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Visual attention, buying impulsiveness, and consumer behavior

Hayk Khachatryan[1] · **Alicia Rihn**[2] · **Bridget Behe**[3] · **Charles Hall**[4] · **Ben Campbell**[5] · **Jennifer Dennis**[6] · **Chengyan Yue**[7]

Abstract Buying impulsiveness is frequently triggered by point-of-sale information. In order to impact consumer behavior, this information must be visually noticed. In this study, researchers propose that consumers' level of buying impulsiveness impacts their visual attention to point-of-sale information (i.e., signs, displays). Specifically, individuals scoring high on the buying impulsiveness scale (BIS) fixate less on point-of-sale information. This was tested in two experiments where participants' task was to rate their purchase likelihood for ornamental plants. Both experiments demonstrate that consumers with high BIS fixate less on in-store signs but more on displays than low BIS consumers. High BIS participants' visual attention to informational signs positively impacts their purchasing behavior while their visual attention to the displays does

✉ Hayk Khachatryan
hayk@ufl.edu

[1] Food and Resource Economics Department and Mid-Florida Research and Education Center, University of Florida, 2725 S. Binion Road, Apopka, FL 32703, USA

[2] Mid-Florida Research and Education Center, University of Florida, 2725 S. Binion Road, Apopka, FL 32703, USA

[3] Department of Horticulture, Michigan State University, 1066 Bogue St, East Lansing, MI 48824, USA

[4] Department of Horticultural Sciences, Texas A&M University, 2133 TAMU, College Station, TX 77843, USA

[5] Agricultural and Applied Economics, University of Georgia, 0314a Conner Hall, 147 Cedar St, Athens, GA 30602, USA

[6] Department of Horticulture, Oregon State University, 300 Kerr Administration, 1500 SW Jefferson Ave, Corvallis, OR 97331, USA

[7] Departments of Applied Economics and Horticultural Science, University of Minnesota, 458 Alderman Hall, 1970 Folwell Avenue, St. Paul, MN 55108, USA

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not. Theoretical contributions to consumer behavior literature and implications for retail marketing efforts are discussed.

Keywords Eye tracking · In-store signs · Point-of-sale · Product displays

1 Introduction

Consumer decision-making styles are important in marketing and are used to develop consumer segments, attract customers, and enhance promotion effectiveness (Hausman 2000; Kalla and Arora 2011). Impulsive buying is one decision-making style that is characterized by a spontaneous, irresistible, powerful, and persistent desire to immediately purchase a product (Goldenson 1984; Rook and Fisher 1995; Wolman 1973). According to recent estimates, 68% of purchases are unplanned (Ståhlberg and Maila 2010) and impulsive buying contributes US$4 billion in annual sales to the US retail industry (Mogelonsky 1998). Additionally, past studies show impulsive buying is encouraged by point-of-sale information including attractive products/displays, pricing, novelty, promotions, and demonstrations (Applebaum 1951; Clover 1950; Piron 1991; Punj 2011; Rostocks 2003). However, studies have not addressed the relationship between buying impulsiveness, *visual attention* to point-of-sale information (i.e., signs, displays), and purchasing behavior. This is surprising considering point-of-sale information greatly influences impulsive buying (Liang and Meng 2008; Piron 1991; Rostocks 2003) but may be overlooked due to in-store visual clutter (Nordfält and Lange 2013; Pieters et al. 2010; Wedel and Pieters 2008). Therefore, a deeper understanding of how buying impulsiveness influences visual attention and purchasing behavior helps companies to effectively present relevant information to attract impulsive consumers and influence their decisions.

The objective of this research is to investigate the relationship between individuals' buying impulsiveness, visual attention to information (presented on signs and displays), and purchasing behavior. Eye-tracking technology (ETT) was used to measure participants' eye movements when viewing example retail images on a computer screen (as described by Behe et al. 2013a, Rihn et al. 2016, and Khachatryan et al. 2017). Two experiments were conducted using ornamental plants. In both experiments, we investigate how consumers scoring high and low on the buying impulsiveness scale (BIS) vary their visual attention to point-of-sale signs and product displays. In the first experiment, we test how the presence of information signs and product displays impact impulsive consumers' visual attention and purchasing behavior. In the second experiment, we validate and extend the first experiment by providing different information/signs and increasing the price points.

