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Seeking attention: an eye tracking study of in-store merchandise displays

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Abstract
Purpose – The purpose of this paper is to elucidate the role that visual measures of attention to product and information and price display signage have on purchase intention. The authors assessed the effect of visual attention to the product, information or price sign on purchase intention, as measured by likelihood to buy.
Design/methodology/approach – The authors used eye-tracking technology to collect data from Australian and US garden centre customers, who viewed eight plant displays in which the signs had been altered to show either price or supplemental information (16 images total). The authors compared the role of visual attention to price and information sign, and the role of visual attention to the product when either sign was present on likelihood to buy.
Findings – Overall, providing product information on a sign without price elicited higher likelihood to buy than providing a sign with price. The authors found a positive relationship between visual attention to price on the display sign and likelihood to buy, but an inverse relationship between visual attention to information and likelihood to buy.
Research limitations/implications – An understanding of the attention-capturing power of merchandise display elements, especially signs, has practical significance. The findings will assist retailers in creating more effective and efficient display signage content, for example, featuring the product information more prominently than the price. The study was conducted on a minimally packaged product, live plants, which may reduce the ability to generalize findings to other product types.
Practical implications – The findings will assist retailers in creating more effective and efficient display signage content. The study used only one product category (plants) which may reduce the ability to generalize findings to other product types.
Originality/value – The study is one of the first to use eye-tracking in a macro-level, holistic investigation of the attention-capturing value of display signage information and its relationship to likelihood to buy. Researchers, for the first time, now have the ability to empirically test the degree to which attention and decision-making are linked.
Keywords Consumer behaviour, Luxury brands, Retail, Retailing, Facet theory, Shopper marketing, Co-design, Electronic intermediaries, Loyalty data, Promotional flyers, Retail atmospherics, Store design, Co-branding strategy, Flagship store, Place marketing, Store
Store displays: the silent salesperson

Because 68 per cent of buying decisions are unplanned, retailers need to understand the effectiveness of point-of-purchase marketing efforts (Stahlberg and Maila, 2010). Effective displays and other marketing point-of-purchase materials (e.g. signs) present an opportunity to capture consumer attention and a share of the contents of their wallet as well as reduce the influence of price on purchase decisions (Allenby and Gintner, 1995). To successfully gain attention at point-of-purchase, retailers need to understand what is capturing customers’ attention. “If you want to know to what people are paying attention, follow what they are looking at,” (Davenport and Beck, 2001, p. 19). Understanding how consumers look at displays (e.g. do they focus on the product or the sign before making an assessment?) will inform design, execution and placement of displays. We seek to expand upon previous research by using portable eye-tracking technology to assess the role of visual attention to price and non-price information on signs for merchandised products in displays. Eye tracking provides marketers with a “shopper’s eye view” of the retail environment. The data elicited from eye-tracking informs the development of a more satisfying shopping experience (Klingensmith, 2013). An understanding of the attention-capturing power of merchandise display elements has practical significance, as our findings will assist retailers in designing more effective displays, leading to a better shopping experience for consumers and enhanced sales for retailers. From a marketing standpoint, observing where people look is not a new concept. Nixon (1924) was the first to observe consumers’ eye movements by watching from behind a curtain as they viewed magazine advertisements. Today, the gap in relating a purchase to stimuli viewed is closing faster (Pieters and Warlop, 1999; Russo and Leclerc, 1994) than when Treistman and Gregg (1979) first documented it. Eye-tracking hardware and software allow direct, robust measurement of eye movements to assess that link (Behe et al., 2013). The majority of eye-tracking literature is related to the act of reading (Rayner, 1998) of package labels (Bix et al., 2009) and more traditional printed materials (Leven, 1991). Recently, eye-tracking studies have expanded to evaluate consumer perceptions and liking of outdoor advertisements (Maughan et al., 2007), and of mall media (Thomas-Smith, 2011). Merchandise displays are ubiquitous in retail settings. Retailers rely on displays to be silent salespeople, to draw consumers into the store and motivate them to touch, evaluate and purchase products. Displays have the capacity to increase sales, for example, Nördfalt (2011) found that disorganized displays, which signal cheaper merchandise, can increase sales by over 900 per cent. Thus, increasing our understanding of how consumers view and react to merchandise displays has both academic and practitioner relevance. Wedel and Pieters (2008) call for more eye-tracking research on “other static visual marketing stimuli besides print ads” (p. 143). The combination of the void in the literature regarding field research on displays and the emergence of affordable, portable eye-tracking hardware and software provided an ideal opportunity to investigate what captures people’s attention in displays, which, as Nördfalt expressed, would be of “great academic and practical interest”. While several studies have investigated consumer attention to discrete elements of the retail environment, such as shelf facings and brands (Chandon et al., 2009), merchandise catalogues (Janizewski, 1999), display and point-of-purchase signage size (Durham et al.,
2007) and attention to mall media (Thomas-Smith, 2011), virtually no holistic investigations of products in a retail setting have been published. Nor have eye-tracking investigations focused on minimally packaged, non-branded products. Thus our study is the first attempt to fill that gap.

