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Correcting erroneous inferences in memory: The role of source credibility

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ABSTRACT

People often continue to rely on erroneous information about people and events, even in the face of subsequent counter information. The current study examined whether this information could be effectively corrected by a credible source. We examined two aspects of credibility: trustworthiness and expertise. Experiment 1 showed that receiving a correction from a source high in trustworthiness and expertise reduced participants' use of original information when making inferences. Experiment 2 showed that source expertise alone was not sufficient to reduce participants' reliance on the original information. The results from Experiment 3 showed that source trustworthiness alone significantly decreased participants' use of the original information when making inferences. The results suggest that people may be able to reduce their use of original information if they receive a correction from a person who is deemed to be highly trustworthy. These findings have implications for decision making in politics and other applied areas.

Many real world examples and laboratory studies have shown that people have a difficult time discarding information, even if it has been later shown to be untrue. This phenomenon occurs in politics where negative (smear) campaigns depress the publics' evaluation of the political opponent (Fridkin & Kenney, 2004; Fridkin and Kenney, 2008) even in the face of counter information. For example, during his election and re-election, the current president of the United States, Barack Obama, was accused of being born outside of the country and therefore not eligible to assume the presidency. Even though counter evidence (including a US birth certificate) was provided on numerous occasions, many American citizens continued to question President Obama's citizenship (Travis, 2010). In fact, the president and his campaign members took many measures to counter misinformation, such as launching a website dedicated to fighting false rumors. Are these attempts to correct false information effective? Laboratory research on memory for inferences suggests that, once made, inferences are very difficult to correct (Guillory & Geraci, 2010; Johnson & Seifert, 1994; Wilkes & Leatherbarrow, 1988; Wilkes & Reynolds, 1999).

In the basic laboratory paradigm, participants read a story that includes a piece of critical information that is later corrected. For example, in several studies (Guillory & Geraci, 2010; Johnson & Seifert, 1994; Wilkes & Leatherbarrow, 1988; Wilkes & Reynolds, 1999), participants read about the progress of a fire at a commercial warehouse. One message in the story stated that a storage room contained carelessly stored paint cans and gas containers. Later participants read that the previous message was incorrect and that the storage room was actually empty. Results showed that participants later failed to use the corrected information when asked to make inferences about the story. For example, when asked about a *possible* cause of the fire, participants indicated that the fire could have started because of the flammable materials left in the storage room (Wilkes & Leatherbarrow, 1988). This effect occurred even though most participants recalled hearing that, in fact the storage room was empty. Thus, it appears that once people encounter a piece of information, they will continue to draw upon this information to make future inferences about an event even if that information is corrected. It is important to note that participants rely on the original information only when answering questions that require inferences and not when answering factual questions about the event (e.g., when asked for a possible cause of the toxic fumes and not when asked about the contents of the building). This finding suggests that inferences, in particular, are powerful sources of information that may be difficult to change.

Although the persistence of false inferences in memory has been demonstrated in a number of previous studies (Guillory & Geraci, 2010; Johnson & Seifert, 1994; Wilkes & Leatherbarrow, 1988; Wilkes & Reynolds, 1999), researchers have yet to offer a full explanation for why people continue to believe their erroneous

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inferences in the face of counter information. Further, few studies have been able to demonstrate effective methods for correcting erroneous information—something that would be of great practical importance. Finding effective methods for correcting erroneous inferences is important not only in the political arena—the focus of the current experiments—but it is also important for medical decision making where false information (e.g., believing that vaccines cause autism) can have major health consequences (e.g., a sharp increase in preventable childhood diseases; Godlee, Smith, & Marcovitch, 2011). Further, and perhaps the most obvious application is in the courtroom, where jurors are often exposed to information and then are told to strike the information from the record (see Lewandowsky, Ecker, Seifert, Schwarz, &, Cook, 2012 for a review of the public concerns associated with the persistence of misinformation).

There have been several attempts at correcting false information. One promising method for correcting information involves providing people with a plausible alternative to the original information (Johnson & Seifert, 1994). In this study participants read a version of the warehouse fire scenario that included the original information (that volatile materials were found in the warehouse). Later, some participants were told that the original information was incorrect and that arson materials were found elsewhere on the premises. When participants were given this alternate information, they were less likely to make inferences using the original information. In other studies, participants are given an alternate explanation for the correction and they are warned about the continued influence effect (Ecker, Lewandowsky, & Tang, 2010). Hearing a specific warning and an alternative explanation greatly reduced the continued influence of misinformation. However, as in the previous study, although the correction was effective at reducing reliance on the original information, it did not eliminate the use of the original information, further demonstrating the difficulty in correcting information. Other research shows that corrections can be effective for people who are suspicious of the original information (Lewandowsky, Stritzke, Oberauer, & Morales, 2005; Lewandowsky et al., 2009). This study investigated the effect of retractions about the 2003 Iraq War on people's memory and beliefs about war-related events. Results showed that participants from Australia and Germany who were more suspicious about the motivation for the war were affected by the retractions, whereas people from the United States who were less suspicious about the motivation for war were not.

