Relevance Is Socially Rewarded, But Not at the Price of Accuracy

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Abstract
Selecting good sources of information is a critical skill to navigate our highly social world. To evaluate the epistemic reputation of potential sources, the main criterion should be the relevance of the information they provide us. In two online experiments (N = 801), we found that receivers are more thankful toward, deem more competent, and are more likely to request information in the future from sources of more relevant messages—if they know the message to be accurate or deem it plausible. To prevent sources from presenting information as more relevant than it is in order to improve their reputation, receivers lower the reputation of sources sending messages that are more relevant-if-true, if they know the message to be inaccurate. Our research sheds light on the reputational trade-offs involved in choosing what information to communicate and helps explain transmission patterns such as rumors diffusion.

Keywords
relevance, competence, reputation, advice taking, communication, impression management, rumor, source

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Message Relevance and the Quality of Sources
For their success and even survival, humans have always relied hugely on cooperation and communication (Dubreuil, 2010; Sterelny, 2003; Tomasello, 2010). Our reliance on others to navigate the world means that the tasks of selecting good cooperation partners, and good sources of information, have long been critical (Baumard et al., 2013; Dessalles, 2007; Mercier, 2020; Sperber et al., 2010).

In evolutionary psychology, most attention has been dedicated to the risk raised by unreliable cooperation partners, that is, partners who would reap the benefits of communication without paying the costs (e.g., Cimino, 2011; Cosmides, 1989; Tooby et al., 2006). However, a similar problem arises with respect to communication. In evolutionary biology, the issues raised by communication have been studied for several decades (Dawkins & Krebs, 1978; Krebs & Dawkins, 1984; for more recent reviews, see Maynard Smith & Harper, 2003; Scott-Phillips, 2008). As is the case for cooperation, communication can be abused, as senders can lie to, or, more generally, provide to receivers information that benefits only the senders.

The few researchers investigating the reliability of communication from an evolutionary perspective initially focused on people’s ability to spot deceit using behavioral cues, whether it be spotting a microexpressions of guilt supposed to betray a liar (Ekman, 2001) or being able to tell a genuine smile from a fake (Frank, 1988). However, evolutionary theory suggests that such cues should be unreliable since they would create a cost for senders, and no constraint would explain their existence (Dezeache et al., 2013; Mercier, 2020). Indeed, research on deception detection has revealed that behavioral cues are unreliable, and that people who use them are unable to spot liars, or find out whether someone is hiding an emotion (DePaolo et al., 2003; Hartwig & Bond, 2011; Porter & Ten Brinke, 2008; Vrij, 2000).

That people are unable to spot deceit thanks to behavioral cues doesn’t mean that they are not vigilant toward communicated information. First, lies are a very rare and extreme form of bad information (e.g., DePaulo et al., 1996). Much more
commonly, we receive bad information because people are mistaken, overconfident, egocentric, and so on. Second, the same mechanism motivates sources of information to send messages that are reliable, instead of deceptive or mistaken: the motivation to create and maintain a reputation as someone who can be trusted. Receivers keep track of who sent what, and of which messages turned out to be reliable, so that they can adjust their trust in sources accordingly (for reviews, see Mercier, 2020; Sperber et al., 2010).

In the current article, we move away from the deceptive/nondeceptive dichotomy, using instead the relevance of a message as a cue to how valuable its source is as an information provider. Within relevance theory (Sperber & Wilson, 1986), the relevance of a message is defined as the ratio of its cognitive effects on the efforts required to process it. The cognitive effects denote the usefulness of the information: How many inferences we draw from it, how much belief revision it warrants (note that usefulness includes practical usefulness since information that leads us to change our plans is also relevant). The usefulness of a piece of information is a function of its estimated accuracy (i.e., its plausibility). If a fortune-teller accosts me and says I’m going to be gravely sick, I won’t accept the information, won’t draw any inferences from it, and it thus will have only minimal relevance. By contrast, the same information coming from my doctor would be accepted, would lead to a wealth of inferences, and would thus be highly relevant. The more relevant the messages provided by a source is, the more the source should be valued, and the better its reputation as a good source of information should be.

