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Patterns in Motion: How Visual Patterns in Ads Affect Product Evaluations

ABSTRACT

This article contributes to research on advertising effectiveness by investigating the combined influence of ad headlines and visual patterns in the ad on consumer product evaluations. Headlines can convey motion (e.g., “move,” “quick”); when the associated ad features a regular visual pattern, it evokes stronger product evaluations than if it depicts an irregular visual pattern. Thus, the way the advertised products are aligned visually represent critical decisions for ad designers. As Study 1 reveals, if the regular (cf. irregular) visual pattern of an advertisement combines with verbal information conveying motion, stronger product evaluations result compared with the use of an irregular visual pattern. Study 2 extends these findings by demonstrating that a regular pattern creates mental simulation, such that consumers imagine themselves experiencing the product, which mediates the relationship between visual patterns and product evaluations. Study 3 uses text mining and image annotation analyses to provide ecological validity for the findings, corroborating them in the context of brand messages on Twitter.

Keywords: advertising effectiveness, mental simulation, motion, product evaluations, text mining, visual patterns

The visual alignment of products in an advertisement, or its visual pattern, represents a critical decision for designers who develop images to accompany promotional messages about products or services in various marketing contexts. For example, Coca-Cola appears to prefer visual patterns that depict products arranged conventionally (i.e., bottles oriented in an ordered way); Pepsi Co. instead seems to prefer unordered arrangements of images (see Figure 1). In strongly visually oriented contexts, such as advertising in social media, deciding how to arrange visual patterns is a critical element for capturing consumers' attention and enhancing their desire for the depicted products (Huffington Post 2017). Therefore, there is a compelling need to identify how to compose the visual patterns in ads to improve consumer product evaluations.

Previous research shows that visual advertising stimuli are decisive for determining consumer product evaluations (Chae and Hoegg 2013; Gkiouzepas and Hogg 2011; Schlosser, Rikhi, and Dagogo-Jack 2016), though studies of the use of visual patterns in marketing are scarce. Visual rhetoric research indicates that the symmetric alignment of perceptually similar objects in ads can influence message elaboration and thereby increase positive ad evaluations (McQuarrie and Mick 1999; Phillips and McQuarrie 2004), though without detailing the influences of (a)symmetric alignments of *identical* objects (Luffarelli, Stamatogiannakis, and Yang 2018). Noting calls for research of the combination of text and visual elements in brand messages (Villarroel-Ordenes et al. 2018), we also cite the need for research on visual alignment that addresses the joint impact of visual patterns and verbal information on consumer product evaluations.

Specifically, we need new insights into the mechanisms that define the relationships among visual patterns created by aligned, identical objects; verbal information; and consumer evaluations. For example, the presentation of objects in an image can lead to perceptions of

motion (Cian, Krishna, and Elder 2014; Elder and Krishna 2012), so we posit that when advertising text refers to motion or action, a regular visual pattern that also creates a mental simulation of motion exerts a greater and more positive impact on consumer product evaluations than does an irregular visual pattern. Mental simulation pertains to the cognitive construction of hypothetical scenarios involving the self, represented by potential future events or the reexperience of past events (Escalas 2004). We seek to determine if the visual pattern in an ad can result in mental simulation that then enhances the product evaluations that result from ads encouraging motion.

In turn, we seek to contribute to advertising literature in several ways. In particular, we extend research on advertising effectiveness by examining how the match between visual patterns in ad images and verbal information affects product evaluations. Across regular and irregular visual patterns, we empirically test the joint effect of visual patterns and headlines on consumer product evaluations. When objects are arranged in a regular (cf. irregular) fashion, we anticipate a sense of forward motion, in line with congruity theory (Roggeveen, Goodstein, and Grewal 2014). We demonstrate that when products are arranged in a regular (cf. irregular) fashion in ads and the headlines also are congruent with the concept of motion (cf. no motion), more positive consumer evaluations result. Furthermore, we offer evidence that mental simulation is the underlying mechanism that can explain these differential effects across visual patterns and consumer product evaluations. The visual presentation of products in an ad can facilitate mental simulation, such that ads with regular visual patterns generate better consumer product evaluations, through increased mental simulation.

In the next section, we establish a conceptual foundation for our research and develop our research hypotheses. We then describe three studies (two experiments and a content analysis of

social media posts), before we conclude by discussing our contributions and some further research directions.

Conceptual Background and Hypotheses Development

According to prior advertising research, visual arrangements affect cognitive, evaluative, and behavioral consumer responses (Pieters, Wedel, and Batra 2010). Visual rhetoric theory predicts that when similar objects appear next to one another, they trigger metaphorical associations in viewers' minds (Phillips and McQuarrie 2004). For example, placing a bullet and a cigarette next to each other conveys the meaning that smoking cigarettes can kill people. Schilperoord, Maes, and Ferdinandusse (2009) further suggest that aligning different types of objects creates strong metaphoric associations (e.g., cigarette is a bullet), resulting in perceptions that each visual element represents the same category of objects. In addition, visual rhetorical images can increase ad attention and liking (McQuarrie and Mick 1996; Phillips and McQuarrie 2004). In an extension of such findings, we assess the effect of *identical* products placed in proximity on consumer product evaluations. Therefore, we rely on studies of visual patterns (Arnheim 1954; Hekkert 2006), motion (van Laer et al. 2019), verbal information, and mental simulation (Elder and Krishna 2012; Escalas 2004) to derive our conceptual framework and propose several novel predictions.

Visual Patterns

Visual patterns, as identified in design aesthetics, can be broadly classified as regular or irregular (Hekkert 2006). Regular visual patterns feature alternated, progressive, or linear arrangements; fractals, spirals, meanders, waves, and stripes are common regular patterns in natural environment and also appear in human artifacts such as advertising. We focus on linear visual patterns, which are characterized by a high degree of regularity. That is, in linear patterns,

visual objects achieve symmetrical equivalence through equal distances, similar sizes, and an ordered visual orientation of the image elements. Irregular patterns instead are characterized by a low degree of regularity or planned arrangement, and image elements follow a random distribution across the space. Accordingly, there is no specific typology of irregular patterns, because they involve random or unordered objects in a space. Figure 1 contains illustrations of different visual patterns in advertising.

