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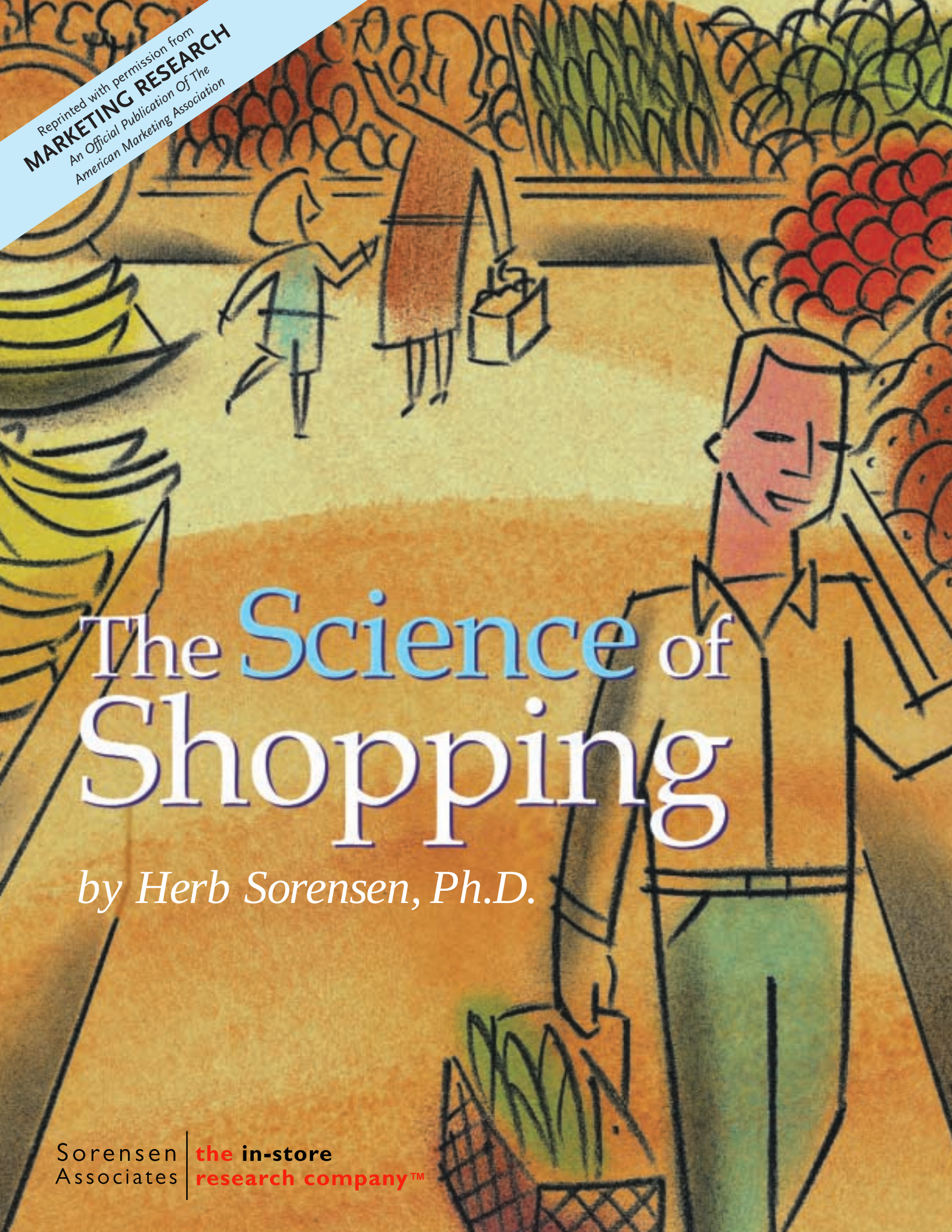


The Science of Shopping

by Herb Sorensen, Ph.D.

Sorensen Associates | the in-store research company™

Location is important, but it's not everything.

By Herb Sorensen

Since the earliest days of trade, marketing has sought to resolve the gap between merchandise and the customer in two basic ways: Bring the merchandise to the customer or bring the customer to the merchandise.

