An Anchoring and Adjustment Model of Purchase Quantity Decisions

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Abstract

How do consumers decide how many units to buy? This is a key issue for researchers, retailers, and manufacturers. While past research has focused on purchase incidence and brand choice, this research focuses on the psychological process behind the purchase quantity decision and shows how marketers can exert influence. We propose that a simple anchoring and adjustment judgment model describes how consumers make purchase quantity decisions. This process also suggests ways in which simple point-of-purchase (POP) materials can be employed to affect the quantity decision. Two field experiments and three lab studies show that external anchors have a powerful impact on quantity decisions whether presented in the form of multiple unit prices, purchase quantity limits, suggestive selling anchors, or even irrelevant anchors. A final study provides more direct evidence of the underlying judgment process and shows that people can be encouraged to retrieve alternative internal anchors that either expand or contract purchase intentions, eliminating the external anchor effect.

An Anchoring and Adjustment Model of Purchase Quantity Decisions

Most research investigating purchase behavior, behavioral or quantitative, has focused on purchase incidence and brand choice, what Gupta (1988) refers to as the "when" and "what" questions. Far less effort has been spent on understanding the psychology of the purchase quantity decision, the "how much" question. For many brands, a myopic focus on brand choice and switchers is self-limiting; instead firms may better leverage their resources by spending some marketing dollars encouraging users to buy more of the brand and/or use it more frequently. In this paper, we offer a model that focuses directly on how consumers answer the "how much" question.

Why is the quantity decision important? The average consumer regularly shops multiple stores and makes a significant number of unplanned, discretionary purchases (Drèze, Hoch, and Purk 1994; Hoch, Drèze, and Purk 1995). Many retailers and manufacturers will prefer guaranteed multiple unit sales from a customer today over probabilistic sales in the future, except when the item is loss leader priced to generate traffic. For retailers, the more units sold on any shopping trip, the greater the share of short-run grocery dollars. For manufacturers, the same logic holds; selling more units now (witness multiple unit coupons and packaging) may avoid consumer stockouts and/or preclude buyers from purchasing a competing product. We suspect that managers prefer selling an individual customer larger than smaller quantities when doing so: (1) takes buyers out of the market; (2) facilitates repeated consumption that leads to habit formation (pseudo loyalty via linear learning); (3) encourages promotion-driven stockpilers to switch stores or brands (Jeuland and Narasimhan 1985); (4) passes inventory holding costs onto consumers (Blattberg, Eppen, and Lieberman 1981; Krishna 1994); or (5) enables accelerated consumption in new situations (Wansink and Ray 1996) or in place of other product categories (Wansink 1994).

We do not wish, however, to overstate the economic significance of stockpiling for retailers and manufacturers. A complete analysis of the benefits and costs of stockpiling requires a dynamic approach that considers multi-period consequences. Our intent is much narrower -- simply to illuminate the internal judgment process driving quantity decisions and show how marketers can

exert more effective influence when it makes sense to do so. Knowledge of the neglected psychological process behind the purchase quantity decision may help managers to influence quantity decisions and deal with multi-period consequences. We take as given that stockpiling can be beneficial to sellers in some circumstances. Still, consumer stockpiling is less valuable to sellers when it is not accompanied by an increase in consumption. If in equilibrium, competitive retailers and manufacturers fully respond to a seller's promotional efforts, such retaliation could nullify any short-term gains from taking consumers out of the market. If the marketer simply wants to stimulate trial and if repeated consumption does not increase favorability, then it may be more profitable to minimize promotional purchases to ensure that consumers pay full price on later purchases.

The rest of the paper is organized as follows. First, we review previous research on the purchase quantity decision and propose that a simple anchoring and adjustment judgment process adequately describes how consumers make these decisions. This anchoring model also suggests ways that marketers can influence quantity decisions through anchors provided at the point-of-sale. We report a series of five field and laboratory studies that document and explain the effect of various POP anchors on quantity decisions. In the first study, we manipulate the anchor through multiple unit pricing (e.g., "2 for," "3 for") in 13 field experiments in an 86 store supermarket chain. Multiple-unit promotion pricing led to a 25% greater increase in sales compared to single unit pricing. Study 2 manipulates the anchor through supermarket quantity limits (e.g., "limit 12 per customer") and reveals a monotonically increasing impact on sales. In a lab setting, Study 3 demonstrates that even seemingly irrelevant product quantity values that are presented with deal information (e.g., "shipped to stores in boxes of 14 units") can serve as anchors that increase purchase intentions. Study 4 shows that suggestive selling anchors (e.g., "buy 12 for your freezer") can influence intended purchase quantities even without a discount. The final study investigates how internally-generated anchors, both a default anchor ("how many units do you usually buy?") and an expansion anchor ("think of all the different ways you could consume this product over the

next two weeks"), influence purchase intentions. These internal anchors influence quantity intentions and moderate the effect of external anchors.

When, What, and How Many?

Several papers suggest that purchase behavior results from the consumer considering three questions: "should I buy the category on this shopping trip?"; "which brand should I buy?"; "and how much should I buy?" (Bucklin and Lattin 1991; Chiang 1991; Chintagunta 1991; Gupta 1988; Krishnamurthi and Raj 1988; Neslin, Henderson, and Quelch 1985). The main empirical finding is that most of the action occurs in the brand choice component followed by incidence and then quantity. Although these papers propose a variety of modeling and estimation solutions, they all focus on the simultaneity (or lack thereof) of the asking and the answering of these three questions. Researchers agree that the questions asked and the resultant answers are not independent. The issue is one of degree. Most of the papers explicitly recognize that the brand choice (what) and the purchase incidence (when) questions are inextricably linked (Krishna 1994). For example, it is easy to imagine purchase situations where the consumer observes that a promotion on one brand brings the price down below their reservation threshold, and then makes the "when," "what," and "how many" decisions simultaneously. Alternatively, consumers sometimes come to the store already planning to buy the category; incidence is insured and only "what" and "how many" are in question.

Chiang (1991) forcefully argues that the answers to all three questions are governed by the same underlying force -- namely, a utility maximization process that is driven by the difference between the price-adjusted quality of each of the brands and the consumer's threshold reservation price. The bigger the difference is, the greater the probability of purchase incidence and brand choice and the greater the quantity purchased. Although Chiang's structural approach is appealing, we believe that the answers to the first two questions are more closely linked to each other than each of them is to the quantity decision. It is not that we do not recognize that stockpiling (without consumption acceleration) must influence purchase incidence. Instead, our reasoning is driven by a simple conjecture that most quantity decisions are not actively considered because the answer is already known or assumed by default. And our best guess is that the answer

is usually a low number consistent with routine purchases. This may be one reason why quantity elasticities typically are smaller than those for brand choice and incidence.

