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Depicting Humans, Animals, and Objects in Motion: The Effect of Implied Motion on Engagement and Persuasion in Advertising

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ABSTRACT

Over the past several decades, visual imagery has become the dominant element in modern advertising. A common content strategy involves depicting humans, animals, or objects in the midst of motion. Whereas previous research indicates that implied motion images enhance persuasion, it is unclear whether this effect is unique to depictions of moving humans or if it also applies to depictions of moving animals (e.g., a dolphin jumping out of the water) and moving objects (e.g., a car driving on a street, a burger being tossed in the air). Across a set of seven experimental studies, we provide robust evidence that images depicting animate *and* inanimate motion increase the persuasiveness of an advertisement and that this effect occurs through enhanced engagement. Our findings further indicate that the level of engagement is influenced by the complexity of the depicted motion, with more complex, nonlinear movements eliciting greater engagement than simpler, linear movements. Overall, this research contributes to the advertising literature by providing an empirically grounded account of implied motion imagery and by helping marketers create more effective advertising.

The adage *a picture is worth a thousand words* has never been more true for advertising (Grigsby, Jewell, and Zamudio 2023). Over the past three decades, advertising has witnessed a remarkable shift toward visual communication (Kjeldsen 2012; Phillips 2000). Whereas 40.5% of marketers reported that more than 90% of the content they published in 2015 included visual images, that number rose to 51.4% of the surveyed marketers in 2022 (Venngage 2017, 2022). Not only has the use of images increased, but the ratio of visual to verbal advertising elements has also grown steadily (Cian, Krishna, and Elder 2014; McQuarrie and Phillips 2008; Pollay 1985; Pracejus, Olsen, and O'Guinn 2006). It is thus not surprising that visual imagery is now considered the most important ad element (Social Media Examiner 2017). Images have come to play an essential role in advertising due to their effectiveness in capturing attention quickly (Finn 1988; Seo 2020), facilitating recall of messages (Nelson, Reed, and Walling 1976), arousing emotions (Escalas 2004), and increasing user engagement as well as overall persuasion (Brubaker and Wilson 2018; Seo 2020). Whereas research has extensively explored "mere presence effects" of single photographic images, less is known about how variations in visual content influence persuasion (Chan, Chen, and Leung 2023).

A common content strategy involves depicting humans, animals, or objects in the midst of motion (e.g., a woman jogging on a street, a dog playing with a ball, or an airplane taking off) (Cian, Krishna, and

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Elder 2014). Such implied motion images are ubiquitous in advertising and can be seen in print ads, billboards, posters, and social media posts (Zhang, Xiao, and Nicholson 2020). A small yet emerging body of research has examined the persuasive effects of implied motion images. Adopting a storytelling lens, the respective work has sought to determine whether depictions of moving characters (i.e., humans and humanized figures) can stimulate viewers to imagine themselves in the presented image, thereby being mentally transported into the depicted scene. In a series of four experimental studies, Grigsby, Jewell, and Zamudio (2023) demonstrated that images of humans and humanized figures in motion prompt consumers to empathize with those characters and experience *narrative transportation*, leading to more positive ad evaluations. These results were only partially supported by Lim and Childs (2020). An experimental study on the social media communication of athletic brands indicated that implied motion images alone might not be sufficient to induce narrative transportation in the audience. It was only when these images were combined with other narrative elements that narrative transportation and an enhanced self-brand connection were elicited.

Although the use of implied motion images appears conducive to persuasion, it is unclear whether this effect is unique to depictions of moving humans and humanized figures or if it also applies to depictions of animals and objects (e.g., a car driving on a street, waves crashing against a shore). Support for the latter comes from Dhanesh, Duthler, and Li (2022). A content analysis of 400 posts from airport brands revealed that depictions of humans and objects (e.g., airplanes) in motion were associated with significantly greater user engagement on Instagram and Facebook. Similarly, brand logos that convey dynamism through moving objects, like an elevated ball on a Newton's cradle, have been found to generate more favorable attitudes toward a brand (Cian, Krishna, and Elder 2014).

In light of these findings, we conducted seven experimental studies to address the following questions related to photographic images in advertising: (1) How do implied motion images featuring different types of moving entities (humans, animals, objects) influence persuasion?; (2) Is there a common mechanism underlying the persuasive effects of these images?; and (3) To what extent is this mechanism influenced by the properties of the depicted motion?

The present research advances advertising research in three important ways. First, we provide consistent evidence that advertisements are more persuasive when they feature depictions of humans, animals, and objects in motion. Second, we demonstrate that this effect is driven by the same mechanism across all types of implied motion images. Our findings show that people are more responsive to implied motion images because they perceive these images as more engaging. Third, engagement can be boosted by featuring images that depict more complex motion (i.e., nonlinear movements). An overview of how the present research builds upon and extends previous studies is provided in Supplemental Online Appendix A.

Conceptual Background

Dynamic Imagery in Advertising

Advertising research has long acknowledged that static visual images can possess dynamic qualities, enabling these images to evoke a sense of movement (Cian, Krishna, and Elder 2014). Such dynamism can be visually implied through composition, style, and content. One aspect of composition that enhances dynamism is *visual friction*, which refers to the amount of contact between visual elements (Cian, Krishna, and Elder 2014). Dynamism increases when visual elements, such as those within a brand logo, have minimal contact, as opposed to clashing, overlapping, or touching each other (Hubbard 1995; Kerzel 2002). Furthermore, employing a diagonal camera angle to depict products is a stylistic technique known to impart dynamism (Peracchio and Meyers-Levy 2005). Additionally, dynamism can be conveyed through visual content that depicts humans, animals, or objects in motion (Cian, Krishna, and Elder 2014; Mulier et al. 2021). Consider a static image featuring a woman jogging along a street. Although we cannot see the actual movement, the positioning of the woman's legs and arms make her appear "frozen in motion," creating the *impression* of movement. Formally, such frozen movements can be described as *vectors*, which are visible or invisible lines that convey directionality and originate from depicted entities, including people, animals, or objects (Kress and van Leeuwen 2020; Zettl 1973). These lines may be formed entirely or partly of a depicted entity (e.g., a body in motion, an outstretched arm, a cup falling off a table) or may be abstract (e.g., arrows) (Boeriis and van Leeuwen 2017; Kress and van Leeuwen 2020). Vectors create "*directed tension*," that is, "motion, expansion, contraction, the process of growth" (Arnheim 1974, 33). This way, vectors evoke the impression that the depicted entities are doing something (Kress and van

Leeuwen 2020). Cognitive psychology has shed light on the mental processes activated during the reception of implied motion images.

Perception of Implied Motion Images

The perception of motion is associated with activation of the superior temporal region of the brain, which facilitates the interpretation of social cues and information (Allison, Puce, and McCarthy 2000). Motion serves as a fundamental source of social information, indicating changes in an individual's social environment (Troje 2012). From an evolutionary standpoint, detecting motion facilitates quick responses to threats and successful interactions among group members (Barrett 2015). As a result, the human brain has evolved an innate bias toward moving stimuli (Pratt et al. 2010; Troje 2012). This bias is also known as the *dynamic default hypothesis*, which suggests that dynamic events capture attention more effectively than static events and are thus prioritized (Fennell and Schneider 2023; Franconeri and Simons 2003). Notably, the same region of the brain that detects actual movement is active when processing implied motion images (Cian, Krishna, and Elder 2015; Kourtzi and Kanwisher 2000). Implied motion images therefore garner the same attentional priority as actual movements (Cian, Krishna, and Elder 2014; Lim and Childs 2020). When we view an implied motion image, our minds create a mental simulation of the depicted action, which will "unfreeze" the image and complete the movement of the entity (Freedberg and Gallese 2007; Mulier et al. 2021; Yamamoto and Miura 2012). This simulation allows us to perceive the depicted scene as a "continuous proceeding of an event" (Lim and Childs 2020, 35). We argue that such perception involves central information processing.

Implied Motion Images, Central Processing, and Engagement

The *elaboration likelihood model* posits that information processing occurs through two distinct routes: *peripheral* and *central* (Petty, Barden, and Wheeler 2009; Petty and Cacioppo 1986). Whereas the *peripheral route* encompasses more shallow and heuristic processing of information, the *central route* entails deep and systematic processing. When individuals engage in central processing, they dedicate considerable cognitive effort to evaluate, scrutinize, and reflect on the content of a message. This effort presumably occurs when individuals process implied motion images (Cian, Krishna, and Elder 2014; Zhang, Xiao, and Nicholson 2020). The vectors in implied movement captivate an individual's attention by signaling that something is happening and prompting the individual to imagine the movement. This imagination, in turn, encourages heightened engagement with the image (Lazard and Atkinson 2015; Magadán-Díaz and Rivas-García 2023; Schultz et al. 2018). When individuals "experience strong engagement with something, they are involved, occupied, interested and attentive to it" (Higgins 2006, 451). Engagement thus describes the maintenance of attention to a selected stimulus that creates a state of immersion and a sense of being connected to that stimulus (Cian, Krishna, and Elder 2014; Kim, Jung, and Kim 2021). As such, engagement can be viewed as a situational interest in a stimulus that results from immediate exposure to it (Krapp 2002).

