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The effect of involvement on visual attention and product choice

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ABSTRACT

Our study examined the effect of consumers' level of involvement on visual attention to product, information sign and price sign guided by the Elaboration Likelihood Model (ELM). We also investigated the relationship between visual attention captured by eye fixation on information and price sign and product choice for garden plants. Using a Tobii X1 light eye tracking device, we obtained data from 101 respondents in Texas and Michigan. We found that participants who had high (vs. low) product involvement paid more attention to the product and its information as demonstrated through higher fixation count (FC), longer total fixation duration (TFD), and total visit duration (TVD). We also found highly involved participants processed price information as a central rather than a peripheral cue. In addition, total visit duration (TVD) on an information sign was found as the strongest predictor of product choice.

1. Introduction

As product decisions made at the point-of-purchase (POP) have increased from 70% in 1995 to 76% in 2012, so marketers' in-store advertising budget has also increased in order to capture consumers' attention at the point of purchase (POPAI, 2012). Recognizing the cognitive processes that underlie decision-making has been of great interest to researchers, marketers, and retailers. Historically, human decision-making has been investigated simply by input-output analyses or just by observing the final decision (Payne, Bettman, and Johnson, 1993; Reisen, Hoffrage, and Mast, 2008). The physiological processes underlying consumer decision processes that occur at the POP were largely ignored until Russo and Rosen (1975) used eye-movement to assess how consumers evaluated used cars. Later studies analyzed eye movements to examine: which advertisement attributes received the most attention (Pieters and Wedel, 2004; Maughan et al. 2007), which visual elements on a package affected in-store purchase decisions (Clement, Kristensen, and Grønhaug, 2013), and patterns of eye fixations in order to understand the information seeking process used to make choices (Russo and Leclerc, 1994; Pieters and Warlop, 1999; Pieters and Wedel, 2007; Kuo, Hsu, and Day, 2009; Ju and Johnson, 2010).

Despite the vast amount of money spent on "buying" consumer attention, there is a dearth of research on in-store visual attention (Clement et al., 2013). This observation, originally made 20 years ago by Janiszewski and Bickart (1994), is still true, as few studies have examined consumer visual attention to POP marketing (see Chandon et al., 2009; Nordfält 2011; Seva et al. 2011; and Clement et al., 2013, as exceptions). Eye tracking technology has been identified as one tool to 'open the black box' of consumer decision making and facilitate the testing and adaptation of existing theories. As a process tracing technology, it has the potential to analyze the processes before, during and after a decision, and provide insight into what a consumer chooses (Schulte-Mecklenbeck et al. 2011).

Rosenbergen et al. (1997) posit that physiological responses to advertising may be more reliable measures of attention than self-reports. Their study focused on magazine advertising, but we believe this assumption *may* also hold for POP advertising. We believe this because eye-movement is physiological response that "cannot easily be consciously controlled or steered" (Bates 2002) and due to "the pervasive role of the task in guiding when and where to fixate" (Hayhoe and Ballard, 2005). Because both magazine advertising and POP advertising influence information search and communicate product information to persuade consumers to purchase a product, physiological responses should be similar. Thus, we believe eye movement *may* be a better indication of the underlying search for information in the buying process compared to self-reports because it is task specific and difficult to consciously control. Despite the call for employing process tracing technologies to gain a greater understanding of consumer

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attention, few investigations have related visual movement to purchase intention. Still, little is known about the deliberate but subconscious eye movement of consumers as they gather visual information to evaluate products at the point of purchase. Further, most studies that do use eye-tracking focus on print advertising (Pieters and Warlop, 1999; Pieters and Wedel, 2004) rather than POP displays, where most consumer decisions are finalized. Our study sheds light on how consumers attend to POP displays.

The availability of inexpensive eye-tracking technology has facilitated the study of consumer attention. However, until recently, less attention has been given to analyzing the relationship between eye movement and consumer attention to retail product displays (Behe et al., 2013a). Those studies investigated which display attributes had an impact on American and Australian consumers' purchase intention in a retail environment (Huddleston et al., 2013) and consumer product involvement, visual attention and purchase intention (Behe et al., 2013a) Sorensen, Clement, and Gabrielsen (2012) examined the relationships between a product name on a label, participant's level of general food knowledge, and attractiveness of the product. They found that consumers with higher general food knowledge showed longer time to first fixation (TFF) on information and shorter total visit duration (TVD), and that consumers paid attention to sign-post labels early in the search process. While researchers are devoting more attention to analyzing eye movement and its relationship to decision-making, an understanding of these processes is not complete.

The purpose of our study is to examine the relationship between visual attention devoted to in-store marketing (i.e. the product itself and price and production information on accompanying signs) to better understand information acquisition and use. We analyzed the influence of consumers' level of involvement with a product on the aforementioned relationships.

Understanding which elements first capture and then hold visual attention helps us to assess the role of product display elements in consumer choice. Consumers' eye movements could be informative about processes such as attention, perceived attractiveness and product choice, but visual attention had been overlooked in marketing research (Pieters and Warlop, 1999, p. 1). Despite its potential, applications of eye-tracking to relevant POP marketing strategies have been limited (Kroeber-Riel, 1984; Clement et al. 2013). Given that visual attention is often a precondition to subsequent processes that lead consumers to choose a product, exploring precisely what draws and keeps visual attention in retail setting should shed light on product display designs that will facilitate consumer decision-making. Involvement, or personal relevance, also influences the amount of effort a consumer expends in the buying process. Thus, the Elaboration Likelihood Model framework may help us understand how information is processed by consumers in high or low involvement states. More specifically, we strive to fill the gap in the literature that relates eye-movement with purchase intention and investigate the relationship with involvement level.

Further, an eye-tracking device offers an inexpensive and innovative means to accurately capture a reflection of the process of consumer information acquisition and decision-making. The data acquired from an eye tracking device provides a physical link between consumer characteristics (involvement) and attention. Our study provides evidence to support the intuitive notion that high and low involvement consumers process information differently. In a highly competitive marketplace, marketers and retailers need to know which display elements capture attention (or are ignored) when consumers make a choice and which factors associated with consumers' personal characteristic affect their final decision. This knowledge results in more effective POP display design and the potential to earn higher margins and ensure their brands' survival in a highly competitive market.

2. Theoretical background

In this section we provide a discussion of consumer product involvement, the Elaboration Likelihood Model (ELM) and visual attention. We posit that the importance consumers place on products (involvement) should influence the way that they visually collect and process information. The ELM provides a theoretical foundation for information processing. Both product involvement and manner of information processing, should, in turn affect visual attention to a product display.