So marketing has rightly always involved distribution and transport to facilitate sales transactions, as well as attraction of shoppers to the point of purchase. This report will show how distribution and attraction are perhaps badly misapplied on the sales floor of supermarkets. And once the principles are established in supermarkets, extrapolation to other classes of trade seems obvious.

There is, of course, a large volume of data (and analysis) on what shoppers carry out the door of the store. Since the 1970s there has been no dearth of scan data to provide grist for the analytical mill. But what is missing is any kind of comprehensive, global data on the actual performance and behavior of shoppers in the aisles of the store that led to these purchases. Other than small samplings representing at most a few hundred shopping trips, no one has attempted to tabulate the details of shopping for tens or hundreds of thousands of trips. The study partially reported here begins to fill that breach with analysis of 200,000 shopping trips.

The study began as a matter of curiosity about the global behavior of shoppers in supermarkets. By global I mean every shopper from wall-to-wall and entrance-to-exit, not just a sampling that might focus on a particular point of interest for either the retailer or the manufacturers. The results we found were surprising.

Executive Summary

By using electronic tracking to monitor shopper behavior, researchers have uncovered millions of data points that have eluded smaller traditional samplings. This article discusses elements of a system for quantitatively analyzing shopper behavior on a wall-to-wall, entrance-to-exit basis. Measures of shopper density, flow, conversion rates, and speed of purchasing demonstrate the impact of location on shopper behavior, independent of the products in front of them.

Tracking Methodology

To conduct the type of studies envisioned, we acquired a tracking system to provide data on the location and paths of shoppers. When this study began, the only available system judged practical for the purpose was the real time locate system (RTLS) produced by Symbol Technologies/WhereNet. It would obviously be of value to track the shoppers themselves, but the technology for doing this effectively on a whole-store basis is not yet commercially available. Therefore, the locations of shopping carts and baskets were used as surrogates for the location of the shoppers. The tracking system consists of four elements:

- A small "tag" mounted under the shopping cart that emits a uniquely coded signal every four seconds
- An array of antennae around the perimeter of the store that continuously monitors the signals from each cart and basket
- The WhereNet/Symbol locate processor system that uses differential time of arrival (DTA) algorithms to iteratively triangulate the location of the "tags"
- The PathTracker software system that integrates location data, purchase transaction data (from the checkout), and planogram data to produce marketing variables

Here we'll focus on one area of learning from the PathTracker laboratory store (a typical suburban neighborhood supermarket) and show how this learning can be leveraged to understand shopping behavior in supermarkets across the United States, with some amplification and clarification through an audit of 150 supermarkets in the United States, England, and Australia.

Traffic Flow and Purchasing

Before continuing, a brief description of the store is necessary. There is one main entrance, with the floral and produce on the immediate right and the in-store bakery and service deli forming a boundary to the left of produce. The perimeter "racetrack" continues across the back of the store from wine, seafood, fresh and processed meat, cheese, and yogurt to the fluid milk in the far corner from the entrance. Then there are the 12 center-of-store aisles and, finally, the checkout and service counters across the front of the store and the exit (which is also a secondary entrance).

A flow diagram showed us that the dominant movement of shoppers around the perimeter of the store is in a counter-clockwise (CCW) direction. This is a consequence of the store entry being located on the right side of the shopping area. An audit of 100 stores verified that right-side entries favor counter-clockwise patterns while left-side entries favor clockwise (CW) patterns.

The significance here is that CCW shoppers spend, on average, $2 more per trip than do CW shoppers. The implication is that putting the store entry on the left is a poor design choice. There is a wide variety of learning from this, but of greatest interest here are the fundamental issues of marketing: distribution and attraction.