Insert Figure 1 here

Motion

Objects aligned according to a specific order (e.g., diagonally, horizontally, vertically) might convey meanings, such as dynamism (Peracchio and Meyers-Levy 2005; Schlosser, Rikhi, and Dagogo-Jack 2016) or motion (Malloy 2015); objects placed randomly on a surface instead may elicit associations unrelated to motion, such as excitement (Luffarelli, Stamatogiannakis, and Yang 2018). According to visual semiotics theory, the arrangement of visual objects in images can generate a sense of motion among viewers (Kress and van Leeuwen 2006). Farace et al. (2017) show that arrangements of visual elements in consumer selfies can trigger perceptions of movement that also affect viewers' responses. Kress and van Leeuwen (2006) theorize that *vectors*, which refer to real or imaginary trajectories formed by the regular arrangement of objects (persons and products) in images, should create this sense of motion. Focusing on vectors or trajectories formed by linear visual patterns, we predict that linear visual patterns (cf. irregular visual patterns) create clear trajectories for consumers, which then generate a sense of forward motion. In contrast, an irregular pattern, such that objects might be arranged without a clear trajectory, clash, or touch other visual objects (Hubbard 1995), is unlikely to create a sense of forward motion.

Verbal Information

Advertising literature highlights the importance of both visual and verbal characteristics, due to their dual role (e.g., dual loop theory) in consumer imagery and ad attention (Rossiter and Percy 1980, 1983). Verbal information, such as a headline or caption accompanying an image, determines the extent to which and how consumers react to an ad (Mazloom et al. 2016). Congruence between the verbal information and the visual image tends to enhance product evaluations; as Phillips (2000) shows, ad headlines that anchor the meaning of ad visuals (i.e., provide a clue of what the image means) increase ad liking by enhancing comprehension.

However, some questions remain about precisely how ad congruity affects consumer responses. Some research suggests congruity in the intentions communicated by an ad image and the related text results in enhanced consumer responses (Poor, Duhachek, and Krishnan 2013). Labroo, Dhar, and Schwarz (2007) also find that visual stimuli that are congruent with word primes prompt more positive evaluations. In an online environment, van Rompay, De Vries, and van Venrooij (2010) show that text–image congruence in vendor sites improves consumers’ product evaluations. But in a social media setting, an image that calls for action is more likely to be shared if it is accompanied by informational text rather than text that also calls for action (Villarroel-Ordenes et al. 2018). Notably, Villarroel-Ordenes et al. (2018) argue that conversations among consumers on social media platforms differ from traditional advertising, because consumers opt in to such conversational (informational, emotional) interactions. Therefore, duplicated calls to action in both the text and the image might not engage consumers. Villarroel-Ordenes et al. (2018) also focus on message intentions when studying the verbal and visual components of social media posts, whereas we seek to understand stylistic message properties, including the visual alignment of objects in the ad and their associated meaning

(semantics). In other words, Villarroel-Ordenes et al. (2018) focus on linguistics and pragmatics, rather than stylistic aspects and semantics. In addition to explicating these conflicting prior findings, we aim to extend the available insights by addressing the combined influence of ad headlines and stylistic message features (i.e., visual alignment of products) on both consumer preferences and behavior.

For example, we predict that for regular visual patterns, associated with forward motion, text–image congruity can be achieved by verbal information that contains motion or action words. Verbal cues can generate a sense of motion; van Laer et al. (2019) specify that narrative customer reviews that use motion words (e.g., “arrive,” “car,” “go”) prompt imagined actions and also positively affect viewers’ responses. If ads combine regular visual patterns with headlines emphasizing motion, we predict that they generate better consumer product evaluations. Formally,

H1: When the verbal information in an advertisement conveys motion, arranging the product images in regular (versus irregular) visual patterns results in more positive product attitudes.

Mental Simulation

Mental simulation, involving an imagined representation of events (Taylor and Schneider 1989), entails cognitive constructions of hypothetical scenarios, such as imagining future events or reconstructing past events (Escalas 2004), in which the person’s own self is the main character. According to Elder and Krishna (2012), mental simulation is automatic, initiated by exposures to some representations of objects. As the main character in this simulation, the consumer takes an active role. In this sense, mental simulation differs from mental imagery, though the two concepts also are related. That is, mental imagery is “a process (not a structure) by which visual information is represented in working memory” (MacInnis and Price 1987, p. 473) that does not trigger consumer self-representation in the simulated experience. Rather,

mental imagery may entail retrieved information related to a third person (or nobody) to construct product images. Therefore, even though both mental simulation and mental imagery take place in the absence of the real object, elicit genuine sensory and perceptual experiences, and can prompt affective reactions and behaviors, they differ in that only mental simulation highlights the self in the retrieved information about past or future situations.

Accordingly, we turn to prior literature on mental simulation, which indicates that perceptions of objects are stored in memory and simulated during subsequent encounters, which may be based on verbal or visual representations of the object (Barsalou 2008; Escalas 2004). In a series of experiments using photographs of graspable objects, Tucker and Ellis (1998) test the relationship between an object's orientation and the hand most suited to perform a reach-and-grasp movement. The objects were depicted to be compatible with either right- or left-hand grasps or not compatible (upright and reversed). Viewers had faster reactions when the objects were presented in an ordered, not reversed fashion. Elder and Krishna (2012) attain similar results in an advertising setting. Using a print ad that mentally simulated running, Escalas (2004) indicates that viewers ignore argument strength while performing the mental simulation; when they are not engaged in this simulation, they only consider argument strength to define their ad attitudes. Thus, the visual representations of objects can affect consumers' ability to simulate product usage mentally, and this mental simulation influences their evaluations of both the ad and its content. We predict in turn that the visual alignment of objects (sneakers organized in regular rather than irregular fashion) leads to more (vs. less) mental simulation of product usage, which then leads to more positive evaluations of the depicted product. Formally,

H2: Regular visual patterns increase mental simulation more than irregular visual patterns.

