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A Picture Paints a Thousand Lies? The Effects and Mechanisms of Multimodal Disinformation and Rebuttals Disseminated via Social Media

MICHAEL HAMELEERS, THOMAS E. POWELL,  TONI G.L.A. VAN DER MEER, and LIEKE BOS

Today's fragmented and digital media environment may create a fertile breeding ground for the uncontrolled spread of disinformation. Although previous research has investigated the effects of misinformation and corrective efforts, we know too little about the role of visuals in disinformation and fact checking. Against this backdrop, we conducted an online experiment with a diverse sample of U.S. citizens (N = 1,404) to investigate the credibility of textual versus multimodal (text-plus-visual) disinformation, and the effects of textual and multimodal fact checkers in refuting disinformation on school shootings and refugees. Our findings indicate that, irrespective of the source, multimodal disinformation is considered slightly more credible than textual disinformation. Fact checkers can help to overcome the potential harmful consequences of disinformation. We also found that fact checkers can overcome partisan and attitudinal filters – which points to the relevance of fact checking as a journalistic discipline.

Keywords disinformation, fact checkers, media trust, media credibility, misinformation, visual communication

In today's fragmented information environment, debates on the truthfulness and honesty of political claims have become more prominent (e.g., van Aelst et al., 2017). The fierce debate on the media's truthfulness and accuracy has become particularly prominent in the aftermath of the 2016 U.S. elections, where a large quantity of "news stories" were found to be inaccurate, or flat-out incorrect. The spread of inaccurate information has been regarded as a severe threat to

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democracy (e.g., Lewandowsky, Ecker, Seifert, Schwarz, & Cook, 2012). In today's information environment, the function of the media to inform citizens by disseminating truthful information is at risk. More specifically, different political and nonpolitical actors can use the affordances of digital media to spread falsehoods across society – without the interference of journalistic gatekeepers that verify information. In this setting, citizens may not be able to make accurate political decisions as they are increasingly unsure about the veracity of political information.

When studying the consequences of the spread of inaccurate information, disinformation has received markedly little attention in the field of political communication (but see Marwick & Lewis, 2017). Misinformation can be defined as any type of information that is spread without the intention to mislead (e.g., Wardle, 2017). Disinformation, however, refers to the *intentional* spread of false information, for example driven by political strategies (Jackson, 2017; Marwick & Lewis, 2017; Weedon, Nuland, & Stamos, 2017). As disinformation resembles propaganda in terms of the intended political consequences of the sender, it is crucial to consider the effects of disinformation on the audience's perception of information credibility, and the potential effect of corrective efforts that counter the intentional falsehoods. Against this backdrop, this paper relies on an experimental study in which the effects of multimodal disinformation and rebuttals on the (dis)information's perceived credibility are investigated.

The current online media environment is increasingly *multimodal* – comprising visuals and text (Harcup & O'Neill, 2017). Despite this, disinformation and rebuttals that combine an image alongside a textual claim have been neglected in extant research. In what is possibly President Trump's most infamous instance of disinformation, he intervened to obtain edited photos of his inauguration, with which he used to claim the crowd to be the biggest in history (Swaine, 2018) – despite images posted on Twitter proving otherwise. The strategic use of visuals in disinformation is likely to be motivated by the premise that images are a direct representation of reality and as such are perceived as more credible than more abstract forms of communication such as words (Messaris & Abraham, 2001). This true-to-life quality of photographs means that the audience may be *less* suspicious of disinformation in multimodal rather than textual form. Multimodal disinformation may thus be perceived as more credible than textual disinformation. Testing this proposition is especially important today, since image manipulation (and even video manipulation) is becoming easier through the wider availability of image-editing software.

Recently, journalistic tools to refute inaccurate information have been developed (e.g., Fridkin, Kenney, & Wintersieck, 2015; Thorson, 2016). Fact-checkers, such as Politifact.com and FactCheck.org, test the claims made in news stories to arrive at a verdict of the accuracy of the claims. Although these fact checkers are found to be effective at times, the desire to confirm identitarian partisan beliefs may outweigh people's accuracy motivations, meaning that fact-checkers may not be effective for stronger partisans (e.g., Thorson, 2016). Against this backdrop, this paper makes at least three important contributions to our understanding of the political consequences of disinformation. First, it investigates the effects of visual (photographic) and textual disinformation on the perceived credibility of disinformation. Second, it assesses whether textual and visual cues in rebuttals can counter the potentially harmful effects of disinformation. Finally, it compares how source cues and prior issue attitudes impact the persuasiveness of disinformation. Taken together, this study is the first to assess how multimodal disinformation distributed by professional versus nonprofessional communicators affects the public, and how multimodal rebuttals may counter the persistence of falsehoods in society.

Multimodal Disinformation: The Interaction of Visual and Textual Cues

Misinformation can be identified as information that is not supported by clear empirical evidence and/or expert opinion (Nyhan & Reifler, 2010). An important political consequence of the spread of inaccurate information is the persistence of false beliefs in society (Reedy, Wells, & Gastil, 2014). If “factual” information is inaccurate, information regarded as the foundation of political judgments can potentially mislead the electorate (e.g., van Aelst et al., 2017). Although misinformation may be a highly problematic phenomenon, the communicator does not necessarily intend to mislead the audience. This is different when it comes to *disinformation* (Jackson, 2017; Weedon et al., 2017). Disinformation is closer to propaganda, as the communicator distributes incorrect information to achieve a certain (political) goal (Marwick & Lewis, 2017). Disinformation agents may for example attack the elites to foster distrust among different segments of the electorate. In that sense, the democratic implications of disinformation may be even more severe than misinformation – as it may eventually lead to polarized divides in society. More specifically, citizens with aligning attitudinal filters may be persuaded by congruent disinformation since their need to maintain cognitive consonance may outweigh the need to be correct (Festinger, 1957). If such selective processing biases occur on both sides of the public, opposing worldviews become further and further apart over time.

