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“Now You See Me”: The Attention-grabbing Effect of Product Similarity and Proximity in Online Shopping

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Key words: Visual attention; product similarity; product proximity; Biased Competition Model; Gestalt Principles.

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Abstract

While past research has extensively investigated how a specific product attracts attention, little is known about how the display of other products in the same visual field affects the consumer's attention. Drawing from the Biased Competition Model and the Gestalt Principles, the current research seeks to examine the effect of distracting products' similarity and proximity on a focal product in a goal-oriented online shopping episode. Specifically, in Study 1 (n=38), using eye-tracking, we show that consumers allocate the most visual attention to distracting products when they are both categorically similar and spatially near the focal product. We replicate this finding in Study 2 (n=211) and results additionally suggest that under such distraction, consumers are less likely to accurately identify the focal product. Theoretical and managerial implications are discussed.

Key words: Visual attention; product similarity; product proximity; Biased Competition Model; Gestalt Principles.

INTRODUCTION

While growth in the global retail market has shown signs of fatigue in the past few years, e-commerce continued to grow. It is estimated that global e-commerce sales will rise 20.7% in 2019 to \$3.535 trillion; and by 2021, experts expect it will approach \$5 trillion (Lipsman, 2019). This robust growth will be primarily driven by a soaring increase in e-commerce sales in emerging markets such as China, India, Philippines, and Mexico, accounting for 30% of annual growth in 2019. Compared to traditional offline retailers who often face limited shelf space and inventory capacity, online retailers can potentially offer a much wider range of products. However, just as in brick-and-mortar stores, numerous products listed online simultaneously compete with each other for the consumer's attention.

In the consumption domain, attention, more precisely, visual attention, is an important research topic because it is known to influence subsequent product choices (Gidlöf, Anikin, Lingonblad, & Wallin, 2017; Janiszewski, Kuo, & Tavassoli, 2012; Milosavljevic, Navalpakkam, Koch, & Rangel, 2012). Past research has found that the key determinants of visual attention include product packaging design (e.g., color, shape, and size) (Clement, 2007; Clement, Kristensen, & Grønhaug, 2013; Folkes & Matta, 2004; Underwood, Klein, & Burke, 2001) and relative position to other products (Atalay, Bodur, & Rasolofoarison, 2012; Chandon, 2013). However, we note that extant research on this topic is rather limited in scope. First, it largely focuses on why and how a specific product attracts attention. What is less known is the role played by other products in shaping attention: in most stores, whether online or offline, products are often displayed together rather than in isolation (e.g., stacked on shelves or listed on a webpage). Second, past research mainly investigates general shopping scenarios where consumers have no specific product in mind (Clement et al., 2013; Gidlöf et al., 2017; Milosavljevic et al., 2012), overlooking shopping episodes where consumers are more goal-driven (e.g., buying a specific product they have in mind). Recent studies in the e-commerce literature has shown that consumer goal-

directedness is important as it influences the effectiveness of web advertising (Wang, Wang, & Farn, 2009). In a goal-directed shopping episode, the ability to hold one's attention on the focal product (and shield one's attention from other distracting products) is more important because failing to do so might result in poor product choices (Janiszewski et al., 2012). We define focal product as the product that can best fulfill one's goal in a goal-driven shopping episode, in contrast to distracting products, which could prevent one from achieving the goal. In reality, consumers often have a specific product in mind prior to entering a retail space, whether it's their favorite ice cream on the shopping list or a particular gift for someone else. To the best of our knowledge, no research has examined attention combining these two perspectives, i.e., other products' influence in a goal-directed shopping task. Therefore, the current study attempts to fill the gap by examining how a consumer's visual attention in online shopping contexts can be influenced by other products' (i.e., distractors) similarity and proximity with the focal product within a webpage.

Specifically, the current research makes three contributions to the literature. First, it contributes to the literature on retail factors affecting consumer distraction by focusing on the latter in an online retail environment. Research on consumer distraction has thus far focused on offline settings (Bellizzi & Hite, 1992; Heroux, Laroch, & McGown, 1988; Hui & Bateson, 1991). Since distraction sources in traditional brick-and-mortar settings may differ from those online (e.g., noise, crowding, employees), our results provide insights on online consumer distraction and their effects. Second, we add to the literature on the consumer's attention by showing that she will be more likely to pay attention to distracting products that are categorically similar and also when they are placed spatially near the focal product. As mentioned, prior marketing research on attention has largely focused on the characteristics of the focal product itself (e.g., (Clement et al., 2013)). Our results suggest that an examination from the perspective of the distractors provides new insights on the consumer's attention when shopping online. Third, while extensive research suggests that visual attention on the focal product significantly increases its purchase

likelihood (Gidlöf et al., 2017; Janiszewski et al., 2012), we show that increased visual attention on distracting products negatively impacts the consumer's judgement on the focal product itself, i.e., consumers tend to be less accurate in determining whether the focal product should fulfill their needs.

