An investigation into online atmospherics:
The effect of animated images on emotions, cognition, and purchase intentions

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Abstract

While prior research on animation effects focused on web advertising, this article focuses on online retailing and identifies animated images as an important online atmospheric cue. Using an extended Stimulus-Organism-Response (SOR) model, this article explores animation effects on emotional and cognitive processes. Across two studies, the findings show that compared with static images, animated images elicit greater pleasure, which in turn induces more favorable website attitudes, and lead to higher purchase intentions. Further, this serial mediation effect holds across different types of products. These findings, from the perspective of online atmospherics, deepen our understanding of animation effects on consumer approach-avoidance responses.

Key words: atmospherics; animated images; pleasure; arousal; website attitudes; purchase intentions.

1. Introduction

Animation, a prominent attention-getting feature used in Web advertising, uses a series of minimally different static images attached to one another, creating the illusion of motion (Sundar and Kalyanaraman, 2004). Most previous research focusing on web banner or pop-up advertisements examined how animated images affect attention (Girelli and Luck, 1997; Yoo et al., 2004), physiological arousal (Heo and Sundar, 2000), quick click-through (Li and Bukovac, 1999), and ads attitudes (Kalyanaraman and Oliver, 2001). However, animation effects have not been sufficiently explored in the context of online retailing. Further, some companies such as Apple, Huawei, Casper (a Canadian mattress brand), and Oreo use animated images in their website designs to make the products more appealing. However, whether the online atmospheric cue of animated (vs. static) images successfully leads to more favorable attitudes towards the website and higher purchase intentions has not been fully investigated. To fill these important knowledge gaps, this research, grounded in an extended Stimulus-Organism-Response (SOR) model, explores the effect of animated images on consumer behavioral responses.

In the context of traditional retailing, atmospheric cues were found to affect individuals’ emotional states such as pleasure and arousal, which in turn lead to approach-avoidance
response behavior (Anderson 1986; Eroglu and Mehleit, 1990; Jang and Namkung, 2009). As such, atmospherics were adopted as a marketing tool to increase the retailer’s attractiveness (Grewal et al., 2003), build brand image (Kotler, 1973), and increase purchase intentions and loyalty (Baker et al., 2002). Extending atmospherics to the online retailing context, Eroglu et al. (2001) conceptualized online atmospherics as “the sum total of all the cues that are visible and audible to the online shoppers” (p. 179). Further, Dailey (2004, p. 796) defined web atmospherics as “the conscious designing of web environments to create positive effects (e.g., positive affect, positive cognitions, etc.) in users in order to increase favorable consumer responses (e.g., site revisiting, browsing, etc.)”. From this perspective, animated images constitute an important visual dimension of the online atmospheric cues. However, recent work has not sufficiently addressed the effect of such a single cue on consumer behavioral responses, because most studies classified animated images and other factors, such as verbal description, colors, and patterns into the same category of task-relevant information (Eroglu et al., 2003), or graphics (Koo and Ju, 2010). As such, which specific atmospheric cue impacts emotions and cognition remains unclear. To fill this research gap, this article, with its focus on online retailing, examines whether animated (vs. static) images lead to more positive attitudes towards the retailer website through emotional and cognitive processes.

Thus, the objective of this research is to examine the effect of animated images on consumer approach-avoidance responses by using an extended Stimulus-Organism-Response (SOR) model. Another aim is to address the issue regarding the sequence of emotional and cognitive processes, which has been debated in prior research (Bandura, 1978; Bitner, 1992; Lazarus, 1991; Pham et al., 2001). More specifically, we include the cognitive process in the SOR paradigm, proposing that animated (vs. static) images elicit emotions (i.e., pleasure and arousal), which in turn influence cognition (i.e., website attitudes), consequently impacting purchase intentions towards the relevant product.

2. Conceptual background and hypotheses development

2.1 Atmospherics and animated images

The term atmospherics was first proposed by Kotler (1973) to describe the effort to deliberately design the retail environment to elicit certain emotional effects in consumers, which in turn increase their patronage intentions. According to Kotler (1973), atmospherics comprise “visual, aural, olfactory, and tactile dimensions” (p. 51). Further, Baker (1986) proposed a typology of atmospherics, consisting of social (e.g., employees and customers),
design (e.g., layout and color), and ambient elements (e.g., music, scent, and lighting). Applied to the online retail stores, these atmospherics are defined as all visual and audible cues (Eroglu et al., 2001), or the intended design of the web environment to elicit positive affect and cognition in users in order to induce positive responses such as site browsing or revisiting (Dailey, 2004).

