

Dynamic by Design: How Incorporating Dynamism in Advertising Affects Evaluations

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ABSTRACT As consumers spend more time engaging with digital media and companies shift marketing budgets accordingly, the number of digital advertisements capable of incorporating dynamic design elements has also increased. Traditional media, like television commercials, have long incorporated movement and action, but very little research has considered the potential consequences that subtle dynamic design elements, like changing color saturation for visual stimuli and stereo panning for audio stimuli, might have on consumers. Five studies demonstrate that exposure to subtle, dynamic design elements bolsters evaluations in subsequent rating tasks (e.g., product liking, willingness to pay, prosocial concern). Effects obtain for subjective ratings that permit personal opinion but do not obtain for objective ratings for which definitive answers exist. Evidence for the proposed underlying process—state-level arousal—is provided, and a boundary condition is shown to exist via annoyance: dynamism that is both arousing and annoying can lead to a net negative effect for evaluations.

Good design is a renaissance attitude that combines technology, cognitive science, human need, and beauty to produce something that the world didn't know it was missing. (Paola Antonelli, Senior Curator and Director of R&D, MoMA)

As of 2018, consumers spend an average of 11 hours a day looking at screens of some sort—tablets, smartphones, computers, gaming consoles, audio devices, and televisions—a 16% increase from just 4 years prior (Fottrell 2018). Not surprisingly, companies spent a record \$88 billion on digital advertisements, a 20% increase from the previous year, in an attempt to connect with these digital-oriented consumers. From advertisements placed within social media platforms to sidebar ads on websites, sponsored audio content between songs and podcasts to short in-app advertisements, the variety of digital ads that consumers encounter while scrolling, reading, tapping, working, or running continues to expand year after year (Drèze and Hussherr 2003; Pieters and Wedel 2004; Hsieh and Chen 2011).

Although traditional elements of design and aesthetics—such as scale, proportion, and negative space—can affect consumer response to digital advertising, what makes digital media so unique is its ability to incorporate dynamism as an element of design aesthetic. As animated GIFs and Instagram story ads replace traditional print and television advertisements, the frontier of advertising design and aesthetics is

being pushed into new territory where dynamic colors, product sizes, and even music/sound effects can enhance ads like never before. However, with these increases in spending on digital media and concerns regarding the return on those investments, understanding how dynamism as a design element affects consumers, particularly when those consumers may not be paying much attention to an advertising stimulus, is an important piece of the emerging digital advertising puzzle.

Our current work explores how dynamism as a design aesthetic element influences consumer judgment and behavior, particularly when consumers may not consciously report noticing the subtle changes within an advertisement. Specifically, we propose that incidental exposure to subtle dynamism in design elements—such as gradually changing product size and change in color saturation in visual advertisements, or panning and tempo changes in auditory advertisements—elicits arousal, which can then be misattributed to subjective evaluations in ad-relevant and ad-irrelevant contexts. Across five studies spanning a variety of consumer contexts and advertising types, we demonstrate support for the proposed dynamism design phenomenon via arousal and provide evidence of a boundary condition with respect to annoyance.

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THEORETICAL BACKGROUND

Dynamism in Marketing

Aesthetics is often linked to ancient Greek art philosophy, but aesthetics as a formal discipline began to emerge in nineteenth-century Germany (Fechner 1871; Hagtvedt, Hagtvedt, and Patrick 2008). What began as theories of art appreciation evolved into a more empirical discipline, with several principles of aesthetics—like shape, scale, proportion, symmetry, and texture (Holbrook 1980)—providing metrics that could extend beyond the evaluation of fine arts and into the evaluation of any category of objects, including consumer products (Bloch 1995; Patrick 2016). More recently, advances in technology and an increase in the amount of time that people spend looking at screens have brought attention to newer principles of aesthetics, like dynamism (Moshagen and Thielsch 2010; Ross and Wensveen 2010; Brasel and Hagtvedt 2016).

Recent academic research has shed more light on when and why dynamic presentation format enhances product evaluation. Roggeveen et al. (2015) show how dynamism in presentation format—using a video portrayal instead of a static image portrayal—leads to greater imagination of an experience and increased involvement, which, in turn, enhances preference for hedonic products. This effect for hedonic products is also shown to extend from the context in which dynamism is experienced to separate, subsequent decisions in which dynamism is not experienced. Thus, effects triggered by dynamism can carry over to unrelated contexts. This comparison is shown with explicit dynamism within video advertisements relative to static visual advertisements.

However, beyond the broad comparison between static (still) image advertisements and video advertisements, additional work has explored the effects of dynamism stemming from a product itself. For example, Kim and Lakshmanan (2015) compared erratic movement and subdued movement of a cellular phone presented on a screen and found that, in the erratic movement condition, participants rated product novelty higher as a function of both “ad liveliness” and “product atypicality.” Dynamism, in this example, involved the noticeable erratic movement of a consumer product. Thus, beyond the increased involvement process from Roggeveen et al. (2015), the perception of liveliness elicited from dynamism has also been shown to affect subsequent consumer evaluations.

In addition to the prior work exploring dynamism through media type, like a static print advertisement versus a video advertisement, and erratic movement of a consumer product

itself, recent work has also considered dynamism as a design element, specifically with respect to implied movement. Cian, Krishna, and Elder (2014) explored the effect of static images with implied dynamic design elements, like two people sitting on a seesaw at an angle versus the same two people sitting on a perfectly balanced seesaw. Implied dynamism corresponds to neuroscience research suggesting that static images with implied motion can activate areas of the brain implicated in the perceptual analysis of actual visual motion (Kourtzi and Kanwisher 2000). Indeed, Cian et al. (2014) found that attitude toward a brand was enhanced via mental engagement triggered by the implied movement of the static image. Thus, unlike the previous examples in which dynamism was incorporated through video or the actual movement of a consumer product, simply integrating design elements implying movement was enough to produce effects on evaluation.

