PAPER IN PRESS AT PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY B

Corrections of Political Misinformation: No Evidence for an Effect of Partisan Worldview in a U.S. Convenience Sample

Ullrich K. H. Ecker[1], Brandon K. N. Sze[1], & Matthew Andreotta[1,2]

[1] School of Psychological Science, University of Western Australia

[2] Data61, Commonwealth Scientific and Industrial Research Organisation

Word Count: 7,172 (including title, abstract, keywords, main text, figure legends, footnotes, references)

Corresponding author: Ullrich Ecker, School of Psychological Science, University of Western Australia (M304), 35 Stirling Hwy, Perth WA 6009, Australia; ullrich.ecker@uwa.edu.au

Acknowledgements: This research was supported by the Australian Research Council under grant DP160103596, awarded to UE. MA's contribution was facilitated by an Australian Government Research Training Program Scholarship at the University of Western Australia and a scholarship from the Commonwealth Scientific and Industrial Research Organisation Research Office. We thank Charles Hanich for research assistance, Briony Swire-Thompson for feedback on the materials, and Matt Nurse, Andy Perfors, Yoshi Kashima, and Greg Nyilasy for discussion of the results.

Abstract: Misinformation often has a continuing effect on people's reasoning despite clear correction. One factor assumed to affect post-correction reliance on misinformation is worldview-driven motivated reasoning. For example, a recent study with an Australian undergraduate sample found that when politically-situated misinformation was retracted, political partisanship influenced the effectiveness of the retraction. This worldview effect was asymmetrical, that is, particularly pronounced in politically-conservative participants. However, the evidence regarding such worldview effects (and their symmetry) has been inconsistent. Thus, the present study aimed to extend previous findings by examining a sample of 429 pre-screened U.S. participants supporting either the Democratic or Republican Party. Participants received misinformation suggesting that politicians of either party were more likely to commit embezzlement; this was or was not subsequently retracted, and participants' inferential reasoning was measured. While political worldview (i.e., partisanship) influenced the extent to which participants relied on the misinformation overall, retractions were equally effective across all conditions. There was no impact of political worldview on retraction effectiveness, let alone evidence of a backfire effect, and thus we did not replicate the asymmetry observed in the Australian-based study. This pattern emerged despite some evidence that Republicans showed a stronger emotional response than Democrats to worldview-incongruent misinformation.

Keywords: continued influence effect; misinformation; backfire effect; worldview; partisan attitudes; motivated reasoning

Corrections of Political Misinformation: No Evidence for an Effect of Partisan Worldview

Misinformation, defined as false information that is presented as valid, often has a continuing influence on people's reasoning even after it has been clearly and credibly corrected, and even when people remember the correction. This effect is known as the continued influence effect (CIE; Chan, Jones, Hall Jamieson, & Albarracín, 2017; Lewandowsky, Ecker, Seifert, Schwarz, & Cook, 2012; Walter & Tukachinsky, 2020).

Most studies demonstrating a CIE have used fictional event reports. For example, Johnson and Seifert (1994) presented participants with a scenario regarding a fictitious warehouse fire, purportedly caused by the negligent storage of volatile materials. Participants who were subsequently informed that the volatile materials did not cause the fire continued to rely on the discredited misinformation when responding to inferential reasoning questions about the event (e.g., why the fire was difficult to extinguish). This research has established that the CIE is driven at least in part by cognitive factors, such as failures of information integration, memory updating, and retrieval (Brydges, Gignac, & Ecker, 2018; Ecker, Lewandowsky, Swire, & Chang, 2011; Ecker, Lewandowsky, & Tang, 2010; Gordon, Brooks, Quadflieg, Ecker, & Lewandowsky, 2017; Kendeou, Walsh, Smith, & O'Brien, 2014; Rich & Zaragoza, 2016; Swire, Ecker, & Lewandowsky, 2017).

