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The authors tested whether image-based information is more effective than text in changing implicit attitudes from positive to negative, even when both forms similarly change explicit attitudes. They studied corrective information (i.e., warnings about misleading advertising and product recall notices) because it is a common, important effort to change consumer attitudes. Corrective information in the form of pictures or imagery-evoking text, as well as direct instructions to imagine the scene, changed implicit attitudes more than plain, descriptive text, which is currently the most common warning method. Image-based stimuli can change implicit attitudes because they evoke vivid visual mental imagery of counterattitudinal valence (Experiments 1–2). Conditions that hindered the formation of visual mental imagery blocked implicit attitude change, whereas cognitive busyness did not (Experiment 3). In short, imagery-based information changed both explicit and implicit attitudes, whereas materials not based on imagery changed only explicit attitudes. Managers and regulators who aim to protect consumers from claims and products that could do harm should use image-based campaigns to best convey the message effectively.

*Keywords:* misleading advertising, product recall, implicit attitudes, attitude change, visual imagery

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## Making Warnings About Misleading Advertising and Product Recalls More Effective: An Implicit Attitude Perspective

The modern marketplace operates on the basis of voluntary exchanges between firms and consumers. Although firms aim to satisfy customers by providing high-quality goods and services, failures occur regularly because of faulty products or misleading advertising. Both these causes require alerts to consumers, and consumer protection announcements accordingly are issued frequently, whether directly by companies or by regulators such as the U.S. Consumer Product Safety

Commission (CPSC) or the Federal Trade Commission (FTC). Reports of product recalls or of misleading advertising typically appear in press releases that contain exclusively text (Darke, Ashworth, and Ritchie 2008; Dawar and Pillutla 2000; Rao and Wang 2017). The FTC's website ([www.ftc.gov](http://www.ftc.gov)) features 3,144 press releases about misleading advertising (keywords: "false," "misleading," "advertising"; search conducted September 21, 2017). Most product recall announcements by companies or by the CPSC also rely on text, often written in a dry, straightforward manner. For instance, the CPSC (2017) reported that "Sony [expanded its] recall of VAIO laptop computer battery packs due to burn and fire hazards."

In the current research, we investigate the effectiveness of current consumer alert practices. We compare text- versus image-based information effects on implicit (e.g., spontaneous, unintentional) attitudes using warnings about misleading

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advertising and product recalls as contexts. In doing so, we extend research on implicit attitude change that has primarily examined responses to verbal information (e.g., Cone and Ferguson 2015; Mann and Ferguson 2015; Rydell and McConnell 2006; for a review, see Gawronski and Sritharan 2010). Yet images are a central component of marketing communications. Furthermore, studies on the effectiveness of text- versus image-based information to change attitudes have been limited to explicit, self-reported attitudes (Wyer, Hung, and Jiang 2008). Given that both implicit and explicit attitudes independently predict behavior (Rydell and McConnell 2006), neglecting predictors of implicit attitude change means potentially missing a key driver of consumer behavior.

In line with the characteristics of visual imagery and dual-process theories, we expected image-based warnings about misleading advertising or product recalls to be particularly effective in changing implicit attitudes (Epstein and Pacini 1999; Evans 2008; Paivio 2007; Sloman 1996). We show that even when pictures and text lead to equivalent changes in explicit attitudes, warnings about misleading advertising or product recalls that rely on pictures are more effective than text in changing implicit attitudes. Our findings also establish that pictures are superior to text because they produce visual mental images (i.e., visual imagery) of counterattitudinal valence. That is, pictures can produce a representative scene in people's minds, replete with evaluative tags that modify implicit evaluations. In addition, text that creates visual imagery thus is just as effective as pictures in changing implicit attitudes.

### THEORETICAL DEVELOPMENT

#### *Implicit Attitude Change from a Dual-Process Perspective*

Explicit attitudes are evaluative judgments about a target, whereas implicit attitudes are evaluative reactions that are automatically activated upon exposure to a target. Implicit attitudes originally were conceived of as overlearned, robust memory structures that resist change (Wilson, Lindsey, and Schooler 2000). It is now clear, however, that implicit attitudes can be modified (Gawronski and Sritharan 2010). Dual-process theories suggest that there are two distinct systems of reasoning that drive consumer attitudes: System 1 processes, which are automatic, unconscious, and associative and drive implicit attitudes, and System 2 processes, which are controlled, conscious, and rule-based and drive explicit attitudes (Evans 2008; Gawronski and Bodenhausen 2006; Rydell and McConnell 2006).

Implicit attitudes reflect System 1 processing and arise from its associative nature (Gawronski and Bodenhausen 2006). They can be modified with procedures in which an attitude object is paired repeatedly with positive or negative stimuli (e.g., Gibson 2008). System 2 processes, such as cognitive dissonance or verbal negation of previous information (e.g., "X is not true"), require rule-based processing and generally do not alter implicit attitudes (Chan and Sengupta 2010; Gawronski and Bodenhausen 2006). One clever prior experiment found that explicit and implicit attitudes toward a single person could simultaneously be formed and changed in opposing directions in response to subliminal word primes and supraliminal verbal descriptions of opposite valence (Rydell et al. 2006). This result means that System 1 and System 2 can proceed independently of one another. To be sure, the two systems are not mutually exclusive (Gawronski and

Bodenhausen 2006). While System 1 processes usually influence System 2 processes, System 2 processes can, at times, influence System 1 processes. Yet for information that is mainly processed by System 2 (e.g., text) to substantially modify existing implicit attitudes, it generally needs to be extreme (e.g., learning that a person committed murder) or shown repeatedly (Cone and Ferguson 2015; Mann and Ferguson 2015; Rydell and McConnell 2006).

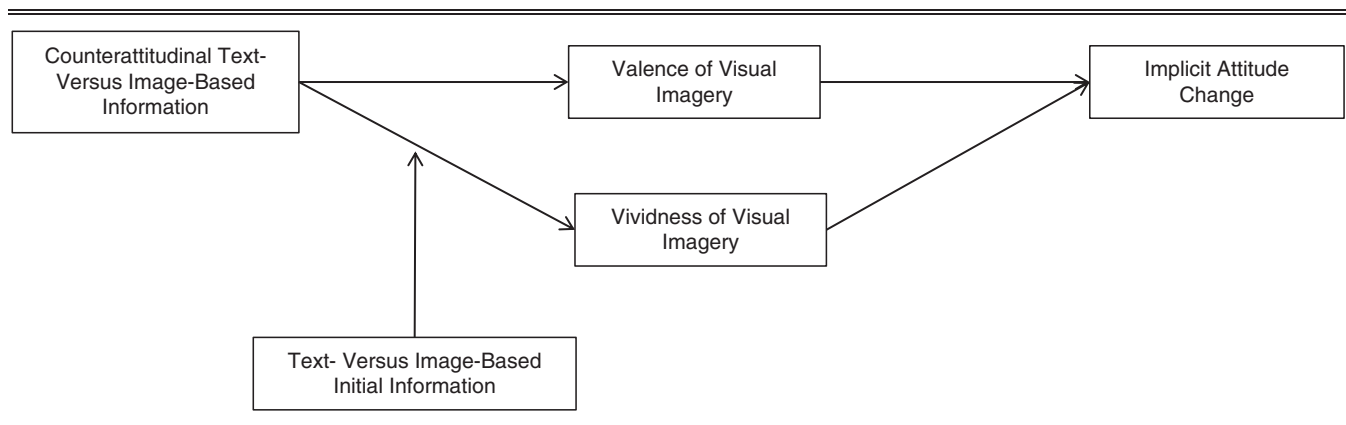
#### *The Role of Visual Imagery in Changing Implicit Attitudes*

