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Framing fast and slow: a dual processing account of multimodal framing effects

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ABSTRACT

Human reasoning can be characterized by a continuum anchored by two extremes: fast, automatic, and emotional processing on the one side; versus slow, controlled and rational processing on the other. Despite theoretical linkages, no studies have empirically connected these types of information processing with the mechanisms of multimodal (visual and textual) media effects. We employ tools from dual processing theories in a framing effects paradigm to test whether the effects of news visuals and text take place via relatively more automatic and controlled information processing, respectively. To do so, we combine experimental manipulations and individual differences data collected across two experiments using different political issues. Results from experimental manipulations provide converging evidence for the distinct processing of visuals and text. Individual differences data paint a more nuanced picture, suggesting that the processing of multimodal news frames does not always conform to a simple automatic-controlled dichotomy.


KEYWORDS

Media effects; framing; visual; multimodal; dual processing; image; text; mechanisms

Everyday experience of people's habitual and minimally effortful media routines shows that visual elements of news are more easily processed than the written word. Take, for example, checking a news site on a smart-phone, skimming a free newspaper on the train, or glancing at the evening news broadcast. The relatively faster and automatic processing of images compared to the slower and controlled processing of text is also endorsed by psychology and neuroscience (e.g., Barry, 1997; Chaiken & Eagly, 1976; Lang, Potter, & Bolls, 1999). However, despite this intuitive appeal, apparent scientific consensus, and ubiquity of multimodal media, it is not known how these different media modalities combine to frame citizen's political opinions and behavior. In this study, we examine whether relatively automatic versus

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controlled processing of news images and text underpin the mechanisms of multimodal framing effects.

News frames are “interpretative packages” (Gamson & Modigliani, 1989, p. 3) used by journalists to emphasize the salience of certain aspects of an issue (de Vreese, 2005). Via devices in words and visuals, news frames “define problems,” “diagnose causes,” “make moral judgments,” and “suggest remedies” (Entman, 1993, p. 52). Depending on the individual, this can affect how citizens think about political issues and, in turn, influence their opinions and behaviours (Scheufele & Tewksbury, 2007). The combined contribution of visuals and text to this final step—framing effects—can be understood by considering the unique qualities of each modality (Geise & Baden, 2014). Generally, visuals are eye-catching, perceived quickly, and exert an activating effect by fostering an emotional connection with the reader (e.g., Barry, 1997; Garcia & Stark, 1991; Paivio, 1991). By comparison, text is less salient but its syntactic structure lends itself to cognitive elaboration of a story’s substance and, in turn, a more prescribed construction of meaning (Messaris & Abraham, 2001).

With these routines in mind, it follows that visuals and text may contribute to framing effects through different information processing mechanisms: Visuals are more automatically and emotionally processed, compared to the more controlled and cognitive processing of text. This contention has received theoretical support from dual processing models of attention (Schneider, Dumais, & Shiffrin, 1984; Shiffrin & Dumais, 1981), memory (Lang et al., 1999; Paivio, 1971, 1991), reasoning (Evans & Stanovich, 2013; Kahneman, 2011), and persuasion (Chaiken, 1980; Petty & Cacioppo, 1986). However, to our knowledge, no studies have empirically tested the link between processing pathways and mechanisms underpinning effects of multimodal message content. Rather, framing studies have focused on the mechanisms of visuals or verbal effects in isolation (Powell, Boomgaarden, De Swert, & de Vreese, 2015; Schmuck & Matthes, 2017), whilst studies of media learning have examined how production factors influence memory for visual and verbal input (Lang et al., 1999). As such, knowledge is lacking about how *multimodal news content*, operationalized here via news frames, prompts effects on opinions and behaviors. Considering that citizens primarily receive information about politics via news media, and news media are inherently multimodal, this knowledge is vital for understanding how political communication contributes to public discourse (Graber, 1996).

As a step toward addressing this fundamental gap, this study uses concepts from dual processing theories of information processing and employs them in a framing effects paradigm combining experimental manipulations and individual differences measures. By doing so, this study makes two important theoretical and empirical contributions: (a) first evidence of the mechanisms of multimodal framing effects and (b) a test for the inclusion of modality in

dual-processing models of information processing—bringing together two typically separate strands of media effects research.

Multimodal news framing

News framing research is indebted to other disciplines, with one obvious predecessor being the equivalence framing studies of Tversky and Kahneman (e.g., 1981). Although their framing manipulation—altering the wording of an otherwise logically equivalent decision scenario—underpins research on dual processing that we draw on in this study, media scholars (e.g., de Vreese, 2005) have pointed out that it is very common to see complex political issues framed in a more multifaceted manner than a single small change to otherwise equivalent content. We therefore focus on news (emphasis) framing, as defined earlier, that occurs through news media presentation and subsequent audience reception of news visuals and text (Dan, 2018; de Vreese, 2005; Entman, 1993). In this study, we use Rodriguez and Dimitrova's (2011) conceptualization of visual framing as the content characteristics (*denotive*, e.g., presence of a victim or belligerent), symbols (*connotative*, e.g., stereotypical clothing) and structural features (*symbolic-semiotic*, e.g., camera angles) in **images**.¹ We define text frames as framing devices (e.g., statements, characterisations, metaphors) and reasoning devices (e.g., problem definition, causal interpretation, treatment recommendation) manifest in the words of an article (Entman, 1993; Van Gorp, 2005).

A move toward multimodality has begun in content analyses of frames (e.g., Dan, 2018; Grabe & Bucy, 2009; van Hoof, Takens, & Oegema, 2010). However, by comparison, framing effects studies lag behind (but see Boomgaarden, Boukes, & Iorgoveanu, 2016; Geise & Baden, 2014; Powell et al., 2015; Seo & Dillard, 2016). In their integrative theoretical model of framing effects, Geise and Baden (2014) articulated several propositions about how multimodal frames are decoded by audiences: Visuals are superior to text in their salience attribution, but texts have a more conventional structure. Compared to visuals, text promotes a more direct matching of signifier and signified. Text frames specify the relations between decoded elements whereas visuals suggest associations. Lastly, the richness of visuals compared to text results in more information for integration and greater variability in the formulation of a central organizing idea. We focus on this final level of the framing process—the integration and subsequent effects of multimodal cues. Importantly for this study, these propositions connect well with the processes thought to underpin framing effects: accessibility and applicability (Nelson, Oxley, & Clawson, 1997). Visuals should be particularly effective at making associations more *accessible* when considering a political issue, whereas text allows individuals determine what is *applicable* to their pre-existing ideas (Coleman, 2010; Scheufele & Tewksbury, 2007). By

examining this distinction, this study aims to shed much needed light on the understudied processes of multimodal framing effects.