Although the study of motion and movement is certainly not new (Gibson 1954; Cutting, Delong, and Brunick 2011), the recent consumer research exploring how dynamism influences consumer judgment, behavior, and decision making shows how versatile dynamism can be as an element of design. Whether implied dynamism (Cian et al. 2014), or actual dynamism (Brasel and Hagtvedt 2016; Kim and Lakshmanan 2015), it is clear that movement integrated into the visual design of an advertisement or product presentation can affect subsequent evaluations. However, beyond the actual or implied movement of a product, it is possible for dynamism to be integrated into other design elements. We explore the effects of visual (e.g., color saturation and product size) and auditory (e.g., sound panning and music tempo) dynamism within advertising.

Attention, Arousal, and Annoyance

Although several of the prior examples demonstrated that the effect of dynamism on subsequent evaluations relied on increased involvement or mental engagement, there is reason to believe that exposure to subtle dynamism might also affect evaluations through a less involving or less engaging mechanism. Support for this implicit influence can be seen in both visual contexts, like the work on change blindness and inattention blindness (Levin and Simons 1997; Simons and Rensink 2005; Jensen et al. 2011), as well as work looking at the implicit effects of music tempo on consumer behavior (Millman 1986; Eroglu 2005). In these examples, participants fail to notice striking visual cues, such as a woman in a gorilla suit walking through a group of people tossing a basketball (Simons and Chabris 1999), or audio cues that effect how long one spends in a store or eating

at a restaurant, yet the effects still occur. Even something as obvious as replacing a person someone is talking to mid-conversation was only noticed by a third of study participants (Simons and Levin 1998). In consumer contexts, moving a brand logo or product description in a series of advertisements has been shown to affect logo preference and brand choice, even though participants were unable to recall how or which elements moved (Shapiro and Nielsen 2013). Thus, even obvious experiences of change can remain consciously unnoticed yet still influence an individual's behavior.

Related work on a phenomenon known as *mindsight*, or visual sensing, sheds some light on how exposure to change that goes consciously unnoticed may still affect an individual's thoughts and behaviors. According to this research, although individuals may not be consciously aware of their exposure to change, they are often able to subjectively report a feeling of arousal without being able to identify the specific source of that arousal (Rensink 2004). This ability for individuals to feel arousal but not consciously know the source of that arousal is also demonstrated within the neuroscience literature. Specifically, researchers have shown that gradual, relative changes, as opposed to discrete changes, are often accompanied by a feeling of arousal "with little to no ability to identify what the change was" (Aly, Ranganath, and Yonelinas 2012, 2014). This research supports prior neural findings in which varying degrees of change recognition produced corresponding varying levels of occipito-temporal activation: the stronger the activation, the more likely that participants reported experiencing change (Beck et al. 2001). In the same study, parietal activation only occurred in instances when participants consciously noticed change. Taken together, the results suggest that exposure to change can be arousing even if an individual is oblivious to what changed or the source of the change.

Notably, Kim and Lakshmanan (2015) measured arousal as a potential mediator in their study of a product's erratic movement and the potential consequences for perceived product novelty. The authors found no mediation via arousal but, instead, found mediation through ad liveliness and product atypicality. Given the obviousness of the product's erratic movement in the ad, it is perhaps not surprising that participants attributed perceived product novelty to the characteristics of the ad and the product. However, if it is more difficult to attribute the source (or any source) of an experience of dynamism, the arousal elicited might mediate the relationship between dynamism and subsequent evaluations. If exposure to subtle dynamism in design elements increases

arousal, then that arousal may be misattributed to subsequent evaluations without an individual consciously making the link of this potential influence.

There is reason to believe that arousal may mediate the relationship between dynamic design elements and consumer evaluations. Consider, for example, prior work linking saturation to perceptions of product size (Hagtvedt and Brasel 2017) and to anticipated product liking (Buechel and Townshend 2018). Saturated colors tend to be more arousing, and arousal was implicated as the mediating factor linking saturation to anticipated product liking in Buechel and Townshend's (2018) work. However, with respect to the current consideration of dynamic design elements, it seems possible that changing saturation could be just as arousing as high saturation. If true, then either increasing or decreasing saturation could elicit arousal, which, in turn, could affect subsequent evaluations as seen in these prior studies. The auditory design analog to this visual example would suggest that a high-tempo song (Millman 1986) is as arousing as a song that starts at one tempo but then increases or decreases to a different tempo. In other words, although a design element of a stimulus (e.g., high color saturation, fast music tempo) can be more or less arousing on its own, the current work explores the idea that dynamism as a design element can elicit arousal, which, in turn, might affect subsequent evaluations.

If arousal mediates the relationship between dynamism and evaluations, it is possible that too much dynamism could become annoying and result in negative consequences. Consider the explicit and implicit approaches taken by Kim and Lakshmanan (2015) and Cian et al. (2014), respectively. Erratic or extreme dynamism, while certainly arousing, may also elicit feelings of annoyance, which might have a negative effect on an evaluative task. Subtler dynamism, which is still likely to be arousing but less likely to be annoying, may bolster subsequent evaluations as individuals misattribute the experienced arousal while engaging in the rating task. The current work builds on these prior studies by exploring these ideas.

In sum, while several studies have explored interesting effects of visual dynamism on consumer outcomes like product preference, perceived novelty, and attitude toward a brand via product involvement, product liveliness, and mental engagement, the current work considers the possibility that dynamism can be integrated into the design elements of a marketing stimulus, whether visual or auditory, and enhance the arousal of an observer. This enhanced arousal, in turn, is expected to bolster subjective

ratings in an evaluative task likely without an individual's conscious realization that this effect is taking place. Whether it is dynamic color saturation, product size, audio panning, or music tempo, the current work explores the idea that it is the arousal elicited from subtle dynamic design elements that bolsters subsequent evaluations.

DYNAMISM AS A DESIGN AESTHETIC: AROUSAL, MISATTRIBUTION, AND RATINGS

Synthesizing the aforementioned research across a variety of disciplines, several hypotheses emerge. First, given the way dynamism has been shown to increase mental engagement, involvement, and other outcomes, the initial hypothesis states:

H1: Marketing stimuli featuring more (vs. less) dynamism will bolster subsequent ratings.