The reputational gains earned by a source that transmits relevant information can take at least three forms. First, receivers should be thankful toward the source of relevant information. Information can be considered as a good (Shaw et al., 2012), whose value is determined by its relevance. As for other goods, the thankfulness should be proportional to the value of the good and thus the relevance of the information provided (on intuitions about fairness, see Baumard et al., 2013). Second, receivers should deem sources who transmit relevant information more competent. Gathering useful information is crucial to behave competently, so that someone who displays their ability to gather such information ought to be deemed more competent (Dessalles, 1998, 2007). Finally, receivers should be more likely, in the future, to request information from sources who have transmitted relevant information. This follows from the fact that such sources are deemed more competent and thus more likely to keep providing relevant information. These three measures (thankfulness, competence attribution, and future request for information) can be aggregated to offer a general score of how well perceived a source of information is.

A first hypothesis emerges from these considerations:

**Hypothesis 1:** When a receiver knows a message to be accurate, they should value more sources of more relevant messages, compared to sources of less relevant messages (i.e., being more thankful toward them, deeming them more competent, and being more likely to request information from them in the future).

By extension, we can formulate a hypothesis that applies when the receivers are not sure a message is accurate:

**Hypothesis 2:** When a receiver judges a message to be plausible (i.e., high estimated accuracy), they should value more sources of more relevant messages, compared to sources of less relevant messages (i.e., being more thankful toward them, deeming them more competent, and being more likely to request information from them in the future).

If only Hypotheses 1 and 2 held, sources could abuse communication in order to improve their reputation: They could accrue a superior reputation by presenting information as more relevant than it is (see, e.g., Yaniv & Foster, 1997). Until the receivers have an opportunity to check whether the information is actually true or not, the ill-gotten reputational gains would persist. These gains would even persist forever if such an opportunity never presented itself. If there were no mechanism in place to constrain sources of false but relevant-if-true messages, the incentives would lead sources to artificially inflate the relevance of their messages. As a result, sources would routinely send false but relevant-if-true messages in order to improve their reputation, and receivers would form inaccurate opinions not only about the sources themselves but also about the content being communicated, so that the signals would benefit the senders but be harmful to the receivers. Such a misalignment between the incentives of sources and receivers is a common threat to the stability of communication systems (Maynard Smith & Harper, 2003; Scott-Phillips, 2008). As mentioned above, cognitive mechanisms have evolved to keep track of what senders have communicated and to adjust their reputation accordingly, thereby stopping senders from abusing communication to their advantage, and allowing receivers to accurately assess sources’ quality (Mercier, 2020; Sperber et al., 2010).

These considerations lead to the following hypothesis:

**Hypothesis 3:** When a receiver knows a message to be inaccurate, they should value less sources of messages that are more relevant-if-true compared to sources of less relevant-if-true messages (i.e., being less thankful toward them, deeming them less competent, and being more less to request information from them in the future).

The literature already offers some support for Hypotheses 1–3. Regarding Hypothesis 1, adults have been found to grant more weight to advice received from a source that has been accurate (and thus relevant) in the past (Fischer & Harvey, 1999; Harvey & Fischer, 1997). Preschoolers are also more likely to select as a source of information a speaker who has been more accurate (and thus more relevant; Eskritt et al., 2008; Gillis & Nilsen, 2013; Vázquez et al., 2013).

Regarding Hypothesis 2, Boyer and his colleagues hypothesized that threat-related information would be deemed more
relevant by receivers and that as a result sources of threat-related information would be deemed more competent, which is what was observed in a series of experiments (Blaine & Boyer, 2018; Boyer & Parren, 2015). The participants in these experiments never found out whether the threat was real or not, which is why these results support Hypothesis 2 (rather than Hypothesis 1). Similarly, 6 and 7 year olds (but not preschoolers) have been shown to select as sources of information more relevant speakers, even when their accuracy hasn’t been established (Gillis & Nilsen, 2013).

