Medium of mass misinformation:

Repetition increases people's rating of truth for real and satirical headlines

A thesis

submitted in fulfilment

of the requirements for the degree

of

Master of Science (Research) in Psychology

at

The University of Waikato

by

James Chun-Chang Lin

THE UNIVERSITY OF
WAIKATO
Te Whare Wānanga o Waikato

2022

Abstract

Many people have adopted harmful behaviors in response to the SARS-CoV-2 pandemic, to the detriment of public health and personal safety of others and themselves. While adoption of these behaviors is often attributed to misinformation in the media, people's tendency to believe previously seen information as being true is also to blame. This tendency, the illusory truth effect, is explained by the similarity in cues between previously seen information and true information, cues such as the ease of processing or a feeling of familiarity. The illusory truth effect has been previously demonstrated with fake news, but not in many other types of misinformation, such as satire. In two experiments, we address the extent to which people come to see headlines—even ridiculous satirical headlines—as being true if they had seen those headlines two days earlier. We found that people tend to rate previously seen headlines as truer than novel headlines, and to a similar extent regardless of whether those headlines were real or satirical. We also found that informing people that some headlines were satirical headlines did not attenuate the illusory truth effect. These results suggest that people rely on the familiarity of information to determine information to be true, regardless of whether that information is ridiculous or if they had been alerted to the presence of misinformation.

Acknowledgements

I would like to thank my supervisors, Maryanne and Andrew, for their continued patience and support. To Maryanne: I have much to thank you for, including a deeper understanding of and appreciation for research. I am thankful you offered me this opportunity; this has been an experience I will not soon forget. To Andrew: you are a fantastic mentor and live-saver. I greatly appreciated both your help and your jokes. At some personal risk, I hope your wellspring of puns never runs dry.

I would like to thank the members of the Garrylab whose support carried me through my time in the lab. To Kayla, Sarah, Ryan, Eryn, Daniel, Andrea, and Mevagh, I have more words to thank you all with than space on this page. One could not hope to meet and work with a more pleasant or intelligent community of researchers but I am privileged to have done so. I wish you all the best.

I would like to thank my family, and especially my parents for continuing to be there. Thank you to my niece and nephews, whose smiles got me through the roughest of days.

Running this marathon of a Master's has been one of the most challenging experiences of my life. I must have enjoyed it a lot because it took a herculean effort from the administrative staff and two of the hardest-working supervisors to get me to leave. Jokes aside, I am humbled by and grateful for this experience, and I wish everyone a good health and happiness on their journeys ahead.

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Medium of mass misinformation: Repetition increases people's ratings of truth for real and satirical headlines

Exposure to misinformation plays a large role in the rise and persistence of conspiracy theories that encourage people to put themselves and those around them in harm's way (Jolley & Douglas, 2014; van der Linden, 2015). The ever-increasing spread of misinformation has led experts to call the current misinformation problem an "infodemic" of misinformation (World Health Organization, 2021). As a portmanteau of information and pandemic, the term "infodemic" captures the prevalence of misinformation worldwide and its capacity to harm the people it infects. Exposure to misinformation has been shown to undermine belief in true information and exacerbate partisan beliefs (Lewandowsky et al., 2017). Although misinformation has always existed, the rampant misinformation during 2016 U. S. Presidential elections confirmed that misinformation posed a tangible threat to people's everyday lives (Allcott & Gentzkow, 2017; Lee, 2019). This event sparked a new line of research on misinformation known as "fake news" that has provided insight into fake news, identifying factors that predispose people to believe fake news, the groups responsible for its spread, and countermeasures to reduce belief in fake news (Allcott et al., 2019; Bronstein et al., 2019; Ecker et al., 2020; Maertens et al., 2021). These findings have also been extended to other topical issues, such as the current global pandemic (Neely et al., 2021).

Nonetheless, there is little research on a seemingly-benign form of fake news: satire. The number of satirical news sources is on the rise (BBC Trending, 2016). The headlines and articles produced by these satirical news sources are not designed to mislead, but to entertain. To this end, satirists frequently conjure false events and exaggerate true ones beyond credibility. But it is both surprising and concerning that people sometimes believe satirical headlines are real. For example, in 2012, a politician launched a diatribe against Planned Parenthood for their construction of eight-billion dollar "Abortionplex" after reading and

believing a months-old satirical article was real (Weinger, 2012). But mistakes of this kind are not reserved for bumbling politicians. Social media is filled with examples of people falling for and believing that satirical headlines are real (Reddit, n.d.; Tumblr, n.d.). How are we to explain these phenomena? One possibility is that people come to believe satire when they encounter it more than once. A large body of research has shown that when people encounter claims more than once, they tend to classify those claims as true—even if the claims are not true (Fazio, 2020; DiFonzo et al., 2016; Hasher et al., 1977). We aimed to determine the extent that repeating satire causes it to feel truer, relative to real headlines. If mere repetition of satire causes people to believe even the more ridiculous claims are true, then mere exposure to satire may be contributing to people's misplaced belief in satire. We conducted two experiments to address this possibility.

The Illusory Truth Effect

The tendency for people to find repeated information true is called the "illusory truth effect" (Hasher et al., 1977; Arkes et al., 1989). In the standard illusory truth experiment, people see a set of claims and rate each on some irrelevant variable, such as interest. After a delay, people then see a mix of claims from the first set and some new claims. Their task is to judge the truth of each claim. This paradigm consistently produces a truth bias, demonstrating a tendency for people to rate information as truer when it is repeated than when it is novel (Dechêne et al., 2010).

Much data suggests the illusory truth effect is driven by an increased ease of processing, or processing fluency, of repeated information relative to novel information (Dechêne et al., 2009; 2010). People consistently respond faster to repeated information than novel information which tends to occur when information is easier to process (Garcia-Marques et al., 2017; Silva et al., 2017). Furthermore, this ease of processing persists over long delays and increases as information continues to be repeated (Brown & Nix, 1996; Fazio

et al., 2021; Hassan et al., 2021). When some information feels easier to process than other information, people will try to make sense of why (Dechêne et al., 2009; Wänke & Hansen, 2015). The ease of processing, when attributed to its actual cause, can quickly and accurately inform decisions. For example, the ease of processing from familiarity allows people to accurately detect when information was previously seen (Garcia-Marques et al., 2017). However, people can misattribute the cause of the ease of processing to something other than the actual cause, especially when the true cause is ambiguous or not readily apparent (Alter & Oppenheimer, 2009; Schwarz, 2012; Winkielman et al., 2003). People will misattribute the ease of processing resulting from reading information that rhymes or is visually distinct as that information being true (McGlone & Tofighbaksh, 2000; Reber & Schwarz, 1999). Similarly, people often misattribute the ease of processing from repeated information to a feeling of familiarity that is strongly associated with true information (Arkes et al., 1989; Boehm et al., 1994; Reber & Unkelbach, 2010; Whittlesea, 1993). Because people cannot differentiate between the familiarity of true information and false information that happens to be familiar, the ease of processing produced by repetition causes both true and false information to feel more familiar and truer.

The extent that this feeling of familiarity causes all information to feel truer is tempered by additional cues of truth that people may use to adjust their truth judgments. People can also make inferences from prior knowledge and experience that may improve the accuracy of the truth judgments (Brashier & Marsh, 2020). For example, in certain circumstances, people will use possessed knowledge to determine whether information is true even after that information has been repeated (Brashier et al., 2017; 2020). But, in most situations, people show a consistent tendency to rely on the feeling of familiarity to make truth judgments. The association between repeated information and true information is strong to the extent such that people will also rate information as truer when they believe that

information has been repeated, even when they have not (Bacon et al., 1979; Mattavelli, 2021). There is a caveat to this observation, however, as recognizing that information has been repeated can have a different effect when the source of the information is seen as unreliable (Begg et al., 1992). People can, to a certain degree, use their ability to recollect whether headlines were previously seen as cue to suggest that information is false.

Reasons Why Satirical Headlines Will Feel Truer After Repetition

Satire, however implausible or absurd, will likely feel truer after repetition because the feeling of familiarity that people use to inform their judgments of truth is determined by the relative ease of processing between repeated and novel information (Dechêne et al., 2009; Wänke & Hansen, 2015). The plausibility of the claim appears to have little effect on this tendency because claims of varying plausibility—even highly implausible claims—all feel truer to a similar extent once they have been repeated (Fazio et al., 2019; Lacassagne et al., 2022). Furthermore, this tendency persists even when other types of misinformation, such as rumours, and fake news headlines, have been repeated, suggesting that different styles of writing or presentation also would not affect the extent information feels truer after repetition (Calvillo et al., 2020; DiFonzo et al., 2016; Pennycook et al., 2018). For these reasons, the implausibility and absurdity of satirical headlines is unlikely to change the feeling of familiarity produced by repeating information. As such, people will likely rate repeated satirical headlines truer than novel satirical headlines to a similar extent as their real counterparts.

And because people often struggle to use cues other than familiarity to determine whether repeated information is true, people will likely rate repeated satirical headlines as truer than novel headlines. People's reliance on familiarity as a cue for truth is not related to a lack of effort or deliberation. For example, people who have applied more effort and resources when making truth judgments are as likely to rate repeated headlines truer than

novel headlines (Brashier & Rand, 2021; Nadarevic et al., 2020; Speckmann & Unkelbach, 2021) This reliance on familiarity is also likely unrelated to a lack of prior knowledge because people rate repeated known and unknown information as truer to similar extents (Fazio et al., 2019). Instead, people likely rely on familiarity to make truth judgments because doing allows them to make quick and accurate truth judgments (Reber & Unkelbach, 2010). This tendency to rely on familiarity to determine truth also starts from early in development, as young as five years of age, and would be difficult to ignore after years of reliance (Fazio & Sherry; 2020). For these reasons, it is reasonable to expect people to use the familiarity of repeated headlines to determine that those headlines are true, even when they are satirical and false. Although satirical headlines have yet to be tested in an illusory truth paradigm, it is highly likely that repeating satirical headlines will cause them to feel truer to a similar extent as when other information is repeated, such as real headlines.

Reasons Why Satirical Headlines Will Not Feel Truer After Repetition.

Despite the reasons provided above, there are also three reasons to expect that people would continue to disbelieve satirical headlines even after the headlines have been repeated. To begin with, people may suspect that some of the headlines they are reading are false when reading a mixture of real and satirical headlines. Recent world events have made people more aware of misinformation in the media and people may be more willing to consider that the headlines they are reading are fake news (Stocking & Sumida, 2018). After reading a particularly ridiculous satirical headline, people may distrust subsequent headlines and consider other qualities of the information they are reading, such as accuracy (Schul et al., 2008). When people consider the accuracy of information, they are less likely to rely on familiarity and more likely to use their own knowledge to determine truth (Brashier et al., 2020). As a result, people are not only less likely to find repeated information truer but also more likely to correctly discern that repeated false information is false (Brashier et al., 2020;

Calvillo & Smelter, 2020). It is plausible, then, that the mere presence of satirical headlines may lead people to question the accuracy of headlines they are reading and more accurately determine that satirical headlines are false.

The presence of satirical headlines could even cause people to use familiarity as a cue to judge headlines as false. In other words, the illusory truth effect may reverse, as can happen in certain circumstances. When people encounter a satirical headline that is false but feels familiar, people may realise that the feeling of familiarity may be a source of potential bias causing them to incorrectly judge satirical headlines as true. In that situation, people may adopt the feeling of familiarity as a cue to judge headlines as false. People show a tendency to form theories about why information may differ and use those to guide their decisions (Unkelbach & Greifeneder, 2013; Wegener & Petty, 2001). For example, people will use the ease of processing attached to famous names to determine that the famous names are less common than non-famous names, likely to counteract the effects of potential bias resulting from overexposure to famous names in the media (Wegener & Petty, 2001; Oppenheimer, 2004). People can even learn to use cues normally associated with true information as cues of falsehood (Unkelbach et al., 2007). By extension, the presence of satirical headlines could prompt people to use familiarity as a cue that repeated headlines are false instead of true. Because satirical headlines are more surprising, satirical headlines should also be more memorable than real headlines (Fandalkova & Gruber, 2020; Fazio & Marsh, 2009). As such, the illusory truth effect may be attenuated or even reversed in satirical headlines (compared to real headlines) because people are more likely to remember satirical headlines and use the feeling of familiarity to determine they are false.