For this study, we combined data from two groups of consumers (Australia and the USA). Australia and the USA were selected for this study because of their similar gardening profiles and to broaden the pool of potential respondents to identify whether differences in visual attention would be found in two different geographic areas. For example, per household spending on gardening in 2012 for the US was $257.8 (Euromonitor, 2014a) and in Australia it was $293.1 (Euromonitor, 2014a). Over 70 per cent of US households spend time and money taking care of lawns and gardens (Euromonitor, 2014b). Comparably, about 75 per cent of Australians own their own home, with the majority of homeowners view gardening as a way to maintain or improve property values (Euromonitor, 2013). Because both Australia and the USA have similar cultural values, being approximately equal on Hofstede’s (2001) country scores for Individualism (AUS-90, US-91) and Masculinity (AUS-61, US-60), we proceeded under the assumption that both groups would react similarly to product displays. When consumers respond similarly to marketing efforts, it allows retailers to use a standardized approach to marketing, which, in turn, facilitates economies of scale.

The aim of our study was to elucidate the impact of visual measures of attention to price and non-price information on signage and product for retail garden centre customers. We used eye-tracking technology to compare measures of attention to price and non-price information on display signage and assess whether likelihood to buy from a display varies by provision of price and product information in the sign. Our study contributes to the literature by providing an analysis of products and display signage situated in an actual retail setting, thus offering a holistic investigation of consumer response to retail displays.

**Theory of visual marketing**

Visual cognitive processing of a scene requires the eyes to attend to an object, and attention requires eye movement (Russo, 1978). Eye-movement is the fastest movement the human body can make (Holmqvist et al., 2011), consisting of a series of stops (fixations) and moves or jumps (saccades). Eye fixations direct attention and attention increases the mental processing of the meaning of the object (e.g. word, image, or other stimulus).

Wedel and Pieters’ (2006) theory of attention to visual marketing (Figure 1) proposes that visual attention is comprised of selection and focalization processes when someone is exposed to visual stimuli. Characteristics about the person, such as individual traits (top-down factors), and characteristics about the stimulus, such as mode or objects (bottom-up factors), contribute to attention and, thus, both affect meaning derived from the stimulus. These top-down and bottom-up factors determine the informative capability and salience of the visual stimuli to the consumer, and influence what attracts their attention. More is understood about the influence of top-down factors than about bottom-up factors on attention (Wedel and Pieters, 2008). The bottom-up factors (mode, objective and features), or stimuli attributes, and their role in capturing attention are only now becoming the subject of investigations with the improved affordability and compactness of eye-tracking hardware (Chandon et al., 2009). This study is novel in that it focuses on bottom-up factors of product and display signage.
Eye tracking research

The bulk of peer-reviewed studies using eye-tracking methods investigated the reading process by following eye movements (see Rayner, 1998, for a 20-year review of this subject). In consumer research, the peer-reviewed studies are sparse (see Wedel and Pieters, 2008, for the most comprehensive consumer research review), and nearly all are investigations of attention capture in print or electronic media. In an early eye-tracking study, Janizewski (1999) discovered that when a focal product in a catalogue display was surrounded by other merchandise that competed for consumer attention, that competition for attention negatively influenced attention to the catalogue display and sales. Kuisma et al. (2010) found that animation in online advertisements drew more of the viewer’s attention in vertical advertisements compared to horizontal advertisements.

