

# Does Your Company Have the Right Logo? How and Why Circular- and Angular-Logo Shapes Influence Brand Attribute Judgments

YUWEI JIANG  
GERALD J. GORN  
MARIA GALLI  
AMITAVA CHATTOPADHYAY

Five experiments document that the mere circularity and angularity of a brand logo is powerful enough to affect perceptions of the attributes of a product or company. It is theorized and shown that circular- versus angular-logo shapes activate softness and hardness associations, respectively, and these concepts subsequently influence product/company attribute judgments through a resource-demanding imagery-generation process that utilizes the visuospatial sketchpad component of working memory. There are no logo shape effects on attribute judgments when the visuospatial sketchpad component of working memory is constrained by irrelevant visual imagery, when people have a lower disposition to generate imagery when processing product information, and when the headline of the ad highlights a product attribute that differs from the inference drawn from the logo shape. Further, there are shape effects even when the shape is incidentally exposed beforehand using a priming technique rather than being a part of the logo itself, demonstrating the generalizability of our findings. When taken together, the results have implications for working memory, consumer imagery, and visual marketing.

*Keywords:* visual marketing, brand logo design, shape, product visualization, mental imagery, working memory

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Yuwei Jiang (yuwei.jiang@polyu.edu.hk) is associate professor of marketing, and Gerald J. Gorn (gerry.gorn@polyu.edu.hk) is chair professor of marketing, Hong Kong Polytechnic University, Hung Hom, Hong Kong. Maria Galli (maria.galli@upf.edu) is assistant professor, Universitat Pompeu Fabra, Barcelona, Spain. Amitava Chattopadhyay (amitava.chattopadhyay@insead.edu) is GlaxoSmithKline chaired professor of corporate innovation at INSEAD, 1 Ayer Rajah Avenue, Singapore 138676. The authors thank the Asian Centre for Branding and Marketing, R&D INSEAD, the Hong Kong Research Grants Council (PolyU 155030/14B, HKU 7517/12B, GRF641308, and PolyU G-UA6Z), and the Ministerio de Economía y Competitividad, Spain (ECO2012-35545), for their financial support. The authors also thank Rashmi Adaval, Rod Duclos, Anirban Mukhopadhyay, Michel Pham, Jaideep Sengupta, and Bob Wyer for their advice and comments on this research.

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Because logos are salient and foundational visual brand elements (Walsh, Winterich, and Mittal 2010), designing an effective one has become a sophisticated and expensive business (Ellis 2010). BP Amoco, for instance, spent £4.6 million on the design of its new brand logo (Davies and Paterson 2000), and the Norwegian Post Office, *Posten*, spent more than US\$55 million to renovate its logo in order to compete internationally (Watanzania 2008). Aside from financial considerations, logo changes can sometimes provoke a consumer backlash (Walsh et al. 2010). Take the GAP. It recently attempted to change to a new logo but abandoned the effort when its new logo met with a fast and furious backlash on both Twitter and Facebook. The company was seen as losing its classic image, with one fascinating *Harvard Business Review* blog

suggesting that the GAP just did not recognize the power of logo design (Haque 2010).

Notwithstanding the importance that industry attaches to choosing and using a brand logo and the consequences of missteps, research on the topic is limited, particularly in regard to how different logo shapes influence product and brand judgments. To address this gap, the present research develops and tests a framework for how one particular aspect of the shape of a logo might influence judgments. That feature is the circularity (the extent to which a logo consists of curved lines) versus angularity (the extent to which a logo consists of straight lines and sharp corners) of logos.

Our research is the first to show that circular- and angular-logo shapes can influence consumers' judgments of a product or company's attributes (e.g., the comfortableness or durability of a sports shoe, or the customer sensitivity of a services company). We show that this occurs via the activation of mental concepts of "softness" and "hardness," something that might be considered intuitive but has not been demonstrated previously.

A more important contribution of our work is the investigation of the underlying mechanism and the convergent evidence we provide for it. Building on previous research in marketing on consumer imagery (e.g., Jiang et al. 2014; MacInnis and Price 1987; Petrova and Cialdini 2005), we develop a conceptual framework for how circular- versus angular-shaped logos influence product/company attribute judgments. Central to this conceptual framework is the notion that when consumers judge a product or a company based on the information they are given, they spontaneously generate mental images related to the product or company (MacInnis and Price 1987). We show that the generation of these mental images demands resources in the visuospatial sketchpad component of working memory (Baddeley and Andrade 2000). Furthermore, we show that the nature of the mental images generated may not always be influenced solely by the product information presented; other concepts made accessible by contextual cues and applicable at the time can also play a role. For example, in the current research we show that circular- versus angular-logo shapes activate "softness" and "hardness" associations, respectively, and these concepts subsequently influence product and company attribute judgments through an imagery-generation process.

Support for this underlying mechanism is provided by investigating moderating factors that are expected to influence imagery generation. One is the capacity that individuals have in their visuospatial working memory to generate the mental images (Baddeley and Andrade 2000). A second is their processing style (Childers, Houston, and Heckler 1985), that is, the degree to which the person has a willingness/disposition to engage in mental imagery during information processing. A third is the consistency between the associations triggered by the visual elements and explicit verbal information that may be present. To our knowledge,

we are the first to distinguish between visual and verbal (phonological) working memory in a marketing context. We are also the first to demonstrate the importance of this distinction for consumer imagery and attribute judgments.

## PRIOR LITERATURE AND CONCEPTUAL FRAMEWORK

Long-standing findings in design, art, and psychology suggest that visual and verbal brand elements such as name, typeface, color, and shape are perceived not only in terms of their formal or technical properties but also in terms of their symbolic connotations (e.g., Arnheim 1974; Berlyne 1971; Chattopadhyay, Gorn, and Darke 2010; Cian, Krishna, and Elder 2014; Gorn, Jiang, and Johar 2008; Hoegg, Alba, and Dahl 2010; Klink 2003; Patrick and Hagtvedt 2011; Spence 2012). Symbolic connotations refer to properties that consumers discern in brands and products that are not actually part of the product's appearance (van Rompay, Pruyn, and Tieke 2009). The symbolic connotations associated with certain elements of a logo (e.g., its color and typeface) and with a brand name (e.g., its sound) have been found to influence both specific brand perceptions and overall brand evaluations (Hagtvedt 2011; Janiszewski and Meyvis 2001).

### Associations Activated by Circular versus Angular Shapes

While there are an almost infinite variety of possible shapes, broadly speaking, shapes can be classified as circular, angular, or a combination of the two. Circular shapes are curved and without sharp angles (e.g., an oval or a circle); angular shapes consist of straight lines and sharp corners (e.g., a triangle or a square).

In the current research, we hypothesize that circular shapes will activate a "softness" association and angular shapes a "hardness" association. Existing research in psychology provides support for this hypothesis. For example, Lundholm (1921), in a qualitative study conducted almost a century ago, asked participants to draw lines to express the affective tone of different adjectives. More angles were drawn for adjectives like "hard," "harsh," and "cruel," and more curves were drawn for adjectives like "weak," "gentle," and "mild" (see also Liu and Kennedy 1993 for similar findings in psycholinguistics).

Findings in marketing provide evidence that particular associations are activated by circular and angular shapes. For example, based on an assumption that circular shapes elicit compromise associations and angular shapes elicit confrontational associations, Zhang, Feick, and Price (2006) found that angular-shaped objects were more attractive to individuals with an independent self-construal (which is associated with a confrontational approach to conflict resolution), and circular-shaped objects were

more attractive to individuals with an interdependent self-construal (which is associated with a compromise approach to conflict resolution). More recently, [Zhu and Argo \(2013\)](#) showed that these two shapes elicit different needs. In their experiments, a circular arrangement of chairs elicited a need for belongingness, whereas an angular arrangement of chairs elicited a need for uniqueness.