Disinformation may not only be textual. Indeed, visual communication has a long history as a propaganda tool (Bagchi, 2016), and a growing body of research points to the crucial role of visuals alongside text in multimodal political communication (Graber, 1990). Much of this work relates to visual and multimodal framing – the integrative ability of images alongside text to highlight a salient aspect of an issue (de Vreese, 2005; Entman, 1993; Grabe & Bucy, 2009) – which can have an even stronger impact on the audience than textual cues alone (Powell, Boomgaarden, de Swert, & de Vreese, 2015). In this paper, we define visual disinformation as the use of images by agents of disinformation to *deliberately* present a misleading or fabricated image of reality. As people tend to be less critical of visuals (Wardle, 2017), it is important to assess the impact of multimodal disinformation.

We follow extant conceptualizations that have classified communicative untruthfulness based on intentions and facticity (e.g., Tandoc Jr., Lim, & Ling, 2018; Wardle, 2017), and add the multimodal component to distinguish different forms of visual disinformation: (1) pairing real visuals with misleading texts (decontextualization); (2) cropping or decontextualizing visuals to make certain aspects of issues more salient in a goal-directed way (reframing); (3) manipulating visuals to present a different reality (visual doctoring); (4) fabricating content by pairing manipulated images with manipulated text (multimodal doctoring). In this paper, we specifically focus on pairing existing visuals originating from a different setting to fabricated text that aims to resonate with polarized divides in society.

Although we focus on disinformation in this study, and thus inherently assume that our manipulated versions of political events are intentionally misleading, the distinction between spreading falsehoods without the intention to mislead (misinformation) and disinformation can be difficult to assess empirically. To empirically examine disinformation, we manipulated textual and visual information in a goal-directed way – and deliberately fabricated information to resonate with polarized divides in U.S. society. Additionally, a deliberate choice to pair (incorrect) information with visuals that are factually unrelated, either in terms of time, place, or context, indicates an intentional purpose to mislead audiences. In that sense, our approach to communicative untruthfulness is closer to the politics of dis- than misinformation (e.g., Tandoc Jr. et al., 2018; Wardle, 2017). Moreover, although news organizations may not be a likely source for the dissemination of disinformation themselves, source cues that indicate

credible organizations can be used and manipulated strategically by agents of disinformation to take advantage of the legitimacy of journalism and formats associated with facticity and verified knowledge.

Central to the role of visuals in disinformation is their *indexicality* (Messaris & Abraham, 2001). This describes the true-to-life quality of visuals in that they are a direct depiction of physical objects and events in the non-mediated environment, whereas words are abstract symbols that bear no physical resemblance to their referents (Grabe & Bucy, 2009). When reading, one must extract semantic meaning from written symbols and then create an imagined reconstruction of an event. By contrast, the addition of an image to a text provides an “index” of reality and lends an inherent evidential quality to a story (Messaris & Abraham, 2001). This can influence audience perceptions of news events (Zillmann, Gibson, & Sargent, 1999), and may inveigle viewers into overlooking the fact that all images are human-made, artificial constructions. Thus, when used in disinformation, visuals could be a powerful propagator of falsehoods as they are seen as more credible and accurate than textual cues alone. This brings us to the first hypothesis: Multimodal disinformation containing text and a visual is perceived as more credible than disinformation that relies on words alone (H1).

News Media and Ordinary Citizens as Sources of Disinformation

Disinformation can be disseminated by different actors, such as politicians, news media and ordinary citizens. At the same time, disinformation oftentimes hides the actual source, or strategically uses or manipulates credible source cues to take advantage of the legitimacy of journalism. Attributions of blame may provide an important context for disinformation spread by agents of disinformation. Applied to blame attribution, disinformation may falsely connect different scapegoats (i.e. the political elites, immigrants) to societal issues (i.e. terrorism, climate change policies). Media outlets have for example been associated with the spread of populist blame attributions that resonate strongly with news values and media logic (e.g., Mazzoleni, 2008). In that sense, to respond to the popular demand of their audience, news media may be motivated to engage in a fact-free blame-shifting discourse that prioritizes news values and conflict over accuracy. As part of this, news sources of existing organizations may be used by agents of disinformation to credibly communicate a blame-shifting message that resonates with today’s media logic.

The advances of social network sites have also empowered ordinary citizens to spread falsehoods across society. On social media, journalistic gatekeepers are largely absent, and the journalistic routines striving toward objectivity and balance can be sidestepped (Engesser, Fawzi, & Larsson, 2017). Different actors can thus spread unfiltered information through their own media channels. In line with these premises, recent research has identified a surge in the direct online communication of populist actors – who use Twitter and Facebook to speak directly to their electorate (e.g., Waisbord & Amado, 2017). At the same time, the digitization of the mediascape has resulted in the spread of extreme-right, fact-free sentiments by (discontented) citizens (e.g., Ouellette & Banet-Weiser, 2018). Not least because of the absence of journalistic gatekeeping, social network sites that engage different actors in the spread of disinformation are crucial to consider in understanding the impact of intended falsehoods on society. In this paper, we focus on disinformation spread via Twitter. Twitter is chosen for two main reasons. First of all, linkages on Twitter are based on weak ties, which indicates that connections may not know each other in real life, and that followers mainly use Twitter as a source to get novel information (Valenzuela, Correa, & Zúñiga, 2018). Second, as

a self-selected elite source, Twitter communication is typically not bi-directional, and people typically follow news organizations, politicians or other sources of political information they trust and/or identify with to be informed about new developments without being mutually connected. As Twitter is used as a source to be informed about political developments, disinformation spread via Twitter may have far-reaching political consequences when people perceive the self-selected sources such as news media and ordinary citizens as opinion leaders as credible.

Against this backdrop, we rely on two source cues that we regard as the “opposite poles” when it comes to the level of journalistic professionalization, distance from receivers, and closeness to the journalistic principles of objectivity and truthfulness: a traditional news media outlet and an unknown ordinary citizen. News media should be subject to professional journalistic principles and routines that verify sources and content (Lecheler & Kruikeimer, 2016). Ordinary citizens, however, are not subject to these routines. Instead, they are protected by perceived anonymity and asynchronous communication, which should result in less pressure to report accurately. As news media sources should consequentially be associated with higher levels of credibility, we expect that disinformation connected to an existing news organization is regarded as more credible than disinformation disseminated by an ordinary, unknown citizen (H2).