Engagement plays a pivotal role in persuasion because attitude and behavior change rarely occur without measurable engagement (comScore 2011; Kim et al. 2015). Research has consistently documented a positive effect of engagement on persuasion, such that it leads to greater perceived effectiveness of an ad (Kim, Shi, and Cappella 2016), more favorable attitudes toward the brand (Cian, Krishna, and Elder 2014; Lee, Keller, and Sternthal 2010), and greater intentions to comply with the message advocacy (Bae 2020; Green and Brock 2000). These persuasive outcomes, in turn, are causally ordered. Specifically, perceived ad effectiveness is known to shape subsequent and more stable outcomes, including attitudes, intentions, and behaviors (Dillard, Shen, and Vail 2007; Rhodes and Ewoldsen 2013; Seo, Dillard, and Shen 2013). Figure 1 provides an overview of the theoretical framework underlying our research.

Hypotheses

Although scarce, previous research indicates that implied motion images increase persuasion (Dhanesh, Duthler, and Li 2022; Grigsby, Jewell, and Zamudio 2023; Lim and Childs 2020; Mulier et al. 2021). Because persuasion involves a sequence of causally linked changes, earlier outcomes are more sensitive to variations in message content (Lee and Homer 2019; Seo, Dillard, and Shen 2013). We therefore anticipate that exposure to implied motion images will primarily influence perceived ad effectiveness.

Hypothesis 1: The use of implied motion images increases persuasion.

We further expect that the effect of implied motion images on persuasion is mediated by engagement.

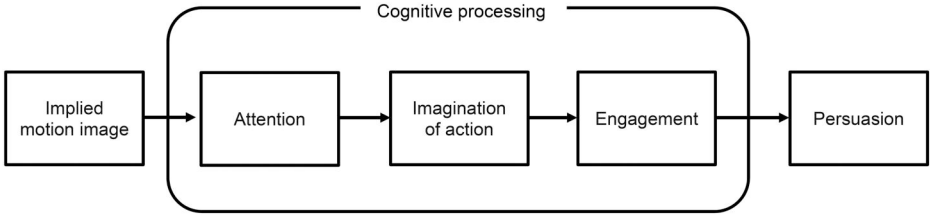


Figure 1. Overview of the theoretical framework.

Our rationale is that exposure to implied motion images prompts individuals to engage in more systematic and thoughtful processing, thereby increasing their interest, involvement, and attentiveness to such images (Cian, Krishna, and Elder 2014; Zhang, Xiao, and Nicholson 2020). This assumption aligns with the *dynamic default hypothesis* (Franconeri and Simons 2003), which suggests that dynamic events garner attentional priority over static ones, making them more likely to engage viewers. We accordingly posit:

Hypothesis 2: The effect of implied motion image on persuasion is mediated by engagement.

One important, yet unaddressed question is whether these persuasive effects apply to all types of implied motion images, irrespective of what entity is shown in motion. Implied motion images can be broadly distinguished based on whether they depict *animate* motion or *inanimate* motion (Lu, Li, and Meng 2016). Animate motion includes movements of living entities with the ability to move independently and in a self-propelled manner (e.g., humans and animals). Inanimate motion entails movements of non-living entities that lack the ability to move in a self-directed way and therefore require an external force to initiate or sustain the movement. Common forms of inanimate motion involve mobility (e.g., a car driving on a street), nature events (e.g., waves crashing against a cliff), and sensory presentations of food and beverages (e.g., maple syrup being poured over pancakes) (Jozwik et al. 2022; Mulier et al. 2021). Findings from a comprehensive eye-tracking study indicate no systematic difference in the way that individuals process images of animate entities (e.g., humans and animals) versus inanimate entities (e.g., vehicles or food) (Kovic, Plunkett, and Westermann 2010), which lends support to the idea that inanimate motion images influence persuasion through the same mechanism than animate motion images. We therefore posit:

Hypothesis 3: Depictions of animate entities (humans and animals) and inanimate entities (objects) in motion influence persuasion through engagement.

While animate and inanimate motion images may engage the same persuasive mechanism, it is possible that animate motion images may elicit stronger responses. This assumption is supported by the *behavioral urgency hypothesis*, which states that not all motion is weighed equally (Franconeri and Simons 2003). Previous studies have shown that recipients successfully discriminate between objects that "are alive" (animate: humans and animals), those that "have mobility" (inanimate: mobility) and those that "are unpredictable" (inanimate: nature) (Jozwik et al. 2022). Moreover, they respond more quickly to animate entities than to inanimate entities in motion (Kirchner and Thorpe 2006; Pratt et al. 2010). Given this attentional advantage of animate motion, depictions of humans and animals in motion may be perceived as more engaging than depictions of objects in motion. We therefore state the following hypothesis:

Hypothesis 4: Animate motion images are more engaging than inanimate motion images.

The complexity of the depicted motion may be another property influencing the extent to which recipients engage with an image (Krishen and Homer 2012). *Motion complexity*, in its simplest form, can be understood as a function of the *density*, *direction*, and *depth* of the depicted movements. *Density* refers to the quantity of movements within an image (i.e., the number of elements depicted as moving). *Depictions* featuring a single moving element (e.g., a person walking on a street or a boat sailing on the sea) are generally less complex than those showing two or more moving elements (e.g., a group of people dancing or hundreds of leaves swirling through the air) (Berlyne 1958; Pieters, Wedel, and Batra 2010; Putrevu, Tan, and Lord 2004). *Direction* describes the shape of a movement, that is, the trajectory that a moving element follows. An element moving in a straight line (e.g., a dog running straight toward a boy) is less complex than one with a nonlinear trajectory (e.g., a person jumping in a parabolic arc, a rabbit running in a zig-zag pattern, chocolate sauce being poured over ice cream, or a wave crashing against a shore) (Kim and Billard 2012; Tripathy and Barrett

2003). Lastly, *depth* captures motion along the z-axis, indicating whether an element changes its position on the sagittal plane. Motion along the z-axis adds a layer of three-dimensionality (e.g., a person walking away from the viewer or kicking a football toward the viewer), making it more complex than vertical or horizontal movements (e.g., a person walking past the camera) (Cottereau, Mckee, and Norcia 2014).

Motion complexity can be considered a particular form of visual complexity, which has been linked to increased audience attention and more deliberate message processing (Liu, Cao, and Proctor 2022; Phillips 1997; Putrevu, Tan, and Lord 2004; Sharma and Kumar 2023; Snodgrass and Townsend 1980). Consequently, we anticipate that greater motion complexity—characterized by the presence of more moving elements, nonlinear movements, or sagittal movements—prompts enhanced engagement with an image. We therefore posit the following:

Hypothesis 5: Images with higher motion complexity are more engaging than images with lower motion complexity.

Overview of Studies and Experimental Design

We investigated our hypotheses in seven studies (Figure 2 provides an overview of the conceptual framework and studies). The first two studies were focused on *animate motion,* demonstrating that implied motion images depicting humans and animals increase engagement and subsequent persuasion. In a next step, we extended our examination to hybrid motion images, that is, depictions of human–object interactions (Study 3) and inanimate motion images (Studies 4 to 7). Results confirmed that hybrid and inanimate motion images employ the same persuasive mechanism as animate motion images. Finally, we pooled the data obtained in our experiments and tested whether the type of motion (no motion vs. animate vs. inanimate vs. hybrid) and the complexity of the depicted motion (density, direction, and depth of moving elements) influence engagement.

All seven experimental studies utilized a one-factor (image: no implied motion vs. implied motion) between-subjects design. Message exposure in all studies was randomized at two levels. First, participants were randomly assigned to either the implied motion or the no implied motion image condition, and then to one of three stimuli within each condition. Accordingly, each participant saw only one of six stimuli. All stimuli were presented as Instagram advertisements for a fictitious brand. Each advertisement included the brand logo, a set count of 183 Likes, a brief caption, and an accompanying image. We opted for Instagram ads to reflect the fact that brands are increasingly focusing their marketing efforts on social media rather than traditional marketing channels (Ordenes et al. 2019). Moreover, we chose the same message format across our experimental studies to reduce potential confounding factors that could bias the results of the pooled analysis.