Finally, people may explain the familiarity that arises from repetition as originating from a unique quality of satire instead of attributing it to truth. If people explain familiarity as humour, for example, and not truth, then people will not feel that repeated headlines are truer.

In conditions where people attribute ease of processing to a source other than truth, we would expect people's truth ratings to decrease. Although people can attribute the ease of processing to many sources, people will also only attribute the ease of processing in one way at any one time and discount the contributions of competing sources. For example, people rate repeated information as more familiar and more likable when giving the ratings separately, but only as more familiar when giving the ratings together (Westerman et al., 2015; Bornstein & D'Agostino, 1994). As such, it is plausible that people will interpret processing fluency as funniness, for example, and not truth, when reading repeated satirical headlines. But this prediction is undermined by evidence suggesting that people attribute ease of processing produced by repetition differently to ease of processing produced by other means. While the ease of processing produced without the use of repetition can be attributed to many sources, people tend to attribute the ease of processing produced by repetition to truth—even when the ease of processing can be attributed to other reasons (Vogel et al., 2020; Westerman et al., 2015). For example, people rate familiar information as being true even when the ease of processing can be attributed to the fact that information was previously presented (Garcia-Marques et al., 2017). Given the novelty of satirical headlines in both processing fluency and illusory truth literature, it is possible, if not unlikely, that people will attribute the ease of processing produced by repeating information to a quality of satirical headlines. If people can attribute the ease of processing produced by repetition to a quality other than truth, then people may not rate repeated headlines as truer when the headlines are satirical.

The Present Research

To address these competing predictions, we investigated the extent that repetition leads people to rate satirical headlines as truer, as compared to real headlines. We also investigated the extent that the tendency to rate repeated information truer than novel information differs when people suspect that some headlines are false compared to when

people are informed that some headlines are false. In Experiment 1, we tested the extent that repetition makes satirical and real headlines feel truer using a standard illusory truth paradigm, with participants rating headlines for interest in the exposure phase and, two days later, rating headlines for truth in the judgment phase. In Experiment 2, we replicated Experiment 1 and determined whether warning people to expect misinformation beforehand leads to reductions in truth ratings at the judgment phase. Across these experiments, we found that people find repeated real and satirical headlines truer than novel ones. We also found some evidence that people may rate repeated headlines truer than novel headlines to a lesser extent for satirical headlines than real headlines. Furthermore, we found that providing warnings did not have an effect on truth ratings or the illusory truth effect.

Experiment 1

The aim of Experiment 1 was to address the extent to which people would rate repeated information truer than their novel counterparts on a set of satirical and real headlines. Because the illusory truth effect is observed across differences in cognitive ability, experimental conditions, and prior knowledge, one possible outcome is that repeated satirical headlines will feel truer to a similar extent as repeated real headlines (Dechêne et al., 2010; De keersmaecker et al., 2020; Fazio et al., 2020). But because people may differently interpret cues of familiarity for satirical headlines, another possible outcome is that people will rate repeated satirical headlines as false or less true than repeated real headlines (Wegener & Petty, 2001; Oppenheimer, 2004). We aimed to test these competing hypotheses by adapting the typical truth paradigm, replacing true and false trivia statements with real and satirical headlines. We preregistered this experiment (See Appendix A for the preregistrations).

Method

Design

The experiment used a 2×2 within-subjects design. The independent variables were source status, whether headlines were written by real or satirical outlets, and repetition status, whether headlines had been repeated or were novel. We adapted the typical truth paradigm to include real and satirical headlines, but kept many of the features of the paradigm, including an exposure phase during which participants first see a list of items, and a judgment phase during which participants see and rate a list of previously seen and novel items for truth. In our experiment, the exposure phase took place during Session 1 and the judgment phase Session 2, with a two-day delay between the two sessions.

Participants

We used Monte Carlo Simulations to determine we would need a sample size of 100 people to achieve 90% power, an alpha of .05, and high enough sensitivity to observe a small interaction between source and repetition status (Lakens & Caldwell, 2019). We recruited participants online using Amazon's Mechanical Turk, a platform on which researchers can crowdsource data of reputable quality (Mason & Suri, 2012). Of the 183 participants who completed the Session 1 survey, 22 participants failed the preregistered exclusion criteria: 11 participants failed the attention check, 10 participants failed to comply with instructions, and one participant failed both. We invited only people who passed the Session 1 exclusion criteria to participate in the Session 2 survey. Of the 121 participants who took the Session 2 survey, 11 participants failed the exclusion criteria: two participants failed the attention check, 8 participants failed to comply with instructions, and one participant failed both; in total, we retained 110 participants for data analysis. Details regarding the exclusion criteria are covered in the procedure section.

The retained participants' ages ranged from 20 to 77 years, $M = 46.22$, $SD = 14.25$, 95% CI [43.56, 48.88]. Sixty-six participants identified as female, 43 as male, and 1 as gender non-binary. Ninety-two percent of participants indicated that English was their first language and 95% indicated that English was their primary language. Participants were compensated with 0.50 USD for completing the first session and 1.00 USD for completing the second session. This amount is in line with ethic principles established by our lab and approved by the School of Psychology Research and Ethics Committee at the University of Waikato.

To control for possible order effects of scale labels, participants were randomly assigned to see the Likert scale in a reversed or non-reversed order. Participants who answered questions labelled in the reverse order did not respond differently from those who answered questions labelled in the standard order, $F(1, 479) = 2.07$, $p = .15$.

Procedure

The experiment took place over two sessions on the online survey platform Qualtrics (https://www.qualtrics.com). We recruited participants on Amazon's Mechanical Turk and directed them to the first session of the experiment via a website URL. Participants first read an information sheet providing pertinent details on the two-session experiment, including the pay rate and general task details. We informed participants that the study was investigating visual and verbal learning styles, as awareness of the experiment's true intent could lead participants to alter how they would normally respond to the questionnaire. Participants then indicated informed consent to participate in the research before they could proceed in the experiment.

Next, participants read and were asked to comply with a list of instructions regarding experimental conditions required to ensure the quality of any data collected. For example, we asked participants to complete the session in a quiet environment, to complete the session in a

single sitting, and avoid distraction or deviation from the task at hand (see Appendix C for exact wording).

We then provided participants instructions on how to perform the main task. This task required participants to read a headline and answer, "How interesting is this headline?" on a 6-point Likert scale (1 = *Very interesting* to 6 = *Very uninteresting*; see Fazio et al., 2015). Participants first practised this task on two headlines before repeating this task for each of the 80 headlines of interest, half of which were satirical, and half were real. The survey presented the 80 headlines in a random order. The survey also randomly assigned participants to see one of three versions of the list of headlines. We developed three versions of the list of headlines to counterbalance the headlines seen as repeated and novel. We split the pool of 120 unique headlines into three groups of 40 headlines (half real and half satire) and assigned each group to one of three different roles: repeated, missing, and novel. Repeated headlines were seen in both sessions, missing headlines were only seen in Session 1, and novel headlines were only seen in Session 2. Each group of headlines played a different role for each version of the list such that, although all participants saw groups of headlines assigned to the missing and repeated roles in Session 1, the specific headlines in each group, and the resulting combination of headlines, differed depending on the version to which participants were assigned (see Appendix B for details on how materials were developed and organized.)

After the last headline, participants saw an attention check informing them to "select the second option from the [left/right]" before proceeding to answer a list of demographic questions and compliance checks. Failing to answer this attention check correctly was another exclusion criteria. We positioned the attention check at the very end, as participants may become more analytical of subsequent headlines if they see the attention check earlier (Hauser & Schwarz, 2015). Participants then went on to answer the demographic questions as well as questions asking about whether participants complied with the experimental

conditions requested at the beginning of the questionnaire. For example, we asked participants, “Did you use a search engine at any point during the study to look anything up?” (See Appendix C for complete list of attention checks and demographic questions).

The survey then ended with information about Session 2 of the experiment, including instructions not to look up any of the headlines, and thanked for their participation. Participants were paid 0.50 USD for their time regardless of whether their data was excluded from analysis, unless there was evidence suggesting they were using a bot to answer the questionnaire or showed poor understanding of the task they had just completed, suggesting they were spammers. We invited participants to participate in the second session of the experiment under three conditions: if participants indicated that they complied with our instructions, if they passed the attention check, and if they could accurately describe the task when asked.

For Session 2, we contacted eligible participants approximately two days after the completion of the first questionnaire and provided the URL to the survey. Participants read an abbreviated version of the information sheet that reiterated details covered in Session 1 and were notified that they had one day to complete this second session. Participants read the same list of instructions on how to comply with experimental conditions and how to perform the task in the experiment. For this session, the task required participants to read a headline and respond to the question, “Do you think the claim in the headline is true or false?” on a 6-pt Likert scale, with 1 (*Definitely false*), 2 (*Probably false*), 3 (*Possibly false*), 4 (*Possibly true*), 5 (*Probably true*), 6 (*Definitely true*); this truth rating was our dependent measure of interest. Again, participants practised this task on two headlines before repeating the task for a randomly ordered list of 80 headlines, of which half were satirical and half were real. In addition, half were from two days earlier and half were novel. There were also three versions

of the list of headlines in this session, and participants saw the version that corresponded to the list of headlines to which they were previously assigned.

Participants answered the same attention check and the same compliance check questions as in Session 1. We included an additional compliance check question asking participants whether they had looked up any of the headlines seen in Session 1. We excluded participant data if the participant indicated that they had looked up headlines between Session 1 and Session 2. We omitted the demographic section, except for a question about participant age; we kept the demographic question asking for participant age to check for consistency across the two sessions. The survey then provided a short debrief with information about the true goal of the study. We retained participant data using the same exclusion criteria as in Session 1 and paid participants 1.00 USD regardless of whether they passed the exclusion criteria, deferring compensation only if there was evidence that the participant was a bot or a spammer. For a physical copy of the entire survey, see Appendix C.

Results and Discussion

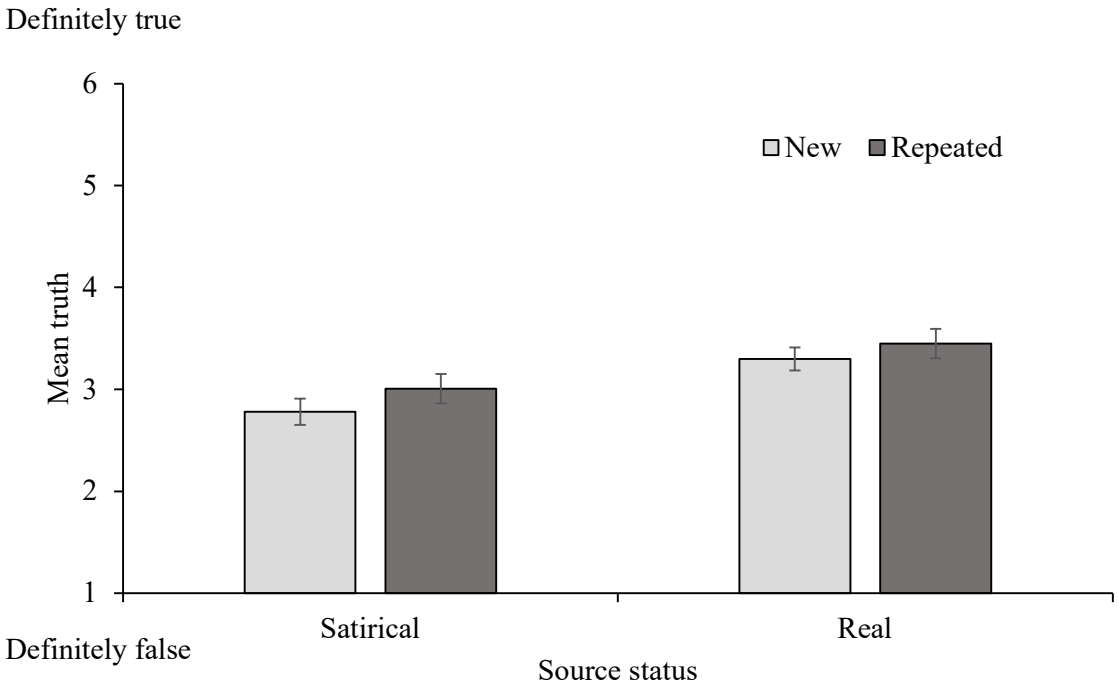
Recall that the primary aim of this experiment was to determine the extent repeated headlines causes those headlines to feel truer in a new set of real and satirical headlines. Do people rate repeated headlines truer than novel headlines to a smaller degree for satirical headlines than for real headlines? As Figure 1 shows, the answer is no.

