to certain people (Fogg, 2003). For example, studies have found that topic experts employ more cues to evaluate the quality of a website's information and an information source's credentials, and are less likely to rely exclusively on simple visual appeal of the site to assess its credibility, compared to less knowledgeable users (Flanagin & Metzger, 2007). Parallel results were found in studies when the information obtained online was higher in personal salience and consequentiality (see also Sillence, Briggs, Harris, & Fishwick, 2007), which

further supports the contention that people with different levels of ability and motivation pay attention to different criteria when judging the credibility of online information.

Accordingly, several personality traits have been explored to explain people's credibility beliefs and evaluation practices, including cognitive dispositions or 'thinking styles.' Because they have been shown to influence how people approach and evaluate information, such traits are likely to affect the strength of the relationship between message sidedness and perceived credibility. *Need for cognition*, for example, reflects the degree to which people engage in and enjoy thinking deeply about problems or information (Cacioppo & Petty, 1982) and, thus, may be willing to exert effort to critically evaluate information. In the context of dual processing theories applied to credibility assessments, this suggests that those higher in need for cognition might be more likely to process information deeply and elaborate more fully on relevant input. Research has demonstrated that greater need for cognition increases openness to two-sided information (Winter, Krämer, Rösner, & Neubaum, 2015) and the consideration of discrepant information (Kardash & Scholes, 1996), although other studies have yielded mixed results concerning need for cognition and message sidedness (Medders, 2015; Winter & Krämer, 2012).

Flexible thinking is another thinking disposition that perhaps has even greater traction in explaining people's credibility evaluation practices. Flexible thinking describes people's tendency to switch perspectives and their willingness to consider alternative opinions and evidence (Stanovich & West, 1997), which could lead to a more complete integration of available information (Atkin, 1973; Winter et al., 2015). Flexible thinking stems from Baron's (1988) notion of 'actively open-minded thinking,' which involves a person's willingness to consider opinions different from their own and to change their beliefs in the face of contradictory evidence. It is also rooted in the open- versus closed-mindedness dimension of Kruglanski's 'need for closure' concept (e.g., Webster & Kruglanski, 1994), which taps into people's comfort with diversity of opinions on issues and solutions to problems, degree of irritation with disagreement, and level of preference for interacting with like-minded people (Kruglanski, Atash, De Grada, Mannetti, & Pierro, 2013).

Although research has demonstrated the value of considering need for cognition in the context of online credibility assessment, flexible thinking also captures people's relevant trait-based differences in this context but has been examined in only very few credibility studies (e.g., Metzger, Flanagin, Markov, Grossman, & Bulger, 2015). Like need for cognition, flexible thinking considers the degree to which individuals might probe available cues to reach considered opinions about information credibility. Unlike need for cognition, which is a general indicator of cognitive engagement with information, flexible thinking captures the specific elements of fruitful credibility assessment, including in particular the willingness to engage with discrepant information and to alter one's beliefs based on contradictory input. Flexible thinkers value having accurate beliefs more than they value holding onto the beliefs that they already have (Stanovich & West, 1997). This thinking style thus indicates an openness to seek out and consider multiple perspectives and suggests that people higher in flexible thinking should value or appreciate information that presents a diversity of opinion (e.g., two-sided messages) more than people lower in flexible thinking. Also, because two-sided messages are more ambiguous and require integration of conflicting views, they take more cognitive effort to process (Sorrentino, Bobocel, Gitta, Olson, & Hewitt, 1988). People higher in flexible thinking likely have more motivation to exert cognitive effort and thus the effect of more balanced information

may be greater for them than people lower in flexible thinking. Therefore, whereas need for cognition is a broad indicator of the extent to which people may enjoy the cognitive labor of information assessment, flexible thinking may be a significantly more germane measure of the degree to which people are willing to seek out and accommodate information they encounter, especially if that information presents multiple perspectives.

To assess the influence of cognitive dispositions in information evaluation, H3 through H5 propose relationships between need for cognition, flexible thinking, and their relative influences on perceived credibility:

> H3: Need for cognition moderates the relationship between message sidedness and perceived credibility, such that the effect of message sidedness is stronger among people with higher need for cognition.

> H4: Flexible thinking moderates the relationship between message sidedness and perceived credibility, such that the effect of message sidedness is stronger among people with higher flexible thinking.

> H5: The interaction effect of flexible thinking and message sidedness is stronger than the interaction effect of need for cognition and message sidedness.

Method

Sample and procedure

Data for this study were collected from the professional research firm GfK's probability-based participant panel that is representative of the entire US population, from which respondents who use the Internet were randomly selected to complete an online experiment. Subjects participated in the study from wherever they typically accessed the Internet, at their leisure. Each subject was presented with a screen shot of an entry from an online encyclopedia, followed by questions about the entry they had viewed.