In this study, we conceptualize news media (news articles) as comprising separate visual inputs (static images containing exemplars) and verbal inputs (headline, lead, source quotations, characterisations) to be integrated by the reader to decode the central meaning, or frame, of a news item (Dan, 2018; Geise & Baden, 2014). By manipulating the semantic correspondence (also known as congruence, or redundancy, see also Lang, 1995) of both the visual and verbal inputs, we study how each modality is processed and contributes to subsequent opinion and behavioural effects. For instance, media portrayals of refugees may emphasize their position as innocent suffering *victims* on the one hand, or as hostile and opportunistic *intruders* on the other (e.g., Van Gorp, 2005). If a story's visual and verbal inputs both portray refugees as victims (or intruders) then the story can be said to have high visual-verbal congruence, and may make audiences more (or less) supportive of refugees. If the visual and verbal elements do not match, they are said to be incongruent. Visual-verbal incongruence reflects natural mismatches in news content—editors are often forced to hurriedly select an image from a limited set—which affects the multimodal frame of a news article, with potentially profound effects (Fahmy, Bock & Wanta, 2014).

Existing research has used visual-verbal congruence manipulations to show that news visuals are most often better remembered than text (e.g., Drew & Grimes, 1987; Lang, 1995; Reese, 1984), and that the effects of multimodal frames can differ according to the dependent variable (i.e., opinions or behaviour; Boomgaarden et al., 2016; Powell et al., 2015; Seo & Dillard, 2016). One of these latter studies, along with a body of unimodal effects studies (e.g., Pfau et al., 2008; Zillmann, Gibson, & Sargent, 1999) have pointed toward different mechanisms underpinning visual and textual effects. Specifically, visual effects are often mediated by emotional responses (Brader, 2005; Iyer, Webster, Hornsey, & Vanman, 2014; Pfau et al., 2008; Powell et al., 2015), whilst effects of text are moderated by issue-specific knowledge (e.g., Druckman & Nelson, 2003; Schuck & de Vreese, 2006). This distinction suggests that images and text could weigh more heavily on emotion and cognition, respectively (but not exclusively, Coleman & Wu, 2015; Schmuck & Matthes, 2017). To our knowledge, however, no studies have tested the processing of framing effects in both visual and verbal modalities simultaneously—preventing insights about truly multimodal effects. This study uses image-text congruence to test whether effects delivered by visual and verbal inputs of multimodal frames differ under different information processing conditions.

Information processing and message modality

The distinction between emotion and cognition in information processing is grounded in dual-processing-accounts of attention, memory, decision-making, and persuasion (Chaiken, 1980; Damasio, 1996; Epstein, 1994; Evans & Stanovich, 2013; Kahneman, 1973, 2011; Loewenstein, Weber, Hsee, & Welch, 2001; Petty & Cacioppo, 1986; Schneider et al., 1984; Zajonc, 1980). These theories have in common two different modes of processing that guide decision-making. Namely, one that is fast, automatic, and emotional, and another that is slow, controlled, and cognitive. These pathways mirror the fast and subconscious route through which human brains initially process visual stimuli—directly from thalamus to amygdala, the originator of affective reactions (Tamietto & de Gelder, 2010)—compared to the necessarily slower and conscious processing of textual stimuli via neocortex (Barry, 1997).

This anatomical link resonates with our core theoretical focus, drawn from the attention and information processing theories of Kahneman (1973) and Shiffrin and Dumais (1981), as well as Lang et al. (1999). They proposed a continuum along which acts of cognition can be positioned—with automatic and controlled processing at opposite poles. Although no task is purely one or the other, whether a task is more automatic or controlled depends on the cognitive resources involved in executing it. Automatic processing is non-conscious and requires minimal cognitive resources to complete. In contrast, controlled processing is reflective and requires active cognitive engagement of working memory (Evans & Stanovich, 2013). The allocation of cognitive resources, and thus the degree of controlled versus automatic processing, is dependent on both task-related factors (e.g., degree of cognitive load) as well individual factors (e.g., level of motivation).

These task-related and individual factors have been used to study the processing of multimodal media messages (e.g., Petty & Cacioppo, 1986; Pfau, Holbert, Zubric, Pasha, & Lin, 2000), but rarely used to examine modality-specific effects. In the domain of media learning, Lang et al. (1999) manipulated the pacing and arousing nature of messages to show that as cognitive load increases (and cognitive resources decrease), memory for text suffers whilst visual memory remains intact. This implies an automatic encoding of visuals to memory. Related ideas come from the persuasion literature, specifically Chaiken's (1980) *heuristic-systematic theory*: Written material was better comprehended and more persuasive than (audio-)visual messages for complex messages, and vice versa for simple messages (Chaiken & Eagly, 1976, 1983). These studies, however, all employ a manipulation of information processing within the content of a message itself, meaning that the manipulated factors are not entirely orthogonal and may interact (Jackson, 1992). In this study, we apply separate manipulations

of framed content (image-text congruence) and cognitive resources (via task-related experimental manipulations and individual differences measures) to explicitly test this link between automatic versus controlled processing and modality-specific media effects.

In line with previous research, our first experimental manipulation of cognitive resources involves stimulating participants' *involvement* in the article (for a meta-analysis see Johnson & Eagly, 1989). By increasing the personal importance of a framed communication, participants are encouraged to allocate cognitive resources to scrutinise it in a more controlled manner (e.g., Chaiken, 1980; Petty & Cacioppo, 1986). According to the reviewed theory, here we should see a dominance of the textual frames over opinion and behavioural effects. In contrast, applying a *cognitive load* whilst participants read a message (e.g., Buller, 1986) disrupts working memory and enforces more automatic processing of the message (Evans & Stanovich, 2013; Lang et al., 1999). Here we expect stronger effects of visual frames. Crucially, combining these processing manipulations with articles comprising congruent and incongruent image-text pairings, enables us to test these predictions.

H1a : *There will be stronger effects of visual frames on opinions and behaviors under automatic processing conditions (cognitive load), compared to controlled processing conditions (cognitive involvement).*

H1b : *There will be stronger effects of text frames on opinions and behaviors under controlled processing conditions (cognitive involvement), compared to automatic processing conditions (cognitive load).*

Individual differences in processing style

In addition to experimental manipulation, we tackle our research question by measuring individual differences in dispositional information processing style. The need for cognition (NfC) scale (Cacioppo & Petty, 1982) indexes one's intrinsic motivation to engage in and enjoy thinking. Those who score highly report a desire to expend more cognitive effort and resources in evaluating messages, and exhibit persuasive effects akin to more controlled and systematic processing conditions (e.g., Cacioppo, Petty, & Morris, 1983; Griffin, Neuwirth, Giese, & Dunwoody, 2002; Priester & Petty, 1995). In contrast, the need for affect (NfA) measures an individual's tendency to seek out and enjoy feelings (Maio & Esses, 2001; Sojka & Giese, 1997). Those with a high NfA are motivated to use feelings as a low-cost and low-resource processing route to judging mediated messages, akin to more automatic

processing conditions (Chaiken, 1990; Slovic, Finucane, Peters, & MacGregor, 2007).