2 Conceptual background and hypotheses

Visual attention is a key component in decision-making because in order for information to influence behavior it must be noticed (Pennings et al. 2014). However, multiple studies have demonstrated that consumers are highly selective of the information they view (Lee and Ahn 2012; Shi et al. 2013). Wedel and Pieters (2008) determined that

consumers direct their gaze to selective information related to the task at hand. The extent to which visual attention influences individual behaviors can also depend on visual representation. For example, Shi et al. (2013) demonstrated that one fifth of information is visually ignored in online decision-making due to information overload. Further, the information viewed varied by decision making stage and reflected its relevance to the task. For instance, price was the only attribute to be consistently considered by participants which indicated increased importance. Lee and Ahn (2012) also found that consumers "avoid visual objects" that are irrelevant to their task when considering online banner ads. Specifically, animated banner ads reduced visual attention and recognition. Thus, consumers selectively ignored eye-catching stimuli and focused instead on relevant information.

Regarding the relationship between buying impulsiveness and visual attention, impulsive buying is triggered by exposure to relevant and/or appealing point-of-sale information, products, promotions, and displays (Hubrechts and Koktürk 2012; Kalla and Arora 2011; Liang and Meng 2008; Nanda 2015; Piron 1991; Rostocks 2003) likely due to intensified urges and reduced self-regulation (Büttner et al. 2014; Field and Eastwood 2005). Hubrechts and Koktürk (2012) found promotional signage had the biggest impact on impulsive buying while Nanda (2015) reported that displays were more important, followed by sales promotions, and packaging. To date, studies utilizing ETT to study the relationship between buying impulsiveness and visual attention to point-of-sale information and displays are limited and focus on distractibility (Büttner et al. 2014) and arousal (Serfas et al. 2014). Büttner et al. (2014) used visual dwell time to measure impulsive consumers' distractibility in shopping situations. They found that impulsive consumers were more visually distracted by non-focal products than less impulsive consumers. Serfas et al. (2014) assessed impulsive buyers' arousal to in-store information by measuring pupil diameter. They determined that impulsive consumers' pupil dilation/arousal increased only for shopping situations. However, arousal did not predict behavior (i.e., picture liking rating). Both studies indicate that buying impulsiveness is related to visual attention but many questions remain unanswered. For instance, since buying impulsiveness is a spontaneous and immediate need to buy (Goldenson 1984; Rook and Fisher 1995; Wolman 1973), does that imply that impulsive consumers are faster decision-makers? Meaning, if they are faster decision-makers, their visual attention to point-of-sale information should be lower than less impulsive consumers. Drawing upon this concept, the first hypothesis was formulated as follows:

> H1: Higher buying impulsiveness scores will negatively affect participants' visual attention to in-store (a) signs and (b) displays.

A second related area of interest assesses the relationship between buying impulsiveness, visual attention, and the quantity of information. In consumer behavior research, one can argue that more information is beneficial because this allows consumers to make more informed choices. However, more information adds burden to the consumer due to increased processing and limited cognitive capacity (Lee and Ahn 2012; Shi et al. 2013; Pieters et al. 2010; Wedel and Pieters 2008). Under certain conditions, consumers selectively view relevant information to reduce their cognitive load (Lee and Ahn 2012; Shi et al. 2013). For instance, Pieters et al. (2010) assessed how visual clutter (i.e., feature and design complexity) influenced consumers' visual

attention to advertisements and brand recognition. The authors found a negative relationship between feature complexity, visual attention, and attitude toward the ad. Conversely, design complexity increased participants' attitudes and comprehension of the ad. Given that impulsive consumers are more visually distractible (Büttner et al. 2014) and that visual attention decreases as more information is provided (Pieters et al. 2010), one would expect that as the amount of point-of-sale information increases (i.e., in-store signs), impulsive consumers' visual attention to that information would decrease. With this in mind, hypothesis 2 is:

> H2: As the number of information signs increases, impulsive consumers' visual attention will be diluted from (a) signs and (b) displays.

Lastly, both hypotheses 1 and 2 focus on impulsive consumers' visual attention. Visual attention metrics have been shown to be correlated with decision-making and cognitive processing (Pieters et al. 2002). However, visual attention measures are not indicative of behavior (e.g., purchase likelihood, brand recall, etc.). For instance, a colorful display may be "eye catching" and attract consumers' visual attention, but not lead to a purchase if the product is not preferable for the consumer. Therefore, another measure must be introduced to capture behavioral outcomes. Since impulsive buying is a sudden urge to *purchase* a product and the ultimate goal of point-of-sale information is to encourage purchases, we included a purchase likelihood metric that allows us to test the relationship between visual attention, buying impulsiveness, and purchase behavior. Thus, hypothesis 3 was framed as follows:

> H3: Participants with greater buying impulsiveness score ratings will be more likely to purchase the products if they view the (a) signs or (b) the product display.