Stimuli, experimental conditions, and manipulation checks

Each entry was presented as originating from one of three different types of online encyclopedias, representing user-generated, hybrid (both user- and expert-generated), and expert-generated information. Accordingly, the notable difference among the encyclopedias was the purported 'source' of the information, which was reflected in the description of the encyclopedia that experimental subjects were given: Participants were instructed that they would see an image of a web page from (a) 'the online encyclopedia *Wikipedia*, where anyone can add or change information at any time without giving their real names,' or from (b) 'the online encyclopedia *Citizendium*, where anyone can contribute entries, as long as they are identified by their real names. All contributions, however, are reviewed by experts before being accepted,' or from (c) the online version of '*Encyclopædia Britannica*, whose entries have been contributed by respected experts worldwide since 1768.' To ensure that all participants understood differences in user-generated, hybrid, and expert-generated information, they were asked to identify which method of selection for entries was used by the encyclopedia source they viewed. Those subjects who did not correctly identify the method of selecting entries for the encyclopedia (42% of subjects) were excluded from all further analyses.

Two versions of each encyclopedia entry were created, reflecting a one-sided information presentation (which recounted only a single perspective on the entry topic at hand) and a two-sided information presentation (which included both, contrasting perspectives on the entry topic). Pretests with a sample separate from this study showed that entries were appropriately perceived as either one- or two-sided.[2] Further, a manipulation check in the main study, which posed the question 'In this encyclopedia entry, one perspective was presented more strongly than other perspectives' (on a 5-point scale from 'strongly disagree' to 'strongly agree'), was used to eliminate those who did not correctly interpret the one-sided or two-sided perspectives presented. Only those subjects viewing a two-sided entry who disagreed or strongly disagreed with this question, and those subjects viewing a one-sided entry who agreed or strongly agreed with this question (26% of subjects), were retained for subsequent analyses.

The stimuli were also designed to be robust to various threats to validity. To guard against name recognizability effects for the particular websites represented in the study, three parallel but fictitious sites were also presented ('Peoplepedia,' 'Userpedia,' and 'World Encyclopedia'), which were designed and described in the identical manner as the three 'genuine' sites. Among those who passed the manipulation checks, no significant differences were found on the study's dependent variable between the actual and fictitious versions of the encyclopedias so they were collapsed for all analyses. Further, to enhance stimulus generalizability (i.e., to determine if any outcomes were merely issue-specific), multiple encyclopedia entries were included that could be presented as either one-sided or two-sided (i.e., entries on the contested circumstances of Kurt Cobain's death and the controversial authorship of William Shakespeare's works [entertainment]; the debated causes of autism as well as of Graves' Disease [health]; and positions on the net neutrality debate and the proposed flat tax in the US [news]), across different information domains (i.e., news, etc.) since past research has shown variation in this regard (Flanagin & Metzger, 2007). The content for each of these entries was gleaned from all three encyclopedias mentioned earlier, and each entry was edited to be of similar format and length. Because there were minor differences on the outcome variable based on the encyclopedia topic, this was included as an experimental factor in the study's design in subsequent analyses in order to identify its effects.

This experiment thus took the form of a 3 (information provision *source*: user-generated, hybrid, and expert-generated) by 2 (message *sidedness*: one-sided versus two-sided) by 6 (topic: Shakespeare, Cobain, autism, Graves' Disease, net neutrality, or flat tax) factorial design, where subjects were randomly assigned to one among these conditions. Figure 1 shows an example stimulus image of the two-sided entry for Graves' Disease on the fictitious user-generated encyclopedia 'Peoplepedia.' The final sample consisted of 463 participants (241 female) with an average age of 47.95 years ($SD = 15.08$). A post-hoc power analysis showed that the sample size was adequate to detect main effects and interactions of source and message sidedness in medium effect sizes ($f = 0.25$; see Eisend, 2006; Koh & Sundar, 2010).

Measures

Following extensive past research suggesting that believability is the core dimension of credibility, the dependent variable of perceived *information credibility* was assessed by the question 'How much do you believe this information,' with response categories

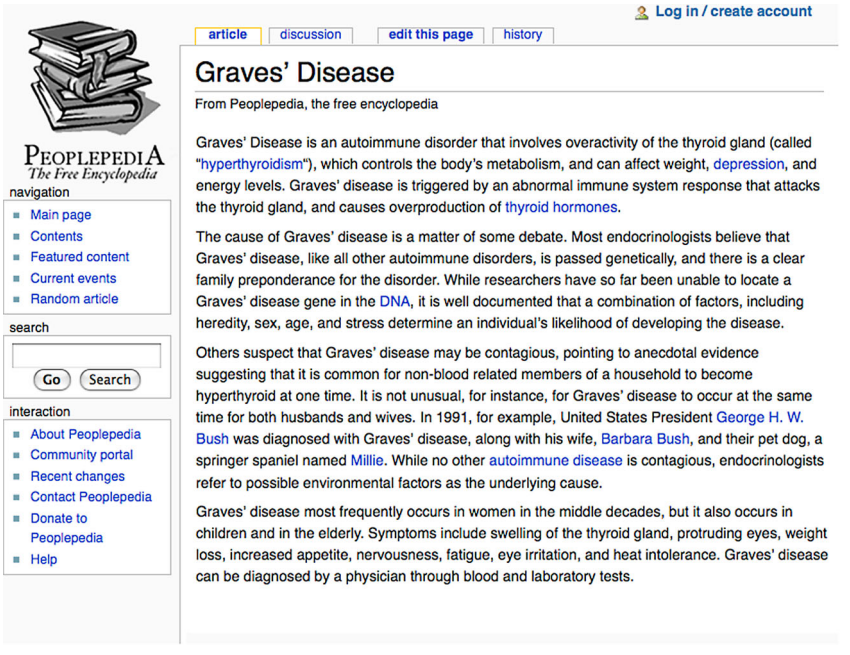

Figure 1. Example stimulus image; Two-sided message on the entry for Graves' Disease, on the fictitious encyclopedia Peoplepedia.