The expectation that pictures will alter implicit attitudes more effectively than text is anchored in the characteristics of visual imagery as well as dual-process theories. Visual imagery involves image-based representations in long-term memory that can be evoked without the original stimulus (Kosslyn, Ganis, and Thompson 2001). Because it depicts specific objects or entities, "visual imagery is inherently concrete" (Amit and Greene 2012, p. 862). In particular, image-based representations in memory are more concrete than verbal representations in memory (Amit, Gottlieb, and Greene 2014; Paivio 2007). The distinction between concrete and abstract information hinges on whether the meaning of the information depends on human minds to be comprehended: concrete information (e.g., animals, buildings) does not require human minds, but abstract information (e.g., freedom, truth) relies on human minds, and often language, to establish its veracity (Hale 1988).

Dual-process theories and empirical findings indicate that System 1, which underlies implicit attitudes, is better able to comprehend concrete information than abstract information (Donovan and Epstein 1997; Epstein and Pacini 1999; Sloman 1996). Feroni and Mayr (2005) found that reading a highly detailed, concrete account changes implicit attitudes better than abstract supposition (conjuring up a hypothetical event). With the present research, we extended such work by proposing that visual imagery, as concrete information in memory, drives implicit attitude change. Furthermore, we predicted that counterattitudinal information that triggers visual imagery would be more effective in changing implicit attitudes than information that does not elicit visual imagery. In doing so, we combine previously disparate areas (i.e., visual imagery and dual-process theories) to shed light on implicit attitude change mechanisms.

Typically, pictures evoke more imagery than text (Wyer, Hung, and Jiang 2008), so they should be more effective than text in influencing visual imagery and, in turn, changing implicit attitudes. Consistent with this proposition, De Houwer and Hermans (1994) found that, compared with words, pictures are linked more closely to evaluative information. In their work, people categorized pictures or words as either "good" or "bad." They found pictures were coded faster than words. Moreover, the speed with which people could categorize pictures was not influenced by the presence of a word, whereas the presence of a picture interfered with and slowed down the categorization of words. For the same reason that pictures were expected to be superior to text in changing implicit attitudes, we expected imagery-evoking text to be more effective than non-imagery-evoking text. Imagery-evoking text can generate visual imagery, sometimes to the same extent as pictures (Unnava and Burnkrant 1991; Wyer, Hung, and Jiang 2008). Therefore, imagery-evoking text should be as effective as pictures in altering implicit attitudes.

Figure 1  
CONCEPTUAL MODEL



We also investigated which dimensions of visual imagery are central to implicit attitude change. Previous research has identified three dimensions of visual imagery: valence (i.e., the goodness or badness of visual imagery), vividness (i.e., images' clarity and liveliness), and quantity (the number of visual images evoked by a stimulus) (Bone and Ellen 1992; Miller, Hadjimarcou, and Miciak 2000; Paivio 2007).<sup>1</sup> Our proposition states that visual imagery is key in changing implicit attitudes. It implies that visual imagery valence—which is to say the goodness or badness of the mental pictures—should mediate the effect of type of counterattitudinal information (e.g., picture vs. non-imagery-evoking text) on implicit attitude change.

Vividness of visual imagery helps explain when and how mental images affect consumer behavior (Bone and Ellen 1992; Burns, Biswas, and Babin 1993; Pham, Meyvis, and Zhou 2001). Accordingly, we predicted that visual imagery vividness would account for changes in implicit attitudes, but only when consumers initially have unclear visual images about a brand. Consumers who have already been exposed to pictorial information about a brand will therefore already have vivid visual images (Burns, Biswas, and Babin 1993; Unnava and Burnkrant 1991). As a result, encountering counterattitudinal information in pictorial form should render the difference between the vividness of mental images based on existing and counterattitudinal information essentially equivalent.

In contrast, consumers who initially learn about a brand through text-based information would be expected to form mainly vague visual images (Burns, Biswas, and Babin 1993; Unnava and Burnkrant 1991). If so, then encountering counterattitudinal information in the form of pictures, as opposed to text, should heighten the vividness with which consumers mentally picture the brand. This reasoning points to the vividness of mental images as a putative mediator of implicit attitude change, implying a moderated mediation effect (Figure 1). Finally, in line with research that suggests that the vividness, rather than the quantity, of visual imagery

explains consumer reactions (Pham, Meyvis, and Zhou 2001), we did not expect the quantity of visual imagery to play a mediating role.

### *The Present Experiments*

As summarized in Table 1, we report three experiments (with three additional experiments reported in the Web Appendix) that tested the hypotheses in the contexts of warnings about misleading advertising and product recalls. Experiments 1 and 2 featured similar procedures. Participants were first given positive information about a novel brand, after which we assessed their implicit and explicit brand attitudes. Participants were then assigned to a counterattitudinal condition (i.e., unfavorable pictures, text, and imagery-evoking text), after which we reassessed participants' implicit and explicit attitudes toward the brand.

In Experiment 1, we tested and found support for the predictions that pictures and imagery-evoking text would change implicit attitudes better than text and that visual imagery valence would mediate the change in implicit attitudes. Experiment 2 showed that when people do not possess clear mental images of a brand, seeing brand-relevant pictures produces vivid mental imagery, which, with the images' valence, mediated the effect of text-based versus pictorial counterattitudinal information on implicit attitude change. In Experiment 3, we directly manipulated people's ability to visualize mental images and contrasted visual and cognitive load tasks, as both require information to be held in working memory but operate on different processes (Herdman and Beckett 1996; Körner and Volk 2014). We found that a visual load task, which prevented people from engaging in visualization, also prevented implicit attitude change from pictures, whereas a cognitive load task, which did not prevent visual imagery formation, did not block implicit attitude change. This last finding supports the contention that System 1 (i.e., automatic processes) underlies implicit attitude change from pictures. In three additional experiments, we replicated and extended main text results (Table 1). We found that instructions to imagine a scene were just as effective as seeing pictures in changing implicit attitudes and that the mediation of visual imagery valence is moderated by individual differences in visual and verbal information processing. Overall,

<sup>1</sup>Concreteness is not a dimension used to explain the effects of visual imagery because, as we have mentioned, visual images always pertain to specific entities and are therefore inherently concrete, more so than verbal representations in memory (Amit and Greene 2012).