To address the extent that people rated headlines in each condition as true, we ran a 2×2 within-subjects ANOVA on people's mean truth rating across each of the four conditions. We found a consistent truth effect: participants rated repeated headlines (M = 3.22, SD = .81) truer than novel headlines, M = 3.04, SD = .72, mean difference = 0.19, 95% CI [.10, .28], $F(1, 109) = 18.07$, $p < .001$, $\eta_p^2 = .14$. But the increase in truth ratings for repeated satirical headlines was not different from the increase in truth ratings for repeated real headlines, $F(1, 109) = 1.95$, $p = .165$, $\eta_p^2 = .018$. As such, our results provide strong

support for the hypothesis that repetition causes both real and satirical headlines to feel truer to a similar extent.

Figure 1

Mean Truth Ratings Across Source and Repetition Conditions



Note. Error bars in the graph represent 95% confidence intervals of the means.

We also found that participants rated real headlines as truer (M = 3.37, SD = .64) than satirical headlines, M = 2.89, SD = .68, mean difference = 0.48, 95% CI [.39, .57], $F(1, 109) = 104.77$, $p < .001$, $\eta_p^2 = .490$. This result fits our expectations, because we knew from norming our materials that people consistently thought real headlines were more plausible than satirical headlines (See Appendix B for a complete list of headlines with their pre-tested plausibility scores). Because satirical headlines produced a similar truth effect to real headlines, this result also provides support for the idea that the plausibility of a claim has little effect on how true that claim feels when it is later repeated (Fazio et al., 2019).

In summary, Experiment 1 provides an important finding. Repeating satirical headlines produces a typical truth effect seen in other types of fake news and misinformation (Calvillo & Smelter, 2020; DiFonzo et al., 2016; Pennycook et al., 2018). By extension, because satirical headlines are less plausible than real headlines, this finding also suggests that the truth effect is likely the same across different levels of plausibility (Fazio, 2019).

That we found that people rated repeated satirical headlines truer than novel ones to a similar extent than real headlines rules out the involvement of mechanisms that would have otherwise reduced the illusory truth effect. Specifically, the fact that we did not observe a tendency for people to reduce truth judgments for repeated false information, suggests that participants did not consider the accuracy of headlines in Session 1 (Brashier & Marsh, 2020). But the role of distrust in reducing participant's ratings of truth is still a plausible explanation.

One of the main differences between our experimental paradigm and the typical illusory truth paradigm was our exclusion of the disclaimer informing people that "some of the information is true and some of the information is false" (Dechêne et al., 2010). Though many studies include this disclaimer in their experimental design, recent studies have shown that the inclusion of this disclaimer can greatly reduce the illusory truth effect (Dechêne et al., 2010; Fazio et al., 2019; Hasher et al., 1977; Jalbert et al., 2020). A likely mechanism for this reduction is a feeling of distrust, which can cause people to question information than accept it is true, reducing the familiarity attached to information and, by extension, the tendency to believe that information is true (Schul et al., 2004). As such, including the disclaimer in our experimental design could foster a sense of distrust that may greatly reduce the illusory truth effect. But there is evidence that including the disclaimer would not change our observed pattern of results. There is already some evidence that our participants distrusted our headlines, because many participants reported that the headlines were "fake

news" or "false news." As such, it is possible that the presence of satirical headlines may have caused participants to distrust both real and satirical headlines, producing similar reductions for both. Another possibility is that people require explicit reasons to distrust information before they will adjust their decision-making processes (Schul et al., 2004; 2008). If it is the latter, including the disclaimer to inform participants that some of the headlines are satirical, may prompt people to act on their distrust and rate repeated headlines as less true.

Although our results showed that participants rated real and satirical headlines as truer than novel headlines to similar degrees, we cannot rule out the potential role of distrust in the illusory truth effect because we did not inform participants that some of the headlines were satirical. It is also possible that the effect of distrust only appears absent in our results because the presence of satirical headlines may have caused participants to distrust both real and satirical headlines. To address this issue, we examine the role of distrust further in Experiment 2 by informing some participants that some of the headlines were satirical.

Experiment 2

The purpose of Experiment 2 was to replicate our findings in Experiment 1. A typical illusory truth paradigm usually includes a disclaimer warning people that some information is true and that some information is false. There is evidence that inclusion of this disclaimer markedly reduces the illusory truth effect. As such, it is possible that our decision to omit this disclaimer when we adapted the typical illusory truth paradigm may have produced an inflated illusory truth effect. Experiment 2 used the same method as Experiment 1 except for the inclusion of a warning condition as a between-subjects factor. Specifically, half of the participants read a brief statement warning them that satirical headlines were present. We preregistered this experiment (See Appendix A for a copy of our preregistrations).

Method

Design

Experiment 2 followed a 2×2×2 mixed-model design. We kept source and repetition status as within-subjects factors and introduced a between-subjects factor called warning status; we randomly assigned participants to either see a warning informing them that some of the headlines were legitimate and some of the headlines were satirical and false, not to see the warning. As with Experiment 1, participants progressed through the exposure phase of the standard truth effect paradigm in the Session 1 survey then, approximately two days later, progressed through the judgment phase in the Session 2 survey.

Participants

Using the same settings as Experiment 1 for power analysis, we determined that we needed 100 participants per between-subjects condition, requiring a total of 200 participants for Experiment 2. In addition to recruiting participants online using Mechanical Turk, we also recruited participants from an undergraduate pool to participate in a hybrid version of the Experiment 1 design; undergraduate participants attended Session 1 in person, and Session 2 online. Although we anticipated equally bifurcating the overall participant pool between Mechanical Turk workers and undergraduate students, poor recruitment in the undergraduate pool resulted in disproportionate contributions to the overall participant pool.

There are also two differences in the exclusion criteria between Mechanical Turk and undergraduate students. First, undergraduate participants conducted Session 1 in person and could not be bots or spammers. Furthermore, the experimenter ensured that undergraduate participants were compliant with experimental conditions. As such, the attention check was the sole exclusion criterion for this session. Second, we invited even those undergraduate participants who had failed the Session 1 attention check to the Session 2 survey, to

encourage undergraduate participation in research. However, we later excluded these students from analysis.

Overall, of the 392 participants who completed the Session 1 survey, 236 participants completed the Session 2 survey, and 206 participants remained after exclusions. We retained 51 of the 67 undergraduate participants who completed both sessions of the experiment. We excluded 16 undergraduate participants; twelve participants for failing at least one of the attention checks, one participant for failing to follow experimental conditions, and two participants who failed both exclusion criteria. We retained 155 of the 169 Mechanical Turk participants who completed both sessions of the experiment. In the Session 1 survey, 57 participants failed at least exclusion criteria and were not invited to the Session 2 survey: 34 participants failed the attention check, 12 failed to follow instructions, and five failed both. We excluded five participants we suspected were spammers; these participants provided nonsensical answers when asked about the task they had just completed, and we also excluded an additional participant who exhibited poor understanding of the task. Of the 169 participants who completed the Session 2 survey, 14 participants failed an exclusion criterion: 12 participants failed the attention check, and two failed to follow instructions. We retained data from 155 Mechanical Turk participants for analysis.

The retained Mechanical Turk participants' ages ranged from 19 to 79 years M = 43.70, SD = 14.41, 95% CI [41.43, 45.97]. Of those, 110 identified as female, 44 as male, and one as gender non-binary. Ninety-five percent of participants indicated that English was their first language and 99% indicated that English was their primary language. As with Experiment 1, Mechanical Turk participants were compensated with 0.50 USD for completing the first session and 1.00 USD for completing the second session.

The retained undergraduate participants' ages ranged from 17 to 49 years M = 22.78, SD = 7.48, 95% CI [20.73, 24.84]. Forty-two participants identified as female, and nine as

male. Eighty-five percent of participants indicated that English was their first language and 92% indicated that English was their primary language. Undergraduate participants received credit for participating in each session.

Procedure

Experiment 2 used an experimental paradigm similar to that of Experiment 1. The one difference was the addition of a warning during Session 1 between the instructions on how to comply with experimental conditions and how to complete the task. This warning was only displayed for participants in the warning condition and informed those participants that some of the headlines were true, and some were satirical:

> Some of the headlines came from a reputable news outlet: they are true.
>
> Some of the headlines came from a satirical news site: they are false.
>
> The goal of satire is to entertain people about political and social issues through ridicule and exaggeration. Although their coverage is based on real issues, the claims made in these headlines are often exaggerated, implausible, or outright impossible.

Our warning was adapted from types of warnings that have proven successful in reducing the illusory truth effect (Jalbert et al., 2020; Nadarevic & Aßfalg, 2017). To address the possibility that some participants may be unfamiliar with the concept of satire, the warning also provided a brief definition of satire. Of note, the participants assigned to not see the warning experienced the same procedure as Experiment 1 participants.

Results and Discussion

Primary analysis

The primary aim of Experiment 2 was to determine the extent that causing participants to expect false information reduced people's tendency to rate repeated headlines truer than novel headlines. Specifically, to what extent do participants who were informed that some headlines are legitimate, and some headlines are satirical, lower their truth ratings

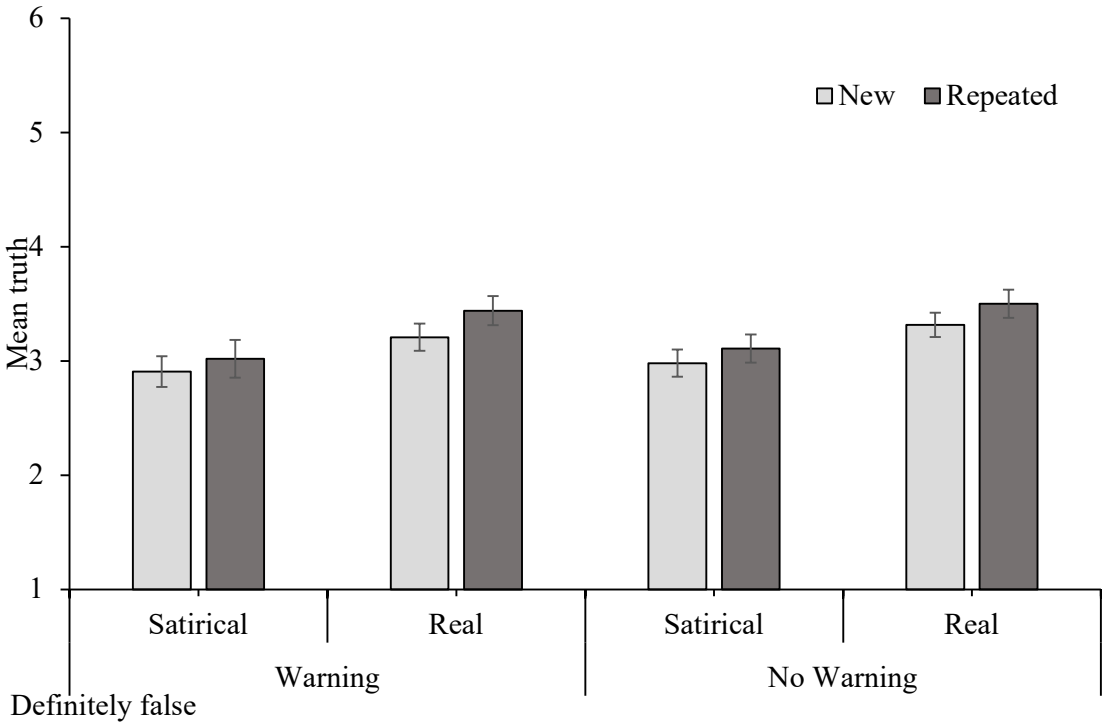
for repeated headlines relative to participants who were not informed? We found that warnings did not appear to have a significant effect on the way people rate headlines for truth.