Much evidence links affective and cognitive processing styles with modality-specific effects. Because images are effective at eliciting an affective response (e.g., Iyer & Oldmeadow, 2006), it follows that those with a high (compared to low) NfA should be more strongly influenced by emotionally charged visuals (Arceneaux & Vander Wielen, 2013). By contrast, those with a high (compared to low) NfC score highly on verbal intelligence scales (Cacioppo, Petty, Feinstein, & Jarvis, 1996) and learn more from newspapers (a primarily textual medium; Liu & Eveland, 2005). Finally, studies drawing on multimedia learning theory (Mayer, 2009) have linked processing style to one's preference for visual or verbal information in daily life. The style of processing scale (Childers, Houston, & Heckler, 1985) includes, for instance, whether one tends to use mental imagery or written notes, or prefers instructions in diagrammatic or written form. More affective and cognitive processors exhibited a preference for more visual or verbal learning, respectively (Sojka & Giese, 2006). Considering the role of visuals and text in framing effects (Geise & Baden, 2014), these processing distinctions should also characterise effects of multimodal frames.

As an indicator of the tendency for more automatic versus controlled processing, we assess whether a predisposition for affective or cognitive and visual or verbal processing style relates to the magnitude of visual and textual effects on opinions and behaviours.² Based on the research reviewed, we expect that:

H2 : *There will be stronger effects of visual frames on opinions and behaviors for individuals with a:*

- a) high NfA compared to low NfA and*
- b) visual processing style compared to verbal processing style.*

There will be stronger effects of text frames on opinions and behaviours for individuals with a:

- c) high NfC compared to low NfC and*
- d) verbal processing style compared to visual processing style.*

The experimental setting

To test these hypotheses, we use two experiments employing the same design but focusing on different international affairs issues with two different sets of news frames. The two issues are both relatively complex, requiring journalistic simplification, and can be readily visualized—thus highly appropriate for the study of multimodal frame processing.³

The first experiment used the context of military intervention in the little-known conflict in the Central African Republic. Since 2013, a violent civil

war has led to humanitarian crisis, portrayed in news media by two frames that have also been a steady feature of war and conflict coverage for the last 30 years. The first emphasizes the *moral obligation to intervene*, typified by graphic images of suffering victims (“empathy framing”; Entman, 2004; Robinson, 2005, p. 30), encouraging military intervention to prevent human rights abuses. The counter-frame to this exhorts the *risks of intervention*, with images of belligerent militants emphasising potential dangers that confront Western troops in far-flung conflicts.

The second experiment used the issue of the refugee crisis in Europe and the Middle East. Here, images of families and children in distress—particularly the publication of the image of the drowned Syrian boy Alan Kurdi—magnified the plight of refugees, and typified the portrayal of *refugees as victims*. In contrast, a prominent counter-frame depicting *refugees as intruders* comprised images of large numbers of hostile (and especially male) refugees posing a threat to Europe’s safety. Framing refugees as victims (e.g., Van Gorp, 2005) and intruders (e.g., Bleiker, Campbell, Hutchison, & Nicholson, 2013) is common media practice.

Experiment 1 method

To test our hypotheses, we used the Central African Republic conflict (Experiment 1) and refugee crisis (Experiment 2) contexts in two online survey-embedded experiments; an appropriate method and setting for examining the processing of media messages.

Design

Participants were randomly assigned to 18 conditions, arranged in a two (image bias: obligation, risk) by three (text bias: obligation, risk, control) by three (processing: automatic, controlled, control) factorial design. To assess hypotheses 2a-d regarding individual differences in information processing style, we asked participants in the *control* processing conditions to complete additional questions of dispositional processing style.

Participants

A total of 1,547 American adults aged 18 to 86 were recruited via Amazon Mechanical Turk in October 2015. The principal motivation for the use of MTurk (implemented via the *MTurk-R* package in *R*) was the increased control and flexibility over participant contact and donation collection than most panel companies. Moreover, although there is some disagreement over its use, MTurk samples are of comparable quality or higher than many panel and student samples in terms of representativeness,

attentiveness, reliability, and concurrent and convergent validity on psychology and social science tasks similar to the present study (Chandler & Shapiro, 2016). Of the initial sample, 165 either failed an attention check question or failed to complete over half of the survey. Nineteen participants were removed for *straight-lining* behavior. Twenty-three participants were removed who reported a problem viewing the article.⁴ The final sample contained 1,340 participants. The median time to complete the experiment was 15 min 18s.

The sample was fairly representative of the US population for age ($M = 38.36$, $SD = 13.08$) and sex (698 women, 52%). Participants came from a variety of racial backgrounds, although most were White (74%) and US-born (89%). Participants possessed a range of educational backgrounds and political ideologies.

Stimuli

Stimuli were selected from media coverage of the ongoing conflict in the Central African Republic, as previously used in Powell et al. (2015). Three pilot experiments were used to arrive at images and texts that conveyed the respective frames and, importantly, that were matched for potentially confounding factors that have been shown to influence media effects (e.g., Lang, 1995; Schuck & de Vreese, 2006). This included perceived arousal, valence, salience, ambiguity, complexity, and newsworthiness. This information can be seen in full in Powell et al. (2015) and so are not described in detail here. In short, the images clearly depicted victims of the conflict in the obligation condition and belligerent militants in the risk condition. The articles were downloaded from the BBC website and were shortened and modified to achieve the framing conditions. See *Supplementary Materials* for stimuli.

Procedure

Upon entering the survey, questions measured participants' interest in politics and foreign affairs, issue-specific knowledge of the conflict in Central African Republic, and political orientation. Participants were then randomized to one of the stimulus conditions. In all conditions, participants were informed that they would be asked questions after viewing the article, and it was emphasized that they should pay attention to the article as a whole in order to avoid any potential preferential processing of the text or image.

In the control processing condition, participants experienced no manipulation of cognitive resources whilst reading the article.

In the automatic processing conditions, a cognitive load was placed on participants whilst they read the article. This was done through an auditory task that involved clicking the computer mouse when the pitch of a piano

note was higher in comparison to the one immediately preceding it (i.e., 1-back; for similar tasks see Brunken, Plass & Leutner, 2004; Romer, 1979; Tversky & Kahneman, 1983). Piano notes were separated in time by approximately 5 sec and participants were given the opportunity to practice the task beforehand. Performance on the sound task was incentivized by informing participants that the top 50% most accurate would be awarded a small additional financial bonus. This was done to increase participants' reliance on automatic processing when reading the article.

