

(A)symmetries in Memory and Directed Forgetting of Political Stimuli

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Abstract: As political information becomes increasingly prevalent in all forms of media, it is becoming increasingly important to understand when and why biases in remembering such information occur. Using an item-method directed forgetting procedure, we conducted two online experiments to determine the efficacy of admonitions to forget politically charged stimuli that were either congruent or incongruent with participants' political beliefs. Participants viewed slideshows wherein each item combined the face of a famous politician (Donald Trump or Joe Biden) with a word that was positive, negative, or neutral in emotional valence. Each slide was followed by an instruction to remember or forget. After a brief filler task, a recognition test assessed their memory for both remember and forget slides and (in Experiment 2) assessed their beliefs about the truth of each word/face pairing and beliefs about the accuracy of their memory. The results showed that for both liberal and conservative participants, politically congruent stimuli were more conducive to recognition memory and more resistant to directed forgetting than politically incongruent or neutral stimuli. There were small asymmetries wherein conservatives showed greater biases in memory and other cognitive measures. We discuss possible explanations of the results and their implications.

Keywords: political information, congruent and incongruent, directed forgetting, politically liberal and conservative



Through online news and social media, people are inundated with information, misinformation, and disinformation on a daily basis. Content warnings and labels such as *fake news* are used in attempts to dissuade people from believing the latter two types of information (e.g., Ball & Maxmen, 2020). Such measures may have limited effects on stopping memory of, belief in, or the spread of misinformation and disinformation, however, due to misinformation (this term will largely be used in reference to both misinformation and disinformation, henceforth) spreading more quickly and persistently than valid information, corrections, and fact-checks (e.g., Burel et al., 2020). Indeed, much recent research has demonstrated the ease with which misinformation on various politically charged topics spreads via social media (e.g., Himelein-Wachowiak et al., 2021; Suarez-Lledo & Alvarez-Galvez, 2021; Valenzuela et al., 2019; Wang et al., 2019), which is likely related to confirmation biases to seek out, process, and remember information that is congruent with an individual's pre-existing beliefs.

The effects of such phenomena can be disastrous when they lead people to believe lies and spread misinformation relevant to consequential issues such as public health, climate science, and the integrity of democratic elections. Accordingly, the current research was designed to determine the relative efficacy of admonitions to forget politically charged information that is either congruent or incongruent with a participant's existing beliefs. The current research used an item-method directed forgetting paradigm to maximize exposure to numerous items in a smaller period of time (just as we see dozens of pieces of political information daily) so that the stimuli used are easily discernible as congruent or incongruent to political partisans on both sides of the aisle.

Item-Method Directed Forgetting and Valence of Stimuli

In the item-method paradigm of directed forgetting, a series of items (typically pictures or words) is presented one at a time to participants. After each item, participants are subsequently presented with instructions to Remember (R) or Forget (F) the previous item (having been

told previously that their memory will be tested only for R items). Sometime after the presentation of all items – and often after a short distractor task – participants complete a memory test for all items (both R and F) wherein they either engage in free recall of items or are asked if they recognize each of a group of items as having appeared in the previous list. Directed forgetting (DF) is demonstrated when performance is greater for R than F items (see Hypothesis 1), and the effect is most robust when participants are asked to forget items that are innocuous or of *neutral* emotional valence such as common nouns (e.g., Bjork, 1970; MacLeod, 1989), objects (e.g., Quinlan et al., 2010), or imagery (e.g., Hauswald & Kissler, 2008).

A great deal of experimental evidence suggests that DF is weakened or eliminated, however, for items that have positive or negative emotional valence in comparison to emotionally neutral items (e.g., Bailey & Chapman, 2012; Hauswald et al., 2011; Nowicka et al., 2011; Otani et al., 2012; Taylor et al., 2018; Yang et al., 2016) and although there is some published research that has failed to find a difference in DF between emotional and nonemotional stimuli (e.g., Gallant & Yang, 2014), meta-analyses have favored the conclusion that emotional stimuli are more difficult to intentionally forget than neutral ones (e.g., Hall et al., 2021; see Hypothesis 2). These findings are consistent with the notion that emotion-evoking stimuli capture both attentional (Hindi Attar & Müller, 2012) and perceptual (Kissler & Herbert, 2013) processes more easily. Additionally, some DF research has suggested that items evoking negative emotions are more difficult to intentionally forget than those evoking positive emotions (Gallant & Dyson, 2016; Otani et al., 2012; see Hypothesis 3).

Confirmation Bias and Motivated Political Cognition

Confirmation bias is a term that encompasses a range of cognitive phenomena revolving around the motivation to preserve one's existing beliefs (e.g., Vedejová & Čavojová, 2022). Such phenomena motivate participants to engage in selective exposure to political information (e.g., Knobloch-Westerwick & Kleinman, 2012; Westerwick et al., 2017), biased interpretation of political evidence (e.g., Kahan et al., 2017; Strömbäck et al., 2021), and biased recall of political information (e.g., Frost et al., 2015). The findings regarding biased recall are particularly relevant to the current research as they suggest that political information – particularly when it supports a person's pre-existing beliefs (see Hypothesis 4) – may be resistant to directed forgetting.