A manipulation check conducted in all seven studies confirmed that implied motion images were consistently rated as displaying more apparent motion than static images (see Supplemental Online Appendix B). Across studies, we used consistent outlier exclusion rules for all analyses (i.e., ± 3 SD from the mean) and specified any additional exclusion criteria for each study (e.g., straight-lining behaviors or survey completion time) (Supplemental Online Appendix C). All analyses were conducted once without covariates (raw model) and once with age and gender as covariates (adjusted model). Since controlling for age and gender did not change the direction or level of significance of the results in any of the studies, we report the raw models.

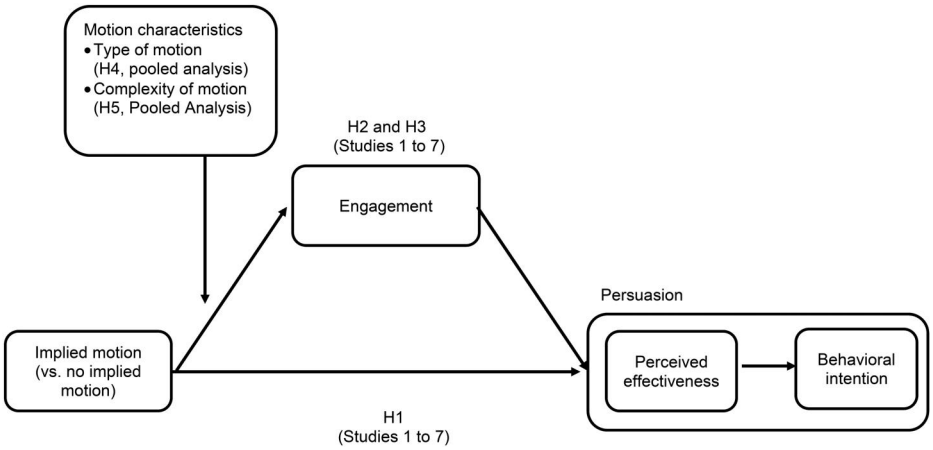


Figure 2. Overview of the conceptual framework and studies.

Study 1: Animate Motion Images (Humans)

Design and Stimuli

As elaborated earlier, Study 1 as well as all subsequent studies employed a one-factor (image: no implied motion vs. implied motion) between-subjects design. In all studies, message exposure was randomized at the condition level. Additionally, within each condition, participants were randomly assigned to view one of three stimuli.

Study 1 tested the persuasive effects of implied motion imagery depicting humans. The stimuli were presented in the form of an Instagram advertisement for a fictitious sportswear brand, containing the brand logo ("GoFit"), the count of the number of likes (183 Likes), a short caption ("Rise and shine in our new sportswear collection. Purchase here: gofit.com/wear"), and an accompanying image. We collected three image pairs featuring people, who were depicted once in motion (jogging) and once in a stationary pose (standing). The images were drawn from commercial photo databases. Image selection was guided by a set of rules intended to account for potential confounding factors. First, pictures of each image pair were taken against the same background. Second, we carefully controlled that the depicted models: (a) exhibit an averted gaze, meaning that they do not look directly into the camera; (b) express a similar facial expression; and (c) are shown from a similar camera angle as well as from a similar spatial distance. One of the stimulus pairs is presented in Figure 3 (see also Supplemental Online Appendix D).

Participants and Measures

Participants in a Prolific panel were invited into the study if they were U.S. residents age 18 years or older and if their native language was English. After screening for data quality issues (e.g., straight-lining) and nonrandom missing data, our final sample included 199 participants (48.2% female; M_{age} = 33.3 years). Following consent, participants were directed to a survey that included sociodemographic questions (e.g., age, gender, education, ethnicity), followed by the exposure to either an ad depicting a person in motion (implied motion condition) or an ad depicting a person in a stationary pose (no implied motion condition). Participants were subsequently asked to indicate their engagement with the image (1 = *uninteresting/boring/unexciting* to 7 = *interesting, engaging, exciting* (α = .95), adapted from Cian, Krishna, and Elder (2014) and Schnurr (2017). Persuasion was measured by perceived effectiveness (1 = *not at all persuasive/convincing/effective* to 7 = *very persuasive/convincing/effective* (α = .95), adapted from Seo, Dillard, and Shen (2013)). We also assessed participants' purchase intentions on a scale ranging from 0% to 100% ("*How likely you are to purchase sportswear from the brand GoFit?*").

Results

We first tested the effect of implied motion image on persuasion. An analysis of variance (ANOVA) revealed a significant impact of implied motion imagery on perceived effectiveness (M_{Motion} = 4.28, SD = 1.49 vs. $M_{NoMotion}$ = 3.32, SD = 1.46, $F(1, 197) = 21.22$, $p < .001$, $\eta^2_p = .097$), with ads depicting people in motion being perceived as more effective. We also conducted an ANOVA with purchase intention as the dependent variable. The purchase intention data exhibited considerable skewness (skewness = 1.335, SE = .173), so we log-transformed the variable and added 1 to each score to ensure that zeros would be included in the analysis. Because the patterns of results were the same for the log-transformed and non-transformed variable, we report the untransformed means for ease of interpretation. Willingness to purchase the brand's sportswear seemed unaffected by the presence (M_{Motion} = 18.17, SD = 20.14) or absence of a frozen motion image ($M_{NoMotion}$ = 16.98, SD = 20.10, $F(1, 195) = .17$, $p = .678$, $\eta^2_p = .001$).

Finally, we were interested in the extent to which exposure to implied motion images influences engagement. In line with our expectations, implied motion image yielded a significant effect on engagement ($F(1, 197) = 19.94$, $p < .001$, $\eta^2_p = .092$). The data suggest that depictions of people in motion were perceived as more engaging (M_{Motion} = 4.44, SD = 1.58) compared with depictions of people in stationary poses ($M_{NoMotion}$ = 3.44, SD = 1.57). All results are reported in Table 1.

Mediation Analysis

A mediation analysis (Hayes 2017, PROCESS Model 6 with 5,000 bootstrap samples, and correcting for heteroscedasticity using HC3) showed that engagement mediates the effect of implied motion images on perceived effectiveness, which subsequently influences purchase intentions[1] (indirect effect = .10, SE = .04, 95% CI = [.03, .18]). The direct effect of implied motion image on purchase intention, controlling for engagement and perceived effectiveness, was nonsignificant (direct effect = −0.10, SE = .08, 95% CI = [−.25, .05]). Table 2 provides an overview of the mediation analysis.

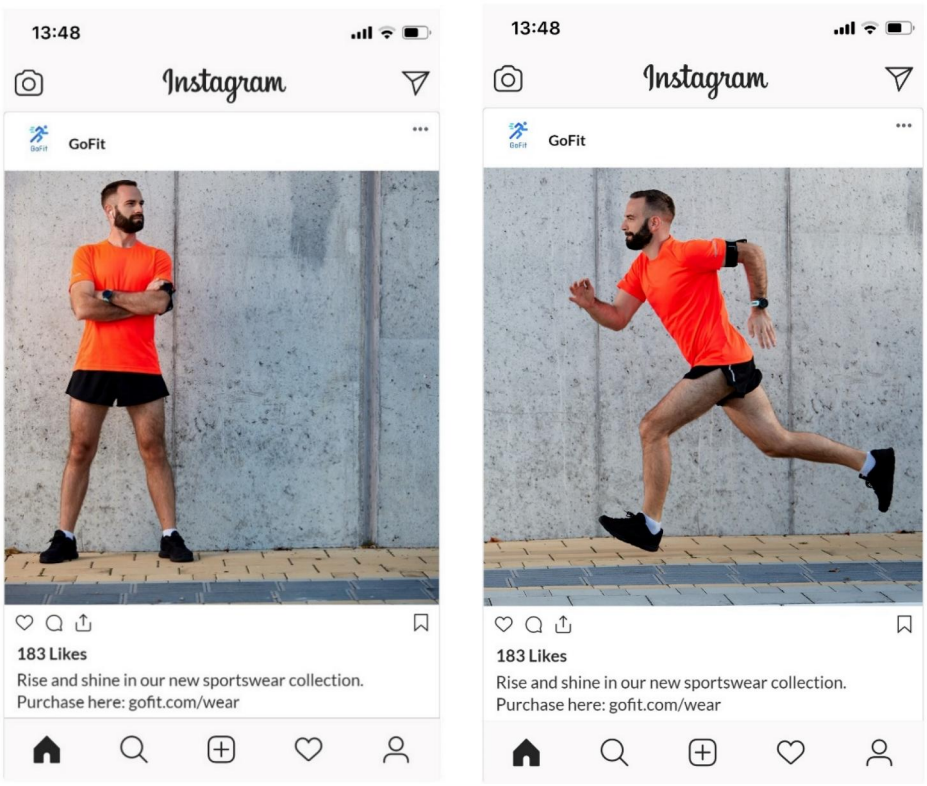


Figure 3. One of the stimulus pairs used in Study 1.

