Identifying the Drivers of Shopper Attention, Engagement, and Purchase

Raymond R. Burke*

Alex Leykin

* Raymond R. Burke is the E.W. Kelley Professor of Business Administration and Director of the Customer Interface Laboratory, Kelley School of Business, Indiana University (rayburke@indiana.edu, 812-855-1066). Alex Leykin is a Research Associate at the Kelley School of Business and Adjunct Research Scientist at the School of Informatics, Indiana University (oleykin@indiana.edu, 812-219-6672). The mailing address for the Kelley School of Business is 1309 East 10th Street, Bloomington, IN 47405.
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Abstract

To cope with the complexity of modern retail stores and personal time constraints, shoppers must be selective in processing information. During a typical shopping trip, they visit only a fraction of a store’s departments and categories, examine a small subset of the available products, and, in some cases, make selections in just a few seconds. New research techniques have been developed to help marketers understand how customers allocate their attention in a complex, competitive environment, and assess the impact of in-store factors on shopper behavior. This paper summarizes studies using observational research, virtual reality simulations, and eye tracking to identify the drivers of shopper attention, product engagement, and purchase conversion. These include shopper goals; product assortment, package appearance, price, and merchandising; shelf space allocation, organization, and adjacencies; and salesperson interaction and crowding conditions. The research reveals that small changes in a product’s appearance and presentation can have a powerful impact on shopper engagement and purchase conversion.

Keywords: shopper marketing, shopper engagement, visual attention, in-store decision making, eye tracking, virtual reality, salesperson interaction.
Identifying the Drivers of Shopper Attention, Engagement, and Purchase

Given the complexity of modern retail stores, shoppers must be selective in processing information. They usually have a limited amount of time available, and must decide which departments to visit, categories to shop, and specific brands and items to examine based on their shopping plans and level of engagement with the merchandise (among other factors). Sorenson (2009) reports that, of the 30,000 to 50,000 items carried by a typical grocery store, the average household buys just 300 different items during the course of a year. On an average trip, half of shoppers purchase five items or less. In a study by Marsh Supermarkets, category penetration ranged from a low of 5 to 25 percent for general merchandise, health and beauty care, and flowers, to a high of 60 percent for the meat department (Burke 1993).

Once they choose to shop in a specific department and category, shoppers continue to be frugal with their time and attention. In a field study of consumer purchases of laundry detergent, Hoyer (1984) found that the median time per purchase decision was 8.5 seconds (including the time taken to walk down the grocery aisle), and only 28 percent of shoppers looked at, and 17 percent picked up, two or more brands. Dickson and Sawyer (1990) found that, for coffee, toothpaste, margarine, and cold cereal, the mean category shopping time was less than 12 seconds, with 42 percent of shoppers spending 5 seconds or less. Shoppers examined an average of 1.2 brands. Young (2010, pp. 22, 34-36) reports that category shoppers actively see and consider only about 50% of the brands on the shelf; with new products seen less than 33% of the time. If shoppers don’t find what they’re looking for in 8-10 seconds, they often walk away.

For marketers to be successful in this environment, they need to understand how shoppers allocate their attention across the available products and displays in the store, and identify the factors that drive shopper engagement and interest. This new focus on measuring shopper
behavior has fueled several recent research trends. The first is the increased use of observational and ethnographic research (see., e.g, Underhill 1999, 2004). Merchants have found that by watching how customers shop their stores, they can identify locations where shoppers are open to communication, isolate points of friction in the shopping process, and discover opportunities to improve the convenience and enjoyment of the experience. This research is usually executed by setting up one or more video cameras within the store, recording consumer shopping activity for several hours a day, and then manually coding shopper behavior at a later time. Video observation is often combined with intercept interviews to identify both how and why consumers buy.

The second trend is the increased use of computer hardware and software tools to track customer behavior in both online and conventional retail shopping environments. Unlike traditional ethnographic research, which can be very time consuming and subjective, computer tracking provides an efficient and reliable means to collect and analyze data on the consumer shopping process. In online environments, detailed records of website usage behavior ("clickstreams") allow retailers to analyze the path that shoppers take through a site and assess how consumer and marketing variables affect click-through rates and purchase likelihood (see, e.g., Bucklin and Sismeiro 2003; Moe 2003; Montgomery, Li, Srinivasan, and Liechty 2004). In conventional retail stores, sophisticated RFID, GPS, handheld barcode scanner, and video-based customer tracking solutions have been developed which permit retailers to track how shoppers navigate through stores and respond to changes in the store environment (Burke 2006, Hui, Fader, and Bradlow 2009a, 2009b; Hui, Huang, Inman, and Suher 2013; Sorenson 2009; Stilley, Inman and Wakefield 2010). The shopping path data encode the sequence of events leading up to a purchase. By counting the number of customers who enter the store and walk through each
aisle, department, and product category, retailers can create thermal maps showing the percentage of customers who penetrate each section of the store. When traffic data are combined with transaction log data, retailers can calculate overall and category-specific purchase conversion rates, reflecting the store’s ability to turn consumer demand into purchase.

A third trend is the use of laboratory or online virtual reality simulations to explore how changes in the store environment affect shopper behavior. Recent innovations in computer graphics permit researchers to create highly realistic simulations of the retail shopping environment (e.g., Baker et al. 2002; Burke et al. 1992; Burke 1996). These simulations provide tremendous flexibility, allowing retailers to go beyond existing conventions and explore new approaches for improving the shopping experience. Like in-store tracking solutions, computer simulations can record detailed information about consumers’ shopping patterns and purchase behavior, and the results can be used to forecast future sales and profitability. Commercial applications are discussed in Breen (2009).

The fourth recent trend, is the use of eye movement recording equipment to measure patterns of visual attention in the online, laboratory, or physical store environment to understand how product presentation, merchandising, and packaging drive shopper attention. Wedel and Pieters (2007, 2008), Chandon et al. (2009), and Orquin and Loose (2013) summarize academic research investigating bottom-up and top-down effects on visual attention in marketing contexts. Eye tracking has also gained popularity in commercial shopper marketing research, and is used in virtual shopping simulations, mock store studies, and field experiments in retail stores (Klingensmith 2013; Young 2010).

In the following sections, we provide an overview of the psychological process involved in directing visual attention, and then discuss several studies investigating how shopper attention,
engagement, and purchase are influenced by the store environment using a combination of customer observation, virtual shopping simulations, and eye tracking.