In the controlled processing condition, participants' cognitive involvement was stimulated by being instructed that they would take part in a debate on the topic of the article after completion of the survey (Johnson & Eagly, 1989). Specifically, they were informed they would be redirected to an online forum in which they would have to justify their judgements made in the survey to a subject matter expert and a fellow participant. Similar to the automatic condition, participants were told that the top 50% performers in the debate would be awarded a small additional financial bonus. By using a nonverbal auditory working memory task as a cognitive load and a debate for inducing involvement, our manipulations were orthogonal to the visual and verbal inputs we assessed.

In all conditions, participants were forced to spend at least 30 sec viewing the stimulus, and the survey automatically continued after 90 sec. This is important for ensuring that participants in the automatic (cognitive load) condition could not compensate for reduced processing capacity by spending more time viewing the article (e.g., De Neys, 2006; Sherman, Lee, Bessenoff, & Frost, 1998). The pretests and average reading times showed this was an appropriate timeframe. After viewing the stimulus, participants responded to the dependent measures, followed by manipulation check questions. At the end of the survey participants were asked to provide basic personal information, including age, sex, education level, race and country of birth, and were then thanked and debriefed.

Measures

Dependent variables

Support for the policy of military intervention was measured with three items (e.g., "Sending an international peacekeeping force;" 1 = *strongly oppose*, 7 = *strongly support*; $\alpha = .86$; $M = 4.81$, $SD = 1.31$).

Actual donating behavior was measured by awarding a financial bonus of 35 cents to *all* participants, instead of only 50% of the top performers as they were earlier informed. Then, at the end of the survey, participants were given the option to either keep the bonus or donate some or all of it to a charity in support those embroiled in the conflict (an International Committee of the Red Cross campaign; $M = 12.96$ cents, $SD = 14.70$).⁵

Moderator variables

Measures of trait processing style were included only for the six control information processing conditions. These measures were taken in a follow-up survey so that they were as far removed from the stimulus as possible, thus minimizing the possibility that the experimental conditions influenced these measures and vice versa.⁶

Participants' trait preference for affective processing was measured using the 11-item NfA scale (Sojka & Giese, 1997; $\alpha = .92$; $M = 4.45$, $SD = 1.21$). Preference for cognitive processing was assessed using the 18-item NfC scale (Cacioppo, Petty & Kao, 1984; $\alpha = .96$; $M = 3.51$, $SD = 0.91$). Preference for visual or verbal processing was assessed using the 22-item style of processing scale (Childers et al., 1985; $\alpha = .73$; $M = 2.58$, $SD = 0.30$; low scores indicate visual preference and high scores a verbal preference). The mean score on the trait processing style variables were comparable with previous research (e.g., Arceneaux & Vander Wielen, 2013; Sojka & Giese, 2006). Items and scoring scales can be seen in the *Supplementary Materials*.

Manipulation checks

Manipulation checks from the pretests detailed in Powell et al. (2015) confirmed that the frame manipulations were achieved. The success of the processing pathway manipulations was confirmed in the main experiment using four items measuring information processing depth, adapted from Wolski and Nabi's (2000) *elaboration depth measure* (see *Supplementary Materials*).

Analysis

Effects of the experimental manipulations of information processing were tested using a three-way ANOVA, including image bias, text bias, and information processing condition as between-subject's factors. Moderation of framing effects by dispositional processing styles was analyzed with the control processing conditions using Hayes PROCESS-macro in SPSS (Hayes, 2017). The obligation and risk image and text were entered separately as the independent variables, and each processing style measure was tested as the moderator. Each analysis was conducted on the two dependent variables: support for intervention in the conflict and monetary donation amount.

Experiment 1 results

Information processing manipulations

There was a main effect of image bias on participants' support for intervention, $F(1, 1139) = 3.93, p = .048, \eta_p^2 = .003$. Support was higher in those who viewed a stimulus with an obligation compared to a risk image. A significant text-by-processing interaction was also observed, $F(4, 1139) = 2.51, p = .041, \eta_p^2 = .01$. Post hoc tests showed that, in the controlled processing conditions, support for intervention was higher for those who saw a control text, compared to a risk text ($p = .082$). In the control processing conditions, support for intervention was significantly higher for those who read an obligation than a risk text ($p = .001$), and higher for the control than risk text ($p = .085$). In the automatic processing conditions, there was no difference in support for intervention between those who saw the different text

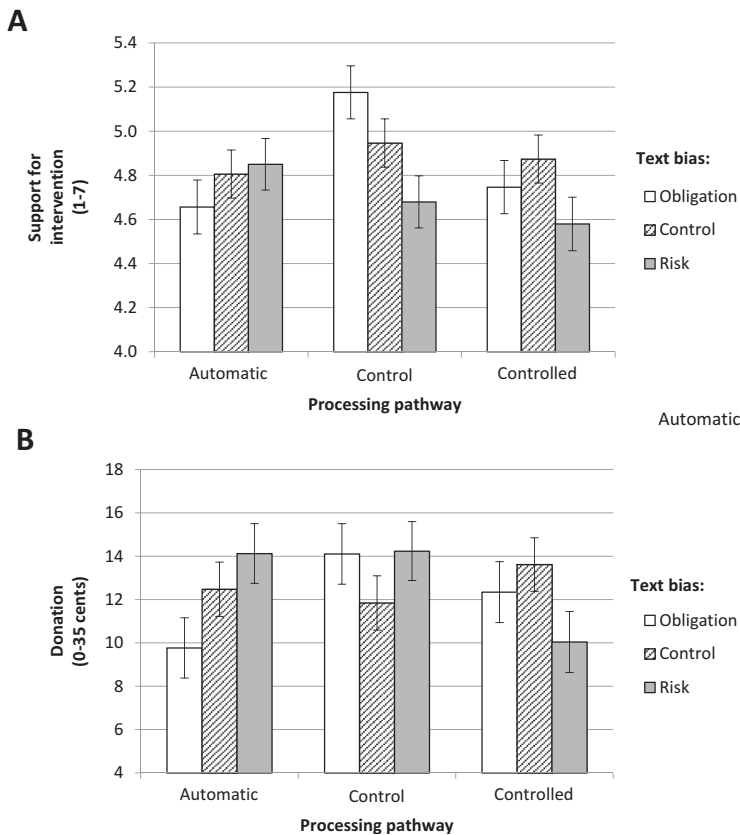


Figure 1. Mean differences between the text bias and processing pathway conditions for (A) support for intervention, and (B) donation. Both *Panel A* and *Panel B* show a text by processing pathway interaction. Means and standard errors are plotted. Note that the y-axes on both charts do not reflect the full range of the scales.

conditions. The text-by-processing interaction, collapsed across the different levels of visual bias, is shown at [Figure 1A](#).