There is also evidence that suspicion surrounding the reason for the correction may play a role in whether or not people will accept the correction. Guillory and Geraci (2010) used a standard warehouse fire paradigm and then asked participants to describe why they believed there was a correction in the story. More than a third of the participants indicated that they believed that the correction was given as a cover up for the truth, whereas the rest thought that it was provided to correct an original mistake or for some other idiosyncratic reason. Those who believed the correction was a cover up reported not believing the police officer (the source of the correction) because they claimed that he was "trying to cover up" for himself or someone else to escape fault, (for the fire in this case). Thus, participants indicated some amount of distrust in the source of the correction, which could be one reason why the simple (negation) correction in this and other studies (e.g., Johnson & Seifert, 1994) is not completely effective. Indeed, participants in the Guillory and Geraci study who thought the correction was a cover-up were numerically more likely to continue using the incorrect original message than participants who thought the correction was correcting a mistake. Thus, it appears that people continue to rely on initial inferences, in part, because they do not believe that the corrected information is true. Therefore, making the corrected information more believable may be key to reducing people's reliance on original information.

One way to make the correction more believable is to have the correction delivered by a source that is deemed to be highly credible. Previous research shows that highly credible sources are more influential than sources with low credibility (Hovland & Weiss, 1951; Johnson & Izzett, 1969; Kelman & Hovland, 1953; Maddux & Rogers, 1980). For example, high credibility sources are generally more persuasive than low credibility sources (Hovland & Weiss, 1951; Kelman & Hovland, 1953) and people are more likely to incorporate new information (even if it is misinformation) when it comes from a highly credible source (see Smith & Ellsworth, 1987; Zhu, Chen, Loftus, Lin, & Dong, 2010). If a correction comes from a credible source participants may be more likely to use the correction compared to when it comes from a less credible source. No research that we are aware of has examined this possibility. This is the goal of the current experiments.

We manipulated the credibility of the source of a correction and measured people's use of that information in making inferences. We predicted that people would be less likely to continue to use original information if a correction came from a highly credible source, compared to a source with low credibility or a no correction (control) condition. We examined how two different elements of credibility, trustworthiness and expertise (Gilbert, Fiske, & Lindzey, 1998; Lupia, 2002; Pornpitakpan, 2004), affect whether people will accept corrected information. Expertise refers to the extent to which a speaker is perceived to be capable of making correct assertions (Pornpitakpan, 2004) and trustworthiness refers to the willingness of a source to provide accurate and reliable information (Sparks & Rapp, 2011). It has been suggested that the trustworthiness and expertise components of source credibility might have differential weights, although the evidence for this suggestion are somewhat mixed (Hovland & Weiss, 1951; Kelman & Hovland, 1953; McGinnies & Ward, 1980; Weiner & Mowen, 1986). Experiment 1 examined source credibility as a function of both expertise and trustworthiness, whereas Experiments 2 and 3 attempted to isolate the individual contributions of these two types of credibility on use of the original information. All three experiments examined the effect of corrections within the political realm, focusing specifically on whether negative information about a political candidate could be effectively corrected using a credible source.

1. Norming

Prior to running the experiments, a norming study was conducted using a separate group of participants to identify sources that participants consider to be highly credible and not very credible within a particular story context. We examined two elements of credibility: trustworthiness and expertise. Participants (34 undergraduates from Texas A&M) read a story about a politician running for re-election (see Appendix A). In message 6 of the story the participants read that the politician was seen taking bribe money. At the end of the story the participants read a statement indicating that this piece of information was shown to be untrue. Participants were then given a list of 32 sources and asked to imagine that the correction in the story came from the source in question. Participants were asked to rate the expertise and the trustworthiness of each source, using a 1–6 scale. Participants first made expertise judgments for each of the 32 sources and then they were given the same sources to rate on trustworthiness. For Experiment 1, we selected 3 sources that on average normed high on both expertise and trustworthiness (expertise $M = 4.85$, $SD = 1.15$; trustworthiness $M = 4.40$, $SD = 1.19$) and three sources that normed low on both factors (expertise $M = 1.86$, $SD = .91$; trustworthiness $M = 1.68$, $SD = .77$). Participants ratings of expertise, $F(1,142) = 300.03$, $MSE = 1.07$, $\eta_p^2 =$

.68, and trustworthiness F (1,142) = 264.96, MSE = 1.01, $\eta_p^2 = .65$ were significantly higher for the highly credible sources compared to the less credible sources. For Experiment 2, we selected sources for each condition that differed on expertise. We selected three sources that normed high on expertise (M = 4.61, SD = 1.49) and three sources that normed low on expertise (M = 2.03, SD = 1.23), F (1,142) = 128.71, MSE = 1.87, $\eta_p^2 = .48$, but that were matched on trustworthiness (M = 2.68, SD = 1.39 and M = 2.54, SD = 1.42 respectively, F (1,142) < 1). For Experiment 3, we selected sources for each condition that differed on trustworthiness. We selected three sources that normed high on trustworthiness (M = 3.44, SD = 1.48) and three sources that normed low on trustworthiness (M = 1.93, SD = .92), F (1,142) = 54.13, MSE = 1.52, $\eta_p^2 = .28$, but were matched on expertise (M = 2.63, SD = 1.52 and M = 2.78, SD = 1.59 respectively, F (1,142) < 1). See Appendix B for the average credibility ratings for each source.