The Potential of Textual and Visual Rebuttals of Disinformation

As a response to the spread of inaccurate information across society, fact-checking may be regarded as an effective journalistic tool that can help to correct falsehoods (e.g., Fridkin et al., 2015; Thorson, 2016; Wood & Porter, 2018). In the US, for example, PolitiFact and FactCheck.org are fact-checking initiatives that gained in popularity after the 2016 U.S. elections. Fact checkers investigate the claims made in (news) stories, and make an overall recommendation on the extent to which the message is true or false, as well as describing the true state of events. Many fact checkers post such corrections on social media, such as Twitter or Facebook.

Corrective information presented in fact checkers can be regarded as an effective rebuttal of disinformation. Specifically, the integration of message simplicity and factual information has been regarded as an effective strategy to counter falsehoods (Lewandowsky et al., 2012). The presentation of fact-based, simple counterarguments in fact checkers should thus result in the *acceptance* of the corrective information (Chan, Jones, Hall Jamieson, & Albarraçin, 2017). Although extant research has demonstrated that misinformation can be hard to correct when it resonates strongly with identity-based beliefs (e.g., Fridkin et al., 2015; Thorson, 2016), we expect that exposure to a fact checker rebutting disinformation should result in a *lower* perceived credibility of disinformation than when such a fact checker is absent (H3).

In line with visual and multimodal communication literature, we expect that disinformation that contains a visual will be harder to refute than disinformation containing text alone. Textual communication relies on an abstraction of reality that is not required for the reception of visual cues (Grabe & Bucy, 2009). The indexicality of visuals (Messaris & Abraham, 2001) should make disinformation that contains a visual appear more credible (see H1), and in turn should be harder to refute via a rebuttal. Another reason why textual communication should be easier to refute is that it can be perceived as easier to manipulate than images. Although visuals are increasingly subject to manipulation and editing – a growing trend that makes the focus of this study particularly pressing – textual communication can rely on a virtually unlimited amount of possibilities

to construct meaning and fabricate a story. By comparison, visuals can be selected or manipulated, but to a more limited extent.

Fact checkers may have the strongest *corrective* effect in multimodal form. Other research that has looked beyond textual fact-checkers indicates that graphical corrections (Nyhan & Reifler, 2011) and visual rating scales (Amazeen, Thorson, Muddiman, & Graves, 2018) can be regarded as effective tools to counter misinformation, and that visual formats may be even more effective than textual rebuttals. The evidential quality of visuals seems particularly relevant to the context of fact-checking which focuses on presenting evidence to establish the truth or falsehood of a claim. By showing an event or story “as it really happened” images may prove a particularly effective tool to refute falsehoods, since, compared to text, they are perceived as unquestionable factual displays. Although extant research has only investigated the effects of textual fact checkers, visual communication ties in with the most recommended format of corrective information: short and factual (Lewandowsky et al., 2012). Textual communication, in contrast, may be more distant from reality, and therefore perceived as a less strong rebuttal. In our study, the multimodal format of the corrective information follows the manipulation of visual disinformation. More specifically, disinformation is refuted by showing the “fake” visual alongside the real image that accurately describes the situation as it happened.

Against this backdrop, we can formulate the following hypotheses on the effects of textual versus multimodal communication in disinformation and fact checkers: Textual fact-checkers that refute multimodal disinformation will be *less* effective in lowering disinformation’s credibility than textual fact checkers of textual disinformation (H4a). Multimodal fact-checkers that refute textual disinformation will be *more* effective than textual fact-checkers of textual disinformation (H4b). Multimodal fact-checkers that refute multimodal disinformation will be more effective than textual fact-checkers of multimodal disinformation (H4c). Finally, we expect that multimodal fact-checkers are more effective in refuting textual disinformation than multimodal disinformation (H4d).

The Attitudinal Filter of Motivated Reasoning

People are inclined to be less critical of information that supports their existing views (Wardle, 2017). Hence, the effects of exposure to (multimodal) disinformation and rebuttals may be contingent upon people’s attitudinal lenses (e.g., Thorson, 2016). People that oppose immigration, for example, may not be persuaded by fact checkers that refute attitudinal-congruent news on the issue at hand (see also Guess, Nyhan, & Reifler, 2018). These processing biases can be understood in the light of motivated reasoning theory (e.g., Festinger, 1957). Motivated reasoning postulates that people process information in line with their perceptual attitudinal or partisan lenses (Taber & Lodge, 2006). Congruent new information is consequentially regarded as more accurate and positive whereas messages that are incongruent with prior attitudes are judged as negative and inaccurate, or actively counter-argued (e.g., Nyhan & Reifler, 2010). Yet, more recent work on the effects of fact-checkers failed to reproduce the so-called backfire effect of partisan motivated reasoning (Hameleers & van der Meer, 2019; Nyhan, Porter, Reifler, & Wood, 2019; Wood & Porter, 2018). Hence, even if strong partisans are unwilling to update their attitudes or political evaluations, they are still willing to accept corrections of *factual* information.

Although empirical evidence is mixed, the congruence of people’s issue attitudes with disinformation may at least partially moderate the effectiveness of fact checkers. As

motivated reasoning theory postulates that congruency motives can outweigh accuracy motives (e.g., Taber & Lodge, 2006), we expect that the effects of textual and visual fact checkers are contingent upon people's issue attitudes. Specifically, we first of all hypothesize that corrective attempts result in a *lower* credibility of disinformation when the refuted disinformation was incongruent with people's prior attitudes than when the disinformation was congruent (H5a). As visuals are harder to refute than textual cues, we expect this effect to be strongest for textual disinformation (H5b).

In contrast to this, based on the same premises of defensive motivation and cognitive dissonance, it can be argued that people that *oppose* the attitudinal stance of the disinformation should be affected *less* by the fact checker than people who support it (Taber & Lodge, 2006). In other words, people who disagree with the claims made in disinformation in the first place should reject the message immediately, even without exposure to a rebuttal. They are thus less sensitive to the new information provided by the fact checker since they *already* perceive the disinformation as inaccurate and misleading. This means that the fact checker may have the *strongest* effects when people agree with the disinformation in the first place, as the opposing camp does not need a fact checker to discredit disinformation (their partisan lens already rejects it). Against this backdrop, we offer an alternative hypothesis to H5: The corrective effect of fact checkers on the perceived credibility of disinformation is stronger when disinformation is congruent than when it is incongruent with people's prior attitudes (H6).