Figure 1. A theory of attention to visual marketing

Source: Used with permission: Wedel and Pieters (2008), http://dx.doi.org/10.1561/
In a conjoint study, Meissner and Decker (2010) demonstrated that consumers spent more time (eye fixations) viewing product attributes that were more important to them. Maughan et al. (2007) found a correlation between eye fixations and “liking” of an advertisement. However, the relationship between time spent looking and consumer purchase intention is not yet firmly established. For example, Patalano et al. (2009) documented that consumer indecisiveness was related to time spent viewing information about the purchase, as well as time spent looking away from information directly related to that choice task.

Eye-tracking has been used to analyse other marketing stimuli, such as packaging, but the analysis is still largely related to reading. For example, in a laboratory study of six packaged brands, Pieters and Warlop (1999) found that visual measures of attention, such as fixation duration, had a positive, significant impact on brand choice. Brands that were fixated on longer, with more “eye jumps” (saccades) from location to location had a higher likelihood of being chosen. In another study of brands, Teixeira et al. (2010) show that branded products received more viewer attention than unbranded products, regardless of product size. Bix et al. (2009) investigated the prominence of package warnings on over-the-counter medicines and showed they were not readily viewed. Sorensen et al. (2012) demonstrated that the product name on a label attracted the most attention, six times greater than any claim on organic production. They further verified that illustrations captured more attention than health claims, even if the illustration had nothing to do with the product.

Recently, eye-tracking research has begun to focus on evaluation of point-of-purchase marketing. Chandon et al. (2008) studied shelf displays of two products to assess brand consideration, and found that consumers fixated on price much less often than on brand, and did not note price if they had not noted the brand. In a study of shelf facings and position, Chandon et al. (2009) found that price had no effect on attention, but that high-priced brands were more likely to be recalled. These studies suggest that price might not be as “attention grabbing” as other information. Only one study examined the influence of information on capturing attention (Seva et al., 2011); they found that information-related factors did not influence attention. An eye tracking study conducted in a retail setting found that, for the jam product category, package contour and shape attracted visual attention, while package text elements had a negative influence on visual attention (Clement et al., 2013). In a study on a mall media campaign, Thomas-Smith (2011) found that people viewed every second advertising panel and half of the shoppers took a second, longer, look at a mall ad they had viewed once before. We did not find any eye-tracking studies of point-of-purchase marketing that included minimally packaged, non-branded products as stimuli, although one (non-eye-tracking) study (Durham et al., 2007) examined the relationship of display and point-of-purchase signage size on produce sales.

While understanding consumer response to point-of-purchase displays would be beneficial to retailers, Nördfalt (2011) observed, “Despite the typically large and hence promising sales effects of special display studies, the area is not particularly well mapped out. For instance, special displays are assumed to be a powerful tool to capture the customers’ attention. Yet, this aspect is very little elaborated on in academic studies” (Nördfalt, 2011, p. 169). He postulated that learning more about capturing attention is of “great academic and practical interest”, and, using eye-tracking hardware, he went on to show that electronic signs did, indeed, capture more consumer attention. Recently, Clement et al. (2013, p. 243) acknowledged that “the effects of visual cues on in-store decision making are not
thoroughly explored in marketing research”. They further recognized that the attention-capturing power of in-store visual design cues has been overlooked (Clement et al., 2013). The retail format for our study is a garden centre because garden centre displays represent minimally packaged and unbranded products. Minimally packaged goods are not supported by advertising, thus effective point-of-purchase displays are essential to sell this merchandise effectively. Consequently, ascertaining whether consumers respond similarly would be beneficial to understanding how consumers process display information without brand information as an information cue. Retailers create point of purchase displays to attract consumers’ attention to merchandise (Allenby and Gintner, 1995; Chandon et al., 2009; Clement et al., 2013; Drèze et al., 1993). A retailer’s decisions about display design and placement are based on the notion that visual attention is a prerequisite to the ensuing processes that eventually lead to choice. Further, researchers have confirmed that increased visual attention will increase the likelihood of choice (Armel and Rangel, 2008; Busemeyer and Diederich, 2002). Thus, the probability that an item will be chosen (and ultimately purchased) depends on the relative amount of time that consumers fixate on the item during the decision-making process (Armel and Rangel, 2008). In other words, the amount of time a consumer focuses attention on an item(s) can be a predictor of the actual purchase (Armel et al., 2008).