In the online environment, animation is achieved by a succession of static images slightly different from one another in order to create the motion effect, which in turn inherently attracts users’ attention in the visual search (Girelli and Luck, 1997; Lang et al., 2002; Reeves and Nass, 1996). While Weaver (2000) contends that animation and video should become more popular and slowly replace the advertisements featuring static images, there are mixed findings regarding animation effects. For example, Burke et al. (2005) found that animation does not attract viewers’ attention to online ads when they are instructed to perform tasks. Similarly, Kuisma et al. (2010) found that animation had no effect on users’ attention, but animation effects were contingent on ad format. Stevenson et al. (2000) found that complex (vs. simple) web page backgrounds, such as animation and color lead to less favorable attitudes towards the ad, website, and brand, thus decreasing purchase intentions. Relatedly, Drèze and Hussersh (2003) revealed that animated (vs. static) online banners did not impact advertising effectiveness, such as brand awareness and recognition.

In contrast, another research stream is aligned with the motion effect theories, which contend that individuals inherently prefer moving objects, with great attention to the stimuli and physiological changes such as heart rate decreases and brain activity changes (Reeves and Nass, 1996; Sundar and Kalyanaraman, 2004). For example, some researchers found that animated images in web ads, compared with static images, elicit higher physiological arousal (Heo and Sundar 2000), orientating response to the stimuli (Diao and Sunder, 2004; Lang et al., 2002), better memory of ads (Lang et al. 2002; Li and Bukovac, 1999), more positive brand attitudes and higher purchase intentions (Li et al., 2002), and more favorable ad attitudes (Kalyanaraman and Oliver, 2001). In this research, we argue that animated images constitute not only one of the most important features in web advertising, such as getting attention (Sundar and Kalyanaraman, 2004), but also an important visual dimension of the online atmospherics.
2.2 Stimulus-Organism-Response (SOR) theory and online atmospherics

Most prior work on atmospherics is grounded in Mehrabian and Russell’s (1974) Stimulus-Organism-Response (SOR) model, which explains that atmospherics (S) influence individuals’ emotional state (O), which leads to their approach-avoidance behavior (R). The model has been empirically supported by a large body of research (Babin et al., 1994; Baker et al., 1992; Richard, 2005; Sherman et al., 1997). While some prior work focused on Mehrabian and Russell’s (1974) three dimensions: pleasure – arousal – dominance (PAD), the current work only focuses on pleasure and arousal because these two dimensions sufficiently capture the extent of the emotional state (Eroglu et al., 2001; Russell, 1979). We adopt Menon and Kahn’s (2002) conceptualization of pleasure and arousal: pleasure refers to the extent to which an individual feels good, pleased, happy, or satisfied in a situation; whereas arousal refers to the extent to which an individual feels stimulated, aroused, or active. These two dimensions are conceptualized to be independent, suggesting that a person can feel highly aroused and may or may not experience pleasure (Menon and Kahn, 2002).

Eroglu et al. (2003) applied the SOR framework to online retail stores, examining whether the effects of atmospherics on customer behavioral responses and purchase intentions can hold in the online retailing context. The findings showed that online atmospheric cues such as verbal or pictorial descriptions, colors, patterns, fonts, and music have significant effects on the users’ emotional state such as pleasure, which in turn influences attitudes, satisfaction, and approach-avoidance responses (Eroglu et al., 2003). Further, Kim et al. (2007) operationalized online atmospherics as an image interactive technology (IIT), such as zoom-in functions and 3D virtual models, demonstrating that high (vs. low) IIT levels lead to online shopping enjoyment and involvement, consequently contributing to users’ prolonged stay on the site and patronage intentions.