CONCEPTUAL DEVELOPMENT

Visual Salience, Attention, and Product Choice

Goal-directed behaviors, such as shopping for a specific product, require consumers to focus on goal-relevant stimuli and ignore irrelevant distractors (Lavie, Hirst, De Fockert, & Viding, 2004). This is based on the premise that attention is regarded as a limited mental resource (Sternberg, 1999), and that one's total attentional capacity at any given time is limited (Kahneman & Tversky, 1973). Therefore, the "visual system cannot process all of the items present in a visual scene; some stimuli must be selected over others to prevent the visual system from becoming overloaded" (Vecera & Behrmann, 2001, p. , p. 149). The ability to concentrate our cognitive resources on information relevant to our goals, while filtering out irrelevant information is referred to as selective attention. The Biased Competition Model (Desimone, 1998; Desimone & Duncan, 1995) explains how an object or a stimulus is selected attentionally for further information processing. The model proposes that "objects compete for cortical representation in a mutually inhibitory network; attention prioritizes objects for further processing by biasing competition in favor of the attended item." (Proulx & Egeth, 2008, p. 106). However, this competition is not perfect as our visual systems have two general sources for the control of attention: 1) top-down sources that arise from goal-relevance (i.e., stimuli that are more relevant to the current behavioral goal attract more attention) and 2) bottom-up sources which are based on stimulus properties (i.e., stimuli that are more visually salient due their size, color, and brightness will be more likely to be seen). These two sources create biases for a particular object in the visual field which would result in a

higher chance of attentional selectivity. In addition, recent studies have uncovered a number of contextual factors that could influence this attentional bias, such as familiarity (Tobias, Wästlunda, & Gustafssonb, 2016; Pieters, Warlop, & Wedel, 2002), emotion (Schupp et al., 2007; Wadlinger & Isaacowitz, 2006), time pressure (Pieters & Warlop, 1999) and arousal (e.g., stress and anxiety) (Wadlinger & Isaacowitz, 2008; Janelle, 2002)

The marketing literature has found supportive evidence on how visual salience (i.e., stimulus properties) affects the consumer's attention and product choices. For example, in an eye-tracking study conducted in a grocery store, Clement et al. (Clement et al., 2013) suggests that several product packaging design features including contour/shape, color contrast, and typography have a significant influence on the consumer's visual attention. Products with a high slim shape, high color contrast, and lesser text on the packaging attracted more initial attention. In a similar vein, results from a virtual reality simulation show that incorporating a picture or illustration on the product packaging increased the shopper's attention to low familiarity brands (Underwood et al., 2001). More importantly, research suggests that the consumer's attention has a significant influence on her product choice and purchase decision. For instance, Janiszewski et al. (Janiszewski et al., 2012) show a "mere selection effect": the fact that when attention is repeatedly directed to a product it will positively influence its choice. Similarly, in a recent eye-tracking study conducted in a supermarket shopping environment, Gidlof et al. (2017) suggest that visual attention is the most important predictor of purchase, even after controlling for internal factors (e.g., brand preferences, price sensitivity) and external factors (e.g., visual salience of a product). In other words, the longer a product is being looked at, the greater the chance it will be purchased.

However, we note that while prior research extensively demonstrates how a product can attract attention, what has been less investigated are the factors that deviate the consumer's attention from this product. Therefore, in this research, rather than examining attention on the focal product, we investigate other products that are often displayed on a shopping website jointly with the focal product. Specifically,

based on the Gestalt Laws of Grouping (Wertheimer, 1938), we propose that the distractors' categorical similarity and spatial proximity with the focal product influence the consumer's attention. As there are numerous factors that could influence consumers' attention in online shopping, it is important to point out that the current research limits its scope to the two above mentioned external factors which are associated with the products, while internal factors associated with consumers themselves (e.g., familiarity, expertise, product/brand preference) are not examined.

Product Similarity and Proximity

Gestalt Laws of Grouping, or Gestalt Principles of Perceptual Organization (Wertheimer, 1938), play a crucial role in our visual processing of graphical representations. Their objective is to explain how human eyes perceive visual elements. Five visual principles are drawn from Gestalt: proximity, similarity, continuity, closure, and symmetry. Extant literature on object-based attention claims that attention spreads based on the Gestalt grouping cues in a way that visual elements belong to the same object are co-selected (Duncan, 1984; Wannig, Stanisor, & Roelfsema, 2011; Yu, Xia, Gao, & Samal, 2015). In other words, this suggests that our attention is influenced by how objects are grouped according to the Gestalt Principles. In this research, we focus on two of the Gestalt Principles: similarity and proximity, which have received wide attention in prior research (e.g., Duncan & Humphreys, 1989; Breugelmans, Campo, & Gijbrecchts, 2007). The law of similarity proposes that people tend to group similar elements together, and the law of proximity proposes that elements which are close to each other are perceived as forming a group or at least are related, whereas distant elements are understood as unrelated.