A great deal of empirical evidence demonstrates that both conservatives and liberals are vulnerable to the effects of confirmation bias and motivated cognition (e.g., Ditto et al., 2018). For instance, conservatives and liberals have shown similar levels of bias against each other (Brandt, 2017; Wetherell et al., 2013) and are equally motivated to avoid exposure to each other's opinions (Frimer et al., 2017). Individuals across the political spectrum also demonstrate more skepticism for research findings that are politically incongruent (Lord et al., 1979) and fall victim to the *party over policy* effect (Cohen, 2003). Additionally, participants with more liberal and more conservative religious values have reported symmetrical levels of bias against each other (Cook & Franks, 2022). However, there is also ample evidence to suggest that, at least in some circumstances, conservatives engage in more biased cognition than liberals. For example, US Republicans have been found to perceive less legitimacy in Democratic administrations than vice versa (Morisi et al., 2018) and are more likely to oppose democratic (small "d") values when it suits their interests (Franks & Hesami, 2021). Conservatives also show a higher degree of partisanship in their preferred media sources and are more likely to spread political misinformation (Faris et al., 2017). Finally, liberals have been shown to hold greater preferences to engage in deliberative, analytical thinking (e.g., Franks & Scherr, 2017; Jost & Krochik, 2014) and score higher on tests of cognitive ability (e.g., Heaven et al., 2011) as well as cognitive flexibility (e.g., Zmigrod et al., 2018), which may be important in the current research as analytical and cognitive abilities have been shown to buffer against the tendency to engage in motivated cognition (Strömbäck et al., 2021; see Hypothesis 5).

Overview and Hypotheses

The present research was designed to examine processes related to memory biases after exposure to political stimuli. It is very common in today's (mis)information-rich world to come across both true and false claims that are both congruent and incongruent with one's own political beliefs (Mitchell et al., 2014). Using an item-method DF paradigm wherein two types of simple stimuli (faces of very well-known politicians and words) were combined to create items that would either be congruent with (e.g., Donald Trump plus the word "liar" for liberal participants) or incongruent with (e.g., Donald Trump plus the word "hero" for liberal participants) a participant's existing political beliefs. In the item-method DF paradigm, participants are instructed to either remember or forget each item after it is presented. Across two experimental studies,

participants identified themselves as liberal or conservative, watched an item-method DF slideshow with target items as described above and instructions to remember or forget each item, and then completed an associative recognition memory test (e.g., Yonelinas, 1997), which tested memory for both remember and forget item pairings. In addition, Experiment 2 took measures related to participants' beliefs about the accuracy of each politician/word pairing (e.g., they would indicate how much they actually thought the word "liar" was an accurate description of Donald Trump or Joe Biden) and their confidence in the accuracy of their answers. Based on the research described above, Experiment 1 tests the following hypotheses:

Hypothesis 1 (H1): Directed forgetting: Participants will be more accurate in recognition memory of word/face pairs that are followed by instructions to remember than those followed by instructions to forget.

Hypothesis 2 (H2): Emotional stimuli will be (a) remembered more overall and (b) more resistant to DF: Participants will be more accurate in recognition memory of word/face pairs that evoke emotions (i.e., by pairing a positive or negative valenced word with a president's face) than word/face pairs that do not evoke emotions (i.e., by pairing a neutrally valenced word with a president's face).

Hypothesis 3 (H3): Stimuli-evoking negative emotions will be (a) the most memorable overall and (b) especially resistant to DF: The DF effect will be reduced for word/face pairings that evoke a negative emotional response (i.e., pairing a [dis]favored politician's face and a [positive] negative descriptive word) in comparison to other word/face pairings.

Hypothesis 4 (H4): Confirmation bias will (a) affect memory and (b) reduce DF: The DF effect will be reduced for word/face pairs that conform to a participant's pre-existing beliefs (i.e., pairing a [dis]favored politician's face and a [negative] positive descriptive word) in comparison to other word/image pairings. This is functionally the opposite of Hypothesis 3.

Hypothesis 5 (H5): Political asymmetry in (a) memory and (b) DF via confirmation bias: If Hypothesis 4 is supported, the effects will be stronger among (or exclusive among) conservatives than among liberals.

Hypotheses related only to Experiment 2 will be outlined in a brief overview after the Experiment 1 discussion.

Experiment 1

Method

Participants

Participants ($N = 120$; $M_{\text{age}} = 37.47$, $SD = 10.67$) were recruited from Amazon's Mechanical Turk online workforce and paid a base rate of US \$1.00 for completing the experiment. They were also offered an additional \$0.02 per correct response on the memory test. Location filters were set to "United States." On political identity items, participants rated themselves as slightly liberal ($M = 3.47$, $SD = 1.87$) on a scale ranging from 1 (=very liberal) to 7 (=very conservative), and 65% of participants indicated that they were more closely identified with the Democratic Party than the Republican Party when forced to choose between the two. The sample consisted of 54% male and 46% female, mostly non-Hispanic White 78%, and had a median education of a bachelor's degree. Data collection for Experiment 1 occurred in November–December 2021.

Procedure and Materials

After completing an informed consent document, participants read instructions for the directed forgetting task (bold included in original survey):

In this experiment, you will view a presentation consisting of a series of images. Each image will contain a picture of either Donald Trump or Joe Biden along with a word across the front of their face. Half of the images will be followed by "RRRR" which stands for remember, and the other half of the images will be followed by "FFFF" which stands for forget. Later, you will be tested on your ability to remember which president appeared with each word for the images followed by "RRRR." You will **not** be tested on your ability to remember word/face pairings in images followed by "FFFF," **so you should forget those items.**

Again, your task will be to **remember the word/face pairings for images followed by "RRRR" instructions only.** You will be able to earn additional compensation for performance on the memory test.