**The Psychology of Visual Attention**

As shoppers enter a retail store and walk the aisles, a tremendous amount of information enters the brain through the lens of the eye. Attention is a mechanism that helps to filter and selectively process this flow of information. Focusing on what to look at can be thought of as the first step in seeing. Vision scientists have identified a number of low-level features of the visual stimulus, such as color, contrast, and orientation, which either guide or modulate attention; what is called “bottom-up” processing (Wolfe and Horowitz 2004). Another class of processing, called “top-down,” involves the interaction of higher level mental processes with the scene. These can range from mental goals and plans, to emotional states and expectations (Baluch and Itti 2011). When shoppers have specific goals and expectations in mind that narrow the focus of their attention, they can easily miss other information in the scene; a phenomenon called “inattentive blindness” (Simons and Chabris 1999; Most et al. 2005).

Human vision operates as a sequence of relatively steady gaze fixations separated by transitional saccades. Saccades have speeds of up to 1,000 degrees of visual field per second and are relatively short in duration – on the order of 50 milliseconds (Fischer and Ramsperger 1984). Fixations are much longer, typically in the range of 100 to 500 milliseconds. During these intervals, the human gaze focuses on specific locations, and this is when the major part of visual processing is believed to take place. In the human eye, the fovea – an area of the retina where the most photoreceptive cells are concentrated – covers only the central two to three degrees of the visual field, which is roughly equivalent to twice the width of your thumbnail at arm's length.
(Smythies 1996). Around this area, there is a parafoveal region of reduced acuity which extends to an additional five degrees of visual angle and usually includes the target point for the subsequent saccade.

Shoppers are often searching for specific products from the complex array of merchandise displayed on store shelves. For the last two decades, there has been a debate among cognitive scientists about the mechanisms behind this visual search process. On the one hand, there are a number of empirical studies showing that visual objects within the field of view are selected and processed at the same time; that is, in parallel (Eckstein 1998). On the other hand, proponents of a “serial processing” approach have demonstrated that some visual features are processed one after the other (Treisman 1996). In recent years, there is a growing body of evidence that object search happens in a hybrid serial-parallel process (Wolfe et al. 2011). One can think of the visual image as a sort of a importance map, which, while varying for each scene type, still usually marks more interesting or common objects as more salient (Elazary and Itti 2008).

The psychology literature has identified a number of low-level stimulus features that guide the visual attention process. In targeted search experiments, an object’s color, orientation, size and motion have all been shown to reliably direct attention (Treisman and Gormican 1988; Czerwinski, Lightfoot and Shiffrin 1992; Wolfe and Horowitz 2004). For example, it is easy to find a green object among a set of red objects, and a small object stands out from a field of large ones. Similarly, an object with a distinctive shape can be located more quickly (Treisman and Gormican 1988). Higher level features such as faces, text, and even houses can quickly draw attention toward them (Cerf, Frady, and Koch 2009; Kanwisher and Wojciulik 2000). A
flickering or flashing stimulus, where there are abrupt changes in luminance, also attracts attention; but curiously, similar changes in color do not have a matching effect (Theeuwes 1995).

The anatomy of the eye also appears to affect the direction of attention. Tatler and Vincent (2009) argue that there are significant oculomotor behavioral biases that influence where people look. For example, there appears to be a strong central bias corresponding to where the gaze would fall when the eye is in a relaxed position.

In addition to the visual characteristics of the target stimulus, the surrounding visual field has a major impact on the shopper’s ability to quickly and reliably find an object. The greater the visual heterogeneity of the background (i.e., the higher the level of “clutter”), the longer the search times. Search times usually directly correlate with the number and variety of visual distractions in the scene. Subjects are faster at finding a green dot among the red ones than among a set of varying colors (Wolfe and Horowitz 2004). The task of creating a balanced visual scene becomes an optimization problem of trying to maximize the saliency of individual target objects while keeping the clutter at a minimum. In natural scenes, the task is even more complex, since the number of objects (set size) is not clearly defined and can vary depending on the scale of consideration. Perceptual organization of the items is another factor affecting clutter. A seemingly diverse set of items can be sorted, for instance, by color, creating a much cleaner visual presentation and thus reducing search times (Rozenholtz, Li, and Nakano 2007).

Since real world images usually present a complex combination of guiding features along with the high variability of visual distractors, Duncan and Humphreys (1989) have proposed to approach the task as an information theory problem. Increasing the difference between targets and distractors would aid the search, while increasing the variety of distractors would create more noise, thus decreasing the efficiency of visual search.
While it is often possible to isolate the individual guiding features in a carefully crafted lab experiment, guided search fails in natural scenes where a complex mix of low-level features interact with the higher-level rules and knowledge of the real world. The latter is often referred to as contextual or scene-based guidance (Torralba et al. 2006). For example, if you are in a retail store, you automatically assume that you will see certain types of objects: price tags, checkouts, navigational signs, etc. Moreover, you would have a set of inherent rules as to where these objects are located (Eckstein, Drescher and Shimozaki 2006). One would expect to see price-tags next to the merchandise in the aisles and navigational signs higher up between the aisles. Indeed, location seems to be an important factor based on analyses of the neural workings of the brain (Bisley 2011).

Memory also plays a role in visual search: objects in a familiar scene are usually easier to find. Labeled “semantic-guidance,” a familiar scene raises the probability of seeing specific objects at specific locations based on prior knowledge (Hollingworth 2006). It is important to note that, unlike context-driven attention, semantic guidance is not generalizable across environments and only applies to the specific, concrete scene observed in the past.

Neurophysiological evidence also suggests that attentional processes must achieve a balance between data-driven and knowledge-driven processes (Colby 1991). Applied to natural scenes, the top-down guidance is somewhat modulated by the visual features, but is clearly demonstrated to play a more dominant role (Henderson, Malcolm, and Schandl 2009). Another interesting feature of visual attention is the ability to “see the forest without recognizing individual trees,” aka the “gist” of the scene (Green and Oliva 2009). This type of processing makes it possible to categorize the scene (e.g. urban or natural) with a single fixation.
Based on the research to date, one would expect that shopper attention will be a function of both high-level goals and expectations (as expressed in a shopping list, or primed by an advertisement or prior experience), and the low-level visual features of the store environment. Several researchers in psychology (e.g., Zelinsky et al. 2005; Kanan et al. 2009; Torralba et al. 2006; Bruce and Tsotos 2009) and marketing (e.g., van der Lans, Pieters, and Wedel 2008a, 2008b; Chandon et al. 2008, 2009) have developed models using a combination of top-down features with low-level saliency to predict visual attention.