H3: Mental simulation mediates the impact of regular visual patterns on product attitudes.

Study 1: Motion Headline and Regular Visual Pattern

Method

In Study 1, we examine the match between the verbal (ad headline) and visual (visual pattern) information in an ad and its impact on product attitudes. One hundred fifty-eight mTurk participants, who were paid \$.40, participated in this 2 (headline: action vs. no action) × 2 (visual pattern: regular vs. irregular) experiment. We excluded two participants who took too long to complete the survey (Time SD > 3). Their exclusion did not change the pattern or significance of the results. The final sample included 156 participants ($M_{\text{age}} = 37.38$ years, $SD = 13.57$; 50% female).

The ad is for sushi, a well-known product category that often is presented in different patterns (regular or irregular) in restaurants, supermarkets, and advertising. To assess consumer evaluations of online ads, we showed the ads on screen, which should improve the realism of the experiment and encourage natural responses (Morales, Amir, and Lee 2017). In the action condition, the ad headline read: “Sushi, quick dining at sushi bar.” In the no action condition, it read: “Sushi, relaxing dining at sushi bar.” To manipulate the visual pattern, the ad presented six pieces of salmon nigiri in a regular or irregular fashion. In both visual patterns, the sushi nigiri were the same size and occupied the same area in the ad (Figure 2).

Insert Figure 2 here

Participants viewed one of four ads, were asked to look carefully at it, and answered the study questions. Specifically, after viewing the ad, the participants evaluated the product on two measures. The high correlation between these measures led us to collapse them to form a combined measure of attitude toward the product (Table 1).

Insert Table 1 here

In a pretest, participants ($N = 40$, $M_{\text{age}} = 39.17$ years, $SD = 11.99$; 40% female) rated the ads' headlines in terms of evoked feelings, attitudes toward the headline, and involvement. They indicated the headlines differed in evoked feeling ($t_{(38)} = -3.94$, $p < .001$, $d = 1.24$), such that the headline designed to evoke inaction was perceived as such ($M = 3.28$, $SD = 1.23$), and the headline evoking action was perceived as such ($M = 4.83$, $SD = 1.26$). The two headlines did not differ in attitudes ($t_{(38)} = 1.60$, $p = .12$) or involvement ($t_{(38)} = .35$, $p = .73$) though. In addition, in a posttest, participants ($N = 108$, $M_{\text{age}} = 34.35$ years, $SD = 11.82$; 57.4% female) rated the visual patterns in terms of their conveyed meaning, which differed ($t_{(106)} = 4.57$, $p < .001$, $d = .88$), such that the regular visual pattern conveyed more forward motion, direction, and movement ($M = 3.42$, $SD = 1.67$) than the irregular visual pattern ($M = 4.87$, $SD = 1.64$).

Results

Attitude toward the product. We performed an analysis of variance (ANOVA), with ad headline and visual pattern as between-subject factors, on attitude toward the product. We find a non-significant main effect for the headline ($F_{(1,152)} = .73$, $p = .40$) and a marginally significant main effect of the visual pattern ($F_{(1, 152)} = 3.15$, $p = .08$, $\eta_p^2 = .01$). The headline \times visual pattern interaction is significant ($F_{(1,152)} = 5.92$, $p < .05$, $\eta_p^2 = .05$; Figure 3).

Insert Figure 3 here

The planned contrasts reveal that when the ad headline evokes motion, attitude toward the product is higher in the conditions with regular (versus irregular) visual patterns ($F_{(1, 152)} = 8.85$, $p < .01$, $\eta_p^2 = .66$). Specifically, participants exposed to the regular visual pattern ($M = 5.65$, $SD = 1.32$) express more positive attitudes toward the product than participants exposed to the irregular visual pattern ($M = 4.68$, $SD = 1.62$). However, when the ad headline does not evoke motion, we find no difference in attitudes across the regular and irregular visual pattern

conditions ($M_{\text{regular}} = 4.87$, $SD_{\text{regular}} = 1.45$; $M_{\text{irregular}} = 5.04$, $SD_{\text{irregular}} = 1.33$; $F_{(1, 152)} = .22$, $p = .64$). These results support H1.

Study 1 thus indicates that when the ad headline conveys motion, a regular visual pattern results in more positive attitudes than an irregular visual pattern. To generalize this finding and extend it beyond sushi, we use a different product (sneakers) in Study 2 and focus only on motion conditions, considering that we find no significant difference between visual patterns when the headlines do not convey motion. In addition, with Study 2 we investigate mental simulation as the psychological mechanism to explain the relationship between the visual pattern and consumers' product evaluations.

Study 2: Testing Mental Simulation

We examine how the visual pattern in an ad that conveys motion influences product attitudes and mental simulation. One hundred nineteen mTurk participants ($M_{\text{age}} = 33.24$ years, $SD = 11.88$; 32% female), paid \$.40, participated in this visual pattern (regular vs. irregular) between-subject experiment.

The ad is for sneakers, another well-known product category. As noted, the ad headline always emphasizes motion, because in Study 1 we find no significant effect of visual patterns on consumer evaluations when the headline does not evoke motion. Thus, the headline read, "More movement. Better movement." The visual pattern manipulation presented five sneakers in either a regular or an irregular fashion. In both visual pattern conditions, the sneakers are the same size and occupy the same area in the ad (Figure 4).

Insert Figure 4 here

Participants, instructed to look carefully at the ad, considered one of the ads, then evaluated the product using two measures. The high correlation between measures again led us to collapse them. We also measured mental simulation with three items (Table 2).

Insert Table 2 here

In a posttest, participants ($N = 93$, $M_{\text{age}} = 37.65$ years, $SD = 12.76$; 44.1% female) rated the visual patterns' conveyed meaning. They indicated that the visual patterns differed in conveyed meaning ($t_{(91)} = 3.97$, $p < .001$, $d = .83$), such that the regular visual pattern conveyed higher forward motion, direction, and movement ($M = 4.19$, $SD = 1.69$) than the irregular visual pattern ($M = 5.43$, $SD = 1.28$).