Given the limited amount of empirical research that has employed eye-tracking to assess consumer attention to point-of-purchase display product and signage, we pose research questions rather than formal hypotheses:

RQ1. Do visual measures of attention and purchase intention (as measured by likelihood to buy) vary by display sign information content (price and product information)?

RQ2. Which visual measure of attention to various display cues (product itself, information sign, price sign) is the best predictor of purchase intention (as measured by likelihood to buy)?

Research method
Retail garden centres were the context for our study. We contacted four garden centres (two US and two Australian) to gain permission for data collection in situ. A complete discussion of the recruitment procedure for the garden centres can be found in Minahan et al. (2013).

Stimuli
We developed images of eight plant displays for this study, and then manipulated the signage information to feature either price or product information (a total of 16 images). All images were taken from current displays in one garden centre. Displays either contained one type of plant (e.g. cyclamen, hydrangea) or contained multiple species of one category of plants (e.g. mixed herbs, mixed annual bedding plants, etc.). Displays had only one visible sign and that portion of the image was digitally blanked. Duplicates of the images were made and the blanked portion was replaced; one duplicate contained “content” information including the name and an interesting piece of information about the plants without the price; the other bore only the plant name and price (Plates 1 and 2). The images were randomized and then incorporated into the Tobii X1 Light eye-tracking software (Danderyd, Sweden) and pre-tested with several subjects prior to study implementation. The research
protocol was approved by both universities’ committees for protection of human subjects prior to implementation.

Plate 1. Kangaroo paw plant display with price sign

Plate 2. Kangaroo paw plant display with information sign
Shoppers entering the garden centre were intercepted before their shopping trip, or after their visit to the garden centre café, and offered an opportunity to participate in the study. Participants were compensated with a $25 gift certificate for the respective garden centre. Participants were briefed about the purpose of the study and seated in front of the Tobii X1 Light eye-tracker which was connected to a Flatron E2241 56 cm (diagonal measure) monitor. Each participant first underwent a calibration procedure to ensure that the eye-tracker could read his/her eye movements. A standard protocol for data collection using the Tobii X1 Light was followed (Behe et al., 2013; Holmqvist et al., 2011).

As each participant viewed the eight displays depicted in 16 slides (one each with either price or product information), we asked him/her to verbally evaluate likelihood to buy the product on the screen by using a ten-point Likert scale of 1-10 (1 = very unlikely, 10 = very likely). Likelihood to buy can be defined as the probability of purchasing something from a specific display, as expressed by each participant. Because we had no references with regard to visual attention diversity or similarity, we recruited 106 participants from two garden centres in Michigan, USA, and two in Melbourne, Australia. In total, 56 participants were Australian and 50 were US. In all, 94 (90 per cent) were female.

Data and analysis
In addition to the likelihood to buy ratings, we extracted two visual measures of attention: fixation count and total visit duration, calibrated to hundredths of a second. Fixations are stops in saccades (eye movement). For complex visual stimuli such as displays, eye fixations are necessary to be able to identify objects (Chandon et al., 2009). Fixations can be counted for the image as a whole or by identifying specific areas of interest (areas of interest). Areas of interest can be created a priori or post hoc as geometric or free-form shapes around products, items, or any other section of the image the researcher desires to analyse. For the data analysis, we created identical areas of interest for the price and product information signs for each display image. Plates 1 and 2 show sample stimuli from our study with areas of interest drawn around the two sign types.