The next section presents the studies' methodology, followed by the empirical results, and a brief discussion and conclusion.

3 Methodology

Similar methodologies were used in studies 1 and 2. Due to limited space, here we describe the overall methodology and note study-specific differences where applicable.

3.1 Experimental design

Plants were selected as a focal product because they are minimally packaged which decreases interference from inferred or expected differences. Several products (including petunias, herbs, and vegetables for study 1 and petunias, hibiscus, and pentas for study 2) were used with overhead informational signs simulating a retail setting. Text was electronically added to the signs, including: price (study 1—$1.49, $1.99, $2.49; study 2—$10.98, $12.98, $14.98), production methods (study 1—energy-saving practices, water-saving practices, sustainable practices, conventional practices; study 2—certified organic, organic practices, conventional), and product type. In addition to the previously mentioned signs, study 2 also included origin (in-state, domestic, import)

and pollinator friendly (yes, no) signs. Key study differences include study 2 having higher price points (due to larger product sizes) and additional information (i.e., origin and pollinator friendly signs). For both studies, price points were identified by visiting retail garden centers. Sign order was randomized except for the product type sign which was always centrally located on the images (Fig. 1). Protocols and instruments discussed by Behe et al. (2013b) and Khachatryan et al. (2017) were followed for 16 scenario images per study. Unlike Behe et al. (2013b), eye-tracking metrics and BIS