However, it seems like a truism that motivational factors also play a role, especially when it comes to misinformation that relates to real-world issues. Lewandowsky, Stritzke, Oberauer, and Morales (2005) demonstrated that participants in support of the 2003 invasion of Iraq were particularly likely to show continued belief in retracted pro-invasion news items. Nyhan and Reifler (2010) presented participants with mock news reports that contained misleading information (e.g., that Iraq had stockpiled weapons of mass destruction [WMDs], or that Bush-administration tax cuts had increased government revenue), and found that corrections of worldview-congruent misinformation tended to backfire, ironically

strengthening the misconception. Nyhan, Reifler, and Ubel (2013) reported a similar effect regarding Sarah Palin's "death panel" claims (that then-President Obama would allow bureaucrats to determine whether citizens were "worthy of health care"). Such findings are in line with the central tenet of motivated reasoning—the notion that people process new information in light of pre-existing beliefs and attitudes (e.g., Edwards & Smith, 1996; Hart, Albarracín, Eagly, Brechan, Lindberg, & Merrill, 2009; Kunda, 1990; Redlawsk, 2002; Taber & Lodge, 2006). To illustrate, Prasad and colleagues (2009) showed that when people are presented with corrections of worldview-congruent misinformation (i.e., Republicans presented with evidence that Iraq had not stockpiled WMDs), they tend to defend their beliefs by ignoring or counter-arguing the correction and bolstering their original position by bringing to mind worldview-consistent arguments.

However, the empirical evidence for worldview effects on the processing of misinformation corrections is surprisingly inconsistent, especially considering how much attention worldview backfire effects have received in both the media and the science-communication community (Nurse, 2019; Swire-Thompson, DeGutis, & Lazer, 2020): Nyhan and Reifler's (2010) original findings of worldview backfire have been difficult to replicate (Wood & Porter, 2019; also see Guess & Coppock, 2018; Haglin, 2017). Berinsky (2017) reported that corrections of "death panel" myths were effective in both Democrat and Republican participants. Similarly, Swire, Berinsky, Lewandowsky, and Ecker (2017) found that correcting misleading claims made by President Trump resulted in equivalent belief updating in Trump supporters and non-supporters—a finding that was later replicated with false claims made by both conservative and liberal politicians in U.S. and Australian contexts (Aird, Ecker, Swire, Berinsky, & Lewandowsky, 2018; Nyhan, Porter, Reifler, & Wood, 2019; Swire-Thompson, Ecker, Lewandowsky, & Berinsky, 2020). Weeks (2015) presented participants with false claims about immigration or the death penalty (most being in line with

a conservative worldview) that were allegedly associated with a political in-group or out-group source; it was found that corrections were effective irrespective of what source the misinformation came from (also see Kuklinski, Quirk, Jerit, Schwieder, & Rich, 2000; Schmid & Betsch, 2019). In a standard CIE study using fictional materials, Ecker, Lewandowsky, Fenton, and Martin (2014) found that while racial attitudes generally influenced the extent to which participants used race-related (mis)information in their inferences about a crime, attitudes had no impact on the effectiveness of misinformation corrections.

Furthermore, even assuming that worldview influences the processing of misinformation corrections at least some of the time, it is not clear whether such worldview effects are symmetrical along the political dimension. On the one hand, Kahan (2013, 2016) has argued that in general, worldview effects should occur equally on both ends of the political spectrum, as biased information processing functions to protect one's socio-cultural worldview and "tribal" identity, while endorsing opposing beliefs may lead to social exclusion (see Hornsey & Jetten, 2004). This view has been supported by studies showing that both liberals and conservatives show motivated resistance to worldview-incongruent science-related information (e.g., Nisbet, Cooper, & Garrett, 2015; Washburn & Skitka, 2018). Correspondingly, a recent meta-analysis concluded that while there is strong evidence for worldview effects, viz. biased processing of political information, there is no evidence for asymmetry along party lines (Ditto et al., 2019). While this conclusion was questioned by Baron and Jost (2019), who argued that Ditto et al.'s meta-analysis included many studies unsuitable for assessing the question of interest, others provided support for Ditto et al.'s position: Guay and Johnston (2020) designed two large-scale studies that took into account Baron and Jost's points of criticism, and yielded strong evidence for worldview effects on information processing—but no evidence for ideological asymmetry.