## Mental Imagery and Logo Shapes

Mental imagery is the mental representation through which sensory experiences are reassembled in working memory ([MacInnis and Price 1987](#)). The construction of mental representations can be stimulated by direct experience with an object, a picture, or a verbal description.

Although an image has been depicted as analogous to a “picture in the mind” ([Kosslyn 1976](#)), mental imagery differs from an actual picture in several important ways. First, notwithstanding that most research on mental imagery has focused on visual imagery, nonvisual forms of imagery (such as auditory, olfactory, and haptic imagery) are common in everyday life (e.g., [Djordjevic, Zatorre, and Jones-Gotman 2004](#); [Hubbard 2010](#)). Nonvisual imagery is by definition different from a picture in the sense that it contains information from other sensory organs as well. There is evidence in the literature supporting the existence of auditory imagery (e.g., [Hubbard 2010](#)), olfactory imagery (e.g., [Djordjevic et al. 2004](#)), gustatory imagery (e.g., [Kobayashi et al. 2011](#)), and somatic/haptic imagery (e.g., [Peck, Barger, and Webb 2013](#)). For example, people have the ability to imagine what a perfume smells like, or what it feels like touching smooth fur or a hard wall.

Second, unlike a picture that is fixed and stable, mental images are flexible, transformable, and capable of being extended ([Kosslyn 1988](#)). Past research has shown that mentally imagined objects or events can be easily modified or distorted. For example, it has been shown that people can rotate ([Shepard and Metzler 1971](#)), enlarge ([Budesen and Larsen 1975](#)), or fold ([Shepard and Feng 1972](#)) an object within their mental imagery. The malleability of mental imagery also explains why people can imagine scenes that they may have never experienced before (e.g., hugging a polar bear) or objects that do not exist on earth (e.g., a pink elephant).

We hypothesized earlier that circular- and angular-logo shapes activate “softness” and “hardness” associations in consumers’ minds. But how do these shape-activated associations influence product/company attribute judgments? Past research on consumer imagery has suggested that consumers spontaneously generate imagery when they encounter product pictures or vivid verbal descriptions of a product ([MacInnis and Price 1987](#); [Peck et al. 2013](#)), and the imagery generated plays an important role in judgment and decision making (e.g., [Bone and Ellen 1992](#); [Dahl, Chattopadhyay, and Gorn 1999](#); [Elder and Krishna 2012](#);

[Jiang et al. 2014](#); [Petrova and Cialdini 2005](#); [Unnava and Burnkrant 1991](#)).

Given its malleability, mental imagery can be influenced by more than a product picture or verbal product information. Other cues or concepts that might be accessible and applicable at the time are also likely to have an effect. In our product judgment context, for example, we propose that it is a two-step process: (1) if a person is exposed to an ad for a product like a shoe or sofa and the product has a circular logo, the notion of softness is likely to be triggered by the logo and become mentally accessible; and then (2) the product imagery generated is likely to be influenced by the softness association, resulting in the shoe/sofa being perceived as more comfortable. If, however, the product has an angular logo, the notion of hardness is likely to become mentally accessible and the shoe/sofa imagined as more durable. Stating our hypothesis formally,

**H1:** A circular (angular) logo is likely to result in perceptions of greater product comfortableness (durability) than an angular (circular) logo.

Softness can refer to more than physical softness. Dictionary definitions of softness include such associations as “not harsh, pleasant” ([www.dictionary.com](#)). Calling a person “soft-hearted” means that s/he is “gentle, sympathetic, feels affection for” ([www.dictionary.com](#)). Given the meanings of softness in the social relationship context, one would expect that if a person is reading an ad for a services company, the notion of softness may become more mentally accessible in their mind when they are exposed to a circular logo than when they are exposed to an angular logo; and if such is the case, then one likely consequence is that the company will be imagined as being more sensitive to its customers (e.g., more caring, warmer, and kinder); such “soft standards” (e.g., customer caring and responsiveness) are critical to service quality ([Zeithaml, Bitner, and Gremler 2012](#)). Stating our hypothesis formally,

**H2:** A circular logo is likely to result in the company being perceived as more customer sensitive than will an angular logo.

## Factors Influencing Mental Imagery Generation

Across a broad spectrum of research, ability and motivation have been found to be two critical factors that shape how people react to their environment when processing information and formulating attitudinal and behavioral responses (e.g., [Anderson and Butzin 1974](#); [Darke, Chattopadhyay, and Ashworth 2006](#); [Moorman and Matulich 1993](#)). These two factors are also likely to affect visual imagery generation. More specifically, we expect people’s mental imagery capacity/ability to depend on (1) the capacity available in the individual’s visuospatial sketchpad component of working memory, and (2) the

person's chronic disposition (motivation) to generate imagery when processing information, or as Childers et al. (1985) described it, their willingness to engage habitually in imaginal processing.

*Visual Working Memory Capacity.* According to Baddeley (1992), working memory has both a phonological system (which he called "the phonological loop"), responsible for processing speech-based and numerical information, and a visuospatial system (which he called "the visuospatial sketchpad"), responsible for processing visuospatial information. Given that visuospatial working memory capacity is necessary for the generation of mental imagery, Baddeley and Andrade's (2000) research found that a concurrent visuospatial task that competed for processing capacity in visuospatial working memory with the test visuospatial task reduced the vividness of imagery associated with the test task and resulted in decreased performance on it (see also Claypool and Carlston 2002; Logie 1986; Logie, Zucco, and Baddeley 1990; Quinn and McConnell 1996 for similar findings). Drawing on this previous research, we expect that occupying a person's mind with unrelated mental imagery (visual load) at the time they are exposed to an ad containing a product with a logo will impede generation of mental images related to the product, and will diminish the effects of circular- versus angular-shaped logos on judgments.

However, because the visuospatial system is a different system in working memory than the phonological system responsible for numerical (or speech-based) memory, we do not expect the process of imagery generation to be affected by cognitive load (e.g., by a traditional cognitive-load treatment such as holding a multidigit number in mind). Thus in contrast to visual load, we expect that the effects of circular- versus angular-shaped logos on judgments will persist under cognitive load. Stating this hypothesis formally:

**H3:** Logo shape effects on attribute judgments are likely to be attenuated or eliminated under visual load but not under cognitive load.

*Predisposition to Generate Imagery.* Systematic individual differences have been found to exist in people's styles of information processing (Childers et al. 1985; Jiang and Wyer 2009; Pham, Meyvis, and Zhou 2001; Wyer, Hung, and Jiang 2008). Childers et al. (1985) suggest that some people have a greater willingness than others to use mental pictures/images habitually when they are thinking and therefore a higher motivation to engage in mental imagery processing when exposed to new information; that is, some individuals (*visualizers*) exhibit a tendency to encode information by forming mental images. Others (*verbalizers*) tend to code information linguistically. The Style-of-Processing scale constructed by Childers and colleagues (Childers et al. 1985) has often been used in previous research to capture systematic

differences in the disposition to process information visually or verbally, and to show how these differences influence judgments (e.g., Childers et al. 1985; Jiang and Wyer 2009; Pham et al. 2001).

Earlier we hypothesized that imagery generation is the process through which the effect of logo shape (a visual cue) influences product/company attribute judgments. One would thus expect that the effect would be weakened if people are less likely to generate mental images of the target (the product or the company). Therefore, similar to the case when individuals may not have the capacity to generate imagery, exposure to circular- versus angular-shaped logos should have a smaller effect on the attribute judgments by people who are less motivated to generate mental imagery in the course of processing information. Stating this expectation more formally,

**H4:** Logo shape effects on attribute judgments are likely to be attenuated or eliminated for consumers who have a lower predisposition to generate imagery in the course of processing information.