While the effects of dynamism are expected to impact consumer evaluations, we propose that these effects will be particularly likely to occur when preferences are constructed.

Misattribution of Arousal and Boundary Conditions

Per the prior work linking dynamic design elements to fluency (Shapiro and Nielsen 2013) and the literature suggesting that individuals can “feel” the arousal elicited from change without necessarily being conscious of that change or the source of the dynamism, integrating dynamism as a design element could evoke feelings of arousal without conscious awareness of the link between the two. The resulting arousal would not be attributed to the dynamic design elements actually causing the arousal but, instead, would likely be misattributed to the task at hand in the moment. This logic follows from other studies of constructed preference and misattribution. The work on constructed preference suggests that individuals often create their preferences on the spot and that irrelevant, misattributed contextual factors often influence these preferences in the process of constructing them (Schwarz and Clore 1996; Payne et al. 1999; Reber, Schwarz, and Winkielman 2004; Schwarz 2004). Thus, if dynamic design elements elicit arousal in individuals, this feeling of arousal may systematically influence subsequent, even unrelated tasks, such as providing ratings or evaluations. Furthermore, consistent with the dynamic constructivist theory, a boundary condition of this phenomenon could exist such that this misattributed influence will be more likely to hold for subjective ratings (i.e., architectural, for which no set answers exist), which are created in the

moment, and less for objective ratings (i.e., archaeological, for which there are definitive answers or established, accepted norms; Payne et al. 1999; Lichtenstein and Slovic 2006). Stated differently, misattribution of arousal is likely to affect only those decisions that are open to subjective influence (see Schacter and Singer 1962). Formally, we propose:

H2: The effects of dynamism on consumer evaluations are more likely to occur for subjective (vs. objective) ratings.

This distinction in the second hypothesis stems from instances in which individuals have historically been more likely to integrate incidental information into their decision making, such as when there is greater uncertainty, lack of expertise, or room for subjective interpretation. Also, consistent with the findings from Roggeveen et al. (2015), the current project also expects that these effects of dynamism can carry over from one context and affect evaluations in a subsequent context.

Next, given that the hypothesized effect relies on misattribution of arousal as the proposed underlying process, we propose:

H3: The effect of dynamism on consumer evaluations will be mediated through arousal.

Importantly, given the dissociation between these feelings of arousal and the source of those feelings (i.e., the dynamic design elements), individuals may not be consciously aware of the dynamism or, if they did notice the subtle dynamic design elements, should not be aware of any link between that dynamism, their feelings of arousal, or the ratings on a rating task. However, in the event that dynamism is perceived to be annoying, a boundary condition should emerge such that:

H4: The effect of dynamism bolsters consumer evaluations via arousal but decreases consumer evaluations via annoyance when dynamism is perceived to be annoying.

In five studies, we first test the initial hypothesis that subtle exposure to dynamism in marketing contexts yields bolstered ratings. We demonstrate this effect using both visual (experiment 1) and auditory (experiment 2) stimuli to show the robustness of the effect. Then, to explore the boundary condition proposed in the second hypothesis,

as well as to extend the effect to a video stimulus and to show the potential practical implications of the proposed effect, we test whether the inclusion of dynamic design elements can bolster ratings for prosocial questions, such as, “How much do you care about sea life?” (experiment 3). If it is true that the inclusion of dynamic design elements can bolster subjective ratings, it should be possible to nudge individuals to care more about social issues simply by exposing them to a subtle experience of dynamism. Next, to provide support for the proposed underlying process, the subsequent study replicates the dynamism effect in a novel context and tests whether arousal mediates the relationship between dynamism and bolstered subjective ratings (experiment 4). Finally, we introduce an annoying dynamism condition to show that the effect of dynamism is not always positive, suggesting a boundary effect of annoyance (experiment 5). We also find additional support for arousal as the mediating mechanism.

EXPERIMENT 1: DYNAMISM VIA COLOR SATURATION

The purpose of the initial experiment was to provide support for the foundational hypothesis of the current project: incorporating a subtle dynamic design element to a marketing stimulus would bolster ratings relative to a control stimulus without a dynamic design element. To give the current work greater ecological validity, the designs of the stimuli throughout all experiments were inspired by common marketing executions found throughout digital media—apps, websites, and social media.

Method

Design and Participants. A total of 100 participants from an undergraduate subject pool from Brigham Young Uni-

versity were recruited to participate in the first experiment in exchange for monetary compensation. Of the 100 available sessions, 93 were fully completed. Participants completed a 10-question survey regarding their behaviors concerning footwear akin to the type of survey popular on sites like BuzzFeed (e.g., “What is your shoe size?”; “When shopping for a pair of shoes, about how long do you spend in the store?”; see the appendix, available online, for the full set of questions). As participants proceeded through this survey we changed the *color saturation* of an advertisement for Nike shoes that was present just above the survey questions. Participants were randomly assigned to one of three conditions, either one of two dynamism conditions in which the color saturation of the Nike ad increased or decreased by 10% each consecutive screen or a control condition in which the saturation was set to the middle level of the two dynamic conditions and stayed that way throughout (see fig. 1 for examples of the stimuli). The decision to have both increasing and decreasing experimental conditions was to show that change, not the particular direction of change, is what matters with respect to dynamism. Following this manipulation, participants rated their overall attitudes toward 21 randomly presented consumer products (9-point scale: 1 = hate, 9 = love) that were unrelated to Nike shoes (e.g., lamp, cookies, couch, iPad, etc.). After the rating task participants completed a funnel debrief to probe for any awareness of the saturation change or any link between the ad and the product rating task (none was reported and no participant guessed the true purpose of the study).