**Managing Shopper Attention**

In a complex and cluttered store environment, it’s critical for marketers to make it easy for shoppers to find the products that meet their needs. In some cases, shoppers are looking for something specific, and the retailer must organize and display products in a way that helps shoppers to “see what there is to see” and connect what they have in mind with what is physically available in the store. In others, shoppers are “just browsing,” so the retailer has to draw the shoppers’ attention to relevant products and “activate” latent needs and desires. Once the shopper is engaged, the shelf presentation must clearly communicate the benefits and value of the available products and minimize purchase obstacles in order to convert demand into purchase (Burke 2005).

In either case, it’s important to identify the factors driving visual attention as shoppers walk the store aisles and visit the various departments and categories, and to understand how the presentation of products affects shoppers’ ability to visually connect with the merchandise and find what they’re looking for. As Wedel and Pieters (2007) note, most of the eye tracking research by marketing academics has focused on print ads. However, there have been a few academic studies that have analyzed visual attention in a retail context, including Russo and
Leclerc’s (1994) study of the stages of consumer choice (orientation, evaluation and verification), Pieters and Warlop’s (1999) study of time pressure and task motivation effects on package examination and choice, and Chandon et al.’s (2009) study of the effects of shelf position and number of facings on brand attention and evaluation. There are also commercial studies using eye tracking, including packaging studies by Young (2010), and mobile eye tracking research by Hendrickson and Ailawadi (2014), reported in this edited volume.

In the following sections, we review five studies conducted at Indiana University’s Kelley School of Business, with support from the School’s Customer Interface Laboratory and Center for Education and Research in Retailing. The first two studies use computer graphic simulations and eye tracking technology to identify in-store factors affecting visual attention for both planned and unplanned purchases. The remaining three studies observe shopper behavior in laboratory and field settings, and explore how store signage, product presentation, and salesperson interactions can engage shoppers and drive sales.

**STUDY 1: What do shoppers “see” as they walk through the store?**

The objective of the first study is to determine where shoppers direct their attention as they enter a grocery store, walk the aisles, and shop the various departments and categories. The study was conducted in a simulated shopping context, where participants shopped for a basket of goods in a visually familiar, self-service shopping environment modeled after a local supermarket chain.
Research Method

A total of 323 adults, age 18-65, were recruited to participate in this study; 201 respondents provided reliable eye tracking data (60 in Phase 1 & 141 in Phase 2). All participants were screened to be the primary grocery shoppers in the household. After giving their informed consent, participants were instructed on how to use the computer interface, presented with a shopping list, and asked to take several “trips” through a computer-simulated store environment. On each trip, visual attention was measured using an Eye Tech eye tracking device attached to a high-resolution (1920x1280) video monitor.

Each shopper took a total of six separate trips through the shopping simulation, with a different shopping list for each trip. These “time compressed” trips helped shoppers to become familiar with the virtual store environment and encouraged them to adopt the same routine shopping mindset as during a typical grocery store visit (cf. Burke et al. 1992). The target categories included lemons, instant coffee, tomatoes, ground coffee, donuts, Spray n Wash, pudding cups, detergent, cereal bars, paper towels, Pop-tarts, aluminum foil, and magazines. The order of the six shopping trips was rotated across respondents. (For example, on the first shopping trip, respondent #1 was asked to shop for lemons and instant coffee, while respondent 2 shopped for tomatoes and ground coffee.) The manipulation of shopping list allowed the comparison of goal-directed product search versus browsing behavior. While shoppers could not actually pick up and purchase products in the virtual store, they could click on displayed products to indicate their purchase interest.

Shoppers had the opportunity to travel around the store’s perimeter and enter the aisles to shop for perishable products (e.g., produce, bakery, and refrigerated items), edible grocery items (cereal, breakfast bars, coffee, etc.), and non-edible grocery items (laundry detergent, cleaning
products, aluminum foil, paper towels, etc.), and then visited the checkout area. In categories of interest, product shelf positions were counterbalanced across conditions to balance the effects of product appeal and shelf position. The study measured the sequence of eye fixations and dwell time for each shopper, their purchase intentions, and ratings of trip shoppability.

**Results**

Several patterns of shopper attention consistently emerged in the findings. First, shoppers navigating through the store tend to look ahead and scan horizontally across the visual field as they search for desired products, as shown in the contour plots in Figure 1. They typically pause in a department for just 3 to 4 seconds, and fixate on 8 to 10 different shelf locations, before deciding to move on to another department. Visual attention is distributed from about 2 to 6 feet above the floor, and concentrated at a height of about 4 feet, just below eye level. We observed that shopper attention is often drawn to distinctive signs and product displays. For example, large signs offering discounted prices and in-aisle secondary displays attracted attention, as did the presence of other shoppers (Figure 2).

When shoppers first glance at a shelf fixture, they tend to focus on the center of the shelf display. If shoppers are not engaged in the category, they may only look at a few products on the middle shelves. However, if they pause to shop from the set of displayed items, their visual attention expands outward as they scan the shelves (see Figure 3). This central bias has also been reported by Chandon et al. (2009) and Atalay, Bodur and Rasolofoarison (2012).
Shoppers’ goals have a strong influence on visual attention and purchase interest. When shoppers plan to purchase an item, they spend significantly longer in the category and examine a larger set of products, as illustrated in Figures 4a, b, and c. For example, for the perishable products used in the study (lemons, tomatoes, donuts and pudding cups), the mean time to shop in each category increased from 3.9 to 11.8 seconds and the average number of fixations jumped from 10 to 29 fixations when the item appeared on the shopper’s list (all \( p < .001 \)). This is consistent with past findings that individuals who observe the same stimuli with different goals will have different scan paths based on the goal-relevance of the stimuli (see, e.g., Pieters and Wedel 2007).

As shoppers approach the checkout lanes, the center of the endcap fixtures receives the most visual attention. When shoppers walk closer to the display, their angle of view changes and their attention shifts towards the higher shelves, closer to eye level. Attention to the various product categories is influenced by adjacent categories and merchandising. For example, shoppers are less likely to look at magazines if they are positioned next to a soft drink cooler, a shelf of snacks, or items promoted as being “new,” unless shoppers are specifically planning to purchase something in the magazine category. The black frame of the beverage cooler’s door seemed particularly effective at focusing the shopper’s attention on soft drinks and away from the adjacent magazines and candy (Figure 4c).