Additionally, each image will be presented for 3 seconds and each "RRRR"/"FFFF" slide will be presented for 1 second. It is important that you pay attention during the presentation.

The submit button will be available shortly after the presentation ends. Please continue to the next page once the submit button appears. Again, it is important that you pay attention during the presentation.

Prior to starting the slideshow, participants answered a set of instruction comprehension questions (see Appendix A) and had to answer them all correctly before they were allowed to proceed. The slideshow contained 36 stimuli divided evenly among combinations of presidents (Trump and Biden) and word valence (positive, negative, and neutral). Photos of Trump and Biden were matched for facial expression, angle, background (American flag), and size of their head in the frame. For the purpose of counterbalancing, eight versions of the slideshow were created using two separate word lists (see Appendix B) and with specific words paired with different candidates across various lists. Word lists were generated by sampling words from the bottom 2.5%, 50th percentile, and upper 2.5% of word valence ratings from a standardized existing data set (Affective Norms for English Words or ANEW, Bradley & Lang, 1999). Examples of negative words included “terrible,” “liar,” and “corrupt”; positive words included “genius,” “successful,” and “compassionate”; neutral words included “iceberg,” “font,” and “background.” Order of words was also varied across versions of the slideshow. Other aspects of the slideshow were consistent with the instructions the participants read above. After watching the slideshow, participants completed a 1-min filler task wherein they were instructed to select all numbers (from a list of 60 two-digit numbers) that were divisible by 3 to eliminate a recency effect in memory. The page autoadvanced after 1 min.

Next, participants were presented with revised instructions for the memory test, which read:

On the next page, we will administer a recognition test. **Initially, you were told to only remember images, including a word and a person, which were followed by “RRRR,” but in this recognition test we would like you to remember ALL words and the persons which were presented in EVERY image.**

In the recognition test, we will provide you with a list of all the words that were included during the presentation. For each word, please indicate whether you think the word was accompanied by a picture of Donald Trump or Joe Biden. If you are unsure which president was with a word, please give your best guess.

Remember, you will receive bonus pay for correctly identifying the person associated with each word (\$0.02 each).

A second round of instruction comprehension questions followed (see Appendix C), and once again participants needed to answer all questions correctly

before advancing. Participants then completed a recognition memory test in which they were presented with all 36 words from the slideshow on a single page – again including words from both “RRRR” and “FFFF” items – from the slideshow and asked to indicate which president’s face appeared with each word. Note that because the only distractors were the wrong face pairings in a forced choice item and no distractor words (i.e., words that were not actually included in the slide show) were included in the recognition test, participants were not given the option to indicate explicitly that they did not recognize a word as would be common in other DF research. The recognition test was one of associative memory (e.g., Yonelinas, 1997), wherein participants study paired items (e.g., word pairs), and during the test, their task is to identify intact pairs. Next, participants completed the demographic measures reported under “Participants” above. Finally, participants reached a debriefing screen, which included a completion code for participants to enter on Mechanical Turk.

Results

A mixed-design analysis of variance (ANOVA) was conducted with correct recognition of word/face pairings (that is to say, whether participants indicated the correct face for each word) as the outcome. Participant political affiliation (Democrat vs. Republican), target president (Trump vs. Biden), stimuli valence (negative vs. positive vs. neutral – adjusted to be congruent with participant politics [e.g., Trump/positive pairings would be considered “negative” for Democrats and “positive” for Republicans]), and instructions (remember vs. forget) were entered as independent variables ($2 \times 2 \times 3 \times 2$). All independent variables other than participant political orientation were within-subjects. Due to the potential size of interactions and very large number of potential pairwise comparisons, we report only portions of the analysis that pertain to testing our a priori hypothesis. Data are available at <https://osf.io/9e47c/>.

Testing Hypothesis 1 (Directed Forgetting)

The main effect of instructions was significant, $F(1, 119) = 34.23$, $\eta_p^2 = .223$, $p < .001$, indicating that participants correctly recognized an average 10.88 (of 18; $SD = 2.36$) word/face pairings under “RRRR” instructions and 9.50 (of 18; $SD = 2.11$) word/face pairings under “FFFF” conditions, 95% CI (0.92, 1.82). Hypothesis 1 was supported.

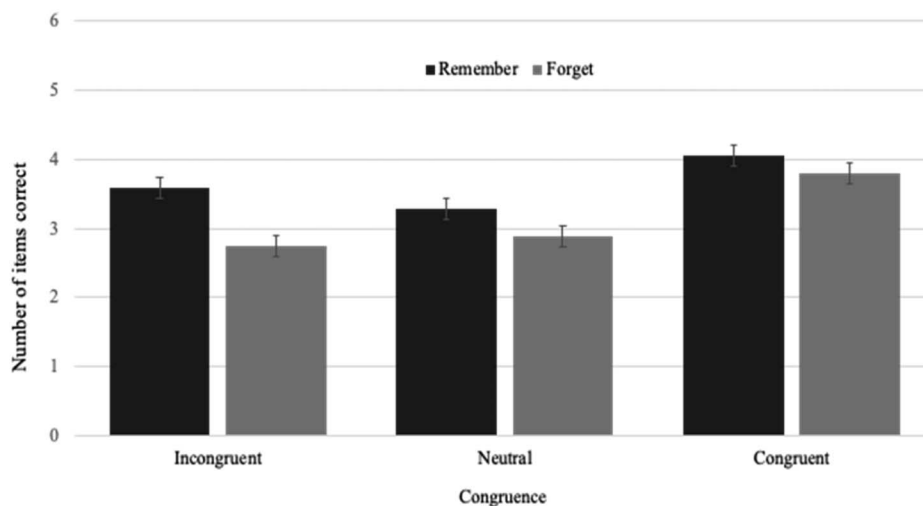


Figure 1. Simple effects of DF on recognition memory performance for incongruent, neutral, and congruent stimuli (Study 1). Error bars represent 95% confidence intervals.