2.1. Involvement

Researchers agree that involvement is a crucial factor in consumers' product choice (Mitchell, 1986; Shamsher and Chowdhury, 2012; Pan 2014) and that the study of a low versus high involvement condition is both interesting and important (Cacioppo et al., 1982; Greenwald and Leavitt, 1984; Petty and Cacioppo, 1983; Petty et al., 1983; Breugelmans and Campo, 2011; and Matthes et al., 2013). However, there is little agreement on how to best define the involvement construct. The literature suggests that a person can be involved with an advertisement (Krugman 1977), or with purchase decisions (Clark and Belk 1978). Involvement with these different objects/processes leads to different responses. Our study adopts the general view of involvement as a person's perceived relevance of the object based on inherent interests, values, or needs (Hupfer and Gardner, 1971; Greenwald and Leavitt, 1984; Suh and Yi 2006; Josiassen 2010).

Involvement influences the amount of mental and physical effort a consumer puts into the buying process. Highly involved consumers will search for more information before they buy, will process relevant information in greater detail and use more criteria in their buying decision than other consumers (Laaksonen, 1994; Breugelmans and Campo, 2011).

2.2. The Elaboration likelihood model (ELM)

The Elaboration Likelihood Model (ELM) suggests that because the level of involvement a consumer has with a product is based on the relevance of that product to the consumer's inherent needs, values, and interest, involvement influences the amount of mental and physical effort a consumer puts into the buying process. (Petty and Cacioppo, 1983; Petty et al., 1983). According to ELM, individuals with high product involvement process information through a central route in which they carefully examine information that they believe is fundamental to a meaningful and logical evaluation of the product. By contrast, low product involvement induces processing through a peripheral route whereby consumers evaluate the product based on superficial but salient cues in the information, regardless of whether these cues are meaningfully related to the product. Some researchers have shown convincing evidence to support these core ideas of ELM (Batra and Ray, 1986; Celsi and Olson, 1988; Park 1995; Park et al., 2007; Breugelmans and Campo, 2011; Matthes et al., 2013). For example, Park et al. (2007) showed that highly involved consumers formed more careful assessments of advertising information, such that their response time for generating brand evaluation was longer than less involved consumers. In an online context, highly involved consumers focused on the product information obtained from an online review, whereas less involved consumers focused on peripheral cues, such as reviewers' popularity, instead of product information. Matthes et al. (2013) suggested that high involvement consumers processed the arguments displayed in an advertisement, whereas less involved consumers processed emotional appeals such as beautiful nature scenery in the context of environmental advertising. Based on these studies, the following

hypotheses were proposed:

H1:Consumers with higher product involvement will focus more visual attention on product information compared to consumers with lower product involvement

H1a: The higher consumers' product involvement, the shorter time to first fixation (TFF) on the product information will be compared to consumers with lower product involvement.

H1b: The higher consumers' product involvement, the greater fixation count (FC) on the product information will be compared to consumers with lower product involvement.

H1c: The higher consumers' product involvement, the greater total fixation duration (TFD) on the product information will be compared to consumers with lower product involvement.

H1d: The higher consumers' product involvement, the greater total visit duration (TVD) on the product information will be compared to consumers with lower product involvement.

As Breugelmans and Campo (2011) underlined, highly involved consumers process more information in detail and use more criteria in their buying decision than less involved consumers. Plants show various symptoms, which include greenness, drying, thickening and wilting (Küpper et al., 1996). We hypothesized that highly involved consumer would exhibit greater attention to a product (plant) in an attempt to estimate their relative health and greenness, thus assimilating all available information during information processing. The following hypotheses were proposed.

H2: Consumers with higher product involvement will focus more visual attention on product compared to consumers with lower product involvement

H2a: The higher consumers' product involvement, the shorter time to first fixation (TFF) on the product will be compared to consumers with lower product involvement.

H2b: The higher consumers' product involvement, the greater fixation count (FC) on the product will be compared to consumers with lower product involvement.

H2c: The higher consumers' product involvement, the greater total fixation duration (TFD) on the product will be compared to consumers with lower product involvement.

H2d: The higher consumers' product involvement, the greater total visit duration (TVD) on the product will be compared to consumers with lower product involvement.

Product involvement has been hypothesized to lead to greater perception of attribute differences, perception of greater product importance, and greater commitment to brand choice. Commitment, in particular, is recognized as an essential element for a successful long-term relationship between consumers and products (Morgan and Hunt, 1994). Robertson (1976) defined commitment as the strength of the individual's belief system with regard to a product or brand. That study showed that that highly committed consumers are less price-sensitive than non-committed consumers. Given that commitment is a crucial component of involvement, less involved, and thus less committed, consumers should direct more of their attention to price compared to more committed consumers.

Zaichkowsky (1988) found that consumers who were highly involved with the product category of red wine placed less emphasis on price than consumers who had low involvement with the product category. Chang and Wildt (1994) and Erdem et al. (2002) also suggested that less involved consumers were more sensitive to the price. The relationship between price sensitivity and involvement has not been studied extensively, but two studies, (Ramirez and Goldsmith, 2009; Goldsmith et al., 2010) found a negative relationship between involvement and price sensitivity that was mediated by innovativeness. We proposed the following hypothesis:

H3: Consumers with lower involvement with product will focus more attention on product price than the product itself compared to consumers with higher product involvement

H3a: The lower consumers' product involvement, the shorter time to first fixation duration (TFF) on the price sign will be compared to more highly product-involved consumers.

H3b: The lower consumers' product involvement, the greater fixation count (FC) on the price sign will be compared to consumers with higher product involvement.

H3c: The lower consumers' product involvement, the greater total fixation duration (TFD) on the price will be compared to consumers with higher product involvement.

H3d: The lower consumers' product involvement, the greater total visit duration (TVD) on the price will be compared to consumers with higher product involvement.

2.3. Visual attention

Gaining insight into viewers' visual attention is crucial to acquire information about the influence of brands or products in consumers' decision-making (Pieters and Warlop, 1999). Two broad categories of stimuli contribute to capturing selective visual attention: bottom-up factors in the stimulus and top-down factors in the person (Chun and Wolfe, 2001). Bottom-up factors refer to display features or advertisements that determine their perceptual salience and include attributes such as product size and shape.

Top-down factors are related to the person or to his/her attention process, including product involvement or familiarity with brands (Rayner et al. 2001). The bottom-up process is believed to be a fast and crude cognitive creation of a topographic map of the saliency of perceptual features (Wolfe, 1994). On the other hand, the top-down process is believed to be a slow and analytical adjustment of the structural map to highlight its informative parts. In the two-state model, bottom- up processing is related to "where" information is located, and top down processing to "what" the information is (Itti and Koch, 2001).

Consumers integrate information from a stimulus with pre-existing knowledge (Petty and Cacioppo, 1986; Payne et al., 1993). Before and during their *conceptual* analyses, consumers engage in *perceptual* analyses when they devote focal attention to a stimulus (Greenwald and Leavitt, 1984). In perceptual analyses, consumers examine sensory features of the stimulus, such as shape, color, and size (Pieters and Warlop, 1999). Then they translate the stimulus into categorical codes, such as brand name, or pictorial and textual information for a brand package, and they select certain elements of the stimulus over others.