The same pattern of results was observed for donation behavior. The main effect of image bias on participants' donations approached significance, $F(1, 1051) = 3.27$, $p = .071$ $\eta_p^2 = .003$. Again, we observed a significant text-by-processing interaction, $F(4, 1051) = 2.57$, $p = .037$, $\eta_p^2 = .01$. In the controlled processing conditions, donations were higher for those who read a control text than a risk text ($p = .068$). No differences were observed between the text conditions for those under control processing conditions. In the automatic processing conditions there were significant differences in donations between the text conditions, but in the opposite direction to expected. Those who read a risk text donated more than those who read an obligation text ($p = .028$). The text-by-processing interaction, collapsed across the visual bias conditions, is shown in [Figure 1B](#).

Taken together, these results support H1b: Text elements in the framed news article exerted a stronger effect under controlled and control information processing conditions compared to automatic processing conditions. However, no support was found for H1a: Image effects were not stronger under automatic processing conditions.

Moderation by processing style

The effect of the image conditions on support for intervention was moderated by participants' NfA, R^2 change = .01, $F(1, 371) = 4.00$, $p = .046$. Probing the interaction (see [Figure 2A](#)) showed that those with high NfA were more supportive of intervention after viewing a stimulus with an obligation image compared to a risk image. In those with low NfA, this was reversed: Participants were more supportive after viewing a stimulus with a risk image than an obligation image. Participants' NfC did not moderate the effects of the text conditions for either of the dependent variables.

Visual-verbal processing style moderated the effect of the image conditions on participants' donations, R^2 change = .01, $F(1, 368) = 3.21$, $p = .073$, albeit just short of conventional significant levels in a two-tailed test. Those with a visual processing style donated more after viewing a stimulus with an obligation image compared to a risk image. In contrast, those with a verbal processing style were not influenced by the image conditions (see [Figure 2B](#)). In addition, the effect of the text conditions on participants' support for intervention was moderated by visual-verbal processing style, R^2 change = .02, $F(1, 247) = 4.35$, $p = .038$. Verbal processors were more supportive of intervention after reading an obligation text compared

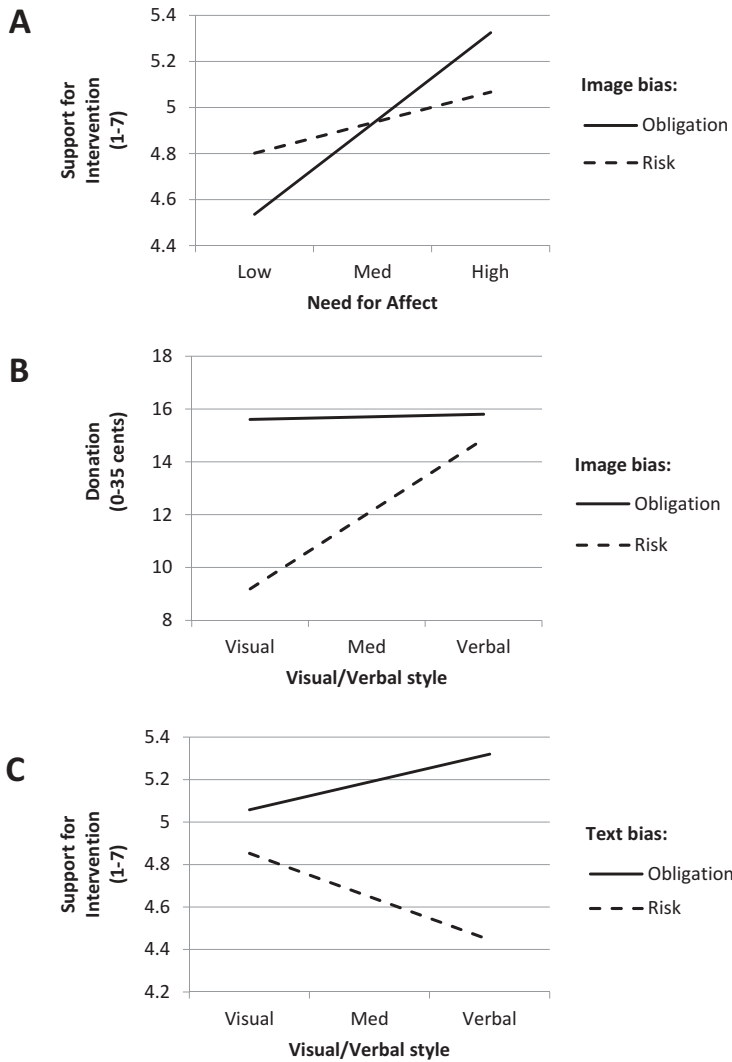


Figure 2. Moderation of framing effects by individual differences in (A) need for affect and (B - C) visual-verbal processing style. Values of the dependent variables are plotted for each frame condition at the mean and + and - 1 SD of the moderator variable.

to a risk text. In visual processors, the text conditions had little to no effect (see [Figure 2C](#)).

These results show that those with a high NfA were more strongly influenced by the images in our framed stimulus articles (supporting H2a). Furthermore, those with a more visual/verbal processing style were more influenced by the image/text elements of the framed articles, respectively (supporting H2b & H2d). Those with a high NfC did not show a more pronounced effect of the text (no support for H2c).

Experiment 1 discussion

Taken together, Experiment 1 provided considerable support for the proposal of distinct processing pathways for visual and textual elements of news frames. Evidence for more controlled processing of text comes from our experimental manipulations. Support for the automatic processing of images comes from individual differences data showing moderation of image effects by NfA. Further support comes from the moderation of image and text effects by participants' visual and verbal processing style, respectively.

Not all results supported our hypotheses, however. Absent from the findings of our experimental manipulations of information processing was the connection between images and automatic processing. Including a cognitive load did not push framing effects in the direction of the image. One possible methodological cause of this could be the timing restriction given to participants. Several of those who were removed for not being able to view the article complained that there was insufficient time to read and complete the sound task concurrently. Although we took steps in the pretests to ensure the timing was sufficient, in Experiment 2 we chose to rectify this issue by shortening the stimulus articles.

Also absent from our findings was increased text effects in those with a high NfC. Although one cannot draw conclusions from null findings, one possible reason could be that those with a high NfC possess relatively stable attitudes that are resistant to change. Experiment 2 gives us another opportunity to test this using different stimuli material about a different political issue.

Experiment 2 method

Experiment 2 tested the same hypotheses using a different context—the European refugee crisis—and a Dutch sample. This issue remains highly relevant to the Netherlands, and using a different nationality (in addition to using a different topic, stimuli, measures and sample) would provide a convincing replication of the findings from Experiment 1. The core part of the study, the design and procedure, remained the same as Experiment 1, except for the topic-specific frame conditions. Details of the new sample, stimulus materials and measures follow.

Participants

1388 Dutch adults, aged 18 to 75, were recruited via an online data panel company, Survey Sampling International, in early August 2016. The same exclusion criteria were used as Experiment 1, leading to a final sample of 1,249. The completion time for Experiment 2 was 12 min 19s.