Testing Hypotheses 2, 3, and 4 (Valence-Based Differences in Recognition and DF)

Note that the terms *positive* and *negative* in this section do not refer to the valence of the words themselves but are in relation to whether the word/face pairing is (in)congruent to a participant's political orientation. In addition, we should note that patterns of results are consistent with categorization of positive/negative and congruent/incongruent pairings throughout. The main effect of valence was significant, $F(2, 238) = 36.72$, $\eta_p^2 = .236$, $p < .001$, indicating differences among the three types of stimuli. On average, participants correctly recognized 7.88 (of 12; $SD = 1.90$) word/face pairings that would presumably evoke positive emotions (e.g., Trump/negative word pairings for liberals), which was significantly greater than the 6.33 ($SD = 1.86$) negative word/face pairings and 6.17 ($SD = 1.80$) neutral word/face pairings correctly recognized. The respective 95% confidence intervals were positive versus negative [1.04, 2.06] and positive versus neutral [1.33, 2.10]. The difference between negative and neutral word/face pairings was not significant. Hypothesis 2a was partially supported as positive word/face pairings were more memorable, which fully supports Hypothesis 4a (enhanced memory for politically congruent stimuli, which would be likely to evoke positive emotions) and fails to support Hypothesis 3a (enhanced memory for stimuli, which would be likely to evoke negative emotions).

The valence \times instructions interaction was also significant, $F(2, 238) = 8.11$, $\eta_p^2 = .064$, $p < .001$. Probing the simple effect of instructions at each valence showed significant directed forgetting for the neutral and negative stimuli. Participants correctly recognized an average of 3.59 negative (politically incongruent) word/face pairings

(of six; $SE = .110$) under instructions to remember versus only 2.74 ($SE = .105$) under instructions to forget, $p < .001$, 95% CI [0.59, 1.11]. Participants correctly recognized an average of 3.28 neutral word/face pairings ($SE = .110$) under instructions to remember versus only 2.88 neutral word/face pairings ($SE = .101$) under instructions to forget, $p = .005$, 95% CI [0.12, 0.68] (see Figure 1). The effect of instructions was nonsignificant for positive (politically congruent) word/face pairings, indicating a smaller or nonexistent DF effect for such stimuli, $p = .262$, 95% CI [-0.10, 0.38]. This pattern of results partially supports Hypothesis 2b (reduced DF effect for emotional stimuli), while fully supporting Hypothesis 4b (reduced DF effect for politically congruent stimuli, which would be likely to evoke positive emotions) and failing to support Hypothesis 3b (reduced DF effect for politically incongruent stimuli, which would be likely to evoke negative emotions).

Testing Hypothesis 5 (Political Asymmetries in Memory and DF)

There was a significant main effect of participant political orientation for overall memory of politically congruent (i.e., positive) word/face pairings such that Republicans correctly recognized an average of 8.1 (of 12; $SD = 1.21$) politically congruent word/face pairings, regardless of instructions, while liberals only correctly recognized 7.5 ($SD = 1.27$), $F(1, 118) = 5.05$, $\eta_p^2 = .045$, $p = .027$. This supports Hypothesis 5a that political conservatives would be more affected by confirmation bias in memory. However, the participant political orientation \times instructions interaction was nonsignificant for politically congruent word/face pairings, $F(1, 118) = 0.146$, $\eta_p^2 = .001$, $p = .703$, failing to support Hypothesis 5b (political asymmetry in DF

effect). Both liberals and conservatives showed a resistance to the effects of DF for politically congruent stimuli.

Discussion

Experiment 1 supported the notion that the DF effect generalizes to neutral stimuli and politically incongruent stimuli. Participants identifying as both Democrats and Republicans showed reduced recognition memory for neutral word/face pairings and word/face pairings incongruent with their political beliefs (e.g., pairing a favored politician's face with a negative word). This would seem to provide evidence against the notion that stimuli arousing negative emotions – as such provocative political stimuli would be expected to do – are especially memorable or especially resistant to the effects of DF (e.g., Otani et al., 2012) or at least suggest a boundary condition that such an effect does not include stimuli related to political beliefs or affected by confirmation biases. Furthermore, the results of Experiment 1 support the hypothesis that politically congruent stimuli are both more memorable and more resistant to DF than other types of stimuli. This was true for participants identifying both as Democrats (liberals) and Republicans (conservatives), but there was a slight asymmetry such that conservatives had better overall memory for politically congruent word/face pairings, which suggests perhaps slightly more confirmation bias in memory for conservatives. However, the fast-paced presentation of stimuli and their similarity (the words varied, but only two different photos were used) may have resulted in some degree of politically motivated guessing. That is to say that under conditions of uncertainty, participants may default to guessing that they had previously seen word/face pairings that are consistent with their politics. Experiment 2 was designed to examine that possibility.

