Consumers’ Perceptions of the Assortment Offered in a Grocery Category:
The Impact of Item Reduction

In the early 1990s, traditional-format grocery retailers began losing sales to “alternative format retailers” (e.g., Walmart) whose superior operating systems provided a 26% cost advantage (Food Marketing Institute 1992). A follow-up industry study (Kurt Salmon Associates 1993) suggests that to survive traditional grocers needed to reduce the costs (e.g., warehouse inventory, space occupancy) associated with carrying broad assortments. Moreover, these increased costs did not appear to generate increased sales, as approximately one-quarter of the items in grocery stores sold less than one unit per week (Jager 1996).

To lower operating costs, grocery retailers were urged to adopt “Efficient Assortment,” whereby low-selling stockkeeping units (SKUs) are eliminated from a category’s offerings (Kurt Salmon Associates 1993). Retailers have resisted the suggested cutback in category offerings on the basis of research that shows assortment perceptions to be related positively to consumer attitudes toward the store (Arnold, Oum, and Tigert 1983; Craig, Ghosh, and McLafferty 1984; Louviere and Gaeth 1987). Assortment is defined by retailers as “the number of different items in a merchandise category” (Levy and Weitz 1995, p. 30). Retailers fear that shoppers will notice that the offering has been reduced, lower their assortment perceptions, and be less likely to shop in that store.

To resolve this dilemma, grocery retailers need a clear understanding of the link between the number of items offered in a category and assortment from the consumer’s perspective. In partial response, recent industry studies have examined the impact of SKU reduction on category sales. A 1993 Food Marketing Institute study finds that reducing the number of SKUs in six test categories (cereal, toothpaste, salad dressing, toilet tissue, spaghetti sauce, and pet food) in three retail chains resulted in no significant loss in category sales. A study reported in Progressive Grocer (Krum 1994) finds...
that reducing the number of SKUs from 26 to 16 in the cat
box filler category resulted in no significant loss in category
sales between the 23 control and 23 test stores.

Furthermore, as part of a comprehensive grocery study, Drez, Hoch, and Park (1994) customized shelf space on the basis of sales movement in eight test categories at a large grocery chain. Shelf facings of SKUs were either increased or decreased in proportion to historical sales, which deleted approximately 10% of the less popular SKUs, while holding shelf space constant. Interestingly, aggregate sales increased nearly 4% between the 30 control and 30 test stores.

Together, these studies provide preliminary evidence that SKU reduction might not have the feared negative effects and even might result in considerable gains for the retailer. However, a null effect of SKU reduction on short-term category sales does not preclude a lowering of consumer assortment perceptions with a potential long-term negative impact on category sales and store choice. Because these previous studies do not directly measure consumer assortment perceptions, it is difficult to draw any conclusions. Because of the financial significance of this issue to today’s grocery retailers, an understanding of those forces that drive consumer assortment perceptions is needed (Drez, Hoch, and Park 1994). Our objective is to directly examine the effect of SKU reduction on consumer-defined assortment.

In this article, we present two controlled lab experiments that shed light on the links among the number of SKUs offered in a category, consumers’ perceptions of the assortment offered, and store choice. Our purpose is to examine three research questions: (1) To what extent are consumers’ assortment perceptions determined by the total number of SKUs on the shelf? (2) Are consumers’ assortment perceptions driven by cues other than the total number of SKUs? (3) Do changes in assortment perceptions cause changes in store choice?

ASSORTMENT PERCEPTION CUES

A key finding from previous research on decision making is that most choices made in grocery stores are very low in involvement; consumers do not actively process available information about choice alternatives (Dickson and Sawyer 1990; Hoyer 1984). For example, a study by Inman, McAlister, and Hoyer (1990) demonstrates how shelf tag cues, rather than actual price discounts, were employed by less-motivated consumers to determine if a brand was on sale. Given the limited in-store processing of consumers, we make two basic assumptions: (1) Consumers are unlikely to make active assortment perceptions each time they are at a store, and will do so only if there is a drastic change, and (2) Assessments of change are likely to be influenced by simple, and potentially nondiagnostic, cues.

A psychological theory that is relevant to understanding consumer assortment perceptions is Brunswik’s (1955) lens model. Brunswik posits that to understand human perception, the “lens” through which the person views the stimulus must be examined. The objective of Brunswik’s lens model is to identify the directly observed cues that constitute this perceptual lens and assess the accuracy between a person’s use of these cues and the cues’ relationship with a distal variable in the environment.

Retailers have failed to consider that the lens through which consumers view assortment might not correspond to their objective definition of assortment, as the total number of SKUs in a category. That is, retailers have assumed that there is a one-to-one correspondence between consumer perception of the distal stimulus of assortment and the cue of the total number of SKUs offered in that category. We argue that this correspondence might not hold for two reasons. First, given their limited processing, the lens through which consumers view assortment might be based on other, more simple cues rather than on an actual counting of the number of SKUs. Although many potential cues exist, we narrow our investigation to two cues that involve minimal cognitive effort and are tied most closely to the Efficient Assortment decision. Specifically, retailers focus on two issues: (1) which SKUs to eliminate and (2) what to do with the empty space in the category display. Therefore, we chose to study cues related to the availability of a favorite product and the amount of shelf space devoted to the category. A key proposition is that it might be possible to eliminate SKUs without affecting these cues, thereby lessening the likelihood that assortment perceptions will be affected.