Results and Discussion. The dependent variable of interest was an average of the ratings across the 21 products. Paired contrasts revealed no difference between the two dynamism conditions ($t(90) = -.49, p = .62$) but a significant



Figure 1. Examples of the most and least saturated stimuli used in experiment 1.

difference between the control condition and the increasing dynamism condition ($t(90) = -2.91, p < .03$) and a marginal difference between the control condition and the decreasing dynamism condition ($t(90) = 1.70, p = .09$). The increasing and decreasing color saturation dynamism conditions were collapsed into one general dynamism condition and compared to the control condition. If our initial hypothesis were to be supported, then it should be the case that the average rating across the consumer products was bolstered for those participants randomly assigned to the dynamism condition relative to the control condition. This is exactly what happened: participants randomly assigned to a condition in which the saturation of the Nike ad changed by 10% with each subsequent screen rated liking the products more ($M = 5.39, SD = .53$) compared to participants in the control condition ($M = 5.13, SD = .51; F(1, 91) = 5.09, p < .03, d = .50$). Thus, as an initial test of our foundational hypothesis, the first study provides evidence that, yes, exposure to subtle dynamism can bolster subjective ratings even when the rating task is unrelated to the context containing the dynamic design element. Not only is the effect significant, but the effect size is moderately large. Indeed, subtle exposure to a dynamic design element can bolster ratings.

EXPERIMENT 2: DYNAMISM VIA AUDIO PANNING

The purpose of experiment 1 was to provide initial support of the proposed hypothesis that subtle exposure to dynamism will bolster ratings in a subsequent rating task. Although much of the attention in change detection studies and the few consumer studies looking at dynamism involve visual design, aesthetics is not limited to visual sensation alone. Thus, the purpose of the second experiment is to provide further support for the initial hypothesis while also demonstrating the robustness of the proposed effect in an auditory, rather than a visual, context.

Method

Design and Participants. A total of 129 participants ($M_{\text{age}} = 34.47, SD_{\text{age}} = 13.25$; 62% female) recruited from Amazon Mechanical Turk (MTurk) completed the second experiment in exchange for \$.20 credit. As part of the cover story, all participants were first asked to list five medications that came to mind. Participants were then introduced to fibromyalgia and asked how likely they would be to take symptom relief medication if they suffered from the disease (100-point scale: 1 = extremely unlikely to

100 = extremely likely). Next, participants completed demographic information and were asked to listen to a sample Lyrica advertisement typical of those that stream on online media sites like Pandora and Spotify. At this point, participants were randomly assigned to one of three conditions. In the control condition, no manipulation was made to the advertisement. As in the first study, dynamism was incorporated into two experimental conditions: one condition in which the audio of the commercial panned from the center to the left ear and another condition in which the audio of the commercial panned from the center to the right ear. After listening to the ad, participants were asked to rate how likely they would be to buy Lyrica for symptom relief (100-point likely to buy scale: 1 = not at all likely, 100 = extremely likely). Participants were asked on a scale of 1–7 how much they liked the advertisement and whether or not they had heard it before (yes/no). After answering the questions, participants completed a funnel debrief to probe for any awareness of the sound change or any link between the ad and their likelihood of use rating (none was reported and no participant guessed the true purpose of the study).

Results and Discussion. As predicted, results supported the proposed hypothesis such that participants in either dynamic panning condition were significantly more likely to indicate a willingness to use Lyrica (center-to-left: $M = 69.70, SD = 28.87$; center-to-right: $M = 63.38, SD = 28.49$) than participants in the control condition ($M = 50.03, SD = 30.68; F(2, 126) = 5.09, p < .01, d = .57$). Paired contrasts revealed no difference between the two dynamism conditions ($t(126) = 1.01, p = .32$) but revealed significant differences between the control condition and the dynamic center-to-left panning condition ($t(126) = 3.16, p < .01$) and the dynamic center-to-right panning condition ($t(126) = 2.02, p < .05$). Collapsing across the dynamism conditions again reveals support for the central hypothesis that exposure to dynamism will lead to bolstered ratings: participants exposed to dynamic audio panning were more likely to rate themselves as willing to purchase Lyrica if they suffered from fibromyalgia ($M = 66.93, SD = 28.71$) than participants in the control, nonpanning condition ($M = 50.03, SD = 30.68$). General liking of the ad did not differ by condition ($M_{\text{dynamism}} = 4.72, SD = 1.31$ vs. $M_{\text{control}} = 4.39, SD = 1.43; F(1, 126) = 1.78, p = .18$). Taken together with the findings from experiment 1, the results of experiment 2 suggest that exposure to dynamic design elements extend beyond visual change into auditory change and likely

others. Thus, sensory modality in which dynamism is experienced may not matter, so long as dynamism is sensed.

EXPERIMENT 3: DYNAMISM AS A NUDGE FOR PROSOCIAL BEHAVIOR

The first two experiments provide initial support for the idea that exposure to subtle dynamism in stimulus design can bolster subsequent ratings. However, one potential limitation of these findings is that the questions asked in the rating tasks were subjective. Per the limitations of dynamism's effects regarding hedonic versus utilitarian products in prior work (Roggeveen et al. 2015), as well as the potential limitations of the current effect implied by the constructed preference literature, the purpose of the third experiment is to test the second hypothesis empirically. Per the constructed preference research, it might be the case that dynamism is more likely to affect subjective (but not objective) ratings, as the former involves dynamic construction whereas the latter, by its nature of being more definitive, may not. In addition, while the stimuli up to this point have included visual and auditory marketing executions, video has not yet been explored. Thus, a secondary goal of experiment 3 is to test whether dynamism's effect on subjective ratings can be elicited via a video stimulus.

Finally, a third purpose of experiment 3 is to see whether the dynamism effect can influence the rating of a prosocial issue or charitable cause. The theorizing up to this point suggests that participants rating their likelihood of engaging in prosocial behavior or their personal concern for a pressing social issue should be bolstered if the rating task follows exposure to dynamism. Still, given the potential for the demonstrated effect to serve as a nudge for consumer behavior, experiment 3 tests this idea directly and contributes to transformative consumer research.