Table 1  
STUDY SUMMARIES

Study (Sample Size)	Initial Condition(s)	Counterattitudinal Conditions (Mean Implicit Attitude Change <sup>a</sup> )	Implicit Measure	Mediator(s)	Mediators Ruled Out	Context
Experiment 1 (219)	Pictures	<ul style="list-style-type: none"> <li>• Corrective pictorial condition (M = -.30)</li> <li>• Corrective imagery-evoking text (M = -.36)</li> <li>• Corrective text (M = .01)</li> </ul>	Evaluative priming task	Valence of visual imagery	<ul style="list-style-type: none"> <li>• Vividness of visual imagery</li> <li>• Quantity of visual images</li> </ul>	Misleading advertising disclosure
Experiment in Web Appendix F (107)	Pictures	<ul style="list-style-type: none"> <li>• No disclosure (M = .03)</li> <li>• Text disclosure (M = .03)</li> <li>• Pictorial disclosure (M = -.40)</li> <li>• Instruction to use visual imagery disclosure (M = -.41)</li> </ul>	Evaluative priming task	Valence of visual imagery	<ul style="list-style-type: none"> <li>• Vividness of visual imagery</li> <li>• Quantity of visual images</li> </ul>	Ambush marketing disclosure
Experiment 2 (140)	Pictures versus text (manipulated)	<ul style="list-style-type: none"> <li>• Initial text followed by text recall (M = -.07)</li> <li>• Initial text followed by picture recall (M = -.26)</li> <li>• Initial picture followed by text recall (M = -.05)</li> <li>• Initial picture followed by picture recall (M = -.24)</li> </ul>	SC-IAT	<ul style="list-style-type: none"> <li>• Valence of visual imagery</li> <li>• Vividness of visual imagery when initial condition is text-based</li> </ul>	<ul style="list-style-type: none"> <li>• Quantity of visual images</li> <li>• Affect</li> </ul>	Product recall
Experiment 3 (139)	Text	<ul style="list-style-type: none"> <li>• Cognitive load (M = -.29)</li> <li>• Visual load (M = -.05)</li> <li>• No load (M = -.41)</li> </ul>	Evaluative priming task			Product recall
Experiment in Web Appendix N (150)	Text	<ul style="list-style-type: none"> <li>• Cognitive load (M = -.12)</li> <li>• Visual load (M = .13)</li> <li>• No load (M = -.19)</li> </ul>	Evaluative priming task			Product recall
Experiment in Web Appendix O (312)	Pictures	<ul style="list-style-type: none"> <li>• Text (<math>M_{\text{verbalizers}}^b = .03</math>, <math>M_{\text{visualizers}} = -.19</math>)</li> <li>• Picture (<math>M_{\text{verbalizers}} = -.20</math>, <math>M_{\text{visualizers}} = -.18</math>)</li> </ul>	IAT	Valence of visual imagery	<ul style="list-style-type: none"> <li>• Reinterpretation</li> <li>• Perceived diagnosticity</li> <li>• Processing fluency</li> </ul>	Misleading advertising disclosure

<sup>a</sup>Implicit attitude scores obtained from evaluative priming tasks (Experiment 1 and 3 and the experiments in Web Appendices F and N) have a theoretical minimum of -1 and maximum of +1. Implicit attitude scores obtained from IATs (i.e., D scores; Experiment 2 and the experiment in Web Appendix O) have a theoretical minimum of -2 and maximum of +2.

<sup>b</sup>The distinction between verbalizers and visualizers is based on moderation analyses using the Johnson-Neyman technique.

we consistently found that imagery-based materials changed both explicit and implicit attitudes, whereas non-imagery-based materials changed only explicit attitudes.

For all experiments, we extensively pretested counterattitudinal stimuli to ensure equivalent levels of explicit persuasiveness (resulting in equivalent levels of explicit attitude change) between conditions. These tests helped guard against concerns that image-based information may be more influential in changing implicit attitudes because it is more persuasive, as measured by explicit assessments. All experiments also tested and found that text- versus image-based information led to largely equivalent changes in explicit attitudes (Tables 2, 3, and 4).<sup>2</sup>

#### EXPERIMENT 1: PICTURES VERSUS WORDS IN CHANGING IMPLICIT ATTITUDES: THE ROLE OF VISUAL IMAGERY VALENCE

Experiment 1 studied corrective information in the context of warnings about misleading advertising (Darke, Ashworth, and Ritchie 2008). It featured three conditions, such that participants saw a corrective picture or read one of two corrective texts. One text was intended to evoke counterattitudinal visual imagery, whereas the other was not. With this design, we tested the central prediction that image-based information is more effective than text in changing implicit attitudes. The condition in which participants read imagery-evoking text was used to provide further evidence that visual imagery is key to changing implicit attitudes. We predicted that pictures and imagery-evoking text would lead to similar changes in implicit attitudes, and these changes would be greater than those prompted by non-imagery-evoking text.

<sup>2</sup>See also Web Appendix A. A meta-analysis of all six experiments that compared imagery-based conditions with conditions that did not allow for visual imagery further confirmed that there was no significant difference on explicit attitude change (Web Appendix B).

Table 2  
EXPERIMENT 1: DESCRIPTIVE AND PLANNED COMPARISONS STATISTICS

	Condition			Planned Comparisons
	Corrective Text	Corrective Picture	Corrective Imagery Text	
Explicit attitude change	-1.96 (1.88)	-1.95 (1.76)	-2.46 (2.12)	$F_{T \text{ vs. } P \text{ and } I(1, 213)} = .86, p = .36$ $F_P \text{ vs. } I(1, 213) = 3.06, p = .08$
Implicit attitude change	.01 (.46)	-.30 (.78)	-.36 (.81)	$F_{T \text{ vs. } P \text{ and } I(1, 213)} = 11.15, p = .001$ $F_P \text{ vs. } I(1, 213) = .34, p = .56$
Valence of visual images	5.01 (1.61)	4.11 (1.40)	4.19 (1.42)	$F_{T \text{ vs. } P \text{ and } I(1, 213)} = 16.22, p < .001$ $F_P \text{ vs. } I(1, 213) = .10, p = .75$
Vividness of visual images	4.75 (1.29)	4.48 (1.25)	4.43 (1.24)	$F_{T \text{ vs. } P \text{ and } I(1, 213)} = 2.71, p = .10$ $F_P \text{ vs. } I(1, 213) = .06, p = .81$
Quantity of visual images	4.43 (1.33)	4.48 (1.49)	4.27 (1.27)	$F_{T \text{ vs. } P \text{ and } I(1, 213)} = .07, p = .79$ $F_P \text{ vs. } I(1, 213) = .87, p = .35$

Notes: T = text; I = imagery text; P = picture. The “Condition” columns list means, with standard deviations in parentheses.