Second, psychophysics shows that individuals are able to detect a change in the environment only when it surpasses a certain threshold or “just noticeable difference.” Therefore, consumers who use the total number of SKUs (SKU Count) cue might not be able to detect small or moderate changes in the number of items offered. If this is the case, then assortment perceptions will be unaffected by a small or moderate reduction in SKUs.

Following Holbrook (1981), we extend Brunswik’s model to a two-stage model to examine how these cues affect assortment perceptions, which, in turn, affect store choice (see Figure 1). That is, we first examine how the cues of Favorite Available, Category Space, and SKU Count are related to consumer assortment perceptions. Because our purpose is to understand the lens through which consumers perceive assortment, our measurement of assortment is purposively general. In Study 1, we simply ask consumers about an overall assortment perception measure and let them define the construct of assortment. In Study 2, we supplement this consumer-defined measure with specific measures related to the number of items. We then determine if these assortment perceptions affect store choice. Finally, we attempt to determine whether these cues directly affect store choice or whether their impact occurs through assortment perceptions. We begin by discussing the theoretical justification for this two-stage model and related hypotheses.

Availability of Favorite Product

One way consumers reduce their cognitive effort is to screen quickly the alternative set and reduce it to a subset of alternatives that has the potential to meet their needs (Hauser and Wernerfelt 1990). Only those products in a consumer’s consideration set receive further processing. For repeat purchase products, consumers are expected to have these consideration sets established in memory. The screening process therefore can occur automatically through selective perceptual attention at the shelf, as products in the consideration set are perceptually enhanced and, consequently, are the first products scanned (cf. Alba, Hutchinson, and Lynch 1991). According to the principles of Efficient Assortment, it is the infrequent-selling SKUs that are the leading candidates for elimination. Therefore, we
hypothesize that removing low-preference SKUs will go unnoticed, as there is a low probability that these alternatives belong to a consumer’s consideration set and therefore a low probability that they are perceptually scanned. Removing a consumer’s favorite product, however, almost surely would be noticed and will negatively affect his or her perception of the assortment offered in the category.

The Food Marketing Institute (1993) industry study offers tentative support for consumer use of this cue to estimate assortment. In-aisle interviews with selected shoppers in test stores, conducted after product choice, found that few shoppers noticed the moderate reduction in SKUs, and those that did tended to report that their favorite brand was unavailable. Therefore, we hypothesize that

\[ H_1: \text{In the face of SKU reduction, consumers will be less likely to lower their assortment perceptions if low- rather than high-preference SKUs are removed.} \]

**Category Space**

A second cue of interest is related to the display space for the category. The relationship between perception and size is one of the basic principles of Gestalt theory, with size being a fundamental cue in any perceptual representation (Berlyne 1971). Therefore, the general size of the category shelf display is expected to be noticed by consumers and to have a strong impact on their assortment perceptions. Research by Piaget (Easley 1978) suggests that young children believe that a one-to-one correspondence exists between the quantity of items and the amount of space they occupy. Instruction is necessary to teach children that the relationship between space and the number of items is tenuous and that they must engage in more effortful processing to estimate quantity. In a grocery setting, where the level of processing is likely to be limited, we expect that consumers will not go beyond their initial assessment and, consequently, might equate a larger amount of category space with a larger number of products being offered.

Therefore, we hypothesize that if eliminating SKUs reduces the size of the display, consumers will be more likely to notice the change and lower their assortment perceptions. However, retailers might be able to attenuate the negative impact of SKU reduction by maintaining the size of the original category space. Therefore, we hypothesize that

\[ H_2: \text{In the face of SKU reduction, consumers will be less likely to lower their assortment perceptions if the amount of space devoted to the category is held constant, than if the space is reduced.} \]

**SKU Count**

Assuming that consumers do not actively process information about the product display, we do not expect them to notice moderate reductions in SKU count. Psychophysics recognizes that equal stimulus ratios do not produce equal sensory intervals and that sensory scales must be constructed on the basis of magnitude changes that result in a “just noticeable difference” (JND) in the eyes of the perceivers (Marks 1974). Only if the degree of reduction passes a certain level or threshold will these differences become salient. In other words, as long as the degree of SKU reduction is below a certain threshold, consumers are less likely to notice the change.

The approximate level at which this threshold occurs, however, is an empirical question that we partially investigate here. Psychophysical laws by Weber and Fechner posit that JND is a proportion of the magnitude of the original stimulus (Marks 1974). Proliferation of line extensions has
Consumer Perceptions of the Assortment in a Grocery Category

led to assortments of increasing magnitude, with category sizes ranging from 45 to 545 SKUs (Food Marketing Institute 1993), which would tax the information processing abilities of most consumers. Thus, because of the existing high levels of assortment, we contend that consumers will not notice small to moderate reductions in SKUs. Although no formal hypothesis is offered, we address this research question by examining different levels of SKU reduction in Study 2.

**Store Choice**

Several studies have shown that assortment is an important factor in store choice (Arnold, Oum, and Tigert 1983; Craig, Ghosh, and McLafferty 1984; Louviere and Gaeth 1987). However, the preceding discussion argues that consumer use of the Favorite Available, Category Space, and SKU Count cues to generate assortment perceptions might enable retailers to eliminate a moderate number of items without a negative effect on assortment perceptions. If these cues affect store choice through assortment perceptions, then store choice also might not be affected by moderate SKU reduction. Therefore, we hypothesize that

\[ H_3: \text{In the face of SKU reduction, consumers will lower their likelihood of choosing a store only if their assortment perceptions are lowered.} \]

We present two studies that are designed to examine the hypotheses systematically. In Study 1, we manipulate the Favorite Available cue by eliminating the most popular SKUs. In Study 2, we examine the more realistic case in which the least popular SKUs are dropped and the impact of the Favorite Available cue is measured. The Category Space cue is manipulated in both studies. Also in Study 2, we assess the threshold below which SKU reductions go unnoticed as well as the impact of SKU reduction on store choice.