ranging from 1 = 'Not at all' to 5 = 'A whole lot' ($\bar{X} = 3.00$, $SD = 1.11$). This measure was validated (as part of a wider data collection effort) through a multi-step, multi-method process including feedback from small-scale focus groups, face-to-face interviews, and pilot-testing with a sample independent from the current study. Although multi-item measures are often advantageous, single item measures with high face validity offer several important practical advantages including accommodating subjects' limited attentional and time resources and are successfully invoked to measure concepts ranging from state anxiety (Davey, Barratt, Butow, & Deeks, 2007) to narcissism (Konrath, Meier, & Bushman, 2014).

Nine Likert-scale items slightly modified from existing measures of flexible thinking and need for closure (Stanovich & West, 1997; Webster & Kruglanski, 1994) were used to measure *flexible thinking open-mindedness* (on a 5-point scale; $\bar{X} = 3.66$, $SD = 0.48$).[3] Cronbach's alpha for this measure was .75. *Need for cognition* was measured with 9 Likert-scale items with response options ranging from strongly disagree to strongly agree, using a scale adapted by Kokis, Macpherson, Toplak, West, and Stanovich (2002) from Cacioppo and Petty's standard 18-item adult need for cognition scale ($\bar{X} = 3.53$, SD = 0.57, Cronbach's alpha = .80).[4]

Results

In order to test H1 and H2 and to answer RQ1, an analysis of variance (ANOVA) with the between-subject factors message sidedness, information source, and encyclopedia entry topic (to account for potential variations due to the different texts) and the dependent

variable of perceived credibility was conducted. Results showed significant main effects of information source, $F(2, 426) = 42.05$; $p < .001$, $\eta_p^2 = .17$, and message sidedness, $F(1, 426) = 4.47$; $p = .035$, $\eta_p^2 = .01$, as well as a significant interaction of information source and message sidedness, $F(2, 426) = 9.10$; $p < .001$, $\eta_p^2 = .04$. As predicted, entries were perceived as most credible on expert-generated sites ($\bar{X} = 3.70$, $SD = 1.01$), followed by hybrid sites ($\bar{X} = 3.02$, $SD = 0.97$), and least credible on user-generated sites ($\bar{X} = 2.55$, $SD = 1.03$). All post-hoc comparisons with Bonferroni correction were significant ($p < .001$). H1 is therefore supported.

With regard to the effect of message sidedness, mean values showed that two-sided entries ($\bar{X} = 3.14$, $SD = 1.18$) were perceived as more credible than one-sided entries ($\bar{X} = 2.88$, $SD = 1.03$). Although this pattern supports H2, the effect size is relatively small and perhaps is best understood in terms of the disordinal interaction effect between information source and message sidedness. The mean values (see Table 1) of the interaction show that two-sided entries were perceived as particularly credible when displayed on a hybrid site, whereas there were only minor differences between one-sided and two-sided entries when displayed on purely expert-generated or user-generated sites. Follow-up analyses of this interaction showed no significant effect of message sidedness in the subsample of participants who received the article with the source of a user-generated or expert-generated site (for the user-generated site, the mean value for the one-sided article was even slightly higher than for the two-sided version, but this difference was not significant). Only in the subsample of the hybrid source did a significant main effect of message sidedness occur, $F(1, 132) = 21.30$; $p < .001$, $\eta_p^2 = .14$. With regard to RQ1, this suggests that message sidedness has the strongest effects for sources with a hybrid method of information provision.[5]

H3, H4, and H5 exploring the moderating effects of thinking styles were tested with a hierarchical regression analysis. In the first block, message sidedness, flexible thinking, and need for cognition were entered as potential predictors; the second block included all two-way interaction terms (as the product of the centralized variables: sidedness and flexible thinking, sidedness and need for cognition, flexible thinking and need for cognition) and the three-way interaction. The final model was significant, $F(7, 460) = 5.54$; $p < .001$; $R^2 = .079$. As shown in Table 2, the interaction of message sidedness and flexible thinking emerged as a significant predictor of credibility. To investigate the direction of this interaction, a simple slope analysis (Aiken & West, 1991) was conducted: Results showed that those with high levels of flexible thinking perceived two-sided entries to be more credible, $b = 0.56$, $SE = 0.16$, $t = 3.40$, $p = .001$, whereas the slope was not significant for lower levels of flexible thinking (see Figure 2). This finding supports H4. The data show no support for H3 because the interaction of message sidedness and need for cognition was not a significant predictor of perceived credibility. Finally, in support of H5, flexible

Table 1. Effects of message sidedness and information source on perceived credibility (mean values and standard deviations in parentheses).