In a goal-oriented or utilitarian online shopping episode, consumers may be searching for a specific product (i.e., the focal product) in a "task-oriented, efficient, rational, and deliberate" manner (Wolfenbarger & Gilly, 2001, p. 35). Since they are transaction-directed episodes consumers would ideally require no distraction; in reality, however, e-commerce is not distraction-free. In a typical e-

commerce website, there might be a host of other stimuli presented on a webpage, which could be potentially considered as distractors, since they are less relevant or even irrelevant to the shopping task at hand (ads, complementary products, etc.). As discussed, under such circumstances, multiple stimuli compete for the consumer's exclusive visual attention.

First, we posit that the product category of the distracting products relative to the focal product should play an important role in determining their attentional selectivity. Similarity is a key determinant of how consumers categorize products in everyday life (Murphy & Medin, 1985; Smith & Medin, 1981; Tversky, 1977). The literature suggests that two product categorizations based on similarity exist in our memory: common taxonomic and goal-derived categories (Barsalou, 1983; 1985). The former categorization often implies a stimulus-based or bottom-up view where individuals assess the similarity of two or more products based on their common attributes (e.g., t-shirt A, t-shirt B), while the latter involves an *ad-hoc* and top-down process where categories are constructed to achieve a common salient goal (Ratneshwar, Barsalou, Pechmann, & Moore, 2001). In comparison to goal-derived categories, taxonomic categories are well-established in memory, making external similarities more accessible when considering a set of products. Therefore, we propose that when searching for a focal product online, the distracting products that are more similar (i.e., same product category, e.g., t-shirt) with the focal product (e.g., shirt) should attract more attention than those which are categorically distant (e.g., lawnmowers) due to the fact that consumers might attentionally perceive them as more relevant to the focal product. We note that while there are other visual elements relating to product appearance such as brand logo, color, and shape that might also influence the perception of similarity as shown in previous research (e.g., Clement 2013), these elements are excluded and controlled for in the current research as we focus on similarity inferred by product category.

Extant research has shown the effect of target-distractor similarity on visual attention and search efficiency (Duncan & Humphreys, 1989; Treisman & Gormican, 1988). Researchers found that the neural

and visual selection of a target stimulus relative to distractors is weaker when the distractors resemble the target (Bichot & Schall, 1999). This implies that similar distractors deviate visual attention from the target stimulus. Sato et al. (Sato, Watanabe, Thompson, & Schall, 2003) show that the effect of target-distractor similarity on the neural activity for the distractors persisted even when the target was absent and only distractors were presented. They conclude that this occurs because the neural activation for distractors was greater when they were highly similar to the target stimulus. Similarly, in two experiments, Feria (2012) shows that distractors that are identical to targets are more likely to hinder visual tracking than those whose features are distinct from the targets such as shape and color. Therefore, based on the Gestalt law of similarity and past research on target-distractor similarity, we suggest that the consumer's attention will be drawn towards products that are categorically similar to the focal product. Thus, we propose the following hypothesis.

H1: Distractors similar to the focal product attract more attention than distractors that are dissimilar to the focal product.

Second, we explore the spatial component of Gestalt Principles, namely the impact of proximity on visual attention. The effect on attention of distractors physically close to the focal stimulus has been less researched in the marketing literature. We posit that in the e-commerce context, distractors which are closely placed to a focal product will receive more attention than those are placed further away. This is because, according to the Gestalt principle of proximity, elements that are close to each other should be perceived as forming a group or at least being related, whereas objects that are more distant from each other are understood as unrelated. Translated into a typical product listing webpage, consumers might divert their attention to the products that surround the focal product due to their proximity. Previous studies on shelf effect suggest that a product shelf position significantly influences its purchase likelihood. For example, on traditional grocery store shelves, a product placed near a highly preferred

item will increase its probability of being chosen (Simonson & Winer, 1992). In online contexts, research suggests that a “primacy and proximity effect” exists; it suggests that a product's choice probability increases when presented on the first screen or located near focal products, especially when the latter are out-of-stock (Breugelmans, Campo, & Gijssbrechts, 2007). Also, research in advertising suggests that in online games, brand messages placed near the focal character receive more attention (Lee & Faber, 2007). Therefore, consistent with the previous research on proximity and attention, we suggest that when a focal product is identified, other products should have a significant attentional advantage when placed next to it. In addition, based on the Object-based Attention Theory and Gestalt principles of perceptual organization, when two principles are joined (e.g., proximity and similarity), attention is more preponderant than when only one of them is present (Egley, Driver, & Rafal, 1994). Therefore, we propose that grouping distractors that are similar to and near the focal product will trigger the greatest attention than any of the other combinations (dissimilar and far, similar and far, or dissimilar and near). Thus, we posit the following hypotheses.