The Effects of Multimodal Disinformation across Issues

To investigate whether the effects of multimodal disinformation and rebuttals are similar for different political contexts, we look at the effects of disinformation on two different topics: school shootings and refugees. The selection of these topics is informed by extensive pilot testing, and the empirical consideration of striving for equivalence between topics in terms of (ideological) leanings. We manipulated right-wing issue positions as it has been argued that disinformation is frequently used by the (alt) right to spread (radical) right-wing issue positions (e.g., Marwick & Lewis, 2017)

Although differences in textual framing effects across topics may be limited as equivalence between texts is easier to establish, *visual* disinformation may have different effects for different topics – cultivating different emotional responses and processing styles (e.g., Petty & Cacioppo, 1986; Powell et al., 2015). As visuals are perceived as a more direct depiction of reality (Messaris & Abraham, 2001), and as they may be processed heuristically (Powell, Boomgaarden, de Swert, & de Vreese, 2019), visuals on school shootings and refugees could tell different stories for people with different perceptual screens. For instance, it can be argued that visual disinformation on refugees may be harder to correct as images that depict this topic strongly resonate with people's partisan identities. However, images of school shootings depict a comparatively less distant threat for many Americans – thereby being potentially more activating. Against this backdrop, we raise the following question: To what extent are the effects of multimodal disinformation and rebuttals dependent on the topic of the disinformation?

Method

Design

This study relies on an online survey-embedded experiment. All participants were exposed to messages about both topics in turn. Participants were randomly assigned to one of 12 between-subjects' experimental conditions. Specifically, these conditions comprised a 2 (Disinformation: text versus multimodal Twitter post) x 2 (Source: ordinary citizen versus news agency) x 3 (Rebuttal: text versus multimodal versus absent) factorial design. A randomization check ensured that these groups did not significantly differ on a number of background variables, including age, gender, education, political interest, political ideology, prior attitudes on gun control and immigration, and general satisfaction with the media. The authors received IRB approval from the University of Amsterdam with IRB number 2018-PCJ-9400.

Sample

U.S. participants were recruited in August 2018 via the online sampling company Survey Sampling International/Dynata. In total, 1,404 respondents completed the survey in full (cooperation and completion rate of 62.7%). The mean age of the participants was 40.48 years ($SD = 15.06$). There were slightly more women (61.0%) than men (38.6%), while six participants did not identify with this classification (other). Regarding education, 25.8% was lower educated, 16.3% was higher educated and 57.9% had a moderate level of education.

In order to test our final set of hypotheses regarding the moderating effects of prior attitudes, we included one question assessing prior attitudes toward each topic for which quotas were set (pre-treatment). By doing so, we achieved a sample with a majority of participants with supporting or opposing prior attitudes on the issues of gun control and refugees. Specifically, regarding the issue of banning guns, 614 participants were in support, 691 opposed, and 99 neither supported or opposed. Regarding the position that refugees pose a threat to citizens' safety, 616 participants were in support, 624 opposed, and 164 neither supported or opposed this statement. This variety was also reflected in the partisanship of our sample, with 9.9% self-identifying as Independent, 43.9% as Republican and 46.2% as Democrat.

Stimuli

Tweets about the topics of refugees and school shootings were chosen after extensive pilot tests ($N = 474$) among a diverse sample of U.S. citizens collected via MTurk (different participants from main study). Three topics were manipulated: school shootings, immigration (terrorism), and climate change. The pre-test results indicate that disinformation by citizens is slightly less credible ($M = 3.38$, $SD = 1.42$) than disinformation by a news source ($M = 3.74$, $SD = 1.38$). Disinformation on school shootings was perceived as most credible ($M = 4.10$, $SD = 1.21$), followed by terrorism ($M = 3.35$, $SD = 1.24$) and climate change ($M = 2.41$, $SD = 1.40$).

Regarding the results of the manipulation checks, the corrective attempt of the fact-checker was recognized for all topics, albeit stronger for school shootings (90.7%) and climate change (90.4%) than terrorism (76.4%). Regarding the visual manipulation, people in the multimodal conditions were more likely to correctly recognize the visual (98.9%) than participants in the text-only conditions (13.7%).

If we look at perceptions of being misled, the topic makes an important difference. Disinformation on school shootings lead to the lowest perceptions of being deceived

(17.7%) – with a noteworthy difference between CNN (23.9%) and citizens (12.1%). Disinformation on terrorism is perceived as substantially more misleading (51.1%), but there is no strong difference between sources. Finally, 67.7% of participants in the pre-test indicated that the climate change story was misleading.

Based on the pilot test, we decided to use the two topics that were perceived as least misleading and equally credible: school shootings and terrorism. We revised the experimental materials after the pilot test in order to aim for more equivalence between the visuals. Specifically, the visuals used in the main study aim to depict equivalent information: the images depict the perpetrator alongside a second actor that is incorrectly linked to this person. For both topics, the fact-checkers show the same person, and refute the false link with the second actor. Furthermore, the chosen tweets also met a number of manipulation checks that were also confirmed in the main study (see manipulation checks section).

The tweets were manipulated to provide factually incorrect arguments against refugees, or in support of arming teachers to protect students. Depending on the condition, this claim came either via text alone or in combination with an image that supported the claim. Regarding the source of the tweets, they originated from either a (fabricated) “normal citizen” or a news agency (CNN). Subsequently, depending on the conditions they were in, some participants were exposed to a tweet from a fact checker – PolitiFact, one of the largest fact-checking organizations in the U.S. – that comprised a textual message that the previous tweet was false, whilst others saw the same message combined with an image that strengthened this claim, while a third group was not exposed to a rebuttal at all. Thereafter, this process was repeated and participants were exposed to a tweet about the other topic.

The anti-refugees tweet focused on the terrorist threat refugees might pose, in a way that a refugee was accused of being a terrorist associated with Islamic State. This manipulation was based on a real case in Germany, where a refugee who took a selfie with Angela Merkel was falsely accused of being a “Brussels bomber” on social media – referring to the 2016 terrorist attack in Brussels. We chose this case due to its realism and since it is likely little known to an American audience. The manipulated rebuttal tweet from PolitiFact declared this message as false, and emphasized that the accused refugee took Facebook to court in order to clear his name (see [Figure 1](#) for stimuli examples).