In summary, shoppers scan the visual field and rapidly decide if a product category or display is relevant. Shopper goals are critical in determining the breadth and duration of visual search. When shoppers are just browsing, a product’s shelf position, visual distinctiveness, presentation, and product adjacencies are key drivers of attention.
STUDY 2: What affects shoppers’ ability to find what they want?

Given the proliferation of products in retail stores, it can be difficult for shoppers to find the products they desire. This is especially true for modern supermarkets, discount stores, and supercenters, which can carry tens of thousands of different items. The second study investigates how the visual appearance and complexity of a shelf display and the mental representation of shopper goals affect how quickly shoppers can find a desired product.

Research Method

Eighty four undergraduate students participated in a computer-controlled, laboratory study of grocery shopping. Participants were asked to take a series of 40 “shopping trips” through a simulated grocery store. On each trip, the shopper was first shown either the name of a specific product (e.g., “Corn Chex”) or an image of the product’s package for 5 seconds, and then shown a shelf display that may or may not contain the item. The shelf display featured an assortment of 32 different brands of cereal, with eight different brands positioned on each of four shelves; two facings per brand. (The positions of brands were counterbalanced across conditions.) Participants were asked to locate the target item from the available selection of products as quickly as possible. As soon as the respondent found the product on the shelf, he or she would press the right Shift key. If the specified product was not found, the respondent would press the left Shift key. Two example trials were conducted before the main data collection. On each trip, visual attention was measured using an Eye Tech eye tracking device attached to a high-resolution (1920x1280) video monitor.
Four factors were manipulated in the experimental design: the target brand to be located (10 levels), the shelf configuration (10 levels), whether the search target was specified with text or a package image (2 levels), and shelf permutation (2 levels). Each respondent was asked to find one of 10 different targets (Corn Chex, Frosted Cheerios, Golden Grahams, Kellogg’s Apple Jacks, Kellogg’s Corn Flakes, Kellogg’s Raisin Bran, Nabisco Shredded Wheat, Post Bran Flakes, Post Honey Comb, Rice Chex) from each of 10 different shelf configurations: (1) default organization by brand; (2) products grouped by package color; (3) products grouped by common visual features (e.g., presence of large spoon, bowl, cartoon characters); (4) products grouped by similar size and orientation of text; (5) angled shelf to simulate walking down aisle; (6) angled product packages to simulate disorganized shelves; (7) increased number of facings - 4 facings per brand for 16 brands; (8) 30% out-of-stock condition with search target present; (9) 30% out-of-stock condition with search target absent; and (10) product facings distributed randomly on the shelf. The specific pairings of brands and shelves were determined by a 10 x 10 Latin-square design, which was rotated across respondents and trials.

Across the 40 trials, respondents were presented with two different search prompts (textual or visual) and two shelf permutations for each of the 10 brand/shelf combinations. Across all respondents, a total of 400 unique target-brand/shelf-configuration shopping scenarios were tested. Eye fixation, latency, and accuracy data were recorded for each trial, and then a survey was administered at the end of the procedure.

**Results**

The manipulations of the target object and shelf appearance had a significant impact on the speed with which shoppers could find the desired products. In the following discussion, the
reported means and significance tests summarize data from the full set of 400 unique shopping scenarios, and the 3,360 (40 trips x 84 respondents) search trials. Only data where targets were present and identified are reported. To help illustrate the findings, example maps of visual attention are presented reflecting specific combinations of shelf organization and search target.

When shoppers have a picture of the desired product in mind, they are much faster at finding the item (p < .001). It took an average of 4.9 seconds for shoppers to successfully locate a product with a textual target, and only 3.0 seconds with a visual target. Figure 5 shows this effect for one of the 10 target brands (Frosted Cheerios). These findings are consistent with research in psychology on feature priming, which demonstrates that visual search for a unique target item is quicker when the property that defines this object is repeated between trials (e.g., Maljkovic and Nakayama 1994).

[Insert Figure 5 About Here]

Looking at the relative performance of the various brands, a distinctive package appeared to improve brand findability, cutting search times from 20 to 40 percent. Compared to the average search time for the category (3.9 seconds), packages with a distinctive color, like the bright green Apple Jacks box or the purple Raisin Bran box, had significantly shorter search times of 2.3 and 3.0 seconds, respectively (p < .01; see, e.g., Figure 6). These findings parallel the results of van der Lans, Pieters and Wedel (2008a), who find that a distinctive package improves brand salience, which helps the product to be identified faster and more accurately.

[Insert Figure 6 About Here]

Additional shelf facings also improve brand findability. When the number of facings was doubled, search times dropped 26 percent, from an average of 3.9 seconds for two facings to 2.9

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1 Product search times were highly correlated with the number of eye fixations (r = 0.89) and gaze trajectory length (r = 0.88) across trips and respondents, and all three measures yielded similar results. We therefore focus on search times in the following discussion.
seconds for four facings ($p < .001$). Figure 7 illustrates this effect for the visual search target Post Bran Flakes. Looking across the experimental conditions, the additional shelf space seems to have the greatest positive impact when the target product is not positioned in the center of the shelf fixture. Chandon et al. (2009) similarly report that the number of facings has a strong influence on visual attention, and this can drive choice for brands that might otherwise not have been noticed.

[Insert Figure 7 About Here]

Neat shelves appear to improve shopping efficiency, while packages that are not arranged in a consistent way can slow down the search process. When the packages on the shelf were not aligned with the shelf edge, but rotated slightly to the left or right, the search times increased 10 percent, from 4.0 to 4.4 seconds ($p < .05$). This effect was magnified when shoppers had just the name of the brand in mind rather than the package image. Comparing the standard brand organization with alternative product groupings (by package color, similarity of visual features, and text orientation), there were no significant differences in search times. Also, as expected, there were no differences in search times for the counter-balanced shelf arrangements; $p = .42$.

Packages that were out of stock dramatically increased search times ($p < .001$). When a desired product was “sold out,” it took shoppers almost 9 seconds to realize that the item was missing from the shelf. The more interesting result occurred when a desired item was actually in stock but the shelves looked depleted (with 30 percent of items out of stock). In this case, respondents were 50 percent more likely to conclude that the item they were looking for was unavailable than when the shelves were fully stocked. They also spent less time looking for the target item ($p < .02$) and looked at fewer items ($p < .08$).
Managing Shopper Engagement and Purchase

The next three studies explore how marketers can connect with shoppers’ needs through relevant signage, store organization, product presentation, and sales assistance. All three studies were conducted in the context of a retail apparel store. The first study uses a computer-simulated shopping environment while the second and third studies report on field experiments conducted in a physical retail store.

