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Disclose your flaws! Admission positively affects the perceived trustworthiness of an expert science blogger☆,☆☆

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ABSTRACT

Laypeople need to trust experts, because they lack sufficient background knowledge to handle scientific evidence. This study investigates if a science blogger's expertise, integrity, and benevolence are affected by an admission of a study's flaw in contrast to a critique by another scientist. Results ($N = 90$) showed that ascriptions of expertise were lower when a flaw was disclosed, no matter by whom. However, ascriptions of integrity and benevolence were higher when admitted vs. when introduced via critique. Hence, epistemic trustworthiness is inferred from objective data (a flaw was made), but also from communicative actions (admission of the flaw).

1. Introduction

In 2011, *Science* published an article on a newly discovered type of bacteria that could incorporate arsenic into its DNA instead of phosphorus (Wolfe-Simon et al., 2011). However, soon after publication, critiques appeared online, many in science blogs (Wolinsky, 2011; Yeo et al., 2016). Various researchers commented that the article contained flaws, and they attributed these to Wolfe-Simon's research procedure (e.g., ways of preparing DNA).[1] Questioning and refuting methods, results, and theories of other scientists is everyday business in the work of researchers (Lakatos & Musgrave, 1970; Upshur, 2000). By addressing the study's flaws, science bloggers provided a common service to the scientific community quite similar to what for example peer reviewers do (Wolinsky, 2011). But also, this example illustrates a new feature of conversations within the academia: Nowadays discussions among scientists do not only take place within relatively closed conversational settings, for example face to face in research groups or during conferences, or by the exchange of papers via email. Online-discussions about scientific methods and discoveries among scientists in blogs (e.g., researchblogging.org) are much more accessible to the general public than the former conversational settings for scientific discourse used to be (Batts, Anthis, & Smith, 2008; Brumfiel, 2009; Kouper, 2010).

Online sources have become increasingly important as sources of scientific knowledge. Indeed, 63% of the Americans surveyed in a National Science Board study (Besley, 2014) cited the Internet as their primary source of information on specific scientific issues such as global warming or biotechnology; and it is especially young audiences that access the Internet to gather scientific information (Anderson, Brossard, & Scheufele, 2010). One is quite likely to come across blog entries during an Internet search and blogs and other nontraditional media outlets are frequently used for information (Brossard & Scheufele, 2013). When finding such science blogs, laypeople will experience experts who disagree with each other and criticize each other (Luzón, 2013). In this paper we will scrutinize the impact of such conversations among scientists on laypersons' perceptions of the trustworthiness of a scientist, who provided his/her findings in the blog. We will examine especially the effect of critical comments on specific components of trust judgments and focus on the question if it matters who comes up with a critical comment, either another scientist or the expert blogger himself. This study is about conversations among scientists in

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[1] See, for example, Rosie Redfield's blog: http://rrresearch.fieldofscience.com/2010/12/arsenic-associated-bacteria-nasas.html.

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blogs, not about the conversation between scientists and members of the general public with such settings, therefore we refer to the interlocutors as *expert bloggers.*

1.1. Epistemic trust: Which inferences about experts are made?

Laypeople usually have insufficient background knowledge to deal with scientific evidence directly, and assess, for example, its coherence, veracity, or adequacy (Bromme & Goldman, 2014). Nevertheless, their need to make sense of scientific information is greater than ever (Sinatra, Kienhues, & Hofer, 2014). Therefore, laypeople need to defer to experts who can provide deeper topic knowledge and ensure its validity and veracity (Bromme, Kienhues, & Porsch, 2010; Origgi, 2014). Large-scale surveys in Europe, and in the U.S. show that the general public holds quite positive attitudes about science in general (Besley, 2014; Castell et al., 2014; European Commission, 2013). However, when it comes to specific issues, laypeople's opinions and decisions may not only depend on their general trust in science, they may also be a result of an assessment of risks and dangers associated with the issue (Lidskog, 1996; Siegrist & Cvetkovich, 2000), and the trust placed in the scientists who engage in research about those issues (Critchley, 2008; Cummings, 2014). How much trust is placed in one expert depends on what is known about her – for example if she possesses relevant expertise (Winter & Krämer, 2012), or if she is affiliated with a trustworthy institution, for example a public university (Critchley, 2008) – and it depends also on what this expert communicates, for example, the extent to which she refers to conflicts (Jensen & Hurley, 2012) or uncertainties (Jensen, 2008; Winter, Krämer, Rösner, & Neubaum, 2015) in her reports. In short, recipients hold expectations about an expert's epistemic trustworthiness and evaluate the fulfilment of these, when being confronted with an expert who communicates about science. Such judgments of epistemic trust (Origgi, 2004) are not equal to blind trust: While assuming that speakers are generally honest, recipients also are vigilant to deception and will infer about the trustworthiness of their interlocutors (Sperber et al., 2010). Summing up, even if laypeople have bounded capacities to evaluate directly the validity of expert information, they will evaluate the experts' trustworthiness.