With regards to the school shooting tweet, respondents saw a message about a teacher who was able to prevent a school shooting from happening because he was armed. In fact, this was a mixture of two real stories – a common occurrence for mis- and disinformation – where a school resource police officer had stopped a school shooting, but this was attributed to a teacher who had left his gun in a bathroom at school, which was later found by a student. The manipulated rebuttal from PolitiFact therefore emphasized that not a teacher, but the school resource officer, was the one who prevented the school shooting. See [Figure 2](#) for stimuli examples. The full set of stimuli can be requested from the authors.

Procedure

Upon entering the survey, participants completed an informed consent procedure. Immediately after, they answered the prior issue-attitude moderator items regarding banning guns in the U.S., and whether refugees pose a threat. Thereafter, participants answered standard demographic and political variables, including age, gender, education level, political ideology, party affiliation and completed an attention-check. When people failed the attention check, they received a notification containing a warning that they needed to pay more attention to the



(A) A text-only tweet by an ordinary citizen; (This is a tweet created by the authors of this study to appear as a tweet by an ordinary citizen)



(B) A text-plus-image tweet by CNN; (This is a tweet created by the authors of this study to appear as a tweet by an ordinary citizen)



(C) Rebuttal tweet with text-plus-image. (This is a tweet created by the authors of this study to appear as a tweet by an ordinary citizen)

Figure 1. Example stimuli for the refugee topic. Note that this is a selection of the full stimuli set for this topic, shown for display purposes. The text-only tweet (A) shows a citizen as a source, and another version (not shown) contains the same tweet with CNN as the source. The text-plus-image tweet (B) shows CNN as a source, and another version (not shown) contains the same tweet with a citizen as the source. The text-plus-image rebuttal shows includes an image in the rebuttal tweet, and another version (not shown) shows the rebuttal tweet without an image.

Armed teacher stopped school shooting and saved countless of lives! Teacher Sean Simpson is a hero! #armedteachers

114 353 832

(A) A text-only tweet by an ordinary citizen; (This is a tweet created by the authors of this study to appear as a tweet by an ordinary citizen)



(B) A text-plus-image tweet by CNN; (This is a tweet created by the authors of this study to appear as a tweet by an ordinary citizen)



(C) Rebuttal tweet with text-plus-image. (This is a tweet created by the authors of this study to appear as a tweet by an ordinary citizen)

Figure 2. Example stimuli for the school shooting context. Note that this is a selection of the full stimuli set for this topic, shown for display purposes. The text-only tweet (A) shows a citizen as a source, and another version (not shown) contains the same tweet with CNN as the source. The text-plus-image tweet (B) shows CNN as a source, and another version (not shown) contains the same tweet with a citizen as the source. The text-plus-image rebuttal shows includes an image in the rebuttal tweet, and another version (not shown) shows the rebuttal tweet without an image.

survey in order to prevent a screen-out. The data were analyzed with all participants. If we exclude participants that failed the attention-check, the results remain the same.

Participants then read an introductory text which instructed them to imagine a scenario that they are browsing the internet in the comfort of their home, and come across some Twitter posts in their social media newsfeed. They were then randomly assigned to one of the two topics (order counterbalanced) and viewed the first disinformation tweet. Thereafter a related rebuttal followed (or not for the “no rebuttal” condition). After this, participants immediately saw a disinformation tweet for the second topic, followed by a related rebuttal (or not for the “no rebuttal” condition). By showing the tweets successively in this manner we wished to enhance the impression of a social media style newsfeed. Participants were forced to view each tweet for at least 10 seconds, and were informed of this beforehand.

Next followed the post-treatment survey, which included measures of perceived credibility, items measuring perceived source credibility for ordinary citizens, CNN and fact-checkers, and manipulation check items. At the end of the survey participants were debriefed, asked to offer feedback, and thanked for their time.

Measures

Dependent Variable. To measure participants’ perceived credibility of the disinformation presented in the school shooting tweets, respondents rated the tweets on five bipolar characteristics: “*The tweet was (1) was credible/not credible; (2) was accurate/inaccurate; (3) reflected reality/was distant from reality; (4) was true/untrue; (5) contained no falsehoods/falsehoods*”) on a 1–7 Likert scale. The items were combined into a single scale measuring the dependent variable message credibility ($\alpha = .93$, $M = 3.74$, $SD = 1.80$). The items were adapted from existing measures of message credibility (e.g., Roberts, 2010; Wölker & Powell, 2018) but with a focus on perceived accuracy and falsehood – vital in the context of disinformation. The same measurement was completed for the tweets about refugees ($\alpha = .95$, $M = 3.60$, $SD = 1.74$).

Moderator Variables. As described previously, we included an issue-attitude item for each topic to divide our sample into those who possessed pro- or anti-gun control and pro- or anti-refugee prior attitudes. Specifically, the items asked whether participants (1) “[support/oppose/neither support or oppose] the general position that guns should be banned in the U.S.”, and (2) “[support/oppose/neither support or oppose] the position that refugees should be regarded as a threat to U.S. citizens”. As the separate scores on this filter question were used to allocate participants to conditions, we could not use a scale consisting of multiple items. To assess the reliability of these single item measures, we included two 4-item scales for these same prior issue attitudes which correlated positively and significantly with the single-item measures (shootings: $r = .754$, $p < .001$; refugees: $r = .795$, $p < .001$). Re-analyses with the four-item scales as moderators yield the same results as compared to the one-item measure.

Manipulation Checks

The aforementioned pilot experiment (via Amazon Mechanical Turk, $N = 474$) was conducted to ensure the stimuli manipulations were effective and credible. Manipulation checks captured in the pilot test focused on whether participants could accurately report the presence versus absence of an image in the tweets (refugees 92.4% accurate; shootings 93.2%) and the

source of the tweet (from CNN 82.2% accurate, normal citizen 85.3%, and from PolitiFact; 97.5%). These checks were confirmed at similar levels in the main study. Furthermore, extra manipulation checks in the main study showed that fewer participants reported the fact-checker rebuttals as intentionally misleading (10.9%) compared to the disinformation tweets (refugees 36.0%; shootings 21.9%).