In Experiment 1 we compared the use of the corrected information to answer inference questions when the correction was provided by a source deemed high in trustworthiness and expertise to when the correction was provided by a source deemed low in trustworthiness and expertise. In Experiment 2 we compared the use of the corrected information when the correction was provided by a source deemed high in expertise to when the correction was provided by a source deemed low in expertise. And in Experiment 3 we compared the use of the corrected information when the correction was provided by a source deemed high in trustworthiness to when the correction was provided by a source deemed low in trustworthiness. Each correction condition was compared to the control (no correction) condition run in Experiment 1. As shown in previous research (Ecker, Lewandowsky, & Apai, 2011; Ecker, Lewandowsky, Swire, & Chang, 2011; Wilkes & Reynolds, 1999), we predicted that simply providing a correction would reduce participants' use of the original information. The main question of interest, however, was whether credibility (defined differently in each experiment) would further reduce participants' likelihood of using the original information.

2. Experiment 1

In this experiment, we examined whether people would be able to correct their erroneous beliefs if a correction came from a credible source. Participants read a story presented as a series of messages about a politician running for re-election (see Appendix A). One message indicated that the politician was seen taking bribe money. In the control condition, this information was not corrected, whereas in the two correction conditions, it was. In one correction condition, the correction (that the politician did not take bribe money) came from one of three highly credible sources (that were high in trustworthiness and high in expertise, according to the norming results; a government report, the district attorney, or a representative from the state legal department). In the other correction condition, the correction came from one of three sources that were low in credibility (rated as low in trustworthiness and expertise, according to the norming results; a popular political blogger, a celebrity actor, or an interest group who supports the politician). Of interest in the present study was whether participants would be significantly less likely to use the original information if the correction came from a highly credible source compared to a less credible source and no correction.

2.1. Methods

2.1.1. Participants

Ninety adults between the ages of 18 and 81 (reported age ranges: 20% ages 18–24; 32% ages 25–30; 24% ages 31–40; 9% ages 41–50; 10% ages 51–60; 4% ages 61–70; 0% ages 71–80; 1% ages 81 and up) participated using Amazon's Mechanical Turk in return for monetary compensation. Thirty participants were randomly assigned to each of the three conditions (the high credibility source correction condition, the low credibility source correction condition, and the control no correction condition).

2.1.2. Design

The study used a between-subjects design with condition (high credibility, low credibility, and control) as the manipulated variable. The dependent variable of interest was the extent to which participants used the original information to answer inference questions.

2.1.3. Materials and procedure

All participants read a story about a politician running for re-election (see Appendix A). Each version (the high credibility source correction, the low credibility source correction, and control no correction) contained a critical piece of information—that the politician was seen taking bribe money. In all three versions of the story this information came from an unnamed source. In two versions of the story (the correction conditions), participants read a twelfth message that explained that the previous report was incorrect and that the politician never received any bribe money. For both correction conditions participants received the correction from one of three named sources (which source participants received was counterbalanced across participants in that condition). In the high credibility correction condition, the correction came from one of three sources that was rated during norming as being high on both expertise and trustworthiness. In the low credibility version, the correction came from one of three sources that was rated during norming as being low on expertise and trustworthiness. The control version of the story did not contain a correction message. Instead the twelfth message referred to the local school children following the election coverage.

Participants were informed at the outset of the study that they would be asked to read and recall a story. Participants were presented with one message at a time. Reading was self paced, but participants were not allowed to go back to a previous message. Once participants finished reading the entire script, they were given a free recall test in which they were asked to recall, as accurately as possible, everything they remembered reading in the report. Then the participants received a 20-item questionnaire that included specific questions about the story (see Appendix C). Half of the questions were designed so that participants could answer them by recalling the literal content of the story (e.g. "When did the politician announce his campaign for re-election?") and half were designed so that participants could answer them by using inferences about the story (e.g. "Is there any reason to believe that the politician will not be re-elected?"). In the correction conditions, at the end of the questionnaire, participants were asked a specific question about the correction (e.g. "What was the point of the message from _____?"). We only included data for participants who correctly answered this question. In the control condition, the final question on the questionnaire asked about the local school children mentioned in message twelve. The order of the test questions was randomized, except for the question concerning the point of the correction, which always came at the end.

After completing the questionnaire, participants were asked to rate how likely they would be to vote for the politician, on a scale of 1–7, *where 1 is highly unlikely and 7 is highly likely*. They were also asked to provide the reasons behind their vote. Following the procedure used by Guillory and Geraci (2010), participants were asked to indicate why they believed that there was a correction in

the story. Finally, all participants were given a brief demographic questionnaire to complete.

2.2. Results

Significance was set at $p < .05$ for the following analyses. Free recall, factual questions, inference questions, and post-test questionnaire were scored by two judges acting independently, using a sample of 18 questionnaires. Inter-rater reliability was high ($r = .94$, .97, .82, .90, respectively).