However, these studies have not theoretically explained which atmospheric cue has an effect on emotions due to different research purposes and experimental designs (Koo and Ju, 2010). Building on the SOR paradigm, Koo and Ju (2010) found that online atmospheric cues such as colors, links, and graphics induce the consumers’ emotional state (i.e., pleasure and arousal), thus increasing purchase intentions. Notwithstanding, this research treated pictures and animation in the same category of graphics. Relatedly, Loureiro and Roschk (2014) have examined the effects of graphics design on emotional response and loyalty in online/offline retail environments. However, they did not include animation in their work, calling for future research. Recent research found that an online atmospheric cue such as visual aesthetics positively affects satisfaction, arousal, and perceived quality of the online service (Nia and
Shokouhyar, 2020). Some recent studies extended atmospherics effects to the context of mobile applications. Lee and Kim (2019) found that the need for app atmospherics, such as interactivity and attractiveness leads to consumers’ reuse intentions and entertainment enjoyment. Wu et al. (2021) demonstrated that online atmospherics of travel-related apps, such as interactivity and vividness positively affect customers’ perceptions of media usefulness and enjoyment, and flow experiences. Further, Hsieh et al. (2021) found that online atmospheric cues, such as aesthetic design and entertainment, gamification, and informativeness trigger pleasure – arousal – dominance, respectively, which in turn lead to app usage intention and brand loyalty. Again, these recent studies combine animation, font types, colors, and shapes into one category of aesthetic design (Hsieh et al., 2021), or measure online atmospherics with interactivity and vividness (Wu et al., 2021). Therefore, in this research, with its focus on one online atmospheric cue – animated images, we use an extended SOR framework and propose that compared with static images, animated images will trigger online shoppers’ emotional state, such as pleasure and arousal.

2.3 Emotion-cognition approach, website attitudes, and purchase intentions

While the Mehrabian and Russell’s (1974) SOR model only focuses on emotions (i.e., PAD), Bitner (1992) considered cognition and physiology within the SOR framework, applying the extended SOR model to servicescapes. Further, Thang and Tan (2003) expanded the SOR framework by including the stimuli related to store attributes, such as merchandising, availability of merchandise, service, reputation, and promotion. Thus, the SOR framework has been extended and more researchers have focused on both cognitive and affective processes triggered by the atmospheric cues (Babin et al., 2004; Bellizzi and Hite, 1992; Ward et al., 1992). More specifically, emotional or affective responses involve consumers’ affective feelings about a certain object (Ward and Russell, 1981). Cognitive evaluations refer to consumers’ perceptions of the retailer environment (Chebat and Michon, 2003), or their inferences about price, product/service quality from the important information conveyed by atmospheric cues (Baker et al., 2002; Kumar and Kim, 2014). A person’s attitude refers to “a function of his salient beliefs at a given point in time” (Fishbein and Ajzen, 1975, p. 222), and thus, we define website attitudes as a user’s general evaluations or perceptions of the website after browsing it. Further, website attitudes resemble ad attitudes because websites and ads function in a similar way, since the content is planned by the retailer (Bruner and Kumar, 2000; Richard and Chebat, 2016). As such, we argue that website attitudes, which constitute the
cognitive process, can be triggered by the online atmospheric cue such as animated images. Further, some researchers argue that emotions follow cognition during the process (Bandura, 1978; Lazarus, 1991), whereas others contend that cognitive response follows emotional state (Bitner, 1992; Pham et al., 2001; Zajonc and Markus, 1984), and that pleasure-arousal-dominance emotions can improve consumers’ store attitudes (Porat et al., 2007). Considering that animation inherently captures users’ attention and induces physiological arousal (Sundar and Kalyanaraman, 2004), we adopt the emotion-cognition approach in the current work, proposing that website attitudes (cognition) follow pleasure and arousal (emotions).

Prior research on atmospherics demonstrated the effects of retail atmospheric cues on customer approach-avoidance responses: the effects of music on customer perceptions of waiting time via mood and attention (Chebat et al., 1993; Hui et al, 1997), and evaluations of time/effort costs (Baker et al., 2002); the impacts of lighting on product sales (Hegde, 1996) and evaluations of product/service quality (Baker et al., 1994); the effects of color on perceptions of the store, merchandise quality, and price (Bellizzi et al. 1983); and the positive effects of scents on attitude towards the store and products (Spangenberg et al., 1996). More recent research reveals that pleasure and arousal positively affect shopping mall patronage and word of mouth (Das and Varshneya, 2017), and that branded app atmospherics induce pleasure and arousal, positively impacting brand loyalty and continuous usage intention (Hsieh et al., 2021). Therefore, using the emotion-cognition approach, we propose that an important online atmospheric cue such as animated images (vs. static images) on a retail web page will elicit the consumers’ emotional state, such as pleasure and arousal, consequently leading to more positive cognitive perceptions such as attitudes towards the retailer website. Specifically,

**H1:** Pleasure mediates the relationship between animated (vs. static) images and website attitudes, such that animated images elicit a higher level of pleasure, which in turn leads to more favorable website attitudes.

**H2:** Arousal mediates the relationship between animated (vs. static) images and website attitudes, such that animated images elicit a higher level of arousal, which in turn leads to more favorable website attitudes.