## Visual Logo Shape and Verbal Ad Headline

As mentioned, working memory has, in addition to a visuospatial sketchpad responsible for processing visuospatial information, a phonological loop responsible for processing speech-based and numerical information. The latter is of course key to marketing strategy since consumers are typically not exposed to logo cues in isolation, but rather in contexts like advertising where there is other product information. Thus it would be important to address how the mix of logo visual cues and verbal product information is integrated to affect product attribute judgments.

Consider an ad headline and the verbal statement made in it. The headline is such a critical element that advertising guru David Ogilvy described it as 80% of the ad. He mentioned the importance of conveying a benefit in it since if the headline is read, it sets the context for how the ad and the information it contains will be processed (Clark 2012). Given this, we expect an ad headline to facilitate the representation of headline-related attributes in the product imagery the consumer generates when processing the ad. Specifically, we expect that if the headline in a shoe ad makes comfortableness salient, it will facilitate the mental representation of headline-related product attributes that the circular logo induces (i.e., comfortableness), and we should observe a maintained or strengthened effect of the logo shape on perceived comfortableness; the corollary is that there will be a weakened or no logo shape effect on perceived durability, an attribute not related to the headline. Following the same logic, when the headline makes durability salient, we expect to observe a reversed data pattern, that is, the effect of logo shape on the durability judgment will be maintained or strengthened, whereas the



effect on comfortableness will be diminished. Stating this formally,

**H5a:** When an ad headline is presented together with the brand logo, the effect of logo shape on product attribute judgments is likely to be maintained or strengthened (attenuated) when the attribute associated with the logo shape is consistent (inconsistent) with the headline-highlighted product attribute.

Consistent with previous marketing research showing that information congruency/consistency results in more favorable judgments than information incongruency/inconsistency (e.g., Lee and Labroo 2004; Lee and Mason 1999), we further expect overall product attitudes to be most favorable and the dollar amount people are willing to pay for the product to be the highest when the logo shape inferences are consistent with the headline of the product ad. Stating our hypothesis formally,

**H5b:** Product attitudes will be more favorable and willingness to pay (WTP) will be higher when the association induced by the shape of the logo matches the headline of the product ad than when these two features are mismatched.

## Overview of Experiments

Our experiments investigate the influence of circular and angular logos on product and company attribute judgments, attitudes, and WTP, and the psychological mechanisms underlying these effects. Experiment 1 provides initial evidence that logo shapes influence how comfortable and durable a product (e.g., a shoe) is perceived to be (supporting hypothesis 1). Experiment 2 shows that circular and angular logos elicit associations of “softness” and “hardness,” respectively, and these associations drive the effect on product attribute judgments. Experiment 3 finds that the logo shape effect is eliminated under conditions of visual load (where imagery generation is “blocked” by competing mental images in the visuospatial working memory system), but not under conditions of cognitive load, providing causal evidence for mental imagery being the mechanism underlying our observed effects (supporting hypothesis 3). Experiment 4 provides convergent support for this mechanism by showing that the effect of circular and angular-shaped cues is attenuated when people have a lower disposition to generate imagery when processing product information (hypothesis 4); this experiment also provides support for the robustness of our shape effects on product attribute judgments with its finding that perceptions of the company’s customer sensitivity are affected when circular versus angular shapes are made salient (hypothesis 2). Experiment 5, which examines how logo shape inferences interact with the (verbal) ad headline, finds that the logo effect on attribute judgments is eliminated, and

product attributes (and WTP) are lower, when the associations induced by the logo shape are unrelated to the attribute that the ad headline focuses on (hypothesis 5).

## EXPERIMENT 1

Experiment 1 tested our basic hypothesis that circular and angular logo shapes influence consumers’ judgment of softness-related and hardness-related product attributes. We did this by presenting an ad for a product (a sports shoe) in which one of the positive attributes of the product was related to “softness” (the comfortableness of the shoe) and another one was related to “hardness” (the durability of the shoe). These two product attributes were chosen based on the results of a pretest in which 40 participants gave their opinion about the kinds of material that went into the making of a pair of comfortable shoes and a pair of durable shoes. Participants believed that comfortable sports shoes are more likely to be made of softer materials and that durable sports shoes are more likely to be made of harder materials.

Consistent with our theoretical framework, we expected that a circular logo would favorably influence perceptions of the softness-related attribute (comfortableness), whereas an angular logo would favorably influence perceptions of the hardness-related attribute (durability). To examine the degree to which circularity versus angularity drove the effects observed, experiment 1 incorporated a no-logo control condition.

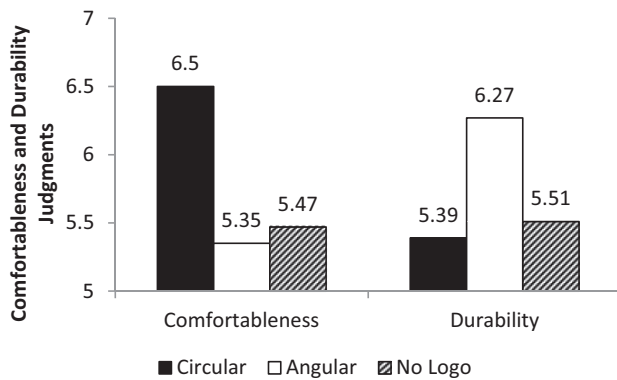
## Method

Undergraduates ( $N=109$ ) were randomly assigned to one of three logo shape conditions: circular, angular, or no logo. Participants were told that the study was about people’s ad preferences. They were shown an ad for a running shoe with the headline “Introducing the New Farber Shoes.” In the circular- and angular-logo conditions, the ads contained a picture of the shoe with the logo on both the shoe itself and at the bottom of the ad next to the Farber trademark (see appendix A and appendix B). There was no logo in the control ad condition. The ad contained no other information. The particular shoe was chosen based on a pretest indicating that it was perceived to be similar in terms of comfortableness and durability (i.e., both moderately comfortable and moderately durable).

Following exposure to the ad, participants indicated their attitude toward the shoe on three 9 point scales (1 = Bad/unattractive/poor quality, 9 = Good/ attractive/good quality;  $\alpha=.80$ ). They then indicated how comfortable (1 = Not at all comfortable, 9 = Very comfortable) and how durable (1 = Not at all durable, 9 = Very durable) they thought the shoe was.

FIGURE 1

EXPERIMENT 1: COMFORTABLENESS AND DURABILITY JUDGMENTS AS A FUNCTION OF LOGO SHAPE



## Results

We first examined participants' perceptions of comfortableness and durability. A  $2 \times 3$  mixed-measures analysis of variance (ANOVA), with comfortableness and durability treated as a repeated factor, revealed only a significant logo-shape-by-product-attribute interaction ( $F(2, 106) = 7.63$ ,  $p < .01$ ; see Figure 1). Contrasts revealed that participants rated the shoe as more comfortable in the circular-logo condition ( $M_{\text{cir}} = 6.50$ , standard deviation [SD] = 1.66) than in either the angular- ( $M_{\text{ang}} = 5.35$ ,  $SD = 1.65$ ;  $F(1, 106) = 8.17$ ,  $p < .01$ ;  $\eta_p^2 = .113$ ) or the no-logo condition ( $M_{\text{no-logo}} = 5.47$ ,  $SD = 1.26$ ;  $F(1, 106) = 8.86$ ,  $p < .01$ ;  $\eta_p^2 = .107$ ), with no difference between the latter two groups ( $F < 1$ , not significant [NS]). Participants rated the shoe as more durable in the angular-logo condition ( $M_{\text{ang}} = 6.27$ ,  $SD = 1.28$ ) than in either the circular- ( $M_{\text{cir}} = 5.39$ ,  $SD = 1.65$ ;  $F(1, 106) = 4.36$ ,  $p < .05$ ;  $\eta_p^2 = .085$ ) or the no-logo condition ( $M_{\text{no-logo}} = 5.51$ ,  $SD = 1.57$ ;  $F(1, 106) = 4.42$ ,  $p < .05$ ;  $\eta_p^2 = .054$ ), with no difference between the latter two groups ( $F < 1$ , NS).