2.2.1. Free recall

The free recall test was scored using "idea units". An idea unit was recorded as being recalled if the participant reproduced all or a substantial part of its content; otherwise it was scored as absent. Results from the free recall test showed that overall recall performance did not differ across conditions (high credibility, $M = .49$; $SD = .15$; low credibility, $M = .46$; $SD = .15$; control, $M = .48$; $SD = .20$), $F(1,88) < 1$.

2.2.2. Questionnaire responses

Next, we examined responses to the questionnaire. Half of the questions on the questionnaire were inference questions and the other half were factual questions. For the factual questions, there were no significant differences in correct responses between conditions, $F(1,88) < 1$. The proportion of correct responses to factual questions was .80 ($SD = .14$) for participants in the high credibility condition, .76 ($SD = .17$) for participants in the low credibility condition, and .74 ($SD = .19$) for participants in the control (no correction) condition.

Of interest was whether people answered inference questions using information from the original, but incorrect, message. Responses to the inference questions were scored as "using the original information" (the politician *took* a bribe) or some "other" response. "Other" responses included comments about bribe "rumors" or "alleged" bribery charges. We used a strict scoring scheme in which inference questions were scored as using the original information *only* if participants explicitly mentioned in their responses that the politician *took* bribe money. If participants mentioned bribe money but indicated any disbelief in the taking of the money, this type of response was not counted and was scored as "Other" (not use of the original information). Following the questionnaire participants were asked to state what they thought was the purpose of the message from either source of the correction. Only participants who correctly recalled the purpose of the correction statement were included in the results. Thus, the results do not reflect differences in participants' ability to recall the critical message.

Participants in the high credibility source correction condition were significantly less likely to use the information in the original message to answer inference questions compared to participants in the low credibility source condition, $F(1,58) = 8.19$, $MSE = .02$, $\eta_p^2 = .12$. In addition, those in the high credibility source correction condition were also less likely to use the information in the original message to answer inference questions compared to participants in the control (no correction) condition; $F(1,58) = 21.57$, $MSE = .03$, $\eta_p^2 = .26$. However, participants in the low credibility source correction condition were just as likely to use the original information as those in the control condition who had not received any correction $F(1,58) = 3.45$, $MSE = .04$, $\eta_p^2 = .05$ (see Table 1). The results indicate that receiving a correction from a trustworthy and expert source significantly decreased participants' use of the original incorrect statement when making inferences, whereas receiving a correction from an untrustworthy and non-expert source had no effect.

Table 1
Use of the original information to answer inference questions in Experiment 1.

Condition	M	SD
No correction (control)	.32	.23
High expertise and high trustworthiness[a]	.11	.10
Low expertise and low trustworthiness	.22	.18

[a] Significant difference in comparison to low credibility condition.

2.2.3. Behavioral Measure Question (Voting)

After completing the questionnaire, participants were asked to indicate how likely they would be to vote for the politician on a scale of 1–7, *where 1 was the least likely and 7 was the most likely*. Collapsing across conditions, there was a significant correlation between use of the original information in answering inference questions and voting likelihood predictions, $r(88) = -.40$, $p < .01$. As one would expect, participants who used the original information (that the politician took bribe money) when making inferences were less likely to say that they would vote for the politician. For the effect of condition on voting predictions, a one-way ANOVA showed no significant differences in voting behavior across conditions (high: $M = 4.94$; $SD = 1.71$; low: $M = 4.64$; $SD = 1.68$; control: $M = 4.48$; $SD = 1.87$), $F(2,87) < 1$, although the means are in the predicted direction with voting predictions being numerically highest in the high credibility correction condition and lowest in the control condition. Participants were also asked to explain how they came to their voting decision. Many participants stated that they did not have enough information to determine whether or not they would vote for the politician, which may be one possible explanation for why we did not see an effect of condition on voting behavior.

2.2.4. Post-test questionnaire

Participants were given a post-test questionnaire that asked them to describe why they believed there was a correction in the story. The answers were categorized as one of three response types; (1) the person providing the correction lied, (2) the person providing the correction was simply correcting a mistake, and (3) some other reason for the correction that could not be placed into one of the previous two categories. The results indicated that participants in the low credibility correction condition were more likely to indicate that the person providing the correction was lying (30% of participants) than participants in the high credibility correction condition (<1% of participants).

If participants believed that the person providing the correction was lying (and that the original information was true), then they may be more likely to continue using the original information when answering inference questions relative to people who believed that the correction was simply provided to correct an earlier mistake. Indeed when we collapsed across conditions, the results showed that participants who thought the correction was a lie were more likely to use the original information to answer inference questions ($M = .29$; $SD = .23$) than participants who thought the correction was provided to correct a mistake ($M = .10$; $SD = .08$), $F(1,40) = 15.92$, $MSE = .02$, $\eta_p^2 = .29$.

2.3. Discussion

The results from Experiment 1 indicated that when the source of the correction statement is high in trustworthiness and expertise participants were less likely to rely on original information when answering inference questions compared to when the source of the correction is low in trustworthiness and expertise, and compared to control. It has been suggested that trustworthiness and expertise are important components of source credibility (Hovland & Weiss, 1951; Kelman & Hovland, 1953; McGinnies & Ward, 1980; Weiner & Mowen, 1986). The subsequent experiments are designed

to examine the individual contributions of these aspects of credibility to the acceptance of a correction.