Purchase intentions refer to the likelihood and willingness to buy a certain product or service. Prior research found that atmospheric cues, such as scent can enhance favorable store attitudes and increase purchase intentions (Spangenberg et al., 1996); that positive affect leads to more spending in the store (Babin and Darden, 1996); that online atmospheric cue, such as layout design, leads to more favorable website attitudes, which positively affect purchase intentions (Wu et al., 2014); and that website attitudes positively impact intention to visit the
island featured on the website (Loureiro, 2015), and online shopping practices (Martínez-López et al., 2005). Therefore, using the emotion-cognition approach, we argue that purchase intentions are the downstream consequences of website attitudes (cognition), which are triggered by animated images via emotions. Specifically,

**H3:** Website attitudes mediate the relationship between animated (vs. static) images and purchase intentions, such that animated images induce more favorable website attitudes, which in turn lead to higher purchase intentions.

**H4:** Pleasure and website attitudes serially mediate the relationship between animated (vs. static) images and purchase intentions, such that animated images elicit a higher level of pleasure, which in turn induce more favorable website attitudes, thus leading to higher purchase intentions.

**H5:** Arousal and website attitudes serially mediate the relationship between animated (vs. static) images and purchase intentions, such that animated images elicit a higher level of arousal, which in turn induce more favorable website attitudes, thus leading to higher purchase intentions.

All these hypotheses are summarized in the research model (Figure 1).

----------------------- Insert Figure 1 here -----------------------

3. Study 1

The objective of study 1 is to test **H1** and **H2**. Specifically, this study aims to explore the effect of animated (vs. static) images on website attitudes through parallel mediators such as pleasure and arousal.

3.1 Method

128 undergraduate students from a major North American university participated in the study (female = 44.5%, $M_{age} = 21.55$) for a credit. Due to the pandemic, participants were recruited through the university online platform rather than in a physical laboratory. Participants were randomly assigned to one of the two conditions: animated or static images. We developed two web pages that were identical, including the same images and product descriptions except for the image type (animated vs. static). First, they read a description: “Companies try to design good websites displaying their products. Imagine that you are planning to buy a laptop and you have a good budget. You will view a product web page and answer some questions”. Then, participants viewed a fictitious laptop brand (HoLi MateBook) web page with three images of a laptop. In the condition of the animated-image web page, the
animation of product images was presented to participants in graphic interchange format (GIF),
which was achieved by a rapid succession of several slightly different images. In an animated
GIF, product animation is displayed continually and repeatedly while users browse the web
page featuring the GIF (Jia et al., 2020). However, in the condition of the static-image web
page, three product images were static when participants were browsing the web page.

After viewing the laptop web page, participants answered questions related to their
pleasure and arousal levels. We adopted Mehrabian and Russell’s (1974) 9-point bipolar scales
to measure pleasure (i.e., after browsing this website, I felt: annoyed/pleased; unsatisfied/satisfied; despairing/hopeful; α = .90), and arousal (i.e., after browsing this website, I feltunaroused/aroused; sleepy/wide-awake; α = .69). Afterwards, we adopted Richard and
Habibi’s (2016) 3-item 7-point bipolar scale to measure participants’ attitudes towards the
website (i.e., I dislike/like this website; I react unfavorable/favorably towards this website; I
have negative/positive feelings towards this website; α = .94). At the end of the questionnaire,
participants provided demographic information, and were provided with a debriefing stating
that the web page with the product images they viewed was fictitious. All the scales and
reliability values are summarized in Appendix A.

3.2 Results

We conducted a parallel mediation analysis in PROCESS (5,000 bootstrapped samples; Model 4; Hayes, 2013) with image type (0 = static images, 1 = animated images) as the
independent variable, pleasure and arousal as parallel mediators, and website attitudes as the
dependent variable. The results show that animated (vs. static) images triggered a higher level
of pleasure (B = .70; SE = .26; 95% CI = [.17, 1.22]) and that pleasure positively affected
website attitudes (B = .43; SE = .07; 95% CI = [.30, .56]). As predicted, we found a significant
indirect effect for the mediation path through pleasure (B = .30; SE = .12; 95% CI = [.08, .54]),
supporting H1. Further, the direct effect of image type on website attitudes was significant (B
= .42; SE = .12; 95% CI = [.17, .66]), indicating partial mediation through pleasure. However,
we did not find a significant indirect effect for the mediation path through arousal because the
confidence interval included zero (95% CI = [-.07, .06]), not supporting H2. Specifically, we
did not observe that animated (vs. static) images elicited a higher level of arousal, and arousal
led to more favorable website attitudes, because all confidence intervals included zero. Figure
2 summarizes all estimated path coefficients. The mediation analysis results indicate that
compared with static images, animated images induced a higher level of pleasure, which in turn led to more favorable website attitudes.