	One-sided	Two-sided	Total
User-generated	2.64 (0.99)	2.44 (1.08)	2.55 (1.03)
Hybrid	2.75 (0.96)	3.44 (0.85)	3.02 (0.97)
Expert-generated	3.67 (0.86)	3.72 (1.10)	3.70 (1.01)
Total	2.88 (1.03)	3.14 (1.18)	3.00 (1.11)

Table 2. Hierarchical regression analysis: Effects of message sidedness, flexible thinking, need for cognition, and their interactions on perceptions of information credibility.

	Perceived credibility		
Predictor	R^2	*Beta*	*p*
Block 1	.032		
Message sidedness		.118	.011
Flexible thinking (FT)		.116	.036
Need for cognition (NC)		.032	.565
Block 2	.079		
Interaction: sidedness X FT		.152	.006
Interaction: sidedness X NC		.080	.145
Interaction: NC X FT		–.027	.557
Three-way-interaction		.048	.338

thinking was shown to be the only significant (and thus stronger) moderator of the relationship between message sidedness and perceived credibility.

Discussion

This study extends knowledge on the interplay of heuristic cues in complex information environments and the conditions under which people value particular information sources and 'balanced' content in evaluating the credibility of information they might encounter online. Results from our experiment in the context of online encyclopedia entries indicate that the degree to which information is generated and/or vetted by experts versus laypeople is an important factor in people's credibility decisions. This is consistent with past research (e.g., Blikstad-Balas, 2016; Flanagin & Metzger, 2011; Kubiszewski et al., 2011; Lucassen & Schraagen, 2011), and is likely a manifestation of the authority and reputation heuristics that have been observed to affect credibility evaluation in other online contexts (Metzger et al., 2010).

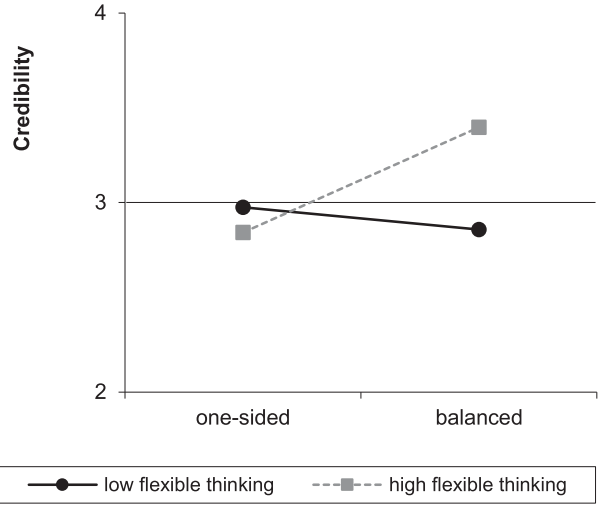

Figure 2. Simple slope analysis: Interaction of message sidedness and flexible thinking on perceived credibility.

Data from this study also confirm that people factor in message sidedness as they assess credibility, although to a lesser extent than information source. Two-sided messages were perceived as more credible than one-sided messages, perhaps because in the online encyclopedia context one-sided messages violate people's expectations for unbiased information and trigger a response to perceived persuasive intent. However, although our findings for message sidedness are consistent with credibility research in other domains (e.g., Eisend, 2006; Pechmann, 1992; Zhao & Capella, 2008), they are weaker than anticipated. Their more modest influence could stem from message sidedness cues being more obscure, since they are manifest only in the message, in contrast to relatively more conspicuous cues such as those of the information source (i.e., partisan news outlets), which may be detected more readily.

More intriguing is that message sidedness matters most when content comes from a hybrid source (i.e., when information is *both* expert- and user-generated). One possible explanation for this interaction is that people may have clearer expectations for expert- and user-generated information than they do for less familiar hybrid models of information provision. In the case of online encyclopedias especially, people may expect expert-generated information from a source such as Encyclopedia Britannica to be neutral or balanced (two-sided) and user-generated information from a source like Wikipedia to be more biased (one-sided), and arrive at their credibility judgments according to those expectations.

Heuristics may guide this process. For hybrid sources for which authority and reputation are less clear, persuasive intent/expectancy violation heuristics, which have been shown to trigger arousal and therefore skepticism (Metzger & Flanagin, 2015; Metzger et al., 2010), might be more pronounced. Consequently, one-sided content as an indicator of persuasive intent, which prompts an expectancy violation in the online encyclopedia context, becomes more crucial as a credibility cue. Under conditions of more ambiguous hybrid information sources, persuasive intent may be mitigated by two-sided messages, assuaging people's concern about the credibility of the information. Taken together, the results from Hypotheses 1 and 2 tentatively suggest a potential two-step process in credibility evaluation whereby people check the information source to determine its credibility, and if there are doubts about the source, they then turn to message factors. In this way, two-sided messages may provide the biggest credibility 'boost' to information from less familiar sources, since the source cues are more ambiguous.