Method

Design and Participants. A total of 151 participants were recruited from an undergraduate panel to participate in experiment 3 in exchange for course extra credit. Participants were seated at individual carrels with partitions restricting other participants' views. Participants were instructed that they would be viewing a television commercial and that they would be asked their opinions regarding the company advertised. Participants also wore headphones during the study, with the volume standardized across conditions to a normal volume. Each participant watched a 60-second video commercial for SeaWorld demonstrating SeaWorld's role in saving sea life and featuring Anheuser-Busch (SeaWorld's former parent company). As in previous studies, participants were randomly assigned to one of three conditions, a control condition in which the color saturation of the commercial remained at its normal level or one of two experimental conditions: increasing, in which the video's color saturation increased from 0% (black and white) to 200% in 20% intervals every six seconds; or decreasing, in which the video's color saturation decreased from 200% in 20% intervals every six seconds (see fig. 2 for examples of stimuli).

Following the completion of the commercial, participants responded to a series of seven questions, two subjective questions (e.g., "How much do you care about sea life?" and "What do you think of Anheuser-Busch as a company?") and five objective questions (e.g., "How much more expensive are Anheuser-Busch products on average compared to 20 years ago?"; see table 1 for complete list of questions). Ratings were provided on question-relevant 7-point scales (1 = low, 7 = high). As in the prior studies, participants completed a funnel debrief to probe for any awareness of the changing color saturation of the video advertisement and any perceived link between the changing color saturation and the subsequent ratings (none was reported and no participant guessed the true purpose of the study).



Figure 2. Examples of the most and least saturated stimuli used in experiment 3.

Table 1. Summary of Results by Question

Question	Results
Subjective:	
Question 1 How much do you care about sea life?	$M_{\text{dynamism}} = 4.84, SD_{\text{dynamism}} = 1.01$ $M_{\text{control}} = 4.35, SD_{\text{control}} = 1.35$ $p < .05$
Question 2 What do you think about Anheuser-Busch as a company?	$M_{\text{dynamism}} = 4.84, SD_{\text{dynamism}} = .94$ $M_{\text{control}} = 4.46, SD_{\text{control}} = 1.12$ $p < .05$
Objective:	
Question 1 Compared to other problems, how much attention is paid to environmental problems in today's media (e.g., climate change)?	$M_{\text{dynamism}} = 3.59, SD_{\text{dynamism}} = 1.34$ $M_{\text{control}} = 3.61, SD_{\text{control}} = 1.35$ $p = .95$
Question 2 Compared to 20 years ago, how much more pressing are environmental problems (e.g., climate change)?	$M_{\text{dynamism}} = 5.84, SD_{\text{dynamism}} = .96$ $M_{\text{control}} = 5.57, SD_{\text{control}} = 1.28$ $p = .20$
Question 3 Does Anheuser-Busch sell more products today than they did 20 years ago?	$M_{\text{dynamism}} = 4.41, SD_{\text{dynamism}} = 1.41$ $M_{\text{control}} = 4.28, SD_{\text{control}} = 1.28$ $p = .59$
Question 4 Compared to 20 years ago, are Anheuser-Busch products more or less expensive?	$M_{\text{dynamism}} = 5.43, SD_{\text{dynamism}} = 2.19$ $M_{\text{control}} = 5.12, SD_{\text{control}} = 2.28$ $p = .43$
Question 5 Compared to 20 years ago, is SeaWorld more or less expensive?	$M_{\text{dynamism}} = 4.02, SD_{\text{dynamism}} = 1.55$ $M_{\text{control}} = 3.89, SD_{\text{control}} = 1.41$ $p = .61$

Note.—As predicted, participants in the dynamism condition provided higher ratings than participants in the control condition but only for subjective questions.

Results and Discussion. As in the prior studies, paired contrasts revealed no difference between the two dynamism conditions for any of the five objective questions or the two subjective questions (all $F < 1$), nor across all objective ($t(150) = -1.46, p = .14$) or both subjective questions ($t(150) = -1.50, p = .14$). As such, the two dynamism conditions were collapsed to create one dynamism experimental condition. As predicted, results revealed that dynamism bolstered ratings for subjective, but not for objective, questions. While condition had no effect on any of the five objective questions (all $F < 1$), condition did significantly influence ratings for both of the subjective questions: “How much do you care about sea life?” ($M_{\text{dynamism}} = 4.84, SD_{\text{dynamism}} = 1.01$ vs. $M_{\text{control}} = 4.35, SD_{\text{control}} = 1.35$; $F(1, 149) = 4.93, p < .03, d = .41$) and “What do you think about Anheuser-Busch as a company?” ($M_{\text{dynamism}} = 4.84, SD_{\text{dynamism}} = .94$ vs. $M_{\text{control}} = 4.46, SD_{\text{control}} = 1.12$; $F(1, 149) = 4.10, p < .05, d = .37$). Collapsing the subjective ($F(1, 151) = 8.19, p < .01$) and objective ($F(1, 151) = .96, p = .33$) questions also replicated the effect. Of particular importance given the purpose of experiment 3, the subjective question asking participants how much they care about sea life produced a significant difference such that participants randomly assigned to the dynamism condition rated themselves as caring more for sea life than participants randomly assigned to the control condition. With respect to practical implications, this finding suggests that

introducing a dynamic design element into a marketing execution can make individuals more likely to rate themselves as caring about a particular issue. While it remains to be seen whether or not this increased rating of concern translates to financial donations or behaviors like volunteering, future studies can rely on the current finding to see just how far dynamism can go with respect to inspiring behavioral change.

EXPERIMENT 4: MEDIATION THROUGH AROUSAL

The purpose of experiment 4 is to provide preliminary evidence of the proposed underlying mechanism of the dynamism phenomenon. As predicted, subtle exposure to change and dynamism when engaging with a marketing stimulus should be arousing even if an individual is not consciously aware of the dynamism. As the previous literatures on change blindness, inattention blindness, metacognitive experience, and misattribution suggest, it is often the case that cues we are not consciously attending to are influencing our judgments and behaviors. Thus, if it is truly the case that dynamism can bolster ratings through increased arousal—not fluency or mental engagement or involvement—then the current work adds to the small-but-growing body of literature exploring exactly how dynamism affects human behavior.