Analysis Strategy

Multilevel regression analyses were used to estimate differences between the conditions on an aggregated level. As the topic was a within-subjects factor, each respondent saw both issues. For this reason, the data were stacked (wide to long) to get an overall understanding of differences across conditions irrespective of the issues. The final observations in the data are not independent, and responses are clustered within respondents. To control for this, a multilevel approach with random intercepts is applied (respondents are included as a level). The regression analysis (Table 1) tests if different pairs of disinformation and corrective information can explain respondents’ perception of the credibility of information. In addition, ANOVAs were run to estimate mean differences across individual conditions and topics.

Results

The Perceived Credibility of Textual and Multimodal Disinformation

As a first step, we investigated the perceived credibility of disinformation that relies on textual versus multimodal cues (H1). Table 1 shows that, overall, there are no differences

Table 1

Multilevel model explaining respondents’ perceived accuracy of the content based on the condition they were assigned to

Conditions		Dependent Variable	Dependent Variable
Disinformation	Corrective Information	Credibility	Credibility
Text	No Fact-checker	Omitted	.09 (.09)
Text & visual	No Fact-checker	.09 (.09)	Omitted
Text	Text	-.33 (.09)***	-.42 (.09)***
Text & visual	Text	-.36 (.09)***	-.45 (.09)***
Text	Text & visual	-.38 (.09)***	-.47 (.09)***
Text & visual	Text & visual	-.30 (.09)***	-.39 (.09)***
Constant		3.46 (.07)***	3.46 (.07)***
ICC level		.623	.623
LL full model		-5265.447	-5265.447

Note. Reference category is either the condition with textual disinformation without exposure to a factchecker (second last column) or textual and visual disinformation without exposure to a fact checker (last column).

Cells contain unstandardized regression coefficients with standard errors. IIC = Intraclass correlation coefficient; LL = Log likelihood.

***p < .001.

Table 2

The effect of textual and visually-framed disinformation and fact-checkers on the perceived accuracy of disinformation on refugees and school shootings

Disinformation	Corrective Information	<i>All</i>	<i>Refugees</i>	<i>School Shootings</i>
		Mean (SD)	Mean (SD)	Mean (SD)
Text & visual	Text & visual	3.47 (1.69) _b	3.48 (1.79) _b	3.45 (1.58) _b
Text & visual	Text	3.50 (1.82) _b	3.45 (1.82) _b	3.54 (1.81) _b
Text & visual	No Fact-checker	4.29 (1.70) _a	4.17 (1.67) _a	4.41 (1.72) _a
Text	Text & visual	3.29 (1.76) _b	3.38 (1.71) _b	3.19 (1.81) _b
Text	Text	3.41 (1.75) _b	3.43 (1.73) _b	3.38 (1.77) _b
Text	No Fact-checker	4.08 (1.65) _a	3.69 (1.62) _b	4.47 (1.67) _a

Note. Means with differing subscripts differ significantly at the $p < .05$ level.

in perceived credibility across the conditions without corrective information. However, when looking at the separate issues, the results of the ANOVAs indicate that adding an image to disinformation that connects refugees to terrorism significantly augments the perceived credibility of the message, albeit this effect is relatively modest (see Table 2). More specifically, visually-framed disinformation on refugees is perceived as significantly more credible ($M = 3.70$, $SD = 1.79$) than disinformation that relies on text alone ($M = 3.49$, $SD = 1.69$, $t = -2.17$, 95% CI [- .38, -.02], $p = .030$). The difference between the presence and absence of visual framed disinformation was not significant for the topic of school shootings ($t = -1.42$, $p = \text{n.s.}$, 95% CI [- .35, .05]). Against this backdrop, we found partial support for H1: Multimodal disinformation is perceived as more credible than textual disinformation, but this difference is only significant when the disinformation attacks refugees for being involved in terrorism.

The Credibility of Disinformation by News Media versus Ordinary Citizens

As a second step, to test the effect of the source (i.e., news media versus an ordinary citizen) on the perceived credibility of disinformation, the interaction between source and the presence of disinformation was estimated in the multi-level regression model. No significant interaction effect was found. The ANOVAs demonstrate a comparable pattern. Contrary to our expectations, disinformation coming from a news source was not regarded as significantly more credible than ordinary citizens. This was the case for disinformation on both refugees ($t = .22$, $p = \text{n.s.}$, 95% CI [- .16, .20]) and school shootings ($t = -1.63$, $p = \text{n.s.}$, 95% CI [- .35, .03]). These findings thus do not provide support for hypothesis 2: the source of the disinformation does not affect its credibility¹.

The Effect of Fact Checkers of Textual and Multimodal Disinformation

Table 1 shows that the perceived credibility of disinformation significantly decreases when any type of corrective information is presented after the disinformation. Compared to the conditions that only showed textual or multimodal disinformation, respondents significantly evaluated the disinformation as *less* accurate when a fact-checker was

present. Taken together, these findings indicate that both textual and visual disinformation can be debunked with corrective information. This supports H3.

To give an overview of the effects across topics irrespective of modality, disinformation on refugees and terrorism is significantly *less* credible when a fact checker is present ($M = 3.43$, $SD = 1.76$) compared to when the disinformation is *not* corrected by a fact checker ($M = 3.93$, $SD = 1.76$) ($t = 5.05$, $p = .001$, 95% CI [.30, .69]). The effect is even stronger for the topic on school shootings. Specifically, the perceived credibility of disinformation on school shootings was relatively high (above the midpoint of the scale) when it was not rebutted ($M = 4.44$, $SD = 1.69$). The perceived credibility was significantly and substantially lower when participants were exposed to a rebuttal of disinformation ($M = 3.38$, $SD = 1.75$; $t = 10.88$, $p < .001$, 95% CI [.86, 1.25]). Taken together, H3 was fully supported for both contexts – irrespective of their modality, fact checkers lower the perceived credibility of disinformation.