Another important contribution of this study is the identification of individual differences in thinking styles to understand who is more or less influenced by two-sided versus one-sided information. In contrast to prior research that has found need for cognition to be a significant moderator of the relationship between message sidedness and people's attitudes (Winter et al., 2015) and beliefs (Kardash & Scholes, 1996), need for cognition did not significantly affect the influence of message sidedness on credibility ratings. Given this, although need for cognition is influential on attitudes and beliefs more generally, it does not appear to similarly affect people's credibility evaluations specifically (see, for example, Medders, 2015). Flexible thinking, however, does.

Prior work on flexible thinking open-mindedness has found that it lowers heuristic and increases analytic processing (Kokis et al., 2002) and makes people more skeptical toward, and less willing to blindly accept, information based on surface cues or features (Swan & Revlin, 2015). Furthermore, flexible thinking inoculates against the belief bias

(believing information based on plausibility rather than quality; MacPherson & Stanovich, 2007), confirmation bias (selecting information simply because one agrees with it; Hohn, 2015; Svedholm-Häkkinen & Lindeman, 2018), and evaluation bias (tendency to evaluate preference-consistent arguments as higher quality). It is also shown to increase propensity to evaluate information objectively (Svedholm-Häkkinen & Lindeman, 2018).

Findings from this study reflect these tendencies. High flexible thinkers rated two-sided messages as more credible than one-sided messages, which suggests that flexible thinkers are more favorable to messages that provide alternative viewpoints. Moreover, favoring two-sided over one-sided messages would seem to require a more analytic orientation to information processing and attention to quality (versus surface) cues, as might be the case when seeking information from an encyclopedia, and the reductions in various information processing biases described above also suggest a greater appreciation for diverse information. In addition, consistent with findings from this study, those more tolerant of ambiguity (i.e., uncertainty-oriented) were more persuaded by two-sided rather than one-sided messages (Sorrentino et al., 1988) and high need for cognitive closure individuals have been hypothesized to dislike two-sided messages because they are ambiguous and frustrate closure (Braatz, 2017).

Overall, flexible thinking is a specific, useful, and relevant measure of people's capacity to openly consider diverse viewpoints, which in a rich and varied media environment might serve as an important indicator of willingness to entertain alternative perspectives across a variety of contexts online. In an information environment that is seemingly increasingly dominated by one-sided information, flexible thinking may in fact serve to inoculate against the biased presentation of information. Nonetheless, flexible thinking has received almost no attention as a relevant thinking style measure in the context of information evaluation, despite the fact that it is clearly more important in the context of credibility assessment than is need for cognition. The findings of our study suggest, for example, that flexible thinkers are more receptive to messages that provide alternative viewpoints, and may thus be the best 'target' group for such content.

To some extent, the findings from this study might be somewhat context specific, and the role of source and message factors – and the relevant heuristic cues they trigger – might vary in other contexts. For example, research examining more subjective personal preference information (i.e., movie reviews) found user-generated content to be more credible than expert-generated content at high volume of information contributors (Flanagin & Metzger, 2013), quite possibly due to a 'bandwagon' heuristic whereby individuals privilege laypeople's opinions, but only at high information volume. In that context, the primacy of source information was moderated by volume cues (which are not terribly relevant in the context of Wikipedia) and the mitigating role of message sidedness was not applicable. Thus, although the general logic of heuristic information processing endures, heuristic processing must be understood in terms of the specific information context.

While the present study is limited by a forced exposure setting and only considers the outcome measure of perceived credibility, future research could benefit by focusing squarely on information processing or elaboration measures in order to better unpack the *process* of credibility evaluation across contexts. Indeed, studies that are more naturalistic and that measure the ways in which people arrive at their credibility decisions are

required to build theory about the processes that guide online credibility evaluations. Moreover, changing social perceptions of user-generated information sources as legitimate and credible necessitate future research in this domain to ensure that the findings of this study endure over time.

That said, contributions of the present study include an extension of source type to include the diversity of possibilities available online today (including whether information is expert-generated, user-generated, or a combination of these) and the clarification of how message sidedness and type of information source affect the perceived credibility of online information. Although past research had indicated source differences consistent with our findings, it had not considered message sidedness in this context, nor had the important interactions between these factors been uncovered. This study thus serves to specify and elucidate the conditions under which people favor two-sided over one-sided reference content online. Additionally, this study introduces, tests, and validates how individual psychological differences affect the evaluation of online information credibility. Importantly, flexible thinking is proposed as a novel, critical, and understudied factor in online information assessment, which appears to be a superior measure of other cognitive dispositions or 'thinking styles' such as need for cognition in this domain. Overall, these contributions help to clarify how people navigate the wide diversity of information options available today in efforts to locate credible information to guide their attitudes and behaviors.