On the other hand, a substantial literature has established that conservative personality traits promote a specific style of information processing—including greater levels of negativity bias, perceived threat, need for certainty, cognitive rigidity, and closed-mindedness (e.g., Carraro, Castelli, & Machiella, 2011; Fibert & Ressler, 1998; Jost, 2017; Jost, Glaser, Kruglanski, & Sulloway, 2003; Jost & Krochik, 2014; Price, Ottati, Wilson, & Kim, 2015; also see Zmigrod, Eisenberg, Bissett, Robins, & Poldrack, this issue). This cognitive style arguably contributes to conservatives being more likely than liberals to see profoundness in "bullshit" (Pfattheicher & Schindler, 2016; Sterling, Jost, & Pennycook, 2016), engage with and share misleading information online (Grinberg, Joseph, Friedland, Swire-Thompson, & Lazer, 2019), and show stronger in-group favouritism regarding both political leaders and others on social media (Morisi, Jost, & Singh, 2019; Yan, Yang, Menczer, & Shanahan, 2020; also see Iyengar, Hahn, Krosnick, & Walker, 2008). In theory, this particular style of processing should also make conservatives more prone to the CIE. For instance, perceived threat may encourage defensive reasoning when faced with counter-attitudinal information, and uncertainty avoidance and closed-mindedness may increase resistance to worldview-incongruent retractions (Hart et al., 2009; Iyengar et al., 2008; Levitan & Visser, 2008; also see Vraga, 2015). Sinclair, Stanley, and Seli (2020) found that people with high scores on right-wing authoritarianism showed relatively little updating of beliefs in response to prediction errors even on topics that did not challenge their worldview (it should be noted that the overall pattern of results suggested that this effect was driven by cognitive rigidity or closed-mindedness and not political conservatism per se). The fact that all reported instances of worldview (backfire) effects on correction processing pertained to conservative samples also insinuates asymmetry. However, many of these studies focused on misinformation that challenged a conservative worldview, and were thus ill-equipped to assess the asymmetry thesis.

Ecker and Ang (2019) investigated worldview effects on the processing of political-misinformation retractions, as well as their symmetry, directly. They were the first to present participants of differing partisan attitudes with parallel materials in a fully-crossed design—presenting politically liberal and conservative participants with mock news reports containing false accusations of misconduct in either a liberal or conservative political party.[1] In line with previous work, Ecker and Ang (2019) found that political worldview influenced misinformation reliance in general (i.e., irrespective of a retraction being provided), such that liberal participants were generally more likely to refer to alleged misconduct by conservative politicians, and vice versa. However, Ecker and Ang also found an influence of worldview on the effectiveness of a retraction: Corrections were less effective if the misinformation was worldview-congruent, and this effect of worldview was particularly pronounced in conservative participants. In fact, while retractions were generally at least somewhat effective across conditions, they were entirely ineffective in conservative participants if worldview-congruent misinformation was being corrected. In other words, while there was no (significant) worldview *backfire* effect, Ecker and Ang still found evidence for a worldview effect on retraction processing that was asymmetrical along the partisan dimension. However, this study used a relatively small sample of Australian undergraduates, so in light of the conflicting findings reviewed earlier, more data are needed, preferably from a different population, before we can reach any more definitive conclusions on the prevalence and symmetry of worldview effects in the CIE paradigm.

Hence, this study aimed to replicate Ecker and Ang's (2019) study in a different, more representative population—namely U.S. residents recruited through a panel service—and with greater experimental power. Participants identifying as either Democrat or

[1] Note that Weeks (2015) systematically manipulated the source of the misinformation but not the worldview-congruence of the misinformation itself.

Republican received misinformation alleging that politicians from either of the parties have been found more likely to embezzle funds; this misinformation was or was not subsequently retracted. Participants' reliance on the misinformation was then assessed with several inferential-reasoning items. The experimental design thus fully crossed participant group (Democrats, Republicans) and worldview-congruence of the misinformation (congruent, incongruent) to investigate the symmetry of potential worldview (i.e., partisanship) effects along the political liberal-conservative dimension.

In line with previous research (and specifically Ecker & Ang, 2019), we hypothesized that (1) retractions would reduce participants' reliance on the misinformation, but not eliminate it completely (i.e., we expected a CIE to occur); (2) there would be worldview effects on participants' reliance on the misinformation (i.e., we expected participants to rely more on worldview-congruent than worldview-incongruent information); and (3) there would be a stronger worldview effect in politically-conservative participants (i.e., a three-way interaction between group, worldview congruence, and retraction condition).