Results

Attitude toward the product. An independent sample t-test of the means across visual patterns reveals a marginally significant difference in terms of attitudes toward the product ($t_{(117)} = -1.77$, $p = .08$, $d = .32$). Specifically, participants exposed to the regular visual pattern ($M = 5.50$, $SD = 1.51$) express a more favorable attitude toward the product than participants exposed to the irregular visual pattern ($M = 4.97$, $SD = 1.75$), in support of H1.

Mental simulation. Another independent sample t-test reveals a significant difference in the means for mental simulation across the visual patterns ($t_{(117)} = 2.78$, $p < .01$, $d = .51$). Participants exposed to the regular visual pattern ($M = 5.16$, $SD = 1.60$) indicate greater mental simulation than those exposed to the irregular visual pattern ($M = 4.26$, $SD = 1.94$), in support of H2.

Mediation analysis. To determine if mental simulation drives the relationship between the visual pattern as the independent variable (1 = regular, 0 = irregular) and the dependent variable of attitude toward the product, we conduct a mediation analysis using Model 4 (10,000 bootstrap samples) in the SPSS PROCESS macro (Hayes and Preacher 2014). The bootstrapping technique

for conditional indirect effects indicates mediation, because the 95% confidence interval (CI) for mental simulation does not include zero when we consider the difference between regular and irregular visual patterns (conditional indirect effect = .67, Boot SE = .24; 95% CI: .20, 1.14).

These results provide support for H3.

Discussion

Both Studies 1 and 2 support H1; when an ad headline conveys motion, providing a regular visual pattern in the ad results in better product evaluations than does providing an irregular visual pattern. Study 2 extends this insight to demonstrate that regular visual patterns prompt consumers to mentally simulate motion, and this mental simulation is a mediator that can explain the relationship between the visual pattern and product attitudes. In Study 3, we use social media posts to corroborate our findings and explore the interactive effects of visual patterns and verbal information on consumer social media responses.

Study 3: Nike Twitter Posts

Method

As recommended by Humphreys and Wang (2017), we seek to add ecological validity to our results by corroborating the findings in a content analysis of social media posts, which we conduct on a popular social media marketing platform, widely used to connect with consumers and promote products and services (Lamberton and Stephen 2016). On these platforms, visual images strongly drive communication (Hutchinson 2016), so they provide a compelling setting for assessing the effect of visual patterns. The data set includes 1,034 Twitter posts generated by Nike, a leading consumer brand, between May 2017 and May 2018. To test our hypotheses, we include only posts that include an image together with a text caption (94% of the posts included an image). The Twitter account maintained by Nike (@nikestore) mainly promotes clothing

apparel. To rule out potential bias related to the type of clothing apparel promoted, we focus on images of shoes, resulting in a final sample of 832 tweets. By investigating an industry leader, we also ensure that we evaluate a social media strategy that is broadly accepted by consumers and potentially copied by other brands.

Consistent with extant social media research (de Vries, Gensler, and Leeflang 2012; Villarroel Ordenes et al. 2018), we use the numbers of likes and retweets as dependent variables. They both provide good indicators of consumers' attitudes toward products. We do not include comments in response to a tweet, which may result from factors unrelated to how much consumers like or want to recommend the depicted product. For example, comments often include responses to some question, asked by the firm to prompt dialogues with consumers. Furthermore, comments can have positive or negative valence, and retrieving them through text mining techniques is not recommended for dependent variables (Humphreys and Wang 2017; Villarroel Ordenes et al. 2018). Every brand message in the data set had been published for at least a week, the time frame when most consumer engagement occurs (Lee, Hosanagar, and Nair 2017).

Considering the many images in our data set, we decided to use Upwork, an online labor market, to hire image annotation specialists. We selected three people based on their previous experience with similar jobs and their job success rate (greater than 95%). We sought annotators who could code whether the image included a regular, irregular, or no visual pattern. We established the standard that a visual pattern requires the presence of two or more products of the same type in the image. To ensure that coders consistently annotated the images, we developed additional annotation instructions. The first two annotators achieved a Krippendorff's alpha of

88%, and disagreements were solved by adding the third annotator's assessment. Figure 5 provides examples of images with regular, irregular, and no visual patterns from our data.

Insert Figure 5 here

In our model, the visual pattern is a dummy variable; no pattern provides the baseline. To corroborate the link between visual patterns and visual rhetoric (i.e., how artful or deviant regular versus irregular visual patterns appear), we also asked two independent coders to indicate the level of deviation in each image, from 1 (plain, matter of fact) to 10 (artful, clever) (McQuarrie and Mick 1996). These coders achieved a correlation of .88, and we aggregated their scores. With a one-way ANOVA, we investigate if any significant difference arises between the visual patterns with regard to the degree of deviation. These results suggest that irregular patterns are more deviant than regular patterns ($M_{\text{no pattern}} = 2.49$, $M_{\text{regular}} = 1.90$, $M_{\text{irregular}} = 3.94$; $F = 22.76$, $p < .01$). As a robustness check, we repeated this analysis for images with three or more products; the results are consistent. Because several images included text, to rule out the potential effects of this presentation, the annotators also coded whether text appeared within the image (Krippendorff's alpha = 86%).

To measure the degree of motion in the tweet caption, we used a text mining dictionary. This approach can measure constructs represented by semantically related word lists (Humphreys and Wang 2017). In line with previous marketing research (Ludwig et al. 2013), we use the LIWC software (Tausczik and Pennebaker 2010), a psycholinguistics dictionary for automated text mining that provides high domain generalizability across word categories. We use the word category "Motion," which includes any words associated with movement, action, and dynamism (e.g., move, walk, arrive, car, fast). It has been used previously in consumer research (van Laer et al. 2019). Thus, we operationalize caption motion as the number of motion words in tweet i

divided by the total words of tweet i . We identify 259 tweets in our sample that include at least one motion word.