An Anchoring and Adjustment Judgment Process

We propose a simple behavioral model to explain purchase quantity decisions. When consumers see a product on sale whose price-adjusted utility rises sufficiently above a threshold, they may decide to buy it (brand choice) on the spot (purchase incidence). The question then becomes how many units to buy. Because of the frequent nature of most packaged goods purchases, the default value may be close to one. We contend that consumers often adopt low default anchors and then adjust upward depending on a deal's attractiveness, stockpiling constraints, substitution opportunities, their perceptions about deal frequency, and their overall budget constraint.

If this model reasonably characterizes the basic quantity decision process, then consumers may not adjust very much away from their initial anchor. There are at least two reasons for this. First, anchoring and adjustment judgment processes are characterized by excess reliance on the starting point and insufficient adjustment for subsequently considered information (Plous 1993). Second, because food shopping is generally a mundane and low-stakes activity, it is unlikely that most consumers are motivated to engage in extensive adjustment activity that requires thinking about the dynamic costs and benefits associated with stockpiling (Blattberg, Eppen, and Lieberman 1981; Krishna 1994; Meyer and Assuncao 1990). If an anchoring model drives the quantity decision, it also suggests that it is going to be expensive for the marketer to increase purchase quantities if they rely solely on price (or display and feature) to encourage consumers to make adjustments away from the likely low default anchor. Assuming that the natural decision process involves anchoring on a small quantity and then insufficiently adjusting upwards depending on the goodness of the deal (price), larger quantity decisions may result if consumers first anchor on a larger externally supplied anchor and then adjust downward for the goodness of the deal.

Anchoring is observed in many natural contexts and appears to be "extremely robust" across experts and across important decisions (Plous 1993, p. 151). Potential anchoring values can be

difficult to ignore; as with other heuristics, people often are unaware of their influence (Bazerman 1993). Even random and irrelevant values taken from a roulette wheel and converted to a response scale (e.g., by questions asking whether the true value is more or less than the wheel value) can act as an anchor that influences quantity judgments (cf. Tversky and Kahneman 1974; Plous 1993). These findings suggest that retail promotions which explicitly provide product-unit values may have an important impact on how much a consumer buys.

Current merchandising practice suggests that retailers have the same intuition. Product quantity values that may serve as anchors are found in multiple unit prices (e.g., prices that are presented as "4 cans for $2" instead of "50 cents per can"), purchase quantity limits ("Limit of 6 per customer"), and suggestive selling (e.g., "Buy 12 for your freezer"). We hypothesize that although purchase anchors can be suggested in several ways, they will have a similar impact on consumers.

Study 1: Do Multiple Unit Prices Influence Supermarket Sales?

Supermarket consumers are exposed to potential quantity anchors whenever multiple-unit prices are presented instead of single unit prices (e.g., "On sale -- 6 cans for $3.00" versus "On sale -- 50¢"). When involvement is low, an anchoring perspective suggests that a multiple unit price promotion could stimulate more sales by making salient a higher-than-normal purchase quantity. Although each promotion offers the same discount, the number of product units is presented at point-of-purchase and by virtue of sharing the same response scale (number of units) is quite likely to act as an anchor when consumers make the quantity decision (Tversky, Sattath, and Slovic 1988). Conventional wisdom in the retail trade suggests that multiple pricing does work, but we know of only one study reported by Blattberg and Neslin (1990, p. 351) documenting the effect. Using an econometric approach to control for baseline sales and marketing variables, "N for" pricing increased sales 12% across seven brands in three categories. We use field experiments to examine multiple unit pricing effects across a larger set of categories.

Method and Procedure

In the thirteen categories listed in Table 1, we conducted a one week field experiment comparing multiple versus single unit promotional pricing. Each study utilized a simple two group

pre-post design. Half of the 86 stores were randomly assigned either to a single or multiple unit pricing condition separately for each category. Baseline sales were computed for each test item using the procedure outlined in Dhar and Hoch (1996) -- the average weekly sales over the previous six months during all weeks when the item was not promoted. The dependent variable was calculated as a percent change in unit sales compared to the baseline. During the week of each experiment the test item was sold with a temporary price reduction ranging from 9-44% signaled at the point of purchase with a 3.5 inch x 2.5 inch "BONUS BUY" shelf tag. The tag indicated the regular price (e.g., 99¢) but expressed the deal price in single unit (e.g., 75¢) or in multiple unit (e.g., 2 for $1.50) form.

Results and Discussion

The results are summarized in Table 1. As can be seen, multiple prices resulted in a 25% increase in sales versus the single unit control. For 12 of 13 categories, sales were higher with multiple unit pricing, and for 9 categories the difference was statistically significant. A meta-analysis of all 13 tests indicates that the multiple pricing effect is highly reliable ($p<.0001$). The sales increases with multiple unit pricing were substantial.

Table 1.
The Impact of Multiple Unit Pricing on Sales

Category	Level of Discount	Form of Price Expression	Percentage Change in Unit Sales		P-Value
			Single Unit	Multi-Units	
Bathroom Tissue	15%	1/50¢ vs. 4/$2.00	+57	+97	.02
Candy	9%	1/50¢ vs. 2/$1.00	+24	+25	n.s.
Cereal (Breakfast)	33%	1/$1.99 vs. 2/$3.98	+133	+137	n.s.
Cookies	44%	1/$1.67 vs. 2/$3.34	+306	+372	.01
Frozen Dinners	12%	1/$2.49 vs. 2/$5.00	+33	+70	.003
Frozen Dinners	20%	1/$2.50 vs. 2/$5.00	+133	+195	.0001
Frozen Entrees	26%	1/$1.25 vs. 2/$2.50	+133	+156	.02
Paper Towels	31%	1/75¢ vs. 2/$1.50	+403	+565	.001
Soap (3 bar packs)	15%	1/$1.99 vs. 2/$3.98	+48	+30	n.s.

Soft Drinks (2 liters)	17%	1/$1.49 vs. 2/$3.00	+33	+66	.01
Soup (canned)	20%	1/$1.33 vs. 3/$4.00	+200	+248	.01
Soup (canned)	17%	1/50¢ vs. 2/$1.00	+108	+112	n.s.
Tuna (canned)	18%	1/65¢ vs. 2/$1.30	+36	+66	.004
	21%		**+125%**	**+165%**	**.0001**

Before moving on to the rest of the studies, it is important to be clear about exactly what this experiment does and does not tell us about anchoring and quantity decisions. One possibility is that some consumers may have been confused and believed that they had to buy multiple units in order to get the deal price. Of course, the retailer does not really care whether consumer confusion caused the sales increase as long as there is no loss of goodwill that might later affect the store patronage decision. We cannot categorically rule out confusion, though it seems implausible that confusion could have produced a 30%+ (165%/125%) improvement in promotional lift.[1] Also, because we are dealing with store-level data, it is unclear whether individual consumers are buying more units than normal or whether more consumers are buying their usual quantities of the item. For example, multiple unit prices are much less common in this supermarket chain and, as such, were probably more salient and more likely to attract consumer attention.