We ran a 2×2×2 MANOVA on the mean truth ratings of headlines across each condition. As seen in Figure 2, participants who saw the warning (M = 3.14, SD = .60) did not respond differently from participants who did not see the warning (M = 3.22, SD = .51), $F(1, 204) = 1.14$, $p = .288$, $\eta_p^2 = .006$. Seeing the warning did not affect the extent people rated real headlines truer than satirical headlines, $F(1, 204) = .0002$, $p = .987$, or—more importantly—the extent people rated repeated headlines truer than novel headlines, $F(1, 204) = .104$, $p = .747$. The size of the illusory truth effect was consistent across participants who saw the warning and participants who did not see the warning. Finally, the warning had no effect on the relationship between source status and headline status, $F(1, 204) = .62$, $p = .433$. The lack of warning effect supports the idea that warnings that inform people that some information may be information does not reduce the illusory truth effect when people read and judge headlines for truth.

Figure 2

Mean Truth Ratings Across Source, Repetition, and Warning Conditions

Definitely true



Note. Error bars in the graph represent 95% confidence intervals of the means.

The secondary aim of Experiment 2 was to replicate the typical truth effect observed in Experiment 1. Based on our Experiment 1 results, we expected people to rate repeated headlines as truer than novel headlines to similar extents for real and satirical headlines. But we did not replicate the exact pattern of findings observed in Experiment 1. Although we expected repetition to produce similar increases in truth ratings for both real and satirical headlines, we found that the increase in truth ratings was smaller for satirical headlines than real headlines.

As in Experiment 1, we found a consistent truth effect, participants rated repeated headlines truer (M = 3.27, SD = .63) than novel headlines (M = 3.11, SD = .55), mean difference = 0.16, 95% CI [.11, .21], $F(1, 204) = 39.88$, $p < .001$, $\eta_p^2 = .16$. Similarly, participants rated real headlines as more true (M = 3.36, SD = .58) than satirical headlines (M = 3.00, SD = .66), mean difference = .36, 95% CI [.29, .44], $F(1, 204) = 92.05$, $p < .001$, $\eta_p^2 = .31$. But, in contrast to Experiment 1, participants also rated repeated satirical headlines as

truer than novel ones to a smaller extent than when they rated repeated real headlines, $F(1, 204) = 4.30$, $p = .032$, $\eta_p^2 = .022$. Because this pattern of findings is not explained by the introduction of the warning, these results provide some evidence for the existence of cues or processes that reduce the tendency to believe false information after it has been repeated. But, considering the fact we found inconsistent results using experimental paradigms, further research is warranted to determine which pattern of findings is correct.

Exploratory analysis

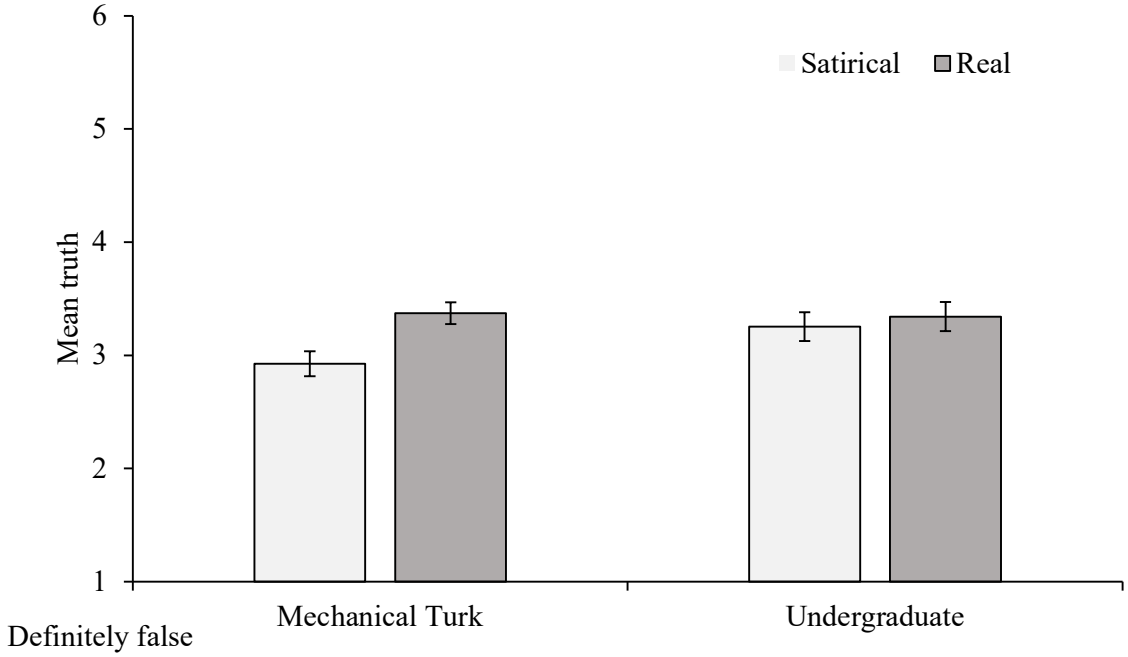
The other difference this experiment differed from Experiment was the inclusion of undergraduate participants. Because undergraduate participants and Mechanical Turk participants were randomly assigned to each condition, individual differences due to being from different participant pools should not have an effect on the way that participants respond to headlines. But there is one reason to expect undergraduate participants to respond differently to Mechanical Turk participants. On average, undergraduate participants tended to be younger ($M = 22.77$, $SD = 7.37$) than Mechanical Turk participants ($M = 43.70$, $SD = 14.41$), $t(1, 206) = 10.17$, $p < .001$. There is also some evidence that older adults are less likely to rely on familiarity to make truth judgments, provided they know the correct answer to some of the repeated and novel information (Brashier et al., 2017). If that were the case, then we would expect Mechanical Turk participants to exhibit a smaller truth bias than undergraduate participants. We conducted a series of non-preregistered analyses in order to address these competing hypotheses. As such, we ran a mixed-model ANOVA and included participant type as a between-subjects factor. Did we find any differences in the way undergraduate participants responded to headlines, relative to Mechanical Turk participants? Yes, but those differences did not affect how we interpreted our main findings and were constrained by the smaller undergraduate sample size.

For the most part, the way undergraduate participants responded to headlines (M = 3.30, SD = .45) was similar to that of Mechanical Turk participants, M = 3.15, SD = .59, $F(1, 202) = 2.50$, $p = .115$. Crucially, undergraduate participants rated repeated headlines as truer than novel headlines to a similar extent as Mechanical Turk participants; the illusory truth effect was similar for both participant types. The only difference between undergraduate and Mechanical Turk participants was in how they responded to the headlines from different sources, $F(1, 202) = 16.45$, $p < .001$, $\eta_p^2 = .075$. The means are presented in Figure 3. Notably, undergraduate participants rated real and satirical headlines as true to similar extents. In contrast, Mechanical Turk participants exhibited the typical truth bias to rate real headlines truer than satirical headlines. We analysed pairwise comparisons using the Tukey adjustment. We found that Mechanical Turk participants rated real headlines as truer (M = 3.37, SD = .61) than satirical headlines M = 2.93, SD = .70, mean difference = .45, SD = .52, 95% CI [.37, .53], $t(1, 154) = 10.63$, $p < .001$. Conversely, the undergraduate participants did not differ in how they rated real headlines (M = 3.35, SD = .47) and how they rated satirical headlines (M = 3.24, SD = .47), $t(1, 50) = 1.42$, $p = .49$. These findings suggest that there were some differences in response pattern between participant pools.

Figure 3

Mean Truth Ratings Across Source and Participant

Definitely true



Note. Error bars in the graph represent 95% confidence intervals of the means.

In short, the exploratory findings did not provide any additional insight into the pattern of findings produced by the primary analysis. Although we found that undergraduate participants did respond differently to headlines relative to Mechanical Turk participants, this difference in pattern of responding did not produce any differences in the illusory truth effect. Both undergraduate and Mechanical Turk participants rated repeated headlines, real and satirical, as truer than novel headlines to similar extents.

General Discussion

The primary goal of our experiments was to determine whether repeating satirical headlines made them feel truer. Across two experiments and 316 people, we replicated the illusory truth effect: repeating real and satirical headlines caused people to rate repeated headlines as truer than novel headlines. In Experiment 1, we found that repetition affects people's ratings of truth for satirical headlines as much as real headlines. In Experiment 2, we found that the illusory truth effect for satirical headlines was comparable to real headlines,

although slightly smaller, indicating that people are less likely to rate repeated headlines truer when they are satirical than when they are real. We also found that the presence of a warning had little effect on this tendency; people responded similarly regardless of whether they had previously seen a warning.

Although we found a consistent illusory truth effect across both experiments, we also found a different pattern of findings across experiments. Although this discrepancy in findings was not accounted for by the changes made to the experimental design, such as the introduction of the warning variable or our inclusion of undergraduate participants, it can be explained by the difference in sample sizes. Interaction effect sizes can be smaller than anticipated, resulting in underpowered studies when power is determined using established main effect sizes and predicted interactions (Calvillo & Smelter, 2020). Increasing the sample size in Experiment 2 to account for a between-subjects variable likely also improved our ability to detect the small interaction between our main effects, which could explain why we observed a significant interaction in Experiment 2 but not Experiment 1.

The finding that satirical headlines can produce a smaller illusory truth effect does not fit with the established finding that repetition increases people's rating of truth for both true and false information to similar extents. But this finding is consistent with the smaller illusory truth effects that may occur when people's attention is directed toward the accuracy of the information at exposure. When people are led to question the accuracy of novel information, through suggestions that the source of the information is unreliable or direct instructions, people will use other cues, such as whether information was previously presented or prior knowledge, to infer whether repeated information is true (Begg et al., 1992; Brashier et al., 2020). Likewise, the fact that many of our participants noted that the headlines used in Session 1 appeared false or fake, suggests that the presence of questionable and satirical headlines caused people to consider the validity of the headlines they were rating

for interest. When our participants later rated headlines for truth, participants may have used additional cues, such as whether the events described in the headlines are possible, to infer that repeated satirical headlines were less true than the feeling of familiarity would have suggested. It is also possible that the additional cues enhanced how true real headlines feel relative to satirical headlines, but this scenario is less likely than the former because familiarity is already a strong predictor for truth and the processes that correct for truth biases, such as recollection, tend to attenuate than increase truth ratings (Begg et al., 1992). Together with previous findings, our findings suggest that people anchor truth judgments for repeated information using the feeling of familiarity and use other cues as additional evidence of information being more or less true. For example, prior knowledge can be used to falsify obviously incorrect information, and declarative cues that the source is reliable can enhance how true familiar information feels (Brashier et al., 2020; Unkelbach & Greifeneder, 2018). We extend also extend previous findings by demonstrating that people will exhibit this same pattern of behaviour in the absence of the external cues or instructions used in previous studies; people will also adjust their truth judgments if the accuracy of information appears questionable. Despite finding support that such a cue exists, we did not find additional evidence that would allow us to identify the cue that participants may have used to adjust their truth ratings for repeated satirical headlines. But, based on previous research, the most likely cue is that of prior knowledge—because satirical headlines are often questionable and can be easily falsified.