Experiment 2

Overview

Experiment 1 seemingly supported the notion that processes related to confirmation bias motivate enhanced memory of politically congruent stimuli and reduce the effect of DF on such stimuli. Experiment 1 also indicated a slight asymmetry in terms of enhanced memory for politically congruent stimuli among US conservatives (Republicans) over US liberals (Democrats), although both groups showed resistance to DF effects for congruent stimuli. Two immediate questions regarding such results include the degree to which

participants are truly remembering rather than guessing correctly for congruent stimuli and also the degree to which stimuli we label as *congruent* truly are. Accordingly, Experiment 2 used the same item-method DF paradigm with a recognition memory test but added questions measuring participants' confidence in their answers and their perceptions that each (positive/negative) word actually describes the president that they remember appearing along with it. Neutral words were excluded from this experiment both because the neutral words from Experiment 1 do not work as descriptors of people and because of the length added to the recognition test by the additional questions on confidence and belief.

Experiment 2 was designed to once again test Hypotheses 1, 4, and 5 in regard to both overall memory and the DF effect, all of which were, at least partially, supported in Experiment 1. That is to say, it is hypothesized that DF will occur overall (H1), that memory will be enhanced and the effect of DF reduced for politically congruent stimuli (H4), and that such effects regarding politically congruent stimuli will be stronger among political conservatives (H5). In addition, the following new hypotheses will be tested.

Hypothesis 6 (H6): Confirming “Political Congruence”: Participants self-identifying as Democrats will report stronger belief that negative words describe Trump (rather than Biden) and that positive words describe Biden (rather than Trump), while participants self-identifying as Republicans will show opposite patterns.

Hypothesis 7 (H7): Confirmation Bias in Memory Confidence: Participants will report greater confidence in pairings that they remember as politically congruent than those that they remember as politically incongruent.

Hypothesis 8 (H8): Political Asymmetries in Beliefs and Confidence: As an extension of Hypothesis 5, the effects related to Hypotheses 6 and 7 will be stronger among Republicans than among Democrats.

Method

Participants

Participants ($N = 240$; $M_{\text{age}} = 37.19$, $SD = 10.33$) were recruited from Amazon's Mechanical Turk online workforce and paid a base rate of US \$1.00 for completing the experiment (and were offered an additional \$0.02 per correct response on the memory test). Location filters were set to “United States.” On political identity items, participants rated themselves very close to the midpoint

($M = 3.90$, $SD = 1.71$) on a scale ranging from 1 (=very liberal) to 7 (=very conservative), and 60% of participants indicated that they more closely identified with the Democratic Party than the Republican Party when forced to choose between the two. The sample consisted of 55% male and 44% female, mostly non-Hispanic White 73%, and had a median education of a bachelor's degree. Data collection for Experiment 2 was conducted in May–June 2022.

Procedure and Materials

The procedure and materials for Experiment 2 were identical to those for Experiment 1, except for the following: (1) Stimuli containing neutral words were removed, (2) additional Likert-type items were added to the memory test to measure the degree to which participants (a) perceived each word to accurately describe the president with whom they believed the word appeared (on a scale ranging from 1 [*strongly disagree*] to 5 [*strongly agree*]) and (b) were confident in their memory regarding the word/face pairing (on a scale ranging from 1 [*not at all confident*] to 5 [*very confident*]).

Results

A mixed-design ANOVA was conducted with correct recognition of word/face pairings (that is to say, whether participants indicated the correct face for each word) as the outcome. Participant political affiliation (Democrat vs. Republican), target president (Trump vs. Biden), congruence (congruent vs. incongruent; e.g., whether faces were paired with negative or positive words – adjusted for participant politics [e.g., Trump/positive pairings would be considered “incongruent” for Democrats and “congruent” for Republicans]), and instructions (remember vs. forget) were entered as independent variables ($2 \times 2 \times 2 \times 2$). All independent variables other than participant political orientation were within-subjects. Due to the potential size of interactions and very large number of potential pairwise comparisons, we report only portions of the analysis that pertain to testing our a priori hypothesis.

Testing Hypothesis 1 (Directed Forgetting)

The main effect of instructions was significant, indicating that participants correctly recognized 7.67 word/face pairings (of 12) that were followed by remember instructions ($SD = 1.65$) compared to 6.70 word/face pairings

($SD = 1.44$) that were followed by forget instructions, $F(1, 239) = 54.08$, $\eta_p^2 = .185$, $p < .001$. The results once again support Hypothesis 1 regarding the DF effect.

Testing Hypotheses 4 and 5 (Enhanced Memory and Reduced DF for Congruent Stimuli)

The main effect of congruence on memory was significant such that congruent word/face pairings ($M = 7.69$ [of 12], $SD = 1.74$) were correctly recognized more than incongruent word/face pairings ($M = 6.67$ [of 12], $SD = 1.58$), $F(1, 239) = 45.18$, $\eta_p^2 = .159$, $p < .001$, which supports Hypothesis 4a. The congruence \times instructions interaction was also significant, $F(1, 239) = 6.34$, $\eta_p^2 = .026$, $p = .012$. The simple effect of instructions was significant for both levels of congruence, but the effect appears to be larger in the incongruent condition (remember: $M = 3.39$ [of 6]; $SD = 0.78$ vs. forget: $M = 3.01$, $SD = 0.68$) than in the congruent condition (remember: $M = 3.93$ [of 6]; $SD = 0.76$ vs. forget: $M = 3.71$, $SD = 0.67$), 95% CIs incongruent [0.24, 0.56] versus congruent [0.08, 0.38], indicating support for Hypothesis 4b (reduced DF effect for politically congruent stimuli; see Figure 2). The congruence \times instructions \times participant political affiliation interaction was nonsignificant, however, $F(1, 239) = 0.16$, $\eta_p^2 < .001$, $p = .903$, which fails to support Hypothesis 5 (political asymmetry in memory and DF effect).