It seems fairly clear that there are natural limits to the sales impact of multiple unit prices. As they become more common, the novelty will wear off and overuse of anchors may result in increased vigilance. Also, some items are not amenable to multiple pricing (e.g., two 50 LB dog food bags for $30), and the sales impact of multiple-unit pricing everything in the store would be negligible or possibly harmful due to confusion. Even though some of the multiple pricing effect may be due to its uniqueness, we believe that there is more to it than that.

[1] While experience has taught some consumers that they can buy fewer units and receive the sale price, other shoppers may have been confused about unit prices. However, presentation of single-unit prices (or any other prices for fewer units) would likely defuse the higher anchor. Moreover, confusion about multiple unit prices (e.g., "do I have to buy 5 cans to get the sale price?") may still induce anchoring. Given the completely unobtrusive nature of the field study, we have no self-report data on the frequency of such confusion.

While the key question for managers is whether multiple unit prices increase sales, the key question for researchers is why they increase sales. To more directly test the impact of anchoring, we searched for a natural and managerially relevant way to present monotonically increasing anchor points. A common promotional method that fits these criteria are purchase quantity limits (e.g., "limit 12 per customer").

Purchase Limits and the Quantity Decision

The next two studies provide consumers with anchors in the form of purchase quantity limits. These studies generalize the external anchor effect suggested by the multiple unit pricing study and allow us to examine individual level purchase behavior. Retailers frequently limit the quantity of aggressively priced items used to increase store traffic. These limits restrict sales of loss leaders and reduce the probability of out-of-stocks.

Despite their widespread use, only two studies examine purchase quantity limits, and each examines very low limits (four units or less). Several critical questions about the effect of purchase limits on sales remain unanswered. For example, different psychological processes have been proposed to explain the sales effects of relatively low purchase limits. Lessne and Notarantonio (1988) suggest that low purchase limits can increase sales because consumers react to the loss of freedom to buy more price-promoted units. However, consistent with the scarcity literature (cf. Lynn 1992), Inman, Peter, and Raghubir (1996) found that single unit purchase limits increased purchase incidence by signaling that the deal was good. Indeed, single unit limits may have particularly strong effects on deal evaluations. However, no previous studies have examined how higher purchase limits affect sales. For example, a purchase limit of 12 versus 4 units per customer may not increase sales through signaling or reactance, because a higher limit should reduce reactance and weaken deal signals. But if progressively higher purchase limits begin to influence the quantity decision through anchoring, they could still yield sales increases.

Study 2: Purchase Limits and Supermarket Sales

Study 2 uses unobtrusive observation to investigate how various purchase limits influence supermarket sales of a familiar, sale-priced consumer packaged good. If anchoring drives purchase quantity decisions, a high anchor should encourage greater purchase amounts than a lower anchor.

Method and Procedure

A field study was designed using end-aisle displays to advertise a variety of Campbell's Soups for 79¢ a can. The regular price was 89¢, implying a modest 12% discount. At this discount, it is in the retailer's interest to sell as many units as possible. Profits will increase as long as promotion price elasticities are reasonably large. (For a category with normal gross margins of 25%, the break-even promotional lift for a 12% discount is 1.92 baseline sales.)

A sign was mounted behind each display announcing "Campbell's Soup Sale - 79¢/can," and presenting one of three limit conditions ("no limit per person," "limit of 4 per person," or "limit of 12 per person"). Three supermarkets in Sioux City, Iowa participated in the study on three consecutive evenings. Each night from 8:00 - 9:00 PM, a rear-aisle display was set up at each store announcing the sale under one of the purchase limits. The purchase limits were rotated each evening, so that each store offered the sale under each limit condition. Rotating the different purchase limits across the supermarkets and across days minimized any store-related or day-related confounds. Other efforts were made to make sure the three stores served as replications of each other. The three supermarkets were selected because they had similar sales volumes and a similar demographic mix of shoppers. Monday, Tuesday, and Wednesday were selected because these are the three consecutive evenings that have the most similar shopping volumes for these three stores.

Shoppers were unobtrusively observed at the end-aisle display. For each shopper who passed the display, an observer noted whether they purchased soup and how many cans they purchased.[2] Data for eight consumers who bought more items than the limits allowed were excluded from the analyses (six of these shoppers bought from displays with a four-can limit).

[2]The supermarkets' scanner records of purchases could not be used for two reasons. First, scanner data could not be used to discriminate soup that was bought at the end of aisle display (with the purchase limit) from soup that was bought from the interior shelf. Because the stores would not allow signage in the interior aisles, it was important to isolate purchases from the display that gave the limits. In

Results and Discussion

An ANOVA was conducted to test whether we could aggregate the data across the three stores. Although mean-level sales varied between the stores, no two- or three-way interactions (store x purchase limit x day) were significant and the data were aggregated. The results are displayed in Table 2.

Table 2.
Purchase Limits and Supermarket Sales

	Quantity Limit Level		
Measure	**No Limit**	**Limit 4**	**Limit 12**
Purchase Quantity per Buyer	3.3[a]	3.6[a]	7.0[b]
Purchase Incidence	7%	10%	9%
Total Units Sold	71[a]	109[a]	188[b]

Note: Within a row means with different subscripts are reliably different from each other at the $p<.05$ according to the Duncan multiple comparisons procedure.

addition, we wanted to determine if purchase limits increase purchase likelihood. Therefore, it was necessary to have observers record the number of shoppers who passed the display.

The results show that purchase limits can increase sales even with a relatively small 10¢ discount. Shoppers who bought soup from the displays with no limit purchased 3.3 cans of soup, whereas buyers with limits of four and of twelve respectively purchased an average of 3.6 and 7.0 cans, ($F_{2,86} = 17.2$; $p < .0001$). Consumers in the limit 12 condition purchased significantly more cans than consumers in either the no limit or limit 4 conditions. The magnitude of the effect is large -- limit 12 signage increased sales per buyer by 112%. And because per-unit promotion costs did not differ across conditions, profits should show the same pattern.

Consistent with the work of Inman, Peter, and Raghubir (1996), purchase quantity limits encouraged directionally higher purchase incidence versus the no limit condition (10% and 9% versus 7%). It is important to note that when these seemingly small variations in purchase incidence are multiplied by the respective purchase quantities, differences in total sales between the no limit condition (71 cans) and the limit 4 condition (109 cans) and the limit 12 condition (188 cans) are magnified. For every person walking by the display, this translates into .24, .35, and .64 cans respectively ($F_{2,906}=5.3$, $p<.01$). In terms of total sales, the limit 12 condition was reliably different than both limit 4 and control condition, but no other contrasts were statistically significant.