It is concerning that other questionable information—fake news— does not cause people to similarly reduce their truth judgments for repeated information. People tend to rate repeated fake news headlines truer to the same extent as repeated real headlines (Calvillo & Smelter, 2020; Pennycook et al., 2018). This difference in findings is concerning because satire matches fake news on several dimensions, such as emotional evocativeness and

exaggeration (Das & Clark, 2018; Golbeck et al, 2018). Although our satirical headlines were written to entertain and were likely funnier than real headlines, fake news headlines are funnier than real headlines as well (Calvillo & Smelter, 2020). Furthermore, we used satirical headlines that were closer in plausibility to their real counterparts than the fake news headlines used in other studies, which would have made discerning between real and satirical headlines even more difficult (Pennycook et al., 2018; 2021). Despite these factors, there are other differences between our experiment and those used by previous misinformation studies other than our use of satirical headlines, such as differences in methodology, which could also account for the differences in findings.

For example, the way we presented our headlines may have felt unnatural to our participants and prompted a set of behaviours reserved for unreliable information. Unlike previous misinformation studies, which used images to simulate real news articles, we elected to present the headlines alone (Calvillo & Smelter, 2020; Pennycook et al., 2018; Smelter & Calvillo, 2020). Because headlines are often paired with images, participants in other studies may have been more likely to believe that the fake news headlines were real and relied on the feeling of familiarity to determine whether repeated headlines were true. In comparison, participants in our experiments may have been more likely to believe that the headlines were fake because headlines may appear more fake without images. Although some findings suggest that the presence of images has no effect on the illusory truth effect, those findings are limited by the fact that they were conducted on trivia statements, which may not require images to appear valid (Nadarevic et al., 2020). As such, it is still possible that the difference in findings between our study and previous headline studies are the result of differences in headline presentation due to images. Future research could investigate the effect of images on the illusory truth effect for headlines: if people may treat headlines as an unreliable source of

information when headlines lack images, then the difference in findings may be the result of our decision to omit images.

There are also other methodological differences between our study and other studies that used headlines that could account for the difference in findings. For example, we used headline lists at exposure and at judgment that were twice as long as those used in previous studies (Calvillo et al., 2020; Pennycook et al., 2018; Smelter & Calvillo, 2020). Because people may be unaccustomed to seeing that many ridiculous headlines in such a short span of time, our participants may have been less predisposed to accept that any of the headlines were real. In addition, the real headlines used in previous studies were much more plausible than our real headlines, and people may infer that the source of information is reliable in the presence of highly plausible headlines. Although speculatory, the plausibility of these explanations warrants further investigation of the features of information presentation that may elicit different patterns of behaviour.

In Experiment 2, we also aimed to determine whether warning participants that some of the headlines were false would reduce their tendency to rate repeated headlines as true. Despite using a similar warning, we did not observe any reduction in the illusory truth effect (Jalbert et al., 2020). It is possible that this kind of warning did not change how our participants responded to headlines because the warning works by causing people to distrust the information they are reading, and our participants were already skeptical, if not distrustful, of our headlines. Furthermore, descriptive trends in our Experiment 2 results suggest that participants who saw the warning were more likely to rate headlines across all within-subjects conditions as less true than participants who did not see the warning. This trend points to participants being more hesitant to rate any headline as true after seeing a warning, a trend that is more consistent with the effects of warning tags on fake news than a reduction of the familiarity signal due to distrust—which should have predicted a larger

decrease in truth ratings for repeated headlines than novel headlines (Jalbert et al., 2020; Pennycook et al., 2018). Our results show that informing participants that misinformation is present may be even less effective for headlines than warning tags, and that warnings of this kind may be ineffective in reducing people's tendency to believe false headlines after the headlines have been repeated.

One explanation for the lack of warning effects is that our wording of the warning may have confused people, dissuading them from using the warning to inform more accurate truth judgments. We informed participants that some of the headlines were written by satirical outlets and, thus, false where the previous studies simply informed people that some information is false. Because the key message in our warning was the same as previous studies (that some of the headlines were true and others were false), including additional details about the outlets that produce real or satirical headlines may have confused people and made it harder for people to apply the warning to headlines at exposure (Hasher et al., 1977; Jalbert et al., 2020). Unsurprisingly, people are better at applying easier instructions, such as "all the information is false" or "all old information is false" than more difficult ones, such as those asking people to use the feeling of familiarity as a cue that information may be false (Effron & Medha, 2020; Nadarevic et al., 2017; Unkelbach & Stahl, 2009). Because we deviated from the warning used in previous studies, it is possible that changing the original statement to apply to headlines may have made it harder for participants to apply the warning at all.

It is also possible that warnings of this kind do not work on headlines at all. People may be used to seeing content warnings on popular media and may have dismissed our warning out of habituation. Alternately, this kind of warning may not prompt a change in behaviour due to distrust because our participants may have already distrusted our headlines—many participants reported that the headlines seen in Session 1 were false or fake

headlines. But there are other potential explanations, such as forgetting or inattention, that can also explain the absence of a warning effect on the illusory truth effect (Nadarevic & Aßfalg, 2017; Skurnik et al., 2005). Warnings that do work to reduce the illusory truth effect also tend to lose their efficacy when the repeated information reappears a few days later (Nadarevic & Aßfalg, 2017; Pennycook et al., 2018; Skurnik et al., 2005). Admittedly, we should have included a manipulation check because its inclusion would have allowed us to determine whether the lack of a warning effect was because participants did not understand or because they did not attend to our warning. Our experimental design would have greatly benefited from the inclusion of a manipulation check for our warning because it would have provided evidence that people's tendency to ignore warnings was not specific to the way we presented our warning. The absence of a warning effect would be more compelling if it was the result of people's behaviour and not confounded by experimental limitations. Although the inclusion of a manipulation check in future research is indisputable, placement of such a manipulation check should be treated with caution. If the goal is to determine the effectiveness of a single warning, the only viable locations for a manipulation check in our experimental design is either immediately following the initial instructions or at the end of Session 2; including a manipulation check anywhere else could also function as a second warning.

Despite the lack of a manipulation check, there is some evidence suggesting that participants forgot the warning by the time they saw the list of headlines in Session 2. Some participants in the warning condition incorporated details from the warning, such as including the phrase "real and satirical headlines," in their comments at the end of Session 1; however, at the end of Session 2, none of the details from the warning were incorporated in their comments. The efficacy of warnings can be reduced by people's tendency to forget about warnings or how to correctly apply warnings within a few days, while the feeling of

familiarity can persist up to several months (Brown & Nix, 1996; Fazio et al., 2021; Nadarevic & Aßfalg, 2017; Skurnik et al., 2005). As such, the absence of a strong warning effect in our study may have resulted from reduced recall of the warning two days later. Because satire often appears in online environments where information is frequently reposted after long delays, our current findings provide evidence that broad content warnings informing people that misinformation may be present, may be ineffective at reducing misplaced belief in misinformation when that misinformation is frequently repeated.

Overall, our research has theoretical implications on the processes by which people determine information is true. Our results contribute to a branch of illusory truth literature showing that the bias to believe repeated information can be disrupted by reducing the relative contribution of familiarity to people's truth judgments. Previous research found that bringing people's attention to the accuracy of information through declarative cues or instructions can cause people to consider cues of truth other than familiarity and reduce the truth bias. We found evidence that people respond in a similar way in the absence of declarative cues when reading satirical information. More practically, our results show that people will mistakenly believe satirical headlines are true when those headlines have been seen before. Our results also contribute to the body of research investigating the efficacy of interventions by providing support against the efficacy of content warnings in an online environment where information is frequently repeated with variable delay periods (Nadarevic et al., 2017). Our research does, to some extent, confirm concerns that repeating of any misinformation, however well-intentioned, can bias people to believe that misinformation is true. But our research also provides evidence that people's inferences of truth are tempered by processes that ameliorate inaccurate belief in repeated misinformation.

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Appendix A

Preregistrations

Experiment 1 preregistration — https://aspredicted.org/KC9_TQY

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Examination of the illusory truth effect in real and satirical headlines. (#56529)

Created: 01/24/2021 02:51 PM (PT)

This is an anonymized copy (without author names) of the pre-registration. It was created by the author(s) to use during peer-review.
A non-anonymized version (containing author names) should be made available by the authors when the work it supports is made public.

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1) Have any data been collected for this study already?
It's complicated. We have already collected some data but explain in Question 8 why readers may consider this a valid pre-registration nevertheless.

2) What's the main question being asked or hypothesis being tested in this study?
To what extent does repeating satirical headlines cause people to believe they are more true on later viewings compared to when repeating real headlines?

3) Describe the key dependent variable(s) specifying how they will be measured.
Participants will rate headlines during two sessions, separated by 48 hours. The key dependent variable is truth ratings at session two. It will be measured on a 6-point Likert scale using the question: "Do you think the claim in the headline is true or false?" The possible answers participants can select are "definitely false", "probably false", "possibly false", "possible true", "probably true", and "definitely true" (Fazio, et al., 2015).

4) How many and which conditions will participants be assigned to?
We will use a 2 (Source: Real versus Satirical) × 2 (Repetition: Repeated versus New) within-subjects design. Participants will take part in all 4 conditions, viewing 80 headlines per session evenly split among conditions and in a randomized order.

5) Specify exactly which analyses you will conduct to examine the main question/hypothesis.
To test the main hypothesis, will conduct a 2 (Source: Real versus Satirical) × 2 (Repetition: Repeated versus New) within-subjects ANOVA on average ratings of truth. We also plan a number of ancillary and exploratory analyses, specifically a number of signal-detection analyses (d-prime, c, ROC) to examine if discriminability or response bias changed as a function of condition.

6) Describe exactly how outliers will be defined and handled, and your precise rule(s) for excluding observations.
We will assess outliers outside of ±2 SD for leverage, and delete them if they have large effects on the results. We will exclude participants for a number of reasons. (1) Failed attention check: participants must pass one attention check. (2) Failed to follow instructions: participants self-report instruction compliance on 5 items, all of which are critical; suspicious IP addresses. (3) Participant suspected of being a bot: We will exclude participants with suspicious behaviour (e.g., advertisements in comments, contradictory demographics between session, multiple survey attempts, known bot IP addresses, etc.)

7) How many observations will be collected or what will determine sample size? No need to justify decision, but be precise about exactly how the number will be determined.
We have set a target sample of 100 participants after missing data and exclusions. Power analyses (Fauf et al., 2009) and simulations (Lakens & Caldwell, 2019) were conducted at an alpha level of .05, and .90 power. We anticipated a small main effect of repetition, a medium main effect of source, and the possibility of a small interaction (Dechêne et al., 2010).

8) Anything else you would like to pre-register? (e.g., secondary analyses, variables collected for exploratory purposes, unusual analyses planned?)
We have not collected any study data yet, but have pre-tested headlines for ratings of truth. These data were used to help select headlines.

Experiment 2 preregistration — https://aspredicted.org/LL5_2CX

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Effect of warnings on illusory truth in headlines (#61685)

Created: 03/23/2021 01:57 PM (PT)

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A non-anonymized version (containing author names) should be made available by the authors when the work it supports is made public.

1) Have any data been collected for this study already?
No, no data have been collected for this study yet.