Our study focuses on the perceptual analyses of consumers during brand choice, as revealed through patterns of visual attention. In this sense, consumers' eye-movements should be informative about processes such as attention, information acquisition and product choice (Pieters and Warlop, 1999). Process-tracing methodologies such as eye tracking, allow researchers to monitor cognitive process in decisions (Willemson and Johnson 2011; Schulte-Mecklenbeck et al. 2011).

Marketing practitioners and academics share the belief that consumers' attention and in-store brand choice are intimately related (Chandon et al., 2009; Kuo et al., 2009; Ju and Johnson, 2010; Clement et al., 2013). Retailers manage shelf space and special displays to draw attention to products and brands they wish to sell (Drèze et al., 1993; Allenby and Ginter 1995; Chandon et al., 2009;

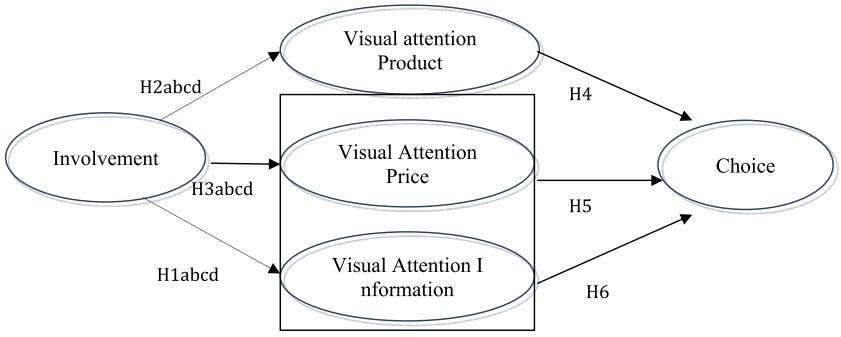

Fig. 1. Theoretical model predicting product choice.

Clement et al., 2013). Such attempts rest on the assumption that visual attention precedes subsequent processes that eventually lead to choice, and that increased visual attention will increase the likelihood of choice (Busemeyer and Diederich, 2002; Armel and Rangel, 2008). The latter study argued that the probability that an item will be chosen 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 attending to an item can be a predictor of the actual purchase (Armel et al., 2008). Clement et al. (2013) investigated which visual elements on the package influenced the consumers' purchase decision in a grocery store and suggested that a simple design feature had a higher likelihood for capturing initial attention, thus choice. A consumer's visual attention to various display elements (e.g. product, sign) should be related to purchase intention. However, we are uncertain as to which element will be most influential.

The following hypotheses were proposed on the basis of attention–choice relationship:Fig. 1

H4: A higher total visit duration on the product area of interest (AOI) will have a positive impact on likelihood to choice.
H5: A higher total visit duration on an identification sign (AOI) will have a positive impact on likelihood to choice.
H6: A higher total visit duration on a price sign (AOI) will have a positive correlation with likelihood to choice.

A path diagram was drawn based on these hypotheses as follows:

3. Methods

3.1. Participants

The data for this study were part of a larger investigation[1] in which we designed an experiment using a TobiiX1 light eye-tracking device and a survey to collect data in 2013 in East Lansing, Michigan, and College Station, Texas. Participants ($N=108$) were recruited through social websites Craiglist and Listerv. They received $30 incentive for participating in this study.

[1] Researchers investigated the role of water conservation practices (in plant production and in plant use in the landscape) in two locations (MI and TX) representing two extremes of water availability (see Appendix A, Table A.1). Texas ranked 3rd in nursery plant production while Michigan ranked 10th (Hodges et al. 2011).

3.2. Procedure

Live plants were the product of interest, as the floriculture industry in the U.S. represents a $34.3 billion industry (Geisler, 2013) and, unlike most fast moving consumer goods (FMCG), they are minimally packaged. Thus our study contributes a new dimension to the literature. We developed a conjoint design with three plants (rose, hydrangea, and clethra), three prices ($9.99, $14.99, and $19.99), and two water conservation messages (grown using water conserving practices, conserves water in the landscape, no message). To reduce the likelihood of participant fatigue, the 27 possible choices in the full factorial were reduced to 9 in a partial factorial design. The three landscape plants were chosen because they would be suitable in a broad range of landscapes and climate zones, including Michigan and Texas. Researchers photographed the plants against a black background and in a plain grey container. No plants had flowers in bloom, but buds were evident on the hydrangea. The 9 images used in the study were then developed from the individual plant images. These images were placed in a quadrant so that a respondent could select from three plant choices or an "I would not choose any of these plants" option (see Appendix B: Figure B.1). The quadrant in which each plant and the "no choice" option was presented was randomized among the 9 conjoint images. The "no choice" option was included to increase the external validity of the experiment, as consumers can choose not to buy an item from a display. Before each of the 9 images was presented to the participant, a bull's-eye centered in the middle of the screen was shown to refocus subjects' gaze to the central part of the screen.

Subjects were recruited at each location using a variety of means (e.g. listserv, Craigslist advertisement) and scheduled at 15 min.-intervals. Subjects were greeted, provided with an informed consent form, paid a $30 incentive, and provided with the first page of the written survey to elicit demographic information. Half of the subjects then proceeded to the eye-tracking portion of the study and the other half proceeded to respond to the written survey.

Once seated at the Tobii eye-tracking device, the eye-tracker was calibrated to the subjects (Behe et al., 2013b). The study began with an introductory slide and an instruction slide. Subjects were directed to look at the bull's eye between images, and "to make a choice (A, B C, or D) as to which plant (or none) you would buy." A practice bull's eye followed by an image of three types of fruit and a "no choice" 4th option (A, B, C, or D) were then presented to familiarize subjects with the layout of the study. A reminder instruction slide followed and noted that "all of the plants are in the same size container." The study then began with the 9 images of 3 plants and the 1 "no choice" options. The study was created to be incentive compatible in that one slide would be randomly selected and one plant from that slide would be randomly selected. If the participants selected that plant as one s/he would buy at the stated

price, then s/he would be required to remit that amount from their $30 incentive. In turn, the participants would receive a plant of the same type.

3.3. Measurement

3.3.1. Visual attention

To produce the data for the visual attention measures, three separate areas of interest (AOIs) were drawn: one for the product, one for the information in the sign and one for the price in the sign. An area of interest is a user-defined area in a stimulus that allows the researcher to measure looking behavior, e.g. how often a subject fixated on the price (Tobii Technology, 2008). After the areas of interest were drawn, we extracted the relevant visual metrics described below.

The length of a fixation is considered to be an indication of information processing leading to product choice. To calculate the amount of visual attention, the following measurements were defined and extracted from the 2 areas of interest (Tobii Technology, 2008):

Time to first fixation (TFF): The time in seconds[2] from when stimulus was shown until the start of the first fixation with an area of interest. TFF indicates where the participants' eyes stop first on the image.