Insert Figure 1 Here

Figure 1 displays the discrete density functions for each of the three conditions. The overall pattern of data appears to result from a combination of two separate influences, both brought about by the presence of a particular limit level -- one anchoring and truncating. Anchoring is evident from the mass point

that appears at each limit level and a stretching out of the response scale (compare no limit vs. limit 12). The data suggest that a reasonable number of consumers bumped into the limit level in the limit 4 condition and would have bought more if they had been allowed.

Thus far, we have shown sales effects when external anchor values were given in multiple unit prices and purchase limits. However, if anchoring influences quantity decisions in the manner we suggest, then other presentations of product quantity values should influence purchase amounts. For example, previous findings suggest that even irrelevant product quantity values that are presented at the POP may affect quantity decisions (cf. Plous 1993; Tversky and Kahneman 1974). Study 3 investigates this possibility.

Study 3: Can Irrelevant Anchors Affect Intended Purchase Quantities?

The findings in study 2 are consistent with the idea that high purchase quantity limits provide consumers with an anchor from which they insufficiently adjust downward. However, quantity limits have other properties -- truncation and a potential scarcity signal -- whose influence is difficult to gauge. Given our hypothesis that promotions can influence quantity decisions through anchoring, we would expect that other means of presenting product-quantity values could induce anchoring.

In study 3, we devise a lab experiment wherein subjects are informed that a product is "shipped to stores" in boxes of a specified number of units in one condition, and given the same anchor values in purchase limits in a second condition. Although the "shipped to stores in boxes of _ units" information clearly is unrelated to a consumers' quantity decision, we expect that these irrelevant product quantity values may induce anchoring (see Tversky and Kahneman 1974). An additional purpose is to examine effects of rather extreme limits (e.g., 56 cans of tuna). These anchor values may help to separate potential explanations of the effects of high purchase limits. If reactance or signaling drives the effects of higher purchase limits, then relatively extreme limits should not increase purchase intentions (Lessne and Notarantonio 1988; Lynn 1992). But if anchoring drives the effects of high limits, then even extreme limits may be effective (Plous 1993).

Method and Procedure

Ninety-eight undergraduate subjects from a large eastern university participated in study 3 in partial fulfillment of a course requirement. Each subject was given a shopping scenario with five well-known products offered at a 20-30% discount (Snickers candy bars, Quaker Oats granola bars, Sunkist oranges, Snapple iced tea, Minute Maid orange juice boxes). Each subject saw one product in a no anchor control format and four other products accompanied by different anchors, either 7, 14, 28, or 56. The anchors were expressed either in the form of purchase quantity limits ("purchase quantity limit of __ units per customer") or in terms of the size of the wholesale shipping carton ("shipped to stores in boxes of __ units"). Anchor form was a between-subjects variable. The overall design, therefore, was a 2 anchor forms (between) by 4 anchor size (within) mixed design where each subject also provided a no-limit control response.

Subjects were told that they were involved in a "shopping study" conducted for managers of a local store and asked to assume that they and their roommate have been given a ride to the grocery store. They were then asked to provide purchase quantity intentions for each of five products at a randomly assigned anchor type (quantity limit anchor or "shipped in boxes" anchor) and anchor quantity (7, 14, 28, 56). The subjects then indicated whether they believed the offered prices to be low or high relative to other sellers. Consistent with Inman, Peter, and Raghubir (1996), deal evaluations were measured using three nine-point semantic differential scales anchored at "a bad deal - a good deal," "hard to find - easy to find," "unattractive to me - attractive to me" (a = .83).

Results and Discussion

A MANOVA indicated that although intended purchase quantities differed across the five product replicates (a main effect of product type), the basic pattern held up across all products (no interactions with product). Therefore, in the rest of the analyses we controlled for the main effect of product type by mean-centering the data separately for each product type. These mean-centered data were then analyzed using a mixed design MANOVA.

The untransformed cell means are shown in Table 3. Only the main effect of anchor size was statistically significant, $F_{3,88}=6.6$, $p<.001$. Simple effects tests indicated that the main effect of

anchor size was significant in both the purchase limit ($F_{3,88}$=2.6, p=.05) and the shipping carton ($F_{3,88}$=5.5, p<.001). The main effect of the shipping carton size anchor (x=6.6) exceeded the purchase limit anchor (x=5.9), but the difference was not reliable, $F_{1,88}$=2.5, p=.12. Although the 2-way interaction was not significant, $F_{3,88}$=1.8, p=.14, simple effects tests using polynomial contrasts indicated a positive trend in the purchase limit condition and a quadratic trend in the shipping carton size condition. We have no ready explanation for this difference. Possibly, the 56 item carton size appeared absurd to the subjects and so some of them rejected or ignored it, though it is not clear why a quantity limit of 56 would also not be treated with similar skepticism.[3]

Table 3
How Irrelevant Anchors Influence Quantity Intentions

	Quantity Intentions		**Incidence**	
Anchor Size	**Quantity Limit**	**Shipping Carton**	**Quantity Limit**	**Shipping Carton**
No Anchor	5.3		.79	
Anchor = 7	3.7	3.9	.76	.71
Anchor = 14	5.4	5.6	.75	.68
Anchor = 28	7.1	10.5	.85	.77
Anchor = 56	7.4	6.5	.72	.69

Deal evaluations were examined as a potential mediator of the purchase intent effects. However, the anchors had no impact on deal evaluations. The correlation between deal evaluation and the four anchor levels (7, 14, 28, and 56) was insignificant with purchase limit (r = .11, n.s.) and carton size (r=-.09, n.s.) presentation. These results suggest that deal evaluations did not serve as a mediator between the higher anchors and the purchase intentions.

Study 4: Suggestive Selling Anchors With and Without Discounts

[3]The within subject manipulation of anchor value might cause some concern about experimental demand. Therefore, we reanalyzed each subject's first response which should be uncontaminated by later exposure to other limit levels. The basic pattern was virtually identical to that reported in Table 3, though the lack of within subjects comparison reduced statistical significance ($F_{3,93}$=2.1; p=.09).

In study 4, we investigate another anchor format involving suggestive usage slogans. For example, a suggestion to "Buy Snickers Bars for Your Freezer" can easily be modified to include an external anchor, "Buy 18 Snickers Bars for Your Freezer." Study 4 examines whether these suggestive selling anchors can influence purchase intentions both with and without discounts.