Table 1. Effects of animate and hybrid motion images on engagement and persuasion (non-log-transformed).

	Study 1 (humans) $N = 199$		Study 2 (animals) $N = 195$		Study 3 (human–object) $N = 198$	
Outcome	No motion	Motion	No motion	Motion	No motion	Motion
Engagement	3.44^{a}	4.44^{a}	4.65^{b}	5.52^{b}	3.22^{c}	4.76^{c}
Perceived effectiveness (persuasion)	3.32^{a}	4.28^{a}	4.11^{b}	4.58^{b}	3.21^{c}	4.70^{c}
Purchase intention (persuasion)	16.98	18.17	21.43	24.21	14.15^{c}	25.89^{c}

Note. Within a row, means with a common superscript (^{a}, ^{b}, or ^{c}) differ at $p < .05$.

Table 2. Mediation effect of engagement on persuasion.

Study	Direct Effect (Implied motion → Intention) [95% CI]	Indirect Effect (Implied motion → Engagement → perceived effectiveness → Intention) [95% CI]
Animate motion		
Study 1 (humans)	[−.25, .05]	[.03, .18]
Study 2 (animals)	[−6.23, 5.77]	[2.08, 7.91]
Hybrid motion		
Study 3 (human-object)	[−.23, .15]	[.12, .37]
Inanimate motion		
Study 4 (cars)	[−.30, .34]	[.01, .16]
Study 5 (airplanes)	[−.07, .23]	[.004, .158]
Study 6 (waves)	[−.21, .15]	[.10, .25]
Study 7 (food)	[−9.27, 5.03]	[5.27, 15.53]

Note. A significant effect is present when the confidence interval does not include zero.

To conclude, the results from Study 1 are in line with our predictions, showing that depictions of humans in motion are conducive to persuasion (Hypothesis 1, see Table 1) and that this effect occurs through enhanced engagement (Hypothesis 2, see Table 2). Study 2 sought to validate these findings by investigating another type of animate motion image, namely depictions of animals in motion.

Study 2: Animate Motion Images (Animals)

Design and Stimuli

Study 2 examined the persuasive effects of implied motion images depicting animals. The stimuli were presented as Instagram advertisements for a fictitious wildlife conservation charity called "SafeWildlife." All ads consisted of the brand logo, the count of the number of likes (183 Likes), a caption ("Secure a future for our wildlife! Donate now and help to safe endangered species: savewildlife.com/donate"), and an accompanying image. The images featured three different wildlife animals, each depicted once in motion (running) and once in a stationary pose (lying). The images were drawn from commercial photo databases and selected based on the same criteria as those in the previous study. One of the stimulus pairs is presented in Figure 4 (see also Supplemental Online Appendix D).

The procedure and measures for Study 2 closely followed those used in Study 1. Screening for data quality issues (e.g., straight-lining) and nonrandom missing data resulted in a final sample of 195 Prolific panelists (49.2% female; M_{age} = 33.6 years). After viewing the ad, participants reported their engagement (α = .92) with the image as well as the perceived effectiveness of the ad (α = .97) and their intentions to donate ("*How likely are you to make a donation?*," measured on a scale ranging from 0% to 100%).

Results

A one-way ANOVA with perceived effectiveness as the dependent variable revealed that implied motion imagery led participants to perceive the ad as significantly more effective (M_{Motion} = 4.58, SD = 1.50 vs. $M_{NoMotion}$ = 4.11, SD = 1.59, $F(1, 193) = 4.56$, p = .034, η^2_p = .023). However, no significant effect was found for donation intention (M_{Motion} = 24.21, SD = 23.57 vs. $M_{NoMotion}$ = 21.43, SD = 22.63, $F(1, 193) = .71$, p = .401, η^2_p=.004). In line with our expectations, the presence of an implied motion image resulted in greater engagement with the image (M_{Motion} = 5.52, SD = 1.34 vs. $M_{NoMotion}$ = 4.65, SD = 1.47, $F(1, 193) = 18.53$, $p < .001$, η^2_p = .088). The results can be found in Table 1.

Mediation Analysis

A mediation analysis (Hayes 2017, PROCESS Model 6 with 5,000 bootstrap samples, and correcting for heteroscedasticity using HC3) confirmed that engagement mediates the effect of implied motion images on perceived effectiveness, which subsequently influences donation intention (indirect effect = 4.70, SE = 1.48,

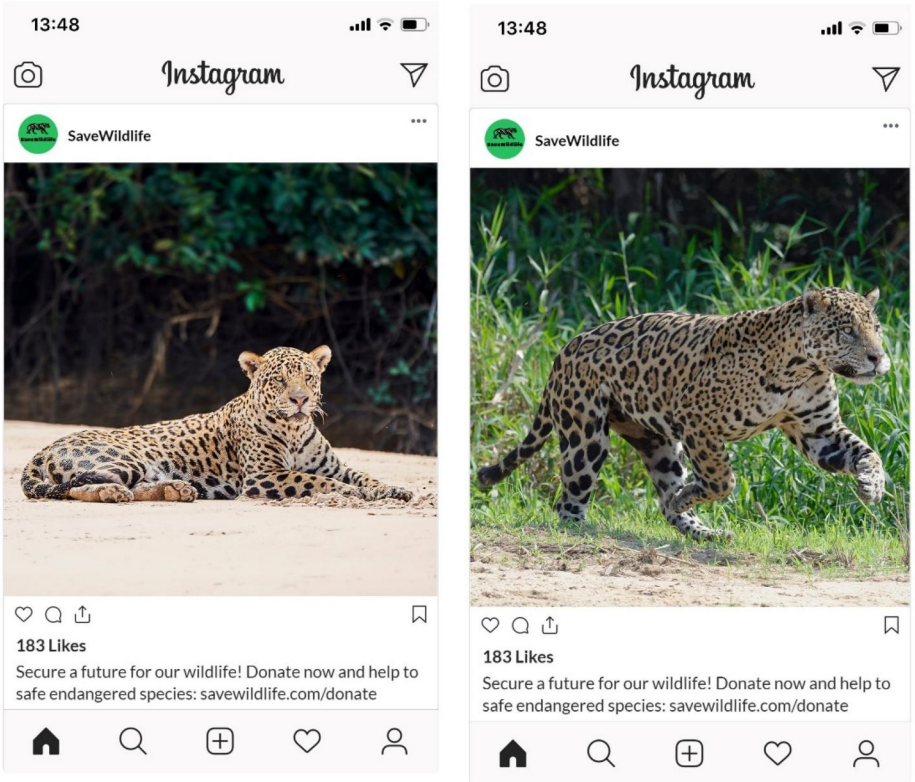


Figure 4. One of the stimulus pairs used in Study 2.

95% CI = [2.08, 7.91]). The direct effect of implied motion image on donation intention, controlling for engagement and perceived effectiveness, was nonsignificant (direct effect = −0.23, $SE = 3.04$, 95% CI = [−6.23, 5.77]).

Overall, findings from Studies 1 and 2 corroborate the idea that implied motion images depicting humans or animals increase persuasion *via* enhanced engagement. Study 3 expanded the examination to hybrid motion images, namely photographs depicting humans interacting with objects.

Study 3: Hybrid Motion Images (Human-Object Interactions)

Design and Stimuli

We used the same Instagram ads as in Study 1, but this time included images featuring three different people, each shown playing with a football (in motion) and posing with the football (in a stationary pose). The images were taken from commercial photo databases and selected based on the same criteria used in Study 1. One of the stimulus pairs is presented in Figure 5 (see also Supplemental Online Appendix D).

The final sample included 198 participants from a Prolific panel (49.5% female; M_{age} = 40.8 years). After seeing the ad, participants reported their engagement (α = .94) with the image as well as the perceived effectiveness of the ad (α = .97) and intention to purchase the brand's sportswear.