2) What's the main question being asked or hypothesis being tested in this study?
To what extent do warnings reduce increased feelings of truth induced by repeating satirical and real headlines?

3) Describe the key dependent variable(s) specifying how they will be measured.
Participants will rate headlines during two sessions, separated by 48 hours, with the key dependent variable of truth ratings at session two. Prior to seeing the headlines in session one, half of the participants will see a warning with the text: "Some of the headlines came from a reputable news outlet: they are true. Some of the headlines came from a satirical news site: they are false. The goal of satire is to entertain people about political and social issues through ridicule and exaggeration. Although their coverage is based on real issues, the claims made in these headlines are often exaggerated, implausible, or outright impossible." Truth ratings will be measured on a 6-point Likert scale using the question: "Do you think the claim in the headline is true or false?" The possible answers participants can select are "definitely false", "probably false", "possibly false", "possibly true", "probably true", and "definitely true" (Fazio et al., 2015).

4) How many and which conditions will participants be assigned to?
We will use a 2 (Source status: Real versus Satirical) × 2 (Repetition status: Repeated versus New) x 2 (Warning status: With warning versus Without warning) mixed-model design. Headline status and repetition status will be manipulated within-subjects and participants will take part in all four conditions, viewing 80 headlines per session evenly split among conditions and in a randomized order. Warning status will be manipulated between-subjects, with participants randomly assigned to either see a warning or see no warning prior to answering questions about headlines in the first session.

5) Specify exactly which analyses you will conduct to examine the main question/hypothesis.
To test the main hypothesis, will conduct a 2 (Source status: Real versus Satirical) × 2 (Repetition status: Repeated versus New) x 2 (Warning status: With warning versus Without warning) mixed-model ANOVA on average ratings of truth. We also plan a number of ancillary and exploratory analyses, specifically a number of signal-detection analyses (d-prime, c, ROC) to examine if discriminability or response bias changed as a function of condition.

6) Describe exactly how outliers will be defined and handled, and your precise rule(s) for excluding observations.
We will assess outliers outside of ±2 SD for leverage, and delete them if they have large effects on the results. We will exclude participants for a number of reasons. (1) Failed attention check: participants must pass one attention check. (2) Failed to follow instructions: participants self-report instruction compliance on 5 items, all of which are critical; suspicious IP addresses. (3) Participant suspected of being a bot: We will exclude participants with suspicious behaviour (e.g., advertisements in comments, contradictory demographics between session, multiple survey attempts, known bot IP addresses, etc.).

7) How many observations will be collected or what will determine sample size? No need to justify decision, but be precise about exactly how the number will be determined.
We have set a target sample of 100 participants for each of our between-subjects conditions, after missing data and exclusions, for a total sample of 200 participants. Power analyses (Fauf et al., 2009) and simulations (Lakens & Caldwell, 2019) were conducted at an alpha level of .05, and .90 power. We anticipated a small main effect of repetition, a medium main effect of source, the possibility of a small interaction (Dechêne et al., 2010), a small main effect of warning and the possibility of a small interaction with warning (Jalbert et al., 2020).

8) Anything else you would like to pre-register? (e.g., secondary analyses, variables collected for exploratory purposes, unusual analyses planned?)
We plan some additional exploratory analyses to examine correlations between factors and features of the survey (latency of responses, effects of anchoring, etc.).

Appendix B

Material selection

Collecting Headlines for Norming

Before collecting headlines, we set several criteria. Satirical headlines had to cover events that either never happened or exaggerate the true events to the point of disbelief. For the sake of consistency, we only collected satirical headlines from *The Onion*. Real headlines had to cover events that actually happened, confirmed by at least one other legitimate news outlet.

On first collecting contemporary satirical headlines, we found that the majority of satirical news related to then-President Trump. We surmised that people may be more likely to suspend belief for Trump-related news, given his propensity to espouse fake news. As such, we elected to collect headlines from before his presidency and only collected headlines from between January 1, 2011 and December 31, 2015. We collected a total of 471 satirical headlines using Google search filters "before:YYYY-MM-DD," "after:YYYY-MM-DD," and "site:theonion.com," on the Google search engine. Of the search results, a small number of headlines were too short to pass for satirical headlines and were excluded.

To minimize differences in plausibility and funniness, we collected real headlines using a more diverse search strategies. We collected headlines using keywords such as "funny news headlines" on the Google search engine. To ensure that the real headlines covered true events, we only considered headlines with events that could be substantiated by at least two legitimate news outlets. We also only considered real headlines that matched the writing style of headlines from *The Onion*. In the absence of a content analysis, we judged real headlines that contained any amount of humour or ambiguity to have met this criterion. In situations where similar headlines were used by numerous news organisations, the most ambiguous headline was selected. Because the number of real headlines that met these

criteria were far fewer than desired, we also searched headlines using archives from legitimate news outlets, such as *The Wall Street Journal*. Using these methods, we collected a total of 345 real headlines.

Norming Headlines for Plausibility

We recruited 376 participants on Amazon's Mechanical Turk from November 17, 2020, to December 2, 2020, to rate our headlines for plausibility. Participants saw a total of 30 headlines, 15 real and 15 satirical, and answered "How likely is it that the claim in the headline is accurate?" on a 6-point Likert scale (1 = *Not very likely* to 6 = *Very likely*). We included an attention check which asked participants to select the second option from the left. Participants were excluded if they selected any other option. We excluded 18 participants and retained the data from the remaining 358 participants for analysis.

We stopped norming headlines once we had normed 270 of the 816 headlines. We planned to collect 150 headlines of each source type so that we could have 50 headlines in each counterbalancing condition (missing, repeated, new) in the main experiments. We also wanted our materials to have a range of plausibility centred around the mid-point of the scale. We excluded highly plausible headlines due to potential ceiling effects and excluded highly implausible headlines because research showed that very implausible claims do not feel truer when repeated (Pennycook et al., 2018). As such, we aimed to only use headlines with a mean plausibility rating between 2 and 5 on a 6-point plausibility scale.

We had planned to continue norming headlines until we had collected 150 real headlines and 150 satirical headlines of desired plausibility, but we stopped norming earlier than planned, at 148 satirical headlines and 179 real headlines of desired plausibility. This was because we had additional satirical headlines that fell out of our predetermined exclusion criteria that also had acceptable mean plausibility and could not justify the costs of additional norming.

Assigning Headlines to Each Counterbalancing Group

After initial testing, we determined that asking people to rate 200 headlines in each session could result in higher number of drop-outs due to fatigue and reduced the number of headlines in each session to just 80 headlines. This number meant that we would need a total of 120 real and satirical headlines, 40 that would be only seen in Session 1 but missing in Session 2, 40 that would be only seen in Session 2 but missing in Session 1, and 40 that would be seen in both sessions. After organising two lists of descending plausibility (one for satirical news and one for real news), we randomly selected 60 headlines from each list using R-studio (R Core Team, 2020).

We organised the 60 headlines from each list into three counterbalancing groups of comparable plausibility, by assigning headlines "A-B-C-C-B-A" down the lists of descending plausibility. We then concatenated real and satirical headlines (see Table 1 and Table 2 for average plausibility and counterbalancing assignment of real and satirical headlines). We then set up combinations of these counterbalancing groups so that each group of headlines would be seen the same number of times as missing (only seen in Session 1), new (only seen in Session 2), or repeated (seen in both sessions). Different groups of participants would see different combinations of the counterbalancing groups (Group 1 would see AB then AC, Group 2 would see AC then BC, Group 3 would see BC then AB).

We generated a list of 120 headlines (60 real, 60 satirical). All 120 headlines were normed to ensure that participants would read a range of plausible and implausible claims. We also excluded headlines that were extreme (i.e., beyond the 90% confidence interval of the grand mean for each source type). We eliminated extremely implausible or plausible headlines—both real and satire—for two reasons: (1) to potential explore the role of plausibility on illusory truth, and (2) to increase task difficulty and, thus, participants' reliance on fluency signals when judging real and satirical headlines (Dechêne et al., 2010;

Fazio et al., 2019). However, the headlines we pretested differed in plausibility and this difference was maintained in our selection of headlines, $t(1, 118) = -4.24$, $p < .001$, Cohen's d = .77. The mean plausibility of our real headlines ($M = 3.23$, $SD = .72$) was higher than the plausibility of our satirical headlines, ($M = 2.68$, $SD = .67$). We randomly selected 120 headlines from the pool of pretested headlines and systematically divided these headlines into counterbalancing groups using headline's rank plausibility (see Appendix B for details on how materials were developed and organised).

Participants saw 80 headlines at both Session 1 and Session 2. In both sessions, half of the headlines were real and half were satire. In Session 2, half of the headlines were old (previously seen at Session 1) and half were new (not seen at Session 1). To counterbalance the headline presentation, we split the 120 headlines into three equal groups (half real and half satire) so that we could assign them to three different roles: repeated, missing, or novel. Repeated headlines were a group of forty headlines in both Session 1 and 2, missing headlines were a group of 40 headlines that were only in Session 1, and novel headlines were 40 headlines that were only in Session 2. Each group played a different role for each of the counterbalancing groups, and to ensure that headlines in each group played each role the same number of times, participants were randomly assigned to one of the counterbalancing groups in Session 1. We ran a one-way ANOVA on the mean plausibility scores of the headlines in each counterbalancing group and found that mean plausibility was not different across these counterbalancing groups, $F(1, 119) = .001$, $p = .999$.

Table A1

Real news headlines, mean plausibility and counterbalancing assignment

Headline	Mean plausibility	Counterbalance
Coughs Take Longer To Clear Up Than People Think: Study	4.59	A
Collier County Deputies Crash Segways; 1 Breaks Ankle	4.53	B
Obamas Lei Low On Hawaiian Trip	4.33	C
Kids Today Run Slower Than Their Parents Did, Study Finds	4.33	C
Study Links Stroke Risk To Some Weather Patterns, Including Cold, High Humidity	4.31	B
Energy Drinks Blamed For Boost In Emergency Room Visits	4.27	A
Fasting For Three Days Can Regenerate Your Entire Immune System	4.19	A
McDonald's To Host 'McWeddings' In Hong Kong	4.15	B

Chinese Billboards Warn Locals 'Not To Photoshop Officials Into Porn'	4.05	C
Indonesia Considers Ban On Witchcraft	4	C
News Is Bad For You - And Giving Up Reading It Will Make You Happier	3.97	B
Bedbugs Take America, America Attempts To Fight Back	3.93	A
Police: Man Used Fake Penis To Foil Drug Test	3.9	A
City Removes Actual Fork In the Road	3.9	B
Mumbai Bans Lingerie-Clad Mannequins To Save Men From 'Impure Thoughts'	3.9	C
Holy Cop Conundrum! Police Pull Over Batman In His Batmobile For Having Wrong Number Plates	3.74	C
Squeaky-Clean Singapore In Toilet Manners Campaign	3.72	B
Give Memory-Altering Drugs A Chance	3.64	A
Police: Pet Parrot Squealed On Drunken Driving Suspect	3.56	A

Showering Home Intruder Calls 911 On Homeowner	3.51	B
In Tunisia, Act Of One Fruit Vendor Sparks Wave Of Revolution Through Arab World	3.49	C
Canadian Sues Hospital For Shortening Penis In Botched Surgery	3.48	C
Ohio Boys Suspended For Farting On School Bus	3.46	B
Things Get Messy When Bartenders Crack An Egg	3.45	A
Last Two Speakers Of Dying Language Refuse To Talk To Each Other	3.44	A
Intelligent Knife Tells Surgeon If Tissue Is Cancerous	3.39	B
Bloomberg's Very Strange Headlines Are In Danger Of Making Sense	3.38	C
Shanghai Announces 'One-Dog Policy'	3.36	C
French Club Suspected Of Bribing Opponents With Cases Of Wine Mid-Match	3.35	B
Lesbian Teen: School Sent Me To Fake Prom	3.34	A