The effect of logo shape on overall attitude was not significant ( $M_{\text{cir}} = 4.65$ ,  $SD = 1.75$  vs.  $M_{\text{ang}} = 5.01$ ,  $SD = 1.42$  vs.  $M_{\text{no-logo}} = 5.06$ ,  $SD = .96$ ;  $F < 1$ , NS).

## Discussion

Supporting hypothesis 1, the circular logo led to more favorable perceptions of comfortableness (the softness-related attribute), whereas the angular logo led to more favorable perceptions of durability (the hardness-related attribute). In addition, the results of the no-logo control condition suggested that the effect of the circularity versus angularity of the logo depended on the attribute that participants were judging. A circular logo enhanced perceptions of comfortableness but did not affect perceptions of

durability. An angular logo enhanced perceptions of durability but did not affect perceptions of comfortableness.

One might wonder why we found no effects on overall attitude. One reason might be that product (i.e., shoe) attitudes represent a more complex judgment than an attribute judgment in that it involves various other considerations (e.g., price, attractiveness of the shoe, model, etc.). Also, while comfortableness and durability are features of shoes, they may not be the most important ones when people are choosing a sports shoe. This was verified in a posttest we ran where participants indicated that by far the two most important features when choosing a sports shoe were appearance and price. As will be seen later, the only time when we expected and found a logo shape effect on overall attitude was when the ad included, in addition to the logo, explicit (verbal) information highlighting either the importance of comfortableness or the importance of durability (experiment 5).

## EXPERIMENT 2

Experiment 2 had two objectives. The first was to replicate the findings of the first experiment with a different type of logo and with a different product category. We tested the logo effect using more complex circular and angular shapes than in experiment 1 and using sofas as the product category rather than sports shoes. We also investigated whether the activated softness/hardness-related associations mediated the logo shape effect on product attribute judgments.

## Method

Undergraduates ( $N = 69$ ) were randomly assigned to one of two (circular vs. angular) logo shape conditions. Participants were told that the study was about people's product preferences, and then they were exposed to an ad for a sofa containing a picture of the product with either a circular or angular brand logo (see appendix A and appendix B) and no other information.

Following exposure to the ad, participants indicated their perception of the sofa's back cushion, seat cushion, and arms on 9 point scales (1 = Very hard, 9 = Very soft;  $\alpha = .86$ ). They then rated the product's comfortableness (1 = Not at all comfortable/cozy/"cushiony," 9 = Very comfortable/cozy/"cushiony";  $\alpha = .91$ ) and durability (1 = Not at all durable/enduring/long-lasting, 9 = Very durable/enduring/long-lasting;  $\alpha = .95$ ).

## Results

A  $2 \times 2$  mixed-measures ANOVA, with comfortableness and durability treated as a repeated factor, revealed a significant main effect of product attribute ( $F(1, 67) = 118.50$ ,  $p < .001$ ) qualified by a significant logo-shape-by-product-attribute interaction ( $F(1, 67) = 9.77$ ,  $p < .01$ ). Replicating

findings of our first experiment, participants rated the sofa as more comfortable ( $M_{\text{cir}} = 6.44$ ,  $SD = .96$  vs.  $M_{\text{ang}} = 5.85$ ,  $SD = 1.18$ ;  $F(1, 67) = 5.10$ ,  $p < .05$ ;  $\eta_p^2 = .071$ ) and less durable ( $M_{\text{cir}} = 3.43$ ,  $SD = 1.17$  vs.  $M_{\text{ang}} = 4.19$ ,  $SD = 1.34$ ;  $F(1, 67) = 6.29$ ,  $p < .05$ ;  $\eta_p^2 = .086$ ) in the circular-logo condition than in the angular-logo condition. Participants also rated the sofa as softer in the circular-logo condition than in the angular-logo condition ( $M_{\text{cir}} = 6.50$ ,  $SD = 1.17$  vs.  $M_{\text{ang}} = 5.63$ ,  $SD = 1.25$ ;  $F(1, 67) = 8.88$ ,  $p < .01$ ;  $\eta_p^2 = .117$ ).

We further tested whether perceived softness mediated the effect of logo shape on the perceived comfortableness and the perceived durability of the sofa. Consistent with expectations, using PROCESS model 4 (with 5000 bootstrapping resamples; see Hayes 2013), the effects of logo shape on both perceived comfortableness (95% confidence interval [CI],  $-.5823$  to  $-.0400$ ) and perceived durability (95% CI,  $.0813$ – $.6965$ ) were mediated by the softness/hardness perception.

## Discussion

Experiment 2 replicated the logo shape effect with different logo shapes and a different product category, demonstrating the robustness of the effect of circular/angular logos on softness/hardness associations, as well as their consequent effect on product attribute judgments. We next turn to the proposed mental imagery mechanism that we suggest underlies the logo shape effect on product attribute judgments with experiments that test the effect of two imagery-related moderators.

## EXPERIMENT 3

With hypothesis 3 we predicted that logo shape effects on attribute judgments would be eliminated or at least reduced by occupying a person's visuospatial working memory with unrelated visual imagery but not by utilizing a traditional cognitive-load manipulation, because the former would likely dampen their capacity to generate product-related mental imagery. Experimentally reducing the visual working memory capacity that would be necessary for the generation of mental imagery enables us to draw causal inferences about the role that visual imagery plays in the proposed mechanism.

## Method

U.S. participants ( $N = 306$ ) were recruited via Mechanical Turk (MTurk) and participated in exchange for a small monetary incentive. Our sample included 194 men and 112 women with an average age of 38. Participants were randomly assigned to one of a 2 (logo shape: circular or angular)  $\times$  3 (mental load: visual load, cognitive load, or no-load control) between-subjects conditions.

Participants first were exposed to a purported memory task in which they were asked to memorize different stimuli. In the *visual-load* condition, participants were shown a  $5 \times 5$  grid with an "X" in some of the cells (see appendix C) and asked to remember which cells in the table had the symbol "X" in them because at the end of this research session they would be asked to recreate the table (adapted from Logie et al. 1990). In the *cognitive-load* condition, as in previous research (e.g., Petrova and Cialdini 2005), participants were asked to remember a 10 digit number throughout the research session. In the *control* condition there was no memory task.

After the memory task, participants were shown either the circular- or angular-logo ad used in experiment 1. Then they responded to the same attitude, comfortableness, and durability measures as in experiment 1. Following this, participants in the visual-load and cognitive-load conditions completed their respective recall tasks and indicated the difficulty of the memory task and the effort they put into it on two 9 item scales (1 = Not difficult/effortful at all, 9 = Very difficult/effortful).

## Results

We first examined participants' perceptions of comfortableness and durability. A  $2 \times 3 \times 2$  mixed-measures ANOVA with comfortableness and durability treated as a repeated factor revealed a significant logo-shape-by-product-attribute interaction ( $F(2, 300) = 18.05$ ,  $p < .001$ ). Most importantly, the three-way interaction among logo shape, type of mental load, and product attribute was significant ( $F(2, 300) = 4.88$ ,  $p < .01$ ; see Figures 2a and 2b).