STUDY 3: How do a store’s signage and layout affect store penetration and purchase?

Retailers often attempt to connect with shoppers needs and desires and improve shopping convenience through relevant signage and navigational aids, positioned in the store windows and throughout the store. Edwards and Shackley (1992) report that placing displays in the windows of drug stores – especially displays that are relevant to the target audience, feature new products, and use color and contrast –boost product interest, recall, and sales. Burke (2006, 2009) reports that digital signs can drive store traffic and lift product sales, especially when they feature “news” (new items, promotions, seasonal information) and hedonic products (e.g., food and entertainment).

Once shoppers enter a store, a familiar and well organized layout can help them find their way through the complex array of products to locate the desired items (Park, Iyer, and Smith 1989). The effective organization of store interiors and the presence of navigational aids can enhance the perceived “environmental legibility” of the store (Titus and Everett 1995; Weisman 1981), resulting in fewer errors in navigation and lower stress among consumers (Nelson-Shulman 1984; Wener and Kaminoff 1982). The design and layout of stores can aid or hinder
consumer movement inside the store, and reduce or add to the time spent in locating desired products (Sadalla and Montello 1989; Weisman 1981).

When consumers shop in stores with low environmental legibility, this can increase the time and effort required to find the desired products. In such difficult and time-constrained environments, people are more likely to engage in heuristic and noncompensatory processing (Chaiken 1980; Payne, Bettman, and Johnson 1988), focusing on easily processed and distinctive cues, such as price, to make a decision (cf. Dhar and Nowlis 1999). One would therefore expect to see higher consumer price sensitivity in stores with low rather than high legibility.

To explore these issues in more detail, the first author collaborated with Professors Saurabh Mishra (McGill University) and Alex Rusetski (York University) on a project to simulate a specialty apparel store and measure the influence of exterior signage, store organization and navigational aids, and price on shoppers’ penetration of the store and purchase likelihood (Mishra, Rusetski and Burke 2008).

**Research Method**

One hundred and fifty one undergraduate students, enrolled in introductory marketing courses at a major university, participated in the study. Individuals were told that the purpose of the study was to understand how consumers shop in retail stores and the role that consumer goals and the shopping environment play in the shopping process. After giving their approval to participate, people were seated in front of computer displays which were used to simulate the retail shopping environment, present information, and take measurements. The three-dimensional interactive model of the retail context was created with the Auto-des-sys FormZ software
package based on the layout of an actual retail store. The interactive simulation and electronic survey were programmed using Macromedia Authorware and software plug-ins.

Participants were asked to assume that they had traveled to another city to attend a business-casual meeting. Because of the warm weather, they would like to wear a polo shirt but forgot to pack one, and so visited a nearby shopping mall to look for a shirt. Participants entered a simulated shopping mall environment and arrived at the first apparel store, called Elements.

At the first stage of the shopping simulation, individuals could visually scan the exterior of the store, "walking" closer or farther from the window display. They were asked to decide whether they would like to enter the store to look for a polo shirt or shop somewhere else, rating their entry likelihood on a scale from 0% to 100%. At the second stage, individuals entered the Elements store and were asked whether they would like to continue walking through the store to look for the shirt or turn around and leave, shopping somewhere else. Once again, they rated the likelihood on a scale from 0% to 100%. At the third stage in the simulation, participants entered the polo shirt department and could scan the shelf fixture stocked with ladies’ and men’s shirts in various colors. They were asked if they would like to buy one of the shirts at the price shown (assuming the store carried the appropriate size) or shop somewhere else, and rated their purchase likelihood on a 0% to 100% scale, with additional questions about the shopping experience and their personal background. Figure 8 illustrates the manipulation of the store’s exterior and interior appearance.

[Insert Figure 8 About Here]

Participants were randomly assigned to one of eight treatment conditions in a 2 x 2 x 2 full factorial between-subject design. The first factor was a manipulation of the goal relevance of the exterior window display. The store windows featured a total of four posters, two each for
men's and women's fashions. In the high relevance condition, two of the posters featured models wearing polo shirts while two displayed models wearing other styles of clothing. In the low relevance condition, all four models were wearing non-polo-style shirts (see Figure 6). A change was also made to the semi-transparent banner that appeared just inside the store. In the high relevance condition, the male model was wearing a polo shirt, while both the male and female models were wearing other fashions in the low relevance condition. In all other respects, the posters were identical across the two conditions.

The second factor in the design was a manipulation of the environmental legibility of the store’s interior (Titus and Everett 1995). In the high legibility condition, the store used a "racetrack" format, with wide aisles and department signs to facilitate visual and physical navigation. In the low legibility condition, the store had a more conventional appearance, with fixtures placed throughout the store, and there were no department signs. (This format was similar to many existing specialty apparel stores.) To simulate the effects of store legibility on the time needed to navigate the store, participants in the high legibility condition experienced a 10-second delay before they found the polo shirt category while individuals in the low legibility condition took 60 seconds to reach the polo shirt category.

The third factor in the design was product price. In the low price condition, polo shirts were featured at $24.95, and in the high-price condition, the same shirts were featured for $34.95. These values reflected the prevailing range of prices in the marketplace at the time of the study.
Results

The manipulation of the store's window display had a significant impact on shoppers' reported likelihood of penetrating the store. The mean entry likelihood increased from 64% in the "low relevance" condition to 73% in the "high relevance" condition, $F(1, 149) = 9.79, p < .01$. If one assumes that only those shoppers with store entry likelihoods greater than 50% would actually enter the store, the window display manipulation would increase the conversion of mall customers to store traffic from 65% to 83% ($\chi^2 = 6.42, p < .02$). When display attractiveness was included as a covariate in the analysis of the effects of window display on store entry likelihood, the coefficient was statistically significant; $F(1, 148) = 56.11, p < .001$. However, the manipulation of display relevance still had a significant positive impact on store entry likelihood; $F(1, 148) = 5.55, p < .05$.