Fixation count (FC): The number of fixations within an area of interest (AOI). FC indicates how many times the participant looks at the area of interest (which may be a product, its information sign, or price label).

Total fixation duration (TFD): The length of the fixation in seconds within an AOI.

Total visit duration (TVD): The total time in seconds spent viewing an AOI. It is a product of FC multiplied by fixation duration and includes any movement in or out of the AOI. TVD indicates how long the product is visually considered for the choice.

3.3.2. Involvement

Development of a scale to measure consumer product involvement with minimally packaged woody plants was necessary to analyze the hypotheses. Since an additional construct, expertise, was also of interest for other hypotheses, we adapted 15 questions each from existing involvement and expertise scales (Bruner et al. 2001) for a total of 30 questions related to woody plants, but used only the involvement items for this study. Everitt (1975) mentioned that the ratio of sample size to the number of observable variables be at least 10 but Cattell (1978) noted this ratio could be in the range of 3 to 6, thus our target sample was 100 persons. The questions were measured with a 5-point Likert scale with 1 (least favorable or strongly disagree) and 5 (most favorable or strongly agree). Since the self-reported item responses are indictors of a latent construct (SAS Library, 1995), principal factor analysis was used to identify it in the underlying factor structure using the FACTOR Procedure in SAS® software v. 9.3 (SAS Institute Inc., SAS Library, 1995).

We set prior communality estimates for each variable to its squared multiple correlation with all other variables (PRIORS=SMC) and extracted the principal factors using the principal-axis factoring method (METHOD=p) (SAS Library, 1995). We used Kaiser's measure of sampling adequacy (MSA) (Fernandez, 2003) to test the appropriateness of principal factor analysis (PFA[3]). Item reduction criteria included examination of Cronbach's alpha and item means (de Vellis 2012), and Pearson Correlation Coefficients (Hatcher, 1994). Factor reduction included evaluation of the eigenvalues (or commonalities) and the scree test (de Vellis 2012; SAS Library, 1995) or the average of the prior communality estimates, in this case by SMC (Fernandez, 2003). Five factors initially emerged from the 30 questions, 11 items on the expertise factor, 15 items on the involvement factor, and four on the other three factors. All the original involvement items loaded on the involvement factor. A second round of PCA, as described above, was repeated on only the items that loaded on the involvement factor (Appendix A, Table A.2.).

The overall response mean by participants to the 15 questions was 3.5 (s.d.=1.2) with $N=106$ due to missing values for 2 observations; mean responses by item ranged from 2.2 to 4.1 with s.d. ranging from (0.8) to (1.4). Kaiser's measure of sampling adequacy (MSA) to test the appropriateness of PFA for factor extraction was 0.9, well above the acceptable threshold of 0.5. Examination of the initial PFA on the 15 items yielded two potential factors with eigenvalues greater than the mean eigenvalue of 0.62 (7.87 and.76 respectively), in accordance with choosing factors that explain above-the-average eigenvalues (Pasta and Suhr, 2004) (Appendix A Table A.2).

The scree test (de Vellis 2012) also indicated a one- to two-factor extraction. The program was rerun with factor level capped at two (NFACTOR=2) and varimax rotation was applied. Factor 2 loadings were less than acceptable (less than.5) and contributed very little to the scale.

Subsequent scale reliability[4] and PFA testing identified 11 items as a single factor for involvement (Appendix A, Table A.3). General statistics for respondent factor scores computed for involvement are reported in Appendix A, Table A.4.

Respondents were grouped according to factor scores with divisions proportioned by standard deviations (s.d.). The medium involvement group was within 0.5 s.d. below and above the mean. (This "medium" group was omitted from analyses in which low versus high involvement were compared). The low involvement groups included all participants with scores at or below half a s.d. from the mean. Likewise, the high involvement groups included all respondents that scored at or above half a s.d. from the mean.

4. Results

4.1. Demographic characteristics of participants

Of the 108 respondents, 29.6% were from 18 to 32, 38.0% were 33 to 50 years old and 31.5% were over 50 years old; 0.9% did not respond. The majority of participants were female (71.3%) and Caucasian (78.7%). 101 out of 108 respondents had valid eye-tracking data (see Appendix A, Table A.1).

[2] Measured to the millisecond

[3] PFA, in contract to principal component analysis (PCA), does not standardize the variance of the variables to "1" and thus does not lead to an eigenvalue (i.e. variance explained by the factor) of average equal to 1, but to an eigenvalue average equal to the average of the total variance among the factors (total divided by the number of original variables) (Pasta and Suhr, 2004).

(*footnote continued*)

[4] Initial Cronbach's Coefficient alpha and simple statistics (Devellis, 2012), and Pearson Correlation Coefficients (Hatcher, 1994) revealed two items (#'s 10&12) that failed scrutiny and were subsequently omitted from further analysis. Cronbach's alpha tests during further PFA analysis indicated a slightly improved alpha when two additional items (#'s 5&23) were deleted. Final number of items was 11 out of the original 15 (Appendix A,Table A.2), considered a good length for future scale use. Everitt (1975) mentioned that the ratio of sample size to the number of observable variables be at least 10. But Cattell (1978) noted this ratio could be in the range of 3 to 6. MacCallum and Widaman (1999) underlined that communalities are more important than the ratio of sample to the number of variables. They demonstrated that when communalities are consistently low (under.50), seven indicators per factor and a small number of factors, larger samples are required (over 100). In our study, only two indicators out of 11 were under.50.

Table 1
Results of GLIMMIX for comparison between groups of involvement on visual attention ($N=101$)

Visual Attention Measure		Involvement		*F*	*DF*
		High *Mean(SD)*	Low *Mean(SD)*		
Product (Foliage)	TFF	3.69(2.65)	3.16(2.58)	22.51[a]	1115
	FC	2.10(2.05)	1.87(1.93)	10.19[b]	1510
	TFD	0.51(1.01)	0.42(0.92)	6.48[c]	1510
	TVD	0.54(1.04)	0.45(0.95)	6.30[c]	1510
Information (Sign)	TFF	2.74(2.32)	2.40(2.21)	15.17[a]	1380
	FC	4.73(3.08)	4.27(2.92)	18.00[a]	1510
	TFD	1.35(1.65)	1.19(1.54)	8.03[b]	1510
	TVD	1.50(1.73)	1.31(1.62)	9.81[b]	1510
(Price)	TFF	4.33(2.80)	3.85(2.94)	8.47[b]	621
	FC	0.76(1.23)	0.58(1.07)	19.24[a]	1510
	TFD	0.23(0.68)	0.15(0.55)	12.51[a]	1510
	TVD	0.23(0.68)	0.15(0.55)	12.50	1510

[a] Significant at 0.001.
[b] Significant at 0.01.
[c] Significant at 0.05.