We examined the different mental-load conditions separately. First, replicating our previous findings, in the control condition a  $2 \times 2$  ANOVA on participants' perceptions of comfortableness and durability revealed only a significant two-way interaction between logo shape and product attribute ( $F(1, 300) = 14.48$ ,  $p < .001$ ). Contrasts revealed that in the no-load control condition, participants rated the shoe as more comfortable when the logo was circular ( $M_{\text{cir}} = 6.02$ ,  $SD = 1.58$ ) as compared to angular ( $M_{\text{ang}} = 5.31$ ,  $SD = 1.76$ ;  $F(1, 300) = 6.61$ ,  $p < .05$ ;  $\eta_p^2 = .043$ ), and participants rated the shoe as more durable when the logo was angular ( $M_{\text{ang}} = 6.02$ ,  $SD = 1.66$ ) as compared to circular ( $M_{\text{cir}} = 5.23$ ,  $SD = 1.63$ ;  $F(1, 300) = 7.90$ ,  $p < .01$ ;  $\eta_p^2 = .054$ ).

In the cognitive-load condition, a  $2 \times 2$  ANOVA on participants' perception of comfortableness and durability similarly revealed a significant two-way interaction between logo shape and product attribute ( $F(1, 300) = 13.69$ ,  $p < .001$ ). Contrasts revealed that in the cognitive-load condition, participants rated the shoe as more comfortable when the logo was circular ( $M_{\text{cir}} = 6.18$ ,  $SD = 1.53$ ) than when it was angular ( $M_{\text{ang}} = 5.45$ ,  $SD = 1.89$ ;  $F(1, 300) = 6.52$ ,  $p < .05$ ;  $\eta_p^2 = .044$ ), and they rated the shoe as more durable when the logo was angular ( $M_{\text{ang}} = 5.98$ ,

FIGURE 2A

EXPERIMENT 3: COMFORTABLENESS JUDGMENTS AS A FUNCTION OF LOGO SHAPE AND MENTAL LOAD

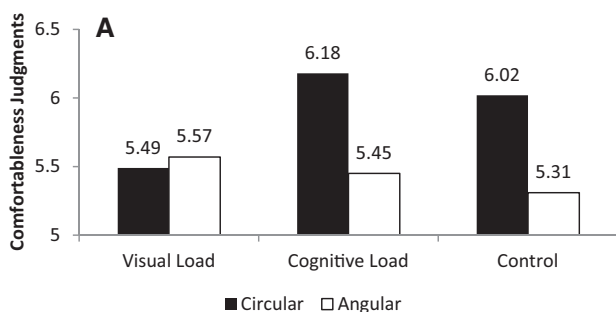
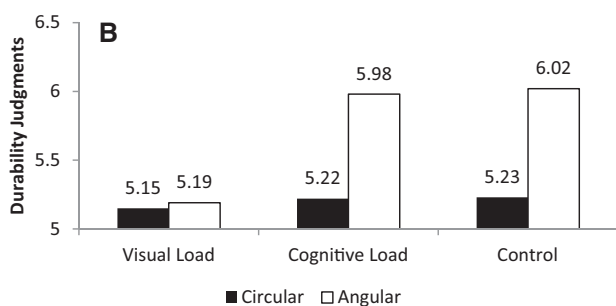


FIGURE 2B

EXPERIMENT 3: DURABILITY JUDGMENTS AS A FUNCTION OF LOGO SHAPE AND MENTAL LOAD



SD = 1.60) than when it was circular ( $M_{\text{cir}} = 5.22$ , SD = 1.39;  $F(1, 300) = 7.18$ ,  $p < .01$ ;  $\eta_p^2 = .062$ ).

In the visual-load condition, consistent with expectations, there was no interaction effect between logo shape and product attribute on participants' perception of comfortableness and durability, and also no main effect of logo shape ( $F$ 's  $< 1$ , NS).

Similar to experiments 1 and 2, a  $2 \times 3$  ANOVA on the attitude index ( $\alpha = .86$ ) with logo shape and type of mental load as independent variables revealed no significant interaction or main effects ( $p$ 's  $> .34$ ). Finally, participants rated the cognitive-load task as more difficult ( $M = 5.85$ , SD = 2.39) than the visual-load task ( $M = 4.43$ , SD = 2.38;  $F(1, 198) = 17.77$ ,  $p < .001$ ) and indicated that they spent more effort on the cognitive-load task ( $M = 6.41$ , SD = 2.11) than on the visual-load task ( $M = 5.25$ , SD = 2.41;  $F(1, 198) = 13.15$ ,  $p < .001$ ), rendering less viable an alternative explanation of our results based on the visual-load manipulation being a more resource-demanding treatment.

### Posttest

One alternative explanation of the results of experiment 3 is that instead of interfering with the imagery-generation

process, the visual load blocked participants from even encoding and processing the visual information in the ad (i.e., what the shoe looked like and the brand logo). Such blocking could have potentially accounted for the lack of logo effects in the visual-load condition. If correct, it would be expected that participants would have poorer recall of the visual information in the ad because the encoding and processing of this information would have been blocked by the visual load. To investigate this possibility, we ran a posttest.

Undergraduate participants ( $N = 165$ ) were randomly assigned to one of a 2 (logo shape: circular or angular)  $\times$  3 (mental load: visual load, cognitive load, or no-load control) between-subjects conditions. They went through the same procedures as participants in the main study, except that in the end, instead of evaluating the shoe, participants were asked to (1) draw the ad on a piece of paper based on their memory, and (2) classify the shape of the brand logo they just saw on the ad into one of the following four categories: circle, oval, square, or rectangle.

A research assistant blind to our research hypotheses rated each participant's drawing as being in one of the two categories: similar to the ad they saw or dissimilar to the ad they saw. Since our theoretical predictions centered on circularity or angularity of the logo, participants' logo classification responses were coded as accurate if they selected "circle" or "oval" in the circular condition and "square" or "rectangle" in the angular condition. Otherwise they were coded as inaccurate. Logistic regressions confirmed that there were no significant main effects of logo shape ( $p$ 's  $> .10$ ) or type of load ( $p$ 's  $> .27$ ), or significant interaction effects ( $p$ 's  $> .31$ ). Participants showed similar levels of drawing accuracy ( $M_{\text{visual-load}} = 70\%$ ;  $M_{\text{cognitive-load}} = 69\%$ ;  $M_{\text{no-load}} = 65\%$ ) and highly accurate and similar memories regarding the logo shape across different load conditions ( $M_{\text{visual-load}} = 91\%$ ;  $M_{\text{cognitive-load}} = 87\%$ ;  $M_{\text{no-load}} = 87\%$ ). The null effect of visual load on participants' memory of the visual information in the ad suggests that participants' encoding and processing of visual information was not impeded in the visual-load condition.

### Discussion

Consistent with hypothesis 3, the results supported the notion that logo shape effects on attribute judgments would be reduced when participants must simultaneously keep other visual information in mind (the visual-load condition), but not when they have to keep a 10 digit number in mind (the cognitive-load condition). This finding provides support for our proposed two-step process that drives the effect of logo shape on attribute judgments: (1) exposure to a circular (angular) logo triggers the notion of softness (hardness), making it mentally accessible; and then (2) the product imagery generated is influenced by the softness



(hardness) association, resulting in the product being perceived as more comfortable (durable). Had it been a simple association process, with the circle (square) eliciting the softness (hardness) association, and the latter influencing perceived comfortableness (durability) directly, then the imagery load should not have eliminated the effect of logo shape on comfortableness/ durability judgments, but it did.

In addition, our posttest suggested that the competing visual task did not influence participants' encoding and processing of the visual information in the ad, including the logo. Instead it appeared to reduce participants' capacity to generate product-related imagery.

## EXPERIMENT 4

The objectives of experiment 4 are threefold. The first was to provide convergent support for mental imagery as the proposed underlying mechanism. To do this, we incorporated imagery-generation predisposition as a moderator. If mental imagery is essential for the logo effect to occur, we would expect the logo effect to decrease for people whose predisposition to generate mental imagery is lower.