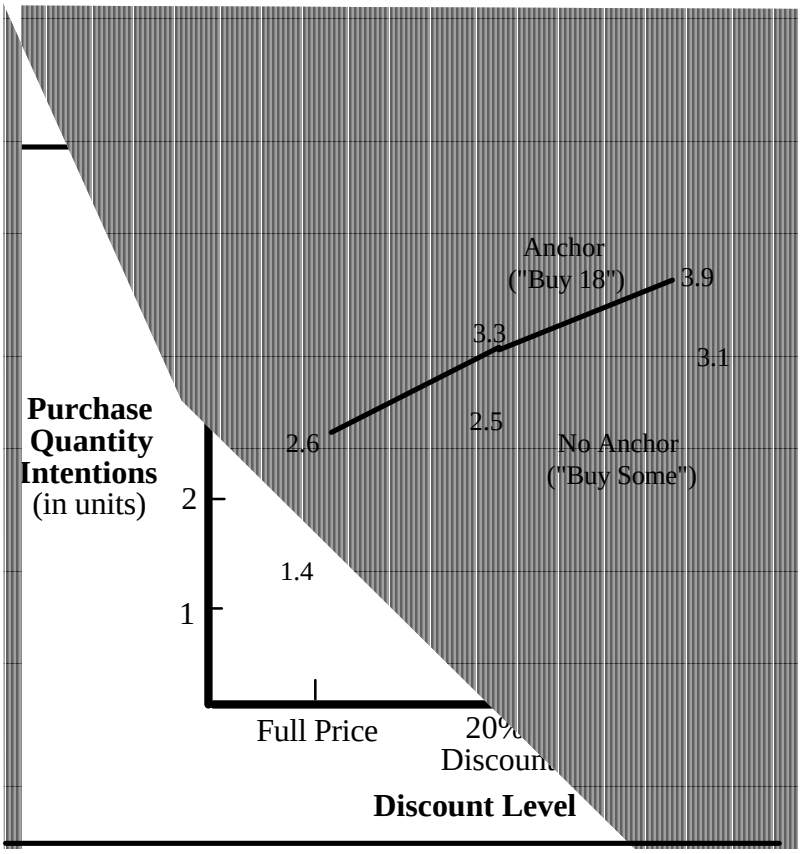
Method and Procedure

One hundred twenty undergraduates participated in a shopping scenario similar to that used in the previous study. Each subject was offered six well-known products at one of three price levels: an actual convenience store price and a 20% and 40% discount. In addition, all subjects were given suggestive selling claims that included either no product quantity anchor ("Snickers Bars -- Buy Them for Your Freezer") or an explicit product-quantity anchor ("Snickers Bars -- Buy 18 for Your Freezer").[4] The design was a 2 anchor by 3 discount within-subjects design using 6 counterbalanced product replicates with randomized presentation order. Subjects were given no indication about whether the price was a discount. Finally, the subjects provided quantity intentions for all products.

Results and Discussion

A MANOVA of purchase quantity intentions indicated a main effect of product type but no interactions with the other variables. Therefore, we mean-centered the data separately by product. The untransformed means are shown in Figure 2. Both the anchor ($F_{1,112}$=4.1, $p<.01$) and discount level ($F_{2,112}$=5.3, $p<.05$) increased purchase quantity intentions. There was no interaction between anchor type and discount level, $F_{2,112}$=1.2, n.s. Simple main effect tests indicated a positive trend for discount level within both anchor conditions. Of greatest interest is the fact that the external anchor increased intended purchase quantities even without a discount.

[4] Other anchoring operationalizations included "Quaker Oats Granola Bars -- Buy 18 for your backpack," "Wrigley's Gum -- Buy 18 for class," "Certs -- Buy 18 for studying," "Minute Maid Orange Juice Boxes -- Buy 18 for your room," and "Yoplait Yogurt -- Buy 18 for dessert."



The first four studies contribute to the literature which indicates that external anchors have an substantial impact on everyday decision making. However, we believe that supermarket shoppers may be able to resist anchors by using anchors. Study 5 examines whether consumers can counter external anchor effects with self-generated anchors. In doing so, we provide additional evidence that anchoring is the psychological mechanism driving the results of the earlier experiments.

Study 5: How Internally-Generated Anchors Influence Quantity Decisions

The first four studies show that external anchors can have a pronounced impact on quantity decisions. This holds across different types of promotions (multiple unit pricing, quantity limits, suggestive selling) and even with irrelevant external anchors ("shipped from manufacturers in boxes of 28 units"). Moreover, the findings occurred both under controlled laboratory conditions and in field tests. Yet, we have provided no direct evidence that the psychological mechanism driving the results is actually an anchoring and adjustment process. Obtaining process level evidence about judgmental heuristics is not easy, either through retrospective or concurrent verbal protocols. And so, Study 5 continues to rely on analysis of judgmental output but does so in the context of experimentally manipulated internal anchors.

Let us assume that the judgment process underlying the quantity decision is as described at the outset of the paper -- that is, once consumers decide whether and what to buy, they anchor on a

small purchase quantity and make upward adjustments depending on deal attractiveness. Our logic for getting at psychological mechanism is as follows: if respondents tend to generate low anchors on their own, then their judgments should not be altered if we ask them to generate similar internal anchors before they make quantity decisions (Hoch 1985). Alternatively, if we ask them to generate an anchor they normally would not retrieve, for example a larger anchor prompted by considering an expanded set of usage occasions, we should observe a divergence in judgmental output.

We examine the effect of two internally-generated anchors on purchase intentions, a default anchor ("how many units do you usually buy?"), and an expansion anchor ("think of all the different ways you could consume this product over the next two weeks"). Because of the personal nature of these internal anchors, we believe that when they are made salient they will influence quantity intentions, and they may override any effect of a contemporaneously presented external anchor.

Method and Procedure

One hundred and thirty nine undergraduate subjects from a large eastern university participated in study 4 in partial fulfillment of a course requirement. The experimental set-up was similar to study 3. Each subject was given a shopping scenario with well-known products offered at a 20-30% discount (e.g., Snickers candy bars, Wrigley's 5-pack gum, Sunkist oranges, 20 oz. diet or regular Coke), told they were involved in a shopping study, and asked to assume they and their roommate have been given a ride to the grocery store.