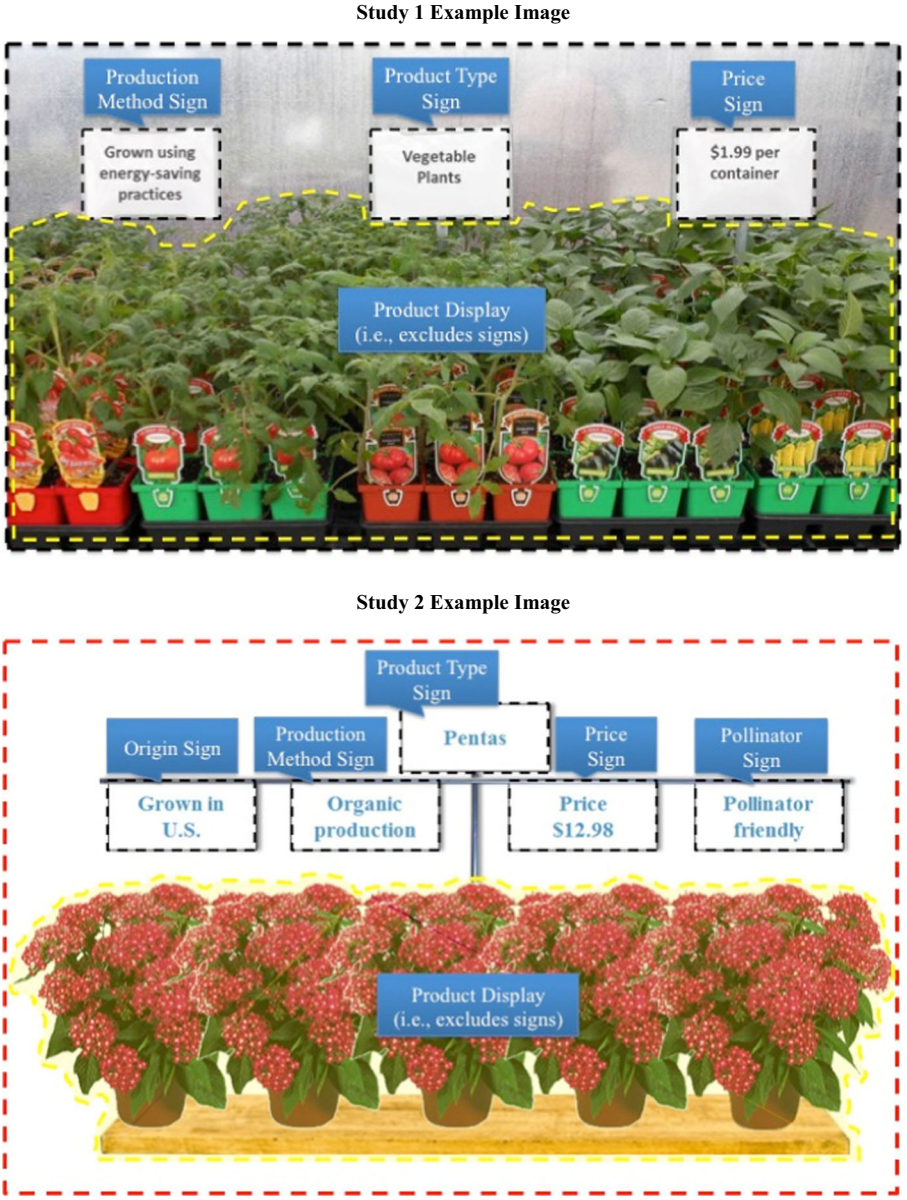

Fig. 1 An example of the areas of interest (AOIs) in studies 1 and 2

ratings were collected for each participant to provide new insights on buying impulsiveness.

Regarding eye-tracking metrics, visual fixations (stops) are of interest because they are the primary period of information acquisition (Pieters et al. 2002) and have been previously used in decision-making research (Shi et al. 2013). For both studies, fixation counts (FC) were extracted for each area of interest (AOI) on the images. FC are the number of visual fixations within each AOI. An AOI is a designated area on the image where visual attention metrics are extracted for analysis. Each AOI corresponded to a sign (price, production method, display, product type, origin (study 2), pollinator friendly (study 2)), product display (the plant image), and not an AOI (areas other than the previously listed AOIs) in each image (see Fig. 1). For each study, the FC, BIS ratings, and questionnaire responses were merged using unique subject identification numbers. Then, data was analyzed in a two-step process. First, to analyze participants' visual attention to the signs and displays, we used FC means for the total sample and for participants with high BIS (≥ 4) and low BIS (< 4) ratings. Pairwise *t* tests were used to determine statistical significance between high and low BIS groups. Then, following procedures outlined by Long and Freese (2006), an ordered logit model was used to estimate the relationship between the dependent variable (purchase likelihood rating) and independent variables (including sign and display attributes, interactions between FC and BIS, and demographic variables). In order to estimate how the fixations influence the relationship between BIS and purchase likelihood, BIS and FC interaction terms (e.g., BIS × FC_i, where *i* represents product attributes) were used. For the BIS × FC interaction terms, a statistically significant positive (negative) coefficient indicates that for each additional fixation, the odds of an impulsive consumer purchasing (not purchasing) the product increases (decreases) by the coefficient amount.

3.2 Experimental procedures and participant recruitment

After being informed about the study purpose and signing a consent form, subjects completed the demographic portion of the questionnaire.[1] They were subsequently seated at the Tobii X1 Light eye-tracking device which was calibrated using a five-point system (see Behe et al. (2013a)). Visual data collection began with the subject viewing a sample image followed by a fixation cross (shown for 2 s) to become familiar with the study protocol. Subjects were given the task of determining their purchase likelihood for each image using a Likert scale (1 = not likely, 10 = very likely (study 1); 1 = not likely, 7 = very likely (study 2)). This method was repeated for each image. After viewing the images, subjects completed supplemental questions including the 9-item BIS adapted from Rook and Fisher (1995).

Data collection locations and sample sizes varied by study. For study 1, conducted in 2012, 331 subjects were recruited by newspaper advertisements and flyers in six study locations (i.e., Orlando, FL; College Station, TX; West Lafayette, IN; East Lansing, MI; St. Paul, MN; Vineland Station, Ontario, Canada). Study 2 took place in 2014 and 87 subjects were recruited by local newspaper advertisements and flyers in Orlando, FL.

[1] All experimental procedures and processes were approved by the research institution's IRB.