Method

This study adopted a 2 × 2 × 2 between-subjects design, with factors group (Democrats, Republicans), worldview congruence (congruent, incongruent), and retraction condition (no-retraction, retraction). Participants' event-related reasoning and their memory for the event report were measured using a test questionnaire.

Participants

An a priori power analysis suggested a minimum sample size of 387 to detect an effect of $f = 0.14$ (based on Ecker & Ang, 2019) at $\alpha = 0.05$ and $1 - \beta = 0.8$. Participants were recruited online through Prime Panels,[2] and pre-screened using a 7-point partisanship Likert scale. Respondents identifying as *Republican* / *Strongly Republican* or *Democrat* / *Strongly*

[2] https://www.cloudresearch.com/products/prime-panels/

Democrat (i.e., Likert scale scores 1-2 and 6-7) were invited to participate. Prime Panels was instructed to supply a minimum of 432 complete and valid data sets (approx. n = 54 per condition). After applying a-priori rejection and exclusion criteria (see Online Supplement [OS] for details), the final sample for analysis comprised N = 429 participants (203 males, 225 females, 1 participant of undisclosed gender; mean age M = 47.59 years [SD = 15.87; range 18-94]).[3] Participants were rewarded for their participation as agreed upon with the platform through which they entered the experimental survey. Participants were randomly assigned to one of the four experimental conditions, with the constraint of approximately equal cell sizes.

Materials

Scenarios. Participants were presented with a fictitious report revolving around a research study that purportedly found that politicians of either the Democratic or Republican Party were three times as likely to embezzle funds compared to the rival party (based on Ecker & Ang, 2019); the scenario is provided in the OS. Each report comprised 10 statements, with the key information presented in statement 4, which was retracted or not retracted in statement 9, depending on condition. For example, statement 4 in the Democratic worldview-congruent conditions stated that "*The study found that Republican politicians over the last three decades were more than three times as likely to misappropriate public funds compared to Democratic politicians.*" In the retraction condition, the corresponding statement 9 stated that: "*…the lead author…clarified…that the study results had been misrepresented and that Republican politicians were not, in fact, more likely than Democrats to misappropriate public funds.*" Participants in no-retraction conditions were presented with neutral, arbitrary content in statement 9.

[3] The OS presents an analysis without post-treatment exclusions, which yielded identical results.

Test questionnaire. The test questionnaire consisted of nine inferential-reasoning items, three memory items, and two retraction-awareness items; it is provided in the OS. Three of the inferential-reasoning items were open-ended questions designed to evoke references to the key information (e.g., "*What would be a good headline for the report about the study?*"); the remaining six used 11-point rating scales (e.g., "*Further investigations should focus mainly on the Republican Party because Republican politicians are more likely to embezzle"*—rated on a scale from *"Strongly disagree, 0"* to *"Strongly agree, 10"*).[4] Multiple-choice memory items targeted arbitrary report details and were included mainly to assess if participants had adequately encoded the materials presented. Retraction-awareness items were designed to assess participants' encoding and acknowledgement of the retraction in the conditions that included one.

Party-preference scale. A five-item scale (adapted from Mehrabian, 1996; see OS) was used to validate group assignment (e.g., "*I am politically more in line with the Democratic Party than the Republican Party*"*—"Strongly disagree, 0"* to *"Strongly agree, 6"*).

Procedure

The study was administered using Qualtrics software (Qualtrics, Provo, UT). Participants were presented with an ethically-approved information sheet, before completing demographics and being presented with the scenario, with each statement presented separately for a predetermined time (set at approx. 150 ms per word). Participants were not made aware of the fictional nature of the report (nor was it explicitly labelled as real), but were simply asked to read it carefully. After a 1-minute distractor task (a word puzzle), the test questionnaire was administered, before participants completed the party-preference scale.

[4] While this approach differs from Ecker and Ang (2019), who used predominantly open-ended questions, we note that rating scales and open-ended questions have been found to yield comparable results in CIE research (Connor Desai & Reimers, 2019).

Finally, participants were asked if they had put in a reasonable effort or if their data should be discarded, and were then debriefed; this included a clarification that the report was fictitious.