Method

Design and Participants. A total of 182 students participated in the experiment in exchange for course credit. Participants were randomized into one of three conditions: control, dynamism increasing, or dynamism decreasing. The initial instructions informed participants that the experimenters were interested in knowing the participants' Starbucks habits. Following the initial instruction screen, participants answered 10 separate questions about their Starbucks habits (e.g., "What do you typically order when you go to Starbucks?"; see the appendix for the full set of questions). Answers to the questions were open-ended, and participants were provided with a text box in which they could type their responses. Similar to the Nike survey from experiment 1, each question in the survey appeared on a refreshed screen, and above each question was a picture of a cup of Starbucks hot chocolate. This image served as the manipulation. Participants were randomly assigned to one of three possible conditions: a control condition in which the size of the Starbucks cup stayed the same across all 10 questions, and two experimental conditions—one in which the cup began at a smaller size and increased in 10% increments until it reached full size and another in which the cup began at a larger size and decreased in 10% increments until it reached the size of the former dynamic condition's starting point (see fig. 3 for examples of stimuli). As participants answered each survey question, a white screen was displayed for a brief moment before the next cup image and survey

question appeared, which emulates comparable surveys popular on digital sites and ad galleries that require users to click to advance to each subsequent image. Following the Starbucks survey, all participants were asked to complete a rating task involving questions relevant to Starbucks on question-relevant 9-point scales (1 = low, 9 = high). Some of those questions were deliberately designed to be subjective while the others were designed to be objective. The subjective questions included: (1) If you had the opportunity, how likely would you be to go buy hot chocolate from Starbucks right now? (2) How intense do you think the flavor of Starbucks hot chocolate is? (3) How would you rate the quality of Starbucks hot chocolate compared to other hot chocolate? The objective questions included: (1) How hot (in degrees Fahrenheit) do you think Starbucks hot chocolate is served? (2) How expensive is Starbucks hot chocolate compared to other hot chocolate? These ratings served as our dependent variables. Following these questions, participants were asked to indicate how they were feeling using a sliding scale (0 = very numb, 100 = very aroused), which served as our measure of arousal, the proposed mediator.

Results and Discussion. The two dynamism conditions did not differ in their impact on the dependent measures ($p > .5$) and were collapsed into one dynamism condition. As predicted, participants in the dynamism condition reported feeling significantly more aroused ($M = 52.84$, $SD = 18.90$) than participants in the control condition ($M = 46.03$,



Figure 3. Examples of the stimuli used in experiment 4. The top series of cups shows the ordering of the Starbucks cups from smallest to largest, increasing in size by 10% from cup to cup. The bottom set of cups shows the smallest and largest cups next to each other for comparison. In spite of this substantial difference in size, no participant reported noticing a change in the size of the Starbucks cup in the increasing or decreasing conditions.

SD = 20.98; $F(1, 180) = 4.89, p < .05, d = .34$). In order to test our full predicted model, a PROCESS analysis (Hayes 2017) of the dynamism condition, the five outcome measures, and the measure of arousal as the proposed mediator yielded support for the underlying process for the subjective (but not objective) measures. Specifically, arousal was found to mediate the relationship between the dynamism condition and two out of the three subjective dependent variables of interest—both likelihood of purchasing hot chocolate (95% confidence interval [CI]: [.04, .58]) and flavor intensity (95% CI: [.01, .28]). Specifically, an increase in arousal led to more positive evaluations. These findings represent indirect only mediation, as the direct effects of dynamism were not significant. Contrary to our predictions, arousal did not mediate the relationship between dynamism and quality (95% CI: [−.02, .20]). As predicted, feeling arousal did not mediate the relationship between dynamism and the objective ratings for temperature (95% CI: [−.78, 3.23] or how expensive Starbucks is compared to other options (95% CI: [−.13, .09]), as these questions have definitive answers (see table 2 for a summary of the PROCESS results).

The results of experiment 4 provide empirical evidence in support of hypothesis 2: dynamism does affect subsequent ratings but is more likely to affect subjective ratings than objective ratings. Initial evidence of this boundary condition suggests something about the way in which individuals may rely on dynamism as a source for information. Another contribution of experiment 4 is the fourth way in which dynamism is integrated into design, specifically the use of dynamic product size within a digital ad. Together with print ad color saturation, audio panning, and video color saturation, this fourth manipulation illustrates several ways dynamism can be incorporated into design aesthetic.

EXPERIMENT 5: DYNAMISM, AROUSAL, AND ANNOYANCE

The results of experiment 4 provided initial evidence that arousal mediates the relationship between dynamism and

bolstered subjective ratings. Taken together, the results of the experiments up to this point suggest that dynamism only enhances subjective ratings. However, the manipulation of dynamism in the prior experiments was subtle, able to elicit arousal without being particularly distracting or annoying. What might happen if dynamism not only elicited arousal but also elicited annoyance? Could the bolstering effect of arousal be offset by a negative effect of annoyance? The fifth and final study explores this possibility.