Finally, to the best of our knowledge, Hypothesis 3 has only been tested somewhat indirectly. A series of experiment has confronted participants with two speakers who turn out to be wrong, but one of them had been more confident (Tenney et al., 2007, 2008; Tenney & Spellman, 2011; Vullioud et al., 2017). Participants then consistently trusted less and were less likely to select as a source of information the source who had been the most confident. If we assume that a message transmitted with more confidence is more relevant, these results support Hypothesis 3. Similarly, when two speakers are wrong, but one of them implied rather than explicitly stated a message, the latter was then trusted less (Mazzarella et al., 2018).

The Present Experiments

Although there is some support for Hypotheses 1–3, it is scattered, with different paradigms supporting each of these hypotheses. Moreover, Hypothesis 3 is only supported by experiments in which relevance is indirectly manipulated (e.g., by varying the confidence levels of sources).

To offer a more direct and consistent test of Hypotheses 1–3, we developed novel material for two experiments. Participants read a vignette describing a situation in which two sources were described, each providing a message varying in relevance (four vignettes with different contents were developed for each experiment). One third of the participants received no feedback and were asked which of these two speakers they thought were more relevant toward, which was the most competent, and which they would select as source of information in the future. Given that participants had at this stage not received any feedback, and had no reason to seriously question the messages’ veracity, this no feedback condition tests Hypothesis 2.

The other participants received feedback about the accuracy of the message and were asked the same three questions. In the positive feedback condition, participants were told that both messages were accurate, testing Hypothesis 1. In the negative feedback condition, participants were told that both messages were inaccurate, testing Hypothesis 3.

Experiment 1

In the first experiment, we asked participants to evaluate two sources of information sharing with them the same message (e.g., “you should try this restaurant”). However, the description of the restaurant varied in terms of practical relevance: One of the sources presented the place as “amazing,” while the other said it was “pretty good.” Knowing that a restaurant is amazing should be more relevant than knowing a restaurant is pretty good, for instance, because it warrants more practical inferences (i.e., one should really go to the former restaurant but not necessarily the latter). Given the conversational context, participants have no reason to seriously question the message, so that, before they receive positive or negative feedback, the more relevant-if-true message should be deemed more relevant. In a pretest, we established that participants deemed messages with the most intense quantifiers (amazing compared to pretty good) to be more useful, 80%, 39/49; \( \chi^2(1, N = 49) = 17.16, p < .001, \varphi = .59 \); instead of directly asking about relevance, we asked participants about the more intuitive concept of usefulness, which should give us a good measure of relevance since the effort is held constant. Details of the pretests can be found in the Electronic Supplementary Materials (ESM).

Participants

A power analysis for goodness-of-fit tests with an estimated effect size of \( \omega = 0.3 \) (corresponding to a medium effect size), an \( \alpha \) level of 5%, and a power of 90%, suggested that we needed 117 participants per condition. Since we have three conditions, we needed a minimum of 351 participants. We recruited 401 U.S., UK, Ireland, participants online, using Prolific Academic. Participants were paid 0.2£ (British Pounds). We removed six participants who did not correctly answer the attention check, leaving 395 participants (255 women, \( M_{\text{Age}} = 35.13, SD = 12.33 \)).

Materials

Here is an example of a vignette we presented to the participants (the four vignettes are available in the ESM). The positive feedback condition is presented here, with the modification for the negative feedback condition between brackets. In the no feedback condition, participants were asked the three last questions after the message had been initially presented, and not given any feedback.

Imagine you are talking with your friend Alex about local restaurants. At some point they say: “Le Cosi always serves amazing food.”