We also created an area of interest around the product in the specific display (excluding fixtures), and then analysed two visual metrics for each area of interest on both the image with the price sign and the image with product information sign. The fixation count revealed how often a participant viewed that area of interest or refocused attention to that element. Visits are fixations to an area of interest. Total visit duration is equal to the fixation count multiplied by the fixation duration, yielding a measure of time spent attending to a particular area of interest. For example, if there were ten fixations, with each fixation being 0.1 of a second, then total visit duration would be 1.0 second. We interpreted total visit duration to be a measure of cognitive processing (thought) through attention, consistent with Wedel and Pieters (2008). While the relationship between likelihood to buy and the measures of attention has not been previously examined, there is evidence to suggest that a positive relationship exists between the two variables. For example, fixation counts have been found to increase the probability of brand consideration; specifically, at least two fixation counts increased the probability of brand consideration by 13 per cent (Chandon et al., 2008). Fixation counts and fixation duration increased advertising recall (Maughan et al., 2007).

Data were analysed using SAS System for Windows (Version 9.4, Cary, North Carolina, USA).
Results
We analysed the fixations where participants viewed product or price information. Of 106 participants, eight were omitted due to low sampling quality (low percentage of visual data generated by subject) by the eye tracker (<50 per cent). One additional participant neither looked at content nor price signage and they were also omitted from subsequent analyses. One subject had poor data on five images, yielding a total sample of 1,547 data points [1]. Because we found no literature comparing multiple samples of subjects when collecting eye-tracking data, we used ANOVA to evaluate whether differences existed between Australian and US consumers on the two visual measures of attention and likelihood to buy. When we compared Australian and US consumers on likelihood to buy and the two measures of attention by sign, we found likelihood to buy and fixation count were statistically similar. Total visit duration was longer for Australians (1.04 second vs 0.89 second, F (6.41), p = 0.0011), thus indicating a slightly higher level of cognitive processing compared to the US sample. For subsequent analysis we combined the data from the two samples because of cultural and gardening profile similarities (Hofstede, 2001) and the great similarity in visual attention to the displays:

RQ1. Do visual measures of attention and purchase intention (as measured by likelihood to buy) vary by display sign information content (price and product information)?

The data for the combined groups produced a maximum of 774 and 773 total observations for content sign and price sign, respectively (Table II). There were 34 participants who looked at (had at least one fixation on) both price and product information signs an equal number of times (35.1 per cent). In total, 21 participants looked more frequently at the product information sign than the price sign (21.7 per cent) and 42 viewed the price sign more often than the content sign (43 per cent). The χ2 test for equal proportions was significant at 0.031 (χ2 = 6.9485). Thus, participants did not look at price and content sign equally.

Consumers viewing displays with only product information (price absent) indicated a higher likelihood to buy than for displays with only price on the sign (Table I). This suggests that, in motivating garden centre purchases, product information in the absence of price may be more influential than price in the absence of additional product information. However, we found one difference for the measures of attention (total visit duration) and no difference in the other (fixation count) for the sample as a whole. We observed a slightly higher fixation count for the price sign compared to the product sign. This indicated that price held consumers’ attention slightly more (0.15), but the sign content did not influence consumers’ total visual attention:

RQ2. Which visual measures of attention display cues (product itself, information sign, price sign) is the best predictor of purchase intention (as measured by likelihood to buy)?

We found a significant relationship between likelihood to buy and sign type (Table II). Fixation count on the display was negatively related to likelihood to buy, which meant that lower fixation count on the display meant a higher likelihood to buy. We did not find a relationship between fixation count on the sign and likelihood to buy, nor a relationship between total visit duration on the sign or display and likelihood to buy.
None of the interaction terms were significant and the amount of variance accounted for by the model was quite low, indicating other influences not captured in this study were likely at work.