3. Experiment 2

3.1. Methods

3.1.1. Participants

Sixty adults between the ages of 18 and 70 (reported age ranges: 14% ages 18–24; 29% ages 25–30; 29% ages 31–40; 11% ages 41–50; 15% ages 51–60; 2% ages 61–70) participated using Amazon's Mechanical Turk in return for monetary compensation. Thirty participants were randomly assigned to each of the correction conditions (the high credibility source correction condition and the low credibility source correction condition).

3.1.2. Design

The study used a between-subjects design with condition (high credibility and low credibility source) as the independent variable. The dependent variable of interest was participants' use of the original information to answer inference questions. The participants were randomly assigned to one of the two conditions. In both conditions participants read a story that contained a series of messages about a politician running for re-election.

3.1.3. Materials and procedure

The materials and procedure were identical to those from Experiment 1 with one exception. In the high credibility condition the correction came from one of three sources with a high level of expertise (a prosecutor, the politician's campaign manager, or the politician himself) and in the low credibility condition this information came from one of three sources with a low level of expertise (a political satire news show, the wife of the politician's opponent, or an uninvolved political historian). The trustworthiness of the high and low expert sources was held constant across conditions. Again, which one of the three sources participants received in each condition was counterbalanced across participants in each condition.

3.2. Results

3.2.1. Free recall

As in Experiment 1, in Experiment 2 the free recall test was scored by "idea units". Again, the results showed that overall level of recall was not influenced by condition, (high, $M = .60$; $SD = .23$; low, $M = .53$; $SD = .19$), $F(1,58) = 1.51$, $MSE = 05$, $\eta_p^2 = .03$. All of the participants included in data analysis recalled the purpose of the message from the source of the correction (the final question on the questionnaire).

3.2.2. Questionnaire responses

There was no difference in participants' ability to accurately answer the factual questions across conditions (high, $M = .77$; $SD = .16$; low, $M = .72$; $SD = .18$; $F(1,58) = 1.39$, $MSE = 03$, $\eta_p^2 = .03$). Unlike the results from Experiment 1, when credibility was manipulated only in terms of expertise, there was no influence on participants' likelihood of using original, incorrect, information to answer to inference questions. Participants in the high credibility condition were just as likely to refer to the original incorrect story information to answer inference questions as those in the low credibility condition. While there was no significant difference across levels of expertise, ($F(1,58) = 1.68$, $MSE = 03$, $\eta_p^2 = .03$), the low credibility $F(1,58) = 9.78$, $MSE = 04$, $\eta_p^2 = .15$ and the high credibility condition $F(1,58) = 4.54$, $MSE = 04$, $\eta_p^2 = .07$ showed a significant difference in comparison to the control (no correction) condition from Experiment 1 (see Table 2). As seen in previous research (Ecker, Lewandowsky, & Apai, 2011; Ecker, Lewandowsky, et al., 2011; Wilkes & Reynolds, 1999), simply providing a correction reduced the overall influence of the original information. Indeed, whereas trustworthiness was held constant across both sources, both high and low expertise sources were given a moderate level of trustworthiness during norming. Thus, having a correction from a moderately trustworthy source did reduce participants' reliance on the original information relative to not having a correction at all. The lack of difference between the high and low expertise sources, though, demonstrates that hearing a correction from a source deemed to be highly expert did not further reduce participants' reliance on the original erroneous information.

Table 2
Use of the original information to answer inference questions in Experiment 2.

Condition	M	SD
No correction (control from Experiment 1)	.32	.23
Experiment 2		
High Expertise	.22	.17
Low Expertise	.18	.15

3.2.3. Behavioral Measure Question (Voting)

Again, there was a significant correlation between use of the original information across conditions and voting likelihood predictions, $r(88) = -.34$, $p = .001$, showing that participants who used the original information to answer inference questions were less likely to report that they would vote for the politician. There was no effect of condition on voting predictions (high: $M = 4.97$; $SD = 1.43$; low: $M = 5.23$; $SD = .78$; control: $M = 4.48$; $SD = 1.87$), $F(2,87) = 2.01$, $MSE = 2.19$, $\eta_p^2 = .05$.

3.2.4. Post-test questionnaire

Again, participants were given a post-test questionnaire that asked them to describe why they believed there was a correction in the story. The results indicated that many participants in both the high (67%) and low (72%) credibility conditions believed that the person providing the correction was simply correcting an earlier mistake.

We examined the use of the original information (conditions collapsed) for participants who said the correction was a lie compared to those who said it was correcting a mistake. Similar to the previous experiment, participants who thought the correction was a lie ($M = .45$; $SD = .25$) were more likely to continue using the incorrect original information than participants who said the correction was correcting a mistake ($M = .16$; $SD = .12$), this difference was statistically significant, $F(1,40) = 17.82$, $MSE = .02$, $\eta_p^2 = .31$.

3.3. Discussion

These results indicated that source expertise alone does not reduce the tendency for people to use the original incorrect information when answering inference questions. Thus, source expertise may not be the critical factor shown to reduce susceptibility to erroneous inferences in Experiment 1. Therefore, in Experiment 3 we examined the specific role of source trustworthiness (while holding constant source expertise) in reducing susceptibility to erroneous inferences in memory.