**STUDY 1**

Study 1 provides a preliminary test of \( H_1 \) and \( H_2 \) by examining the roles of the Favorite Available, Category Space, and SKU Count cues. Subjects went on shopping trips for commonly purchased items. Favorite Available, Category Space, and SKU Count were manipulated on the last shopping trip, and consumer ratings of assortment were collected.

**Method**

**Procedure.** Two hundred twelve undergraduate business students participated in the study for extra credit. Subjects went on six shopping trips and made selections in the focal category of microwaveable popcorn, as well as the filler categories of canned pasta, yogurt, toilet tissue, detergent, and peanut butter. To motivate realistic choices, subjects were told that they would receive one randomly selected choice as a free gift.

Stimuli were presented in booklet format—each product category was listed on a separate page, and product lists described the brand name, flavor/form, size, and unit price of each SKU. At the end of each shopping trip, subjects answered a different set of five grocery questions and completed a puzzle to simulate the passage of time. On shopping trips 1–5, all subjects saw a base popcorn condition of 25 SKUs, 25 Slots, and Favorite Present. The independent variables of SKU Count, Category Space, and Favorite Available cues were manipulated in shopping trip 6. Measures of assortment perceptions in the popcorn category were collected following shopping trips 1 and 6. The number of SKUs in the filler categories did not change over the six shopping trips.

**Experimental design.** The base condition was the 25 SKUs, 25 Slots, and Favorite Present cell, in which 25 SKUs each occupied one slot on the shelf. Stimulus selection for the Favorite Available factor was determined through a pretest in which 50 different undergraduate subjects evaluated 40 popcorn profiles for their favorability. On the basis of these evaluations, the 25 SKUs were composed of 24% (6/25) most preferred SKUs, 24% (6/25) least preferred SKUs, and 52% (13/25) randomly selected mid-range preference SKUs.

On shopping trip 6, a control and three test conditions were examined in a between-subjects design. The control condition was the same as the base condition, with 25 SKUs, 25 Slots, and Favorite Present. The second condition was the 19 SKUs, 19 Slots, and Favorite Present, in which the 6 least favorite SKUs were deleted without replacement. The third condition was the 19 SKUs, 19 Slots, and Favorite Absent, in which the 6 most preferred SKUs were deleted without replacement. The fourth condition was the 19 SKUs, 25 Slots, and Favorite Absent, in which the 6 favorite SKUs were deleted and the number of shelf slots was held constant at 25 by duplicating the facings of the 6 next-most preferred SKUs (i.e., these 6 SKUs received two facings each).

**Dependent variable.** Consumers’ assortment perceptions in the popcorn category were assessed using a five-point scale that ranged from 1 = Very little variety to 5 = Excellent variety.\(^1\) The dependent variable consisted of the differences in assortment perceptions between shopping trips 6 and 1. The difference score would be negative if reductions to SKUs, favorite items, or category space negatively affected assortment perceptions.

**Results and Discussion**

Tests of the hypotheses involved planned comparisons using the pooled mean squared error (MSE = 1.37) from the overall ANOVA model with 1 and 208 degrees of freedom (Keppel 1982).\(^2\) Table 1 contains the means of the four conditions.

\( H_1 \) predicts that the Favorite Available cue will moderate the effect of SKU reduction on consumer assortment perceptions. In support, the results show the influence of the Favorite Available cue, as consumer assortment perceptions are significantly higher when low- (Cell 2 = −1.4) rather than high-preference (Cell 3 = −9.0) SKUs are removed (\( F = 7.83, p < .01 \)). Moreover, a comparison with the control condition shows that when favorite alternatives are avail-

\(^1\)Retailers distinguish between the terms assortment and variety, as the former refers to the depth in a product category and the latter the breadth between categories. However, pilot testing revealed that consumers had difficulty with the term assortment. We consulted Websters’ dictionary, which defines assortment as a “variety of goods.” Therefore, we used the more readily understood wording of “variety” in a single product category for our assortment scale measure.

\(^2\)Consistent with Keppel (1982, p. 147), we restrict the number of comparisons to the number of degrees of freedom associated with the treatment source (df = 3).
able, assortment perceptions are not adversely affected by reductions in category space and SKUs (Cell 1 = -.07 versus Cell 2 = -.14, F = .10, p > .74). Consumer use of the Favorite Available cue appears to allow retailers to reduce SKUs without lowering assortment perceptions.

$H_2$ predicts that the Category Space cue will moderate the effect of SKU reduction on consumer assortment perceptions. Results show that holding Category Space constant (Cell 4 = -.98) rather than reducing it (Cell 3 = -.90) had no effect in offsetting the negative reaction from SKU reduction and removal of favorite brands (F = .10, p > .74). Therefore, we do not find support for the Category Space cue. Note, however, that this is a difficult test of $H_2$, as Category Space was pitted against both SKU reduction and the Favorite Available cue. Study 2 provides a cleaner test of the effect of the Category Space hypothesis.

In summary, Study 1 provides evidence of the influence of the Favorite Available cue. When favorite SKUs are available, consumer assortment perceptions are unaffected by a reduction in the number of SKUs offered or changes in the category space. When favorite items are not available and SKUs are eliminated, consumers' assortment perceptions fall.