4 Results

Study 1 and 2 had complementary results, thus both studies' results will be presented in this section. Table 1 shows participants' mean FC for the total sample and grouped by high (≥ 4) and low (< 4) BIS ratings. The majority of participants had low BIS ratings (80.77% for study 1 and 74.1% for study 2). In studies 1 and 2, high BIS participants fixated less on production method signs (supporting H_{1a}) but they fixated more on the product display than the low BIS participants (counter to H_{1b}). In study 2, high BIS participants fixated less on price and production method signs than low BIS participants. Percent FC are also provided to assist in FC data interpretation (Table 1). The percent FC results show two key trends. First, in both studies, the FC percent on price was consistently around 10%. Second, although the display captured the highest percentage for both studies, study 1's display captured double the percent of FC than study 2. Similarly, as more information was introduced (study 2), visual attention was reduced on the display rather than from other signs as indicated by all signs capturing 11–13% of the total FC. However, the BIS ratings did not influence this result indicating that as the quantity of point-of-sale information increased, visual attention was drawn from the display rather than other information sources regardless of buying impulsiveness, counter to H_{2a} and H_{2b}.

The ordered logit regression coefficients estimate the impact of information (i.e., product attribute signs), BIS, BIS × FC interaction variables, and demographics on purchase likelihood (Table 2). As expected, the mere presence of additional point-of-sale information impacts purchasing decisions (as indicated by the estimated coefficients of the product attributes). Specifically, participants in both studies expressed increased purchase likelihood for different products (i.e., product A, B, or C). Products produced using alternative practices had an increased purchase likelihood compared to conventionally produced products. In study 2, the pollinator friendly sign increased purchase likelihood and participants were more likely to purchase products from closer (in-state, domestic) origins than imported products. Overall, price negatively impacted purchase likelihood indicating that lower priced products were preferred. Several socio-demographic variables were significant but varied by study, likely reflecting different study locations. In study 1, females, larger households, children, and living in a metropolitan area increased participants' purchase likelihood while a higher income level decreased purchase likelihood. In study 2, a higher income level increased purchase likelihood while having children decreased purchase likelihood. A higher education level decreased purchase likelihood for both studies.

Regarding BIS specific variables, both studies demonstrated an inverse relationship between BIS and purchase likelihood with higher BIS reducing participants' purchase likelihood by 0.076 and 0.192 times in studies 1 and 2, respectively (Table 2). The estimated coefficients of the interaction terms (BIS × FC) demonstrated how the relationship between BIS and purchase likelihood was impacted by visual attention (FC). In study 1, high BIS participants who fixated on price and alternative production practices were 0.008 times more likely to purchase the product, supporting H_{3a}. Conversely, if they fixated on the display, they were 0.002 times less likely to purchase the product, counter to H_{3b}. In study 2, high BIS participants who fixated on information signs (production method, pollinator friendly, origin) were 0.042, 0.099, and 0.050 more likely to purchase the products, supporting H_{3a}. Interestingly, fixations on

Table 1 Mean fixation counts (FC) on attributes, by BIS subgroups

	Study 1 ($n = 331$)[a]						Study 2 ($n = 87$)[a]					
	Total		High BIS		Low BIS		Total		High BIS		Low BIS	
Attribute	Mean (std. dev.)	%[b]	Mean (std. dev.)	%[b]	Mean (std. dev.)	%[b]	Mean (std. dev.)	%[b]	Mean (std. dev.)	%[b]	Mean (std. dev.)	%[b]
FC_{price}	0.388 (1.066)	11%	0.361 (1.114)	10%	0.394 (1.054)	11%	2.520 (1.380)	10%	*2.388* (*1.764*)	10%	*2.562* (*1.232*)	10%
$FC_{production\ method}$	0.362 (1.123)	10%	*0.323* (*1.096*)	9%	*0.371* (*1.129*)	11%	3.206 (1.878)	13%	*2.980* (*2.196*)	12%	*3.278* (*1.761*)	13%
$FC_{conventional}$	0.113 (0.618)	3%	0.101 (0.594)	3%	0.116 (0.624)	3%	3.252 (2.176)	13%	*2.840* (*1.730*)	12%	*3.383* (*2.284*)	14%
$FC_{product\ display}$	2.159 (5.081)	61%	*2.379* (*5.479*)	64%	*2.106* (*4.980*)	60%	7.892 (5.294)	32%	*8.705* (*5.975*)	36%	*7.635* (*5.035*)	31%
$FC_{product\ type}$	0.534 (1.326)	15%	0.532 (1.433)	14%	0.534 (1.300)	15%	1.752 (1.656)	7%	1.740 (1.838)	7%	1.756 (1.594)	7%
FC_{origin}[c]	–		–		–		3.072 (1.674)	13%	2.948 (1.846)	12%	3.112 (1.615)	13%
$FC_{polinator\ friendly}$[c]	–		–		–		2.832 (1.691)	12%	2.800 (2.151)	11%	2.843 (1.518)	12%
Total fixations	3.556		3.696		3.521		24.526		24.401		24.569	
Percent of sample	100%		19.23%		80.77%		100%		25.9%		74.1%	