------------------------ Insert Figure 2 here ------------------------

3.3 Discussion

The results of Study 1 demonstrate that compared with static images, animated images of a product on a web page lead to a higher level of pleasure, which in turn contributes to more favorable website attitudes. However, we did not observe a statistically significant effect of animated images on website attitudes through arousal, not supporting H2. This was not uncommon in previous research. For example, Eroglu et al. (2003) found that the effect of online atmospherics on satisfaction and approach response was mediated by pleasure, but not by arousal. Similarly, Koo and Ju (2010) did not observe a positive effect of online menu on arousal. Nisco and Warnaby’s study (2014) showed that the atmospheric cue of esthetic design did not induce a higher level of arousal in the context of an urban shopping area.

To replicate the findings of the mediation effect observed in Study 1, and to further explore the underlying mechanisms and downstream consequences of website attitudes in response to animated images, we conducted Study 2 to offer more insights into animation effects.

4. Study 2

The objective of study 2 is to test H3 through H5 using a different stimulus set (a smartphone) and a different subject pool. Specifically, we examine whether website attitudes mediate purchase intentions in response to animated (vs. static) images, and whether emotional state and cognition serially mediate the relationship between the animated (vs. static) image and purchase intentions.

4.1 Method

We recruited 184 participants from Amazon MTurk, who were randomly assigned to one of the two conditions: animated or static images. We developed two web pages of a smartphone that were identical, including the same images and product descriptions, except for the image type. We removed incomplete responses, leaving 150 valid questionnaires (female = 44.7%). The majority of the participants were between 26-41 years old (55.4%). The procedure was similar to that of Study 1. First, participants read a scenario describing that they had a good budget and were planning to buy a smartphone. In the condition of the animated-image web page, participants were shown product animation in the GIF format. After viewing a fictitious
smartphone brand (HoLi MateS) web page with the product images, participants answered questions regarding pleasure, arousal, and website attitudes. The scales were the same as the ones used in Study 1: a 3-item scale of pleasure \((\alpha = .91)\), a 2-item scale of arousal \((\alpha = .68)\), and a 3-item scale of website attitude \((\alpha = .96)\). Afterwards, we adapted Dodds et al.’s (1991) 4-item 7-point Likert scale to measure purchase intentions (i.e., The likelihood of purchasing this product is high; The probability that I would consider buying the product is high; My willingness to buy the product is high; I intend to buy this product; \(\alpha = .96\)). At the end of the questionnaire, participants provided demographic information and they were provided with a debriefing stating that the web page with the mobile phone images was fictitious.

4.2 Results

First, we conducted a mediation analysis (5,000 bootstrapped samples; Model 4; Hayes, 2013) with image type as the independent variable, website attitudes as the mediator, and purchase intentions as the dependent variable. The results show that there was a significant indirect effect \((B = .46; SE = .23; 95\% CI = [ .03, .94])\) for the mediation path through website attitudes, supporting \(H_3\). Further, the direct effect of image type on purchase intentions was not significant \((95\% CI = [-.71, .03])\), indicating full mediation through website attitudes. Using Model 4 (Hayes, 2013), we also replicated the parallel mediation analysis reported in Study 1 to assess the hypothesized process. Again, pleasure mediated the effect of animated (vs. static) images on website attitudes \((B = .26; SE = .12; 95\% CI = [ .03, .51],\) but no mediation effect through arousal was observed \((95\% CI = [-.02, .11])\).

Then, we conducted a multiple-step mediation analysis using Model 80 in PROCESS (5,000 bootstrapped samples: Hayes 2013). As predicted, we found a significant indirect effect \((B = .25; SE = .12; 95\% CI = [ .02, .50])\) for the mediation path through pleasure and website attitudes, supporting \(H_4\). However, we did not observe a significant indirect effect for the mediation path through arousal and website attitudes \((95\% CI = [-.02, .11]), not supporting \(H_5\). Further, the direct effect of image type on purchase intentions was insignificant \((95\% CI = [-.70, .02]), indicating full mediation through pleasure and website attitudes (Figure 3). Then, we focused on the mediation path through pleasure and website attitudes to better understand the complex multiple-step mediation model. As a further check, we used Model 6 (Hayes, 2013) to run a mediation analysis with the mediators in reverse order (i.e., website attitudes first and pleasure second). The indirect effect on purchase intentions was not significant \((95\% CI = [-.02, .20])\). Taken altogether, the mediation analysis results indicate that animated images
elicited a higher level of pleasure, which in turn led to more favorable website attitudes, consequently contributing to higher purchase intentions.