In the second stage of the shopping trip, respondents were shown a panoramic interior view of the retail environment and asked if they would like to walk through the store to look for a polo shirt, or turn around and leave, shopping elsewhere. The manipulation of store organization and signage did not have a significant effect on shoppers' judgments; $F(1, 147) = .02, p > .10$. The mean shopping likelihood ratings were 64% and 65% in the low- and high-legibility conditions, respectively. Those consumers who chose to enter the store may have felt committed to shop in the store despite what appeared to be a difficult shopping environment. The incremental effort to shop a relatively small (approximately 6,000 square feet) store would be minimal. Supporting this, over 80% of the people who entered the store indicated that they would continue shopping rather than going somewhere else. The correlation between the probability of entering the store and walking through the store was .539 ($p < .001$).
In the third stage of the shopping trip, respondents were shown a panoramic image of the polo shirt category and asked to decide whether to buy one of the shirts at the price shown or to leave and shop somewhere else. As one would expect, the manipulation of price had a significant main effect on purchase likelihood; \( F(1, 143) = 15.88, p < .001 \). The mean purchase likelihood was 60% when shirts were priced at $24.95, but only 44% when they were sold at $34.95.

The more interesting result was the interaction between store legibility and price. For the 111 customers who chose to enter the store, their likelihood of buying in the two price conditions depended on the ease with which they could shop the store; \( F(1, 107) = 6.60, p < .02 \). When customers visited a store that was well organized and clearly signed, with quick access to the desired product, a $10 increase in price produced a small, but statistically insignificant drop in purchase likelihood (\( M_{\$24.95} = 64\%, M_{\$34.95} = 55\%, p > .10 \)). However, when the store environment was not as well organized and the shopping process took much longer, the same price change caused a dramatic decrease in purchase likelihood (\( M_{\$24.95} = 69\%, M_{\$34.95} = 38\%, p < .001 \); see Figure 9). This effect was mirrored by interactions between legibility and price for customer ratings of overall store value (\( F(1, 147) = 4.11, p < .05 \); see Figure 10), and the shopper’s likelihood of recommending the store to a friend; \( F(1, 147) = 8.99, p < .01 \). Once again, price increases only produced a negative effect in the low legibility conditions.

[Insert Figures 9 & 10 About Here]

In summary, the results reveal that a store’s signage and layout have direct effects on store penetration and purchase likelihood, as well as carryover effects on consumer price response and value perceptions. Consumers are willing to pay a higher price for products in

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2 This effect is marginally significant when customers who chose not to enter the store are also included in the sample; \( F(1, 143) = 3.33, p < .07 \).
stores with high environmental legibility, where product organization and signage make it easy and less time consuming to find the desired items.

**STUDY 4: How does product presentation affect shopper engagement and purchase?**

While the store environment plays an important role in creating a convenient and enjoyable shopping experience, the primary focus of the shopper is on the *physical product*, and its presentation can have a powerful effect on shopper engagement and purchase likelihood (Burke 2005). The objective of this study is to explore how merchandising products as “solutions” and folding apparel items to facilitate mental simulation can help retailers to connect with shoppers’ needs and desires and increase sales.

**Research Method**

This study was conducted in cooperation with a retailer selling private-label apparel to young adults (aged 15 to 25) through a chain of mall-based specialty stores. In this particular chain, almost half of the store’s floor space was allocated to men’s merchandise, but men represented less than 30 percent of the chain’s customers and 20 percent of yearly dollar sales. To help identify the reasons for the poor performance with male customers, observational data were collected to measure how customers shopped the men’s section of the store and identify points of engagement and friction in the shopping process. Fifty three hours of observation were conducted in a local store, and the activities of 440 customers (305 men and 135 women) were recorded. (Only data for male shoppers who shopped on the men’s side of the store are reported here.) Trained observers coded each shopper’s path through the store, and the sequence and degree of interaction with shelf fixtures and employees. Purchase transactions were recorded
using the point-of-sale system. Shoppers were randomly selected as they exited the store and asked to complete a short survey with questions about their perceptions of the shopping experience and reasons for not buying.

Of the shoppers observed during the study, over 25 percent of men stopped to examine merchandise on the lead fixture as they entered the store. Many of them walked past the various displays in the center area to the back of the store, arriving at the clearance racks, which again had a high rate of product interaction (+25%). Levels of engagement were much lower with the various product display tables, rounders, and wall displays in the middle part of the store (less than 10 percent). This appeared to be a missed opportunity, as the category-level purchase conversion rates for shoppers who stopped at these fixtures were relatively high (13 to 25%).

When male shoppers were intercepted and asked why they did not make a purchase, most reported that they could not find what they were looking for. This echoes the results of a survey conducted by the Verde Group and Wharton faculty, which found that young men have more problems than women with store navigation and item selection, and will walk away rather than ask for assistance if they can’t find the desired product (Verde Group 2007). When male shoppers were asked why they did not stop to interact with more of the merchandise, a few commented that they could not fold and put back the clothing the way they found it.

Two techniques were used to increase shopper engagement. The first was to group related products together as “solutions.” Complementary products were identified through an analysis of two years of historical purchase data, collected from 54,511 of the retailer’s customers.³ The analysis revealed that certain combinations of products were often purchased

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³ The dataset only included purchases that could be linked to an individual customer’s identity through a credit card, loyalty card, e-mail solicitation, catalog, or online purchase. Therefore, cash purchases were not captured in this database. In a typical store, 80 to 90% of transactions are completed with a credit card, so the dataset should provide a representative sample of the kinds of products customers purchased at the chain.
together, including men’s shorts with graphic tees ($r = .413$) and active tops (.346); men’s denim with sport shirts (.379), knit tops (.389), and active tops (.414); and men’s footwear with active tops (.280), graphic tees (.276), sportshirts (.274), and shorts (.262). To help men put together outfits, a “Men’s Style Center” was created using six bust forms featuring popular combinations of men’s shirts, shorts, and flip-flops, positioned in close proximity to tables with product inventory (see Figure 11). The Style Center was located near the center of the store, and would be seen by shoppers as they passed the lead fixtures.

[Insert Figure 11 About Here]

The second technique for encouraging product interaction was to change how products were folded on tables. Instead of using the conventional creased fold, shirts and pants were simply folded in half and stacked. The goal was to make it easier for shoppers to imagine picking up, examining, and returning a product to the shelf (see Elder and Krishna’s 2012 discussion of embodied mental simulation).