Results

A series of one-way ANOVAs showed that implied motion images depicting human-object interactions led to greater perceived message effectiveness (M_{Motion} = 4.70, SD = 1.58 vs. $M_{NoMotion}$ = 3.21, SD = 1.50, $F(1, 196) = 19.94$, $p < .001$, $\eta^2_p = .190$), as well as greater intentions to purchase the brand's sportswear[2] (M_{Motion} = 25.89, SD = 26.42 vs. $M_{NoMotion}$ = 14.15, SD = 16.71, $F(1, 196) = 13.90$, $p < .001$, $\eta^2_p = .066$) and greater engagement with the image (M_{Motion} = 4.76, SD = 1.59 vs. $M_{NoMotion}$ = 3.22, SD = 1.45, $F(1, 196) = 49.67$, $p < .001$, $\eta^2_p = .202$). The results are reported in Table 1.

Mediation Analysis

A mediation analysis (Hayes 2017, PROCESS Model 6 with 5,000 bootstrap samples, and correcting for heteroscedasticity using HC3) again showed that engagement mediates the effect of implied motion images on perceived effectiveness, which subsequently influences purchase intention[3] (indirect effect = .24, SE = .06, 95% CI = [.12, .37]). The direct effect of implied motion image on purchase intention, controlling for

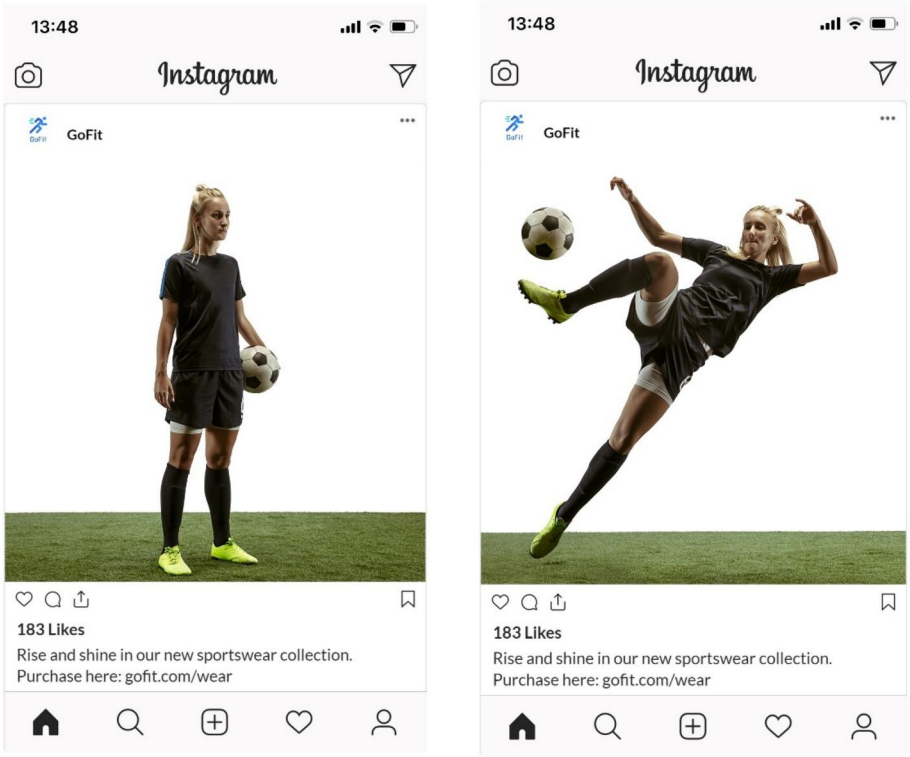


Figure 5. One of the stimulus pairs used in Study 3.

Table 3. Effects of inanimate motion images on engagement and persuasion (non-log-transformed).

	Study 4 (cars) $N = 208$		Study 5 (airplanes) $N = 194$		Study 6 (waves) $N = 201$		Study 7 (food) $N = 197$	
Outcome	No motion	Motion	No motion	Motion	No motion	Motion	No motion	Motion
Engagement	4.32^{a}	4.90^{a}	2.94^{b}	3.40^{b}	3.56^{c}	5.24^{c}	3.93^{d}	5.08^{d}
Perceived Effectiveness (Persuasion)	3.94^{a}	4.48^{a}	$2.84^{(b)}$	$3.22^{(b)}$	2.61^{c}	3.74^{c}	3.87^{d}	4.93^{d}
Purchase Intention (Persuasion)	23.26	27.19	8.14*	9.93*	16.49^{c}	28.86^{c}	38.58^{d}	50.39^{d}

Note. Within a row, means with a common superscript (^{a}, ^{b}, ^{c}, or ^{d}) differ at $p < .05$. The means for perceived effectiveness in Study 5 differ at $p = .084$.
*Effect became significant when the log-transformed variable was used as the dependent variable.

engagement and perceived effectiveness, was nonsignificant (direct effect = −0.04, *SE* = .09, 95% CI = [−.23, .15]). The findings of the mediation analysis are presented in Table 2.

Taken together, Studies 1–3 lend consistent evidence that implied motion images depicting humans, animals, and humans interacting with objects make people feel more engaged (Hypothesis 1, see Table 1) and, by doing so, enhance the persuasiveness of an advertisement (Hypothesis 2, see Table 2). The aim of the subsequent studies was to extend the examination of implied motion imagery to depictions of moving objects.

Study 4: Inanimate Motion Images (Cars)

In Studies 4 through 7, we investigated whether implied motion images depicting moving objects would evoke the same persuasive mechanisms as animate and hybrid motion images. Due to the relative novelty of this research endeavor, we investigated different types of inanimate motion images—ones that feature mobility-related motion (Study 4: cars, Study 5: airplanes), ones that feature nature-related motion (Study 6: waves), and ones that feature food-related motion (Study 7: food).

Design and Stimuli

The stimuli were presented as Instagram advertisement for a fictitious car magazine called "Motor News." The ads again included the ads included the brand logo, the count of the number of likes (183 Likes), a caption ("What's new in the world of sports cars? Click here to learn more: motornews.com/trends"), and an accompanying image. The manipulation of implied motion in the image followed the same approach as that in the previous studies. We selected three image pairs, with each pair showing a car once driving on a road (motion) and once parked on a street (static). The photos were taken from various sources, including commercial photo databases and official brand websites. Potential confounding factors were controlled insofar as the objects of each image pair were photographed in the same or a very similar setting and shown from similar angles and distances. We also ensured that no human beings were shown in the pictures (see Supplemental Online Appendix D).

Using the same criteria as those in the previous studies, participants were recruited from a Prolific panel (i.e., U.S. resident, age 18 years or older, English as native language). After screening for data quality issues (e.g., straight-lining) and nonrandom missing data, the final *N* was 208 participants for Study 4 (49.5% female; $M_{age} = 37.2$ years).

Following consent, participants were directed to a survey that included sociodemographic questions, followed by the exposure to one of six ads. We subsequently measured participants' engagement ($\alpha = .94$) and the perceived effectiveness of the ad ($\alpha = .95$), as well as their intention to read the magazine's article ("*How likely are you to click on the link mentioned in the Insta post and learn more about sports cars?*" measured on a scale from 0% to 100%).

Results

A series of one-way ANOVAs showed that the ads were perceived as significantly more effective when they depicted sports cars in motion (vs. no motion) ($M_{Motion} = 4.48$, SD = 1.57 vs. $M_{NoMotion} = 3.94$, SD = 1.73, $F(1, 206) = 5.54$, $p = .02$, $\eta^2_p = .026$). No significant impact was found on participants' intention to read the magazine's article[4] ($M_{Motion} = 27.19$, SD = 33.03 vs. $M_{NoMotion} = 23.26$, SD = 29.50, $F(1, 206) = .82$, $p = .366$, $\eta^2_p = .004$). Yet, exposure to depictions of sports cars in motion led to greater message engagement ($M_{Motion} = 4.90$, SD = 1.64 vs. $M_{NoMotion} = 4.32$, SD = 1.80, $F(1, 206) = 5.27$, $p = .023$, $\eta^2_p = .025$). Results are reported in Table 3.

Mediation Analysis

We also performed a mediation analysis (Hayes 2017, PROCESS Model 6 with 5,000 bootstrap samples, and correcting for heteroscedasticity using HC3). In line with our expectations, engagement mediated the effect of inanimate motion imagery on perceived

effectiveness and subsequent intention[5] to comply with the message advocacy (indirect effect = .07, *SE* = .04, 95% CI = [.01, .16]). The direct effect of inanimate motion imagery on intention, controlling for engagement and perceived effectiveness, was nonsignificant (direct effect = −0.13, *SE* = .08, 95% CI = [−.30, .34]). Results for the mediation analysis can be found in Table 2.

Overall, Study 4 provided preliminary evidence that images depicting objects in motion increase persuasion and that this increase occurs through enhanced engagement. To further validate these findings, we conducted another study examining transportation means in motion—this time, airplanes.