Table 3  
EXPERIMENT 2: DESCRIPTIVE AND ANOVA STATISTICS

	Condition				2 (Initial Condition) × 2 (Recall Condition) ANOVA Results
	Initial Text		Initial Picture		
	Text Recall	Picture Recall	Text Recall	Picture Recall	
Explicit attitude change	-4.61 (2.61)	-4.78 (2.27)	-4.56 (2.56)	-4.89 (2.26)	$F_{\text{recall}}(1, 136) = .39, p = .53$ $F_{\text{initial}}(1, 136) = .01, p = .94$ $F_{\text{interaction}}(1, 136) = .04, p = .85$
Implicit attitude change	-.07 (.34)	-.26 (.59)	-.05 (.38)	-.24 (.45)	$F_{\text{recall}}(1, 136) = 6.07, p = .01$ $F_{\text{initial}}(1, 136) = .09, p = .76$ $F_{\text{interaction}}(1, 136) = .00, p = .98$
Valence of visual images	4.32 (2.07)	3.26 (1.83)	4.62 (2.21)	4.19 (2.09)	$F_{\text{recall}}(1, 136) = 4.61, p < .05$ $F_{\text{initial}}(1, 136) = 3.08, p = .08$ $F_{\text{interaction}}(1, 136) = .80, p = .37$
Vividness of visual images	5.09 (2.05)	6.51 (1.91)	5.85 (1.84)	6.13 (1.95)	$F_{\text{recall}}(1, 136) = 6.59, p < .05$ $F_{\text{initial}}(1, 136) = .34, p = .56$ $F_{\text{interaction}}(1, 136) = 3.01, p = .08$
Quantity of visual images	5.00 (1.90)	6.18 (1.78)	5.55 (1.35)	5.94 (1.69)	$F_{\text{recall}}(1, 136) = 7.33, p < .01$ $F_{\text{initial}}(1, 136) = .31, p = .58$ $F_{\text{interaction}}(1, 136) = 1.87, p = .17$

Notes: The “Condition” columns list means, with standard deviations in parentheses.

Table 4  
EXPERIMENT 3: DESCRIPTIVE AND PLANNED COMPARISONS STATISTICS

	Condition			Planned Comparisons
	No Load	Cognitive Load	Visual Load	
Explicit attitude change	-3.21 (1.33)	-3.06 (1.71)	-3.14 (1.39)	$F_{V \text{ vs. } C \text{ and } N(1, 136)} = .00, p = .99$ $F_{N \text{ vs. } C(1, 136)} = .25, p = .62$
Implicit attitude change	-.41 (.87)	-.29 (.84)	-.05 (.60)	$F_{V \text{ vs. } C \text{ and } N(1, 136)} = 4.91, p < .05$ $F_{N \text{ vs. } C(1, 136)} = .58, p = .45$

Notes: V = visual load; C = cognitive load; N = no load. From left to right, the first three columns list means and standard deviations in parentheses. The far right-hand column details planned comparison results.

Method

*Sample and design.* Two hundred twenty-two undergraduates at a Hong Kong university (75 men) completed the experiment in exchange for HK\$40. The experiment used a 3 (condition: text vs. picture vs. imagery-evoking text) × 2 (measurement order: explicit vs. implicit attitude first) × 2 (measurement time: Time 1 and Time 2) mixed-subject

design. Implicit attitude scores for three participants who committed too many errors (more than 50% errors on critical trials) could not be computed, leaving 219 participants for the analyses.

*Stimuli and procedure.* Participants watched a slideshow with five positive ads for Arcelik, an unknown brand of dishwashers in Hong Kong (for the initial and counterattitudinal

stimuli used in Experiment 1, see Web Appendices C and D, respectively). We then measured initial implicit and explicit attitudes toward Arcelik (order counterbalanced). Next, participants read a short press release ostensibly issued by the Hong Kong Consumer Council. The beginning of the press release was similar in all conditions and mentioned that advertisements for Arcelik “have led many consumers to conclude that the advertised product was one of the highest-quality dishwashers available, but that independent testing had determined that it was actually the poorest performer on the market. Indeed, Arcelik had to recall its dishwashers due to a faulty hose clamp that caused many cases of flooding and waste of water.” In the text condition, participants then read, “Arcelik used a nylon hose clamp instead of the usual steel band. Since the nylon was of a very bad quality, the clamp often broke after a few months, causing a lot of damage.” In the picture condition, a picture of a damaged kitchen was shown. In the imagery-evoking-text condition, participants read, “Take a moment to visualize the place where you currently live... Can you see it? Now, imagine your floor under water. Your furniture soaked in water and deformed. Your moldy carpet. Your cracked floor.... That is what happened to many buyers of Arcelik dishwashers.” Participants in all conditions wrote a summary of what they learned. We again measured implicit and explicit attitudes toward Arcelik (order counterbalanced). Finally, participants rated the characteristics of their visual images and briefly described the images.

*Implicit and explicit attitude measures.* We assessed implicit attitudes with an evaluative priming measure (Fazio et al. 1995). The task briefly presents a prime stimulus (e.g., Arcelik’s logo) followed by a positive or negative target word or picture. Participants were to quickly decide whether the target was positive or negative by pressing one of two response keys. Following standard procedures, we calculated implicit attitude scores such that higher values indicated more positive implicit attitudes toward Arcelik (for the evaluative priming procedure and data preparation, see Web Appendix E). We measured explicit attitudes with the average of three items rated on a semantic differential scale (1 = “negative/unpleasant/bad,” and 9 = “positive/pleasant/good”;  $\alpha_{\text{Min}} = .91$ ).

*Qualities of visual images.* A final questionnaire instructed participants to visualize the brand and rate their visual images using nine-point scales intended to assess three qualities of mental images. One quality, valence of visual images, was assessed with three items (“negative/positive,” “unpleasant/pleasant,” and “bad/good”;  $\alpha = .95$ ). A second quality, vividness of visual images (i.e., images’ clarity and liveliness; Paivio 2007), was assessed with five items ( $\alpha = .86$ ): clarity (“fuzzy/clear”), strength (“weak/strong”), realism (“unrealistic/realistic”), liveliness (“not lively/lively and dynamic”), and level of detail (“vague/detailed”). The third quality, the perceived quantity of visual images, was measured with five items ( $\alpha = .85$ ; Bone and Ellen 1992): to what extent visual images appeared to them (“to a very small extent/very great extent”), how many images were visualized (“few or no images/lots of images”), ease with which the images were produced (“not easily at all/very easily”), speed of appearance (“not quickly at all/very quickly”), and how images appeared (“progressively/suddenly”).