4.2. Hypothesis tests

Hypotheses were analyzed by conducting generalized linear mixed models (GLIMMIX) with Poisson distribution in SAS because the responses were not normally distributed and correlated. The GLIMMIX fits statistical models to data, which display correlations among some observations as well as non-normality (SAS, 2010). Due to low or no visual data capture, data for 101 participants was available for the visual portion of the analysis.

H1a predicted that participants with higher involvement with plant would show shorter time to first fixation (TFF) on the product information compared to those with lower involvement. First, a generalized linear mixed model (GLIMMIX) was computed on visual attention with time to first fixation (TFF) as a dependent variable and involvement (Low/High) as an independent variable.

Contrary to our hypothesis, the results showed that high involvement ($M=2.74$, $SD=2.32$) showed longer TFF on the product information than less involved participants ($M=2.40$, $SD=2.21$) (See Table 1). Consistent with H1b, highly involved participants exhibited greater fixation count on the product information than less involved participants ($M_{high}=4.73$, $SD=3.98$, $M_{low}=4.27$, $SD=2.92$, $F(1, 1510)=18.00$, $p<.001$). The results indicate that highly involved participants paid more attention to the product information compared to less involved participants.

In support of H1c, the higher involvement, the greater TFD on product information ($M_{high}=1.35$, $SD=1.65$, $M_{low}=1.19$, $SD=1.54$, $F(1, 1510)=8.03$, $p<.01$). That is, higher involvement participants exhibited longer fixations in the product information AOI than those with lower involvement.

Similarly, H1d was confirmed in that those with higher involvement visually stayed longer on the plant information ($M_{high}=1.50$, $SD=1.73$, $M_{low}=1.31$, $SD=1.62$, $F(1, 1510)=9.81$, $p<.01$). The result implies that participants who were highly involved with the product were motivated to devote substantial processing effort to their choice.

For hypothesis 2a, the results did not support the hypothesis. Similar to the H1a, participants with high involvement ($M=3.69$, $SD=2.65$) showed longer TFF on the product than less involved participants ($M=3.16$, $SD=2.58$).

We hypothesized that participants with high product involvement would show a greater fixation count on the product than less involved participants. The results support the hypothesis 2b ($M_{high}=2.10$, $SD=2.05$, $M_{low}=1.87$, $SD=1.93$, $F(1, 1510)=10.19$, $p<.01$). Since participants highly involved with the product are regarded as not only more concerned about the plant but also perceive it as more important, it is logical that they spend more visual time in investigating the product.

H2c posited that participants with higher product involvement would exhibit longer fixations on the plant than those with lower involvement. Our results supported H2c. The higher involvement, the greater TFD ($M_{high}=0.51$, $SD=1.01$, $M_{low}=0.42$, $SD=0.92$, $F(1, 1510)=6.48$, $p<.05$). H2d was also confirmed. Those with higher involvement looked longer at the plant than those who were less involved ($M_{high}=0.54$, $SD=1.04$, $M_{low}=0.45$, $SD=0.95$, $F(1, 1510)=6.30$, $p<.05$). The result implies that participants who were highly involved with the product were motivated to assimilate all available information to their choice.

H3a proposed that the lower consumers' involvement was with the product, the shorter the time would be to first fixation duration (TFF) on the price sign compared to consumer with higher product involvement. The data showed that low involvement led to a shorter TFF on the price ($M=3.85$, $SD=2.94$) than high involvement ($M=4.33$, $SD=2.80$, $F(1, 621)=8.47$, $p<.01$). These findings may indicate that low involvement consumers may be more price sensitive, consistent with Robertson (1976).

In line with H3b, we assumed the lower consumers' involvement was with the product, the greater the fixation count (FC) on the price sign. In our study, however, participants with low involvement showed lower FC on the price ($M=0.58$, $SD=1.07$) compared to those with higher involvement ($M=0.76$, $SD=1.23$, $F(1, 1510)=19.24$, $p<.001$). Thus, H2a was not supported.

H3c proposed that the lower consumers' product involvement was with product, the greater total fixation duration (TFD) on the price would be compared to more highly involved consumers. The participants responded in a reverse fashion: less involved participants paid less attention to price ($M=0.15$, $SD=0.55$) than those with high involvement ($M=0.23$, $SD=0.68$), and the difference between the two groups was significant ($F(1, 1510)=12.51$, $p<.001$).

H3d was not supported because high involvement participants had a higher TVD on the price sign compared to low involvement participants ($M_{high}=0.23$, $SD=0.68$, $M_{low}=0.15$, $SD=0.55$, $F(1, 1510)=12.50$, $p<.001$).

Some agree that visual attention is a precondition to subsequent processes that eventually leads to choice (Busemeyer and Diederich, 2002; Armel and Rangel, 2008). Therefore, the willingness to pay for an item increases the amount of time that attention is paid to the item. Based on this premise, H3 posed that the higher total visit duration on the product would have a positive impact on likelihood to choice. H4 suggested that higher total visit duration on an information sign would have a positive impact on likelihood to choice. H5 posed greater total visit duration on a price sign would have a positive correlated with likelihood to choice.

To test these hypotheses, the Logistic Procedure in SAS for Windows version 9.3 was conducted with product TVD, sign TVD, and Price TVD as independent variables and product choice as dependent variable. A stepwise procedure and binary logit model with the Fisher's scoring optimization technique was employed. The probability that choice=Yes was modeled.

Mean values for each variable was summarized in Table 2.

Mean values shown in Table 2 indicated that participants who answered that they would choose a product (vs. none chosen) showed a significantly longer total visit duration on the product ($M_{choice}=1.62$, $SD=1.40$, $M_{no\ choice}=1.41$, SD=1.72, $F=3.86$, $p<.05$), information sign ($M_{choice}=4.32$, $SD=3.39$, $M_{no\ choice}=3.68$, SD=3.31,

Table 2
Total visit duration means and standard deviations for product, sign, price to choice.

Area of interest	Choice		*F*
	Yes (*N*=627) *Mean(SD)*	No (*N*=282) *Mean(SD)*	
Product	1.62 (1.40)	1.41(1.72)	3.86[b]
Information sign	4.32(3.39)	3.68(3.31)	7.12[a]
Price sign	4.33(2.80)	3.85(2.94)	5.58[b]

Note: *N* refers to a 101 respondents' product choice response for 9 images.
[a] Significant at 0.01.
[b] Significant at 0.05.

Table 3
Analysis of maximum likelihood estimates.

Parameter	DF	Estimate	Std. error	Wald χ^2
Intercept	1	0.55	0.12	22.17[a]
Sign TVD	1	0.07	0.02	6.94[b]

Note:
[a] Significant at 0.001.
[b] Significant at 0.01.

$F=7.12$, $p<.01$) and price ($M_{choice}=4.33$, $SD=2.80$, $M_{no\ choice}=3.85$, SD=2.94, $F=5.58$, $p<.05$) of the chosen items than participants who demonstrated no choice. This result is consistent with previous work in that the probability that an item will be chosen depends on the relative amount of time that consumers fixate on the item during the decision-making process (Armel and Rangel, 2008).