H2: Distractors near the focal product attract more attention than distractors farther from the focal product.

H3: There is an interaction effect between similarity and proximity on attention where distractors that are both similar and near the focal product attract the greatest attention.

As discussed, visual attention positively influences product choice. For example, prior research suggests that the longer the product is being looked at, the more likely it will be chosen (Gidlöf et al., 2017). Following this logic, the reverse should also be true: in a goal-directed online shopping episode, as attention is a limited mental resource and often exclusive, consumers should be less likely to correctly identify the focal product as the goal-attaining product, due to the deviation of attention when distracting products successfully grab attention. In addition, research on visual search effectiveness has uncovered

that the search process consists of two latent attention states: localization and identification (Van der Lans, Pieters, & Wedel, 2008). In the localization state, the visual brain quickly scans the visual scene and locates the candidate targets, and once a candidate is localized, attention switches to the identification state where it is matched with the target in memory in order to verify whether it is the true target. This process requires people to repeatedly switch between localization and identification states to find the correct target. Therefore, when the distraction level is high as in the presence of similar and near products, such a process would require a much higher effort and longer time to perform, which, consequently decreases the search effectiveness. Therefore, we propose the following hypothesis regarding the relationship between distractors' similarity and proximity to the focal product and consumers' judgement accuracy.

H4a: Consumers have less accuracy in identifying the focal product as the right product when the distractors are similar to the focal product than when they are dissimilar.

H4b: Consumers have less accuracy in identifying the focal product as the right product when the distractors are near to the focal product than when they are farther away.

H4c: Consumers have the least accuracy in identifying the focal product as the right product when the distractors are both similar and near to the focal product.

METHOD

Study 1

The purpose of Study 1 is to test the main effects of distractors' similarity and proximity with the focal product, and their interaction, on visual attention (H1-H3). In order to do this, we conducted a lab experiment using eye-tracking, which is a well-established method in the literature for studying visual

attention (Drèze & Hussherr, 2003; Gidlöf et al., 2017; Kuisma, Simola, Uusitalo, & Öörni, 2010; Milosavljevic et al., 2012).

Participants and Design

We used a 2 (similarity between the focal product and distractors: similar vs. dissimilar) x 2 (proximity between the focal product and distractors: near vs. far) within-subject experimental design. Thirty-eight students ($M_{\text{age}} = 23.32$, 55% female) participated in the study. In the similar condition, the focal product and the distractors were conceptually similar (e.g., dress vs. skirt), whereas in the distant condition they were less similar (e.g., dress vs. socks). In the near condition, the distance between all products was small (i.e., at the center of the screen), whereas in the far condition, the focal product was in the center of the screen and distractors were at the periphery.

Procedure and Measures

All participants performed an online shopping task involving 32 trials with two experimental factors: similarity and proximity of the distractors. A scenario was first presented to participants. They read about their niece “Sarah”. As she celebrated her 7th birthday, they were asked to find her a pink dress as a gift. Therefore, the focal product was a pink dress. The distractors’ similarity was manipulated so that products such as t-shirts, skirts, sweatshirts, and jackets served as similar distractors whereas products such as swimwear, accessories, underwear, and shoes were presented as dissimilar products. Proximity was manipulated through the location of the distracting products: In the near condition, they were placed close to the focal product whereas in the far condition they were placed on the edge of the screen farther away from the focal product (see Figure 1 for the study stimuli). The 32 trials included the four combinations between similarity and proximity, each was shown for 8 trials in a randomized order. The tasks started with a fixation cross in the center of the screen that was displayed during a random time period between 1000 ms and 3000 ms. Then, the screen that contained both the distractors and the focal

product (a dress, which was not always pink) was displayed for 4000ms. This duration was constant for every trial. It included one focal product and four distractors. Each trial consisted of two screens: the first with a fixing cross and the second containing the distractors and the focal product.

Attention was measured using a computer monitor with an integrated SMI eye tracker (Model: RED 250, SensoMotoric Instruments GmbH, Teltow, Germany) that had a sampling rate of 60 Hz. Each participant was seated on a chair with a viewing distance of approximately 24 inches from the monitor. The equipment was individually calibrated using a five-point calibration method, producing a low tracking error (less than 0.4). To assess time spent on distractors, we first defined the pixel areas of the distractors as separate areas of interest (AOIs) (Riedl & Léger, 2016). Then the time spent on distractors were calculated based on total milliseconds of net dwell time on these areas of interests. The longer the time spent, the higher the allocation of attention.

(Insert Figure 1 About here)

Results

To analyze attention, time spent on distractors was utilized as a dependent variable in a linear mixed-effects regression model, in which similarity and proximity were entered as independent variables. To assess statistical significance, we used one-tailed tests. As for multiple comparisons, to avoid errors, the Holm-Bonferroni method was employed to adjust p-values. Results in Table 1 show the mean time spent on distractors, which was measured in milliseconds.