Experiment 4 also tried to advance our understanding of the observed effect in another manner. In the previous experiments, visual shapes were varied by manipulating the shape of the brand logo in the ad. However, if our theoretical predictions are correct, they should hold for any circumstances under which the shape is made salient, irrespective of whether or not it is integrated into the ad or shown on the product. In other words, any circumstance that makes circular or angular shapes salient should have the same effect on attribute judgments. Thus even incidental exposure to visual shapes (those that might be unrelated to the product) should be effective in activating the relevant associations and influencing the imagery-generation process. We test this possibility in the current experiment by using a long established operation to increase salience, namely priming.

A third purpose of experiment 4 was to generalize our findings beyond physical product perceptions by investigating perceptions of a service. A critical aspect of service quality is the extent to which service employees make the effort to understand the customer's needs (Parasuraman, Zeithaml, and Berry 1985). It is both intuitive and has been shown in extensive research that perceived customer sensitivity (i.e., to what extent the company cares about its customers' feelings and welfare) has a powerful influence on perceptions of a company. One dictionary definition of "soft" is "emotionally involved"; calling a person "soft-hearted" means that s/he is "gentle, sympathetic, feels affection for" (www.dictionary.com). Given this definition, in a service context we would expect that circular and angular shapes are likely to influence

consumers' judgment of how customer sensitive the company is perceived to be.

## Method

A total of 95 U.S. participants were recruited via MTurk and participated in exchange for a small monetary incentive. Our sample included 58 men and 37 women with an average age of 33. Participants were randomly assigned to one of the two between-subjects shape-priming (circular vs. angular) conditions.

Participants first completed a purported logo evaluation task for a logo database in which they were asked to view a series of 12 different brand logos and judge each one in terms of color scheme and overall design on 9 point scales (1 = Very bad, 9 = Very good). In the *circular shape-priming* condition, participants evaluated 12 circular logos; whereas in the *angular shape-priming* condition, all logos presented were angular (for examples, see appendix A).

Participants then read a scenario in which a person (Kevin) tried to board an airplane with overweight luggage. In the scenario, the airline (Fly Airways) that Kevin booked his flight with was described as a very large low-fare airline in Europe having both domestic and international routes. Participants were asked to assume that one of their friends, Kevin, was taking his first flight on Fly Airways. Kevin wanted to take his carry-on luggage on board with him, but at the check-in counter he was told that it exceeded the 8 kg carry-on weight limit of Fly Airways by 2 kg. Since his carry-on was the only luggage he had, Kevin did not want to check it. Participants were asked what the reaction of the airline would be given that Kevin did not want to check his bag. After reading the scenario, participants indicated their perception of Fly Airways' customer sensitivity: how willing (1 = Not willing at all, 9 = Very willing) they thought Fly Airways would be to listen to Kevin's explanation, show empathy toward Kevin, and attempt to accommodate Kevin's request ( $\alpha = .90$ ).

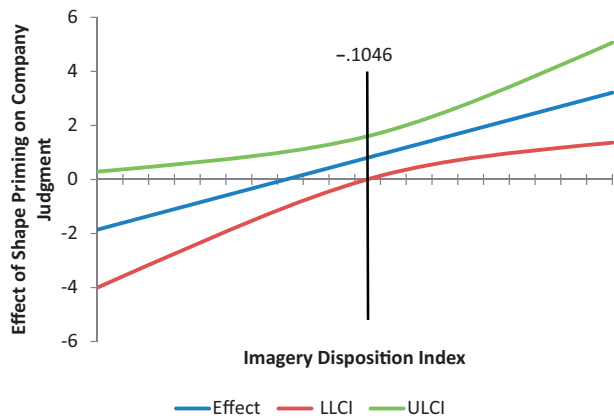
Participants then completed the visual subscale of the Style-of-Processing (SOP) scale (Childers et al. 1985). This scale contains 11 items assessing respondents' chronic disposition for engaging in mental imagery when processing information (e.g., "My thinking often consists of mental 'pictures' or images"), and its construct validity has been documented in the past literature (e.g., Childers et al. 1985; Jiang and Wyer 2009; Pham et al. 2001).

## Results

Participants in the circular and angular shape-priming conditions judged the logos as equally good in terms of their color scheme ( $M_{\text{cir}} = 5.78$ ,  $SD = .87$  vs.  $M_{\text{ang}} = 5.90$ ,

FIGURE 3

EXPERIMENT 4: EFFECT OF SHAPE PRIMING AND IMAGERY DISPOSITION ON COMPANY JUDGMENT



LLCI = lower level confidence interval; ULCI = upper level confidence interval.

$SD = .93$ ;  $F < 1$ , NS) and overall design ( $M_{\text{cir}} = 5.69$ ,  $SD = .96$  vs.  $M_{\text{ang}} = 5.65$ ,  $SD = .86$ ;  $F < 1$ , NS).

Participants' scores on the visual SOP scale ( $\alpha = .74$ ) were summed and standardized to build an index for their imagery disposition. We then regressed customer sensitivity on shape priming (operationalized as a dummy variable; 1 = Circular and 0 = Angular), imagery disposition, and their interaction term. Replicating our findings in previous experiments, consistent with hypothesis 2, we observed a significant main effect of shape priming: specifically, participants believed that the airline company would be more customer sensitive after they were primed with circular shapes than after they were primed with angular shapes ( $\beta = .91$ , standard error [SE] = .40;  $t(91) = 2.28$ ,  $p < .05$ ). More importantly, consistent with our expectation, there also was a significant interaction effect between shape priming and imagery disposition ( $\beta = 1.10$ , SE = .40;  $t(91) = 2.75$ ,  $p < .01$ ).

Since imagery disposition was a continuous variable, to explore this interaction we used the Johnson-Neyman "floodlight" approach recommended by Spiller et al. (2013). As depicted in Figure 3, the positive effect of shape priming on customer sensitivity was significant only for participants with a standardized imagery disposition index higher than  $-.1046$  (38.2 if nonstandardized;  $B_{\text{JN}} = .80$ , SE = .40,  $p = .05$ ). As expected, results of the floodlight analysis confirmed that participants who have a relatively higher disposition to engage in mental imagery—those who are more likely to imagine the service encounter—were influenced more by the shape priming.

## Discussion

As expected, consumers' chronic disposition to engage in mental imagery moderated the effect of visual shape on product attribute. Specifically, there was only a significant positive effect of shape priming on company judgment for consumers with higher imagery disposition levels. This is consistent with mental imagery as the underlying mechanism.

In addition, we used priming with shapes at large instead of the brand logo to induce the visual shape effect. This suggests that the shape does not need to be conceptually related to the product. Incidental exposures to circular and angular shapes are powerful enough to induce the shape effect we observed.

## EXPERIMENT 5

Experiment 5 examined the possible interaction effects between the (verbal) ad headline and the associations induced by the logo's shape. Following hypothesis 5a, in our shoe ad context we expected a (circular vs. angular) logo shape effect on perceived comfortableness when the headline made comfortableness salient, and a (circular vs. angular) logo shape effect on perceived durability when the headline made durability salient. In contrast, we expected the logo shape effect on perceived comfortableness to be diminished when the ad headline focused on durability, and its effect on perceived durability to also be diminished when the headline focused on the shoe's comfortableness.

We further expected that the logo shape would result in more favorable product attitudes and higher WTP for the product if the inferences that a person drew from it were consistent with (i.e., matched) versus not consistent with (i.e., did not match) the attribute(s) highlighted in the ad headline (hypothesis 5b).

## Method

Undergraduates ( $N = 231$ ) were randomly assigned to one of a 2 (logo shape: circular vs. angular)  $\times$  2 (ad headline: comfortableness vs. durability) condition. Participants were told that the purpose of the study was to examine consumers' preferences for different types of ads and that they would see one of them.

The ad was similar in design to the ads used in experiments 1 and 3, but this time the verbal headline focused on a specific attribute (comfortableness or durability), supported by verbal ad copy consistent with it. In the comfortableness headline condition, the shoe in the ad was described as smooth and comfortable, with a tread designed for shock absorption and reduction of foot fatigue. In the durability headline condition, the shoe in the ad was

described as rugged and durable, with a tread designed for traction and a long life (see appendix B).