Push vs. Pull

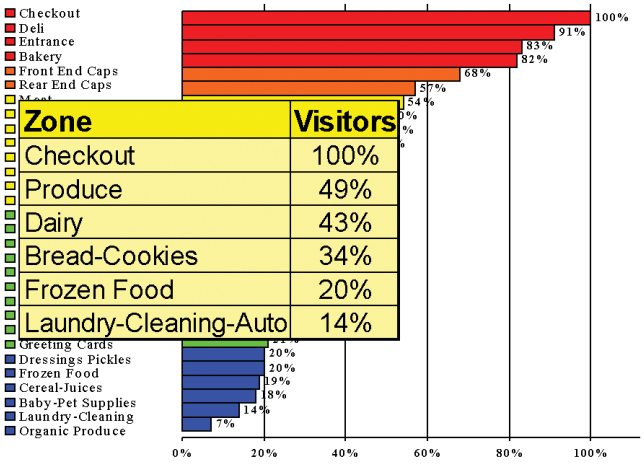
One of the first and most important findings from this study was that the average shopping trip only covers about 25% of the store. In looking at the 30 zones or departments in the store, we can learn something about the population that we have available to sell to at any given location. In our marketing paradigm, these are the potential customers who have been "pulled" to a rendezvous with the products that we have "pushed" to that location.

Here we introduce an important concept for managing merchandising in the store—EffectiveDistribution. Distribution has long been measured as a percentage of all commodity volume (ACV). Thus, a product with an ACV of 90% is generally available to customers in about 90% of the outlets where relevant commodities are sold. So, in focusing on distribution, the manufacturers and retailers give their attention to getting products into the store.

But simply getting the product into the store is very ineffective if in fact only a small percentage of shoppers actually visit the area where the product is sold. Another way of saying this is that, in order for the distribution to be effective, the products must be distributed to right where the shoppers are. This means that, if a product has a 90% ACV but is in a location of the store that only 20% of the shoppers visit, then its EffectiveDistribution is actually 18% (90% x 20%). The actual EffectiveDistribution for some of the zones or departments in the PathTracker Laboratory store is seen in Exhibit 1.

In Exhibit 1 we see that only about half the trips pass through the produce area. Since it's at the beginning (or end) of the racetrack, this means half the shoppers are not using the racetrack mode of shopping. It is the half of the shoppers using the racetrack that the store caters to best. And they do tend to buy more than the other half of shoppers. However, we can study the shopping patterns of the half of shoppers not using the racetrack to learn how to best meet their needs, beginning with pushing the products they're interested in onto their paths.

Exhibit 1 Actual effective distribution



Zone	Visitors
Checkout	100%
Produce	49%
Dairy	43%
Bread-Cookies	34%
Frozen Food	20%
Laundry-Cleaning-Auto	14%

One might reasonably ask why shoppers visit certain areas and not others. Is it simply that they're interested in some categories and not others? This is almost certainly the case in some instances. (See the discussion of anchor departments under "The Microstore Hypothesis" section.) However, it is clear that many items on the shoppers' paths will result in opportunistic impulse purchases. The concept of EffectiveDistribution moves the focus from the products to the paths. This, in turn, encourages better management of this large, unplanned (non-search for) segment of shopping.

Our purpose here is not to do a detailed analysis of EffectiveDistribution at the department and category levels, but to illustrate the right way to think about this most important aspect of merchandising—put the right products in front of the right shoppers, rather than trying to attract the shoppers to the merchandise or expecting them to find (search for) the merchandise.

Conversions

In developing an analysis system for shopping, it's helpful to break the entire shopping/merchandising process into component parts. So far we have looked at only the aspect of shoppers visiting various areas and have recognized that, by putting merchandise where they are, we are effectively distributing products to them. In doing this we skipped entirely the issue of what shoppers see before or during their visit to an area or zone, a measure we call EyeShare. But we will now move on to the second most important measure that relates to what shoppers do when they visit an area—conversions.

There are two conversions that must occur to achieve a sale. First, those shoppers who visit the area where the merchandise is displayed must shop the merchandise. That is, they must do more than simply pass by; they must typically pause or stop to examine (or shop) the merchandise. The first conversion is from visiting to shopping. The second conversion occurs when the shopper actually selects the merchandise and puts it in their cart or basket. This conversion is then from shopping to buying. Together, we refer to this as DoubleConversion.