Since the objective of Study 2 was to enhance the generalizability of our findings obtained in Study 1, and to further explore the downstream outcome of website attitudes in response to animated images, we combined the two datasets (N = 278) from Study 1 and Study 2 to rule out a potential interaction effect between image type and product type. We conducted a moderated mediation analysis (5,000 bootstrapped samples; Model 7; Hayes, 2013) with image type as the independent variable, product type (laptop vs. smartphone) as the moderator, pleasure and arousal as the parallel mediators, and website attitudes as the dependent variable. As expected, no moderated mediation effect was observed through pleasure (95% CI = [-.34, .29]) and through arousal (95% CI = [-.08, .06]). Therefore, the results of Study 2 enhanced the generalizability of our previous findings, suggesting that the mediation effect of animated images on website attitudes through pleasure holds across two different types of products.

4.3 Discussion

The results of Study 2 reveal that website attitudes mediate the effect of animated images on purchase intentions. More importantly, we demonstrated that pleasure and website attitudes serially mediate the relationship between animated (vs. static) images and purchase intentions. Specifically, compared with static images, animated images on a web page induce a higher level of pleasure, which in turn leads to more favorable attitudes towards the website, consequently increasing purchase intentions. Study 2 replicated the findings of Study 1 that pleasure mediates website attitudes in response to animated images, and more importantly, identified the serial mediation effect through pleasure and website attitudes. However, we did not find a serial mediation effect of animated images on purchase intentions through arousal and website attitudes. This might be explained by Menon and Kahn’s (2002) argument that a person may not equally experience arousal and pleasure at the same time. Notwithstanding, most of the hypotheses are supported, with the results summarized in Table 1. Further, we conducted a moderated mediation analysis to rule out a potential interactive effect of image type and product type on website attitudes through two parallel mediators. The results enhance the generalizability of our findings and demonstrate that the mediation effect of animated images through pleasure holds across two types of products. Taken altogether, grounded in an
extended SOR framework, our findings confirm that the effects of atmospheric cues such as animated images on customer behavioral response can hold in the context of online retailing.  

5. General discussion and implications

5.1 Summary of findings

Across two studies involving different subject pools and stimuli of different product categories, we provided evidence in support of our hypothesized serial mediation effect. Specifically, we demonstrated that the online atmospheric cue of animated (vs. static) images leads to more positive website attitudes. Such an effect is driven by a higher level of pleasure, consistent with previous findings in the traditional retailing context that atmospheric cues elicit the consumer’s emotional state such as pleasure, which in turn affects the cognitive process, consequently leading to approach-avoidance responses such as higher purchase intentions (emotion-cognition approach, Bitner, 1992; Pham et al., 2001; Zajonc and Markus, 1984). More importantly, the current research only focuses on animation as a single atmospheric cue, which is separate from other cues such as colors, patterns, and graphics, providing a more nuanced understanding that animated images can effectively impact consumers’ approach-avoidance behavioral responses.

5.2 Theoretical contributions

This article makes several contributions to different streams of literature. First, it contributes to the atmospherics literature by exploring whether atmospherics effects in the traditional retailing context can hold in the online retailing one. More importantly, our work tests the parallel and serial mediation effects of emotions (i.e., pleasure and arousal) on cognition (i.e., website attitudes), and consequently on purchase intentions. Specifically, the findings suggest that a single online atmospheric cue such as animated images can affect users’ emotional state such as pleasure, which in turn induces more favorable website attitudes, leading to higher purchase intentions. While the previous work investigated the effect of online atmospheric cues such as colors, verbal or pictorial descriptions, graphic design, and store layout design (Eroglu et al., 2003; Koo and Ju, 2010; Loureiro and Roschk, 2014; Wu et al. 2014), it grouped multiple cues into one factor affecting customer behavioral responses. In other words, it is unclear which specific online atmospheric cue plays a role in online shoppers’ emotional and cognitive processes. Animation, which has been used as an important attention-getting marketing tool in web advertising (Sundar and Kalyanaraman, 2004), constitutes a
critical facet of online atmospherics, and should receive more attention from marketing researchers. Therefore, the current research fills this research gap by offering more nuanced insights into the effect of this single visual cue on emotions and cognition.