A field experiment was conducted in one of the retailer’s stores to test the impact of the presentation manipulations on shopper behavior. The study was run during the May/June time frame, when sales were traditionally stable, and not affected by major promotions, clearance events, or “back to school” shopping. During the one-month baseline period, products were displayed in their conventional locations, as prescribed by the retailer’s standard floor set and planograms for the season. During the subsequent one-month test period, the Men’s Style Center was assembled in the center of the men’s section, with merchandised products available for sale on adjacent tables. Sales data were collected using point-of-sale terminals; customer traffic was recorded using ShopperTrak Orbit sensors; and product fixture interaction was captured through covert observation by trained observers.
Results

The findings support the prediction that enhanced product displays make it easier for customers to shop, driving store traffic, product interaction, and sales. Compared to the baseline period, total store traffic increased 11 percent during the test period (from 537 to 596 customers per day); transactions increased 20 percent (from 129 to 154 per day, $p < .05$); and unit sales increased 18 percent (from 266 to 313 units per day, $p < .05$).

The Men’s Style Center had an even more dramatic impact on shopper interaction with the featured products. The percent of shoppers who stopped to examine the men’s shirts and cargo shorts jumped from 2.9 percent to 13.3 percent; and examination of the accompanying flip-flops had a similar increase from 2.0 percent to 10.3 percent ($p < .05$). This increase in attention translated into significantly higher sales. The unit sale of men’s knit tops increased 54 percent (from 13 to 20 per day, $p < .05$), and dollar sales increased 74 percent (from $219$ to $380$ per day, $p < .01$). The unit sales of men’s shorts increased 36 percent (from 14 to 19 units per day, $p < .05$), and dollar sales increased 20 percent (from $432$ to $518$). In contrast, sales in these categories were flat or declined during the same period in the previous year. Note that there were no changes to the prices or assortment of products. The store simply did a better job of connecting what was in the mind of the shopper with what was physically available in the store.

**STUDY 5: What role do salespeople play in influencing shopper behavior?**

When a customer can’t find the product that he or she is looking for, a salesperson can intervene in the shopping process and play an active role in clarifying and addressing the shopper’s needs (Pennington 1968; Weitz 1981). Interactions with salespeople can enhance shopper engagement by slowing down the shopper, encouraging a longer store visit, and
increasing product interaction and purchase (Zhang et al. 2013). Retail sales associates have various selling tactics at their disposal, but often with limited knowledge about which of these will be most effective. The objective of the next study was to investigate the different selling approaches that are used by sales associates, and identify which are most (and least) effective at converting customers into buyers. This study was conducted by Professors Katie Hartman and Rosann Spiro (2006), and described here with their permission.

**Research Method**

In the fall of 2005, a study of sales associate-customer interaction was conducted in a mall-based specialty apparel store. During this period, sales associates were asked to wear concealed microphones to record their conversations with shoppers. Each device could record conversations for a two-hour interval, and then the audio data were saved and the device was passed along to another sales associate to wear for the next two hours. Two or three different sales associates stationed in the main selling area of the store (not the fitting room or cash wrap) might wear a device during a given day.

At the completion of each shopper’s store visit, the number of items purchased was recorded by the sales associate. Shoppers were then given a “customer appreciation card” which offered them a gift card ($10 off the next purchase over $50) if they completed an online survey and entered their unique customer ID number. This short (10-15 minute) “exit interview” asked about the shopper’s reasons for visiting the store, shopping companions, items purchased, recollections of the sales interaction, satisfaction with the shopping experience, repeat patronage intentions, and demographics.
Results

The research team transcribed and coded the audio recordings of the conversations and merged the data with the survey responses. A total of 46 “tracked” conversations (matched to customer surveys) were coded. There was considerable variability in the length of conversations between sales associates and customers, ranging from 30 seconds to 19 minutes. Most interactions were relatively short, with an average length of 4.5 minutes. About half of the conversations lasted less than 2.5 minutes. A typical conversation between a sales associate and customer is as follows:

1. A sales associate makes an inquiry as an opening statement (e.g., “Is there something I can help you find today?” “How are you doing today?”);
2. A series of questions are asked to identify customer product interests (“What colors do you like?” “Do you want a small or medium?”);
3. A series of statements provide product information (“We have this style in brown and green,” “The jeans we carry are available in different washes and cuts”);
4. A conversation closer (“Here you go,” “Would you like me to get you into a fitting room?”); and
5. When necessary, a follow-up inquiry (“How’s that working out for you?” “Can I get you a different size?”).

A content analysis of the conversations revealed that sales associates were most likely to ask shoppers questions to elicit additional information (92% of conversations); provide the customer with product information (87%); and offer assistance or aid to the customer (80%). Less frequent comments involved sales associates sharing their personal opinions (which were always positive, 48%); recommending a particular product, style or size (25%); describing personal experiences with a specific product (25%); passing along the opinions of other customers (15%); and/or suggesting a different (or additional) product, style, or size than what the customer is currently considering (12%).
In some conversations, the sales associate attempted to \textit{proactively address or anticipate the customer’s needs and wants} by making product suggestions, sharing personal experiences about the product, offering to get the customer into a fitting room, making a product recommendation, etc. For example, the associate might say, “I found the dark jeans you were looking for in a size 6. I also found other jeans in a size 6 that you might like. Would you like to take a look at these?” In other conversations, the sales associate was more reactive, simply responding to the customer’s verbalized needs. For example, “I found the dark jeans you were looking for in a size 6. Let me know if you need anything else.”

When proactive conversations were compared to reactive conversations, the former produced significantly higher average sales ($97 vs. $62), and shoppers who engaged in these conversations felt that the salesperson was more persuasive (although their satisfaction levels were not higher). The content analysis revealed several specific comments that seemed to drive higher shopping baskets, as listed in Table 1.

[Insert Table 1 About Here]

The data indicate that sales associates frequently missed opportunities to personalize conversations with individual shoppers. Personalization could include general comments such as making small talk or sharing personal information, and product-specific comments like complimenting the customer on his/her appearance, asking personal questions, or sharing personal product experience. Surprisingly, the study revealed only three instances in which a sales associate directly or indirectly complimented or flattered the customer (e.g., “That looks nice on you,” “Cute,” “That’s a good color for you”). In all three instances, customers reported the highest level of satisfaction with the employee at the time of purchase (5 on a 5-point scale); the highest level of influence attributed to the sales associate; and the highest level of satisfaction
with store employees during all past shopping experiences. Chan and Sengupta (2013) also find that salesperson flattery can lead to higher sales, even for customers who overhear the conversation.