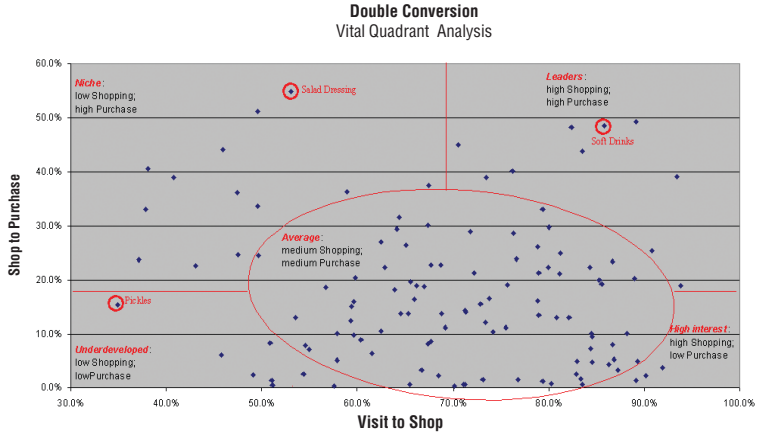
It's important to note that we base these conversion rates not on visitors to the store, but on visitors to the specific merchandising area. This is because we want to separate the issue of traffic (visits) from the issue of shopping/buying (conversions) so we can evaluate them independently. Exhibit 2 illustrates the conversion matrix for the 170 subzones in the test store.

We follow Paco Underhill in identifying the four conversion quadrants: leaders, high interest, niche, and underdeveloped. However, as noted above, we base these conversions on visitors to the subzone rather than visitors to the store. In addition, following J.M. Juran, we focus on the vital few by applying the concept to quadrant analysis. With the VitalQuadrant we identify those merchandise categories that lie within one standard deviation of the mean (elliptically). This helps us focus on those categories that can benefit from attention. For example, pickles have low conversions at both levels, from visit-to-shop and from shop-to-buy. This identifies the category as an underdeveloped or underperforming category. Obviously, the manufacturer of the merchandise might attempt to improve one or the other of the conversion rates, either of which may improve sales.

For the retailer it's more a matter of asking, "Do the conversion rates of pickles justify the amount of exposure I am giving them?" The problem is that "exposure" is very nearly the only asset the retailer has to generate sales. (Exposure equals shoppers in front of merchandise.) In this particular case, pickles were actually receiving relatively high exposure (EffectiveDistribution), but were not delivering the sales. This spells opportunity, especially if we can identify a merchandising leader that's not getting adequate exposure.

There's a very important distinction to be made here: A merchandising leader is not simply a product that's producing a lot of sales at the cash register, but one that's delivering a lot

Exhibit 2 Conversion matrix



of sales in relationship to the amount of traffic it's receiving. DoubleConversion is the tool to classify product performance. EffectiveDistribution can determine whether a particular category is getting over or under exposed.

The Speed of Shopping

There are a dozen different tools in the PathTracker Tool Suite. So far we've looked at the high points of the two most important ones. The third most important tool is the speed with which shoppers make their purchase of a particular item, what we refer to as the BuyTime. We measured this as the number of seconds the shopper spends in the immediate vicinity of a specific item purchased.

Whereas the other measures refer to zones and categories, the BuyTime is specific to individual products. When BuyTime is reported for a category or larger division, it necessarily refers to an average for those items purchased in that area—weighted because each individual purchase has its own individual BuyTime.

As with the other measures, BuyTime has a somewhat different value and use for the manufacturer than for the retailer. For example, two factors that might increase the amount of time it takes to make a purchase are confusion and emotional involvement. For salad dressings, one item stands out as requiring an extraordinary amount of time to purchase—squeezable mayonnaise. Given the unlikelihood of much emotional involvement in this purchase, confusion and uncertainty over whether this item will fill the shopper's need is a more plausible explanation. The long BuyTimes for soup are probably driven by a different confusion and uncertainty, which is a consequence of the multiplicity of choices. On the other hand, although baby foods provide a similar confusing multiplicity, it seems likely that selection of food for the baby is an emotionally freighted decision.