Second, our findings enriched the SOR model by including cognitive evaluations (i.e., website attitudes) as a consequence of an emotional state. Further, previous findings did not converge on the sequence of emotional state and cognitive process: cognition-emotion approach (Bandura, 1978; Lazarus, 1991) and emotion-cognition approach (Bitner, 1992; Pham et al., 2001; Zajon and Markus, 1982). Thus, Chebat and Michon (2003) compared these two competing models, showing that the cognition-emotion model better explains the impact of ambient scent on shoppers’ spending in a shopping mall. However, our findings suggest that in the online retailing context, the emotion-cognition mechanism underlies the effect of animated images on purchase intentions, whereas the serial mediation effect for cognition-emotion sequence is not statistically significant. Thus, our work sheds new light on this debate.

Third, by combining the datasets from the two studies using different products as stimuli and different subject pools, we demonstrated that the mediation effect of animated images on website attitudes through pleasure and arousal was not moderated by the product type (e.g., laptop vs. smart phone). Therefore, these results enhanced the generalizability of our findings, confirming the mediating role of pleasure in the relationship between animated images and website attitudes, regardless of the product type.

Finally, prior research on animation mostly focused on web advertising such as animated banner ads and online commercials, demonstrating the effects of animation on attention (Burke et al., 2005; Kuisma et al., 2010), ad attitude (Kalyanaraman and Oliver 2001; Stevenson et al., 2000), and advertising effectiveness (Drèze and Huss Herr, 2003). Conducted in the online retailing context, our study takes a different track and expands the literature by adopting an extended SOR model to uncover an important mechanism, whereby animation triggers an emotional state, which in turn enhances cognitive evaluations, consequently leading to higher purchase intentions. These findings deepen our understanding of animation effects in the context of online retailing, suggesting that animation can be utilized as an important atmospheric cue in a retailer’s website design. Although we did not observe the animation effect on website attitudes and purchase intentions via arousal, we offered an explanation for it.
5.3 Managerial implications

Online companies or online retailers create websites to give online shoppers a first impression of their products, services, and the companies themselves. Lindgaard et al.’s (2006) empirical study revealed that individuals make their decisions on the preferred homepages within 50 milliseconds (ms), indicating that the company only has 50 ms to create a first impression to convince consumers to stay or to leave. Further, animated banner ads increase click-through rates and recall of ads (Li and Bukovac, 1999). Therefore, our work has important implications for those retailers who want to increase click-through rates in search engine optimization (SEO), and elicit consumer’s emotions and cognition, keeping them on the website, and increasing their spending likelihood. Particularly during the pandemic, which has accelerated the shift towards online shopping globally (UNCTAD, 2020), website design strategies have become more important than before in the digital world. As our findings suggest, online shoppers who view animated (vs. static) images will experience greater pleasure, which in turn leads to more favorable attitudes towards the company’s website, consequently increasing their purchase intentions. Thus, a carefully designed web page with animated images of products can make a good impression and trigger online shoppers’ positive emotions and cognitive perceptions, consequently increasing purchase likelihood.

Moreover, some companies’ websites feature videos, which cause slow page load speeds, thus leading to poor user experiences. Animated images, if optimized, can be much faster than videos to download, and thus improve user experiences. Therefore, we would suggest that online companies or online retailers consider animated images in their SEO strategy to increase click-through rates. However, marketers and website designers should carefully consider the appropriate number of animated images used in the Web design, because prior research has found that complex web pages featuring animation, items, and colors lead to less favorable attitude towards the site and brand (Stevenson et al., 2000). Thus, it is important to achieve the balance among the number, load speeds of animated images, and other content such as audio, fonts, colors, and verbal descriptions.

6. Limitations and future research

This research has limitations, calling for further studies. First, we did not find the indirect effect for the mediation path through arousal, and thus future research may consider wear-out effects in the online retailing context. Second, we only used a laptop and a smartphone as stimuli in the studies. Thus, future research may validate our findings using other product categories, such as other utilitarian and hedonic products. Third, we did not explore potential
moderators, posing another limitation. While prior research examined some variables moderating the effect of online atmospheric cues on customer emotional state and approach-avoidance responses, such as involvement and atmospheric responsiveness (Eroglu et al., 2003), and perceptual curiosity (Koo and Ju, 2010), we propose that trust, self-brand connection (SBC; Escalas and Bettman, 2003), or some personality traits may moderate animation effects. For example, trust in online shopping or the brand might strengthen the relationship between emotional state and website attitudes, thus increasing purchase intentions. If consumers have already established strong connections with the relevant brand, they may experience higher pleasure, which in turn will enhance favorable website attitudes, contributing to higher purchase intentions. Personality traits may also influence individuals’ emotions, feelings, website perceptions, and behavioral response (Loureiro, 2015), thus offering a venue for future research.