**STUDY 2**

**Overview**

In Study 2, we switch the focus to those situations in which favorite alternatives are available, because retailers altering categories will clearly try to maintain those items their shoppers want. From Study 1, we observe that a 25% reduction in category space and items has no impact on assortment perceptions if the favorite alternatives are present. In this study, we go beyond the 25% level of space and item reduction to examine the impact of 50% and 75% reductions.

The study context involves subjects going on simulated shopping trips at two stores, a base store that offers the full range of SKUs and a test store that offers fewer SKUs. On each shopping trip, subjects made a selection in the focal category of microwavable popcorn, which enables us to investigate the impact of changes in Category Space and SKU Count on both assortment perceptions and store choice. If assortment perceptions are unaffected by changes in Category Space and SKU Count, then store choice similarly should be unaffected.

We also address some of the limitations of Study 1. First, we increase the visual realism of the stimuli by constructing full-size mock shelf displays using high-quality color copies of actual package facings. Adding the visual element offers a fairer test of the Category Space heuristic. Second, we move to a more representative sample of "real world" consumers. Third, we reword the assortment scale and collect multi-item measures of assortment. The rating scale used in Study 1 was inconsistent in the orientation of its endpoints. The lower endpoint ("Very little variety") corresponded to a counting measure, whereas the upper endpoint ("Excellent variety") corresponded to an evaluative measure of subjects' assortment perceptions. In Study 2, we directly ask subjects both an overall question that assesses whether they perceived more or less variety, as well as several specific questions that assess whether they perceived more or fewer number of items offered at the test compared with the base store.

**Method**

**Experimental design.** In this study, we employ a 3 (SKU Count) x 2 (Category Space) x 2 (Store Order) x 2 (Question Order) between-subjects design. The Favorite Available cue was measured as a covariate. The SKU Count factor compared a base level of 48 SKUs with test levels of 36, 24, and 12 SKUs. Only low-preference SKUs were deleted. We included the 25% fewer SKU (36 SKUs) level for comparison with Study 1. The 50% fewer SKU (24 SKUs) level was included as a manipulation at which differences might or might not be noticed, whereas the drastic change in the 75% fewer SKU (12 SKUs) level was expected to be noticed by consumers.

The Category Space factor varied whether popcorn shelf space in the test store equaled or was less than popcorn category space in the base store. To reduce SKUs while holding category space constant means either that the eliminated SKU facings become empty space in the category display or that the eliminated SKUs are replaced with duplicate facings of the retained SKUs. In line with Efficient Assortment principles, when category space was constant, facings of dropped items were replaced with duplicate facings of the most preferred items.

The Store Order factor varied whether subjects saw the test store with fewer SKUs before or after they visited the base store. The Question Order factor varied whether subjects first responded to the assortment perception or store choice question. Both factors were counterbalanced across subjects.

**Stimulus materials.** The simulated shopping environment used mock shopping aisles with the focal popcorn category in the middle and the filler categories of laundry detergent and breakfast bars constant on either side. Each aisle was a constant 60 inches high. In the base store, the laundry deter-
Consumer Perceptions of the Assortment in a Grocery Category

gent, popcorn, and breakfast bar categories covered 120, 80, and 80 linear inches, respectively. The popcorn shelf in the base store had 48 SKUs with one slot per item. To be consistent with actual store shelves and to make the shelves appear fully stocked, smaller boxes (3-pack and snack) were stacked so that there were two facings per slot. The layout of the category was a compilation of layouts from leading grocery stores in the test area.

SKU reduction in the test store involved eliminating the low-preference SKUs. A pretest was conducted using 70 staff members at a large university to assess SKU preference. Pretest subjects were shown a list of 48 microwavable popcorn items and asked to rank the five products that they would be most likely to buy. Aggregating across subjects yielded a preference rank order of the 48 test items. In the 25%, 50%, and 75% reduction conditions, the least-preferred 12, 24, and 36 SKUs were dropped, respectively.

In the constant category space condition, additional slots of the most-preferred 12 SKUs were added to replace dropped items, so that the total space allocated to the category remained the same. Therefore, in the base store, the top 12 SKUs received one slot each. These items received two, three, and four slots in the test stores for the 25%, 50%, and 75% SKU reduction/category space constant conditions, respectively. Special care was taken to have consistent item positioning among the different conditions. That is, if an item was positioned in the upper left-hand corner in the base shelf condition, it retained this position if available in other conditions.

Procedure. The study was conducted in conjunction with a statewide junior volleyball tournament that was taking place at a convention center in a medium-sized southwestern city. We recruited 229 subjects for participation and promised them a free gift and a financial donation to their volleyball organization in exchange for their participation. The sample appeared to be fairly representative of the primary target markets for microwavable popcorn (Blake 1995), as most subjects were between the ages of 35–54 years (54%), or were teenagers (28%), and were predominantly women (81%).

The experiment was conducted in a room adjacent to the tournament. Upon arrival at the experimental room, subjects were told that a consumer group was interested in how people buy products in a grocery store. They were told to imagine that they were at a grocery store, needed to buy a box of microwavable popcorn, and had five dollars to spend (the highest priced microwavable popcorn item was $4.99 for a 10-pack box). To motivate both realistic choices and use of price, they were told that their free gift most likely would be one of their selections and that the leftover money would be donated to their volleyball organization.

After reading these instructions, subjects were led to the first store aisle. The order of stores was counterbalanced such that half of the subjects started with the base store and the other half began with the test store. Subjects were told to select a popcorn alternative as they normally would in a real store. After making a selection, subjects were asked to indicate which item they chose and why they selected it. No mention of assortment was made.