Results

Coding of Responses

Responses to the party-preference scale items were averaged and transformed onto a continuous 0-1 scale, with greater scores indicating preference for the Democratic Party. Responses to the memory items were awarded a score of either 0 or 1; a mean memory score was calculated for each participant. Similarly, responses to the two retraction-awareness items were awarded a score of 0 or 1, and a mean retraction-awareness score was calculated for each participant (in the retraction conditions). Responses to the three open-ended inferential-reasoning items were coded by a trained scorer who was blind to conditions. Responses were given a score of 1 if they reflected belief in the key information, and 0 if they did not. For instance, if a participant was presented with the key information that Republican politicians were more likely to embezzle funds, any responses that referred to Republican politicians' actions and implied the belief that they had embezzled funds were awarded an inference score of 1. Controverted mentions such as "*Republican politicians were originally under suspicion, but this was later clarified*" were awarded a score of 0. Ambiguous responses such as "*Republicans may have spent money inappropriately*" were awarded a score of 0.5. Responses to the six inferential rating-scale items were transformed onto a continuous 0-1 scale (after accounting for reverse-coding). A mean inference score was then calculated for each participant from all nine inferential-reasoning items. This was the main dependent variable (analyses on memory and retraction-awareness scores showed no condition differences; see OS for details).

Party-preference Scores

Mean party-preference scores were $M = 0.09$ ($SE = 0.01$; range 0-0.47) for Republicans ($n = 223$), and $M = 0.82$ ($SE = 0.01$; range 0.53-1) for Democrats ($n = 206$). The distribution showed the expected strong bimodality, such that the grouping was deemed appropriate.

Inference Scores

Mean inference scores across conditions are depicted in Figure 1. A pre-planned 2 (group) × 2 (worldview congruence) × 2 (retraction condition) factorial ANOVA found a significant main effect of worldview congruence, $F(1,421) = 264.73$, $MSE = 0.04$, $p < .001$, $\eta_p^2 = .386$, indicating stronger reliance on worldview-congruent information, as well as a main effect of retraction condition, $F(1,421) = 68.20$, $p < .001$, $\eta_p^2 = .139$, indicating stronger reliance on non-retracted information. There was no significant main effect of group, $F(1,421) = 3.47$, $p = .063$, $\eta_p^2 = .008$, and all interaction effects were also non-significant, all Fs < 1.[5] Given the clear absence of any interaction effects in the omnibus ANOVA, pre-planned interaction contrasts were not conducted.[6]

An additional Bayesian analysis (e.g., see Wagenmakers et al., 2018) was run to quantify evidence in favour of the absence of an interaction effect. It suggested that the preferred model was one that included only worldview-congruence and retraction factors, $BF_{10} = 8.75e + 51$, closely followed by a model that additionally included the group factor, $BF_{10} = 5.30e + 51$. All models including interaction terms achieved poorer fit; in particular,

[5] The effect pattern was identical when participants with a retraction-awareness score of 0 were excluded from analysis, following precedent (e.g., Ecker & Ang, 2019), and also in exploratory analyses restricting the sample to extreme partisans (as suggested by Zmigrod, Rentfrow, & Robbins, 2019).

[6] The OS presents additional analyses on all available data sets ($N = 617$) across both the current U.S. experiment and Experiment 2 of Ecker and Ang (2019) conducted in Australia. Results were in line with results presented here.

inclusion of the three-way interaction term resulted in a less competitive model, BF_{10} = 6.77e + 48. The Bayes ratio, quantifying evidence against the full-factorial model relative to the preferred main-effects model, was thus 1,292. Hence, the data are approximately 1,292 times more likely under the preferred main-effects model than under the full-factorial model including the three-way interaction. This can be considered decisive evidence against inclusion of the three-way interaction, corroborating the ANOVA findings.