## Results

*Implicit attitude change.* A 3 (condition)  $\times$  2 (measurement order) analysis of variance (ANOVA) on implicit attitude change indicated a main effect of condition ( $F(2, 213) = 5.76, p < .01$ ). Table 2 reports descriptive and planned analyses statistics. As we expected, the comparison of implicit attitude changes between the text condition and the combination of the picture and imagery-evoking-text conditions revealed a significant difference: implicit attitudes changed less in the text condition than in other conditions. One-sample t-tests (test value 0) showed that implicit attitude change was significant and negative in the picture and imagery-evoking-text conditions ( $t(148) = 5.11, p < .001$ ) but did not significantly change in the text condition ( $F < 1$ ). The magnitude of implicit attitude change did not differ between the picture and imagery-evoking-text conditions.

Measurement order did not interact with condition, even when we compared the text condition with the combined picture and imagery-evoking-text conditions ( $F < 1$ ). These results indicate that whether implicit attitudes were assessed before or after explicit attitudes, the changes in the implicit attitudes persisted in the same patterns.

*Visual imagery dimensions.* Participants reported on the visual imagery they formed using three scales. We expected the valence of the images to mediate implicit attitude change, but not vividness or quantity of images, because the initial information was pictorial. A 3 (condition)  $\times$  2 (measurement order) ANOVA on valence of visual imagery showed that valence of visual imagery differed by condition, as we predicted ( $F(2, 213) = 8.12, p < .001$ ). Measurement order did not evince a significant main effect or interact with other factors ( $F_s < 1$ ). Planned comparisons indicated that participants’ visual images of Arcelik were significantly more negative in the picture and imagery-evoking-text conditions than in the text condition (Table 2). Valence did not differ between picture and imagery-evoking-text conditions. These results demonstrated that the valence of visual imagery was altered by certain types of corrective materials, thereby suggesting that valence could mediate the relationship between type of corrective information and implicit attitude change.

Two 3 (condition)  $\times$  2 (measurement order) ANOVAs on vividness and quantity of visual images showed that these two qualities did not differ between conditions ( $F_s < 1.35$ ; Table 2). This result suggests that they should not mediate the relationship between type of corrective information and implicit attitude change.

*Mediation of valence of visual imagery.* To assess mediation, we conducted a bias-corrected bootstrap mediation analysis using 10,000 bootstraps in the PROCESS tool for SPSS (Hayes 2013).<sup>3</sup> The dependent variable was implicit attitude change toward Arcelik, with the initial implicit attitude toward Arcelik entered as a covariate. We compared the two conditions hypothesized to elicit visual imagery (picture and imagery-evoking text) with the neutral text, with valence of visual imagery as the putative mediator. The confidence interval (CI) for the indirect effect ( $-.11$ ) excluded zero (95% CI =  $[-.1834, -.0501]$ ). The direct effect was also significant

<sup>3</sup>For all mediation analyses, in all studies, we used bias-corrected bootstrap analyses with 10,000 bootstraps in the PROCESS tool for SPSS (Hayes 2013).

( $p < .01$ ) and negative ( $-.34$ ). Finally, we analyzed whether quantity and vividness of visual images could explain the effects of information type on implicit attitudes. We tested a model with three simultaneous mediators. As we expected, the only significant indirect effect was the reported valence of participants' visual images (estimate =  $-.10$ , 95% CI =  $[-.1842, -.0457]$ ). Quantity (estimate =  $-.002$ , 95% CI =  $[-.0232, .0105]$ ) and vividness (estimate =  $.002$ , 95% CI =  $[-.0148, .0345]$ ) did not mediate. Therefore, the effect of the type of corrective information on implicit attitude change was explained by the presence of unfavorable visual imagery.

### Discussion

Experiment 1 showed that, to correct misleading advertising, a corrective picture is more effective than corrective text in changing implicit attitudes. Moreover, it showed that when a corrective text is imagery-evoking it can lead to the same implicit attitude change as a corrective picture. These patterns occurred even though the three corrective conditions were equivalently effective in making explicit attitudes negative (see Table 2). Imagery-based materials changed both explicit and implicit attitudes, whereas materials not based on imagery changed only explicit attitudes. Indeed, the valence of visual imagery statistically accounted for (i.e., mediated) the change in implicit attitudes. Therefore, the type of corrective information is important for implicit attitude change insofar as it gets consumers to conjure up negative connotations of the brand in a visual way.<sup>4</sup>

### EXPERIMENT 2: WHEN VISUAL IMAGES ARE UNCLEAR INITIALLY

Experiment 2 aimed to replicate the mediating role of visual imagery valence and further sought to show that visual imagery vividness mediates the superiority of pictures over text on implicit attitude change in a specific condition—namely, when consumers have initially unclear visual images about a brand. We proposed that the reason why visual imagery vividness did not mediate implicit attitude change in Experiment 1 is that participants first learned about a brand through pictures and only then received counterattitudinal information in picture or text format. As a result, it may have been difficult to find changes in visual imagery vividness because of the visual imagery evoked by the initial information. Experiment 2 thus contrasted a condition in which the initial information was pictorial with a condition in which the initial information was text-based, and tested a moderated mediation pattern (Figure 1). We also predicted that valence would mediate the effect of counterattitudinal pictures versus text on implicit attitudes no matter the format of the initial information (Figure 1). That is, regardless of whether consumers first learn about a brand through text or pictures, their visual images should become more negative when exposed to counterattitudinal pictures than counterattitudinal text, consistent with the results of Experiment 1.

Experiment 2 also aimed to address an alternative explanation for the superior effect of image-based counterattitudinal information. Because implicit attitudes are often affect based (Gawronski and Bodenhausen 2006) and because text- and

image-based information could produce different emotional states (Jiang and Wyer 2009), we examined whether affect (i.e., feelings toward the counterattitudinal information; Pham et al. 2001), rather than valence and vividness of visual imagery, could explain why pictures are more effective than text in changing implicit attitudes.

Finally, Experiment 2 featured two design changes aimed at showing the robustness of the proposed effects. First, it altered the context of the counterattitudinal information by using the context of a product recall, which can harm a firm's reputation and financial value (Dawar and Pillutla 2000). Second, it used a different measure of implicit attitude, the Single Category Implicit Association Test (SC-IAT; Karpinski and Steinman 2006).

### Method

*Sample and design.* One hundred seventy participants in the United States (32 men;  $M_{\text{age}} = 47.3$  years) were recruited through an online panel company (Made in Surveys). The experiment used a 2 (initial information: picture vs. text)  $\times$  2 (product recall information: picture vs. text)  $\times$  2 (measurement time: Time 1 and Time 2) mixed-subject design. Thirty participants failed to remember what they learned from the product recall information (i.e., that Beifa dehumidifiers can catch fire), so their data were omitted.<sup>5</sup> Therefore, 140 participants had adequate data for the analyses.

*Stimuli and procedure.* In the initial text condition, participants first read a favorable description of a dehumidifier made by Beifa, a brand unfamiliar to participants, that included information about the firm's environmental efforts. Participants in the initial picture condition first read a short, positive, text-based description of Beifa's dehumidifier and saw five pictures illustrating Beifa's commitment to the environment (e.g., a beautiful lake; for the initial stimuli used in Experiment 2; see Web Appendices G and H). Participants summarized what they learned by responding in an open-ended format. We then measured initial explicit and implicit attitudes, in that order.