As suggested by prior research, content and framing characteristics of the caption (i.e., what the actual tweet says) also could influence consumer message liking and sharing. Accordingly, we account for message positivity using the Dictionary of Affect in Language (Whissell 2009), assess the number of hashtags in the message (Stieglitz and Dang-Xuan 2013), and control for the presence of questions (1 = yes; 0 = no) as a measure of the level of interactivity of a post (de Vries, Gensler, and Leeflang 2012). We also control for the hour of the day the message was posted, if it appeared on the weekend (1 = yes; 0 = no) (Cvijikj and Michahelles 2013), and whether it included a link (i.e., URLs) (1 = yes; 0 = no). This data set purposefully features some unique characteristics (i.e., visual patterns), so we control for the number of products repeated and whether the image used had also appeared in a previous social media message (1 = yes; 0 = no). This last control reflected our recognition that content managers often use the same image for different posts during a day. The descriptive statistics and correlations among the variables appear in Table 3.

Insert Table 3 here

To estimate the hypothesized relationships, we used a Poisson regression model, as is recommended for count data (e.g., # retweets; Heimbach and Hinz 2016). Neither the number of likes nor the number of retweets followed an overdispersed distribution around the mean, so we chose not to use a negative binomial model (Heimbach and Hinz 2016; Villarroel Ordenes et al. 2018). We include a lagged dependent variable (retweet – 1) in the predictor set (Franses and van Oest 2007), to account for potential carryover effects, such that the number of retweets of a previous brand tweet might influence the visibility of the next tweet. Formally:

$$\begin{aligned} \# Retweet_i = \exp(\alpha_0 + \beta_1 * \#Retweet_{i-1} + \beta_2 * Regular_i + \beta_3 * Irregular_i + \beta_4 * \\ Caption Motion_i + \beta_5 * Regular_i * Caption Motion_i + \beta_6 * Irregular_i * Caption Motion_i + \beta_7 * \\ Text within Image_i + \beta_8 * Positivity_i + \beta_9 * Question_i + \beta_{10} * Hour_i + \beta_{11} * Hashtag_i + \beta_{12} * \\ Weekend_i + \beta_{13} * URL_i + \beta_{14} * \# of Products_i + \beta_{15} * Duplicate Image_i + \epsilon_{ij}), \end{aligned} \quad (1)$$

where $Regular_i$ and $Irregular_i$ are dummy variables representing whether the image had a regular or irregular pattern, respectively, and the baseline was “no pattern”; and $Caption Motion_i$ is the intensity of motion words in caption i . We also include the interaction effects. The remaining variables are control variables, and ϵ_{ij} is the error term. A similar model features the number of likes. The results for both retweets and likes are in Table 4.

Insert Table 4 here

Hypotheses Tests

Consumers like and retweet significantly more messages that include an irregular rather than a regular visual pattern (likes: $\beta_{irregular} = .425, p < .01$; $\beta_{regular} = .003, p < .01$; retweets: $\beta_{irregular} = .543, p < .01$; $\beta_{regular} = .063, p < .01$). In line with H1 though, when we combine visual patterns with text caption motion, we identify distinct results. Greater motion in the tweet caption has a significant, more positive effect when combined with regular than with irregular visual patterns (likes: $\beta_{irregular \times caption motion} = -.058, p < .01$; $\beta_{regular \times caption motion} = .021, p < .01$; retweets: $\beta_{irregular \times caption motion} = -.068, p < .01$; $\beta_{regular \times caption} = .032, p < .01$). Furthermore, the main effect of caption motion is positive and significant for both likes and retweets (likes: $\beta_{caption motion} = .019, p < .01$; retweets: $\beta_{caption motion} = .016, p < .01$).

Among the control variables, caption positivity has a positive and significant relationship with consumer retweets ($\beta_{Positivity} = .003, p < .01$) but not a significant link with the number of likes ($\beta_{Positivity} = .169, ns$). The use of questions and URLs have significant negative effects;

messages posted during the weekend and later in the day have significant positive effects. If an image has appeared in previous posts, it has a significant negative effect on likes ($\beta_{\text{Duplicate}} = -.533, p < .01$) and retweets ($\beta_{\text{Duplicate}} = -.489, p < .01$). Similarly, with more of the same products in the visual pattern, a negative effect emerges for the number of likes ($\beta_{\text{\#products}} = -.011, p < .01$) and retweets ($\beta_{\text{\#products}} = -.010, p < .01$). Finally, images that include text exert positive effects on the number of retweets ($\beta_{\text{Text Within}} = .301, p < .01$) and likes ($\beta_{\text{Text Within}} = .303, p < .01$).

General Discussion

This article investigates how, when, and why visual patterns affect consumer evaluations. Across three studies (two experiments and a field study), using different products (sushi and sneakers) and advertising channels (print ads and social media posts), we find evidence of a positive joint effect of regular visual patterns and headlines that highlight motion (H1). We show that mental simulation increases in response to regular visual patterns (H2) and that it mediates the relationship between visual patterns and consumer product evaluations (H3). In the content analysis of social media posts (Study 3), we corroborate our experimental findings by showing that matching regular visual patterns with a caption that expresses motion leads to more positive consumer evaluations of social media posts.

Theoretical Implications

This research contributes to advertising literature in several ways. First, we advance research on advertising effectiveness by assessing the joint effects of regular and irregular visual patterns, identical objects, and ad headlines on consumer evaluations. This approach complements previous conceptualizations of rhetoric by addressing the metaphorical associations derived by multiple depicted objects (Phillips and McQuarrie 2004). Prior visual rhetoric research indicates that symmetric alignments of perceptually similar objects in ads influence message elaboration

and increase positive ad evaluations (McQuarrie and Mick 1999; Phillips and McQuarrie 2004); by focusing on the (a)symmetric alignment of *identical* objects, we add to visual rhetoric literature and show that the generation of meaning stems from both visual patterns and verbal information in ads, in combination. Matching visual patterns and verbal information can enhance consumer evaluations (Phillips 2000; van Rompay, De Vries, and van Venrooij 2010). We also validate these results in a content analysis of social media posts that demonstrates that visual patterns and verbal information jointly affect consumer liking and sharing of brand-related messages. Our findings are generalizable across offline (print ads) and online (Twitter) settings.