Unidentified Haggis Causes Security Meltdown In Scottish Railway Station	3.31	A
Human Barbie' Strives To Become Breatharian Who Lives Off Light And Air	3.27	B
Teenage Girl With 'Rapunzel Syndrome' Has Massive 9-Pound Hairball Removed From Stomach	3.213	C
Doctors Say Two Chicken Pox Vaccinations Better Than One	3.213	C
Indian Man Arrested For Drinking Tea 'Suspiciously'	3.153	B
Sleeping Beauty Condition Means Teenager Sleeps For Two Weeks	3.049	A
3 Men Charged After Joyride On Giant Purple Chicken Statue	2.98	A
Boozy Feral Pig Steals Beer, Gets Drunk And Start Fight With A Cow	2.954	B
Milk Better Than Water To Rehydrate Kids, Study Finds	2.859	C
Edinburgh Theatre Accidentally Sends Porn DVDs To Children And Parents	2.85	C
Texas Cops Mistake Actual Weed For Marijuana, Spend Hours Doing Yard Work	2.799	B

Study: Women Who Drink Are Less Likely To Gain Weight	2.781	A
Nepal University Students Told: Rats Ate Your Exams	2.721	A
Study Shows Some Turtles Urinate Through Mouth	2.652	B
Palin Stands With 'Our North Korean Allies'	2.643	C
Dog Poops In Alignment With Earth's Magnetic Field, Study Finds	2.617	C
Vaseline Starts Skin Lightening Facebook Application In India	2.557	B
Mizuno Admits Japan's Baseballs Are Again Too Lively	2.557	A
Tigers Hot-Dog Vendor Fired For Hating Ketchup	2.462	A
Teletubby Charged For Break-In, Chinese Food Theft	2.453	B
Scorpios Need Not Apply: Zodiac Signs Inspire Job Bias	2.453	C
Rally To Restore Sanity Battles March To Keep Fear Alive	2.384	C

One Direction Scared About Catching STDs From Koalas	2.332	B
Virgins With C-Cup Breasts Sought By Tea Plantation	2.159	A
Malaysia Probing Japan Condom Disappearance	2.142	A
Man Turns To 'Human Balloon' After Falling On Air Hose	2.099	B
Famed Magnetic Boy Is Probably Just Very Sticky	2.099	C
Central Colombia Woman Grows Potato In Vagina In Ill-Advised Contraception Attempt	2.03	C
Stoned Wallabies Fingered As Crop Circle Culprits	2.004	B
Dead Indian Guru In Freezer For 'Deep Meditation'	1.9	A

Table A2

Satirical news headlines, mean plausibility and counterbalancing assignment

Headline	Mean plausibility	Counterbalance
Internet Scam Alert: Most "Kickstarter" Projects Just Useless Crap	4.59	A
Abortion Must Be Safe, Legal, And Soon	4.53	B
Nuclear Energy Advocates Insist U.S. Reactors Completely Safe Unless Something Bad Happens	4.33	C
Paula Deen Sponsors .05K Walk For Diabetes Research	4.33	C
Millions Of Courageous Americans Overcoming Media Pressure To Be Thin	4.31	B
Scientists Find Thousands Of Previously Undiscovered Species Cowering In Amazon Rainforest	4.27	A
Christian Groups: Biblical Armageddon Must Be Taught Alongside Global Warming	4.19	A
Dubai Debt Crisis Halts Building Of World's Largest Indoor Mountain Range	4.15	B

Shocker: SNL Kills Off Beloved Seth Meyers Character	4.05	C
Katheryn Bigelow - First Woman To Win Oscar For Best Directress	4	C
Military Now Considering Limiting Soldiers With Severe PTSD To 3 Combat Tours	3.97	B
Science Channel Refuses To Dumb Down Science Any Further	3.93	A
TIME Announces New Version Of Magazine Aimed At Adults	3.9	A
McDonald's Considering Franchising Restaurants After 70 Year Of Being Family Owned And Operated	3.9	B
Amputee Inspires Others Not To Lose Limbs	3.9	C
Security Guards Chase Naked USA Fan Around White House	3.74	C
Leaf-Hunting Season Begins	3.72	B
More Americans Putting Off Marriage Until Ultimatum	3.64	A

Internet Users Demand Less Interactivity	3.56	A
International AIDS Conference Attendees Receive Complimentary Gift Bag Full Of Awesome AIDS Gear	3.51	B
Barbed Wire Industry Protests Negative Portrayal In 'Evil Within' Video Game	3.49	C
Rising Number Of Weak, Emasculated Men Working As Stay-At-Home Dads	3.48	C
Man Who Understands 8% Of Obamacare Vigorously Defends It From Man Who Understands 5%	3.46	B
Study: Most High School Graduates Woefully Unprepared For High School	3.45	A
Time Between Thing Being Amusing, Extremely Irritating Down to 4 Minutes	3.44	A
Malaysia Airlines Expands Investigation To Include General Scope Of Space, Time	3.39	B
Brief Moment Of Lucidity Called Panic Attack	3.38	C
NASA Administrator Resigns After Leak Of Offensive Anti-Moon Email	3.36	C

National Parks Closed For Annual Remajestification	3.35	B
African-American Community Calls For New Black Nerd Archetype	3.34	A
New Ad Urges Hipsters To Go To Applebee's Ironically	3.31	A
BuzzFeed Writer Resigns In Disgrace After Plagiarizing '10 Llamas Who Wish They Were Models'	3.27	B
Study: Humans Display Highest Cognitive Abilities When Trying To Retrieve Object Dropped Between Car Seats	3.213	C
Today Now! Host Undergoes Horrifically Painful Surgery Live On Air	3.213	C
Cancer Researchers: 'Don't Get Cancer'	3.153	B
Michelle Obama Introduces Exercise Program To Combat Obesity In Professional Baseball Players	3.049	A
Nation's Moms Invent New Recreational Drug To Worry About	2.98	A
Man Eating McChicken Sandwich Can Tell McDonald's Switched Up Antibiotics	2.954	B

China Announces Plans To Build International Space Prison	2.859	C
Study: 89 Percent Of Networking Nonconsensual	2.85	C
Do Glass Pipes, Incense Prove Teens Are Practicing Shamanism	2.799	B
Apple Fans Lining Up For iHand	2.781	A
Blissful Ignorance Commemorated On Annual 9/10 Anniversary	2.721	A
World's Youngest Person Born	2.652	B
Police Department Deploys Fancyclothes Cop	2.643	C
Dog Held Against Will Inside Skype Window	2.617	C
New Zipcarp Service Offers Short-Term Carp Rentals	2.557	B
FDA Official: "Just Eat A Goddamn Vegetable"	2.557	A
More Colleges Offering Dick-Around Abroad Programs	2.462	A

McDonald's Unveils New Senior Citizen PlayPlace	2.453	B
Study Finds Hearing Loved One's Voice Induces Excruciating Pain In Coma Patients	2.453	C
More Vegetables Evolving Chocolate-Sauce-Filled Centers As Evolutionary Imperative	2.384	C
American Dental Association Recommends Making Your Gums Hurt Really Bad Once A Day	2.332	B
Nerf Develops New Line Of Biological Weapons	2.159	A
Study: 25-Foot-Tall Asian Women Remain Underrepresented In Media	2.142	A
New Law Requires Women To Name Baby, Paint Nursery Before Getting Abortion	2.099	B
Planned Parenthood Opens $8 Billion Abortionplex	2.099	C
Syria Conflict Intensifies As Bears Enter War	2.03	C
Prevent Identity Theft By Changing Identity Every Three Years	2.004	B
Elementary Schoolers Depressed After Getting Look At Voters Filing Out Of Gymnasium	1.9	A

Appendix C

Survey

Session 1

Information sheet and consent form

Information Sheet: Project FS2020-41

Who is conducting the research?

We are a team of researchers in the School of Psychology. Professor Maryanne Garry will be supervising this research. This research project has been approved by the School of Psychology Research and Ethics Committee under delegated authority of The University of Waikato's Human Ethics Committee. Any questions about the ethical conduct of this research may be sent to the Secretary of the Committee, email alpss-ethics@waikato.ac.nz, postal address, Division of Arts, Law, Psychology and Social Sciences, University of Waikato, Te Whare Wananga o Waikato, Private Bag 3105, Hamilton 3240.

Dr. Eryn J. Newman of the Australia National University is also on the team.

What is the purpose of this research?

The purpose of this research is to examine visual and verbal learning styles.

What is involved if you agree to participate? You will participate in **two sessions**. Today's session is the first of these sessions, and the second session will take place in **two days**. You must complete the second session **within 24 hours** of receiving the link for that session. This first session will take approximately 25 minutes, and the second session will take approximately 25 minutes. You will see a series of headlines from a few years ago. Your task is to answer a question about each headline. We do not anticipate any risks arising

from your participation in this study. You are free to withdraw from the study before your participation is complete, without giving a reason. You will receive $1.50 for completing both sessions ($0.50 for the first session and $1.00 upon completion of the second session).

Privacy and Confidentiality

To protect your privacy, all the information you provide us with will be automatically coded by a number that does not identify you. We will keep proof of your consent to participate, your raw data and all coded data (i.e. data that does not identify you) for at least 5 years after this research is published, and we may keep it indefinitely. All of this information will be stored on a secure online server.

What happens to the information you provide?

The responses you provide will be collected, coded (turned into numbers) and combined with other participants' responses. We will then analyze the data, and look at overall patterns of responses. We may then write scholarly articles or make scholarly presentations in which we talk about these patterns of results. The data may also form part of a Masters or PhD thesis, or an Honours dissertation. We may also use your data in other related projects, and share it with competent professionals. When we do any of these things—share our data, describe our results, write articles or give scientific presentations—it will be impossible for anyone to identify you.

If you have further questions about this study please contact us.

CONSENT TO PARTICIPATE

I have read and understood the information about this research project. I have had an opportunity to ask questions and have them answered to my satisfaction. I understand the purpose of this research, what will happen if I participate, and what will happen to the information I provide. I understand the measures in place to protect my privacy and confidentiality, such that the information I provide will be coded by a number that does not identify me. I understand that I can withdraw my consent at any time prior to the end of my participation, and I do not have to give a reason.

I agree to participate in this research, and I understand that if I check (tick) the box below, it indicates my consent.

○ Yes, I agree to participate in this research. (1)

If you do not agree to participate in this study, please exit the browser window now.

Please enter your **Mechanical Turk Worker ID** so that we can match your survey response with your Mechanical Turk data and pay you.

You can find your Worker ID on this page: http://www.mturk.com/mturk/dashboard

You do not need a completion code for this survey, because all HITs are manually approved.

MAKE SURE YOU ENTER THIS CORRECTLY AS IT IS THE ONLY WAY WE CAN MATCH YOUR RECORDS AND ENSURE THAT YOU GET PAID.

Thank you.

Instructions

During this experiment, we ask that you comply with the following study requirements:

1) Please complete the study in a single session, and do not leave the experiment to engage in other tasks. So do not check your mail, look at Facebook, use your mobile phone, get up for a drink, etc. **Please do not look up any of the headlines you see in this experiment.** If you need to engage in any tasks, please do so right now before continuing onto the next page.

2) Please do not use your web browser's back or refresh buttons at any point during the experiment.

3) Because this experiment requires your close attention, we ask that you complete the experiment in an environment that is free of noise and distraction. Please do not speak to anyone, or have anyone near you. Ideally, you would be alone in a quiet room, or in a room where other people are quiet (such as a library).

The reason we ask you to follow these instructions is to ensure the quality of the information you give us. We know from previous research that if you do take a break, chat with others, etc, it will impair your ability to do the tasks set in this experiment.

I understand these instructions, and agree to comply with them for the duration of the experiment.

Today you will read **80 headlines** and answer some questions about them.

Make sure you pay attention to all of the instructions on the following pages.