Method

Design and Participants. A total of 139 participants ($M_{age} = 35.37, SD_{age} = 12.06$; 47% female) recruited from Amazon MTurk completed the fifth experiment in exchange for \$.20 credit. Participants first completed an auditory check to ensure they would be able to hear auditory stimuli. Only those participants who passed the auditory check were routed to complete the remainder of the study. All participants were told they would watch a commercial for Cymbalta, a nerve pain medication and antidepressant, and then answer some questions. The video of the commercial—taken from a real Cymbalta advertisement—was the same across all participants and consisted of stock footage of people walking along a beach, leaning against a bookshelf, sitting at a desk, looking out a window, reading a book, and other neutral scenes typical of those found in pharmaceutical commercials. The audio from the original commercial was removed and replaced with a song created using loops from Apple’s GarageBand. Three different versions of the song were created: (1) a control song with a tempo of 100 beats per minute, (2) a dynamism condition that began with a tempo of 100 beats per minute but that increased in tempo by 5 beats per minute every 10 seconds, and (3) an annoying dynamism condition that was identical to the dynamism condition but with the three different tracks of the song—bass, guitar, and synth—slightly misaligned so that the tracks were offbeat with one another. Participants were randomly assigned to view the commercial with one of the three song

Table 2. Summary of PROCESS Analysis for Mediation via Arousal

Dependent variable	95% lower level confidence interval	95% upper level confidence interval	PROCESS significant mediation via arousal
Likelihood of buying Starbucks hot chocolate	.0397	.5842	Sig.
Intensity of Starbucks hot chocolate flavor	.0111	.2844	Sig.
Quality of Starbucks hot chocolate	−.0206	.2005	NS
Temperature of Starbucks hot chocolate	−.7789	3.2337	NS
How expensive Starbucks hot chocolate is compared to other options	−.1284	.0911	NS

soundtracks. The survey page was set not to advance until after 1 minute to ensure that participants watched the video in its entirety before proceeding to the survey questions.

Following the video advertisement, participants were presented with a new screen and asked to rate their overall attitudes toward the advertisement they just saw on three dimensions (1 = bad to 9 = good; 1 = dislike to 9 = like; 1 = negative to 9 = positive). On a new page, participants were then asked how much they thought the sound during the commercial made them feel feelings of arousal/energy (7-point scale: 1 = it wasn't changing (or at least I didn't notice if it was changing) to 7 = quite a bit) and a second question that asked how annoying the sound in the commercial was (9-point scale: 1 = it wasn't annoying (or at least I didn't notice that it was annoying) to 7 = extremely annoying). On the final screen of the survey participants provided demographic information, information about how they completed the survey (e.g., on a computer, tablet, phone; wearing headphones, using speakers), and whether or not they had seen the Cymbalta commercial before. Ten participants reported having seen the commercial before, but neither this nor the medium used to complete the survey influenced results.

Results and Discussion. The three attitude toward the ad measures were combined ($\alpha = .97$) to create an overall attitude toward the ad average. As predicted, dynamism had a significant impact on the subjective rating of the advertisement ($F(1, 136) = 12.39, p < .01, d = .85$) but the direction of this influence differed depending on whether or not that dynamism was annoying. Specifically, participants in the dynamism (no annoyance) condition reported the highest overall attitude toward the ad ($M = 6.56, SD = 1.85$), participants in the annoying dynamism condition reported the lowest overall attitude toward the ad ($M = 4.19, SD = 2.77$), and participants in the control condition fell between the two ($M = 5.88, SD = 2.35$). The same pattern of results holds for how bad/good the ad is ($F(1, 136) = 11.56, p < .01, d = .82$), how much participants dislike/like the ad ($F(1, 136) = 12.36, p < .01, d = .85$), and how negative/positive participants found the ad ($F(1, 136) = 10.91, p < .01, d = .80$; see table 3).

Consistent with the arousal mediation from experiment 5, arousal again mediated the relationship between condition and attitude toward the ad (model 4 in Hayes 2017) for both the dynamism condition (95% CI: [.14, .84]) and the annoying condition (95% CI: [.12, .88]). However, annoyance was also shown to mediate the relationship be-

Table 3. Summary of Attitude toward the Ad Means

	Condition	Mean	SD
Bad vs. good	Dynamism	6.59	1.86
	Control	5.85	2.38
	Annoying	4.26	2.81
Dislike vs. like	Dynamism	6.45	2.08
	Control	5.83	2.44
	Annoying	4.00	2.76
Negative vs. positive	Dynamism	6.63	2.06
	Control	5.96	2.32
	Annoying	4.30	2.92
Attitude toward the ad average	Dynamism	6.56	1.85
	Control	5.88	2.35
	Annoying	4.19	2.77

tween condition and attitude toward the ad but only for the annoying condition (95% CI: [-1.81, -.56]), as the confidence interval for the dynamism condition included zero (95% CI: [-.18, .50]). The indirect effect of condition through annoyance was greater and negative ($b = -1.13$) than the indirect effect of condition through arousal ($b = .47$) for the annoyance condition. The results suggest that dynamism can bolster subjective ratings via arousal, but dynamism that is also annoying can actually negate any bolstering effect of arousal. Thus, while dynamism is again shown to enhance subjective ratings, the final experiment introduces a boundary condition in the form of annoyance: some dynamism is arousing and bolsters ratings while too much dynamism can be annoying and decrease ratings.

GENERAL DISCUSSION

Five experiments provide support for the proposed dynamism as a design aesthetic hypothesis that suggests exposure to subtle dynamism in the design of a marketing stimulus can increase arousal, which, in turn, can bolster ratings for subjective (but not objective) ratings. The effect is robust, emerging in a variety of marketing contexts, and is constrained by the extent to which the dynamism is also annoying. By synthesizing the emerging literature regarding dynamism in consumer research, along with prior work on change and inattention blindness, misattribution of arousal, and dynamic constructivism in choice and value architecture, the current work demonstrates how thinking about dynamism as a deliberate, subtle design choice can affect consumer judgment even without the conscious awareness of the consumer.