Testing Hypothesis 6 (Increased Belief in Congruent Pairings)

A 2 (Participant Political Affiliation: Democrat vs. Republican) $\times 2$ (Congruence: Congruent vs. Incongruent) mixed-design ANOVA was conducted with average level of agreement that words described Trump/Biden as the dependent variable. The first variable was between-subjects, and the second variable was within-subjects. The main effect of congruence was significant such that participants were more likely to agree that politically congruent pairings ($M = 2.71$, $SD = 0.66$) were true in comparison to incongruent pairings ($M = 2.17$, $SD = 0.63$), $F(1, 238) = 90.91$, $\eta_p^2 = .276$, $p < .001$. This main effect supports Hypothesis 6 regarding stronger belief in the truth of congruent stimuli than incongruent stimuli. The main effect of political orientation was also significant, suggesting that Republicans ($M = 2.60$, $SD = 0.67$) were overall more credulous regarding the accuracy of word/face pairings than were Democrats ($M = 2.34$, $SD = 0.61$), $F(1, 238) = 20.43$, $\eta_p^2 = .079$, $p < .001$. The

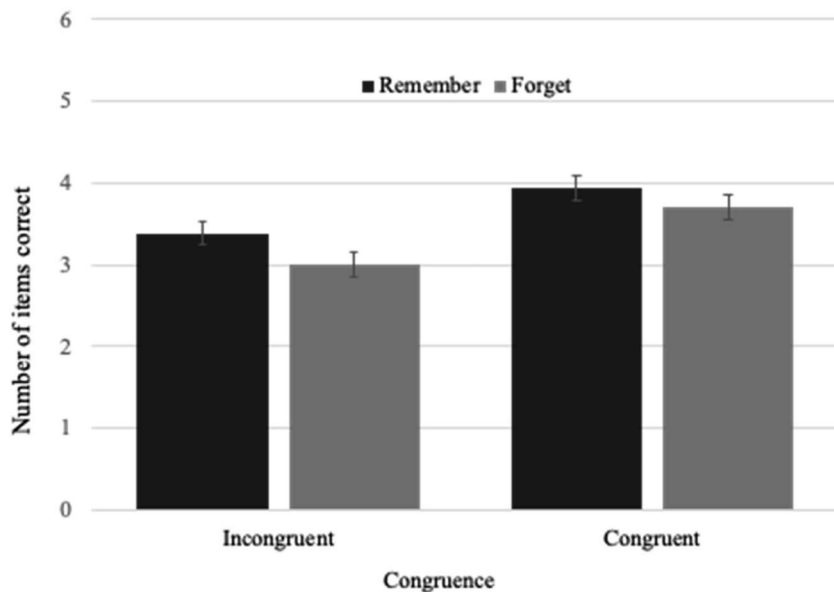


Figure 2. Simple effects of DF on recognition memory performance for incongruent and congruent stimuli (Study 2). Error bars represent 95% confidence intervals.

congruence \times political affiliation interaction was also significant, $F(1, 238) = 4.35$, $\eta_p^2 = .018$, $p = .038$. Probing this interaction, the simple main effect of political affiliation was significant for congruent stimuli, indicating that Republicans ($M = 2.95$, $SD = 0.64$) were more likely to agree with congruent word/face pairings than were Democrats ($M = 2.56$, $SD = 0.53$). Participant political affiliation was not significantly related to agreement with incongruent word/face pairings. This interaction effect lends partial support to Hypothesis 8 regarding political asymmetries.

Testing Hypothesis 7 (Confirmation Bias in Memory Confidence)

A 2 (Participant Political Affiliation: Democrat vs. Republican) \times 2 (Congruence: congruent vs. incongruent) mixed-design ANOVA was conducted with average level of confidence in memory of word/face pairings (regardless of whether their answers were correct) as the dependent variable. The first variable was between-subjects, and the second variable was within-subjects. The main effect of congruence was significant such that participants were more confident when their

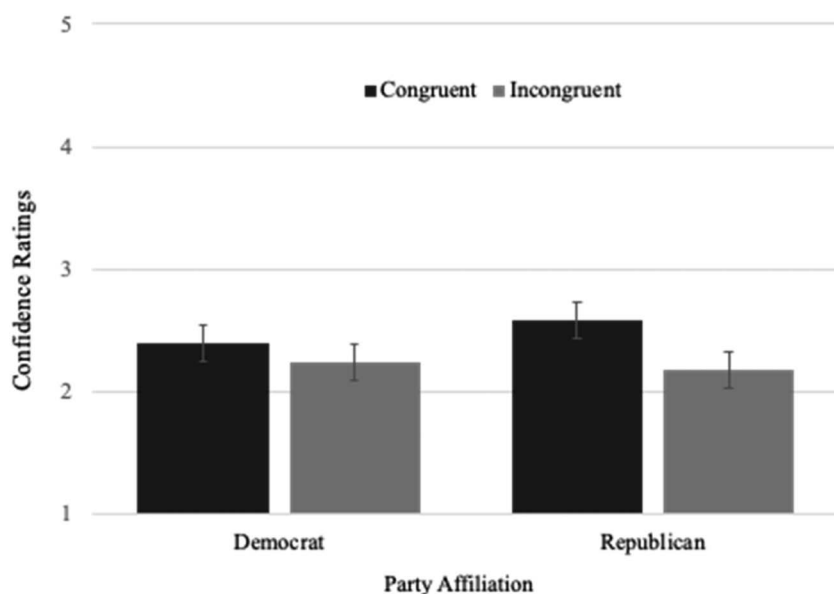


Figure 3. Confidence in congruent versus incongruent pairings by political orientation (Study 2). Error bars represent 95% confidence intervals.