High BIS indicates participants had a "high" buying impulsiveness score (≥ 4); low BIS indicates participants had a "low" buying impulsiveness score (< 4)

[a] Pairwise *t* tests were used to estimate statistical significance (p value ≤ 0.050) between high and low BIS subgroups and total sample as indicated by italics font

[b] % indicates percent of total fixations. (e.g., for price, % = FC_{price} /total fixations)

[c] Origin and pollinator friendly were only included in study 2

Table 2 Ordered logit regression coefficients relating buying impulsiveness scale (BIS), fixation counts (FC), and demographic variables to purchase likelihood

Attribute	Study 1[a] Coefficient (std. err.)	*p* value	Study 2[a] Coefficient (std. err.)	*p* value
Product A (herb study 1; hibiscus study 2)	*0.085* (*0.032*)	0.009	*0.340* (*0.138*)	0.013
Product B (petunia studies 1 and 2)	*0.151* (*0.028*)	0.000	*− 0.422* (*0.119*)	0.000
Product C (vegetable study 1; pentas study 2)	Base		Base	
Production method A (sustainable study 1; certified organic study 2)	*0.201* (*0.034*)	0.000	*0.540* (*0.120*)	0.000
Production method B (energy-saving study 1; organic study 2)	*0.228* (*0.034*)	0.000	*0.736* (*0.135*)	0.000
Production method C (water-saving study 1)	*0.240* (*0.034*)	0.000	–	
Conventional	Base		Base	
Pollinator friendly	–		*0.350* (*0.100*)	0.000
Origin—in-state	–		*1.207* (*0.126*)	0.000
Origin—domestic	–		*0.971* (*0.131*)	0.000
Origin—import	–		Base	
BIS	*− 0.076* (*0.010*)	0.000	*− 0.192* (*0.056*)	0.001
Price	*− 0.004* (*0.000*)	0.000	*− 0.203* (*0.030*)	0.000
Interaction terms				
$BIS \times FC_{price}$	*0.008* (*0.004*)	0.028	*− 0.262* (*0.032*)	0.000
$BIS \times FC_{production\ method}$	*0.008* (*0.003*)	0.028	*0.042* (*0.021*)	0.048
$BIS \times FC_{production\ method}$	0.003 (0.007)	0.678	*0.076* (*0.012*)	0.000
$BIS \times FC_{product\ display}$	*− 0.002* (*0.001*)	0.020	0.004 (0.003)	0.299
$BIS \times FC_{pollinator\ friendly}$	–		*0.099* (*0.021*)	0.000
$BIS \times FC_{origin}$	–		*0.050* (*0.021*)	0.017
$BIS \times FC_{not\ an\ AOI}$	− 0.001 (0.003)	0.632	− 0.004 (0.005)	0.388
Demographics				
Age	0.000 (0.001)	0.709	− 0.002 (0.004)	0.567
Female	*0.463* (*0.026*)	0.000	0.121 (0.111)	0.275
White	−0.071 (0.038)	0.066	–	
High education	*− 0.268* (*0.025*)	0.000	*− 0.182* (*0.036*)	0.000
Metropolitan	*0.102* (*0.031*)	0.001	–	
Income	*− 0.039* (*0.006*)	0.000	*0.052* (*0.020*)	0.011
Child	*0.046* (*0.013*)	0.000	*− 0.742* (*0.193*)	0.000
Household	*0.325* (*0.014*)	0.000	− 0.090 (0.049)	0.067
Threshold parameters[b]				
κ_1	− 3.791 (0.105)		− 5.354 (0.594)	
κ_2	− 3.095 (0.103)		− 4.064 (0.584)	
κ_3	−2.677 (0.102)		−3.298 (0.581)	
κ_4	− 2.191 (0.101)		− 2.903 (0.579)	
κ_5	− 1.577 (0.100)		− 1.779 (0.577)	
κ_6	− 0.974 (0.100)		− 0.551 (0.576)	

Table 2 (continued)