Hypothesis 1 suggests that consumers allocate more attention on distractors that are categorically more similar to the focal product than those that are dissimilar. However, as the results suggest, such an effect was not significant ($t(4788) = .01, p = .50, NS$). Therefore, H1 is rejected.

We also hypothesized that individuals will allocate more attention towards distractors that are closer to the focal product than those which are farther away (H2). Results show a significant effect of the

distractors' proximity: participants spent more time looking at distractors when they were near the focal product ($t(4788) = 2.21, p = .014, d = 0.06$). Therefore, H2 was supported.

For H3, which suggests an interaction effect of similarity and proximity, we performed an analysis using a least-squares means model for multiple factors. The analysis yielded a significant effect. More precisely, distractors in similar and near condition received more visual attention compared to those in the similar and far condition ($M_{\text{near-similar}}=353, M_{\text{far-similar}}=181, t(4788) = 6.07, p <.000, d = 0.15$) and in the dissimilar and far condition ($M_{\text{near-similar}}=353, M_{\text{far-dissimilar}}=181, t(4788) = 3.59, p <.000, d = 0.13$, see Table 1). In addition, a marginally significant difference was observed when compared to distractors that are equally near but dissimilar ($M_{\text{near-similar}}=353, M_{\text{near-dissimilar}}=299, t(4788) = -2.07, p = .10, d = 0.04$). Thus we confirmed H3: There is an interaction between visual proximity and product similarity on the user's attention to distractors. Specifically, distracting products that are similar and near the focal product receive the most visual attention in comparison to others.

(Insert Table 1 About here)

Discussion

The results of Study 1 showed that, when searching for a specific product online, the products that were placed closer to it also received more visual attention, as compared to products that were further away. In addition, this attention-grabbing effect was stronger when the products were both similar and spatially closer to the focal product. Surprisingly, our results did not support a main effect of product similarity. We suspect that this could be potentially due to the fact that the dissimilar distractors we used in the manipulation were not "dissimilar enough" as they share a certain degree of both taxonomical and goal-related similarity with the focal product. For example, we used products such as socks and shoes in the dissimilar condition, although they were conceptually different from the focal product (i.e., dresses),

they share some similarities in terms of product attributes (e.g., material) thus they might still belong to the same broad product category (e.g., apparel or fashion), which fulfil a common consumption goal. Our next study addresses this issue by making the distractors more dissimilar: manipulating the category more explicitly and differentially in terms of attributes and goals.

Study 2

Study 2 had two objectives. First, we intended to replicate the main results of Study 1, which was conducted in a lab environment, in a more natural setting and with a larger sample size. Second, as noted earlier, one of the possible reasons for not finding support for the main effect of similarity (H1) might be the fact that dissimilar distractors were not perceived as dissimilar enough. We addressed this issue by refining the similarity manipulation in this study. Second, building on the previous study we tested H4 in this study, which suggests that the increased attention on similar and near distracting products should negatively influence the consumer's judgement accuracy, meaning that when attention is deviated towards distractors, consumers will be less accurate in identifying the focal product as the correct one.

Procedure and design

A 2 (distractor similarity: similar vs. dissimilar) X 2 (distractor distance: near vs. far) within-subject experimental design was used. This time, the experiment was a scenario-based online study. A total of 211 participants were recruited from an online panel. At the beginning of the experiment, similar to Study 1, participants were asked to imagine that they were looking for a birthday gift for a friend, who is particularly interested in a "grey backpack with zipper closure" (the focal product). Then, participants were presented with screenshots of fictitious shopping webpages each representing one of the four conditions. Similarity was manipulated by product category, where distractors such as handbags,

briefcases, wallets, and suitcases were used as similar products. This time, we used extremely unrelated products such as laptops, cameras, phones, and tablets as dissimilar distractors. Proximity was manipulated by the location of the distractors (see Figure 2 for the stimuli used in the experiment). There were two trials in each condition, totaling eight trials presented in random order. Participants had 7 seconds to look at each web page after which it disappeared automatically. Finally, they answered a short questionnaire after each trial.