Study 5: Inanimate Motion Images (Airplanes)

Design and Stimuli

Study 5 again examined depictions of mobility-related motion, but within the context of travel and vacation. The Instagram ads we created included the brand logo of a fictitious online travel agency called "HolidayNow," the count of the number of likes (183 Likes), a caption ("Need vacation? Visit our website and book a trip: holidaynow.com/trip"), and an accompanying image. The image pairs featured airplanes from three airlines that were depicted once during takeoff (motion: flying) and once at the terminal (no motion: standing still). The photos were taken from various sources including commercial photo databases as well as news platforms and were selected based on the same criteria employed in Study 4 (see Supplemental Online Appendix D).

The study utilized a final sample of 194 participants from a Prolific panel (49.0% female; M_{age} = 34.8 years). We first collected sociodemographic data. Participants were then randomly assigned to one of three ads in either the implied motion image condition or the no implied motion image condition and then asked about their engagement with the ad image (α = .95), the perceived effectiveness of the ad (α = .96) and their intention to comply with the message advocacy ("*How likely are you to click on the link mentioned in the Insta post and book a trip*," measured on a scale from 0% to 100%).

Results

Analyses of variance demonstrated that depictions of airplanes during takeoff (vs. standing still) led to marginally greater perceptions of ad effectiveness (M_{Motion} = 3.22, SD = 1.54 vs. $M_{NoMotion}$ = 2.84, SD = 1.54, $F(1, 192) = 3.02$, $p = .084$, $\eta^2_p = .015$). Initially, inanimate motion image yielded a nonsignificant effect on intention to comply with the message advocacy (M_{Motion} = 9.93, SD = 12.95 vs. $M_{NoMotion}$ = 8.14, SD = 13.70, $F(1, 187) = .85$, $p = .358$, η^2_p = .005). However, the effect became significant when log-transformed intention[6] was used as the dependent variable ($F(1, 187) = 4.32$, $p = .039$, η^2_p =.023). Furthermore, viewing airplanes in motion led participants to experience greater message engagement (M_{Motion} = 3.40, SD = 1.65 vs. $M_{NoMotion}$ = 2.94, SD = 1.61, $F(1, 192) = 3.93$, $p = .049$, $\eta^2_p = .020$). Results are reported in Table 3.

Mediation Analysis

A mediation analysis (Hayes 2017, PROCESS Model 6 with 5,000 bootstrap samples, and correcting for heteroscedasticity using HC3) again provided evidence that engagement mediates the effect of inanimate motion imagery on perceived effectiveness and subsequent intention[7] to comply with the message advocacy (indirect effect = .08, *SE* = .04, 95% CI = [.004, .158]). The direct effect of inanimate motion image on intention, controlling for engagement and perceived effectiveness, did not achieve significance (direct effect = .08, *SE* = .08, 95% CI = [−.070, .227]). Results of the mediation analysis are reported in Table 2.

Although the mediation effect for airplanes in motion was comparatively weaker than that for cars, animals, or humans in motion, the results support our hypotheses. To further enhance confidence in the idea that inanimate motion images engender the same persuasive mechanism as animate motion images, we conducted two additional studies. Study 6 focused on natural phenomena, and Study 7 investigated depictions of food.

Study 6: Inanimate Motion Images (Waves)

Design and Stimuli

Study 6 examined another form of inanimate motion imagery, namely depictions of motion in natural phenomena (e.g., movements involving wind and water). We created Instagram ads for a fictitious chewing gum brand called "MintBoost." The ads featured the brand logo, the count of the number of likes (183 Likes), a short caption ("100% natural. 100% refreshing. Get our mint chewing gum here: mintboost.com/new"), and an accompanying image. The image pairs featured one of three distinct lighthouses, captured in two scenarios: either surrounded by dynamic, crashing

waves (motion: waves), and standing in calm waters (static: still water). The photos were taken from various sources including commercial photo databases and were selected based on criteria similar to those in Study 4. One of the stimulus pairs is presented in Figure 6 (see also Supplemental Online Appendix D).

The study utilized a sample of 201 participants drawn from a Prolific panel (50.2% female; M_{age} = 38.01 years). Sociodemographic data were collected again at the beginning of the experiment. After seeing either image in either the motion or the static condition, participants were asked to indicate their message engagement (α = .96), the perceived effectiveness of the ad (α = .97), and their intention to buy the brand's chewing gum ("*How likely are you to purchase mint chewing gums by MintBoost?*," measured on a scale from 0% to 100%).

Results

A series ANOVAs (see Table 3) demonstrated that depictions of movements involving natural phenomena led to greater perceptions of ad effectiveness (M_{Motion} = 3.74, SD = 1.92 vs. $M_{NoMotion}$ = 2.61, SD = 1.63, $F(1, 199) = 20.077$, $p < .001$, $\eta^2_p = .092$) and greater purchase intention[8] (M_{Motion} = 28.86, SD = 28.86 vs. $M_{NoMotion}$ = 16.49, SD = 21.66, $F(1, 199) = 11.86$, $p < .001$, $\eta^2_p = .056$), as well as greater message engagement (M_{Motion} = 5.24, SD = 1.62 vs. $M_{NoMotion}$ = 3.56, SD = 1.75, $F(1, 199) = 50.07$, $p < .001$, $\eta^2_p = .201$).

Mediation Analysis

A mediation analysis (Hayes 2017, PROCESS Model 6 with 5,000 bootstrap samples, and correcting for heteroscedasticity using HC3) showed that the effect of inanimate motion images depicting natural phenomena on perceived effectiveness and subsequent purchase intention[9] is mediated by engagement (indirect effect = .18, *SE* = .04, 95% CI = [.10, .25]). The direct effect was nonsignificant (direct effect = −0.09, *SE* = .09, 95% CI = [−.21, .15]). Results can be found in Table 2.

Taken together, the results further corroborate the idea that inanimate motion images increase persuasion (Hypothesis 1 and Hypothesis 3) and this effect occurs through enhanced engagement with the ad image (Hypothesis 2). A seventh and final study was conducted to determine if this persuasion effect also applies to a radically different object category—namely, food.



Figure 6. One of the stimulus pairs used in Study 6.

Study 7: Inanimate Motion Images (Food)

Design and Stimuli

Lastly, Study 7 focused on food-related motion (i.e., food being shown as moving). We created Instagram ads for a fictitious restaurant chain called "HappyFood." The ads featured the brand logo, the count of the number of likes (183 Likes), a caption ("Yummy! Visit our restaurants and taste our delicious [food item]") and an accompanying image. The images were drawn from commercial photo databases and depicted three distinct food items (salad, burger, or ice cream), each portrayed in a dynamic state (motion: food thrown in the air or flowing) and a static state (no motion: positioned on a surface). The photo selection followed the same principles as those in Study 4. One of the stimulus pairs is presented in Figure 7 (see also Supplemental Online Appendix D).

Our final sample consisted of 197 participants drawn from a Prolific panel (49.7% female; M_{age} = 41.45 years). Following consent, participants were directed to a survey that included sociodemographic questions, followed by exposure to a stimulus. We then measured engagement (α = .93), as well as perceived effectiveness (α = .98) and intention to visit a HappyFood restaurant ("*How likely are you to visit a HappyFood restaurant if one opened in your city/town?*," measured on a scale from 0% to 100%).

Results

A series ANOVAs showed that depictions of food in motion increased the perceived effectiveness of the ad (M_{Motion} = 4.93, SD = 1.46 vs. $M_{NoMotion}$ = 3.87, SD = 1.90, $F(1, 197) = 19.00$, $p < .001$, $\eta^2_p = .089$) and led to greater intention to visit the brand's restaurant (M_{Motion} = 50.39, SD = 30.45 vs. $M_{NoMotion}$ = 38.58, SD = 31.09, $F(1, 195) = 7.25$, $p = .008$, $\eta^2_p = .036$). Exposure to images depicting food in motion also induced greater message engagement (M_{Motion} = 5.08, SD = 1.37 vs. $M_{NoMotion}$ = 3.93, SD = 1.78, $F(1, 195) = 25.96$, $p < .001$, $\eta^2_p = .117$). The results are reported in Table 3.