Notes

1. Although all information on Wikipedia is user-generated, such users of course include both topical experts and non-experts. Yet, unlike Citizendium and Encyclopædia Britannica, all Wikipedia entries are not routinely confirmed by experts prior to publication.
2. Entries were assessed on a 5-point Likert-type scale (high values corresponded with greater agreement; Cronbach's alpha = .77) in terms of whether respondents ($N = 487$) felt that (a) more than one side of the issue was presented, (b) the information was presented in a balanced way, (c) information was presented impartially, (d) information was biased (reverse-coded), and (e) one perspective was presented more strongly than another (reverse-coded). One-sided entries ($\bar{X} = 2.80$, $SD = .64$) were viewed as significantly less balanced than two-sided entries ($\bar{X} = 3.31$, $SD = .66$; $p < .001$).
3. The scale consisted of the following items: Even after I've made up my mind about something, I am always willing to consider a different opinion; When thinking about a problem, I consider as many different opinions on the issue as possible; I feel that thinking about other points of view is a waste of time (reverse coded); People should always consider evidence that goes against their beliefs; I often ignore information that is different from what I believe (reverse coded); I often change what I believe when I find new information or evidence; I do not usually look at many different opinions before forming my own view (reverse coded); I always see many possible solutions to problems; It's important to change what you believe when new information suggests you should.
4. The scale consisted of the following items: I like challenging problems instead of easy ones; I like problems that take a lot of thought rather than something that needs little thought; I like to do things where I don't have to think at all (reverse-coded); I like to do things that make me think hard; I like to spend a lot of time and energy thinking about something; I try to avoid problems that I have to think about a lot (reverse-coded); I like doing things that I've learned to do well again and again so that I don't have to think so hard about them (reverse-coded); I'm not interested in learning new ways to think (reverse-coded); It's really cool to figure out a new way to do something.

5. With regard to the content of the entries, an additional significant effect of topic on perceived information credibility occurred, F (5, 426) = 6.48; $p < .001$, $\eta_p^2 = .07$, showing that the entry on the topic of Shakespeare was perceived as less credible than all other topics except for the entry on flat tax (from which it did not differ; post-hoc comparisons with Bonferroni correction: $p < .05$). Entries for these two topics thus were perceived as somewhat less credible than others, perhaps due to their highly controversial and somewhat implausible nature. Additionally, a significant three-way interaction of message sidedness, information source, and topic emerged, F (10, 426) = 2.02; $p = .030$; $\eta_p^2 = .05$, which did not qualify the pattern of the higher-order interaction since two-sided messages on every topic were perceived as more credible when presented on hybrid sources. Similarly, no pattern emerged across the information domains (i.e., entertainment, etc.) to suggest they were meaningful in this study. Overall, then, the inclusion of multiple topics seems to have achieved the goal of enhancing validity by guarding against outcomes merely being issue-specific since the preponderance of evidence shows that differences in topic or information domain did not dictate the study's outcomes to any large degree.

Disclosure statement

No potential conflict of interest was reported by the authors.

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References

Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. Newbury Park, CA: Sage.

Allen, M. (1991). Meta-analysis comparing the persuasiveness of one-sided and two-sided messages. *Western Journal of Speech Communication*, *55*, 390–404.

Allen, M., & Stiff, J. B. (1989). Testing three models for the sleeper effect. *Western Journal of Speech Communication*, *53*, 411–426.