(Insert Figure 2 About here)

Measures

Due to the nature of this study, this time it was not possible to directly capture visual attention through eye-tracker since it was not in a controlled lab environment. However, an established method in the literature to assess attention is to use brand/product recall (Moore, Stammerjohan, & Coulter, 2005; Norris & Colman, 1992). Although some recent research has casted doubt on the equation between attention and memory (Atalay et al. 2012; Aribarg, Pieters, and Wedel 2010; Chandon et al. 2007, 2009), there are strong evidences from both established literature on attention and recent eye-tracking studies have found that increased attention leads to increased memory for that object (e.g., Janiszewski, 1998; Wedel & Pieters, 2000; Simmonds et al. 2020; Myers et al. 2020). Simmonds et al. (2020, p. 241) noted, “At least some attention to a brand's advertising is needed for it to have a chance to influence consumers' memories”. Therefore, we posit that although attention might not always lead to correct recall, being able to recall correctly would require attention. Therefore, in line with these prior work, we used product recall as a proxy measure for attention. Specifically, participants were asked a question “If you were also looking for a gym bag (i.e., one of the distractors present on the page), was it on the previous webpage?” on a 5-point scale from “Definitely not” to “Definitely yes”. The object in this question varies depending on the distractors in different trials. Focal product accuracy was measured, by asking participants to

indicate their agreement with the following statement: “The webpage contained the gift I am looking for (i.e., a grey backpack with zipper closure)”. We also measured the perceived similarity and proximity between the focal product and distractors with two statements on a 5-point scale from “Strongly disagree” to “Strongly agree”: “The other products are similar(i.e., in the same category) to the focal product (i.e., the backpack) ” and “The other products are placed close to the focal product (i.e., the backpack) on the screen.”. All measures were analyzed using two-way repeated measures ANOVA.

Results

Manipulation checks. A separate test with 50 participants suggested a successful manipulation of both similarity and proximity. Specifically, participants reported significantly higher similarity between the distractors and focal product in the similar condition than dissimilar ($M_{\text{similar}}=5.31$; $M_{\text{dissimilar}}=4.73$, $t(49)=3.41$, $p < .001$); they also perceived a significantly closer distance when the distractors were placed around the focal product than when they were on the other side of the screen ($M_{\text{near}}=5.48$; $M_{\text{far}}=4.93$, $t(49)=2.57$, $p < .01$).

Attention. Firstly, in support of H1 (i.e., distractors that are similar to the focal product attract more attention), similarity had a significant main effect on attention ($F(1, 210)=231.60$, $p < .000$). Specifically, as illustrated in Table 2, participants could recall the distractors more accurately when they were similar in category to the focal product than when they were dissimilar ($M_{\text{similar}} = 3.73$, $M_{\text{dissimilar}}=3.04$, $t(210)=15.22$, $p < .000$), which implies that on average, participants paid more attention to similar distractors than dissimilar ones. Moreover, results show that proximity had a significant main effect on attention ($F(1, 210)=138.72$, $p < .000$), supporting H2 (i.e., distractors that are near to the focal product attract more attention). Specifically, when distractors were near the focal product, participants were able to recall them better than when they were far from the focal product ($M_{\text{near}} = 3.66$, $M_{\text{far}}=3.11$, t

(210) =11.78, $p < .000$). However, more importantly and consistent with Study 1, we found a significant interaction effect of distractors' similarity and proximity on participants' attention ($F(1, 210)=175.58$, $p < .000$). Specifically, planned comparisons showed that distractors that were categorically similar and physically near the focal product attracted the most attention, more than their counterparts in the similar and far condition ($M_{\text{similar-near}}=4.32$, $M_{\text{similar-far}}=3.15$, $t(210)=15.59$, $p < .000$), in the dissimilar and near condition ($M_{\text{similar-near}}=4.32$, $M_{\text{dissimilar-near}}=3.01$, $t(210)=17.4$, $p < .000$), as well in the dissimilar and far condition ($M_{\text{similar-near}}=4.32$, $M_{\text{dissimilar-far}}=3.05$, $t(210)=16.85$, $p < .000$). Thus, in support of H3, displaying distractors similar and near the focal product attract greater attention.

Accuracy. Results show a significant main effect of similarity ($F(1, 210)=35.98$, $p < .000$) and a significant main effect of proximity ($F(1, 210)=16.21$, $p < .000$) on accuracy. Specifically, in determining whether the focal product is the correct one, participants showed less accuracy when the distractors were more similar than dissimilar, as well as when placed near the focal product rather than far away, ($M_{\text{similar}}=3.32$, $M_{\text{dissimilar}}=3.64$, $t(210)=-6.23$, $p < .000$; $M_{\text{near}}=3.39$, $M_{\text{far}}=3.57$, $t(210)=-3.77$, $p < .000$). An interaction effect was also significant ($F(1, 210)=10.35$, $p < .001$). In deciding whether the focal product was the right product, participants were the least accurate when the distractors were both similar and nearby, in comparison to when they were both similar and far away ($M_{\text{similar-near}}=3.15$, $M_{\text{similar-far}}=3.49$, $t(210)=-4.33$, $p < .000$), dissimilar and near ($M_{\text{similar-near}}=3.15$, $M_{\text{dissimilar-near}}=3.63$, $t(210)=-5.58$, $p < .000$), as well as dissimilar and far away ($M_{\text{similar-near}}=3.15$, $M_{\text{dissimilar-far}}=3.66$, $t(210)=-6.05$, $p < .000$). Thus the results support H4. Consumers are less accurate in identifying the focal product when they are attentionally distracted by others products that are similar and nearby.