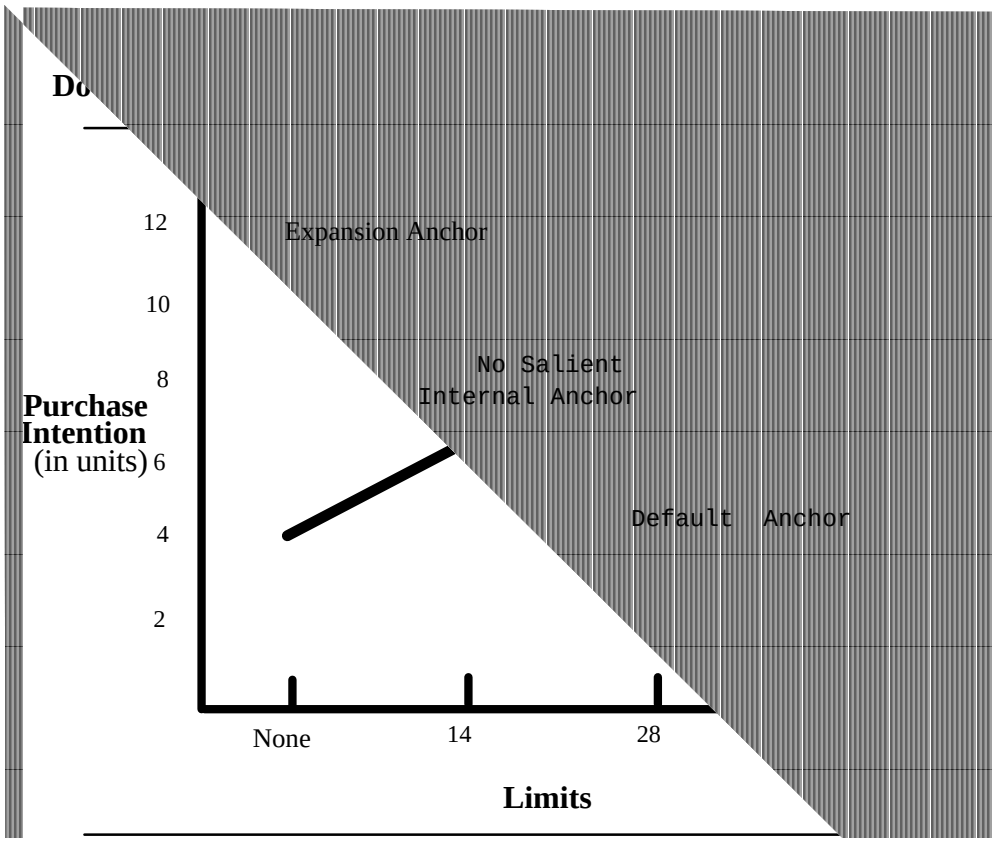
The experiment utilized a 3 internal anchor by 4 external anchor mixed design; internal anchor was manipulated between subjects and external anchor within subjects. For the external anchor, we used four purchase quantity limits: a no limit control, limit 14, limit 28, and limit 56. The internal anchor had three levels: a no internal anchor control, a default internal anchor, and an expansion anchor. Instructions for the default anchor were as follows. After seeing the details of the promotional deal (i.e., product description, regular and discounted prices, and quantity limits if any), subjects were immediately instructed to answer the question: "how many [units of this product (e.g., 'packs of gum')] do you usually buy at a time?" After writing down a number, they then

indicated their intended purchase quantity for the item. Instructions for the expansion anchor were similar to those used by Wansink and Deshpandè (1994). After seeing the deal, subjects were asked the following: "On each of the lines below, please write down a different situation in which you might imagine yourself [consuming this product ('chewing gum')]. After listing different usage occasions, subjects then indicated, "How many [units of this product ('packs of gum')] do you think you might [use ('chew')] in the next month?" Finally, subjects provided their intended purchase quantities.

We had only three firm expectations about the data. First, in the absence of external anchors, the default internal anchor would produce results similar to the no internal anchor control condition. Second, we expected that the expansion condition would increase quantity decisions substantially (Wansink and Deshpandè 1994). Thinking about vivid, expanded usage experiences results in an atypical anchor quantity that may supplant a smaller default anchor. Third, we expected the external anchors to function in a manner similar to that found in studies 2-3. It was not clear to us, however, what would happen when subjects were concurrently exposed to both internal anchors and external anchors. For example, it is possible that internally generated anchors would be more powerful, both for motivational ("it's my anchor") and informational (retrieval of relevant idiosyncratic information) reasons. Alternatively, the two anchors might interact.

Results and Discussion

As expected, there were differences in mean purchase intentions across product replicates. Because the independent variables did not interact with product types, we used the mean-centering procedure from study 3. The pattern for the purchase quantity intentions data is relatively straightforward as displayed graphically in Figure 3. In the no-limit control condition, the default anchor led to purchase intentions close to those produced when no internal anchor was elicited (4.2 vs. 5.0), $F_{1,136}$=.22. The expansion anchor, in contrast, increased intended purchase quantities substantially, an increase of 150% (10.7 vs. 4.2; $F_{1,136}$=14.6, $p<.001$).



A MANOVA of the full design reveals a significant main effect of internal anchor, $F_{2,136}$=3.3, =.04. As indicated in Table 4, purchase intentions in the default anchor condition averaged 5.2 versus 10.3 in the expansion anchor condition and 7.2 in the no internal control condition. There was a significant effect of external anchors, $F_{3,136}$=2.9, p<.04, ranging from a low of 6.6 in the no limit control to 8.9 in the limit 56 condition. These two main effects, however, were qualified by a significant internal by external anchor interaction, $F_{6,136}$=2.5, p=.024. Simple main effects tests within each of the internal anchor conditions revealed that the external anchor had a influence on judgment only in the no internal control condition, $F_{3,134}$=4.9, p=.003. This effect emerged due to a significant positive trend in the data $F_{1,136}$=14.3, p<.001. When subjects generated either a default or expansion anchor, the external anchor had no influence on quantity intentions. This suggests that salient internal anchors can nullify any impact of external anchors.[5]

Table 4.
How Internal Anchors Influence Quantity Intentions

[5]As with study 3, we analyzed subjects' first responses and found them unaffected by the within-subjects anchor manipulation. The same Z-shaped pattern emerged as that shown in Figure 2, thought the interaction was not significant with the between-subjects error term ($F_{6,127}$=1.3; p=.27).

Internal Anchor		External Anchor				
		No Limit	**Limit 14**	**Limit 28**	**Limit 56**	**Mean**
No Internal Anchor	Quantity	4.2	6.4	7.7	10.4	7.1
	Incidence	.77	.80	.88	.81	.82
	Internal Anchor	na	na	na	na	na
Default Anchor	Quantity	5.0	4.5	6.1	5.2	5.2
	Incidence	.89	.89	.87	.85	.87
	Internal Anchor	2.9	2.8	2.6	2.0	2.6
Expansion Anchor	Quantity	10.7	10.6	8.6	11.2	10.3
	Incidence	.87	.89	.96	.89	.90
	Internal Anchor	10.3	10.2	5.6	10.2	9.1

We also computed correlations between the internal anchors and intended purchase quantities. Collapsing across the eight conditions with an internal anchor, the correlation was .70, .61 in the default anchor condition, and .71 in the expansion anchor case. Examination of the within-cell correlations indicates a strong relationship between the internal anchor and quantity intentions in both the absence (r=.84) and presence (r=.62) of an external anchor.

The notable impact of the expansion anchor compared to the default anchor (10.4 vs. 4.2) is intriguing for both the manufacturer and retailer. The challenge is one of in-store implementation. Marketers must motivate the consumer to rethink his or her default purchase quantity under noisy and rushed conditions. Although this is difficult to achieve in a low involvement shopping experience, a coordinated effort between manufacturers and retailers may provide the greatest promise by providing point-of-purchase retrieval cues for expansion advertising.