The sample was fairly representative of the Dutch population for age ($M = 46.71$, $SD = 16.67$) and sex (633 women, 51%). 95% of participants were born in the Netherlands and 38% had at least one parent who was not born in the Netherlands. Again, there was a range of educational backgrounds and political ideologies.

Stimuli

Stimuli were selected from media coverage of the European refugee crisis. The same pilot testing procedure from Experiment 1 was used to select stimuli for Experiment 2. This ensured that the image and text elements conveyed the victim and intruder frames and, again, importantly, were matched for arousal, salience, ambiguity, complexity, and newsworthiness.

The selected victim image (from *Human Rights Watch*) depicted a young boy pulled from a boat as a victim of the crisis, and the selected intruder image (from *Ruptly TV*) showed violent refugees crowding around a fence. Stimulus texts were adapted from articles from the BBC News and UN High Commission for Refugees webpages. Words and phrases were carefully changed in each condition to convey refugees as suffering victims, burdensome intruders, or a balance between the two for the control version. When combining the images and text, two additional images were added containing simple graphics of the statistics behind the crisis. One showed the proportion of the Syrian population affected and the other showed numbers of asylum applications in Germany and the rest of Europe. These two graphics were added to all versions of the articles and thus were the same for all conditions. Because a typical online news article contains more material than a simple headline, image, and text, this addition enhanced the external validity of our stimuli without compromising internal validity. Example stimuli can be seen in the *Supplementary Materials*.

Measures

Dependent variables

Opposition to Syrian refugees was measured using the question, “Syrian refugees are a burden on the country because they take our jobs and social benefits” (1 = *strongly disagree*, 7 = *strongly agree*; $M = 3.94$, $SD = 1.70$).

Donating behavior was measured by awarding a financial bonus of 25 cents to all participants in the same manner as Experiment 1. This time, participants were asked to indicate (yes/no) whether they would like to donate to a charity supporting Syrian refugees (Doctors Without Borders). Participants who clicked *yes* ($N = 127$, 10.3%) were shown the

link to the campaign page on which they could make a donation; those who clicked *no* ($N = 1104$, 89.7%) continued directly onto the next page of the survey.

Moderator variables

To shorten the overall time of the survey we reduced some of the scales for the moderating variables. In line with previous studies (Bakker & Leikes, 2016; Bullock, 2011), a 6-item NfC scale was used and formed a reliable scale ($\alpha = .72$, $M = 4.31$, $SD = 0.93$). We also reduced the style of processing scale to 12 items from the full 22-item version (Childers et al., 1985; $\alpha = .64$, $M = 2.43$, $SD = 0.31$). The same 11-item NfA scale used in Experiment 1 was also used in Experiment 2 ($\alpha = .90$, $M = 4.53$, $SD = 1.00$). For shortened NfC and Style of Processing scales see *Supplementary Materials*.

Manipulation checks

Manipulation checks from the pilot experiments and main study confirmed that the framing manipulations were successful. The processing pathway manipulations were assessed in the same manner as Experiment 1. Processing depth differed significantly across the processing conditions, $F(2, 1232) = 38.57$, $p < .001$. Stimuli were processed significantly more deeply in the controlled ($M = 4.25$, $SD = 1.12$) and control processing conditions ($M = 4.31$, $SD = 1.10$) than the automatic conditions ($M = 3.69$, $SD = 1.04$, both comparisons $p < .001$). However, the difference between the controlled and control conditions was nonsignificant ($p = .447$). The relatively larger difference between the automatic condition and the other two conditions was also present in Experiment 1 (although all differences in Experiment 1 were significant), and should be considered when interpreting the results.

Analysis

The analysis routine remained almost the same as in Experiment 1. The only exception was analysis of the binary donation variable, for which logistic regression was used. In the regression model, we included the image and text conditions, as well as the image-by-processing and text-by-processing interactions.

Experiment 2 results

Processing pathway manipulations

For the donation variable, there was a significant effect of image bias, $b = -0.90$, $ExpB = 0.40$, $SE = 0.37$, $p = .016$. Those who viewed a stimulus with a

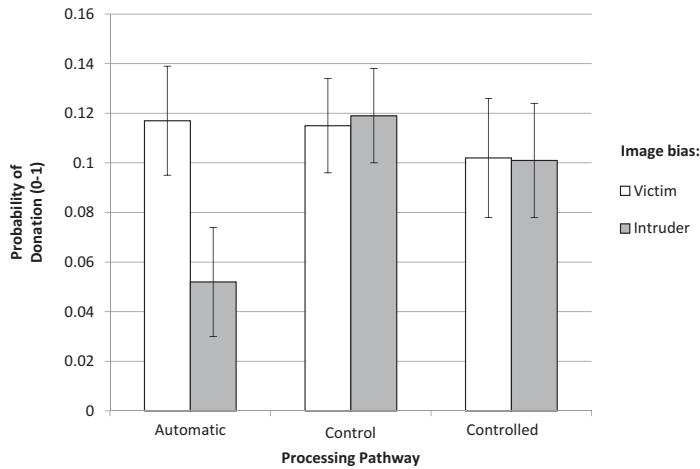


Figure 3. Interaction between the image bias and processing pathway conditions for probability of donation. Means and standard errors are plotted. Note that the y-axis on the chart does not reflect the full range of the scale.

victim image were more likely to donate than those who saw an intruder image. An image-by-processing interaction was also found, which was significant between the automatic and control processing conditions, $b = 0.98$, $ExpB = 2.67$, $SE = 0.44$, $p = .025$, and borderline significant between the automatic and controlled processing conditions, $b = 0.86$, $ExpB = 2.36$, $SE = 0.48$, $p = .072$. Participants were more likely to donate after seeing a stimulus with a victim image than an intruder image under automatic processing conditions, whereas this difference was not present under control or controlled processing conditions. The image-by processing interaction, collapsed across the different levels of textual bias, is shown at Figure 3. For the opposition to refugees variable no main effects or interactions were observed.

Results support H1a: Images in the framed news article exerted a stronger effect under automatic processing conditions, compared to control and controlled processing conditions. No evidence in support of H1b was found: Text effects were not stronger after inducement of more controlled processing.