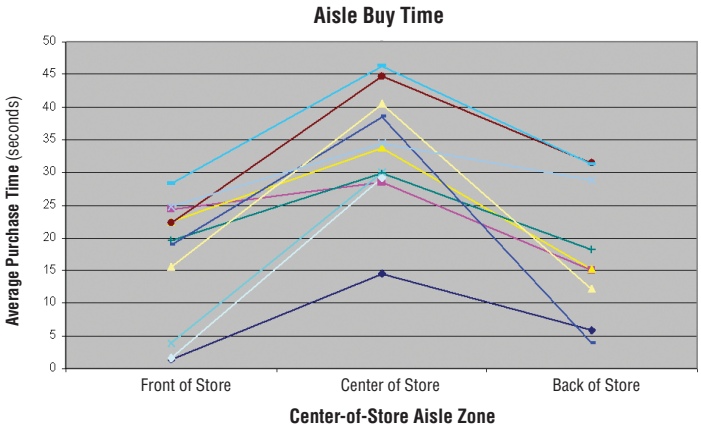
These types of considerations are of prime concern to manufacturers relative to their categories. But for the retailer (and manufacturer with a global shopping perspective), BuyTime has important implications in positioning displays around the store.

Again, there is an interaction with EffectiveDistribution: Products with high BuyTimes need to be placed where shoppers will not be crowded or hurried in their selection. Conversely, very low BuyTimes are evidence of grab-and-go or impulse type shopping. A VitalQuadrant analysis of BuyTime vs. EffectiveDistribution can help pinpoint congestion and suggest alternate locations for merchandise.

The speed of shopping is also a significant factor in understanding many aspects of store traffic. Exhibit 3 illustrates how the shopper's location in center-of-store aisles affects their BuyTime.

The striking thing about this chart is that it shows the same basic pattern repeated for nearly every center-of-store aisle! The discussion about the effect of confusion and emotion on BuyTime is somewhat misleading. In fact, each of the examples cited were selected from the 15% of categories that don't conform to the pattern illustrated here. Consequently they've been eliminated from Exhibit 3 as outliers. For example, the BuyTime for baby food, which is merchandised at the back of an aisle, is not shown.

Exhibit 3 How location affects purchase



This would be a hazardous step if we did not have consistent store-wide data (and now some limited cross channel data from convenience, drug, and specialty stores) showing that how shoppers shop at any given point is far more controlled by their location than the products in front of them. The exceptions to this rule are significant, but are still a small fraction of the merchandising going on in the store.

The Micro-Store Hypothesis

A full account of all the tools available is beyond the scope of this report. And we can hardly begin to explain their application to every nook and cranny of the store. What we have shown here is the beginning of a systematic way to look at the shopping experience and have discovered the immense importance of location.

It has long been a dictum in the real estate business that there are three important factors that affect the value of real estate: location, location, location. With our finding that 85% of the shopping experience is location driven, we establish a parallel to the real estate business. Before expanding on this theme, however, it's worth noting that thinking about merchandising strictly in locational terms is counter-intuitive.

For myself, the counter-intuitive nature of location thinking comes from an entire career focused on the products on the retailer's shelves, and studying the shopper's interaction with those products. In this paradigm, all is determined by the interaction between the shopper and the product in front of them. Perturbations of that interaction are expected to come from other products in the consideration set (e.g., competitive items), the composition of the shopping party, the presence or absence of a list, etc. In fact, the many locational studies we have conducted over the years addressed questions like whether new product X should be sold in location A, location B, or location C. But the interesting thing is that locations A, B, and C were in reality defined not as geographic locations,

but as product categories A, B, and C. This is an absolutely essential point to understand: This type of "locational" study is in reality just another product relational study. Dealing with "xy" Cartesian data is a novel experience.

Frankly, I spent several frustrating months wading through reams of PathTracker data looking for product insights that would answer retailers' and manufacturers' questions about how to merchandise the products that they're all passionately interested in selling. The outlined center-of-store BuyTime aisle analysis was an epiphany that dislocated my product paradigm—and showed the way to a whole new way of looking at the shopping experience, known as the location hypothesis. Subsequently, the validity of this hypothesis has been confirmed over and over.