Conclusion

The present research explores the psychological process underlying the purchase quantity decision. Everyday shopping chores represent low-stakes, uninvolving behavior for most consumers. Casual and controlled observation of supermarket shoppers suggest that they are expedient and, within reason, more interested in minimizing shopping costs than maximizing shopping returns. This is not to say that consumers are irrational; they simply have adapted to the decision task at hand (Payne, Bettman, and Johnson 1993). Most of the time they act reasonably,

but every so often they become inattentive and unduly influenced by various merchandising methods. Given this low level of motivation and involvement, it makes sense that consumers' quantity decisions could be influenced by "suggestions" (Tversky, Sattath, and Slovic 1988). Such suggestions can disrupt the normal tendency to anchor on a small number.

If the price justifies stockpiling, consumers will make upward adjustments from the small anchor; these adjustments, however, will not eliminate the impact of the starting anchor value. Because of this, retailers may be able to increase sales by using anchor-based promotions to present consumers with a larger-than-normal purchase quantity. In effect, these large anchors may supplant lower values, thus leading to an insufficient downward adjustment and larger purchase amounts.

The results of both field and lab studies show that POP anchors can reliably affect quantity decisions. Study 1 examined how multiple unit prices affect sales across 13 product categories in 86 supermarkets. Consistent with an anchoring explanation, multiple unit pricing generated a 40% higher increase in baseline sales than did single unit pricing. Study 2 examined the impact of anchor-based promotions that take the form of supermarket purchase limits. The results of this field study showed that purchase limits increase the number of units a buyer purchases. A key insight from this study was that purchase limits had to be set high enough so as not to truncate the number that would have otherwise been purchased (see Plous 1993). Relatively low values set in other anchor-based promotions (e.g., suggestive selling anchors or multiple unit prices) could also backfire by reducing the quantity decisions of would-be heavy buyers through anchoring.

To more clearly understand the way in which anchoring can influence purchase quantity decisions, studies 3-5 were conducted in a controlled lab environment. Study 3 showed that even seemingly irrelevant POP product-quantity anchors ("shipped from to stores in boxes of 56") can influence purchase intentions. It furthermore showed that increases in anchor size (i.e., 14, 28, 56) can lead to proportional increases in quantity decisions. Study 4 showed that anchors embedded in a suggestive selling slogan also can increase intended purchase quantities even when the price is not discounted. Finally, study 5 examined whether internal anchors based on past purchase quantities or potential future usage would counteract the influence of external POP anchors. The results

supported the anchoring model by showing that both low (past purchase quantities) and high (future usage quantities) anchors overpowered the effects of external (purchase limit) anchors.

Implications for Managers, Researchers, and Consumers

Consider a manufacturer or retailer who is given the option of either selling four units today, or trying to sell one unit in each of the next four weeks. Although consistent weekly purchases are desirable from production and distribution perspectives, many manufacturers probably believe that four units in hand are worth more. Anchor-based promotions might be considered by such managers. However, some applications of anchoring promotions could lead to troublesome production and/or distribution spikes and thus run counter to efficiency goals. Given that multiple unit prices, quantity limits, and suggestive selling are implemented with in-store signs and displays (and not packaging changes), brand managers might present such promotions to a subset of retail chains to avoid system-wide spikes. Interestingly, this strategy of occasional usage may also help to maintain the consumer effectiveness of anchor-based promotions. Retailers may be able to devise ways to use anchoring promotions efficiently and without reducing consumers' shopping trips. For example, stores might rotate the promotions across product categories to avoid effects on frequency of shopping. These promotions might also be used to take advantage of manufacturers' temporary price reductions with less expensive warehousing than in a traditional "forward buy."

In the present research, higher quantity decisions were generated with higher promotional anchors. For example, our field results indicate that purchase limits and multiple unit pricing may increase sales with discounts as low as 12-20%. And our lab findings suggest that suggestive selling anchors may affect quantity decisions even if retailers pass no discount through. The findings can also be combined with those of Inman, Peter, and Raghubir (1996) to generate strategic applications for low and high purchase limits. Whereas very low or single unit limits may increase the number of buyers through deal signaling, higher limits may begin to increase quantity decisions through anchoring. Therefore, managers might use low limits to stimulate trial of new or low-share brands, and higher limits to stimulate stockpiling of established brands. Table 5 offers

additional suggestions on how anchor-based promotions can be executed, improved, and better understood.

Table 5.
Executing and Improving Anchor-Based Promotions

	Anchor-Based Promotions			
	Multiple Unit Pricing	**Purchase Quantity Limits**	**Suggestive Selling**	**Expansion Anchors**
Executions	• 3 for $1.97 • 12 for the price of 10 • Baker's Dozen $2.99	• Limit of 12/person • Limit of 1 per visit • 4 per person per day	• Grab 6 for Studying • Buy 8 and Save a Trip • Buy 12 for Your Freezer	• Remember when you ran out? • Buy a month's worth • How many will you eat this weekend?
Implementation Considerations	• The larger and more expensive the product the lower the suggested number should be • Discounts of 12-20% increase sales while protecting margins	• To avoid truncating sales, set limits at least two times higher than typical quantity bought on deal • Very low limits increase purchase incidence; high limits increase purchase quantities	• May work without a corresponding sales promotion • May be most effective with familiar, inexpensive items like snacks & drinks	• POP or ad or package must cause shopper to stop and think • Can be used as a theme in an ad campaign and may be used without a sales promotion
Research Opportunities	• When will total price counteract the effect of multiple unit pricing? • When does confusion moderate anchor effectiveness and when does it enhance it?	• What joint impact do purchase quantity limits have on purchase incidence and purchase quantity? • What determines the ideal quantity limit?	• Can social norms be leveraged to influence purchase quantities? • Does suggestive selling influence purchase incidence or quantity?	• When and how can involvement be increased enough to generate internal anchors? • When are fear appeals (e.g., social embarrassment or deprivation) more effective than economic appeals?

Our research investigates the effect of anchors only on the purchase quantity decision, not actual consumption. However, previous findings show that ads suggesting alternative usage situations (Wansink and Ray 1996) and substitution opportunities (Wansink 1994) can increase usage frequency for some products. Similarly, generation of expansion anchors based on past usage instances may increase usage intentions (Wansink and Deshpande 1994). Therefore, future work should investigate whether some usage-based suggestive selling and expansion anchors (e.g., "Buy 18 Snickers Bars for Your Freezer") can expand sets of considered uses and influence consumption.

There is also emerging evidence that promotional stockpiling can lead to the temporarily increased consumption of some products (see Aliwadi and Neslin 1996; Chandon 1996). While

such effects appear to be highly category-specific, recent work has shown that promotional stockpiling may increase some products' inventory salience and decrease perceptions of transaction costs (Chandon 1996). For example, consumer stockpiling has been shown to generate temporary consumption increases for some of the food products used in the present research, including yogurt (Ailawadi and Neslin 1996), canned soup (Wansink and Deshpande 1994), and cookies and fruit juice (Chandon 1996). However, insignificant consumption effects have been found after stockpiling of ketchup (Ailawadi and Neslin 1996) and detergent (Chandon 1996). The moderators of such effects (e.g., price, package size, substitutability, inventory salience, familiarity, convenience) are an important area for additional work.