Later the same day, you talk with your friend Tom about the same topic, and he tells you: “Loulou usually serves pretty good food.”

Which friend are you most thankful toward for the recommendation?

Alex—Tom

After a few visits to the restaurants, you come to think that the recommendations of both Alex and Tom were right [wrong].

Which friend are you most [least] thankful toward for the recommendation?
Design and Procedure

After they had completed a consent form, participants were presented with one of four vignettes and asked to answer questions about the sources. One third of the participants received positive feedback about message quality, another third received negative feedback, and the last third received no feedback. In the positive and negative feedback conditions, participants were nonetheless asked one question (“Which friend are you most thankful toward for the recommendation?”) before receiving the feedback. The results of this question will not be analyzed, as they are redundant with the no feedback condition (the question had been added to help maintain the participants’ attention). The presentation order of the sources—that is, whether the source who is the most relevant speaks first or second—was counterbalanced. Next, we gave participants a second, short task which required paying attention to properly understand the instructions (the attention check is available in the ESM). Finally, participants provided basic demographic information.

Results and Discussion

All statistical analyses were conducted with R (Version 3.6.0, R Core Team, 2017), using R Studio (Version 1.1.419, RStudio Team, 2015). All the t tests reported are Welch’s t tests, and all the confidence intervals are 95%. Detailed descriptive information on the results for each vignette and each question can be found in the ESM. All data are available at https://osf.io/render?url=https%3A%2F%2Fosf.io%2Fjfrvu%2Fdownload

We created a composite measure by adding the scores to all three questions, with each source scoring one point when the participants were more thankful toward her, deemed her more knowledgeable, or selected her as a source of information in the future. The score thus ranged from zero to three. The higher the score, the more positive participants’ attitude toward the source is. The scores are dependent in the sense that if one source scores three, the other source must score zero. The results for each individual question can be found in the ESM, together with detailed descriptive information of the results for individual vignettes.

When given no feedback, participants valued more sources of more relevant messages (1.92), compared to sources of less relevant messages, 1.08; t(272) = 5.36, p < .001, CI [0.53, 1.15], d = 0.65, CI [0.40, 0.89], supporting Hypothesis 2.

When the message was revealed to be true, participants valued more sources of more relevant messages (1.91), compared to sources of less relevant messages, 1.09; t(272) = 5.71, p < .001, CI [0.53, 1.09], d = 0.69, CI [0.44, 0.93], supporting Hypothesis 1.

When the message was revealed to be false, participants valued less sources of messages that were more relevant-if-true (0.27), compared to sources of less relevant-if-true messages, 2.73; t(240) = 25.36, p < .001, CI [2.26, 2.65], d = 3.26, CI [2.87, 3.65], supporting Hypothesis 3.

Experiment 2

Experiment 2 is a conceptual replication of Experiment 1. Instead of relevance being manipulated through the intensity of qualifiers (amazing vs. pretty good), it was manipulated through precision. The message was offered to help someone find, for example, good restaurants in a new city. One message was precise (e.g., “Le Cosi and Bofinger are great restaurants”), the other was vague (e.g., “There are some great restaurants in the 4th district of Paris”). In the absence of reasons to believe one message more plausible than the other, given that the former is more actionable, it should be deemed more relevant. As in Experiment 1, given the conversational context, participants have no reason to question the message, so that, before they receive positive or negative feedback, the more relevant-if-true message should be deemed more relevant. In a pretest, we established that participants deemed the more precise message to be more useful and thus more relevant, 80%, 41/51; χ²(1, N = 51) = 18.84, p < .001, φ = 0.61.

Participants

A power analysis for goodness-of-fit tests with an estimated effect size of w = 0.3 (corresponding to a medium effect size), an α level of 5%, and a power of 90% suggested that we needed 117 participants per condition. Since we have three conditions, we needed a minimum of 351 participants. We recruited 400 U.S., UK, Ireland, participants online, using Prolific Academic. Participants were paid 0.2£. We removed eight participants who did not correctly answer the attention check, leaving 392 participants (257 women, M_{Age} = 32.52, SD = 10.79).