To test hypotheses 4, 5 and 6 the analysis was designed to select from a group of predictors the one variable at each stage, which had the largest beta values. If any variables were statistically insignificant at a level of 0.05, the one making the smallest contribution was dropped. The procedure continued until all remaining variables were statistically meaningful. The results showed that only information sign TVD had a significant impact on the product choice ($\beta=7.08$, Wald $\chi^2=6.94$, $p<.01$) (see Table 3). Thus, hypothesis 5 was confirmed but hypotheses 4 and 6 were not.

The overall fit of the logit model was checked by examining the Chi-square statistics. The result showed Chi-square was sufficient to meet a good model fit (Chi-square=7.08, $p=.001$, Wald $\chi^2=6.94$). Based on this result, we conclude that total visit duration (TVD) on the sign was the strongest predictor of likelihood to product choice.

5. Discussion

The purpose of our study was to examine the relationship between visual attention devoted to in-store marketing (product and information on accompanying signs) to better understand information acquisition, use and its influence on product choice by using eye tracking. We analyzed the influence of consumers' level of involvement with a product on the aforementioned relationships.

We found an overall main effect of involvement on visual attention. Participants who were highly involved with the product paid more attention to the product and sign elements (price, product information) as demonstrated through a higher fixation count (FC), longer total fixation duration (TFD), and total visit duration (TVD). One unexpected finding was that time to first fixation (TFF) was longer for more involved participants. This suggests that less-involved consumers processed the information faster than more highly involved consumers and implies that the low-involvement group was quickly "dismissive" of the display information. Our finding that high involvement consumers spent longer processing the display information supports the ELM tenet that high involvement with a product leads to the central route to information processing, as their information processing appears to be more deliberate (Park, 1995; Park et al., 2007; Breugelmans and Campo, 2011; Matthes et al., 2013). Because the product under study was relevant to this group, they processed that information (sign and product) more carefully and in greater depth than less involved consumers.

For the relationship between involvement and attention to price, the results did not support the hypotheses. A previous study (Robertson 1976) found that less committed consumers were highly price-sensitive. Therefore, we assumed that low-involvement (less committed) subjects would be more price-sensitive and thus focus their attention on price rather than product, compared to high involvement consumers. Interestingly, highly involved consumers' exhibited more visual attention (greater FC, TFD, TVD) on the price compared to those who were less involved. This response was the inverse of previous research that found a negative relationship between price sensitivity and involvement (Ramirez and Goldsmith, 2009; Goldsmith, Flynn and Kim, 2010). As the ELM suggests (Petty and Cacioppo, 1983; Petty et al. 1983), perhaps high involvement consumers process price information as a central rather than a peripheral cue or maybe more involved consumers allocate more attention to all aspects of a product display, including price signage. It is also possible that highly involved consumers used price as a surrogate for quality, particularly since respondents could not touch the product (Dodds, Monroe, and Grewal, 1991). We did not measure price sensitivity in our study, thus future work should investigate whether an interaction exists between price sensitivity and involvement and, if so, whether this interaction influences attention to point of purchase displays,

We found that participants who actually selected a product from the display spent more time looking at all display elements (product, price and information signs) as measured by TVD. This finding lends empirical support to the link between visual attention and product selection (Busemeyer and Diederich, 2002; Armel and Rangel, 2008).

Our study found that total visit duration (TVD) on an information sign had the most significant impact on product choice. This finding implies that consumers who devote more cognitive effort to process product related information at point of purchase are more likely to purchase the product (Drèze et al., 1993; Allenby and Ginter 1995; Busemeyer and Diederich, 2002; Armel and Rangel, 2008; Chandon et al., 2009; Clement et al., 2013). Marketing practitioners and academics have agreed that consumers' attention and in-store product choice are closely related (Drèze et al., 1993; Allenby and Ginter 1995). Visual attention to a product or display is the first stage of subsequent steps in the POP choice process (Busemeyer and Diederich, 2002; Armel and Rangel, 2008; Chandon et al., 2009; Kuo, Hsu, and Day, 2009; Ju and Johnson, 2010; Clement, Kristensen, and Grønhaug, 2013). While scholars may agree that the probability that an item will be chosen depends on the relative amount of time that consumers fixate on the item during the decision-making process, the relationship between attention to a specific area of interest to consumers' product choice has not been studied. Our study highlights the important role that display signage information plays in an actual purchase decision.

6. Implications

6.1. Theoretical implication

Our study strengthens the understanding of the role of consumer involvement to decision-making as proposed by the ELM. Specifically, for all participants information signage appears to be processed as a central cue when making a product selection. However, for highly involved consumers, all display elements appear to be processed as central cues because they exhibited a higher levels of visual attention on both price and product than those who were less involved.

We investigated two broad categories that influenced visual attention: bottom-up factors in the visual stimulus and top-down factors in the individuals (Wolfe 1998; Pieters and Warlop, 1999; Chun and Wolfe, 2001; Rayner et al., 2001; Pieters and Wedel, 2007). An eye-tracking device has the advantage in that it can capture top-down factors as well as bottom-up factors by providing objective and quantitative evidence of a person's visual and attention processes (Duchowski 2007).

We investigated involvement as a top-down factor, and found that those with high versus low product involvement responded differently to the physical elements of product display. Consistent with the ELM (Petty and Cacioppo, 1983; Petty et al. 1983), our findings suggest that these consumer segments have different patterns of initial and sustained attention. This finding corresponds with Rosenbergen et al. (1997) who found "attention segments" for print advertisements. That is, visual attention patterns differ among product involvement segments, with more highly involved consumers "looking longer" and less involved consumers processing information quickly.

Our study offers insight into processing and information acquisition strategies in that consumers' level of involvement with the product determines their attention and information seeking strategies and patterns. In particular, unlike previous studies (Park, Lee, and Han, 2007; Rosbergen et al. 1997), which examined the moderating effect of consumers' level of involvement with the product on visual attention, we investigated direct effect of the involvement on visual attention. Our findings strengthen the assertion that consumers are active in allocating attention before making a decision (Pieters and Warlop, 1999; Matthes et al., 2013).

6.2. Managerial implications

Understanding visual attention at POP helps to assess the role of product display elements in consumer choice. Directly exploring precisely what captures visual attention in retail setting sheds light on the design elements of a POP display that contribute positively to consumer decision-making. With the majority of consumer purchase decisions being made in-store and being heavily influenced by POP displays, our results found that product signage is the most influential factor in encouraging consumers' product choice for a minimally packaged good. Our participants attended to the sign longer than any of the other display elements.

Specifically, we examined which bottom-up factors influenced the likelihood for product choice based on specific elements of the product display. Visual stimuli were divided into three areas of interest (AOI) in a product display. These AOIs included product, product information and price sign. We found that the product information is the best predictor of product choice. While Seva et al. (2010) and Clement et al. 2013 found that text-elements are not suitable for capturing first attention, their study focused only on product packaging rather than display signage. Our findings imply that the text-element of product information does capture consumers' attention at point of purchase and is a strong predictor for potential purchase.