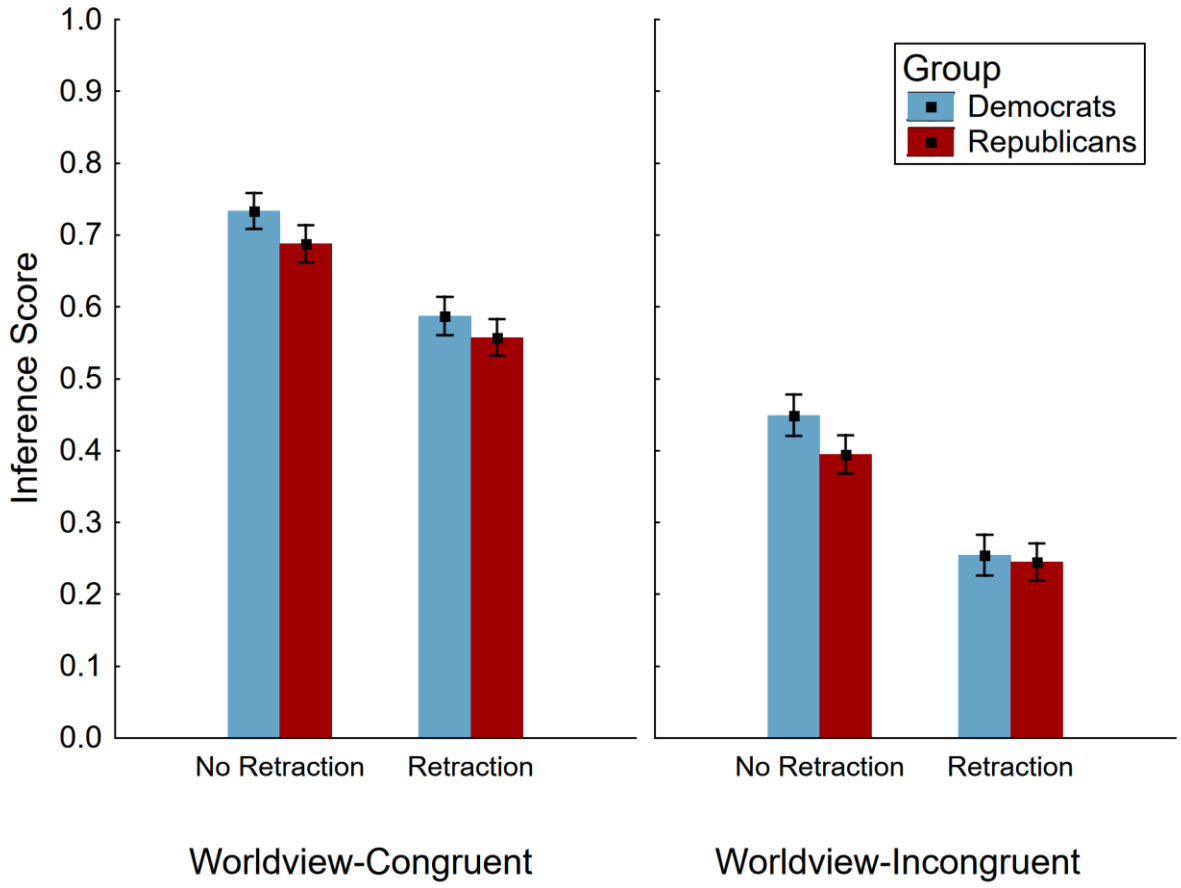

Figure 1. Mean inference scores across conditions; greater scores indicate stronger reliance on the key (mis)information; worldview congruence refers to the congruence of the misinformation and the participants' worldview. Error bars represent standard errors of the mean.

Sentiment Analysis

Prompted by examination of the open-ended text responses, an exploratory analysis investigated the emotions and sentiments expressed in responses to the three open-ended inferential questions. Specifically, logistic regressions were used to model whether a specific

emotion or sentiment was present in participants' responses, with group, worldview congruence of the misinformation, and retraction condition as predictors (see OS for details). Support for group asymmetry was identified in the use of words associated with anger, sadness, and negative sentiment.

For sadness words (most common: "tax", "guilty", "abuse", "ashamed"), main effects of group and worldview congruence were qualified by an interaction between the two predictors, indicating that Republicans were more likely than Democrats to express sadness, particularly after receiving worldview-incongruent misinformation.

For anger (e.g., "politics", "guilty", "abuse", "misrepresented"), there was a main effect of group, qualified by an interaction between group and worldview congruence: Republicans expressed more anger than Democrats, again particularly in worldview-incongruent conditions. Additionally, there was a main effect of retraction, such that the presence of a retraction increased expressions of anger.