Following ad exposure, participants' attitudes were measured using the same three items as in previous experiments ( $\alpha = .73$ ). They were then asked how much they would be willing to pay for a pair of Farber shoes (in HK\$; 1US\$  $\approx$  7.76HK\$). Finally, perceived comfortableness and durability were measured using the same scales as in the previous experiments.

## Results

We first examined participants' perceptions of the comfortableness and durability of the shoe as a function of logo shape and ad headline. As expected, a  $2 \times 2 \times 2$  mixed-measures ANOVA revealed a significant two-way interaction between logo shape and ad headline ( $F(1, 227) = 7.74$ ,  $p < .01$ ) but no main effects. Not surprisingly, the two-way interaction between ad headline and product attribute was also significant ( $F(1, 227) = 4.21$ ,  $p < .05$ ). We next examine participants' perceptions of comfortableness and durability.

The only effect significant for comfortableness judgment was the interaction between ad headline and logo shape ( $F(1, 227) = 7.10$ ,  $p < .01$ ). Consistent with hypothesis 5a, contrasts revealed that in the comfortableness headline condition, the shoe was rated as more comfortable when the logo was circular ( $M_{\text{cir}} = 6.97$ ,  $SD = 1.00$ ) than when it was angular ( $M_{\text{ang}} = 6.45$ ,  $SD = 1.25$ ;  $F(1, 227) = 7.09$ ,  $p < .01$ ;  $n_p^2 = .030$ ), but in the durability headline condition, the difference in perceived comfortableness was not significant ( $M_{\text{cir}} = 6.61$ ,  $SD = .95$  vs.  $M_{\text{ang}} = 6.83$ ,  $SD = 1.01$ ;  $F(1, 227) = 1.24$ ,  $p > .27$ ).

Regarding judgments of durability, there was a significant main effect of ad headline ( $F(1, 227) = 4.70$ ,  $p < .05$ ), which was qualified by a significant logo-shape-by-ad-headline interaction effect ( $F(1, 227) = 4.10$ ,  $p < .05$ ). Again, consistent with hypothesis 5a, contrasts revealed that in the durability headline condition, the shoe was rated as more durable when the logo was angular ( $M_{\text{ang}} = 6.95$ ,  $SD = 1.33$ ) than when it was circular ( $M_{\text{cir}} = 6.50$ ,  $SD = 1.36$ ;  $F(1, 227) = 3.40$ ,  $p < .07$ ;  $n_p^2 = .015$ ), but in the comfortableness headline condition, the difference in durability ratings was not significant ( $M_{\text{cir}} = 6.48$ ,  $SD = 1.35$  vs.  $M_{\text{ang}} = 6.23$ ,  $SD = 1.13$ ;  $F(1, 227) = 1.02$ ,  $p > .31$ ).

As expected, there were no main effects on the overall attitude index, but, as predicted, there was a logo-shape-by-ad-headline interaction ( $F(1, 227) = 17.45$ ,  $p < .001$ ). Consistent with hypothesis 5b, contrasts revealed that in the comfortableness headline condition, the shoe was liked more when the logo was circular ( $M_{\text{cir}} = 6.50$ ,  $SD = .97$ ) than angular ( $M_{\text{ang}} = 5.82$ ,  $SD = 1.04$ ;  $F(1, 227) = 13.29$ ,  $p < .001$ ;  $n_p^2 = .104$ ); and in the durability headline

condition, the shoe was liked more when the logo was angular ( $M_{\text{ang}} = 6.33$ ,  $SD = .89$ ) rather than circular ( $M_{\text{cir}} = 5.95$ ,  $SD = 1.00$ ;  $F(1, 227) = 5.12$ ,  $p < .05$ ;  $n_p^2 = .040$ ).

As expected, the WTP effect mirrored the attitude effect. Only the interaction effect was significant ( $F(1, 227) = 12.54$ ,  $p < .001$ ). In the comfortableness headline condition, participants were willing to pay more when the logo was circular ( $M_{\text{cir}} = \text{HK\$}284$ ,  $SD = 113$ ) than when it was angular ( $M_{\text{ang}} = \text{HK\$}232$ ,  $SD = 116$ ;  $F(1, 227) = 8.74$ ,  $p < .01$ ;  $n_p^2 = .051$ ). Also, as expected, in the durability headline condition, they were willing to pay more when the logo was angular ( $M_{\text{ang}} = \text{HK\$}281$ ,  $SD = 143$ ) rather than circular ( $M_{\text{cir}} = \text{HK\$}230$ ,  $SD = 90$ ;  $F(1, 227) = 4.32$ ,  $p < .05$ ;  $n_p^2 = .045$ ).

We tested for moderated mediation to see if the effect of logo shape on overall attitude was mediated by perceived comfortableness and durability in different ad headline conditions.—Consistent with our expectation, using PROCESS model 7 (with 5000 bootstrapping resamples; see Hayes 2013), we confirmed significant moderated mediation models for both comfortableness (95% CI, .0994–.6836) and durability (95% CI, .0066–.2414). Specifically, in the comfortableness headline condition, comfortableness (95% CI,  $-.4669$  to  $-.0625$ ) but not durability (95% CI,  $-.1161$  to  $.0167$ ) mediated the effect of logo shape on attitude. In contrast, in the durability headline condition, durability (95% CI,  $.0007$ – $.1651$ ) but not comfortableness (95% CI,  $-.0572$  to  $.3108$ ) mediated the effect of logo shape on attitude.

## Discussion

Experiment 5 extends our understanding of the effect of logo shape by providing evidence that the product imagery generated in visual working memory is likely to interact with the product information processed in the phonological loop of working memory (i.e., how the product is positioned in the headline and ad copy). Consistent with hypothesis 5a, the effect of logo shape on attribute judgments depended on whether the salient attribute that the ad headline focused on was comfortableness or durability.

Downstream judgments such as overall product attitude and WTP for the product were affected as well. Insight into the processes involved in the shaping of downstream judgments was provided by the mediation results, with perceptions of comfortableness mediating the logo shape effect when the ad focused on the shoe's comfortableness, and perceptions of durability mediating it when the ad focused on the shoe's durability. These results support our reasoning that the shape of a brand logo can boost product attitudes and WTP, provided that the inferences drawn from it

are consistent with the way the product is positioned in a marketing initiative like an ad.

## GENERAL DISCUSSION

The current research concentrated on a basic, potentially eye-grabbing feature of logos: their shape. It showed that the mere circularity/angularity of a logo is powerful enough to influence the inferences that consumers draw about products and the attitudes they have toward them. Looking across the five reported experiments using various circular and angular shapes, different products, and also a service, the results converged in support of our proposed mental imagery mechanism. The first two experiments showed that a circular (angular) brand logo activated mental associations related to “softness” (“hardness”), and these activated associations subsequently influenced product and company attribute judgments. The rest of the article then examined how exactly these associations influence consumer judgments. We proposed mental imagery as the underlying mechanism driving the effect of logo shape on consumer judgments. That is, consumers spontaneously generate product- or company-related imagery when processing the information, and shape-activated associations are utilized in the course of imagery generation. Convergent support for the proposed mental imagery process was obtained from two experiments: one showing that the logo shape effects were eliminated under conditions of visual load but not cognitive load (because only the former type of load constrained the available resources in visuospatial working memory necessary for imagery generation); and the other showing that the shape effect was reduced when people had a lower chronic predisposition to generate mental images. Our last experiment demonstrated the interactive effect of the logo shape and the verbal positioning of the product in the ad on both attribute judgments and overall consumer attitudes.