Participants next read that Beifa recalled its dehumidifiers for being flammable. For participants in the text recall condition, the text contained a written description of the failed product's consequences: "Several houses and apartments were burned because of a short circuit that disrupted the automatic humidity control, which stops and restarts the dehumidifier as necessary. As a consequence, some BEIFA dehumidifiers worked without interruption for weeks, eventually causing them to overheat and to catch fire." Participants in the picture recall condition saw a picture of a burning dehumidifier and another of a burning apartment as illustrations of the consequences (for the counterattitudinal pictures used in Experiment 2, see Web Appendix D). Then, we assessed affect and reassessed explicit and implicit attitudes, in that order.

*Measures.* For implicit attitudes, we used the SC-IAT, a computerized, quick classification task that requires participants to associate logos of Beifa with "good" or "bad" terms (for the detailed SC-IAT procedure, see Web Appendix I). We prepared the data from the SC-IAT according to the scoring algorithm developed by Greenwald, Nosek, and Banaji

<sup>4</sup>An additional study in Web Appendix F replicated these effects using a condition in which participants mentally simulated the scene described by a text.

<sup>5</sup>These participants did not answer "yes" to the statement "Beifa dehumidifiers can catch fire." We checked that participants' drop-off rates did not differ between conditions ( $ps > .45$ ). We also performed analyses without removing these participants, which altered only the significance level of results concerning vividness of visual imagery.

(2003). A negative value indicates a more negative implicit attitude toward the brand, and a positive value indicates a more positive attitude. We assessed explicit attitudes with three items (1 = “negative/unpleasant/I don’t like,” and 9 = “positive/pleasant/I like”;  $\alpha_{\text{Min}} = .93$ ). Respondents rated their visual imagery of the brand using nine-point scales. Participants rated valence ( $\alpha = .97$ ), quantity ( $\alpha = .89$ ), and vividness ( $\alpha = .95$ ) of visual imagery with the same items used in Experiment 1. Respondents reported the feelings they had when they learned that the brand manufactures flammable products on a feeling thermometer (sliding scale: 0 = “very cold and unfavorable,” and 100 = “very warm and favorable”) and on a ten-item affect scale from Pham et al. (2001; e.g., “I had unpleasant feelings reading the story,” “The story made me feel bad”; 1 = “not at all,” and 5 = “very strongly”;  $\alpha = .79$ ).

### Results

*Implicit attitude change.* A 2 (initial condition)  $\times$  2 (recall condition) ANOVA on implicit attitude change indicated a significant effect of recall condition.<sup>6</sup> Table 3 reports the descriptive and ANOVA statistics. As we expected, implicit attitudes changed more in the picture condition compared with the text condition. One-sample t-tests (test value 0) showed that implicit attitude change was significant and negative in the picture recall condition ( $t(74) = 4.17, p < .001$ ) but was not significant in the text recall condition ( $t(64) = 1.38, p = .17$ ). Initial condition did not interact with recall condition. Thus, pictures changed implicit attitudes more than text, regardless of whether consumers initially learned about the brand from pictures or text.

*Mediation of valence of visual imagery.* A 2 (initial condition)  $\times$  2 (recall condition) ANOVA on visual imagery valence showed that, as we expected, participants’ visual images were significantly more negative in the picture recall than in the text recall condition. Initial condition did not interact with recall condition and had a marginally significant main effect on visual imagery valence (Table 3). We conducted a mediation analysis with implicit attitude change as the dependent variable, recall condition (picture coded 1) as the independent variable, valence of visual imagery as the mediator, and initial implicit attitude and order of the tasks in the SC-IAT entered as covariates. The confidence interval for the indirect effect ( $-.023$ ) excluded zero (95% CI =  $[-.0629, -.0021]$ ). The direct effect was not significant ( $p = .41$ ). Therefore, implicit attitude change from picture (vs. text) recall information was explained by participants’ unfavorable visual images of the brand. We next checked whether the mediation pattern was moderated by the format of the initial condition (PROCESS Model 7, Hayes 2013). The test of mediated moderation relies on the index of moderated mediation (Hayes 2015). The 95% confidence interval for the index did include zero (95% CI =  $[-.0198, .0794]$ ) suggesting that, as we expected, the mediating path of visual imagery valence held across the picture and text initial conditions.

*Mediation of vividness of visual imagery.* A 2 (initial condition)  $\times$  2 (recall condition) ANOVA on imagery vividness showed a marginally significant interaction between initial and recall conditions (Table 3). As we expected, when initial information about the brand was in text format, visual

imagery vividness was affected by the picture recall more so than the text recall ( $F(1, 136) = 9.07, p < .01$ ). Yet when the initial information was pictorial, this difference was not significant ( $F < 1$ ). These results suggested that the vividness of visual imagery could mediate the relationship between type of recall information and implicit attitude change when the initial information was in text format, but not when it was pictorial. We again used PROCESS Model 7 (Hayes 2013) to test whether the initial information condition moderated the mediating path of vividness (Figure 1; text condition coded 0 for both the initial and recall information). The 90% confidence interval for the moderated mediation index did not include zero (90% CI =  $[.0017, .0834]$ ; 95% CI =  $[-.0015, .0955]$ ) providing (marginal) evidence for moderated mediation. As we expected, when the initial information was given exclusively through text, the 95% bias-corrected confidence interval for the indirect effect ( $-.034$ ) excluded zero (95% CI =  $[-.0932, -.0011]$ ), providing evidence for mediation on the part of vividness. In contrast, and as we expected, when initial brand information was pictorial, the 95% confidence interval included zero (95% CI =  $[-.0456, .0112]$ ). The direct effect is not significant ( $p = .36$ ). Thus, consistent with our predictions, visual imagery vividness mediated the effect of recall condition only when participants first learned about the brand in text, not in pictures.

Importantly, all the previous results hold when we controlled for valence of visual imagery or when we added it as another mediator (in parallel with vividness) in the model. Regarding quantity of visual imagery, it did not mediate the effect of recall condition on implicit attitude change (all 95% CIs included zero for the indirect effects).

*Affect.* We tested whether the information format changed feelings about the recall information, which then could explain the advantage of pictures over text in changing implicit attitudes. For both measures of affect, we conducted a 2 (initial condition)  $\times$  2 (recall condition) ANOVA. We found non-significant main effects and interactions ( $F_s < 1.05$ ). This evidence did not support affect as a potential alternate explanation.

### Discussion

Experiment 2 confirmed the mediating role of visual imagery valence in accounting for the influence of picture-based counterattitudinal information over text-based information. It further showed that visual imagery vividness mediated the effect of pictures on implicit attitude change in one specific, predicted condition: when consumers had initially unclear visual imagery about a brand. In that case, the picture product recall (vs. text) clarified participants’ mental imagery, which led to implicit attitude change, consistent with prior work (Burns, Biswas, and Babin 1993; Pham, Meyvis, and Zhou 2001). Finally, Experiment 2 tested whether feelings about the information could have been the explanatory factor. It offered no evidence to support that notion (Web Appendix J provides further evidence that affect is not an explanatory factor).