To more specifically investigate the effectiveness of fact checkers in a multimodal setting, we compared the differential effects of multimodal versus textual rebuttals of multimodal versus textual disinformation (see Table 2). First of all, contrary to the expectations raised under H4a, textual fact-checkers that refute multimodal disinformation are not significantly less effective than textual fact checkers of textual disinformation. Our results also do not provide support for H4b. Specifically, textual and multimodal fact checkers have similar effects on correcting textual disinformation (see Table 2). Contrary to the expectations under H4c, multimodal fact-checkers that refute multimodal disinformation are not more effective than textual fact-checkers. Finally, multimodal fact-checkers are not significantly more effective in refuting textual than multimodal disinformation. Against this backdrop, we also did not find support for H4d. These findings hold across topics.

The Perceptual Screen of Congruent and Incongruent Issue Attitudes

In the final step, we hypothesized that the effects of visual and textual corrections would be contingent upon participants' prior attitudes related to the topic of the disinformation. To contextualize these findings, it is useful to note that the mean credibility scores, in the no-fact-check condition, were 4.61 ($SD = 1.46$, refugees) and 4.69 ($SD = 1.64$, shooting) for congruent issue stance and 3.24 ($SD = 1.63$, refugees) and 4.14 ($SD = 1.74$, shooting) for the incongruent issue stances. We first raised the expectation that participants who agreed with the attitudinal stance of the disinformation should be affected *less* by a fact checker than participants who opposed it (H5). Although the two-way ANOVAs show a significant main effect of attitudinal congruence across both issues (refugees: $F(1, 1239) = 168.08$, $p < .001$, Partial $\eta^2 = .12$; school shooting: $F(1, 1303) = 5.64$, $p < .05$, Partial $\eta^2 = .004$), the two-way interaction effect between attitudinal congruence and exposure to a fact checker was not significant (refugees: $F(1, 1239) = .61$, n.s.; school shooting: $F(1, 1303) = .29$, $p = \text{n.s.}$). In other words, the presence of fact checkers (irrespective of modality) result in lower levels of credibility, and these effects hold both for congruent and incongruent issue publics. These findings do not support H5.

However, in support of H6, we do see that people who oppose the attitudinal stance of disinformation were persuaded *less* by the fact checker than people whose attitudinal lenses aligned with the disinformation. This effect is stable across topics (see Table 3). More specifically, the mean score differences displayed in Table 3 illustrate that the corrective effect of fact checkers on the perceived credibility of disinformation is about *twice* as strong for people with congruent prior attitudes than people with incongruent prior attitudes. In

Table 3

The effects of congruent versus incongruent exposure to multimodal disinformation and fact checkers on the perceived accuracy of disinformation on refugees and school shootings

Congruence of Disinformation	Modality and Presence Fact-Checker	Refugees			School Shootings		
		Mean Difference (SE) ^a	Confidence Interval	Mean Difference (SE) ^a	Confidence Interval		
Congruent/issue stance	No fact-checker	.61***(.016)	[0.222; 1.004]	1.20***(.16)	[0.814; 1.586]		
	Textual fact-checker	.60***(.016)	[0.208; 0.998]	1.30***(.16)	[0.916; 1.687]		
	Textual and visual fact-checker						
Incongruent issue stance	Textual Fact-checker	-.61***(.016)	[-1.004; -0.222]	-1.20***(.16)	[-1.586; -0.814]		
	Textual and visual fact-checker	-0.01(.016)	[-0.404; 0.384]	.10(.17)	[-0.295; 0.499]		
	Textual and visual fact-checker						
Incongruent issue stance	No fact-checker	-.60***(.016)	[-0.998; -0.208]	-1.30***(.16)	[-1.687; -0.916]		
	Textual fact-checker	0.01(.016)	[-0.384; 0.404]	-.10(.17)	[-0.499; 0.295]		
	No fact-checker	.38*(.16)	[-0.009; 0.764]	.64***(.17)	[0.222; 1.056]		
Incongruent issue stance	Textual and visual fact-checker	.40**(.16)	[0.012; 0.794]	.90***(.18)	[0.476; 1.314]		
	Textual fact-checker	-.38*(.16)	[-0.764; 0.009]	-.64***(.17)	[-1.056; -0.222]		
	Textual and visual fact-checker	.03(.16)	[-0.37; 0.42]	.26(.17)	[-0.147; 0.661]		
Incongruent issue stance	Textual and visual fact-checker	-.40**(.16)	[-0.794; -0.012]	-.90***(.18)	[-1.314; -0.476]		
	Textual fact-checker	-.03(.16)	[-0.42; 0.37]	-.26(.17)	[-0.661; 0.147]		

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Note. Two-tailed tests. SE = Standard Error of the Mean Difference.

a = Mean difference are mean scores in third column minus mean scores in second column

support of H6, participants who already disagreed with disinformation relied *less* on the rebuttal offered in fact-checkers compared to people with aligning existing attitudes.

Discussion

The truthfulness of political information has become the subject of fierce debates in media, politics and society (van Aelst et al., 2017). Various actors can strategically manipulate and decontextualize political information to achieve certain political goals, such as fostering political distrust. This phenomenon has been labeled as disinformation (e.g., Marwick & Lewis, 2017). As visuals may be perceived as a more direct representation or “index” of reality compared to text (Messaris & Abraham, 2001), they may offer powerful tools for agents of disinformation – especially as it has become easier to manipulate images. Against this backdrop, we conducted an experimental study in which participants were exposed to multimodal disinformation and rebuttals on the issues of refugees and school shootings.

First of all, there is partial evidence that multimodal disinformation was perceived as slightly more credible than textual disinformation. This connects to visuals’ quality of *indexicality* (Messaris & Abraham, 2001). Words are abstract symbols that need to be reconstructed into a mental image of reality (Grabe & Bucy, 2009). Visuals, in contrast, offer a direct index of reality (Messaris & Abraham, 2001) and, compared to textual disinformation, the use of visuals lowers citizens’ suspicion of being presented with a manipulated reconstruction of reality. The most pressing threat to communicative truthfulness may thus come from the manipulation of visual information. Yet, as we only decontextualized existing images by pairing them with fabricated text, we did not fully explore the effects of different types of visual disinformation. Future research may go beyond our manipulations by investigating the effects of Deep Fake News or the actual manipulation of visual information by itself. Extrapolating from the present study, audiovisual disinformation may be even less likely to be perceived as (intentionally) false, and may have far-reaching political consequences.