I make these comments because thinking in terms of location not only requires a paradigm shift, but it opens the doors to new types of questions about merchandising. In fact, merchandising a single category or section can be thought of as the management of a "micro-store." For this purpose we can think of a single supermarket as being a microcosm that parallels a single shopping mall.

We need to see where the customer goes in the store and select appropriate merchandise to place there, not expect them to come to the product.

Just as a shopping mall has a few anchor stores, so the supermarket has a few "anchor departments." This includes items that are thought to be powerful enough forces to attract shoppers to their locations, things such as produce, meat, dairy, and bakery. Anchor stores in the mall and "anchor departments" in the supermarket are thought to be traffic builders and thus are dispersed around the property for the convenience of the owners and managers—not really for the convenience of shoppers. Whether this is a good idea or not is probably an open question. Has anyone every really tried to build a store just the way shoppers might want it? And how could "how they want it" be known without detailed knowledge of their chosen paths and behavior?

These are pertinent questions because quite obviously a great deal of merchandising management is done in an effort to manipulate the shopper into buying more. This is a very laudable goal, but the question remains: How far should you go to meet the customer where they are, rather than attempting to move them?

This returns us to our original perspective about bringing the merchandise to the customer but at the same time expecting the customer to come some distance to meet the merchant. The entire point of EffectiveDistribution is to move beyond the idea that having a product in the store is an adequate distance to go in meeting the customer. Rather we need to see where the customer goes in the store and select appropriate merchandise to place there, not expect them to come to the product. It's the retailer's duty and opportunity to go the final mile. This means rational space management requires a detailed understanding of where shoppers go (location, location, location).

Pushing this idea further, given the large number of micro-stores in a typical supermarket, what is the best management style to optimize the location of merchandise sections? Bear in mind that even a modest sized supermarket has at least several hundred micro-stores, in addition to the anchor departments.

Presently all management of these markets is largely under central control by the store management. There are good reasons to think there is a better way—beginning with the miserable failure of command economies in heavily socialized or communistic countries. Although application of PathTracker principles to merchandising are yet embryonic, simply defining scientific merchandising will not allow implementation of true market forces within individual stores. This will require some loosening of the control of individual micro-markets so they can compete with each other for exposure to the proper shoppers. That is, bread must be allowed to compete with crackers (or breakfast cereal) on a level playing field without the central management of a "planned" economy.

The mall parallel here is the opportunity that individual stores within the mall have to compete with other stores. Although the mall leasing agent and contracts may manage this competition to an extent, individual stores can succeed or fail on their own merits in relation to the traffic that passes them.

We conclude that as the PathTracker project moves forward, not only must we elucidate scientific merchandising, but also capitalistic management of the micro-stores within the retail stores. We see the growing system of category captains as one step in this direction. But the role of the captains needs to be expanded to not only the internal management of the category within the micro-store, but in competing with other micro-stores for store traffic and location. ●

Additional Reading

Underhill, Paco (1999), *Why We Buy: The Science of Shopping*. New York: Simon & Schuster.

Juran, J.M. (1974), *Quality Control Handbook*, 3rd ed. New York: McGraw-Hill.

Author's Note: The author thanks Peter Fader of Wharton for his encouragement and suggestions about this work. PathTracker™, EyeShare™, EffectiveDistribution™, DoubleConversion™, VitalQuadrants™, and BuyTime™ are trademarks of Sorensen Associates Inc.

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Herb Sorensen, Ph.D., is an international authority on understanding in-store shopping behavior. Dr. Sorensen is the founder and president of Sorensen Associates, an in-store, context-based market research company that has provided shopper insights for retailers and manufacturers for over 30 years. Clients include Fortune 500 brands Procter & Gamble, Starbucks, General Mills, ConAgra, Kraft and Walgreen's. Referring to Sorensen's focus on quantitative measurement of shopper behavior, ***Baseline Magazine*** has said, "Herb Sorensen and Paco Underhill are the yin and yang of observational research." Dr. Sorensen is a panelist on RetailWire's BrainTrust and is collaborating with the Wharton School of Business on his newest research on shopper tracking. More information is available at www.sorensen-associates.com.

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