Mediation Analysis

A mediation analysis (Hayes 2017, PROCESS Model 6 with 5,000 bootstrap samples, and correcting for heteroscedasticity using HC3) suggest that engagement is mediating the effect of food motion images on perceived effectiveness and subsequent purchase intention (indirect effect = 9.10, SE = 2.60, 95% CI = [5.27, 15.53]). As indicated in Table 2, the direct effect of

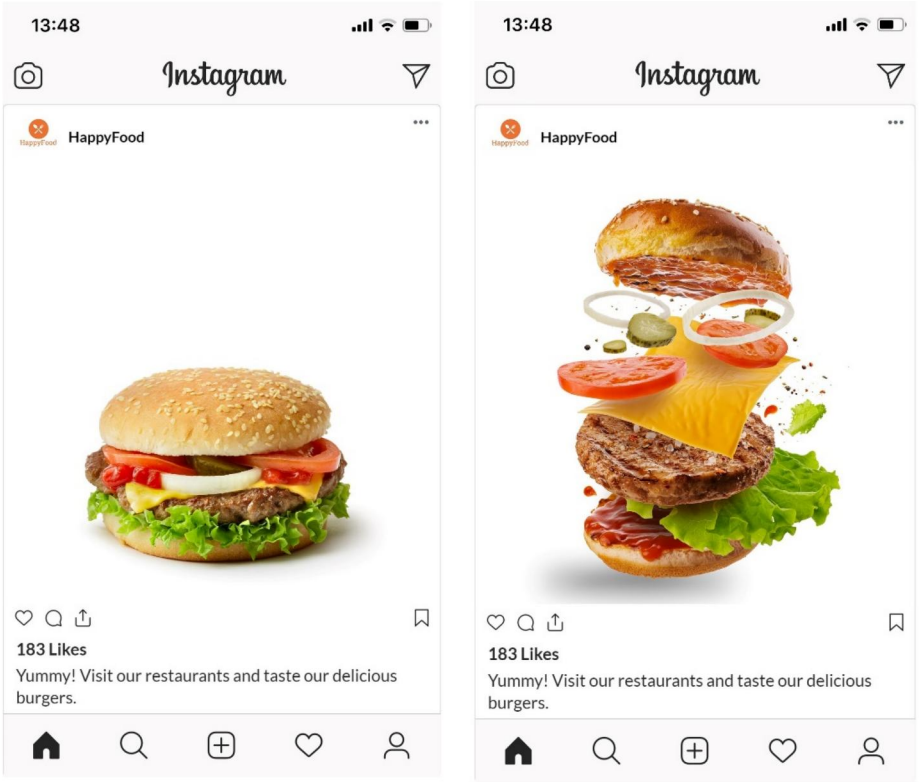


Figure 7. One of the stimulus pairs used in Study 7.

implied food motion image on behavioral intention was nonsignificant (direct effect = −2.12, $SE = 3.62$, 95% CI = [−9.27, 5.03]).

Overall, across a set of seven experimental studies, we provide robust evidence that both animate and inanimate motion images increase the persuasiveness of an ad (Hypothesis 1 and Hypothesis 3) and this effect is mediated by enhanced engagement with the image (Hypothesis 2). To gain a better understanding of this mechanism, we also tested whether certain properties of implied motion images may influence the *intensity of engagement*.

Pooled Analysis

Specifically, we considered the possibility that the intensity of engagement may be influenced by the type of motion (0 = no motion, 1 = animate, 2 = hybrid, 3 = inanimate motion) (Hypothesis 4) and the complexity of the depicted motion (Hypothesis 5). The complexity of a depicted movement involves three dimensions: *density*, *direction*, and *depth*. Whereas *density* is operationalized based on the number of moving elements (0 = no motion, 1 = one moving element, 2 = two or more moving elements), *direction* is assessed based on the shape of the movement (0 = no motion, 1 = linear motion, 2 = nonlinear motion). *Depth* captures motion along the z-axis (0 = no motion, 1 = motion along the x-axis and/or y-axis, 2 = motion along the z-axis).

An overview of how each stimulus used in our research was coded is provided in Supplemental Online Appendix D. To test for the influence of motion type and the different aspects of motion complexity on engagement, we pooled the data from all seven experiments ($N = 1{,}392$) and subsequently performed an analysis of covariance (ANCOVA). Type of motion and complexity of motion (density, direction, and depth) were included in the analysis as independent variables, along with five control variables. The control variables assessed whether the respective image features an actual background (0 = white background, 1 = real background), whether it depicts the product (0 = no, 1 = yes) or the service that is promoted in the ad (0 = no, 1 = yes), whether the spatial distance between the depicted entities and the camera is relatively small or large (1 = relatively close, 2 = relatively far), and whether the accompanying verbal text contains a link (0 = no, 1 = yes). We did not control for the word count of the ads because all Instagram posts were similar in length, ranging between 9 and 15 words. Table 4 provides an overview of the analysis.

The data revealed a significant effect of type of motion on engagement ($F(2, 1380) = 3.327$, $p = .036$, $\eta^2_p = .005$). However, a subsequent post-hoc test using Bonferroni correction showed that this effect was mainly attributable to the contrast between static and implied motion images. Compared with static motion images ($M_{NoMotion} = 3.72$, SD = 1.73), *any* implied motion image increased engagement, regardless of whether the image displayed animate ($M_{MotionAnimate} = 4.98$, SD = 1.56, $p < .001$), inanimate ($M_{MotionInnimate} = 4.66$, SD = 1.73, $p < .001$), or hybrid motion ($M_{MotionHybrid} = 4.75$, SD = 1.59, $p < .001$). However, none of the contrasts between motion images were significant ($p > .05$). Because the evidence does not support the notion that animate motion images induce greater levels of engagement than inanimate motion images, we must reject Hypothesis 4.

For motion complexity, the findings indicated no significant influence of density ($F(1, 1380) = .429$, $p = .512$, $\eta^2_p = .000$) and depth on engagement ($F(1, 1380) = .702$, $p = .402$, $\eta^2_p = .001$). However, the data yielded a significant effect of direction on engagement ($F(1, 1380) = 15.996$, $p < .001$, $\eta^2_p = .011$). Images were most engaging when they depicted nonlinear vectors ($M_{Nonlinear} = 5.06$, SD = 1.52), followed by images containing linear vectors ($M_{Linear} = 4.50$, SD = 1.75) and images featuring no motion vectors at all ($M_{NoMotion} = 3.72$, SD = 1.73). The differences between all three categories were significant at $p < .001$. Our findings support Hypothesis 5 but suggest that the direction of vectors is the most influential dimension of motion complexity.

Discussion

The present work sought to determine whether depictions of different types of moving entities (humans, animals, and objects) influence persuasion and whether they evoke the same mechanism (Table 5).

Across a set of seven experimental studies, we provide robust evidence that both animate and inanimate motion images increase the persuasiveness of an ad (Hypothesis 1 and Hypothesis 3) and this effect occurs through enhanced engagement with the ad image (Hypothesis 2). This finding aligns with the dynamic default hypothesis (Franconeri and Simons 2003), suggesting that dynamic events garner attentional priority over static ones.

Table 4. Results of a pooled analysis of Studies 1 to 7 using an ANCOVA, $N = 1{,}392$.

Predictor	DV: Engagement	
	F Statistic	Partial Eta Squared (η^2_p)
Link	12.95***	0.009
Camera distance	25.377***	0.018
Product	72.686***	0.05
Service	10.118**	0.007
Background	3.638˙	0.003
Type of motion (no motion vs. animate vs. hybrid vs. inanimate)	3.327*	0.005
Complexity of motion		
Density (no motion vs. one moving element vs. two or more moving elements)	0.429	0.000
Direction (no vs. linear motion vs. nonlinear motion)	15.996***	0.011
Depth (no vs. motion along x and/or y-axis vs. motion along z-axis)	0.702	0.001

Note. Type of motion and complexity of motion were included in the analysis as independent variables, along with five control variables. Total R^2 is .207 and adjusted R^2 is .201.
$\dot{p} < .10$. $^{*}p \leq .05$. $^{**}p \leq .01$. $^{***}p \leq .001$.

Table 5. Summary of the findings.

Hypothesis	Description	Conclusion
1	The use of implied motion images increases persuasion.	✓
2	The effect of an implied motion image on persuasion is mediated by engagement.	✓
3	Depictions of animate entities (humans and animals) and inanimate entities (objects) in motion influence persuasion through engagement.	✓
4	Animate motion images are more engaging than inanimate motion images.	✗
5	Images with higher motion complexity are more engaging than images with lower motion complexity.	✓

While our findings suggest that implied motion images consistently outperform static images, we did not consider boundary conditions where static images may be more effective. One such boundary condition may occur in contexts where audiences have limited cognitive resources available to process an ad, such as when driving by a billboard on their way to work or experiencing high levels of stress (Kergoat, Meyer, and Merot 2017). In such circumstances, processing a depicted movement may consume a considerable amount of available resources, causing the viewer to overlook the key verbal message and the brand logo. Support for this assumption comes from Zhang, Xiao, and Nicholson (2020), demonstrating that dynamism in product presentation diverts attentional resources away from other message elements, such as the background image. Another boundary condition may involve products and services whose value proposition involves relaxation and contemplation, such as wellness and spa services or fine dining experiences. Depictions of action processes may be incongruous with consumer expectations, leading to decreased persuasion (Eklund and Helmefalk 2022).