Finally, the current research, along with the prior work, focuses on consumer attitudes and purchase intentions, indicating another promising venue for future research to explore other consequences resulting from animated images. For example, it is worthwhile to examine whether animated images on a product web page will have a similar impact on new product adoption, or whether animated images featured in a brand posting will increase consumer engagement in the social media settings. We believe that extending our findings to different contexts, other product categories, or other relevant consumer behaviors, and exploring the aforementioned moderators will offer valuable insights into the effects of online atmospheric cues.

References


Figure 1. Research model
Figure 2. Parallel mediation results in Study 1

Notes. Regression weights (B) are unstandardized; Standard errors (SE) in parentheses.

* \( p < .05 \), ** \( p < .01 \), *** \( p < .001 \).

The total indirect effect was significant (B = .29; SE = .11; 95% C.I. [0.08, 0.52]). The indirect effect through pleasure (the effect hypothesized in \( H1 \)) was significant (B = .30; SE = .12; 95% CI = [0.08, 0.54]). The indirect effect through arousal was not significant (-.006; 95% C.I. = [-.07, .06]).
Figure 3. Parallel and serial mediation results in Study 2

Notes. Regression weights (B) are unstandardized. Standard errors (SE) in parentheses; C’ = Direct effect of animated (vs. static) images on purchase intentions, C = Total effect of animated (vs. static) images on purchase intentions. *p < .05, **p < .01, ***p < .001. The total indirect effect was significant (B = .47; SE = .23; 95% C.I. [.02, .93]). The indirect effect through pleasure and website attitudes (the effect hypothesized in H4) was significant (B = .25; SE = .12; 95% CI = [.02, .50]). The indirect effect through arousal and website attitudes was not significant (B = .04; 95% CI = [-.02, .11]).
Table 1 Summary of hypotheses testing

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>H1</strong>: Pleasure mediates the relationship between animated (vs. static) images and website attitude, such that animated images elicit a higher level of pleasure, which in turn leads to more favorable website attitudes.</td>
<td>Supported</td>
</tr>
<tr>
<td><strong>H2</strong>: Arousal mediates the relationship between animated (vs. static) images and website attitude, such that animated images elicit a higher level of arousal, which in turn leads to more favorable website attitudes.</td>
<td>Rejected</td>
</tr>
<tr>
<td><strong>H3</strong>: Website attitudes mediate the relationship between animated (vs. static) images and purchase intentions, such that animated images will induce more favorable website attitudes, which in turn lead to higher purchase intentions.</td>
<td>Supported</td>
</tr>
<tr>
<td><strong>H4</strong>: <em>Pleasure and website attitudes serially mediate the relationship between animated (vs. static) images and purchase intentions, such that animated images elicit a higher level of pleasure, which in turn induce more favorable website attitudes, thus leading to higher purchase intentions.</em></td>
<td>Supported</td>
</tr>
<tr>
<td><strong>H5</strong>: Arousal and website attitudes serially mediate the relationship between animated (vs. static) images and purchase intentions, such that animated images elicit a higher level of arousal, which in turn induce more favorable website attitudes, thus leading to higher purchase intentions.</td>
<td>Rejected</td>
</tr>
</tbody>
</table>
Appendix A.

Summary of scales and reliabilities used in the two studies

<table>
<thead>
<tr>
<th>Scales</th>
<th>Study 1</th>
<th>Study 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pleasure</strong> (Mehrabian and Russell’s, 1974)</td>
<td>.90</td>
<td>.91</td>
</tr>
<tr>
<td>After browsing this website, I felt annoyed/pleased.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>After browsing this website, I felt unsatisfied/satisfied.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>After browsing this website, I felt despairing/hopeful.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Arousal</strong> (Mehrabian and Russell’s, 1974)</td>
<td>.69</td>
<td>.68</td>
</tr>
<tr>
<td>After browsing this website, I felt unaroused/aroused.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>After browsing this website, I felt sleepy/wide-awake.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Website attitudes</strong> (Richard and Habibi, 2016)</td>
<td>.94</td>
<td>.96</td>
</tr>
<tr>
<td>I dislike/like this website.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I react unfavorable/favorably towards this website</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have negative/positive feelings towards this website</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Purchase intentions</strong> (Dodds et al., 1991)</td>
<td></td>
<td>.96</td>
</tr>
<tr>
<td>The likelihood of purchasing this product is high.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The probability that I would consider buying the product is high.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>My willingness to buy the product is high.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I intend to buy this product.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>