Second, this study offers a new perspective, focused on the sense of directionality and motion triggered by text and images that depict identical objects. Advertising literature has long acknowledged the roles of visuals and text in consumer imagery processes (Kim and Lennon 2008; Rossiter and Percy 1983); we specify how a sense of motion can be triggered by visual and verbal content. Specifically, we show that matching headlines that convey motion with regular visual patterns results in more positive evaluations. These findings extend previous online brand communication research (Villarroel Ordenes et al. 2018), in that we corroborate the importance of the joint impact of text and visual content. Our findings complement Villarroel Ordenes et al.'s (2018) consideration of text and visual content at the speech act level by addressing the stylistic aspects associated with perceptions of motion in text and visuals.

Third, we provide evidence of a psychological mechanism that explains why regular visual patterns improve product evaluations: They facilitate mental simulation better than irregular visual patterns. Visual elements in regular visual patterns, oriented in a systematic way, help viewers sense a well-defined direction and impression of activity or flow that favors their mental simulation of the depicted object. Irregular visual patterns do not guide viewers in such a clear

direction, resulting instead in a sense of inertia or lack of motion that makes mental simulation less likely. Among the extensive research on visual rhetoric that investigates how visual and verbal information influence processing effort (McQuarrie and Mick 1992), elaboration, (McQuarrie and Mick 1999), and comprehension (Mick 1992), we know of no studies that address the role of mental simulation associated with different types of visual patterns in advertising. By identifying mental simulation as a psychological mechanism that mediates the relationship between visual patterns and consumers' product evaluations, we respond to calls for visual rhetoric research that determines how people process alignments of multiple objects (Schilperoord, Maes, and Ferdinandusse 2009).

Practical Implications

This research also offers actionable implications. As consumers' exposure to visual advertising grows, it is harder for advertisers to capture people's attention and increase the appeal of products depicted in advertising (Jukowitz 2014). Content managers thus seek guidance regarding which visual compositions can evoke a sense of relation and are less likely to be ignored. We suggest they should carefully determine whether they want to use regular or irregular visual patterns. In particular, when choosing visual patterns for printed or online ads, advertisers should account for their match with other ad components (e.g., headline) and ensure their fit. An ad likely will generate more positive product evaluations if its headline matches, rather than mismatches, the visual pattern. If the headline emphasizes motion for example, regular visual patterns generate more positive product evaluations than irregular visual patterns.

Advertisers also should exercise some caution in this choice between irregular and regular visual patterns. Irregular visual patterns may appear more surprising, due to the unexpectedness of the arrangement of the visual elements in the ad, but they also might fail to evoke mental

simulation, which could hinder consumer product evaluations. Our results suggest that advertisers can increase product evaluations by facilitating mental simulation, which can occur by combining a regular arrangement of visual elements with headlines that highlight motion. If they depict multiple identical products, advertisers should seek an overarching composition that resembles shapes or structures that can be easily interpreted by consumers.

Finally, we study visual elements in ads to demonstrate how alignment can trigger mental simulation and affect consumer evaluations, but the implications likely extend to other visual brand elements, such as logo design, packaging, shelf design, and webpage and app interfaces. For example, Nike's swoosh logo, designed in 1971, conveys motion, and this same perception of movement is highlighted by the text in Nike's ads (e.g., "Move more, move better," "The shoe works if you do," "Just do it"). We recommend that marketing practitioners carefully examine the perceptions evoked by the stylistic aspects of all their marketing materials, including perceptions of motion, before designing advertising text and visuals, because inconsistency in these elements might dampen consumers' product evaluations.

Limitations and Further Research

We note several opportunities for continued investigations. First, our variables could be extended. The independent variable in particular could be operationalized in different ways. We use one type of regular visual patterns—linear visual patterns in which identical objects appear at regular or similar intervals. Flowing, progressive, or curvilinear patterns also offer varying degrees of regularity, which could be explored in continued research. Similarly, the dependent variable in our experimental studies is consumer evaluations of the depicted product. Additional research might explore whether the findings also hold for other dependent variables, such as memorability measures, willingness to pay, or actual purchases of the product in the ad.

Second, research might investigate the moderating role of variables related to consumers' thinking or information processing style (Novak and Hoffman 2009). The way people think may interact with the alignment of the objects in the ad to determine their evaluations; perhaps linear or rational thinkers express better evaluations when they see objects presented in a regular and ordered fashion, but nonlinear or emotional thinkers prefer objects presented in an irregular fashion. The opposite trends also could emerge, if nonlinear thinkers benefit from ordered arrangements, such that a regular visual pattern helps them organize information and better understand the ad message. The different visual patterns also could trigger multiple, alternative interpretations across various viewers (McQuarrie and Phillips 2005). We show that visual patterns can evoke a strong feeling of motion, through the regular alignment of product images. However, some viewers might generate weaker or alternative interpretations of the same patterns. Knowing which secondary interpretations viewers generate in response to visual patterns in ads may help clarify how the visual signals in ads generate meaning and influence communication processes.

Third, further research is needed to confirm the generalizability and robustness of the visual pattern effects in other product categories. Some products might not be suitable for evoking perceptions of motion, regardless of the match among stylistic aspects; for example, using text and visual patterns to promote motion likely works better for sneakers than for pillows. Even within the same product category, stylistic aspects that prompt a perception of motion could affect consumer evaluations in different ways. Consider the travel industry for example: Ads promoting relaxing vacations may have less need to evoke motion than those for adventurous holidays. Zooming in on different product categories may provide further evidence of the effectiveness and mental simulation associated with visual patterns.

Fourth, product presentation formats (visual vs. verbal) might trigger more or less motion perceptions. In two web experiments simulating apparel shopping, Kim and Lennon (2008) show that both visual and verbal information exert significant effects on affective and cognitive attitudes toward apparel products, but only verbal information has a significant effect on purchase intentions. Considering the sense of motion that different product presentation formats can trigger would be an interesting route to extend the current research.