answers reflected politically congruent pairings ($M = 2.47$, $SD = 0.89$) than when their answers reflected incongruent pairings ($M = 2.21$, $SD = 0.88$), $F(1, 238) = 30.88$, $\eta_p^2 = .115$, $p < .001$. This main effect supports Hypothesis 7 regarding increased confidence in memory for politically congruent stimuli. The main effect of political affiliation was nonsignificant, $F(1, 238) = 0.317$, $\eta_p^2 = .001$, $p = .574$.

The congruence \times political affiliation interaction was significant, $F(1, 238) = 7.14$, $\eta_p^2 = .029$, $p = .008$. Probing the interaction showed no differences in simple main effects. Simple main effects of political affiliation were nonsignificant across levels of congruence, and simple main effects of congruence were significant for both Democrats and Republicans. The most likely source of the significant interaction is that the simple main effect of congruence was smaller for Democrats (congruent stimuli: $M = 2.39$, $SE = 0.07$; incongruent stimuli: $M = 2.24$, $SE = 0.08$), $p = .024$, 95% CI [0.02, 0.28], than it was for Republicans (congruent stimuli: $M = 2.58$, $SE = 0.09$; incongruent stimuli: $M = 2.18$, $SE = 0.09$), $p < .001$, 95% CI [0.27, 0.58] (see Figure 3). The interaction would again suggest an asymmetry, although small, in partial support of Hypothesis 8.

Discussion

Experiment 2 replicated the findings of Experiment 1 regarding enhanced memory and reduced the effect of DF for politically congruent stimuli. In addition, Experiment 2 replicated the finding that while these effects exist for both liberals (Democrats) and conservatives (Republicans), there is evidence for a degree of asymmetry such that conservatives are more affected than liberals – although again it must be emphasized that this is at best a difference in degree of effects and not a case where participants of any political persuasion are immune to such effects. Politically congruent stimuli were also shown to be perceived as more likely to reflect reality, and participants were more confident in their answers when identifying politically congruent word/face pairings. Conservatives showed slightly more confirmation bias related to their beliefs about the truth of politically congruent word/face pairings and in their level of confidence in their memory when their answers reflected politically congruent pairings.

General Discussion

The current experiments used an item-method directed forgetting paradigm as an analog for the large amount of politically charged information and misinformation people see on a daily basis and biases in memory of such information. The results showed that people are more likely to

remember and recognize stimuli that are congruent with their political beliefs and that they are less likely to forget this information even when instructed to do so. Participants also showed increased credulity for believing congruent information and for being more confident in the accuracy of their memory of such information. These effects occurred for both politically conservative and politically liberal participants, although there was some evidence for asymmetries suggesting increased confirmation bias regarding beliefs in, confidence in, and memory of politically congruent information among conservatives.

There are several possible reasons why politically congruent information is easy to remember and difficult to forget. First, the type of politically congruent information used in the current research may already be stored in memory in some form as pre-existing beliefs. In other words, politically congruent pairing of descriptive words and presidential faces may already be a part of semantic memory, which is easy to activate and difficult to inhibit. Second, one may engage in selective rehearsal of politically congruent information due to confirmation bias in rehearsing such information. For Democrats, rehearsing the pairing of Trump/liar is more pleasant than rehearsing the pairing of Trump/honest. As such, one may choose not to rehearse the latter kind of information as much as the former kind of information. Third, a familiarity-based explanation would predict that familiar information is easier to remember than unfamiliar information (e.g., Yonelinas, 2001). For political information, this means that politically congruent information is easier to remember than politically incongruent information because individuals are more familiar with the former kind of information (e.g., Trump/hero for Republicans) than the latter kind of information (e.g., Trump/traitor for Republicans).

It should be noted that the recognition test used in the present experiments assessed associative recognition (see Cleary, 2019). An extensive literature exists on the difference between recognition of unpaired items (item recognition) and associative recognition regarding underlying processes (e.g., Yonelinas, 1997). A general conclusion is that compared with item recognition, associative recognition relies more on recollection than familiarity (e.g., Hockley & Consoli, 1999; Yonelinas, 1997) although familiarity can support associative recognition judgments under some conditions (Yonelinas et al., 1999). Regardless of underlying processes, both types of recognition tests assess memory for previously occurring events.

Implications

The present results provide reason to be pessimistic regarding attempts at controlling confirmation biases in

politically motivated memory. Interventions such as fact-checks or, more similarly to the DF paradigm, admonitions to simply forget politically congruent (mis)information or stimuli are likely to have relatively small impacts against our confirmation biases in terms of selecting sources of information, believing information, remembering information, and having confidence in our memory of such information, particularly when we are exposed to such a large amount of information daily. The problem may be even worse in conservative information bubbles that are more likely to propagate (often dangerous) misinformation (Faris et al., 2017), and this may be due to some of the asymmetries found in the current experiments wherein the biases studied were slightly more prominent in conservative participants. Perhaps even more concerning, these cognitive biases presented themselves although participants were initially offered extra money to focus on remembering items accompanied by “RRRR” instructions, **not** those that were politically congruent.