What is such 'epistemic trustworthiness'? Which cues are processed when people (trustors) make trust judgments and consequently, which features make up a 'trustworthy' source of information? Sperber et al. (2010) suggested a distinction between the knowledgeability of experts (the trustees), their honesty, and their intentions. Similarly, in research on interpersonal trust relationships (focusing on trust in organizations, e.g., between supervisor and staff), trustworthiness has been conceptualized as consisting of expertise, integrity, and benevolence (Mayer, Davis, & Schoorman, 1995). These and similar conceptualizations of components of trust were corroborated empirically in different contexts. For example, studies in developmental psychology show that children use similar source features to make trust decisions about experts (Harris, 2012; Landrum, Mills, & Johnston, 2013), and in environmental risk communication, trust assessments seem to be determined by the same three dimensions (Peters, Covello, & McCallum, 1997). Furthermore, qualitative data on risk communication about health issues indicate that participants spontaneously apply the three aforementioned criteria when asked to make trust judgments about medical experts (Cummings, 2014). The present study discerns the same three trustworthiness dimensions when asking for laypersons trust in expert bloggers. In this context, *expertise* includes how far experts have mastered their domain and if they are highly knowledgeable, *integrity* refers to their honesty within scientific work and openness in communication of the research, and *benevolence* comprises whether the work or reports of experts indicate concern and care about the reader and/or society (Hendriks, Kienhues, & Bromme, 2015).

1.2. Admitting one's flaws: A way to enhance trust?

Trust in science and its communicators may play an important role in recipients' evaluation of science communication and thus might benefit public understanding of science (Besley, Dudo, & Storksdieck, 2015; Fiske and Dupree, 2014; Irwin & Wynne, 1996; Nisbet & Scheufele, 2009). Research has shown that communicating uncertainty may contribute to a scientist being perceived as trustworthy (Jensen, 2008; Maxim & Mansier, 2014). There are few studies on how the admission of flaws affects trustworthiness judgments—especially in the context of scientific information. Much of criticism, questioning, and commenting within the scientific community is done by others and science bloggers in particular use their blogs to point out limitations or shortcomings in other's research. In the following, we will focus on comments which refer to actual *flaws*, and which hence might also impact on trustworthiness judgments. In this, we will make a distinction between a *critique* (via a comment provided by another expert) and an *admission* of scientific flaws, written by the author to introduce flaws or limitations referring to his or her own original work. Studies by Strickland and Mercier (2014) show that if an experiment was presented as being flawed, participants take a potential bias of the experimenters into account when making judgments about their conclusion. Hence, it could be assumed that the recipient's knowledge of a study's flaw (no matter if admitted by the accountable scientist or pointed to by a critic) would lead to a loss of trust in the accountable scientist. But psychological research on trust judgments gives rise to the expectation that ascriptions of trustworthiness do vary depending on who points to a flaw: An admission of a flaw may serve as a communicative action pointing to one's good intentions toward the reader.

Some evidence that admissions of flaws matter for trust judgments comes from research on physician–patient communication. When a medical error has been made, its full disclosure has a positive effect on the patient's trust in the physician (Mazor et al., 2006). In a survey study, Fisseni, Pentzek, and Abholz (2008) found that patients preferred to stay with their physicians when these disclosed a severe flaw themselves but not if the flaw had been disclosed by other physicians. Admission of flaws restored patients' trust whereas critiques by unaffiliated experts demolished patients' trust in their physicians.

Evidence from the legal context indicates that admitting limitations in one's knowledge can positively influence credibility evaluations (Tenney, MacCoun, Spellman, & Hastie, 2007; Tenney, Spellman, & MacCoun, 2008). When participants (who were asked to act as if they were jurors) assessed the credibility of witnesses, they attributed greater credibility to a witness who was confident in her testimony than to a witness who was rather cautious. However, when flaws in the testimony were made evident, the witness who was both confident in the cases in which she was accurate (thus, reporting *expertly* about the objective truth), and cautious in the cases in which she had provided flawed evidence (thus, being honest or aware about the limitations of her own knowledge), was perceived to be the most credible.

Similar to a witness who is cautious about the truth of her testimony, a scientist who admits a flaw or discloses uncertainties might be conceived as being more trustworthy. In the context of science communication, a study by Jensen (2008) shows that indicating caveats, limitations, and uncertainties (called *hedging*) in journalistic articles about science influences the perception of the scientist whose research is being presented in an article. It was varied in this study if in the journalistic article, hedges were attributed to the responsible scientist or an unaffiliated scientist. Hedging