Table 1. Mean and standard deviation (SD) of likely to buy (LTB) from plant displays using four visual measures of attention to price or product information signs in retail garden centre displays

<table>
<thead>
<tr>
<th>Variable</th>
<th>Product information sign</th>
<th></th>
<th></th>
<th>Price sign</th>
<th></th>
<th></th>
<th></th>
<th>F</th>
<th>p &gt; f</th>
</tr>
</thead>
<tbody>
<tr>
<td>Likely to buy (1-10)</td>
<td>5.8</td>
<td>2.5</td>
<td>774</td>
<td>5.4</td>
<td>2.7</td>
<td>772</td>
<td>7.43</td>
<td>0.0038</td>
<td></td>
</tr>
<tr>
<td>Total visit duration (seconds)</td>
<td>1.01</td>
<td>1.1</td>
<td>774</td>
<td>0.99</td>
<td>1.1</td>
<td>773</td>
<td>0.14</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>Fixation count</td>
<td>2.53</td>
<td>2.5</td>
<td>774</td>
<td>2.78</td>
<td>2.6</td>
<td>773</td>
<td>3.37</td>
<td>0.0666</td>
<td></td>
</tr>
</tbody>
</table>

Discussion

Our findings suggest that product information on a sign, in the absence of price and for minimally packaged products, appears to be more influential in motivating likelihood to buy than price information conveyed on a sign without supplemental product information. This finding suggests that price should be a secondary point-of-purchase message to product information. Additional research is needed to determine the interaction between price and product information on attention and should include additional products. This finding sends a message to retailers that not all consumers even look at price. Providing more product information will draw customers closer to the product for additional inspection; providing relevant product information may increase the likelihood of a purchase. Fixation count was slightly higher on the price sign despite likelihood to buy being lower, on average, when only the price (not product information) was shown. This finding was surprising because information processing of price should be easier (have a lower fixation count) than the more complex product information sign. This finding was not consistent with Chandon et al. (2009), who found that price had no differential effect on attention when consumers viewed packaged goods on shelves. These findings did not concur with Seva et al.’s (2011) findings, as they reported that package image and information factors (e.g. text size and product claim) did not influence fixation duration and frequency of fixation duration. Both Chandon et al. (2009) and Seva et al. (2011) used packaged goods while the present study did not.

Table II. Analysis of variance of likely to buy with total visit duration (TVD), fixation count (FC), and sign type (price or information)

<table>
<thead>
<tr>
<th>Parameter estimate</th>
<th>SE</th>
<th>t-value</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>5.33034</td>
<td>0.17753</td>
<td>30.66</td>
</tr>
<tr>
<td>Sign type (content)</td>
<td>0.66472</td>
<td>0.26519</td>
<td>2.54</td>
</tr>
<tr>
<td>TVD sign</td>
<td>0.0312</td>
<td>0.15815</td>
<td>0.2</td>
</tr>
<tr>
<td>TVD display</td>
<td>0.09992</td>
<td>0.07397</td>
<td>1.37</td>
</tr>
<tr>
<td>TVD sign x sign type</td>
<td>-0.1705</td>
<td>0.221543</td>
<td>-0.79</td>
</tr>
<tr>
<td>TVD display x sign type</td>
<td>-0.1334</td>
<td>0.12439</td>
<td>-1.07</td>
</tr>
<tr>
<td>FC sign</td>
<td>0.08076</td>
<td>0.06281</td>
<td>1.28</td>
</tr>
<tr>
<td>FC display</td>
<td>-0.0559</td>
<td>0.03167</td>
<td>-1.73</td>
</tr>
<tr>
<td>FC sign x sign type</td>
<td>-0.0659</td>
<td>0.09627</td>
<td>-0.59</td>
</tr>
<tr>
<td>FC display x sign type</td>
<td>0.04507</td>
<td>0.04675</td>
<td>0.94</td>
</tr>
</tbody>
</table>

Notes: n = 1.54/7. R² = 0.0113. F(1, 95), p > 0.0419
Since we also found a difference in likelihood to buy by sign content, we conclude what matters to visual measures of attention and likelihood to buy is the information content, not simply the fact that some information is presented on the sign. Our results showed that only a small proportion of consumer fixation on the 16 images ignored price and product information signage. So, why do some consumers simply ignore price? Prior research offers insights. Perhaps those who ignored signage information had a low need for cognition, as suggested by Cacioppo and Petty (1982), and, therefore, those participants did not process the information as did those with higher need for cognition. Alternatively, Monroe (1976) found that product familiarity plays a greater role in cue utilization when products are unfamiliar. For the current study, the plant products were likely to be familiar to the participants, who were patrons of a garden centre. Thus, consumers felt confident in their reliance on intrinsic product cues such as the perceived quality and health of the plant, and/or the vibrant flower colour, to evaluate the merchandise and did not need the signage information.