4. Experiment 3

4.1. Methods

4.1.1. Participants

A sample of sixty adults between the ages of 18 and 70 (reported age ranges: 19% ages 18–24; 25% ages 25–30; 28% ages 31–40; 14%

Table 3
Use of the original information to answer inference questions in Experiment 3.

Condition	M	SD
No correction (control from Experiment 1)	.32	.23
Experiment 3		
High trustworthiness[a]	.17	.12
Low trustworthiness	.30	.17

[a] Significant difference in comparison to low credibility condition.

ages 41–50; 12% ages 51–60; 2% ages 61–70) participated using Amazon's Mechanical Turk in return for monetary compensation. Thirty participants were randomly assigned to one of the correction conditions (the high credibility source correction condition and the low credibility source correction condition).

4.1.2. Design

The study used a between-subjects design with condition (high credibility and low credibility) as the independent variable. The dependent variable of interest was use of the original information on inference questions. The participants were randomly assigned to one of the two conditions. In both conditions participants read a story that contained a series of messages about a politician running for re-election.

4.1.3. Materials and procedure

The materials and procedure were identical to those from Experiments 1 and 2 with one exception. In the high credibility condition the correction came from one of three sources that were deemed to be highly trustworthy (a religious leader, the party chair for the politician's opponent, or the political opponent himself). In the low credibility condition the correction came from one of three sources that were deemed to be untrustworthy (the politician's wife, a news source who received donations from the politician, or the politician's campaign contributors). Expertise was held constant across the two source conditions. Which one of the three sources participants received was counterbalanced across participants in each condition.

4.2. Results

4.2.1. Free recall

As in the previous experiments, story recall was not influenced by condition, (high, $M = .52$, $SD = .19$; low, $M = .50$, $SD = .20$; $F(1,58) < 1$). All of the participants included in data analysis recalled the purpose of the message from the source of the correction (the final question on the questionnaire).

4.2.2. Questionnaire responses

Consistent with the previous experiments, there was no effect of condition on participants' correct answers on factual questions (high, $M = .74$; $SD = .20$; low, $M = .75$; $SD = 20$; $F(1,58) < 1$). However, trustworthiness did influence participants' answers on the inference questions. Results showed that participants who received the correction from a highly trustworthy source were less likely to use the original information to answer inference questions compared to participants who received the correction from a less trustworthy source, $F(1,58) = 12.37$, $MSE = 02$, $\eta_p^2 = .17$. In addition, those in the high trustworthy source correction condition were also less likely to use the information in the original message to answer inference questions compared to participants in the control (no correction) condition from Experiment 1, $F(1,58) = 9.68$, $MSE = .04$, $\eta_p^2 = .15$. Use of the original information did not differ across the low trustworthy condition and the control condition, $F(1,58) < 1$ (see Table 3).

4.2.3. Behavioral Measure Question (Voting)

Again there was a significant correlation between use of the original information across conditions and voting likelihood predictions, $r(88) = -.42$, $p < .001$, indicating that participants who used the original information (that the politician took bribe money) were less likely to vote for the politician. Turning to the effect of condition on voting predictions, unlike in the previous experiments, in this experiment source credibility significantly influenced participants' voting predictions (high: $M = 5.28$; $SD = 1.56$; low: $M = 4.25$; $SD = 1.78$; control: $M = 4.48$; $SD = 1.87$), $F(2,87) = 2.95$, $MSE = 3.06$, $\eta_p^2 = .06$. Participants who received the correction from a highly trustworthy source were more likely to say that they would vote for the politician compared to participants who received the correction from a low trustworthy source $F(1,58) = 5.79$, $MSE = 2.82$, $\eta_p^2 = .09$, or those who received no correction (this difference approached significance, $F(1,58) = 3.46$, $MSE = 3.0$, $\eta_p^2 = .05$, $p = .06$.

4.2.4. Post-test questionnaire

The results from the post-test questionnaire indicated that many participants in both the high (67%) and low (39%) credibility conditions believed that the person providing the correction was simply correcting an earlier mistake.

Participants who thought the correction was a lie ($M = .33$; $SD = .18$) were more likely to continue using the incorrect original information than participants who said the correction was simply correcting a mistake ($M = .18$; $SD = .14$), $F(1,43) = 8.61$, $MSE = .02$, $\eta_p^2 = .17$.

4.3. Discussion

The results of Experiment 3 showed that when the source of the correction statement was high in trustworthiness and neutral in expertise participants were significantly less likely to use the original information when answering inference questions compared to when the correction came from a source who was low on trustworthiness and neutral on expertise. Taken together with the results from all three experiments, this finding demonstrates that source trustworthiness (and not expertise) reduces participants' use of erroneous inferences.