When you are ready to begin the study, please advance to the next page.

On each page, you will read a headline from a few years ago and answer this question:

How interesting is this headline?

When rating each headline, please select one answer before clicking the arrow icon at the bottom-right of your screen to proceed.

When rating each headline, please answer as quickly as possible but not so quickly that you make mistakes.

On the next two pages, you will see two examples of the task you will be doing. Please complete each example before continuing.

Practice question:

How interesting is this headline?

Environmental Ad Campaign Encourages Turning Shower Off After Showering

- ○ Very interesting (1)
- ○ Interesting (2)
- ○ Slightly interesting (3)
- ○ Slightly uninteresting (4)
- ○ Uninteresting (5)
- ○ Very uninteresting (6)

Practice question:

How interesting is this headline?

Empathy: College Students Don't Have As Much As They Used To, Study Finds

- ○ Very interesting (1)
- ○ Interesting (2)
- ○ Slightly interesting (3)
- ○ Slightly uninteresting (4)
- ○ Uninteresting (5)
- ○ Very uninteresting (6)

Now you will be moving on to the main body of the study. You will be completing the same task but for 80 different headlines.

Please click the arrow at the bottom of the page when you are ready to proceed.

Participants see the list of 80 headlines here, each formatted the same as the following example:

How interesting is this headline?

Science Channel Refuses To Dumb Down Science Any Further

- ○ Very interesting (1)
- ○ Interesting (2)
- ○ Slightly interesting (3)
- ○ Slightly uninteresting (4)
- ○ Uninteresting (5)
- ○ Very uninteresting (6)

Attention check

How interesting is this headline?

This Is Not A Headline. Please Select The Second Option From The Left And Continue

- ○ Very interesting (0)
- ○ Interesting (1)
- ○ Slightly interesting (0)
- ○ Slightly uninteresting (0)
- ○ Uninteresting (2)
- ○ Very uninteresting (0)

Thank you for participating. You are nearly at the end of this study but we need you to answer a few more questions before you finish.

Continue onto the next page to begin answering these questions.

Compliance checks

You may recall that we asked you to meet certain requirements and to take certain steps to avoid distractions during the experiment. Now we want to know if you really followed the requirements we asked you to follow. **You will be paid regardless of your response, so please be honest.**

Thank you for your help.

Did you speak with anyone at any time during the study?

- ○ Yes (1)
- ○ No (0)

Did you complete the session in a single sitting, without stopping?

- ○ Yes (0)
- ○ No (1)

Did you use a search engine at any point during the study to look anything up?

- ○ Yes (1)
- ○ No (0)

Did you pause or leave the study to engage in other tasks, even if they were other computer tasks?

- ○ Yes (1)
- ○ No (0)

Demographics

Please answer the following demographic questions:

What do you identify as?

- ○ Man (1)
- ○ Woman (2)
- ○ Gender non-binary (3)

What is your age? Please give your answer in years, as a number (e.g. 35). ___

What was the first language you learned to speak? _____

What would you consider your "primary" language? _____

Please describe the task that you completed in this survey in 1-2 sentences.

_____

_____

Session 1 debriefing

You are almost at the end of the first session.

We are going to catch up with you in two days' time for the second session of this study. The second session will consist of a questionnaire that should take you a similar amount of time that we need you to complete so we can interpret the responses you just gave us. In

approximately **48 hours**, you will be contacted by email (via MTurk) with a link to the questionnaire. Please make sure you are checking your emails because you need to complete the second session within 24 hours of receiving the link. Once you open the survey link, please be prepared to complete the survey in one sitting.

Remember: You will receive $0.50 for today's session and you will receive $1.00 for completing the second session.

Between now and the next session, we ask that you do not try to obtain more information about any of the sentences you read about today. That means please don't look on google, nor talk to your friends, etc. We can't tell you why just now, but we promise it will all be clear when you complete the second session. In the meantime, thank you so much for your cooperation.

○ I understand the instructions above (1)

Please continue to the next page to enter your Worker ID.

That is the end of the first session. Thank you for participating.

Please enter your Mechanical Turk Worker ID so that we can match your survey responses from both sessions of this study with your Mechanical Turk data and pay you.

You can find your Worker ID on this page: http://www.mturk.com/mturk/dashboard

MAKE SURE YOU ENTER THIS CORRECTLY AS IT IS THE ONLY WAY WE CAN MATCH YOUR RECORDS AND ENSURE THAT YOU GET PAID.

PLEASE USE CAPITAL LETTERS.

You do not need a completion code because HITs are manually approved.

Thank you.

_____

Click the arrow button at the bottom of the page to submit your answers.

End of survey here

We thank you for your time spent taking this survey.

Your response has been recorded.

Session 2

Information sheet and consent form

Welcome to the second session of the study.

Important information to remember about this study:

- You will participate in two sessions in total.
- Today's session is the second and final of these sessions.
- You will see a series of headlines from a few years ago.
- Your task is to answer a question about each headline.
- We do not anticipate any risks arising from your participation in the study.
- You must complete this session within 24 hours of receiving the link for this session. Please be prepared to complete this survey in one sitting.
- You are free to withdraw from the study at any time before your participation is complete, without giving a reason.
- When you have completed both experimental sessions, you will receive $1.50 ($0.50 for the first session, and $1.00 upon completion of today's session).

Instructions

During this experiment, we ask that you comply with the following study requirements:

1) Please complete the study in a single session, and do not leave the experiment to engage in other tasks. So do not check your mail, look at Facebook, use your mobile phone, get up for a drink, etc. **Please do not look up any of the headlines you see in this experiment.** If you need to engage in any tasks, please do so right now before continuing onto the next page.

2) Please do not use your web browser's back or refresh buttons at any point during the experiment.

3) Because this experiment requires your close attention, we ask that you complete the

experiment in an environment that is free of noise and distraction. Please do not speak to anyone or have anyone near you. Ideally, you would be alone in a quiet room, or in a room where other people are quiet (such as a library).

The reason we ask you to follow these instructions is to ensure the quality of the information you give us. We know from previous research that if you do take a break, chat with others, etc, it will impair your ability to do the tasks set in this experiment.

○ I understand these instructions, and agree to comply with them for the duration of the experiment. (1)

Today you will read **80 headlines** and answer some questions about them.

Make sure you pay attention to all of the instructions on the following pages.

When you are ready to begin the study, please advance to the next page.

On each page, you will read a headline from a few years ago and answer this question:

Do you think the claim in the headline is true or false?

When rating each headline, please select one answer before clicking the arrow icon at the bottom-right of your screen to proceed.

When rating each headline, please answer as quickly as possible but not so quickly that you make mistakes.

On the next two pages, you will see two examples of the task you will be doing. Please complete each example before continuing.

Practice question:

Do you think the claim in the headline is true or false?

Semester At Sea Students Steal Anchor For Dorm Room

- ○ Definitely false (1)
- ○ Probably false (2)
- ○ Possibly false (3)
- ○ Possibly true (4)
- ○ Probably true (5)
- ○ Definitely true (6)

Practice question:

Do you think the claim in the headline is true or false?

Blue And Green Honey Makes French Beekeepers See Red

- ○ Definitely false (1)
- ○ Probably false (2)
- ○ Possibly false (3)
- ○ Possibly true (4)
- ○ Probably true (5)
- ○ Definitely true (6)

Now you will be moving on to the main body of the study. You will be completing the same task but for 80 different headlines.

Please click the arrow at the bottom of the page when you are ready to proceed.

Participants see the list of 80 headlines here, each formatted the same as the following example:

Do you think the claim in the headline is true or false?

Internet Scam Alert: Most "Kickstarter" Projects Just Useless Crap

- ○ Definitely false (1)
- ○ Probably false (2)
- ○ Possibly false (3)
- ○ Possibly true (4)
- ○ Probably true (5)
- ○ Definitely true (6)

Attention check

Do you think the claim in the headline is true or false?

This Is Not A Headline. Please Select The Second Option From The Left And Continue

- ○ Definitely false (0)
- ○ Probably false (1)
- ○ Possibly false (0)
- ○ Possibly true (0)
- ○ Probably true (2)
- ○ Definitely true (0)

Thank you for participating so far. You are nearly finished, but first we need a few pieces of information from you. It is important that you do not skip these questions because at the very end of the survey you will read a debriefing statement, and complete your HIT.

Continue to the next page to begin answering questions.

Compliance checks

What is your age? Please give your answer in years, as a number (e.g. 35). ___

You may recall that we asked you to meet certain requirements. Now we want to know if you really followed the requirements we asked you to follow. **You will be paid regardless of your response, so please be honest.**

Thank you for your help.

Please tell us whether you used any outside sources (Google, wikipedia, friends, etc.) at any point between the first session and today to research the headlines shown in our study.

- ○ Yes, I used an outside source to research the headlines (1)
- ○ No, I did not use an outside source to research the headlines (0)

Did you speak with anyone at any time during the study?

- ○ Yes (1)
- ○ No (0)

Did you complete the session in a single sitting, without stopping?

- ○ Yes (0)
- ○ No (1)

Did you use a search engine at any point during the study to look anything up?

- ○ Yes (1)
- ○ No (0)

Did you pause or leave the study to engage in other tasks, even if they were other computer tasks?

- ○ Yes (1)
- ○ No (0)

Please describe the task that you completed in this survey in 1-2 sentences.

_____

_____

What do you think the two surveys were about? _____

Is there anything you'd like to tell us about the surveys?

_____

_____

Debriefing sheet

Debriefing Sheet: Project FS2020-41

Dear Participant,

You just took part in a two-session study in which you were asked to read a series of headlines and rate them for interest, and then two days later, you were asked to read a similar series of headlines and rate them for how likely they were to be true. Beforehand, we told you

that the purpose of the study was to investigate visual and verbal learning styles. In fact, we were actually interested in whether you judged that a headline was true or false depending on whether you saw that headline in the earlier session. You should know that half of the headlines you read in our study were from satirical sources. Our hypothesis is straightforward. We suspected that both true and satirical headlines, when repeated, would make those headlines seem more familiar, and much scientific research shows that when something feels familiar, we tend to think the familiar things are true.

What did we find?

At the moment we are still in the process of collecting data, and so we don't have any results to share with you. But if you would like to know what we find in this study, please contact us using the details above and we will email you a copy of the results.

Recall that you were asked to rate headlines on how interesting they were in the first session and two days later, in this session, you were asked to rate how true or false the claims in the headlines were. In this situation, we expected that having previously read some of the headlines would leave a feeling of familiarity when seeing the headlines again today. As a result, we expected that they may seem more true - a completely normal aspect of mental processing. We hope you can see why we could not have told you what our study was about before you took part. We regret having misled you about the genuine purpose of this study, and we wish we could have adopted a non-deceptive procedure instead.

You may wonder about the benefits of research such as this project. Research of this kind is extremely valuable in helping us to understand theoretical issues - such as how memory works - but it also has tremendous practical value. For example, here, we are concerned about

the proliferation of fake news. Why would something people know is fictitious, even a joke, the first time they read it, come to feel true only days later?

Should you have any further questions about the study, please feel free to contact one of us.

Thank you once again for your help.

Sincerely,

Professor Maryanne Garry, James Lin, Dr. Andrew Evelo and Dr. Eryn Newman

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Please re-enter your Mechanical Turk Worker ID so that we can match your survey responses from both sessions of this study with your Mechanical Turk data and pay you.

You can find your Worker ID on this page: http://www.mturk.com/mturk/dashboard

There is no completion code for this survey because all HITs are manually approved.

MAKE SURE YOU ENTER THIS CORRECTLY AS IT IS THE ONLY WAY WE CAN MATCH YOUR RECORDS AND ENSURE THAT YOU GET PAID.

Thank you.

_____

Click Next to submit your survey responses and complete the study.

End of survey here

We thank you for your time spent taking this survey.

Your response has been recorded.