### EXPERIMENT 3: HAMPERING VISUAL IMAGERY FORMATION

Experiment 3 aimed to make considerable advances on the experiments reported thus far by using experimental manipulations to provide evidence that visual imagery plays a crucial role in implicit attitude change. Experiments 1 and 2

<sup>6</sup>Results did not change when the order of the tasks within the SC-IAT was added in the model.



manipulated factors predicted to affect visual imagery. Yet a stronger causal conclusion would come from an experiment designed to block the ability to produce visual imagery. Experiment 3 had some people learn about a product failure by viewing pictures while holding a visual pattern in memory, which created a visual load. We predicted that a visual load task, which hinders visualization (Körner and Volk 2014), would block the effectiveness of pictorial counterattitudinal information and, in turn, block implicit attitude change.

In contrast, we predicted that a cognitive load task (i.e., rehearsing a string of numbers) would not disrupt the effectiveness of counterattitudinal pictures because cognitive load does not prevent the formation of visual imagery (Körner and Volk 2014). Indeed, cognitive and visual load task share features (i.e., both require information to be held in working memory) but operate on different processes (Herdman and Beckett 1996; Körner and Volk 2014). Because System 1 (i.e., automatic processes) depends less on cognitive resources than System 2 (Evans 2008), showing that cognitive resources are not required for implicit attitude change from pictures would provide strong evidence that System 1 underlies implicit attitude changes.

### Method

*Sample and design.* One hundred fifty-one undergraduates from a major Hong Kong university (28 men) completed the experiment in exchange for HK\$40. The experiment used a 3 (condition: visual load vs. cognitive load vs. no load)  $\times$  2 (measurement time: Time 1 and Time 2) mixed-subject design. Implicit attitude scores for seven participants who committed too many errors (more than 50% errors) could not be computed. Five participants committed more than two errors on the load task, and their data were discarded (Gilbert and Hixon 1991).<sup>7</sup> In total, there were data from 139 participants for the analyses.

*Stimuli and procedure.* Participants first were exposed to a positive text-based description of a new dehumidifier from Beifa, an unfamiliar brand in Hong Kong (for the initial and counterattitudinal stimuli used in Experiment 3, see Web Appendices K and D, respectively). Using an open-ended format, participants summarized what they learned. We then measured initial explicit and implicit attitudes, in that order. Participants in the no-load condition next were informed that Beifa had to recall its dehumidifiers because they were flammable. Two pictures illustrated the negative consequences of the product catching fire. Participants in the other two conditions were instead informed that the study concerned how well people can perform two dissimilar tasks simultaneously. Participants in the cognitive load condition were instructed to hold an eight-digit number in mind; they then saw the Beifa product recall information (Gilbert and Hixon 1991). Participants in the visual load condition were instructed to hold a pattern of six dots in mind (Herdman and Beckett 1996); they then saw product recall information (for the pattern of six dots used in Experiment 3, see Web Appendix L). The number of dots was decided on the basis of a pretest that established that

the two load tasks were similar in perceived difficulty (for the pretest, see Web Appendix M). In both of these load conditions, participants were given 20 seconds to retain the information. After reviewing the Beifa product recall information, load condition participants reported the information they had mentally rehearsed. Last came the attitude measures. All participants completed explicit and implicit attitude tests, in that order.

*Measures.* For the implicit attitudes toward Beifa, we used the evaluative priming task from Experiment 1. For explicit attitudes, we used the three items from Experiment 2 ( $\alpha_{\text{Min}} = .84$ ). We assessed the perceived difficulty of the load task with two items (1 = “very easy/not at all challenging,” and 7 = “very difficult/very challenging”;  $\alpha_{\text{Min}} = .95$ ).

### Results

*Manipulation checks.* The magnitude of explicit attitude change did not differ among the three conditions (Table 4). Contrary to the pretest results, which established that the two load tasks were similar in perceived difficulty, the cognitive load task was perceived to be more difficult than the visual load task ( $M_{\text{visual}} = 2.75$ ,  $M_{\text{cognitive}} = 3.33$ ;  $t(89) = 2.18$ ,  $p < .05$ ). Although unexpected, if the visual load task felt easier than the cognitive load task, it would work against the hypothesized effect that implicit attitudes will change less when people’s minds are busy with a visual than with a cognitive load.

*Implicit attitude change.* We expected implicit attitudes toward the brand to change and become less favorable in the cognitive load and no-load conditions compared with the visual load condition, and we expected no difference between the two former conditions. For completeness, we report the omnibus interaction test and the planned comparisons, which are the direct tests of the hypotheses. An ANOVA on implicit attitude change indicated a (marginally) significant omnibus effect of condition ( $F(2, 136) = 2.76$ ,  $p = .067$ ). Planned analyses showed that, as we expected, the contrast comparing a combined factor of no-load and cognitive load conditions against the visual load condition was significant (Table 4). As we expected, implicit attitudes changed less in the visual load condition than in the other conditions. One-sample t-tests (test value 0) showed that implicit attitudes in the no-load and cognitive load conditions became more negative ( $t(94) = 4.07$ ,  $p < .001$ ), but in the visual load condition the change was not significant ( $F < 1$ ). Also as we expected, the contrast comparing the no-load condition with the cognitive load condition was not significant, showing equivalent degrees of change.

### Discussion

Experiment 3 manipulated people’s ability to picture visual imagery in the context of learning about a product recall. We found that a visual load task, which hinders visualization, neutralized the effectiveness of unfavorable pictures on implicit attitude change. Conversely, a cognitive load task, which did not prevent the formation of visual imagery, did not disrupt implicit attitude change.<sup>8</sup>

In total, these results provide further evidence in support of our theory that the formation of counterattitudinal visual

<sup>7</sup>It is not possible to know whether these participants’ high error rates came about because the mental load task was rather strong or the task was not taken seriously; Gilbert and Hixon (1991) recommend discarding these participants. All significant results were preserved when we performed analyses on all participants.

<sup>8</sup>An additional experiment in Web Appendix N replicated these results in showing that a visual load task prevented change in implicit attitudes from unfavorable pictures, whereas a cognitive load task did not impede implicit attitude change.

imagery is essential to elicit implicit attitude change from image-based information. The findings imply that cognitive resources are not required for pictures to be able to alter implicit attitudes and are therefore consistent with our contention that the mechanism by which image-based information affects implicit attitudes is anchored in the automatic system, System 1. To our knowledge, this is the first evidence that a diminution of cognitive resources does not necessarily block a change in implicit attitudes (e.g., Mann and Ferguson 2015).<sup>9</sup>

### GENERAL DISCUSSION

We drew on dual-process theories and the qualities of visual imagery to offer new insights into the efficacy of warnings about misleading advertising and product recalls. We expected that image-based information would be more effective than text in changing implicit attitudes and proposed that the advantage of image-based information is anchored in its ability to generate counterattitudinal visual imagery. The results of three experiments (with three additional experiments reported in the Web Appendix) showed that imagery-based materials changed both explicit and implicit attitudes, whereas materials not based on imagery only changed explicit attitudes (Table 1).