5. General discussion

We examined whether people could reduce their reliance on incorrect information if a highly credible source corrected the information. Results showed that people were able to reduce their use of the original information when the correction came from a source that was deemed to be both highly trustworthy and expert compared to one that was less trustworthy and expert and compared to a control condition in which there was no correction (Experiment 1). The finding that people were able to decrease their reliance on original information did not appear to be due to the expertise of the person correcting the information. When expertise was varied and trustworthiness was held constant in Experiment 2, the use of the original information did not differ across groups. Thus, people were not more willing to accept a correction when it came from an individual who was deemed to be highly expert compared to one with little expertise. Experiment 3 showed that the assumed trustworthiness of the source was the factor that led people to correct their inferences. When the correction came from a more trustworthy (but not more expert) source, people were significantly less likely to use the original incorrect information to make inferences about the politician in the story. Thus, the results suggest that if a correction comes from a highly trustworthy source, then people will be less likely to rely on original

erroneous information when making inferences about people and situations.

Although we did not find an effect of expertise on participants' acceptance of a correction, we think that it may be possible, under some conditions, for people to rely on the expertise of the source when deciding whether or not to accept a correction. Perhaps there would be situations in which the expertise of the source would be more relevant to the decision at hand. For example, in medical decision making, expertise could play a stronger role than it does in political judgments. Future studies could examine this hypothesis. Another interesting finding from the current study was that many of participants in the high credibility conditions believed that the person providing the correction statement was correcting a lie or mistake, while many of participants in the low credibility conditions believed that the person providing the correction was lying. This finding demonstrates that manipulating the credibility of the source of a correction influenced the reasons people believe the information was corrected. The first study of this kind to use a post-test questionnaire found that participants who believed the original information and thought that the correction was a cover up were numerically but not statistically more likely to continue using the original information when answering inference questions (Guillory & Geraci, 2010). In the current study, results from all three experiments showed that participants who believed the original information and thought that the correction was a lie were statistically more likely to continue using the original information when making inferences. This finding is noteworthy because it provides evidence for the claim that many people may continue to rely on the original information because they do not believe the correction. Extensive research shows that people tend to evaluate information with a directional bias toward reinforcing their pre-existing views (Kunda, 1990; Molden & Higgins, 2005). Specifically, people tend to display bias in evaluating political arguments and evidence, favoring those that reinforce their existing views and disparaging those that contradict their views (Edwards & Smith, 1996). Therefore, if people refuse to believe the correction because "all politician's are corrupt", as many of our participants commented on the post-test questionnaire, it is likely that they will continue using the discredited information more than someone who genuinely believes the correction.

Additionally, people may have difficulty disregarding information because of "belief perseverance". As people dwell on the critical information, they may elaborate on the information and incorporate it into a belief system, which can affect subsequent information processing (Ross, Lepper, & Hubbard, 1975). When people acquire new information they incorporate it into the knowledge that they already possess. Once this happens, they are likely to have difficulty undoing the beliefs that the original information inspired. Previous research has shown that people often cling to their beliefs to a greater extent than is logically or normatively warranted. Initial beliefs may persevere in the face of corrective evidence, even when the initial evidence that the beliefs are based upon is weak (Anderson, Lepper, & Ross, 1980). In the present study, even after participants read the correction statement they may have continued to hold beliefs about the original information and this could affect the way they respond to inference questions.

The majority of studies on source credibility examine attitudes rather than behavioral change (Pornpitakpan, 2004). The current study attempted to examine both and showed that the source of the correction influenced whether people believed (and used) the correction when making inferences about the information. For our behavioral measure, we asked participants how likely they would be to vote for the politician. In all three experiments there was a significant correlation between voting behavior and use of the original information on inference questions. Those participants who used the correction and did not mention the misinformation about the politician receiving bribe money were more likely to say they would vote for the politician, as we might expect. In addition, in Experiment 3, a correction from a highly trustworthy source had the effect of reducing people's reliance on the original information when making inferences and when making voting decisions. Our studies are limited in that they use a fictional politician and a fictional voting measure. Future research should examine whether corrections affect real political beliefs and voting behavior.

The present study adds to a growing literature demonstrating the power and the persistence of incorrect inferences in memory (Guillory & Geraci, 2010; Johnson & Seifert, 1994; Wilkes & Leatherbarrow, 1988; Wilkes & Reynolds, 1999). The current experiments reveal three main insights. One, they show unequivocally that inferences persist in part because people do not believe corrections. Two, they show that a correction can be made more believable if it comes from a trustworthy source. Three, and most importantly, the current experiments show that erroneous inferences can be reduced, even when no alternative account is provided, as long as the correction comes from a source that is deemed to be trustworthy.

5.1. Practical application

The current study has important practical implications, particularly in the political realm, where we focus our research. Research shows that negative campaigns depress the public's evaluation of the political opponent (Fridkin & Kenney, 2004; Fridkin and Kenney, 2008). The results from the current study suggest that if a politician wants to correct or change negative information, the correction or clarification should come from someone who the voters view as credible or trustworthy. Of course, who the public deems trustworthy may depend on a host of factors, including political affiliation.