Furthermore, in a highly competitive marketplace, marketers and retailers need to know which elements are attended to or ignored by consumers when they make a choice, as well as which top down factors associated with consumers' personal characteristic facilitate their final decision. Factors associated with consumers' personal characteristics (e.g., involvement) can assist in deducing the reasons behind their final purchase decision. The strategy of using eye-tracking software and hardware to assess the impact of consumer attention to POP display elements can result in more enticing and effective displays, which in turn, may encourage more browsing or attract shoppers to other product displays.

Lastly, our data support existing theory with the physiological evidence from eye-tracking equipment that according to ELM, individuals with high product involvement process information through a central route while individuals with low product involvement process information through a peripheral route.

7. Limitations and further research

Our study was conducted on plants, which are minimally packaged products, contributing a new dimension to the literature, but also creating a limitation for extrapolation of our findings. Although visually stimulating, involvement level with plants may not be representative of other types of product involvement. Future studies should include other products as stimuli.

Moreover, we alternated the instrument order (eye tracking first or the survey first) to block for possible effects. The interaction between the instrument order and involvement did show significant differences. The results indicate that those who were highly involved with a product looked longer and more often at the area of interest when they did eye tracking first compared to when they took the survey first. We believe this finding may be explained by the idea that those who took the survey first may have been sensitized to the stimuli, causing them to process through the eye tracking faster, or maybe they felt more time pressure. This finding implies that instrument order can have a significant impact on more or less involved participants' visual attention. Future studies should consider this when researchers design their experiments.

Furthermore, our study was conducted in only two locales (Michigan and Texas), thus limiting the ability to generalize from the sample. The sample was a convenience sample, selected in two areas in an effort to select subjects who would exhibit a range of product involvement. Subjects were paid, and may have only participated to receive the incentive.

Future research should include more detailed signage information to determine if more information might be more (or less) visually stimulating and have a stronger (weaker) impact on purchase intention. Additional work should focus on products *in situ*, where consumers can evaluate more realistic displays in a more realistic setting where competition for visual attention is even greater. Another line of investigation is to analyze which display element first captures consumer attention and how this "first look" is related to product choice. Finally, analyzing the relationship between a consumer's actual product choice and amount of visual attention to that particular item would be another avenue of analysis to pursue.

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Appendix A

See Tables A1–A4.

A.5 Measurement of Product Involvement, Knowledge, and Expertise (Bruner, James, and Hesel, 2001)

(Actual statements as they appeared in the survey 1 = strongly disagree; 5 = strongly agree)

c1	I know a lot about outdoor woody plants.
c2	I know a lot about trees and shrubs.
c3	I am an outdoor woody plant expert
c4	Compared to other people, I am interested in outdoor woody plants
c5	I use outdoor woody plants around my home
c6	I am involved with growing outdoor woody plants
c7	I automatically know which outdoor woody plants to buy
c8	At the place of purchase, I can visually detect my preferred outdoor woody plant(s) without much effort
c9	I can immediately identify my preferred outdoor woody plant(s) even if it is displayed with others
c10	When I purchase my preferred outdoor woody plants, I do not pay attention to the other outdoor woody plants
c11	I enjoy learning about outdoor woody plants

Table A.1
Demographic Characteristics of Participants.

Michigan and Texas combined		Includes all respondents				Excludes respondents with no or poor ET		
Variables		%	Total	MI	TX	MI (-2)	TX(-5)	Total
Overall		100%	108	50	58	48	53	101
Gender	Male	28.7%	31	16	15	15	14	29
	Female	71.3%	77	34	43	33	39	72
Age group	18-32 yo	29.6%	32	25	7	25	7	32
	33-50 yo	38.0%	41	11	27	10	27	37
	> 50 yo	31.5%	34	14	23	13	18	31
	Prefer not to respond	0.9%	1	0	1	0	1	1
Residence location	Metropolitan	13.9%	15	8	7	7	6	13
	Suburban	63.9%	69	33	36	32	33	65
	Rural	22.2%	24	9	15	9	14	23
Highest Level of Education	High school or GED	6.5%	7	2	5	1	5	6
	Some college completed	16.7%	18	7	11	7	10	17
	college degree	45.4%	49	23	26	22	22	44
	Master's degree	20.4%	22	13	9	13	9	22
	Professional degree	11.0%	12	5	7	5	7	12
Ethnicity	Caucasian	78.7%	85	41	42	39	37	76
	African-American	5.6%	6	1	7	1	7	8
	Hispanic	3.7%	4	0	4	0	4	4
	Caucasian & Hispanic*	1.9%	2	0	2	0	2	2
	Native American	0.0%	0	0	0	0	0	0
	Asian	6.5%	7	5	2	5	2	7
	Prefer not to respond	3.7%	4	3	1	3	1	4
Household income	$19,999 or less	9.3%	10	8	2	8	2	10
	$20,000 to $59,999	36.1%	39	19	20	18	18	36
	$60,000 to $99,999	25.0%	27	12	15	11	14	25
	$100,000 to $159,999	13.0%	14	4	10	4	10	14
	$160,000 or more	7.3%	8	3	5	3	4	7
	Prefer not to respond	9.3%	10	4	6	4	5	9

* Category added from expressed answers to survey question.

Table A.2
Loadings and communalities (h^2) for Involvement (N=106 due to missing values)