After completing this sequence, subjects were led to the second aisle, where the procedure was replicated. Subjects were instructed to imagine that one month had transpired since the first shopping trip and that they had eaten all the popcorn. They could buy the same or a different product from the one previously selected. After making a second selection and supplying their choice rationale, subjects were led to a table where they filled out a questionnaire containing the key dependent variables. The procedure took approximately 15 minutes to complete.

Dependent measures. The key dependent variables were perceptions of assortment and store choice. The order of assortment and store choice questions was counterbalanced. The availability of a subject’s favorite popcorn alternative was measured, and a manipulation check assessed perceptions of category space.

Perceived assortment was assessed on a relative scale that compared the assortment at the first and second “stores.” Shoppers first were asked to rate the general relative assortment of microwavable popcorn offered at the stores on a nine-point scale, where 1 = First Store has much more variety than Second Store, 5 = First and Second Stores have about the same variety, and 9 = Second Store has much more variety than First Store. On a following page, specific questions assessed six additional dimensions of assortment perceptions including the total number of items, brands, package sizes, price ranges, flavors, and nutrition types offered. All dimensions were assessed using a nine-point relative scale, where 1 = First Store has many more (e.g., items, brands, sizes) than Second Store, 5 = First and Second Stores have about the same, and 9 = Second Store has many more (e.g., items, brands, sizes) than First Store.

To measure store choice, subjects were asked to indicate whether they would prefer to shop at the First Store, the Second Store, or if they had no preference between stores. For each store, subjects also were asked to indicate whether their favorite popcorn alternative was available on a yes/no scale. Subjects also were asked to indicate their impression of the amount of shelf space devoted to the popcorn category on a nine-point scale similar to the assortment questions.

Results

The Category Space manipulation check confirmed that subjects were more likely to perceive that the test store had

The predominant prices of the popcorn alternatives chosen were $1.89–$1.99 (52%) and $2.99–$3.09 (41%). Thus, the resulting donations were approximately $3.00 and $2.00, respectively. The amount of donation appeared to be quite salient to subjects, as there were frequent inquiries to check that the proper donation was made on their behalf. When subjects were finished with the questionnaire, they rolled a die to determine their free product. To not draw undue attention to popcorn and the true nature of the study around the convention center, participants could receive either popcorn choice 1, popcorn choice 2, laundry detergent, or breakfast bars.

---

3Generally, store brands were placed in the center of the category display and served as a boundary between Orville Redenbacher and Pop Secret. Six-pack sizes filled half of the display with butter flavors at eye level, extra butter on the top shelf, and low fat below eye level. Gourmet brands were placed on the bottom shelf.

4Note that the pretest results have face validity with 1995 microwavable popcorn sales; Orville Redenbacher accounts for 46% sales and butter flavors at eye level, and low fat below eye level. Gourmet brands were placed on the bottom shelf.

5The predominant prices of the popcorn alternatives chosen were $1.89–$1.99 (52%) and $2.99–$3.09 (41%). Thus, the resulting donations were approximately $3.00 and $2.00, respectively. The amount of donation appeared to be quite salient to subjects, as there were frequent inquiries to check that the proper donation was made on their behalf. When subjects were finished with the questionnaire, they rolled a die to determine their free product. To not draw undue attention to popcorn and the true nature of the study around the convention center, participants could receive either popcorn choice 1, popcorn choice 2, laundry detergent, or breakfast bars.
Table 2

ASSORTMENT MEANS FROM STUDY 2

<table>
<thead>
<tr>
<th>SKU Reduction</th>
<th>Space Constant</th>
<th>Space Reduced</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Means</td>
<td>se</td>
</tr>
<tr>
<td>25%</td>
<td>.36</td>
<td>23</td>
</tr>
<tr>
<td>50%</td>
<td>-.60*</td>
<td>24</td>
</tr>
<tr>
<td>75%</td>
<td>-.107*</td>
<td>23</td>
</tr>
<tr>
<td>Col</td>
<td>-.44*</td>
<td>14</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SKU Reduction</th>
<th>Space Constant</th>
<th>Space Reduced</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Means</td>
<td>se</td>
</tr>
<tr>
<td>25%</td>
<td>+.49*</td>
<td>.20</td>
</tr>
<tr>
<td>50%</td>
<td>-.43</td>
<td>.25</td>
</tr>
<tr>
<td>75%</td>
<td>-.94*</td>
<td>.27</td>
</tr>
<tr>
<td>Col</td>
<td>-.29</td>
<td>1.44</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SKU Reduction</th>
<th>Space Constant</th>
<th>Space Reduced</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Means</td>
<td>se</td>
</tr>
<tr>
<td>25%</td>
<td>-.60</td>
<td>2.0</td>
</tr>
<tr>
<td>50%</td>
<td>-.40*</td>
<td>.44</td>
</tr>
<tr>
<td>75%</td>
<td>-.160*</td>
<td>.21</td>
</tr>
<tr>
<td>Col</td>
<td>-.120*</td>
<td>1.07</td>
</tr>
</tbody>
</table>

A denotes cell difference from scale midpoint significant at $p < .05$.

Note: Assortment Perceptions were observed on a nine-point scale with -4 = Base Store More Assortment, 0 = Same Assortment at Test and Base Stores, and +4 = Test Store More Assortment. se denotes standard error, and n denotes sample size.