Fact checkers may offer a potential remedy to the uncontrolled spread of manipulated images. In line with this, we found that fact checkers can be used to discredit disinformation, which is in line with extant research in the field of misinformation (e.g., Lewandowsky et al., 2012; Thorson, 2016). Across topics, the presence of textual and visual fact checkers resulted in lower levels of credibility, and these effects hold both for congruent and incongruent issue publics. This is in line with recent empirical research that has not found support for a backfire effect of corrective information among opposing partisans (e.g., Nyhan et al., 2019; Wood & Porter, 2018). However, we did find that people who oppose the attitudinal stance of disinformation were persuaded less by the fact checker than people whose attitudinal lenses aligned with the disinformation. Yet, as people in the no-fact checker conditions find the message systematically more credible than people exposed to a fact-checker, we did not find support for a backfire effect. The resonance of disinformation with people’s perceptual screens thus matter, although factual misperceptions can be corrected by factual rebuttals.

The modality of the fact-checker did not matter for its effectiveness, which is not in line with recent empirical evidence that indicates that visual information can make corrective information more effective (e.g., Amazeen et al., 2018). A potential explanation is that textual information is an effective format for corrective information as it fits fact-checkers’ reliance on short, rational and evidence-based argumentation. Moreover, Amazeen et al. (2018) used visual information with a strong link to the overall evaluation

of untruthfulness (a visual rating scale), whereas we used visuals taken from the source of untruthfulness paired with visuals depicting the real situation. Future research may further explore how visuals can be used in corrective information, for example by more clearly indicating the exact source of fabrication, decontextualization or manipulation.

Contrary to our expectations, the *source* of disinformation did not affect its credibility. As it has been argued that the digitized and fragmented media environment may involve different actors into the spread of disinformation (e.g., Jackson, 2017), this finding may have democratic implications. More specifically, the finding that ordinary citizens are equally persuasive as CNN in spreading disinformation may be worrisome, especially since the selection of an image to accompany falsehoods augments the credibility of disinformation to a level that is arguably similar to the credibility of accurate information. It thus seems that established journalists can be perceived as equally credible as unknown citizens, meaning that interventions that aim to counter the dissemination of falsehoods should be targeted at a range of actors – involving both professional journalists and citizens. Yet, the results may be partially driven by partisans' hostile media perceptions, and we recommend future research to use a fictional or local news outlet that is not attacked on partisan lines. In addition, the disinformation in this experiment was disseminated via Twitter, which limits the generalizability of the findings on the credibility of journalist versus citizen sources. Future research may compare the effects of different journalistic and nonprofessional communicators across different media platforms.

On a more positive note, even though multimodal disinformation may be perceived as more accurate, fact checkers may offer a potential remedy for the harmful effects of disinformation as they do seem to be able to overcome partisan biases and attitudinal filters – a finding that contrasts recent work on the persistence of corrected misinformation (e.g., Thorson, 2016). More specifically, we found that fact checkers had a positive effect on correcting disinformation for people with congruent and incongruent pre-existing attitudes. However, fact checkers had a *stronger* effect on perceived credibility among people for whom the disinformation was *congruent* with their prior attitudes. This finding can be explained as a consequence of individual's desire to defend their prior attitudes and avoid cognitive dissonance (e.g., Festinger, 1957). Specifically, people that strongly oppose the attitudinal stance of disinformation refute the inaccurate claims from the start – and the fact checker only plays a minor role in further lowering their disagreement. This finding indicates that fact checkers as a journalistic tool have the most potential to correct the misperceptions of issue publics, whereas they may be redundant for people who already oppose the issue positions presented in disinformation.

These findings have important democratic implications. First, disinformation can pose vexing problems on democratic decision-making as falsehoods related to politics and society can be perceived as credible when they rely on heuristic cues (i.e. visuals). By stimulating heuristic or automatic processing, fact-free politics can be used to sell various lies to the electorate – as long as a strong visual is selected or manipulated to wrap up the issue in a façade of credibility. This issue seems especially pressing in light of recent advances in video manipulation and 'deep fakes'. Moreover, our findings also point to the importance of fact-checking as an emerging journalistic discipline. We show that fact-checks can be effective in countering multimodal disinformation. In an era where citizens and other nonprofessional communicators join the digital newsfeed, journalists' role as truth-crusaders becomes even more important. Another practical recommendation is the need to stimulate media literacy. Citizens may be instructed how to recognize disinformation and unreliable sources, and how to use fact-checkers to check claims and visuals if they

are not sure if they can trust the news. At the same time, it is important that a balance between skepticism and trust in the media is maintained.

Although this study has provided important first insights into the effects of multimodal disinformation and rebuttals, there are some limitations. First, and most important, the effects of multimodal disinformation and rebuttals partially depend on the topic of the message. Although fact-checkers reduce the credibility of disinformation in both settings, and attitudinal congruence plays a consistent role in conditioning responses to multimodal disinformation, visuals do not have the same impact on affecting the credibility of news on school shootings and refugees. However, the effects point in the same direction, and differences may be due to the fact that equivalence is harder to achieve on the level of visual communication than textual communication on different topics. We recommend future research to simplify the design to dissect the role of story topic for different modalities and sources. Second, we forcefully exposed participants to disinformation and fact checkers, whereas they may normally avoid or select such information based on their prior interests and attitudes (Guess et al., 2018). Future research may thus take selective exposure into account to investigate the drivers of selective exposure or avoidance to disinformation and rebuttals. Here, it is also important to note that the medium of disinformation may impact the findings. Attitudes about Twitter as a medium for corrections and disinformation may impact the results. We thus recommend future research to either compare different platforms or to use fictional, unknown media platforms. Finally, we investigated the effects of disinformation in one single country (the US) – a context that has been associated with high levels of polarization. Future research may rely on a comparative research design to investigate to what extent the effects hold in different settings.

Despite these limitations, this study is the first to demonstrate how multimodal disinformation is perceived, and how journalistic tools can be used to counter the potential harmful effects of the uncontrolled spread of disinformation. Although a picture may paint a thousand lies, fact checkers are an effective tool to (partially) erase its political consequences.

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Note

1. To investigate the robustness of this finding, we controlled for partisanship, ideology, media satisfaction, media use and media trust (on both the general and outlet-level). These factors did not impact credibility, and there were no significant interaction effects of the source and the trust in sources on the perceived credibility of disinformation.

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