(Insert Table 2 About Here)

Discussion

The results of Study 2 were overall consistent with Study 1. Specifically, we found evidence that supports H2 and H3, namely the main effect of proximity and its interaction effect with similarity on the participant's attention. Moreover, this time, we also found a significant effect of similarity (H1), which was not observed in Study 1. In addition, the results of Study 2 suggest that participants' judgement of the focal product was less likely to be accurate in the presence of similar and near distractors, implying that increased visual attention on distractors negatively impacts their judgment accuracy on the focal product. This result is in line with previous research on visual search effectiveness (Van der Lans, Pieters, & Wedel, 2008), which found that visual search is an iterative process that consists of localization (e.g., where is the target?) and identification states (e.g., is it the target?). Our findings could be seen as a direct result of interruption of this process in the presence of highly distracting products, as consumers fail to correctly identify the focal product. We argue that such an outcome is essentially undesirable for consumers, since they might end up not finding or choosing the right product that best fulfills their needs.

GENERAL DISCUSSION

In today's highly competitive e-commerce landscape, the ability to gain, and more importantly, to hold the consumer's attention is crucial. Drawing on the Biased Competition Model (Desimone, 1998; Desimone & Duncan, 1995) and Gestalt principles of perceptual organization, this research shows that both distractors' product category and spatial proximity affects the consumer's attention in online shopping. Specifically, we found that when distracting products are both categorically similar and are placed near the focal product, consumers allocate more visual attention to them, and such heightened attention negatively influences their product judgement accuracy – they are less likely to identify it as the one that can actually fulfil their shopping goal. In addition, we complement traditional self-reported, memory-based measures of attention (e.g., recall in Study 2) with eye-tracking (Study 1) in the current research in order to provide a more comprehensive and reliable assessment of the attention. Some

researchers have found that compared to a memory-based measure of attention, physiological responses such as eye movements, which are tightly linked to shifts in attention are considered more reliable indicators (e.g., Molosavljevic and Cerf, 2008). Therefore, when combined with self-reported measures, eye-tracking offers additional reliability and stronger evidence as it allows us to objectively observe and assess consumers' attentional process.

This research first contributes to extant marketing literature on visual attention by studying attention on an e-commerce website, a shopping environment that is significantly differently from the traditional brick-and mortar stores in terms of visual scenes and stimuli. We show that even in a virtual environment consumers can be distracted by the way in which products are organized and displayed. Second, while past research has focused on how a product can attract attention (e.g., packaging and shelf placement) (Clement, 2007; Clement et al., 2013; Folkes & Matta, 2004; Underwood et al., 2001), our research looks at how such attention can be deviated in the presence of other products. Our results show that, when shopping online, consumers are not only looking at the focal product, but are also visually distracted by looking at other products that are unrelated to the shopping goal. Such finding is consistent with past research based on Competition-for-attention theory (Janiszewski, 1998), which suggests that objects in the visual field compete to grab our limited attention. Third, prior research on visual attention on the focal product consistently showed positive effects such as higher purchase likelihood (Gidlöf et al., 2017; Janiszewski et al., 2012). By switching attention on the distracting products, we found a negative effect relating to the consumer's judgement: in a goal-directed shopping episode, increased visual attention on distractors reduces consumers' accuracy in identifying the focal product as the one fulfilling their goal.

Managerial implications

Several managerial contributions can be drawn from this research. Firstly, the most important implication for online retailers is how to optimally present products on the same webpage. For example, many e-commerce websites use product pages to propose additional products (e.g., complementary products, competing products, unrelated products) that might be related or not to the focal product. Our results suggest that while this is likely to increase the chance of other products to be viewed, it also deviates the consumer's attention from the focal product, which potentially affects the consumer's purchasing decision. Second, the study can inform e-retailers on how to strategically organize their online shelf, especially when promoting certain products for a variety of reasons (e.g., overstocking, seasonal products). Past research would mainly suggest to enhance its visual salience in order to capture attention (e.g., Underwood et al., 2001). Our results suggest that where these products are located on a webpage is equally important. Lastly, most of the current e-commerce platforms display products in a rather symmetrical way: they are listed in a way that is perfectly aligned in distance with no variation between them. The website layout should be flexible, depending on both the retailer's and consumer's goals. For example, for consumers searching for a specific product, it is recommended to place all other products away from the focal product to keep the consumer's attention on it and away from distractions, whereas for those whose goal is simply browsing, grouping similar products together might be ideal since the attention allocated to each of the products can be maximized.