Materials

Here is an example of a vignette we presented to participants (the four vignettes are available in the ESM). The positive feedback condition is presented here, with the modification for the negative feedback condition between brackets. In the no feedback condition, participants were asked the three last questions after the message had been initially presented, and not given any feedback.
Imagine you are visiting Paris, and are looking for a good restaurant.

As you talk about it with your friend Tom, he says:

“Le Cosi and Bofinger are great restaurants, you should definitely try one of them.”

Later in the day you talk about this with your friend Alex who says:

“There are some great restaurants in the 4th district of Paris, you should definitely try one of them.”

Which friend are you most thankful towards for the recommendation?

Tom–Alex

After a few visits to restaurants in the 4th district of Paris, including Le Cosi and Bofinger, you come to think that the recommendations of both Tom and Alex were right [wrong].

Which friend are you more [least] thankful toward for the recommendation?

Tom–Alex

Which friend do you think is more [less] knowledgeable about restaurants in Paris?

Tom–Alex

A few months later, you’re back in Paris and are looking for new restaurants. Who would you ask for a recommendation?

Tom–Alex

**Design and Procedure**

The design and procedures are identical to those of Experiment 1.

**Results and Discussion**

We created a composite measure by adding the scores to all three questions, with each source scoring one point when the participants were more thankful toward her, deemed her more knowledgeable, or selected her as a source of information in the future. The score thus ranged from zero to three. The higher the score, the more positive participants’ attitude toward the source is. The scores are dependent in the sense that if one source scores three, the other source must score zero. The results for each individual question can be found in the ESM, together with detailed descriptive information of the results for individual vignettes.

When given no feedback, participants valued more sources of more relevant messages (2.50) compared to sources of less relevant messages, 0.50; \( t(262) = 19.08, p < .001, \text{CI }[1.79, 2.21], d = 2.35, \text{CI }[2.03, 2.66], \) supporting Hypothesis 2.

When the message was revealed to be true, participants valued less sources of messages that were more relevant-if-true (1.33) compared to sources of less relevant-if-true messages, 1.67; \( t(258) = 2.24, p = .03, \text{CI }[0.04, 0.64], d = 0.28, \text{CI }[0.03, 0.52], \) supporting Hypothesis 3.

**General Discussion**

Across two experiments we found support for our three hypotheses. When receivers knew a message to be accurate (Hypothesis 1) or deemed it plausible (Hypothesis 2), they valued more sources of more relevant messages, compared to sources of less relevant messages. By contrast, when receivers knew a message to be inaccurate, they valued less sources of messages that were more relevant-if-true compared to sources of less relevant-if-true messages (Hypothesis 3).

These results suggest that receivers are able to evaluate sources appropriately, in a way that both incentivizes the provision of relevant information while deterring false or exaggerated claims. As a result, communication can remain broadly reliable, benefiting on average both senders and receivers.

We can see these incentives at play in the way people share rumors. In some domains, people are directly affected by the content of rumors: For example, in the workplace, rumors about who will be fired or promoted (Davis, 1972; Marting, 1969; Rudolph, 1971, 1973) or, in the military, rumors about who will be sent to the front or repatriated (Caplow, 1947; Walton, 1961). In such cases, people have relevant prior knowledge that allows them to accurately estimate the accuracy of different rumors, and, after the fact, they quickly find out whether the rumors were true or not. As a result, sources do not share exaggerated rumors, rumors that would be more relevant-if-true, but that they have no solid grounds for believing, and we typically observe rates of rumor accuracy close to 100%.