A MANOVA analysis produced the same pattern of results as did analyses using the single-item measure of variety.

less space when the space was reduced (M = 3.66) than when it was held constant (M = 4.26) (F(1,223) = 11.10, $p < .001$). Examination of the Favorite Available responses showed that the favorite item became less available as SKU reduction increased (Flinear(1,220) = 12.92, $p < .001$), with the favorite unavailable for 7%, 21%, and 30% of subjects as SKU Count was lowered in the test store by 25%, 50%, and 75%, respectively.

Assortment perceptions. A coefficient alpha was calculated for the seven questions dealing with assortment perceptions: general variety, total number of items, number of brands, number of package sizes, number of price ranges, number of flavors, and number of nutrition types. Two items were deleted because of low item-to-total correlations (the number of prices offered and the number of nutrition types). The remaining five items had a coefficient alpha of .86, which indicates sufficient reliability (Nunnally 1978). The composite assortment measure averaged these five questions. For reporting results, all rating scales were converted such that -4 = Base store had more assortment than test store, 0 = Base and test store had the same assortment, and +4 = Test store had more assortment than base store.

The initial analysis was an ANCOVA with independent variables of SKU Count, Category Space nested in SKU Count, Store Order, Question Order, and with Presence of Favorite Available as a covariate. The factors of Store Order and Question Order were not significant ($ps > .20$) and therefore all results are reported collapsing these factors. Means are presented in Table 2; a negative cell mean indicates that the test store was perceived as offering less assortment than the base store.

The results show that the SKU Count factor was significant (F(2,208) = 20.14, $p < .001$), with a significant linear trend such that assortment perceptions decreased as the magnitude of SKU reduction increased (Flinear(1,220) = 12.92, $p < .001$), with the favorite unavailable for 7%, 21%, and 30% of subjects as SKU Count was lowered in the test store by 25%, 50%, and 75%, respectively.

Thus, consumer assortment perceptions are not a direct function of the number of SKUs, as consumers did not appear to notice SKU reductions below a 25% level. Concerns about noticing SKU reductions below a 25% level are supported by the results of Study 1, a SKU reduction of 25% appeared to go unnoticed by subjects (M25 = .89, $p < .01$) and 75% (M75 = 1.53, $p < .01$). Note, however, that the 75% reduction level was included as a condition that was highly likely to be noticed and to lower assortment perceptions. One of the purposes of this study was to examine empirically whether there was a threshold at which consumers would perceive SKU reduction. Consistent with the results of Study 1, a SKU reduction of 25% appeared to go unnoticed by subjects (M25 = +.01). Analysis of the 25% SKU reduction mean, relative to the scale midpoint (which indicates that the base and test had about the same assortment), shows no significant difference ($p > .93$). That is, subjects perceived that the base and test store offered the same level of assortment even though the test store actually offered 25% fewer SKUs. Thus, consumer assortment perceptions are not a direct function of the number of SKUs, as consumers did not appear to notice SKU reductions below a 25% level. Consumers did perceive that the test store offered less variety than the base store when SKUs were reduced by 50% ($M_{50} = -89, p < .01$) and 75% ($M_{75} = -1.53, p < .01$).

Consistent with H1, the Favorite Available covariate was significant (F(1, 208) = 4.67, $p < .04$), which indicates that assortment perceptions are a function of whether the fa-
Consumer Perceptions of the Assortment in a Grocery Category

vorite alternative is present. In the face of SKU reduction, subjects were less likely to lower their assortment perceptions when their favorite SKU was present (M = -0.62) than when it was absent (M = -1.63).

Consistent with H2, maintaining the size of the category space significantly attenuated the lowering of assortment perceptions due to the elimination of SKUs (F(3, 208) = 4.92, p < .01). Subjects were less likely to lower their assortment perceptions when the category space was held constant (M = -0.44) than when it was reduced (M = -1.16). Thus, when we controlled for the Favorite Available cue, the Category Space cue exerted a significant influence on consumer assortment perceptions.

Another interesting issue is the sensitivity of consumers to SKU reduction when the Favorite Available and Category Space cues are positive (i.e., favorite item is available and shelf space is held constant). In this case, our results show that subjects again were sensitive to SKU reduction (F(1, 90) = 8.99, p < .01). However, examination of the cell means and comparison to the scale midpoint reveals several interesting findings. In the 25% SKU reduction condition, subjects actually perceived that the test store had more assortment than the base store (M = +0.49), and this difference was significant (t(1, 34) = 2.40, p < .05). Therefore, rather than SKU reduction lowering assortment perceptions, a moderate SKU reduction increased consumer assortment perceptions. One explanation for this increase is that the most preferred SKUs were now easier to locate as each received two facings. Furthermore, though consumers lowered their assortment perceptions in the 50% condition (M = -0.43, t(1.31) = 1.68, p < .1), this difference was not statistically significant. Although the low power of this test might be an issue, the subjects' marginal sensitivity to a 50% reduction is provocative. Finally, as was expected, subjects did significantly lower their assortment perceptions when SKU reduction reached a 75% level (M = -0.94, t(1.24) = 3.43, p < .01).

Store choice. H3 examines the relationship between assortment perceptions and store choice. Following Holbrook's (1981) procedure, we tested a two-stage model, in which the objective cues (SKU Count, Favorite Available, Category Space) determined assortment perceptions which, in turn, affected store choice. Store choice was analyzed using logistic regression, with the dependent variable dichotomized into choosing the test store or indicating no store preference (i.e., SKU reduction had a positive or null effect on test store choice) versus choosing the base store (i.e., SKU reduction had a negative effect on test store choice). The reported logits take as their dependent variable the probability of "choosing the test store or indicating no store preference" (hereafter referred to as test* store).