Moderation by processing style

The effect of the text conditions on opposition to refugees was moderated by participants' NfC, $R^2 \text{ change} = .01$, $F(1, 329) = 3.00$, $p = .085$. Probing the interaction (see Figure 4A) showed that those with high NfC were less supportive of refugees after reading a stimulus with an intruder text compared to a victim text, whereas the opposite was true for those with a low NfC. NfC also moderated the effects of the image conditions on participants'

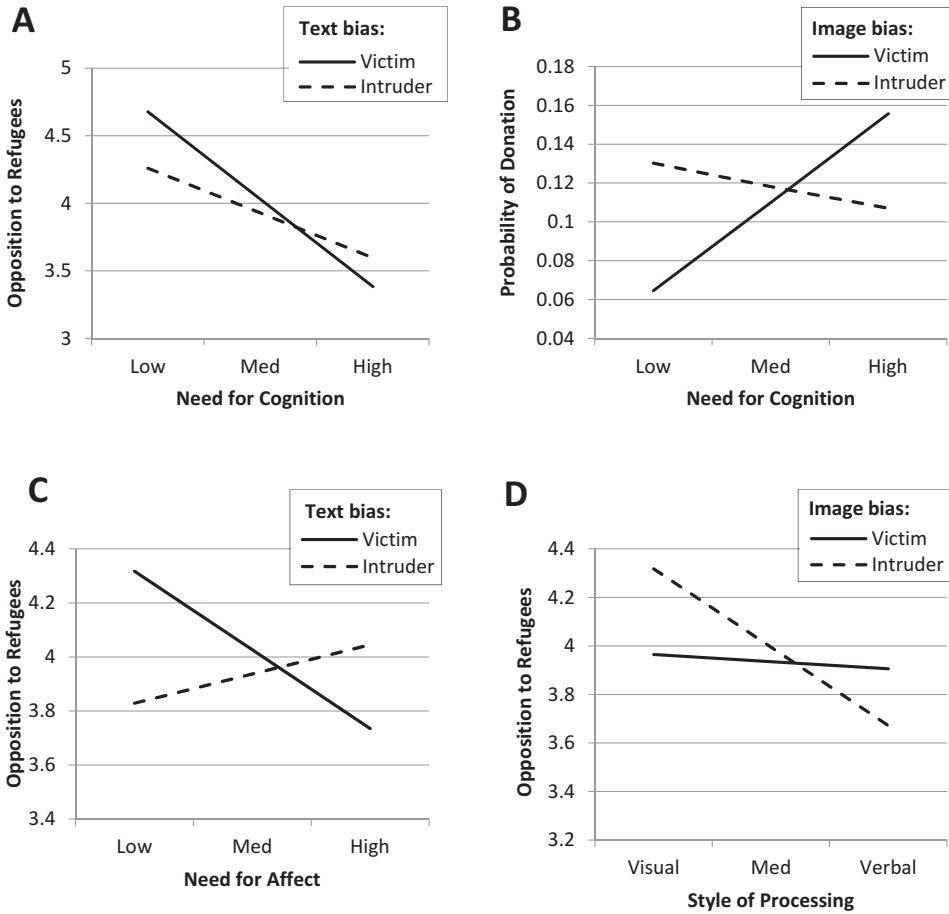


Figure 4. Moderation of framing effects by individual differences in (A-B) need for cognition, (C) need for affect, and (D) visual-verbal style of processing. Values of the dependent variables are plotted for each frame condition at the mean and + and - 1 SD of the moderator variables.

donating behaviour, $b = -0.65$, $SE = 0.31$, $Z = -2.11$, $p = .034$. Those with a high NfC donated more after viewing a stimulus with a victim image than an intruder image. The opposite was true for those with a low NfC (see [Figure 4B](#)). Separately, the effect of the text conditions on opposition to refugees was moderated by participants' NfA, $R^2 \text{ change} = .01$, $F(1, 329) = 4.38$, $p = .037$. Those with a high NfA were less supportive of refugees after reading an intruder text than a victim text. The opposite was true for those with a low NfA (see [Figure 4C](#)).

Participants' style of processing moderated the effect of the image conditions on opposition to refugees, $R^2 \text{ change} = .01$, $F(1, 502) = 3.65$, $p = .056$. Those with a more visual processing style were less supportive of refugees after viewing a stimulus with an intruder image than a victim image, which was not the case for participants with a more verbal processing style (see

Figure 4D). The same moderation result was observed for donation behavior, $b = -1.43$, $SE = 0.70$, $Z = -2.04$, $p = .041$. Participants with a more visual (compared to verbal) processing style donated more after viewing a stimulus with a victim image than an intruder image. Participants' visual-verbal style of processing did not moderate the effect of the text frames, neither for opposition to refugees nor donating behaviour.

These results provide partial support for H2c: Those with a high NfC were more strongly influenced by the text of the framed news articles, however they were also influenced by the images. In opposition to H2a, the effect of the text conditions was stronger in those with a high NfA. Again, support for H2b was found: Visual processors were influenced by the image in the framed articles, however we did not observe a pronounced effect of text in verbal processors (providing no evidence for H2d).

Experiment 2 discussion

Results from Experiment 2 provide some support for the notion of separate information-processing pathways to visual and textual framing effects, albeit less convincing than Experiment 1. Evidence for automatic processing of images comes from our processing pathway manipulations where we observed strong effects of images under automatic processing conditions. The link between images and automatic processing was also evidenced by the moderation of image effects by participants' visual processing style. And the moderation of text effects by NfC supports the link between text effects and more controlled processing. However, the individual differences data also produced results that ran counter to our expectations: Image effects were stronger in those with a high NfC and text effects were stronger in those with a high NfA. In the following section, we integrate and discuss these results with the findings from Experiment 1.

General discussion

This study combined experimental manipulations and individual differences data to investigate processing pathways that underpin multimodal news framing effects. Across two studies using stimuli from two different political issues, we show support for the notion that the effects of visuals and text occur via relatively more automatic and controlled processing, respectively (e.g., Chaiken & Eagly, 1976; Sojka & Giese, 2006). The experimental manipulations of processing pathway showed converging evidence for this contention, whereas findings from individual differences data (particularly from Experiment 2) were more nuanced. Given the body of research indicating distinct processing of images and text (e.g., Barry, 1997; Lang et al., 1999;

Paivio, 1991), we expected to find more convincing evidence for divergent pathways to multimodal effects.

That notwithstanding, across the two experiments, experimental manipulation of information processing provided converging causal evidence for automatic and controlled mechanisms to visual and textual framing effects. This empirically supports the long-standing conceptualization of multimodal news content as comprising salience-enhancing visuals that draw readers into a story, whose meaning is elaborated via text (e.g., Messaris & Abraham, 2001). This finding, for the first time, showcases the distinction between visuals making a news frame more accessible in mind, and words determining a frame's applicability to one's pre-existing ideas (Coleman, 2010; Scheufele & Tewksbury, 2007). This insight was made possible through the use of multiple issues and message exemplars, as well as careful stimulus pretesting (e.g., Reeves, Yeykelis, & Cummings, 2016), to gain converging evidence across the two experiments. Further studies should explore this connection between message modality and the mechanisms of framing effects. Moreover, future research should seek to systematically examine how findings differ for different issue contexts and stimulus factors, and in doing so could incorporate alternative manipulations of visual frames, such as those in the tradition of equivalence framing research (Scheufele & Iyengar, 2012).