In other cases, people have no direct stake in the content of the rumor—for instance, rumors tend to flourish after a natural disaster, without providing any actionable content to those who share them (Prasad, 1935; Sinha, 1952). In such situations, people have less prior knowledge, and, even if they can, they often do not check after the fact whether the rumors were true. As a result, rumors tend to be exaggerated, reporting inflated casualties for instance (see also DiFonzo & Bordia, 2007). However, even in such situations, there are limits to the exaggerations: If the rumors became too implausible, sources would be reputationally punished instead of rewarded for sharing them. As Arndt (1967) noted, “the knowledge that the receiver of word of mouth can . . . check the veracity of the message would appear to discourage extreme exaggerations. After all, the communicator has his reputation as a reliable source at stake” (p. 66). Thus, even in situations in which senders are incentivized to increase rumors’ relevance in order to appear more competent, they do so in a way to minimize potential reputational damages (see Altay et al., 2020). Future studies
could directly test the ability of sources to negotiate these trade-offs, for example, by testing whether the tendency to make exaggerated claims is modulated by the odds that the claims will be verified. For example, exaggerated threats might be less likely to be verified since if they are deemed at least somewhat plausible, receivers might wish to never find out whether they are real or not (e.g., if someone tells me that a given mushroom is highly poisonous, I’ll likely never try eating it, even if that means I might be missing on a delicious treat). As a result, people who share information about threats might be deemed more competent even if the threats aren’t real (as long as they are plausible; Blaine & Boyer, 2018; Boyer & Parren, 2015).

Finally, future studies should further test the present hypotheses using more ecological stimuli, different experimental settings, and participants from different cultures. Our hypotheses should be robust to these variations, as we expect that they reflect the operation of evolved cognitive mechanisms that apply universally to communicated information.

Authors’ Note
The studies received approval from an ethical committee, research has been conducted in accordance to the ethical guidelines of the journal, results have been reported honestly, the submitted work is original and not plagiarized, and the authorship respects individuals’ contributions.

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References
Altay, S., Claidiére, N., & Mercier, H. (2020). It happened to a friend of a friend: Inaccurate source reporting in rumor diffusion, https://psyarxiv.com/5czka
Arndt, J. (1967). Word of mouth advertising: A review of the literature. Advertising Research Foundation.
Baumard, N., André, J. B., & Sperber, D. (2013). A mutualistic approach to morality: The evolution of fairness by partner choice. Behavioral and Brain Sciences, 36(01), 59–78.
Blaine, T., & Boyer, P. (2018). Origins of sinister rumors: A preference for threat-related material in the supply and demand of information. Evolution and Human Behavior, 39(1), 67–75.
Boyer, P., & Parren, N. (2015). Threat-related information suggests competence: A possible factor in the spread of rumors. PLoS One, 10(6), e0128421.
Caplow, T. (1947). Rumors in war. Social Forces, 25, 298–302.
Cimino, A. (2011). The evolution of hazing: Motivational mechanisms and the abuse of newcomers. Journal of Cognition and Culture, 11(3–4), 241–267.
Cosmides, L. (1989). The logic of social exchange: Has natural selection shaped how humans reason? Studies with the Wason selection task. Cognition, 31(3), 187–276.
Davis, K. (1972). Human behavior at work. McGraw-Hill.
Dawkins, R., & Krebs, J. R. (1978). Animal signals: Information or manipulation? In J. R. Krebs & N. B. Davies (Eds.), Behavioural ecology: An evolutionary approach (pp. 282–309). Basil Blackwell Scientific Publications.
DePaulo, B. M., Kashy, D. A., Kirkendol, S. E., Wyer, M. M., & Epstein, J. A. (1996). Lying in everyday life. Journal of Personality and Social Psychology, 70(5), 979–995.
DePaulo, B. M., Lindsay, J. J., Malone, B. E., Muhlenbruck, L., Charlton, K., & Cooper, H. (2003). Cues to deception. Psychological Bulletin, 129(1), 74–118.
Dessalles, J.-L. (1998). Altruism, status, and the origin of relevance. Cambridge University Press.
Dessalles, J.-L. (2007). Why we talk: The evolutionary origins of language. Oxford University Press.
Dezecache, G., Mercier, H., & Scott-Phillips, T. C. (2013). An evolutionary approach to emotional communication. Journal of Pragmatics, 59, 221–233.
DiFonzo, N., & Bordia, P. (2007). Rumor psychology: Social and organizational approaches. American Psychological Association.
Dubreuil, B. (2010). Paleolithic public goods games: Why human culture and cooperation did not evolve in one step. Biology and Philosophy, 25(1), 53–73.
Ekman, P. (2001). Telling lies: Clues to deceit in the marketplace, politics, and marriage. W. W. Norton & Company.
Eskritt, M., Whalen, J., & Lee, K. (2008). Preschoolers can recognize violations of the Gricean maxims. The British Journal of Developmental Psychology, 26(3), 435–443. https://doi.org/10.1348/026151007X253260
Fischer, I., & Harvey, N. (1999). Combining forecasts: What information do judges need to outperform the simple average? International Journal of Forecasting, 15(3), 227–246.
Frank, R. H. (1988). Passions within reason: The strategic role of the emotions. W. W. Norton & Co.
Gillis, R. L., & Nilsen, E. S. (2013). Children’s use of information quality to establish speaker preferences. Developmental Psychology, 49(3), 480.
Hartwig, M., & Bond, C. H. (2011). Why do lie-catchers fail? A lens model meta-analysis of human lie judgments. Psychological Bulletin, 137(4), 643.
Harvey, N., & Fischer, I. (1997). Taking advice: Accepting help, improving judgment and sharing responsibility. Organizational Behavior and Human Decision Processes, 70, 117–133.
Krebs, J. R., & Dawkins, R. (1984). Animal signals: Mind-reading and manipulation? In J. R. Krebs & N. B. Davies (Eds.), Behavioural
ecology: An evolutionary approach (Vol. 2, pp. 390–402). Basil Blackwell Scientific Publications.