The three-level factor of SKU Count was converted to two variables, SKU50 and SKU75, that examine the effect of increasing SKU reduction relative to the 25% level. Note that the 25% SKU reduction level serves as an appropriate control for an examination of store choice frequencies, because this condition found that the majority of subjects (61%) indicated no store preference, whereas the rest were split equally between base (22%) and test (17%) preference (2 < 1). Therefore, a 25% reduction in SKUs had no effect on store choice. The two-stage model results with standardized beta coefficients are shown in Table 3.

To establish that assortment perceptions might be intervening variables between the objective cues and store choice, four paths or links must be established. First, the most critical link to establish is that assortment perceptions do affect store choice. The logistic regression confirmed Link 1, because the probability of choosing the test* store related positively to assortment perceptions of the test store (b = +0.71, \( \chi^2 = 41.09, p < .001 \)). That is, subjects were more likely to choose "the test store or indicate no store preference" as their perceptions of the assortment offered at the test versus base store increased.

Second, there must be a significant main effect for each of the objective cues on store choice. A logistic regression showed that Link 2 was satisfied, as the likelihood of choosing the test* store related positively to assortment perceptions of the test store (b = +0.21, \( \chi^2 = 22.87, p < .001 \)). Therefore, the cues of SKU Count, Favorite Available, and Category Space all were related significantly to store choice.

Third, Link 3 requires that there be a significant relationship between the objective cues and assortment perceptions. Consistent with the previously discussed ANCOVA results, the regression results confirm this link, because assortment perceptions of the test store significantly decreased as the magnitude of the SKU reduction increased to 50% (b = +0.29, \( \chi^2 = 7.50, p < .01 \)) and 75% (b = +0.45, \( \chi^2 = 6.45, p < .01 \)). The favorite product was not available (b = -0.43, \( \chi^2 = 22.87, p < .001 \)), and the category space was reduced (b = +0.26, \( \chi^2 = 8.44, p < .01 \)). Therefore, the cues of SKU Count, Favorite Available, and Category Space all were related significantly to store choice.

Fourth, Link 4 shows that the objective cues influence store choice through assortment perceptions. Confirmation of the intervening assortment construct occurs if, when store choice is regressed on the objective cues plus assortment perceptions, the effect of the objective features is significantly reduced. In support of H3, a logistic regression shows that when assortment perception is added to the model, the likelihood of choosing the test* store is related positively to the assortment perception of the test store (b = +0.62, \( \chi^2 = 23.86, p < .001 \)), and the objective cues of SKU reductions

<table>
<thead>
<tr>
<th>Table 3</th>
<th>TEST FOR TWO-STAGE MODEL OF ASSORTMENT PERCEPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>LINK 1</td>
<td>Choice = +0.71*(AP)</td>
</tr>
<tr>
<td>LINK 2</td>
<td>Choice = +0.21*(SKU50) - 0.29*(SKU75) - 0.43*(FAV) - 0.26*(SPACE)</td>
</tr>
<tr>
<td>LINK 3</td>
<td>AP = +0.26*(SKU50) - 0.45*(SKU75) - 0.13*(FAV) - 0.22*(SPACE)</td>
</tr>
<tr>
<td>LINK 4</td>
<td>Choice = +0.62*(AP) - 0.07*(SKU50) - 0.05*(SKU75) - 0.41*(FAV) - 0.14*(SPACE)</td>
</tr>
</tbody>
</table>

*denotes coefficient significant at p < 0.05 level.
Note: Choice corresponds to probability of "choosing test store or no store preference" options.
AP corresponds to a five-item composite measure of assortment perceptions, where 1 = Base Store had more assortment than Test Store and 9 = Test Store had more assortment than Base Store.
SKU50 compares the 50% to 25% SKU reduction level.
SKU75 compares the 75% to 25% SKU reduction level.
FAV compares Favorite Not Available to Favorite Available.
SPACE compares Category Space Reductions to Category Space Constant.
of 50% (b = -.07, $\chi^2 = .33, p > .56$), 75% (b = -.05, $\chi^2 = .15, p > .69$), and Category Space (b = -.14, $\chi^2 = 2.02, p > .15$) are no longer significant, though the Favorite Available cue remains significant (b = -.41, $\chi^2 = 18.28, p < .001$). Therefore, it appears that the construct of assortment perception captures the effects of SKU Count and Category Space on store choice, but the Favorite Available cue exerts a direct effect on store choice as well as an indirect effect through assortment perceptions.

In summary, we find support for the impact of the SKU Count, Favorite Available, and Category Space cues on assortment perceptions and store choice. These cues affect store choice through assortment perceptions, though the Favorite Available cue also has a direct link to store choice. Moderate reductions of 25% SKUs do not affect consumer assortment perceptions or store choice negatively. Therefore, the threshold for consumer sensitivity to SKU reduction appears, in this case, to be between a 25 and 50% reduction level if favorite items are available and category space is not reduced.

**DISCUSSION**

The Efficient Assortment initiative proposed in the 1993 Kurt Salmon Associates study, *Efficient Consumer Response: Enhancing Consumer Value in the Grocery Industry*, suggests that retailers might be able to reduce costs and therefore increase operating profit by reducing the number of items they carry. Category managers have resisted this initiative on the basis of a fear that eliminating items would lower assortment perceptions, store evaluations, and sales.