This finding is relevant not only in politics, but can be useful in many different areas of decision making. For example, the lingering effects of false inferences can have a negative impact on medical decision making. Not long ago the media reported on research that showed that there is a link between the MMR vaccine and autism. The story was based on an initial study by Andrew Wakefield that subsequent research failed to support (Auyeung et al., 2009). It is also clear now that the original report was based on fraudulent data. Several corrections later came out, but many parents continue to worry about a possible connection and opt not to vaccinate their children, which has had devastating consequences in some cases. This led to a rise in childhood deaths associated with previously eradicated diseases, such as measles and mumps (Godlee et al., 2011). This example provides one instance of the many personal and societal costs to misinformation (see Lewandowsky et al., 2012 for a review of other issues including, food safety, courtroom information, and corrections in the media). The current studies offer one promising method for reducing people's reliance on misinformation when making decisions.

Appendix A. Henry Light runs for re-election

Control condition

Message 1: On August 10th/Henry Light announces his campaign for re-election.

Message 2: This is not a surprise to anyone/because he was a good politician/and did many beneficial things for his state during his first term.

Message 3: In his campaign Henry Light promises to improve schools in underprivileged districts. This is very important to him as he was underprivileged growing up.

Message 4: Henry Light embarks on a bus tour around the state to promote his campaign. During this time he meets with many of the local citizens.

Message 5: There are many secret meetings scheduled during the campaign. No media are allowed in during the meetings.

Message 6: In the middle of his campaign, it is reported that Henry Light was seen taking bribe money.

Message 7: Henry Light was raised by a single mother, with his 4 brothers and 3 sisters.

Message 8: From a young age Henry Light vowed that he would be successful as an adult, and never be poor again. He wanted to give his mother and siblings what they never had growing up.

Message 9: Henry Light takes time away from his campaign to take a vacation with his wife and children. During this time he does not speak with the media.

Message 10: Henry Light and his opponent meet to have a public debate about their stand on important issues. The debate is televised on the local media station.

Message 11: Two months into his campaign/Henry makes a sizeable donation to the homeless.

Message 12: The local school children follow the election coverage.

Message 13: Election day arrives on May 16th.

Correction conditions

Message 12: (*source of the correction goes here*) reports a correction/that the previous report was incorrect/and Henry Light did not take any bribe money.

(The units scored at Free Recall are indicated by/. . .. ./)

Appendix B. Sources identified during credibility norming

Experiment 1: High trustworthiness and high expertise

Source	Trustworthiness	Expertise
Government report	4.42	5.0
District attorney	4.21	4.75
Representative from state legal dept	4.58	4.79
Combined mean (SD)	4.40 (1.19)	4.85 (1.15)

Experiment 1: Low trustworthiness and low expertise

Source	Trustworthiness	Expertise
Popular political blogger	1.83	2.04
Celebrity actor	1.58	1.54
Interest group who supports Henry Light	1.63	2.0
Combined mean (SD)	1.68 (.77)	1.86 (.91)

Experiment 2: Neutral Trustworthiness and High Expertise

Source	Trustworthiness	Expertise
Prosecutor	3.15	5.13
Henry Light's Campaign Manager	2.61	3.67
Henry Light	2.27	5.04
Combined mean (SD)	2.68(1.39)	4.61(1.49)

Experiment 2: Neutral trustworthiness and low expertise

Source	Trustworthiness	Expertise
Political satire news	2.04	2.02
Wife of Henry Light's opponent	2.83	1.98
Uninvolved political historian	2.75	2.08
Combined mean (SD)	2.54 (1.42)	2.03 (1.23)

Experiment 3: High trustworthiness and neutral expertise

Source	Trustworthiness	Expertise
Religious leader	4.01	2.13
Party chair for Henry Light's Opponent	3.12	2.83
Henry Light's opponent	3.20	2.92
Combined mean (SD)	3.44 (1.48)	2.63 (1.52)

Experiment 3: Low trustworthiness and neutral expertise

Source	Trustworthiness	Expertise
Henry Light's wife	1.92	2.92
News source who received donations from Henry Light	1.96	2.83
Henry Light's campaign contributors	1.92	2.58
Combined mean (SD)	1.93 (.92)	2.78 (1.59)

Appendix C. Questionnaire items

Factual questions

1. When (month & date) did Henry Light announce his campaign for re-election?
2. What efforts did Henry Light take to become successful?
3. Why does Henry Light promise to improve schools in underprivileged districts?
4. What does Henry Light do to promote his campaign?
5. How many siblings does Henry Light have (brothers & sisters)?
6. Who raised Henry Light?
7. What did Henry Light vow when he was younger?
8. How do Henry Light and his opponent make their stand on the issues known to the public?
9. How far into his campaign does Henry Light make a sizeable donation to the homeless?
10. When (month & date) was election day?

Inference questions

1. What do you think happened during Henry Light's secret meetings?
2. Do you think Henry Light's campaign was successful? Why or why not?
3. Is there any reason to believe that Henry Light will not be re-elected? If so what?
4. Why do you think the media were not allowed in during the secret meetings?
5. What role did the media play in the campaign?
6. What is a possible reason for why people would not vote for Henry Light?
7. Are there any reasons to believe that Henry Light is not a good politician?
8. Do you think Henry Light expected to win the election? Why or why not?
9. How do you think the local citizens felt about Henry?
10. Do you think money is important to Henry Light? Explain.

Final item on questionnaire

1. What was the point of the message from (*source of the correction goes here*)?

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