For negative sentiment (e.g., "tax", "misuse", "government", "corrupt"), there were main effects of group, worldview congruence, and retraction. Republicans were more likely than Democrats to use words with negative sentiment, and participants were more likely to express negative sentiment in worldview-congruent conditions and retraction conditions. However, these effects were qualified by an interaction between worldview congruence and retraction, suggesting that negative sentiment tended to be greater with unretracted worldview-congruent misinformation ("the others are bad") and retracted worldview-incongruent misinformation ("the others said we are bad but they were wrong"). See OS for details.

Discussion

The present study aimed to replicate Ecker and Ang's (2019) study in a different population and with greater experimental power. Its aim was to test for worldview effects on

the processing of political-misinformation corrections, and to test whether such effects, if they occur, occur equally in conservative and liberal participants. In line with hypotheses, we found that (1) retractions reduced reliance on misinformation, and (2) participants were more likely to use worldview-congruent (mis)information in their reasoning.[7] Contrary to predictions, however, we found that (3) the effect of worldview was not stronger in politically-conservative participants. In other words, retractions were effective in reducing references to misinformation in both Democrats and Republicans, irrespective of whether the misinformation challenged participants' worldview. This pattern emerged despite some evidence from exploratory sentiment analysis that Republicans were emotionally more affected than Democrats by worldview-incongruent misinformation (i.e., misconduct allegations directed at the Republican Party).

This study therefore failed to replicate the asymmetry observed by Ecker and Ang (2019), and instead suggests that the processing of misinformation corrections is not impacted by worldview, even though reasoning in general is biased towards worldview-congruent information (in line with Ditto et al., 2019; Ecker et al., 2014; Guay & Johnston, 2020). These results add further weight to the emerging consensus that worldview biases information selection during reasoning but does not generally lead to dismissal of misinformation corrections in the CIE paradigm, let alone backfire effects. As pointed out by Swire-Thompson, DeGutis et al. (2020), worldview backfire effects have often been found only in exploratory analyses of participant subgroups, or when using notoriously unreliable single-item measures, thus opening up questions about the strength of evidence even in

[7] Note there was also a marginal main effect of group, which Bayesian analyses suggested may be a real effect. This means that Democrats may have produced greater inference scores than Republicans overall, perhaps because they generally referred to the alleged misconduct more often or supported greater scrutiny. It is unclear whether this reflects a response bias, or a difference in underlying values (e.g., greater indignation or generally greater support for regulation and scrutiny). Be that as it may, we had no hypotheses regarding a group main effect, and do not regard the effect as theoretically impactful in the context of this study.

studies reporting backfire. We note that despite our findings, it remains a possibility that worldview backfire effects occur under specific conditions (e.g., with less contrived real-world misinformation and retractions that are perceived as acutely threatening, see Nyhan & Reifler, 2010; also see Hovland, 1959) and that if those conditions are met, worldview backfire effects might still be more likely to arise in conservative people.

It is not entirely clear, however, why the present study yielded different results from Ecker and Ang (2019), which used almost identical materials and measures. One could even argue that, given the stronger political polarization in the U.S. compared to Australia (Iyengar, Sood, Lelkes, 2012; Ratcliff & Jackman, 2018), the failure to replicate the asymmetry observed in Ecker and Ang is particularly surprising. One reason for the discrepancy may arise if greater polarization, rather than leading to asymmetrical retraction effects on belief expressions, leads to differential effects of social desirability: Conservatives in the U.S. may be especially suspicious of liberal bias in academic researchers (e.g., Gross, 2013), potentially resulting in adjusted belief expressions that deviate from true beliefs. However, it is not clear that a majority of conservative participants in the present study would have behaved that way, and that as a group they would have adjusted belief expressions by just the right amount to produce a symmetrical outcome.

Another reason for the discrepant findings may arise from sampling. Ecker and Ang (2019) used an undergraduate sample; even though this sample was also pre-screened, undergraduate samples are generally strongly skewed towards the left, and as such, participants identifying as politically-conservative are relatively rare. It may thus be that in this population, a liberal worldview is a default that is, however, characterized by great variability in political identity centrality—the extent to which one's political worldview is central to one's overall identity (e.g., see Huddy & Bankert, 2017). It follows that liberal and conservative participant samples in Ecker and Ang may have differed in this regard, meaning

that political worldview may have been more important, on average, to the conservative participants, which in turn could explain the more strongly biased reasoning in those participants (Brannon, Tagler, & Eagly, 2007; Guay & Johnston, 2020; Hart et al., 2009; Leeper & Slothuus, 2014). Future research should therefore investigate the possibility that worldview effects on the processing of misinformation corrections are mediated by political identity centrality.