Fifth, as we noted among our practical implications, our findings may apply beyond advertising contexts. For example, package design, merchandise displays, and other media also rely on appropriate arrangements of visual elements for marketing purposes (De Pelsmacker, Geuens, and Anckaert 2002). Further research could test our findings in these marketing areas too. Products or brands usually are aligned symmetrically on supermarket shelves; a regular visual pattern of products thus may appear less deviant (more expected) than a presentation of the same products arranged in an irregular fashion and have different effects on mental simulation. Whether a regular or irregular visual pattern deviate from normative expectations also could depend on the context. Extensions to visual rhetoric literature might consider the potential effects of this context dependency of the degree of deviance in object representations. Consumers are surrounded by visual patterns, yet their influence on consumer behavior remains insufficiently understood.

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Table 1: Variables and measurements, Study 1

Variable	Measurements	
Evoked feeling of ad headlines	<i>Rate the extent to which this headline elicits a feeling of ...</i> Seven-point scales, anchored by stasis–movement and inaction–action	$r = .74$ ***
Attitude toward the ad headline	<i>How would you describe your overall opinion of the ad headline?</i> Seven-point scales, anchored by very unfavorable–very favorable; bad–good; dislike–like; and unpleasant–pleasant.	$\alpha = .94$
Involvement with the ad headline	<i>To which extent was the headline involving to you?</i> Seven-point scale anchored by not involving at all–very involving. <i>To which extent was the ad relevant to you?</i> Seven-point scale, anchored by not relevant at all–very relevant.	$r = .83$ **
Conveyed meaning of the visual pattern	<i>The pattern in the picture...</i> Seven-point scales, anchored by conveys a forward motion–does not convey a forward motion; conveys a clear direction–does not convey a clear direction; conveys a well-defined route–does not convey a well-defined route; and conveys an advancing movement–does not convey an advancing movement.	$\alpha = .88$
Attitude toward the product	<i>How would you describe your overall opinion of the advertised sushi?</i> Seven-point scales, anchored by very unfavorable–very favorable and bad–good.	$r = .89$ ***

*** $p < .001$, ** $p < .01$

Table 2: Variables and measurements, Study 2

Variable	Measurements	
Meaning conveyed by the visual pattern	<i>The pattern in the picture...</i> Seven-point scales, anchored by conveys a forward motion–does not convey a forward motion; conveys a clear direction–does not convey a clear direction; conveys a well-defined route–does not convey a well-defined route; and conveys an advancing movement–does not convey an advancing movement.	$\alpha = .83$
Attitude toward the product	<i>How would you describe your overall opinion of the advertised sneakers?</i> Seven-point scales, anchored by very unfavorable–very favorable and bad–good.	$r = .96^{***}$
Mental simulation (Elder and Krishna 2012)	<p><i>As you viewed the ad, to what extent did images of using the sneakers come to mind (for example, holding them in your hand, wearing them)?</i> Seven-point scale anchored by not at all–to a great extent.</p> <p><i>While viewing the ad, I experienced ...</i> Seven-point scale, anchored by few or no images of using the sneakers–a lot of images of using the sneakers.</p> <p><i>To what extent while viewing the ad could you imagine using the sneakers?</i> Seven-point scale, anchored by not at all–to a great extent.</p>	$\alpha = .93$

*** $p < .001$.

Table 3: Descriptive statistics and correlations

	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14
# Retweets.1	107.82	116.09		0.96	0.13	0.08	0.13	0.07	-0.01	-0.01	0.24	-0.13	0.01	-0.11	0.00	-0.23
# Likes.2	350.38	326.31			0.11	0.08	0.15	0.05	0.00	-0.01	0.25	-0.14	0.01	-0.13	-0.01	-0.27
Irregular pattern.3	0.15	0.36				-0.20	0.06	-0.04	0.07	0.01	0.01	0.00	-0.05	0.05	0.05	0.06
Regular pattern.4	0.18	0.38					0.04	-0.05	-0.05	0.02	0.30	-0.17	0.13	-0.14	0.19	-0.11
Text motion.5	1.52	2.99						0.07	-0.02	-0.01	0.17	-0.19	0.01	-0.24	-0.03	-0.12
Text within image.6	0.07	0.25							-0.02	0.01	-0.01	-0.12	0.07	-0.01	0.01	0.00
Positivity.7	1.87	0.18								-0.06	-0.03	0.07	-0.11	0.09	-0.07	-0.05
Question.8	0.01	0.12									0.01	-0.01	-0.01	0.01	0.00	-0.07
Hour.9	10.20	3.73										-0.36	0.01	-0.14	0.11	-0.27
Weekend.10	0.36	0.48											-0.06	0.09	-0.05	0.29
Hashtag.11	0.02	0.14												0.01	0.02	-0.05
URL.12	0.99	0.12													0.01	0.05
# of products.13	1.87	4.08														0.00
Duplicate.14	0.26	0.44														

Table 4: Poisson regression results

	Likes		Retweets	
Retweet – 1	.001	***	.001	***
Regular pattern in image	.003	***	.063	***
Irregular pattern in image	.425	***	.543	***
Caption motion	.019	***	.016	***
Regular patt. × Caption motion	.021	***	.032	***
Irregular patt. × Caption motion	-.058	***	-.068	***
Text within image	.301	***	.303	***
Text positivity	.169		.003	***
Question dummy	-.179	***	-.150	***
Hour posted	.044	***	.050	***
Hashtag	-.013	***	-.133	***
Weekend	.024	***	.066	***
URL	-.353	***	-.355	***
Number of products	-.011	***	-.010	***
Duplicate image	-.533	***	-.489	***
Intercept	5.585	***	4.274	***

*** $p < .001$.

Figure 1. Visual Patterns in Ads

a. Regular Visual Patterns, Coca-Cola Ads

Coca-Cola Ad in 1947



Coca-Cola "Share a Coke" Campaign 2013 - 2016

What's your name?