Limitations and future research

In both of our studies, we simulated an online shopping environment. Although we made considerable effort to keep the stimuli realistic, participants were not on a real e-commerce website, or completing transactions. Future research should test our results with real online shopping tasks. Second, since we only used a limited range of product categories in our studies, it is possible that attention might also depend on the product categories. For instance, brain imaging studies showed that food-related

stimuli are strongly represented in the working memory (Higgs, 2016) possibly generating more attentional bias towards food items. In addition, an important driver in the growth of e-commerce today is mobile commerce. As it gains more popularity and significance, it is highly recommended to explore visual attention when shopping on a smartphone, considering it has many unique characteristics in terms of its smaller screen size, selection by touch, and closer proximity to the eyes (Senecal et al., 2013; Sénécal et al., 2013; Shankar & Balasubramanian, 2009; Siau, Lim, & Shen, 2001). This opens several research questions that await empirical investigation. For example, does the effect of proximity still exist in mobile commerce since the visual field is even smaller and more focused? Also, how does the ease of scrolling, moving, and zooming on a smartphone enabled by touch affect visual attention? Lastly, past research has found that familiarity about a specific object also influences one's attention (Tobias, Wästlunda, & Gustafssonb, 2016; Pieters, Warlop, & Wedel, 2002). In the current research, one of limitations is that we do not consider internal factors such as whether consumers are familiar with or have prior knowledge about the focal product, which might influence how they perceive similarity. For example, those who are highly knowledgeable about electronics might be less prone to attentional bias towards distractors in the same category, since they might not perceive them as similar as those who do not have this type of knowledge. They might be also more likely to judge the focal product correctly due to such knowledge. In addition, brand familiarity also could play an important role. If a consumer is heavily dedicated to a particular brand it is likely the attention-grabbing effect of competing brands (even when they are similar and close to the focal brand) would be somehow attenuated. Therefore, it would be interesting for future research to test the moderating role of product and brand familiarity among consumers. We believe that as consumers spend an increasing amount of time and money shopping online enabled by a variety of devices, understanding how visual attention is allocated, attracted, and distracted is a fruitful research area in the digital era.

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Table 1. Attention means on distractors by proximity and similarity (Study 1)

Visual Proximity	Product Similarity	Attention (ms)
Near	Similar	353 (320.86)
Near	Dissimilar	299 (324.55)
Far	Similar	181 (190.74)

Far	Dissimilar	181 (290.13)
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Note: Standard deviations are reported in parentheses.

Table 2. Attention and accuracy means by proximity and similarity (Study 2)

Visual Proximity	Product Similarity	Attention (recall)	Accuracy
Near	Similar	4.32 (0.91)	3.15 (1.00)
Near	Dissimilar	3.01 (0.56)	3.63 (0.89)
Far	Similar	3.15 (0.58)	3.49 (0.91)
Far	Dissimilar	3.05 (0.59)	3.66 (0.92)

Note: Standard deviations are reported in parentheses.

Figure 1. Study 1 stimuli

Left panel: distractors with high similarity and far distance to the focal product

Right Panel: distractors with low similarity and near distance to the focal product

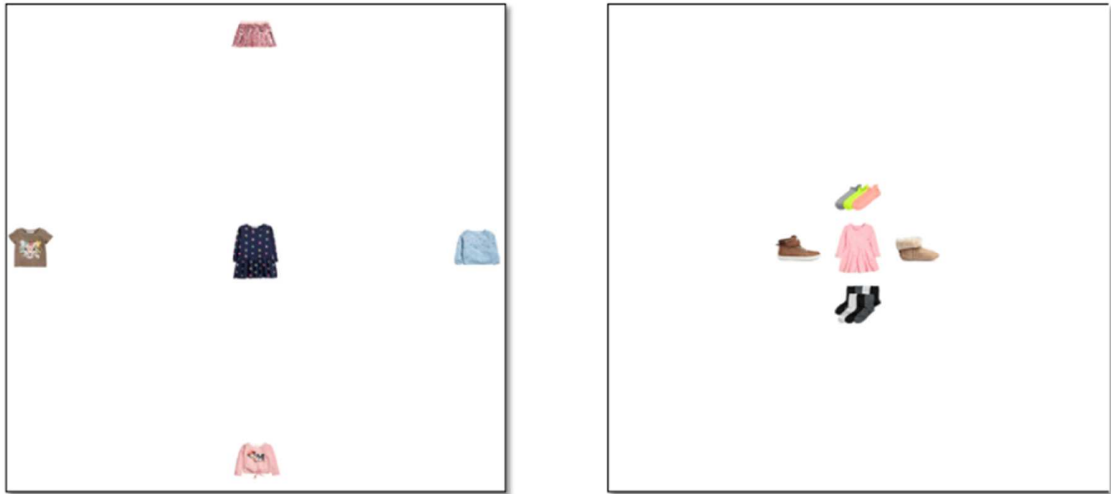


Figure 2. Study 2 stimuli

Upper row (from left to right): Condition: similar and near; Condition: similar and far

Bottom row (from left to right): Condition: dissimilar and near; Condition: dissimilar and far