Marting, B. J. (1969). A study of grapevine communication patterns in a manufacturing organization [PhD thesis]. College of Business Administration, Arizona State University.

Maynard Smith, J., & Harper, D. (2003). Animal signals. Oxford University Press.

Mazzarella, D., Reinecke, R., Noveck, I., & Mercier, H. (2018). Saying, presupposing and implicating: How pragmatics modulates commitment. *Journal of Pragmatics, 133*, 15–27.

Mercier, H. (2020). Not born yesterday: The science of who we trust and what we believe. Princeton University Press.

Porter, S., & Ten Brinke, L. (2008). Reading between the lies: Identifying concealed and falsified emotions in universal facial expressions. *Psychological Science, 19*(5), 508–514.

Prasad, J. (1935). The psychology of rumour: A study relating to the great Indian earthquake of 1934. *British Journal of Psychology. General Section, 26*(1), 1–15.

Rudolph, E. E. (1971). A study of informal communication patterns within a multi-shift public utility organizational unit. Unpublished doctoral dissertation, University of Denver.

Rudolph, E. E. (1973). Information human communication systems in a large organization. *Journal of Applied Communication Research, 1*(1), 7–23.

Scott-Phillips, T. C. (2008). Defining biological communication. *Journal of Evolutionary Biology, 21*(2), 387–395.

Shaw, A., Li, V., & Olson, K. R. (2012). Children apply principles of physical ownership to ideas. *Cognitive Science, 36*(8), 1383–1403.

Sinha, D. (1952). Behaviour in a catastrophic situation: A psychological study of reports and rumours. *British Journal of Psychology. General Section, 43*(3), 200–209.

Sperber, D., Clément, F., Heintz, C., Mascaro, O., Mercier, H., Origgi, G., & Wilson, D. (2010). Epistemic vigilance. *Mind and Language, 25*(4), 359–393.