Results from the visual and verbal processing style measures show that distinct dispositional processing styles also produce consistent visual and textual effects. In both experiments, visual processors were strongly influenced by the image frames, and in Experiment 1 verbal processors were influenced by the text. This extends research on modality-specific styles of learning and memory (Mayer, 2009) to political opinions and behavior. To further this line of inquiry, future studies could more closely examine information processing typologies. For instance, "combined processors" exist who possess a highly affective and cognitive processing style, or are highly receptive to both visual and verbal modalities (Sojka & Giese, 2006, p. 997). In contrast, "low motivation" processors (i.e., low affect, low cognition, or low visual, low verbal) may be a reasonable characterization of the way in which particularly apathetic citizens process news media.

That said, mixed results from moderation analyses in Experiment 2 imply more nuance than straightforward automatic and controlled mechanisms of visual and textual effects. Counterintuitive findings using the NfA and NfC scales in Experiment 2 suggest a weaker link between images and the tendency to use feelings, and text and the tendency to think. In the words of Coleman and Wu (2015, p. 43), "If a picture attracts a person's attention and holds it, encouraging the person to think about what it contains, it will be processed centrally, with careful, rational thought." This chimes with emotion researchers who have argued that those with a high NfC may also be better able to integrate emotions, such as those elicited by a news image, into

a more holistic mental representation of the issue at hand (Maio & Esses, 2001). Ultimately, as mentioned in the *Introduction*, the correlational nature of these analyses should be borne in mind, in that they are inferentially weaker than the causal link provided by the experimental manipulations (Jackson, 1992). Exploring factors that determine citizens' position on the automatic-controlled processing continuum when reading the news is a prime area for future research.

Despite offering rich insights and avenues for further study, this study has limitations. In Experiment 1, the processing pathway manipulation check showed significant differences between all processing conditions, albeit the difference between the control and controlled conditions was relatively small. In Experiment 2, this difference between the control and controlled processing conditions was nonsignificant, which appears to be reflected in the similar effects on our dependent variables. However, because the relatively deep processors (i.e., controlled and control) showed stronger text effects in Experiment 1, and shallow processors (i.e., automatic) showed strong image effects in Experiment 2, this does not affect the veracity of our conclusions but may have reduced the size of the observed effects. It is probable that this is, at least in part, due to social desirability influencing manipulation checks in the control condition, which future studies should seek to minimize. Separately, like any experiment, this study possesses higher internal, than external, validity. This might be considered particularly true of the processing manipulations that, in all conditions, involved a maximum time to read the articles, and a music task for the cognitive load condition. Although a departure from what might be considered a normal media use scenario, these conditions have been employed in many previous studies (e.g., Buller, 1986; De Neys, 2006; Sherman et al., 1998). Moreover, it is not uncommon to be focused on music when reading the news (25% of our sample reported to do so most of the time and 70% at least sometimes), or to have limited time to consume media (for instance on a daily commute or during a lunch break), and online news often shows a *time to read* above articles. Alternative manipulations of information processing could usefully be employed in future research. Finally, this study necessarily forced participants into viewing the framed stimulus articles. In reality, citizens self-select into content, which could influence information processing and effects in ways that we cannot account for in this study (e.g., Garrett, 2009).

This study provides three practical implications for news publishers. First, viewing conditions can have a meaningful influence on the effects of media visuals and text: Those who foresee debating an issue can be more influenced by a story's text, and those who are distracted can be more influenced by news images. Journalists could exploit these findings, for instance by including a debate/chat function alongside news content to encourage citizens to engage more with news. Second, those who tend to rely on visual or verbal thinking in

daily life will be more readily influenced by news images and text, respectively. This has implications for emerging online formats in which users can choose, tailor, or personalize the content and modality to their own preferences (Nguyen et al., 2017; see also [blendle.com](#)). The qualities and effects of such personalized visual political communication is a prime avenue for future research. Third, these findings have consequences for news organizations: When combined with the increasing ease with which images can be manipulated and widely distributed, the automatic and low-effort processing of news visuals could magnify the risk of misinformation effects. Therefore, the results of this study highlight the need to make verification and fact checking a fully multimodal enterprise.

Finally, this study makes several important theoretical contributions. By using manipulations and measures from the persuasion literature to shed new light on multimodal framing effects, this study connects two typically separate fields of media effects research (for a related theoretical consideration, see Chong & Druckman, 2007). This study is, to the best of our knowledge, the first to empirically position message modality in dual-processing theories of persuasion and cognition. Furthermore, this approach suggests that framing theory can be enriched by employing concepts from psychology and persuasion to complement the currently underspecified concepts of applicability and accessibility (Scheufele & Tewksbury, 2007). Indeed, rather than abandoning emphasis framing (Cacciatore, Scheufele, & Iyengar, 2016), this study shows that the paradigm can yield externally valid insights, which, when combined with well-specified constructs from broader media effects literature, equips researchers with the toolkit to study multimodal framing effects.

Notes

- 1 Some media scholars have suggested that a closer adherence to the minimal changes of equivalency framing would be possible by small manipulations to visuals associated with a text (e.g., Scheufele & Iyengar, 2012). The primary reason we do not adopt this approach is because small manipulations to visuals alone would not enable us to examine multimodal effects. In addition, as noted in the main text, it is very common to see political issues framed in a more complex manner than a single small change (e.g., de Vreese, 2005). Indeed, until now effects studies that have adopted an equivalence-style visual manipulation have tended to focus on politicians and candidates rather than issues (e.g., Bailenson, Iyengar, Yee, & Collins, 2008; von Sikorski, 2018). By using emphasis frames this study cannot contribute to this body of work, but we wholeheartedly echo the call for more work in the equivalence tradition, especially with a focus on issue framing.
- 2 Note that we consider this approach as complementary but secondary to the experimental manipulations described previously for two reasons. First, no single scale has been designed to measure one's trait position on the automatic-controlled processing continuum, thus our individual differences measures are necessarily indirect indicators of this concept. Second, such measures are, by nature, correlational and thus lacking causal inference provided by experimental manipulations. Nevertheless, we consider these steps worthwhile

because it yields novel evidence about multimodal framing effects at no extra cost to our experimental design.

- 3 And, although not a key factor in this study, the issues were differentially salient in news media at the time (Experiment 1 being less salient than Experiment 2), helping to improve generalizability (Jackson, 1992).
- 4 This was captured in a free-text response box. As an extra check, we also assessed these participants' comprehension of the article using four multiple choice answer questions (e.g., "What kind of intervention was called for in the article?", $M = 2.53$, $SD = 1.08$). These participants scored 1 out of 4 or less on this measure, suggesting their reports were accurate.
- 5 A total of \$280 was raised by the participants and donated to the International Committee of the Red Cross. All participants were recontacted and informed of this after the study.
- 6 All participants in the control processing conditions were invited to complete the follow-up survey. Of the 435 who completed the main experiment, 375 completed the follow-up survey (86%). Only those who completed the follow-up were included in the moderation analyses.

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