Our results indicate that consumers spent very little time attending to signage information before making a decision of how likely they would be to buy something from the display shown. For example, total visit duration to the signage area of interest was, on average, 1.0 second compared to 4.4 seconds on the entire image. The signs used in this study were white with black lettering, so it is possible that more elaborate signs would capture more attention and have a greater influence on likelihood to buy – this area merits future study. Perhaps the product (flowering plants) was so visually captivating that assessment of any supplemental information would not have helped make a decision. An understanding of the attention-capturing power of merchandise display elements has practical significance, as findings will assist retailers in designing more effective displays. Despite the relative complexity of the product information sign (vs the price sign), overall consumer attention to both signs was approximately equal. This suggests that most consumers use and process both types of information when viewing a display. Interestingly, our findings provide concrete evidence for retailers that, while most consumers do attend to price, there is a small segment of consumers for whom signage information does not play a central role in catching their attention. Thus, when creating displays, other cues capture attention; future studies should focus on identifying those cues.

There are implications from our study for academicians as well as practitioners. From the literature, we know that eye-tracking technology can collect eye movement and fixation at times < 0.1 second. No tool has given researchers the precision to identify areas of visual interest (within a few mm) and aggregate them over a number of subjects. With the eye-tracking tool we are able to detect what subjects are viewing and relate that to their purchase intentions. This provides a physical link between consumer statements and intentions. Statements can sometimes be contradictory to intentions but visual attention is not. Thus researchers now have the ability to empirically assess the degree to which attention and decision-making is linked.

We also demonstrated a relationship between display composition, especially the messages conveyed on signs, and overall intention to purchase. The signs conveyed useful cues, which many study subjects used to arrive at a purchase decision. This study lays the groundwork for more investigations on the role of display elements in the purchase decision.
**Future research/limitations**

The images used in the study were fixed images, and, while they featured actual plant displays, consumers might respond differently in a real-time shopping environment. Future studies should include the opportunity to use eye-tracking in a real shopping context. Other researchers have included branded products (e.g. Chandon et al., 2008, 2009) in their studies, but our stimuli images did not include brand information. Subsequent studies should consider adding branded products. Only one bottom-up factor (scene-display) from the Theory of Attention to Visual Marketing (Wedel and Pieters, 2006) was included. Researchers should develop a systematic investigation agenda to study other bottom-up factors (e.g. size, colour) in order to isolate the effects of those factors on their contribution to consumer attention and product selection.

Future studies could also combine the influence of bottom-up and top-down factors to gain insights into why elements of a display are attention-getting. For example, to understand why some consumers ignore pricing information, using established price perception measures (e.g. Lichtenstein et al., 1993) would shed light on psychological explanations for this behaviour. In addition, future studies could investigate top-down factors of consumers who pay attention to vs those who ignore display signage. For example, can experts rely primarily on intrinsic rather than extrinsic cues in assessing products in a display?

Participants were queried on “likelihood to buy”; this proxy measure, however, may not reflect actual purchase intention. Only two countries were included in this study, thus the results cannot be generalized to other cultural contexts. We also acknowledge that product involvement and expertise may play a role in assessment of product/plant quality. Since plants are not typically merchandised in packages, we hypothesize that plant expertise and involvement in the product category may also play a role in the cues that customers utilize. Finally, other measures, such as involvement with the product category and/or expertise with the product category, in conjunction with demographic characteristics might further explain how consumers visually assess a display before arriving at a purchase decision.

**Note**

1. In all, 97 subjects with useful data on 16 slides = 1,552 data points – five instances of poor quality data for one subject = 1,547 total.

**References**


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