Theoretical and Practical Contributions

The current research was built on a foundation provided by the few existing studies in consumer literature exploring dynamism and its effects on consumer judgment and behavior. Keeping those sources of inspiration in mind, the current work builds upon this prior knowledge in several important ways. First, while previous research (Cian et al. 2014) demonstrated that implied movement in logos could enhance mental engagement in the viewer, the current work provides evidence that dynamic design can elicit more general feelings of arousal. Second, we used subtle manipulations of dynamism in contrast to more explicit manipulations of movement (e.g., Kim and Lakshmanan 2015), showing that dynamism need not be consciously noticed to influence consumer judgment. Third, we show that exposure to dynamism in one context can lead to consequences in a subsequent, unrelated task, building on previous research (Roggeveen et al. 2015). An important boundary condition, whether the subsequent ratings were subjective versus objective, provides direction for future research on the impact of design on subsequent evaluations. Another important contribution is the explication of the operating process of arousal, which shows another way dynamism impacts evaluations beyond mental engagement (Cian et al. 2014), product liveliness (Kim and Lakshmanan 2015), involvement (Roggeveen et al. 2015, and fluency (Shapiro and Nielsen 2013). Finally, as an extension of the prior literature, our findings exhibit an additional boundary condition in which too much dynamism affects both arousal and annoyance, the latter of which has a negative effect on subsequent evaluations.

A practical contribution of the current work involves the many different ways dynamism was integrated as a design aesthetic. From changing the size of a product to gradually changing the color saturation of a print or video advertisement to panning the audio of a sound clip, the robustness of the effect across sight and sound provides several possible opportunities for marketers and designers to elicit arousal via dynamic design. The current work sheds light on exactly how dynamic design in digital contexts could affect measurable outcomes.

Our research also has implications for transformative consumer research. We provide initial findings within the results of the SeaWorld study (experiment 3). Transformative consumer research is work that seeks to benefit consumer welfare and the quality of life for all beings affected by consumption. By incorporating dynamism into a video commercial concerning SeaWorld's efforts to save ocean

life, participants were significantly more likely to say they, too, care about sea life than participants in the control condition. Thus, the inclusion of dynamism in the commercial's design was enough to elicit greater concern from viewers. Organizations like SeaWorld, People for the Ethical Treatment of Animals (PETA), and the American Society for the Prevention of Cruelty to Animals (ASPCA) could potentially benefit from figuring out ways to incorporate dynamism in their marketing stimuli's design to elicit stronger feelings of concern from viewers. The same could be true for comparable organizations, like UNICEF or the International Red Cross and Red Crescent Movement.

Limitations and Future Research

The current collection of experiments provides rather robust evidence for the proposed dynamism effect, suggesting that exposure to subtle dynamism can increase feelings of arousal, which, in turn, influences subjective ratings. Although the experiments replicate the effect across a variety of contexts (i.e., dynamic size, dynamic sound panning, dynamic tempo, dynamic color saturation), it remains to be seen whether the effect is obtained via other sensory changes as well. Might it be possible to elicit arousal via changes in ambient smells? Could it be possible to evoke arousal subtly via changing flavors or deliberately changing room temperatures? Might the subjective enjoyment of artwork in a museum increase with slight changes in room temperature or even physical space design, like a ground that gradually slopes upward or downward? Perhaps the same physical changes would shape consumer preferences in retail settings, as well. Exploring the phenomenon across more sensory modalities opens up avenues for future research regarding dynamism as an everyday design aesthetic.

Another limitation of the present work involves the degree to which dynamism must be subtle to elicit arousal that is not attributed to its source so that it can be misattributed during a subjective rating task. Although a funnel debrief in each study revealed that no participants were explicitly aware of the dynamism, it is possible that participants did notice the change but simply did not report it or were consciously aware of it at the time but did not remember being so. Consistent with prior misattribution and priming studies, an argument exists such that even conscious awareness of a prime can elicit prime-related effects as long as individuals do not explicitly link the prime as being the cause to the outcome's effect. Future research can explore the boundaries at which these effects may disappear. Might it be possible for participants to consciously notice not-so-subtle

dynamic design but still not be aware this dynamism is eliciting arousal and affecting subjective ratings? Relatedly, it would be important for future research to explore how the duration of time between change impacts perception of dynamism and its subsequent impact on ratings.

With respect to process, although initial evidence in support of the proposed underlying process is presented in the final two studies, future work may want to consider other ways that exposure to dynamic design may subtly influence consumers in a way that also affects ratings or other downstream consequences. Whereas some of the prior work on dynamism in consumer contexts takes a more external focus on how dynamic design changes perceptions about the product (Kim and Lakshmanan 2015), the current work takes a decidedly internal focus comparable to the work that looked at mental stimulation and involvement as underlying mechanisms. Thus, future work may want to consider other ways in which exposure to dynamic design alters individuals in a way that may have downstream effects on consumer choice and behavior.

Research findings found within this current issue also inspire ideas for future extensions of the current article's findings. Consider, for example, Crolc et al.'s (2019) work in which aesthetics influence missing attribute information over and above other diagnostic information that is present. The current article demonstrates that dynamism is more likely to impact subjective rather than objective evaluations. It may also be possible that dynamism is more effective when important attribute information is missing, as individuals use the dynamic aesthetic and its accompanying arousal when making estimations about absent information. In another example, Cutright et al. (2019) found that incidental confidence resulting from the aesthetic of one's attire could spill over and affect purchase intentions in an unrelated context. In the current article, each study explores the relationship between dynamic aesthetic elements in a particular context (e.g., changing Starbucks cup sizes) and consequences for relevant consumer outcomes in the same context (e.g., likelihood of purchasing Starbucks hot chocolate). There is reason to believe, however, that dynamic aesthetic elements and the arousal produced in one context could very well spill over to other, unrelated contexts. Finally, Warren and Reimann (2019) found that consumers perceive unusual product designs to be "cool" or "humorous" depending on whether the design aesthetic made sense or seemed appropriate. In the current work, annoyance moderated the effect of dynamism, but future work could explore whether dynamic aesthetic elements help or hurt

evaluations based on whether dynamism makes sense or fits a particular context.

Even mere exposure to subtle dynamic design elements can affect human judgment and evaluation in not-so-subtle ways. Whether affecting perceptions of product quality, purchase intentions, or even how much one believes he or she cares about sea life, misattribution of the arousal stemming from subtle exposure to dynamic design aesthetic has the potential to affect human decision making and behavior. As technological advances continue to change the dynamic abilities of marketing media, understanding how dynamism as a design aesthetic affects consumer behavior could not be more important.

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