It is also worth noting that associative recognition can also be construed as a type of source-monitoring task (Johnson & Raye, 1981) in which participants are asked to recall or recognize features/details associated with a remembered item (such as perceptual, spatial, temporal, and emotional features). That is, remembering that the word *traitor* was presented with a picture of Trump/Biden can be considered as remembering source information (e.g., context) of that word. The relation between associative recognition and source memory is still not clear, although Yonelinas et al. (1999) showed that similar to associative recognition, judgments of source rely on recollection more than familiarity. However, despite the similarity, research on source memory has often investigated incidental remembering of associated features (e.g., Hashtroudi et al., 1989; Otani et al., 2012), whereas research on associative recognition investigates intentional learning of associations (e.g., Westerman, 2001). In the present study, we explicitly instructed participants to remember word/picture pairs for R items and forget word/picture pairs for F items, and thus, we interpret our results in the context of associative recognition. Nonetheless, the present results would also be informative regarding politically biased remembering of source information.

Limitations and Future Directions

The current research was limited by the type of stimuli used. Simple word/face pairings (e.g., Biden’s face plus the word “hero”) used as stimuli in the present study may be interpreted as expressing unfalsifiable opinions that would be difficult to fact-check in real life. Future research may seek to use stimuli that are more ecologically valid such as falsifiable factual claims (e.g., Rhodes, 2022), followed by fact-

checks labeling the claim as true or false, as a way of modifying the DF paradigm to be a more direct analog of the fact-checking of political claims online. The stimuli may have also presented limitations in terms of their similarity. While there were a variety of words used, there were only two photos of two faces presented along with the words. The high degree of similarity among stimuli may have resulted in more politically congruent guessing due to uncertainty, but it should also be noted that participants were also more confident in congruent pairings, which means it is possible that memory was actually enhanced for such pairings as well. Whether higher performance on the associative recall test for congruent pairings was entirely due to motivated guessing or combination of guessing and actual enhancements in memory is a question for further research, however. Additionally, although we attempted to motivate participants to remember stimuli based on instructions rather than political congruence by offering additional money only for remembering “RRRR” items (at least in our initial instructions), it is possible that the small amount of additional money was not sufficient motivation.

The online format of the experiments is also a limitation. Some participants may have found a way to keep notes in a shorthand format and/or record the slideshow on personal devices. This concern is amplified by a small number of participants having unrealistically high scores (e.g., remembering 30+ items in Experiment 1 and 20+ items in Experiment 2) – although it should be noted that removing such individuals did not affect patterns of results. Future research should be conducted in a more controlled laboratory environment where participants can be monitored so as not to take notes or record the slideshow.

The current research is also limited by its inability to speak to the potential causal relationships between belief, confidence, and memory, although the current research was able to demonstrate that the three outcomes are affected by the same processes likely related to confirmation bias. Additionally, it is possible that under conditions of uncertainty individuals default to guessing in a way that is congruent with what they already believe is true and assign higher confidence ratings to politically congruent pairings.

As noted above, the current research is limited in terms of the conclusions that can be drawn regarding the causes and mechanisms by which politically congruent information is remembered more accurately. Future studies should investigate the exact mechanisms that would create the memory advantage of politically congruent information. By identifying the mechanisms, it might be possible to devise a method of disrupting the selective remembering of politically congruent information, particularly misinformation.

Finally, the present study used a very specific type of associative recognition test to assess memories for associations between words and pictures. Future research

should determine whether the current effects have boundary conditions related to the type of memory test used (e.g., standard recognition, associative recognition, recall, source monitoring).

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Open Data


To the best of my ability and knowledge, I have provided all original materials and clear references to all other materials via a stable online repository: <https://osf.io/9e47c> (Franks, 2023).

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Appendix A

Instruction Comprehension Questions 1

Which images are you supposed to remember?

- o Images followed by “RRRR” (1)
- o Images followed by “FFFF” (2)

The memory test will ask you to remember images followed by “RRRR.”

- o True (1)
- o False (2)

You will receive bonus compensation for correct answers.

- o True (1)
- o False (2)

Appendix B

Word Lists

List 1

Negative Words: Dictator, Dishonest, Terrible, Fraud, Hostile, Cruel, Horrible, Parasite, Corrupt, Ugly, Awful, Enemy

Positive Words: Successful, Fantastic, Hero, Genius, Splendid, Courageous, Wise, Winner, Accomplished, Compassionate, Inspiring, Excellent

Neutral Words: Linear, Scissors, Network, Iceberg, Summary, Piping, Application, Figure, Font
Inspiring, Canteen, Background, Dash, Excellent

List 2

Negative Words: Vile, Liar, Hateful, Cowardly, Thief, Unsuccessful, Scum, Traitor, Failure, Worthless, Repulsive, Criminal

Positive Words: Beautiful, Honest, Amazing, Kind, Talented, Truthful, Sincere, Great, Awesome, Faithful, Friendly, Triumphant

Neutral Words: Forum, Snowboard, Initiate, Navigate, Landing, Pong, Category, Hour, Localized, Domain, Bit, Paperweight

Appendix C

Instruction Comprehension Questions 2

You will be asked to identify whose picture accompanied each of the words from the presentation.

- o True (1)
- o False (2)

If you are unsure of the correct answers, you should guess.

- o True (1)
- o False (2)

You will receive bonus compensation for correct answers.

- o True (1)
- o False (2)