Atkin, C. K. (1973). Instrumental utilities and information seeking. In P. Clarke (Ed.), *New models for mass communication research* (pp. 205–242). Beverly Hills, CA: Sage.
Baron, J. (1988). *Thinking and deciding*. New York: Cambridge University Press.
Blikstad-Balas, M. (2016). "You get what you need": A study of students' attitudes towards using Wikipedia when doing school assignments. *Scandinavian Journal of Educational Research*, *60*, 594–608.
Block, L. G., & Keller, P. A. (1995). When to accentuate the negative: The effects of perceived efficacy and message framing on intentions to perform a health-related behavior. *Journal of Marketing Research*, *32*(2), 192–203. doi:10.2307/3152047
Braatz, L. A. (2017). *Consumer responses towards promotional posts: The effects of message sidedness and product depiction* (Master's thesis). University of Twente, Twente, The Netherlands.
Cacioppo, J. T., & Petty, R. E. (1982). The need for cognition. *Journal of Personality and Social Psychology*, *42*, 116–131.
Chaiken, S. (1980). Heuristic versus systematic information processing and the use of source versus message cues in persuasion. *Journal of Personality and Social Psychology*, *39*, 752–766.
Davey, H. M., Barratt, A. L., Butow, P. N., & Deeks, J. J. (2007). A one-item question with a Likert or visual analog scale adequately measured current anxiety. *Journal of Clinical Epidemiology*, *60*(4), 356–360.
Del Giudice, K. V. (2010). *Trust on the web: The impact of social consensus on information credibility* (Unpublished doctoral dissertation). University of Central Florida, Orlando, Florida. Retrieved from http://purl.fcla.edu/fcla/etd/CFE0003240
Eisend, M. (2006). Two-sided advertising: A meta-analysis. *International Journal of Research in Marketing*, *23*, 187–198.
Faison, E. W. (1961). Effectiveness of one-sided and two-sided mass communications in advertising. *Public Opinion Quarterly*, *25*, 468–469.
Fischer, P., Jonas, E., Frey, D., & Schulz-Hardt, S. (2005). Selective exposure to information: The impact of information limits. *European Journal of Social Psychology*, *35*, 469–492.
Flanagin, A. J., & Metzger, M. J. (2007). The role of site features, user attributes, and information verification behaviors on the perceived credibility of web-based information. *New Media and Society*, *9*, 319–342.
Flanagin, A. J., & Metzger, M. J. (2011). From Encyclopædia Britannica to Wikipedia: Generational differences in the perceived credibility of online encyclopedia information. *Information, Communication & Society*, *14*, 355–374.
Flanagin, A. J., & Metzger, M. J. (2013). Trusting expert- versus user-generated ratings online: The role of information volume, valence, and consumer characteristics. *Computers in Human Behavior*, *29*, 1626–1634.
Fogg, B. J. (2003). *Prominence-interpretation theory: Explaining how people assess credibility online*. Proceedings of CHI'03, extended abstracts on human factors in computing systems, pp. 722–723.
Fogg, B. J., & Tseng, H. (1999). The elements of computer credibility. *Proceedings of CHI'99, Human factors in computing systems*, pp. 80–87.
Gigerenzer, G., & Todd, P. M. (1999). *Simple heuristics that make us smart*. New York: Oxford University Press.
Hilligoss, B., & Rieh, S. Y. (2008). Developing a unifying framework of credibility assessment: Construct, heuristics, and interaction in context. *Information Processing & Management*, *44* (4), 1467–1484. doi:10.1016/j.ipm.2007.10.001
Hohn, R. E. (2015). *Myside bias in probabilistic ethical decision making* (Masters theses). 68. Retrieved from http://commons.lib.jmu.edu/master201019/68
Hong, T. (2006). The influence of structural and message features on web site credibility. *Journal of the Association for Information Science and Technology*, *57*, 114–127.
Hovland, C. I., Janis, I. L., & Kelley, J. J. (1953). *Communication and persuasion*. New Haven, CT: Yale University Press.
Jensen, M. L., Averbeck, J. M., Zhang, Z., & Wright, K. B. (2013). Credibility of anonymous online product reviews: A language expectancy perspective. *Journal of Management Information Systems*, *30*, 293–324.

Kamins, M. A., Brand, M. J., Hoeke, S. A., & Moe, J. C. (1989). Two-sided versus one-sided celebrity endorsements: The impact on advertising effectiveness and credibility. *Journal of Advertising*, *18* (2), 4–10. doi:10.1080/00913367.1989.10673146

Kardash, C. A. M., & Scholes, R. J. (1996). Effects of pre-existing beliefs, epistemological beliefs, and need for cognition on interpretation of controversial issues. *Journal of Educational Psychology*, *88* (2), 260–271. doi:10.1037/0022-0663.88.2.260

Keller, P. A., & Lehmann, D. R. (2008). Designing effective health communications: A meta-analysis. *Journal of Public Policy & Marketing*, *27*(2), 117–130.

Koh, Y. J., & Sundar, S. S. (2010). Effects of specialization in computers, web sites and web agents on e-commerce trust. *International Journal of Human-Computer Studies*, *68*, 899–912.

Kokis, J. V., Macpherson, R., Toplak, M. E., West, R. F., & Stanovich, K. E. (2002). Heuristic and analytic processing: Age trends and associations with cognitive ability and cognitive styles. *Journal of Experimental Child Psychology*, *83*, 26–52.

Konrath, S., Meier, B. P., & Bushman, B. J. (2014). Development and validation of the single item narcissism scale (SINS). *PLoS ONE*, *9*(8), e103469.

Kruglanski, A. W., Atash, M. N., De Grada, E., Mannetti, L., & Pierro, A. (2013). Need for closure scale (NFC). Measurement instrument database for the social sciences. Retrieved from www.midss.ie

Kubiszewski, I., Noordewier, T., & Costanza, R. (2011). Perceived credibility of internet encyclopedias. *Computers & Education*, *56*, 659–667.

Lang, A. (2000). The limited capacity model of mediated message processing. *Journal of Communication*, *50*, 46–70.

Lucassen, T., & Schraagen, J. M. (2011). Factual accuracy and trust in information: The role of expertise. *Journal of the Association for Information Science and Technology*, *62*, 1232–1242.

MacPherson, R., & Stanovich, K. E. (2007). Cognitive ability, thinking dispositions, and instructional set as predictors of critical thinking. *Learning and Individual Differences*, *17*, 115–127.

Mayweg-Paus, E., & Jucks, R. (2017). Conflicting evidence or conflicting opinions? Two-sided expert discussions contribute to experts' trustworthiness. *Journal of Language and Social Psychology*. Advance online publication.

Medders, R. (2015, May). *The role of credibility assessment in exposure to political information on the Internet*. Paper presented at the annual meeting of the International Communication Association, San Juan, Puerto Rico.