We also explored the behavioral urgency hypothesis, which posits that different types of motion are weighted differently (Franconeri and Simons 2003). No indication of such an effect was found regarding the *type of motion* because animate and inanimate motion images elicited similar levels of engagement (Hypothesis 4). This result aligns with the research by Kovic, Plunkett, and Westermann (2010), who discerned no systematic differences in the way individuals process images of animate versus inanimate entities. While animate and inanimate motion images do not appear to differ quantitatively in the amount of engagement they induce, one may wonder if they differ qualitatively in the specific form of engagement they elicit. Engagement can be conceptualized as a multi-dimensional construct, encompassing both cognitive and emotional components (Fredricks, Blumenfeld, and Paris 2004; Tang and Hew 2022). Whereas *cognitive engagement* refers to the extent to which recipients think about and reflect on an advertisement, *emotional engagement* describes the (sum of) affective reactions toward the ad (Ben-Eliyahu et al., 2018; Chan-Olmsted and Wolter 2018; Tang and Hew 2022). It is possible that inanimate motion images elicit more cognitive engagement, whereas animate motion images are more likely to evoke emotional engagement. Objects are the focal point in inanimate motion images, which may prompt viewers to pay particular attention to the properties and functionalities of the depicted things. Such focus seems readily linked to cognitive engagement. Because humans or animals are the salient content features in animate motion images, recipients may be particularly attuned to social and emotional cues, which likely fosters emotional engagement. Support for this assumption comes from previous research suggesting that the amygdala (an area of the brain responsible for emotional processing) is more readily activated by threatening animate stimuli than by threatening inanimate stimuli (Coker-Appiah et al. 2013). Similarly, participants have reported greater emotional arousal when seeing

video clips of mistreated humans and animals compared with video clips of mistreated objects (Mattiassi et al. 2021).

In line with the behavioral urgency hypothesis, our findings show that the *complexity of the depicted motion* influences the extent to which audiences engage with an image (Hypothesis 5). Interestingly, this effect was only observed for one of the three complexity dimensions. Whereas the direction of the depicted vectors had a significant effect on engagement, the density and depth of the depicted vectors did not.

This finding may result from the different ways in which the complexity dimensions stimulate our imagination. Whereas direction determines the path of motion we mentally construct, density shapes how many elements we imagine as moving, and depth influences whether this mental simulation is two- or three-dimensional. Creating a mental simulation of nonlinear motion paths, such as curves and flows, may foster a greater sense of discovery and surprise than merely imagining a larger number of moving elements (density) or picturing motion in three-dimensional space (depth). This effect presumably makes the direction of motion the complexity dimension with the greatest impact on engagement.

We also wonder whether certain personality traits may influence individuals' engagement with implied motion images. One apparent candidate is openness to experience, one of the five major dimensions in the *Big Five personality model* (McCrae and John 1992). Individuals high in openness tend to have a more vivid imagination and find more pleasure in creating detailed mental simulations. This inclination may prompt those higher (vs. lower) in openness to engage more extensively with implied motion images.

Another important personality factor may be *Novelty-Seeking* (Hirschman 1980). Individuals high in this trait have an innate tendency to seek out new experiences and sensations. This quality may make them more receptive than those low in novelty-seeking to processing action sequences implied in photographic images.

Lastly, researchers may want to test the potential moderating effect of *Need for Closure* (Kruglanski et al. 2006). Individuals with a high need for closure prefer clear, unambiguous information. Because implied motion images require viewers to mentally simulate the depicted action, such depictions come with increased ambiguity. As a result, individuals with a high need for closure might be less willing to engage with implied motion images than those with a low need for closure.

Theoretical and Practical Contributions

The present research makes three important theoretical contributions. First, while previous studies have provided valuable insights into the persuasive effects of implied motion images, they have primarily focused on images of humans and human-like figures (Grigsby, Jewell, and Zamudio 2023; Lim and Childs 2020). Our research goes one step further by systematically exploring how photographic depictions of humans, animals, *and* objects in motion affect persuasion.

Second, and relatedly, we demonstrate that all types of implied motion images evoke the same processing mechanism. Our findings show that depictions of humans, animals, and objects in motion increase consumers' engagement with the ad, leading to enhanced persuasion. This finding aligns with previous research, indicating that brand logos conveying dynamism enhance engagement and, as a result, induce more favorable brand attitudes (Cian, Krishna, and Elder 2014). The mediating role of engagement can be explained using the elaboration likelihood model. We posited that implied motion images prompt consumers to imagine the depicted movement and, by doing so, engage with the content more thoughtfully and systematically.

Third, we identify properties of the depicted movements that increase engagement with an image. Our data suggest that images with greater motion complexity—in the form of nonlinear movements—enhance the extent to which consumers engage with the image.

In terms of practical contributions, our project provides actionable implications for commercial and nonprofit organizations alike. Our findings show that the persuasive effects of implied motion images are stable across advertising contexts, including sportswear, travel and tourism, automobiles, the food industry, and charity. This way, we provide consistent evidence that marketers can increase consumer engagement with their ads and boost subsequent persuasion by depicting humans and objects in motion. Our data further indicate that this effect is particularly pronounced for images depicting nonlinear motion. In conclusion, the present research helps marketers create more effective and successful advertising in today's increasingly visual society.

It is worth noting that brands may face certain constraints in choosing which animate or inanimate entity to depict in motion. For instance, it may seem incongruous for a car manufacturer to feature a person swimming in a pool instead of depicting a car driving on the road. Similarly, it may be confusing if a wildlife charity showcases a plane taking off rather than a tiger wandering through the jungle. Future research may therefore want to investigate genre conventions and how they impact advertisers' selection of implied motion images as well as audience responses.

Limitations and Avenues for Future Research

As with any research endeavor, this study is not without limitations. First, the stimuli in our studies varied not only by type of motion and motion complexity, but also in terms of content, mood (e.g., color saturation, lighting, contrast, perspective, spatial arrangement) and background. Follow-up studies could look more closely at the interplay of these different visual elements, such as whether color can increase or decrease the implied motion effect and thus the persuasiveness of an ad. A recent study lends evidence for this assumption, demonstrating that variation in color saturation evokes dynamism, which then improves product evaluations (Mourey and Elder 2019). Second, the standard limitations of using behavioral intentions as a proxy for actual behavior apply.

Conclusion

This research was set out to explore the persuasive effects of implied motion images. Across a set of seven experimental studies, we provide robust evidence that images depicting animate and inanimate motion increase the persuasiveness of an advertisement and this effect occurs through enhanced engagement. Our findings further indicate that the level of engagement is influenced by the complexity of the depicted motion, with more complex, nonlinear motion stimulating greater engagement that less complex, linear motion. Taken together, the present research adds to advertising literature by offering an empirically grounded account of implied motion images and by helping marketers create more effective advertising.

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Disclosure Statement

No potential conflict of interest was reported by the author(s).

Ethics Statement

According to Swiss law and institutional guidelines, this research did not require formal IRB approval (Local Swiss law; IRB Regulations of the Zurich University of Applied Sciences; Criteria for exempt research). The research was conducted in compliance with local legislation, institutional requirements as well as the APA Ethical Principles regarding research with human participants. Participants gave their informed consent prior to taking part in each survey and were informed about the purpose of the data collection, as well as their rights concerning their data and participation. All data were collected anonymously. Participants had the option to contact the researchers at any time to request additional information or withdraw their consent.

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Data Availability Statement

The data underlying this article will be shared on reasonable request to the corresponding author.

Notes

1. DV: Log-transformed purchase intention.
2. Skewness of data led us to log-transform purchase intention (skewness = 1.18, SE = .173). Because the pattern of results remained the same with the log-transformed variable, we report the untransformed means.
3. DV: Log-transformed purchase intention.
4. Skewness of data led us to log-transform purchase intention (skewness = 1.07, SE = .169). Because the pattern of results remained the same with the log-transformed variable, we report the untransformed means.
5. DV: Log-transformed intention.
6. Skewness of data led us to log-transform purchase intention (skewness = 1.90, SE = .177). Because the pattern of results remained the same with the log-transformed variable, we report the untransformed means.
7. DV: Log-transformed purchase intention.
8. Skewness of data led us to log-transform purchase intention (skewness = 1.17, SE = .172). Because the pattern of results remained the same with the log-transformed variable, we report the untransformed means.
9. DV: Log-transformed purchase intention.

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