Of course, we also cannot rule out that the relatively low power achieved in Ecker and Ang (2019) resulted in a false-positive finding (e.g., see Krzywinski & Altman, 2013). In fact, while power in the present experiment was greater, critics could argue that it was still insufficient, which may have led to inflated effect sizesand thus future studies should use even larger samples. The assertion that one should never draw strong conclusions from any one experiment (also see Murayama, Pekrun, & Fiedler, 2014) also applies here, and thus the present study can only take us one small step closer to answering the research question. With this in mind, our interpretations should be treated with care.

With regards to more general tendencies to reject evidence and resist belief change, the present results mesh well with recent findings that these tendencies are not as clearly linked to conservative ideology as previously thought. For example, recent work using behavioural rather than self-report measures has found that cognitive flexibility is reduced in strong partisans on both sides of the political spectrum (Zmigrod et al., 2019). In this study, while social conservatism also predicted lower cognitive fleibility, this factor was much less influential than partisan extremity (also see Crawford, Kay, & Duke, 2015). Ryan and Aziz (2020) reported an experiment in which Democrats and Republicans were equally likely to endorse misleading rumours about political opponents. Druckman and McGrath (2019) examined the development of climate-change belief polarization along partisan lines; they argued that support for a motivated-reasoning account of conservative climate-science

rejection was not as strong as often stated. Instead, they claimed that most citizens are motivated to form accurate beliefs about climate change, but simply differ in how credible they perceive the evidence to be.

In line with this, Jern, Chang, and Kemp (2014) demonstrated that belief polarization can indeed occur as a consequence of rational belief updating under certain conditions, namely when existing beliefs lead to differences in the interpretation of evidence (e.g., based on differences in the perceived trustworthiness of the evidence source; see Cook & Lewandowsky, 2016). While this is a nuanced point, it may be a powerful one: Strong worldview effects (and in particular worldview backfire effects and belief polarization) may occur only if the evidence presented (e.g., a correction) provides compelling reasons for a particular group of people to dismiss it outright. While some findings are potentially incompatible with this view (e.g., the correction of the WMD myth in Prasad et al. [2009] involved a statement from former President Bush himself, arguably a trustworthy information source for the conservative participants of that study), one must keep in mind that people will differ in the extent to which they perceive a correction source (e.g., the media, scientists, or researchers conducting psychological experiments) as trustworthy and well-intentioned (thus, participants in Prasad et al. may have counter-argued the correction because it was provided by the researchers, despite it featuring a Bush statement).

In sum, our results are in line with the notion that potentially-irrational rejection of evidence is equally likely on both ends of the political-worldview spectrum, and that part of the reason that evidence rejection has been predominantly demonstrated in conservatives is that researchers have predominantly looked at rejection of evidence that is consistent with conservative worldviews. However, this presents future research with a conundrum, because a number of studies have now aimed but failed to find rejection of scientific evidence on the left (e.g., Baumgaertner, Carlisle, & Justwan, 2018; Hamilton, Hartter, & Saito, 2015;

Lewandowsky, Woike, & Oberauer, 2020). For example, Lewandowsky et al. (2020) reported that vaccine-hesitancy and endorsement of alternative medicine—both anecdotally associated with a liberal worldview—were in fact more prevalent in right-wing libertarians and conservatives. Based on additional evidence from a task that required reasoning about scientific evidence "dilemmas" that featured both worldview-consistent and inconsistent aspects, Lewandowsky et al. concluded that partisans on both ends of the spectrum show biased processing of evidence, but that science denial was nevertheless a mainstay of the political right. Future research therefore needs to shed light on the catalysts that turn omnipresent information-processing biases into actual evidence rejection and science denial. For example, some have linked the promotion of misinformation to a deep-seated psychological need for chaos that is more prevalent on the political right (see Arceneaux, Gravelle, Osmundsen, Petersen, Reifler, & Scotto, this issue).

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