Experiment 1 revealed that corrective pictures or corrective imagery-evoking text were more effective in changing implicit attitudes toward a brand using deceptive advertisements than corrective text alone. This pattern was consistent, even though all corrective conditions were equally effective in changing explicit attitudes. A follow-up experiment revealed that text combined with instructions that asked participants to imagine what it implied was as effective as pictures in changing implicit attitudes, thereby confirming the central role of visual imagery (see Web Appendix F). Those two experiments also indicated that valence of visual imagery mediated the change in implicit attitudes. Experiment 2 confirmed the mediating role of visual imagery valence and showed that visual imagery vividness also mediates the superior effect of pictures on implicit attitude change, albeit in one specific condition: when consumers have initially poor vivid visual imagery about a brand. In that case, the greater vividness of visual imagery emanating from the counterattitudinal picture, compared with the counterattitudinal text, explained implicit attitude change. These results are consistent with work indicating that imagery effects are often determined by the degree to which they are vivid (Bone and Ellen 1992; Burns, Biswas, and Babin 1993). Experiment 3 directly manipulated participants' ability to form visual images. As we expected, a visual load task prevented implicit attitude change, whereas a cognitive load task did not. The cognitive load task and neutral (no-load) task led to similar degrees of implicit attitude change, a finding that supports work on dual process models and thus suggests that implicit attitude change from image-based information does not rely on deliberative cognitive processing.

An additional experiment tested a theoretically derived boundary condition (see Web Appendix O). The finding that pictures have an advantage over text in changing implicit attitudes held for people who are stronger in verbalizing

(meaning that they do not often form visual imagery when reading text), but not for people who are stronger in visualizing (who easily form visual imagery from text). This experiment also showed that visual imagery valence mediated the type of corrective information on implicit attitude change for verbalizers but not for visualizers (i.e., showing moderated mediation). The null result for visualizers attests to the ease and readiness with which they form visual images from both text and pictures.

We obtained convergent evidence that image-based information is more effective than text in changing implicit attitudes even with changes in procedure, methods, and contexts. We assessed implicit attitudes using evaluative priming, the SC-IAT, and the IAT. We used a host of stimuli including pictures of people, places, and objects. Because we found consistent evidence using multimethod approaches, this increases confidence in our findings.

### IMPLICATIONS FOR FIRMS AND ORGANIZATIONS

The results have direct practical applicability. Foremost, they question the efficacy of regulators' most commonly used strategy to disclose misleading claims—namely, press releases (Darke, Ashworth, and Ritchie 2008)—in showing that they will be less effective than imagery-based strategies (e.g., pictorial corrective information) in altering implicit attitudes. Indeed, a single piece of verbal information—again, the most common form of misleading advertising corrections—was ineffective in changing implicit attitudes. Take, for example, the FTC's press release (FTC 2016) about misleading advertising by Mars Petcare U.S. Inc., which details the deceptiveness of claims that Eukanuba dog food helps dogs live longer. Written in plain, descriptive prose, the alert is unlikely to have altered consumers' implicit attitudes. Press releases with pictures (e.g., of old, sick dogs), however, might help public officials protect consumers and punish offending advertisers.

Similarly, government agencies often announce product recalls using plain information that does not provoke visual imagery. As we mentioned previously, the CPSC reported a defective product from Sony using dull, factual text. According to our findings, this warning was unlikely to trigger negative visual imagery about the potential risks. To change implicit attitudes and protect consumers, public officials should use pictures and text that spur rich, negative visual images. The CPSC could have shown some pictures of burnt battery packs, for example.

In contrast with regulators who sometimes want to generate negative publicity toward a brand, managers facing a product recall want to limit damage to their brand. Because recalls generate negative information about a brand's performance and can harm its reputation (Dawar and Pillutla 2000), our findings might prompt brand managers to only use text recalls. Yet we caution that this strategy is not in consumers' or firms' best interests. Using text to limit the understanding of a product recall might not prevent consumers from using potentially dangerous products. The consequences can be painful and traumatic for consumers—and for the brand (Chang 2007).

Our results could explain why consumers often do not return recalled products (Chang 2007) or why warnings about misleading advertising only mildly influence the behaviors of existing consumers (Rao and Wang 2017). Indeed, we found that the most common corrective information—which does not

<sup>9</sup>Implicit attitudes can be modified under conditions requiring minimal cognitive focus (e.g., when people view repeated subliminal stimuli). However, to the best of our knowledge, all studies that manipulated cognitive processing conditions (high vs. low processing ability) reported weaker implicit attitude changes in conditions that constrain cognitive processing.

trigger visual imagery—leaves implicit attitudes unchanged, and implicit attitudes have been shown to predict many behaviors when opportunities and motivation to understand are low (Perugini, Richetin, and Zogmeister 2010), which constitutes the majority of everyday actions. Therefore, managers and regulators who want to protect consumers from problematic claims and products should use image-based campaigns.

#### FUTURE DIRECTIONS

Although our results were encouraging and generalized to different contexts, measures, and stimuli, they point the way for potential future research. A question for future work, then, is whether the processes documented here would differ if people first adopted negative attitudes and then encountered positive counterattitudinal information. On the one hand, implicit attitudes seem harder to change from negative to positive (Cone and Ferguson 2015) and, theoretically, negative information is psychologically weightier than positive information (Baumeister et al. 2001). On the other hand, we see no direct, theoretical reason why the superiority of image-based information over text information would not also hold in that case. These competing hypotheses could be a rich basis for future investigations.

Our findings suggest that the concreteness of representations in memory is key for implicit attitude change. Therefore, it is likely that the concreteness of stimuli also affects the effects of messages on implicit attitudes. Future research could confirm this assumption and assess whether abstract or concrete words and/or pictures differ in their impact on implicit attitude change.

Finally, one feature of our experimental designs included having people report on the characteristics of their visual imagery, which could have prompted participants to visualize the focal brand even if they had not done so previously. It is therefore likely that people created new visual images during the course of the experiment. This raises the question of why imagery characteristics differed for participants who were instructed to imagine the text they were reading versus other conditions (which was the case in the experiment detailed in Web Appendix F). One response is that completing measures of visual imagery is unlikely to trigger imagery as powerful as when the participant deliberately imagines a specific scene (e.g., imagining the brand as a thief). Nevertheless, the visual images created at the time of measurement may have polluted the imagery measures, which may explain why we found evidence of partial, and not full, mediation for some mediation tests. Future research could develop new techniques to assess the dimensions (valence, vividness, and quantity) of visual imagery that do not create any new mental images.

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