Item		Initial PFA				Final PFA		
	Item	Factor		h^2		Involve- ment	h^2	
	No.	1	2	Prior	Final		Prior	Final
I am _____ in outdoor woody plants (1="uninterested" to 5="interested")	ca4	0.909	0.046	0.818	0.831	0.907	0.806	0.822
Outdoor woody plants are (1="of no concern to me" to 5=of great concern to me")	ca2	0.844	0.123	0.751	0.784	0.832	0.737	0.692
I am very interested in outdoor woody plants	22	0.826	-0.177	0.732	0.763	0.826	0.729	0.683
Outdoor woody plants are (1="mundane" to 5="fascinating")	ca7	0.805	0.116	0.728	0.747	0.822	0.726	0.675
Outdoor woody plants are (1="boring" to 5="exciting")	ca5	0.803	0.149	0.741	0.777	0.819	0.716	0.670
Outdoor woody plants (1="mean nothing to me" to 5="mean a lot to me")	ca3	0.812	0.145	0.677	0.714	0.801	0.653	0.641
Outdoor woody plants are (1="unimportant" to 5="important")	ca1	0.787	0.030	0.715	0.725	0.781	0.679	0.609
Compared to other people, I am interested in outdoor woody plants	4	0.748	-0.218	0.639	0.620	0.761	0.616	0.579
Outdoor woody plants are (1="unappealing" to 5="appealing")	ca6	0.718	0.221	0.637	0.673	0.724	0.627	0.525
I enjoy learning about outdoor woody plants	11	0.709	-0.185	0.596	0.622	0.702	0.558	0.493
I am involved with growing outdoor woody plants	6	0.723	-0.305	0.639	0.621	0.698	0.504	0.487
I use outdoor woody plants around my home	5	0.640	-0.415	0.637	0.667			
When I purchase my preferred outdoor woody plants, I do not pay attention to the other outdoor woody plants.	10	0.059	0.241	0.229	0.175			
I will search for the latest information on outdoor woody plants before make a purchase	12	0.498	0.010	0.325	0.285			
Because of my personality, I would rate outdoor woody plants as being of the highest importance to me personally	23	0.558	0.447	0.510	0.561			
Communality Estimates				9.374	9.566		7.350	6.876
Eigenvalue of reduced correlation matrix: Variance explained by factor		7.868	0.760			6.876		
Eigenvalue of reduced correlation matrix: Total variance		9.374				7.350		
		Value				Value		
Squared Multiple Correlations of the variable with each factor (SMC)		0.9481				0.9524		
Cronbach Coefficient Alpha-standardized variables (Overall)		0.9316				0.9567		
Scoring Coefficient estimated by regression						0.9584		
Root Mean Sqr. Off-Diag Residuals=0.0334								
Root Mean Sqr Off-Diag. Partials=0.0889								

Table A.3
Involvement scale reliability and improvement potential for raw and standardized variables (N=106)

Involvement scale (as is)	Cronbach coefficient alpha with deleted variable			
	Raw variables		Standardized variables	
	Correlation with total	Alpha 0.95	Correlation with Total	Alpha 0.96
Variable to test for improved alpha if deleted				
I am _____ in outdoor woody plants (1="uninterested" to 5="interested")	0.88	0.94	0.89	0.95
Outdoor woody plants are (1="of no concern to me" to 5=of great concern to me")	0.80	0.95	0.81	0.95
I am very interested in outdoor woody plants	0.81	0.95	0.81	0.95
Outdoor woody plants are (1="mundane" to 5="fascinating")	0.80	0.97	0.80	0.95
Outdoor woody plants (1="boring" to 5="exciting")	0.80	0.95	0.79	0.95
Outdoor woody plants (1="mean nothing to me" to 5="mean a lot to me")	0.79	0.95	0.78	0.95
Outdoor woody plants are (1="unimportant" to 5="important")	0.75	0.95	0.76	0.95
Outdoor woody plants are (1="unappealing" to 5="appealing")	0.70	0.95	0.70	0.96
I enjoy learning about outdoor woody plants	0.68	0.95	0.68	0.96
Compared to other people, I am interested in outdoor woody plants	0.75	0.95	0.74	0.95
I am involved with growing outdoor woody plants	0.69	0.96	0.68	0.96

Table A.4
Descriptive statistics for involvement factor score.

							CL for mean	
N	Mean	SD	Mode	Median	Minimum	Maximum	Lower 95%	Upper 95%
106	0	0.98	0.40	0.17	−2.62	1.65	−0.19	0.19

c12 I will search for the latest information on outdoor woody plants before I make a purchase
c13 I keep current on the most recent developments in outdoor woody plants
c14 I consider myself knowledgable about outdoor woody plants
c15 My knowledge of outdoor woody plants helps me to understand very technical information about outdoor woody plants

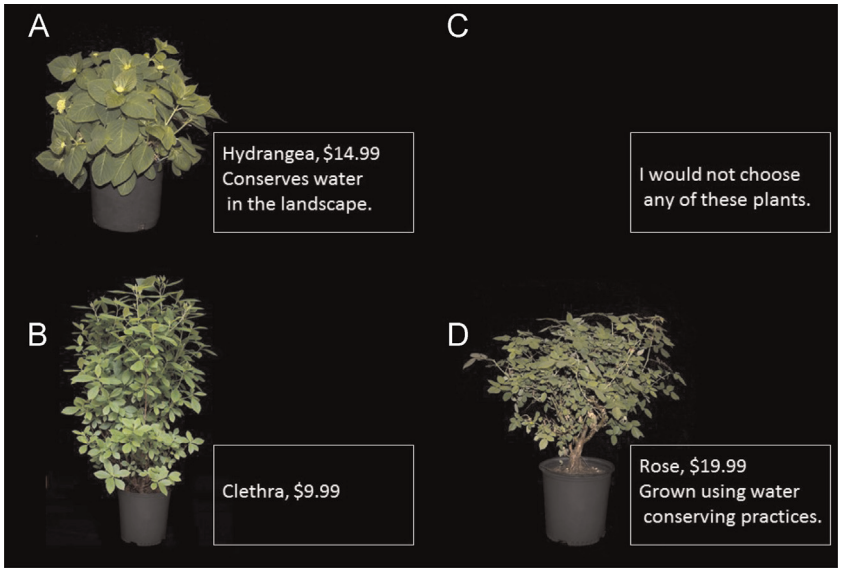

Fig. B.1. Images in a quadrant.

c16	I use my knowledge of outdoor woody plants to verify that advertising claims are in fact true
c17	I can recall many outdoor woody plants from memory
c18	I can recognize many names of outdoor woody plants
c19	I can recall product-specific attributes of outdoor woody plants
c20	I am knowledgable about outdoor woody plants
c21	In general, I know a lot about outdoor woody plants
c22	I am very interested in outdoor woody plants
c23	Because of my personality, I would rate outdoor woody plants as being of the highest importance to me personally
ca1	Outdoor woody plants are (1="unimportant" to 5="important")
ca2	Outdoor woody plants are (1="of no concern to me" to 5=of great concern to me")
ca3	Outdoor woody plants (1="mean nothing to me" to 5="mean a lot to me")
ca4	I am _____ in outdoor woody plants (1="uninterested" to 5="interested")
ca5	Outdoor woody plants are (1="boring" to 5="exciting")
ca6	Outdoor woody plants are (1="unappealing" to 5="appealing")
ca7	Outdoor woody

Adapted from these specific scales in Volume III, Marketing Scales Handbook: A Compilation of Multi-item Measures, Volume iii. Bruner, James, and Hensel.

#205 Involvement (Product Class) p. 328
In general I have a strong interest in this product category.
This product category is very important to me.
This product category matters a lot to me.
#206 Involvement (Product Class) p. 330
Compared to other products, this product is important to me.
I'm not interested in this product.
#207 Involvement (Product Class) p. 331
I have a strong interest in _____.
I value _____ as an important.
#225 Knowledge (Product Class) p. 364
I feel quite knowledgeable about _____.
Among my circle of friends, I'm one of the "experts" on _____.
I rarely come across a _____ that I haven't heard of.
I know pretty much about _____.
Compared to most other people, I know less about _____ (R).
I do not feel knowledgeable about _____ (R).

Appendix B

See Fig B1.

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