Results of our two studies suggest that the potential risk inherent in item reduction is more limited than one initially might guess. We find consumer assortment perceptions to be significantly affected by the simple cues of availability of a favorite item and amount of space devoted to the category, in addition to the more effortful cue of the total number of SKUs offered. Consumer use of these simpler cues appears to enable a 25% reduction in the number of items carried without a negative effect on assortment perceptions. Furthermore, if favorite items are available and category space is held constant, our Study 2 results suggest that the threshold for perceiving a reduction in items is somewhere between 25 and 50%.

Further research with significant power is needed to pinpoint this precise level. Although we demonstrate a JND threshold in SKU reductions on assortment perceptions, the precise structural form of this relationship is beyond this article’s scope. Additional research might derive a more specific quantitative model of assortment perceptions, similar to the functional relationships between objective stimulus changes and subjective experiences in psychophysics.

It is important to note that this suggestion does not imply that actual SKU Count is unimportant. Rather, the key point is that the cues of Favorite Available and Category Space can attenuate the impact of SKU reduction and raise the level of the threshold at which consumers notice a difference. An interesting topic for further research would be to identify individual difference (e.g., variety-seeking, need for cognition) and situational (e.g., new store visit, memory-based versus in-store assessment) factors that might affect the influence of these cues in consumer assortment perceptions.

Study 2 results also show that the Favorite Available, Category Space, and SKU Count cues affect store choice *through* assortment perceptions. Therefore, if SKU reduction does not affect assortment perceptions negatively, there should be no adverse effect on store choice. In support, we find that a 25% reduction in SKUs has no impact on store choice; conversely, there might be a positive effect. In Study 2, we find that a 25% SKU reduction *increases* consumer assortment perceptions when low-preference SKUs are eliminated and their category space is replaced with duplicate facings of the most popular SKUs. Perhaps for subjects using the Favorite Available cue, it now was easier to find their desired products.

Given the current overproliferation of SKUs (Jager 1996), there might be considerable latitude for retailers to cut SKUs without negatively affecting the availability of favorite products for the majority of consumers. Using the simple rule of eliminating low-selling items, we find that a 25% SKU reduction results in only 7% of subjects finding their favorite product unavailable. Furthermore, even if a few consumers perceive a marginal difference, and assortment perceptions are slightly lowered, increased profitability due to lower inventory and restocking costs, as well as fewer out-of-stock products, still might make these assortment reductions worthwhile. Finally, more sophisticated rules for SKU elimination that factor in market segmentation and the substitutability of SKUs for satisfying each segment might allow for a greater magnitude of SKU reduction without negatively affecting the Favorite Available cue.

However, retailers also need to consider carefully the Category Space cue when making their efficient and profitable assortment decisions. Our results suggest that consumers use Category Space as a cue for the level of assortment. Maintaining a constant shelf space is critical in minimizing the impact of SKU reductions.

**Evidence from the Field**

Because Studies 1 and 2 were conducted in tightly controlled laboratory environments, researchers could question the extent to which these findings would generalize to a "real-world" shopping situation. Although not designed to test the current hypotheses specifically, as part of an ongoing project for a major convenience store chain, we were able to study shoppers’ reactions to dramatic item reductions in an actual store environment. In two test stores, approximately half (54%) of the low-selling SKUs were eliminated in five categories (candy, beer, soft drinks, salty snacks, and cigarettes), which accounted for 80% of the convenience chain sales, while category space was held constant. Results from these test stores were compared with two matched control stores.

In-store intercepts with 62 test and 80 control store shoppers who came to purchase one of the five target categories were conducted approximately two to three weeks after SKUs were eliminated. Each shopper was interviewed for one category purchase regarding his or her perception of assortment (1 = Low variety to 5 = High variety), perceptions of category change, ability to find wanted items in that cate-

---

7Although convenience stores do not contain as many product categories as typical grocery stores, a focus group study reveals that consumers perceive high assortment for single-serving packages within the key categories in the store (e.g., soft drinks, cigarettes) (Azzato 1997).
Consumer Perceptions of the Assortment in a Grocery Category

Assortment Cues and Further Research

Our research examines the impact of only two cues that might play a role in forming assortment perceptions. An interesting topic for additional research would involve the identification of other important cues that might further influence this process. To get a sense of what assortment cues might be operating, we conducted a survey of 119 consumers from a medium-sized metropolitan city. These consumers were polled randomly by telephone to generate a list of assortment cues and assess cue importance for assortment perceptions in one of four product categories (popcorn, salty snacks, laundry detergent, and soft drinks). Specifically, respondents first were asked to generate a list of assortment cues (using an open-ended question), as well as rate the importance of nine preselected factors (on a scale of 1 = Unimportant and 5 = Very Important for assortment). In the open-ended portion of the survey, some of the most frequently mentioned cues were the number of brands/items, the size of the shelf space, and the number of package colors, Note, however, that most of these cues (with the exception of shelf space) involve some counting or processing of the display. If low-involvement consumers do not process the display in detail (as we argued previously), consumers might use some other cues to make these quantity judgments. Therefore, further research might be needed to uncover more subtle cognitive processes that are employed to make assortment perceptions.

In terms of importance, the highest ratings were given to “availability of favorite product” (M = 4.24), “ease of finding products” (M = 4.02), and “range of prices” (M = 3.77). Taken together with the results of the open-ended respons-

---

8 Analyses compared actual with predicted test store sales. A model was fit between test and control store sales using two years of weekly sales data. Using this model as a basis, control store sales during the experimental period then were used to predict test store sales.

The authors express their appreciation to an anonymous reviewer for suggesting this idea.
results suggest that grocers can make moderate reductions to the number of items offered without negatively affecting assortment perceptions.

REFERENCES


Snack Food Association (1996), personal communication (May 10).