Attribute	Study 1[a] Coefficient (std. err.)	*p* value	Study 2[a] Coefficient (std. err.)	*p* value
κ_7	− 0.245 (0.100)		–	
κ_8	0.647 (0.100)		–	
κ_9	1.606 (0.101)		–	
Number of obs.	22,935		1392	
Log likelihood	− 48,901.574		− 2384.105	
Prob > χ^2	0.0000		0.0000	

[a] Statistically significant (p value < 0.050) coefficients are shown in italics

[b] Threshold parameters indicate the estimated coefficients for the boundaries for each category in the distribution of the purchase likelihood variable

conventional also increased purchase likelihood by 0.076. In study 2, fixations on the display did not substantially impact purchase likelihood, not supporting H_{3b}.

5 Discussion and conclusions

In a competitive market, it is important for firms to better understand how to attract contemporary web-savvy consumers. One way firms can attract consumers, and increase sales, is to understand the role of point-of-sale information and consumer characteristics in purchasing decisions. More than half of retail purchasing decisions are unplanned (Ståhlberg and Maila 2010), so the role that buying impulsiveness plays in purchase decisions, moderated by visual attention data, makes practical and theoretical contributions. This research contributed several important findings. First, more impulsive consumers require fewer fixations on point-of-sale signs and more fixations on displays when compared to less impulsive consumers. However, additional analysis reveals that visual attention to the product display can actually reduce impulsive consumers' purchase likelihood. Conversely, visual attention to signs positively impacts purchase likelihood. Another contribution is that when more product information is provided, visual attention (FC) is diluted from the product display rather than from other information signs, but this phenomenon is independent of buying impulsiveness. Lastly, there is a positive relationship between high BIS consumers' fixations on alternative production signs and their purchase likelihood. This research is one of the first to address how buying impulsiveness relates to visual fixations on point-of-sale information and purchase intentions. These findings offer practical managerial implications for attracting and influencing impulsive consumers' preferences and purchase behavior.

5.1 Managerial implications

From a managerial perspective, several strategies can be derived from the results of this study. First, for managers targeting impulsive consumers, point-of-sale

communication strategies should capitalize on the consumers' impulsive nature. Broadly, it can be argued that impulsive consumers fixate on interesting point-of-sale information and that point-of-sale materials should emphasize and draw attention to this information to generate impulsive purchases. For instance, textile companies may be able to encourage impulse purchases by promoting their products as "sustainably produced." Fresh produce companies could use "organic" signage to encourage impulse purchases. As more information is provided to impulsive consumers, their visual attention to the product display decreases but their purchase likelihood increases. Marketers could pair multiple attributes to encourage buying impulsiveness. For example, fresh produce companies could pair "organic," "local," and "pollinator friendly" production to attract impulsive consumers. However, the raising volume of marketing messages may become overwhelming and negatively impact purchase likelihood. Future studies addressing this question could investigate the extent to which information overload influences purchase intentions. Overall, these insights are valuable to managers of retail outlets or product lines that target impulsive consumers. Marketers and other researchers interested in studying point-of-sale information, product design, or other purchasing considerations could benefit from these experiments.

5.2 Strengths and limitations

To the best of our knowledge, this study is the first to investigate the role of visual attention measures on point-of-sale signs and displays utilizing BIS. Buying impulsiveness and visual attention to point-of-sale information were demonstrated to be related; however, much remains to be investigated. The key contribution of the paper links FC on signs and displays with BIS. Despite these contributions, there are several limitations that are worth mentioning. First, one product category (plants) may not be indicative of other product categories, especially packaged products since plants are typically marketed in little or no packaging. Secondly, sample representativeness is questionable because eye-tracking equipment requires geographically bounded samples. Lastly, the experiments were conducted in the lab (for consistency across data collection locations and studies) using still images. Consequently, the generalization of the results into real retail settings should be approached cautiously.

5.3 Future research directions

Future research testing the validity of the current study's framework by involving other products and increasing the number of participants could expand our understanding on how visual attention relates to purchase intentions and buying impulsiveness. Secondly, the inclusion of impulsive (e.g., candy) and non-impulsive purchase products with an increasing amount of point-of-sale marketing messages could clarify the relationships between the product type, visual attention, information overload, and impulsive purchasing. Lastly, since our data were collected in the lab, a similar experiment could be conducted in the retail setting to further assess how well point-of-sale information attracts impulsive consumers' visual attention when competing with other in-store signs and displays (i.e., visual clutter).

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