Metzger, M. J. (2007). Making sense of credibility on the Web: Models for evaluating online information and recommendations for future research. *Journal of the American Society for Information Science and Technology*, *58*(13), 2078–2091. doi:10.1002/(ISSN)1532-2890

Metzger, M. J., Flanagin, A. J., Eyal, K., Lemus, D. R., & McCann, R. (2003). Credibility in the 21st century: Integrating perspectives on source, message, and media credibility in the contemporary media environment. In P. Kalbfleisch (Ed.), *Communication Yearbook 27* (pp. 293–335). Mahwah, NJ: Lawrence Erlbaum.

Metzger, M. J., Flanagin, A. J., Markov, A., Grossman, R., & Bulger, M. (2015). Believing the unbelievable: Understanding young people's information literacy beliefs and practices in the United States. *Journal of Children and Media*, *9*, 325–348.

Metzger, M. J., Flanagin, A. J., & Medders, R. (2010). Social and heuristic approaches to credibility evaluation online. *Journal of Communication*, *60*, 413–439.

Metzger, M. J., & Flanagin, A. J. (2015). Psychological approaches to credibility assessment online. In S. S. Sundar (Ed.), *Handbook of the psychology of communication technology* (pp. 445–466). Hoboken, NJ: Wiley-Blackwell.

Metzger, M. J., Hartsell, E. H., & Flanagin, A. J. (2015). Cognitive dissonance or credibility? A comparison of two theoretical explanations for selective exposure to partisan news. *Communication Research*. doi:10.1177/0093650215613136

O'Keefe, D. J. (1990). *Persuasion: Theory and research*. Newbury Park, CA: Sage.

Pechmann, C. (1992). Predicting when two-sided ads will be more effective than one-sided ads: The role of correlational and correspondent inferences. *Journal of Marketing Research*, *29*, 441–453.

Petty, R. E., & Cacioppo, J. T. (1981). *Attitudes and persuasion: Classic and contemporary approaches*. Dubuque, IA: Brown.

Rieh, S.Y., & Danielson, D.R. (2007). Credibility: A multidisciplinary framework. In B. Cronin (Ed.), *Annual review of information science and technology* (Vol. 41, pp. 307–364). Medford, NJ: Information Today.

Schwind, C., & Buder, J. (2012). Reducing confirmation bias and evaluation bias: When are preference-inconsistent recommendations effective – And when not? *Computers in Human Behavior*, *28*, 2280–2290.

Sillence, E., Briggs, P., Harris, P. R., & Fishwick, L. (2007). How do patients evaluate and make use of online health information? *Social Science & Medicine*, *64*(9), 1853–1862. doi:10.1016/j.socscimed.2007.01.012

Sorrentino, R. M., Bobocel, D. R., Gitta, M. Z., Olson, J. M., & Hewitt, E. C. (1988). Uncertainty orientation and persuasion: Individual differences in the effects of personal relevance on social judgments. *Journal of Personality and Social Psychology*, *55*(3), 357–371.

Stanovich, K. E., & West, R. F. (1997). Reasoning independently of prior belief and individual differences in actively open-minded thinking. *Journal of Educational Psychology*, *89*, 342–357.

Stroud, N. J. (2008). Media use and political predispositions: Revisiting the concept of selective exposure. *Political Behavior*, *30*, 341–366.

Sundar, S. (2008). The MAIN model: A heuristic approach to understanding technology effects on credibility. In M. Metzger & A. Flanagin (Eds.), *Digital media, youth, and credibility* (pp. 73–100). Cambridge, MA: MIT Press.

Svedholm-Häkkinen, A. M., & Lindeman, M. (2018). Actively open-minded thinking: Development of a shortened scale and disentangling attitudes towards knowledge and people. *Thinking & Reasoning*, *24*, 21–40.

Swan, A. B., & Revlin, R. (2015). Inhibition failure is mediated by a disposition toward flexible thinking. *Proceedings of the 37th annual meeting of the cognitive science society*. Austin, TX: Cognitive Science Society.

Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science*, *185*(4157), 1124–1131. doi:10.1126/science.185.4157.1124

Webster, D., & Kruglanski, A. (1994). Individual differences in need for cognitive closure. *Journal of Personality and Social Psychology*, *67*(6), 1049–1062.

Westerwick, A., Johnson, B. K., & Knobloch-Westerwick, S. (2017). Confirmation biases in selective exposure to political online information: Source bias vs. content bias. *Communication Monographs*, *84*, 343–364.

Winter, S., Krämer, N. C., Rösner, L., & Neubaum, G. (2015). Don't keep it (too) simple: How textual representations of scientific uncertainty affect laypersons' attitudes. *Journal of Language and Social Psychology*, *34*, 251–272.

Winter, S., & Krämer, N. C. (2012). Selecting science information in Web 2.0: How source cues, message sidedness, and need for cognition influence users' exposure to blog posts. *Journal of Computer-Mediated Communication*, *18*, 80–96.

Zhao, X., & Cappella, J. N. (2008). The influence of ambivalence on adolescents' reactions to anti-drug messages. *Communication Quarterly*, *56*(2), 131–148. doi:10.1080/01463370802026885