Coke Diet "It's mine" Campaign 2016



b. Irregular Visual Patterns, Pepsi Ads

Pepsi Outdoor Banner 2010



Pepsi Ad 2015



"Say it with Pepsi" Campaign 2016



Figure 2. Stimuli in Study 1

Sushi, Relaxing Dining at **sushi Bar**



Sushi, Quick Dining at **sushi Bar**



Figure 3. Influence of Visual Patterns and Ad Headline on Consumer Product Evaluations, Study 1

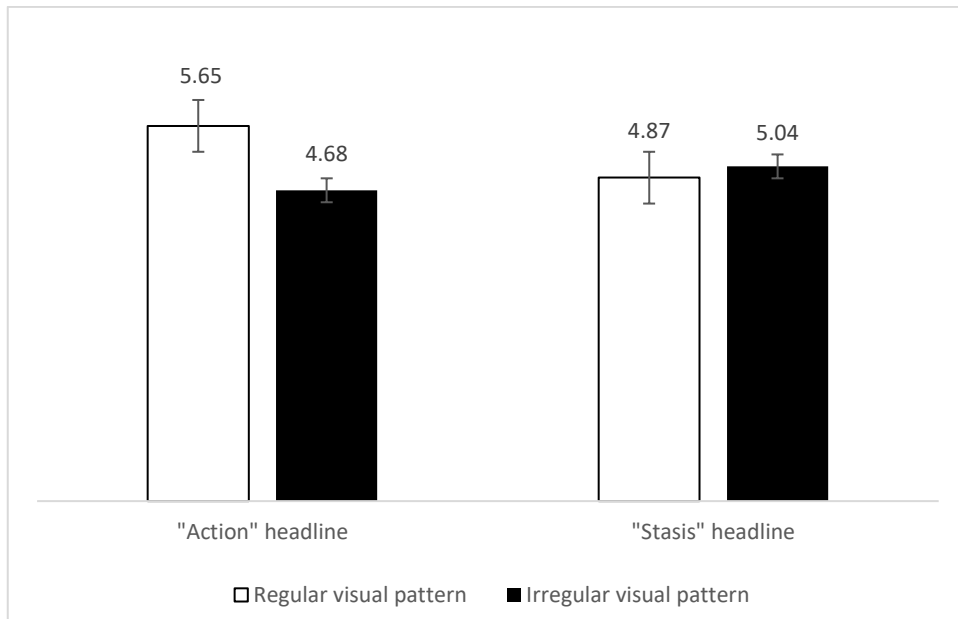


Figure 4. Stimuli in Study 2

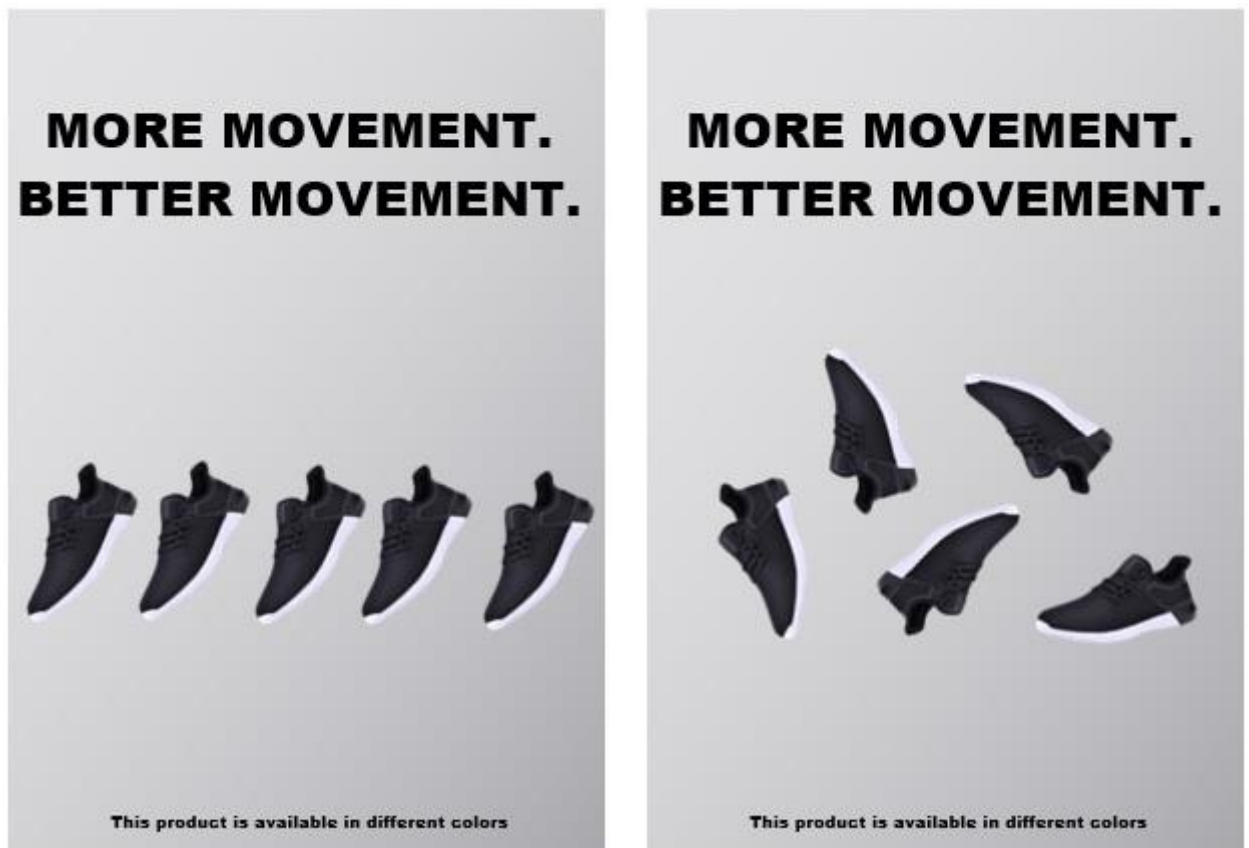


Figure 5. Example of Visual Patterns in Nike Data Set, Study 3

a. Regular pattern



b. Irregular pattern



c. No pattern