The fact that visual shapes influence judgment may not be surprising news for consumer researchers. Previous literature on this topic (e.g., Zhang et al. 2006; Zhu and Argo 2013) has identified various specific mental associations activated by shapes and investigated how they influence attitudinal and behavioral responses. We attempt to further understanding by focusing on the underlying mechanism. Specifically, we focus on what happens at the working memory level and how shapes influence product-related imagery generated in visuospatial working memory and their downstream effects on attribute and attitude judgments.

To our knowledge, we are the first to introduce the concept of visuospatial working memory into the marketing literature and demonstrate the impact of mental imagery capacity and imagery predisposition on visual marketing

effects. This is important because, even though the concept of imagery has been in the marketing literature for decades (e.g., Jiang et al. 2014; MacInnis and Price 1987; Petrova and Cialdini 2005), the imagery-generation process itself has not been discussed or empirically examined in a systematic way. By isolating the two components of working memory and then independently influencing the capacity of each, our work contributes toward articulating the characteristics of imagery generation. Specifically, the results of experiment 3—where we independently manipulated the availability of mental resources in the visuospatial sketchpad and the phonological loop, by utilizing visual and verbal load, respectively—show that the availability of sufficient mental resources in visuospatial working memory is necessary for imagery generation, since our logo shape effects were eliminated when there was a concurrent visual load task, but not when there was a verbal load task. Thus using Bargh’s (1994) widely accepted definition of automatic processes, imagery generation may not always be automatic because the imagery-generating process in our experiments was not efficient (i.e., it still required processing resources). Our findings thus can serve as a springboard for future research examining the characteristics of mental imagery more fully, since we did not examine whether the other characteristics of automatic processing (i.e., awareness, intention, and control; Bargh 1994) are necessary for imagery generation.

With its focus on predisposition to generate mental imagery, experiment 4 provided convergent evidence for imagery as the proposed underlying mechanism. We found that, independent of imagery capacity, people’s chronic disposition to generate imagery also moderated the shape effect on attribute judgment. This provides additional evidence testifying to the importance of people’s chronic processing style in understanding how visual marketing information is processed and its consequent effects on consumer decision making (Bloch, Brunel, and Arnold 2003; Childers et al. 1985; Peck and Childers 2003; Wyer et al. 2008).

Existing literature on working memory has focused exclusively on how the two components of working memory, the visuospatial sketchpad and the phonological loop, interact to affect attention and task performance (e.g., Baddeley 1992, 2012; Baddeley and Andrade 2000). We extend this literature with our experiment 5 to show how these two components of working memory might interact to influence attribute judgments, attitudes, and behavioral intention (WTP) in an advertising context. Experiment 5 shows that attribute judgments are more influenced, and attitudinal and behavioral responses more positive, when the information processed in the two working memory systems is mutually supportive, that is, both systems focus on



information or inferences about the same attribute (e.g., comfortableness), as opposed to one system providing information/inferences about one attribute (e.g., comfortableness) and the other system doing it for another positive attribute (e.g., durability). We speculate that the most reasonable interpretation of our results is that once the verbal headline in an ad positions the product, unrelated visual (logo) cues are likely to be less important, and potentially disruptive.

Existing visual marketing research has focused on the impact of visual characteristics of marketing stimuli such as the shape (Bloch 1995; Zhang et al. 2006), color (Chattopadhyay et al. 2010; Gorn et al. 1997; Labrecque, Patrick, and Milne 2013), or aesthetic design (Henderson and Cote 1998) of a product or brand logo. In experiment 4, we used a priming method instead of a brand logo to induce the visual shape effects. The fact that we replicated the findings of our previous experiments in experiment 4 suggests that the shape does not have to be on the product itself, or exposed to people simultaneously like in an ad, to obtain shape effects on judgments. Using the classic priming paradigm, our experiment 4 results suggested that as long as the shape-related associations are activated in mind, they will become accessible, and they will be diagnostic in the generation of product imagery and in subsequent judgments if they are relevant. The findings advance our insight into how shapes affect judgments, in addition to having a broader practical implication by pointing to the possibility of using incidental shape exposure in marketing communications to create favorable product perceptions.

Our research contributes to the congruency literature by showing that congruency not only applies to the information provided by product pictures and verbal descriptions, but also applies to the inferences induced by a visual (logo) shape and their effect on downstream product attribute and attitude judgments. It also extends previous research on logo recognition and liking (Henderson and Cote 1998; Henderson et al. 2003; van der Lans et al. 2009) by showing that logo features can affect product and company attribute judgments, and how it does so. The soft versus hard associations elicited by circular and angular shapes, respectively, are found to be critical to the evaluation of physical product attributes (comfortableness and durability) and nonphysical attributes (a company's customer sensitivity).

We recognize that brand logos usually are complex stimuli composed of multiple visual elements (e.g., shape, typeface, color) through which meaning is communicated. Our research focus was on theory testing, and hence we restricted our examination to the specific influence of one element (circularity/angularity), controlling for other style elements. In the real world, however, logos are typically more complex than the ones we tested, and the symbolic associations induced by them are likely to vary depending on context. Take, for example, the (angular) cross-shaped logos frequently used by Christian organizations and hospitals. The meaning of the cross shape and the associations it is likely to induce will be different in the two cases. This is just one of many potential future research topics. Given the value and emphasis that organizations place on their logos (sometimes to the point of litigation if their logo trademark is infringed on—see, for example, Adidas, which has sued a number of companies for infringement of its “three stripes”; Marinovich 2006), more research in this area is certainly called for.









How does a company decide on the shape it will use for its brand logo? Designers are taught that “circles are graceful and their curves are seen as feminine. They are warm, comforting and give a sense of sensuality and love”; and “squares and rectangles represent order, mathematics, rationality, and formality” (www.vanseodesign.com). These shape associations are widely used in the teaching and practice of visual brand design, but the guidance they provide is very general. Our research contributes more specific guidance, with its results differentiating situations when effects of logo shapes on product attribute judgments are more or less likely to emerge.

## DATA COLLECTION INFORMATION

The first author supervised the data collection for studies 1, 2, and 5, by research assistants at the Hong Kong Polytechnic University in fall 2010, spring 2015, and spring 2010, respectively. Studies 3 and 4 were conducted online using Amazon's Mechanical Turk in fall 2013 and spring 2015, respectively. Data of these five studies were analyzed by the first author.



















## APPENDIX A

## Logos Used in Experiments

	Circular Logo	Angular Logo
<b>Exp. 1, 3, 5</b>		
<b>Exp. 2</b>		
<b>Exp. 4</b> <b>(Examples</b> <b>of Priming</b> <b>Stimuli)</b>	 	 

## APPENDIX B

### Ads Used in Experiments

Ad used in Experiments 1 and 3	
 <p>INTRODUCING THE NEW FARBER™ SHOES</p>   <p><b>Farber™</b></p>	 <p>INTRODUCING THE NEW FARBER™ SHOES</p>   <p><b>Farber™</b></p>
Ad used in Experiment 2	
 <p> <b>LANE SOFA</b></p> 	 <p> <b>LANE SOFA</b></p> 
Ad used in Experiment 5	
 <p>INTRODUCING THE NEW FARBER® COMFORT WALKER</p>   <p><b>Farber</b></p> <p>Featuring the same smooth and comfortable design that Farber® is known for, the new Farber® Comfort Walker has a tread designed for shock absorption and will reduce foot fatigue throughout the day.</p>	 <p>INTRODUCING THE NEW FARBER® POWER TRACKER</p>   <p><b>Farber</b></p> <p>Featuring the same rugged and durable design that Farber® is known for, the new Farber® Power Tracker has a tread designed for traction and will provide support throughout the long life of this shoe.</p>

## APPENDIX C

## Visual-Load Manipulation Used in Experiment 3

X				
	X	X		
X				X
X	X	X	X	
				X

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