Other social factors can also play an important role in the shopping process, affecting the time shoppers spend in the store, the departments they visit, and the specific products they notice, pick up, and purchase. For example, Hui, Bradlow, and Fader (2009) find that grocery shoppers are drawn to areas of the store with high shopper density but spend less time visiting these regions. Zhang et al. (2013) report that crowds in a mall store can sometimes be beneficial, as a busy store can attract shoppers into its departments and encourage product interaction, but higher levels of shopper density can interfere with the shopping process, reducing the likelihood of purchase.

Conclusion

Retailers typically assess store performance using measures like change in same-store sales, gross margin, direct product profit, sales per square foot, and return on inventory investment. While these metrics can help guide store operations and improve productivity, they provide little insight into the unmet demand of shoppers and the obstacles they face when attempting to find and buy desired products. Several new research techniques have become available, including video-based customer tracking, virtual reality simulations, and eye tracking, that measure how shoppers allocate their attention across the available products and displays in the store. Merchants can leverage these tools to identify the factors that drive shopper engagement and purchase, as well as the points of friction in the shopping process, and create store environments that better connect with shoppers’ needs and desires.
This paper summarizes several recent studies which use these tools to begin to map out how various elements of the store environment can facilitate or impede the shopper’s journey. Critical factors include the interaction between shopper’s goals and the available product assortment, package appearance, price, and merchandising; shelf space allocation, organization, and adjacencies; and salesperson interaction and crowding conditions. The research reveals that small changes to the shopping environment, such as showing the right product on window signs, grouping products into solutions, folding items to encourage touch, and offering a compliment to the shopper, can have a powerful impact on shopper engagement and purchase conversion.

The research also suggests several promising avenues for future research. For example, the simulation research demonstrates that shoppers who have a picture of a desired brand in mind are faster at finding the item on a store shelf. However, additional research is needed to determine if this mental picture makes shoppers more susceptible to distraction from similar looking competitors (cf. van Horen and Pieters 2012). We observed that shoppers are more willing to pay a higher price for merchandise in a store that is well organized and signed, but it’s still unclear if this is because the psychological costs of shopping are lower, or such stores convey a higher-quality image that casts a positive halo on the products (cf. Baker et al. 2002).

Of course, there will always be a role for talking with customers to better understand their requirements, their perceptions of the store environment, and opportunities for improving the shopping experience. Researchers can use personal interviews, focus groups, and surveys, alone or in combination with tools discussed in this article, to explore how customer characteristics interact with attributes of the store and product categories (e.g., Inman, Winer and Ferraro 2009).

Looking ahead, observational research technologies will continue to evolve to capture more detailed information about shoppers and their behavior. For example, using computer
vision techniques, we can automatically code the demographic characteristics of shoppers (e.g.,
gender, age category, ethnicity), estimate their height and weight, record their interactions with
products and displays, and analyze their facial expressions to measure their emotional reactions.
As marketers experiment with these new tools, it’s important to consider issues of consumer
privacy and shopper reactance. Companies must act responsibly to protect shoppers’ identities
and personal information, and to secure their informed consent if any risks are involved.

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# TABLE 1
The Influence of Salesperson Comments on Customer Behavior

<table>
<thead>
<tr>
<th>Conversation Content</th>
<th>Conversations with content</th>
<th>Avg. sales w/content</th>
<th>Avg. sales without</th>
</tr>
</thead>
<tbody>
<tr>
<td>The sales associate working with a customer specifically recommends a particular product, style, or size. Statements that provided a product recommendation were characterized by an explicit expression suggesting a particular product.</td>
<td>25%</td>
<td>$107</td>
<td>$75</td>
</tr>
<tr>
<td>The sales associate working with a customer explains his or her own experiences with a particular product. Product experience provided information about product purchases, product wear, and/or product care.</td>
<td>25%</td>
<td>$92</td>
<td>$80</td>
</tr>
<tr>
<td>The sales associate working with a customer suggests a different (or additional) product, style, or size than what the customer is currently considering.</td>
<td>12%</td>
<td>$91</td>
<td>$83</td>
</tr>
</tbody>
</table>
FIGURE 1
Visual Attention During Store Navigation

Note: The contour plots show the density of visual attention in each region (in seconds). When shoppers pause in a specific location of the store to examine merchandise, statistics are calculated for the average number of fixations, dwell time, and number of “clicks.” Shoppers indicate purchase interest by clicking on products, displayed as crosses.
FIGURE 2
Visual Attention to Product Promotions and Displays

Note: Promotional signs (e.g., “Buy one, get one free”) and in-aisle temporary displays attract two to four times the visual attention of surrounding merchandise.
FIGURE 3
Visual Attention as a Function of Category Dwell Time

Note: The contour plots show the percentage of attention across the visual field as a function of the shopper’s dwell time. For brief fixations (less than a second), shoppers tend to focus on the center of the product display. If they are engaged by the category, their visual attention expands outward as they scan the shelves.
FIGURE 4a
The Influence of Shopper Goals on Visual Attention to Produce Items

Browsers

Tomato Shoppers
The Influence of Shopper Goals on Visual Attention to Bakery Items

**FIGURE 4b**

**Browsers**

**Donut Shoppers**
FIGURE 4c
The Influence of Shopper Goals on Visual Attention to Checkout Items

Browsers

Magazine Shoppers
FIGURE 5
Search Speed and Visual Attention as a Function of Target Type (textual/visual)

Text Target: Frosted Cheerios

Visual Target: Frosted Cheerios
FIGURE 6
Search Speed and Visual Attention as a Function of Target Brand

Visual Target: Golden Grahams

Visual Target: Apple Jacks
FIGURE 7
Search Speed and Visual Attention as a Function of Number of Shelf Facings

Visual Target: Post Bran Flakes – 2 Facings

Visual Target: Post Bran Flakes – 4 Facings
FIGURE 8
Store Context Manipulations

Stage 1: Exterior Window Display

Stage 2: Store Interior

Stage 3: Product Category

Price: $24.95

Price: $34.95
FIGURE 9
Effect of Store Legibility and Product Price on Purchase Likelihood
(subjects who decided to enter the store, N=111)

FIGURE 10
Effect of Store Legibility and Price Level on the Rating of Store Value
FIGURE 11
Product Merchandising Manipulations

Baseline Condition

Initial Product Presentation

Test Condition

Men’s Style Center  Adjacent Products (half fold)