Consumers can also benefit from an improved understanding of anchoring. We have shown that internal anchors based on potential uses or past purchases can increase or decrease purchase intentions and overwhelm external anchors. For example, purchase amounts may increase when consumers generate an internal anchor that exceeds their usual purchase quantity (see last column of Table 5).[6] However, it may be risky for marketers to encourage reflection on past product-related behavior. For many consumers, the most salient past behavior may be a purchase episode rather than a consumption episode. And as we have shown, a focus on past purchases can lead to a low initial anchor. Although low anchors are not beneficial to managers, they may be beneficial to consumers who wish to limit their purchases and effectively maintain self-control (Hoch and Loewenstein 1991). To generate low anchors, consumers might recall past purchases or modify their shopping lists to include purchase quantities.

We have examined an emerging issue of importance for retailers, managers, and consumers: how shoppers decide "how many" to buy. Past research has often concentrated on how marketing influences purchase likelihood; we contribute to the next step by showing how inexpensive marketing efforts can influence purchase quantity. Consider our findings on how anchoring alters

[6]A number of ads humorously play on the notion of what happens when one runs out of milk, has no Pepsi in inventory, or what happens to the party when Bud is depleted. Although these ads do not specifically suggest a purchase quantity anchor, they encourage consumers to generate their own anchors by having them recount past consumption quantities and then add a safety stock to their next purchase.

purchase quantity decisions. While contributing to a better understanding of consumer behavior, these results also have implications for retailers and manufacturers. Moreover, we identify a simple strategy that consumers can use to counter anchoring effects. In effect, anchoring can be used by managers to increase purchase quantity levels and by informed consumers to resist such attempts.

References

Ailawadi, Kusum and Scott Neslin (1996), "The Effects of Forward Buying on Purchase Frequency," Working paper, Amos Tuck School of Business, Dartmouth College.

Bazerman, Maxwell H. (1990), Judgment in Managerial Decision Making, New York: John Wiley.

Blattberg, Robert C. and Scott A. Neslin (1990), Sales Promotion: Concepts, Methods, and Strategies, Englewood Cliffs, NJ: Prentice Hall, Inc.

Blattberg, Robert C., Gary D. Eppen, and Joshua Lieberman (1981), "A Thoeretical and Empirical Evaluation of Price Deals for Consumer Nondurables," Journal of Marketing, 45:1, (Winter), 116-129.

Bucklin, Randolph E. and James M. Lattin (1991), "A Two-Stage Model of Purchase Incidence and Brand Choice," Marketing Science, 10 (1), 24-39.

Chandon, Pierre and Giles Laurent (1996), "How Promotion Packs, Purchase Quantity, and Purchase Variety Accelerate Category Consumption," working paper, H.E.C., Cedex, France.

Chiang, Jeongwen (1991), "A Simultaneous Approach to the Whether, What, and How Much to Buy Questions," Marketing Science, 10 (4), 297-315.

Chintagunta, Pradeep K. (1993), "Investigating Purchase Incidence, Brand Choice, and Purchase Quantity Decisions of Households," Marketing Science, 12 (2), 184-208.

Dhar, Sanjay K. and Stephen J. Hoch (1996), "Price Discriminattion Using In-Store Merchandising," Journal of Marketing, 60 (January), 17-30.

Drèze, Xavier, Stephen J. Hoch, and Mary E. Purk (1994), "Shelf Management and Space Elasticity," Journal of Retailing, 70 (4), 301-326.

Gupta, Sachin, Pradeep Chintagunta, Anil Kaul, and Dick R. Wittink (1996), "Do Household Scanner Data Provide Representative Inferences from Brand Choices: A Comparison with Store Data, Journal of Marketing Research, (November), forthcoming.

Gupta, Sunil (1988), "Impact of Sales Promotions on When, What, and How Much to Buy," Journal of Marketing Research, 25 (November), 342-55.

Hoch, Stephen J., Xavier Drèze, and Mary Purk (1995), "Exploring Relationship Marketing: Converting Customers into Loyal Shoppers," American Greeting Cards Research Council.

----- and George F. Loewenstein (1991), "Time-Inconsistent Preferences and Consumer Self-Control," Journal of Consumer Research, 17 (4), 492-507.

Inman, J. Jeffrey, Anil C. Peter, and Praia Raghubir (1996), "Framing the Deal: The Role of Restrictions in Accentuating Deal Value," unpublished manuscript, University of Wisconsin.

Jeuland, Abel, P., and Chakravarthi Narasimhan (1985), "Dealing -- Temporary Price Cuts -- by Seller as a Buyer Discrimination Mechanism," Journal of Business, 58 (3), 295-308.

Krishnamurthi, Lakshman and S. P. Raj (1988), "A Model of Brand Choice and Purchase Quantity Price Sensitivities," Marketing Science, 7 (1), 1-20.

Krishna, Aradhna (1994), "The Impact of Deal Patterns on Purchase Behavior," Marketing Science, 13:4 (Fall), 151-373.

Lessne, Greg J. and Elaine M. Notarantonio (1988), "The Effects of Limits in Retail Advertisements: A Reactance Theory Perspective," Psychology and Marketing, 5 (1), 34-44.

Lynn, Michael (1992), "Scarcity's Enhancement of Desirability: The Role of Naive Economic Theories," Basic and Applied Social Psychology, 13 (March), 67-78.

Meyer, Robert J., and Juao Assuncao (1990), "The Optimality of Consumer Stockpiling Decision," Marketing Science, 9 (1), 18-41.

Narasimhan, Chakravarthi, Scott A. Neslin, and Subrata K. Sen (1996), "Promotional Elasticities and Category Characteristics," Journal of Marketing, 60 (2) 17-30.

Neslin, Scott A., Caroline Henderson, and John Quelch (1985), "Consumer Promotions and the Acceleration of Product Purchases," Marketing Science, 4 (2), 147-165.

Plous, (1993), "Anchoring and Adjustment," in The Psychology of Judgment and Decision Making, Philadelphia: Temple University Press, 145-152.

Slamecka, Norman J. and Peter Graf (1978), "The Generation Effect: The Delineation of a Phenomenon," Journal of Experimental Psychology: Human Learning and Memory, 4, 592-604.

Tversky, Amos and Daniel Kahneman (1974), "Judgment Under Uncertainty: Heuristics and Biases," Science 185, 1124-1131.

-----, Shmuel Sattath, and Paul Slovic (1988), "Contingent Weighting in Judgment and Choice," Psychological Review, 95 (3), 371-384.

Wansink, Brian (1994) "Advertising's Impact on Category Substitution," Journal of Marketing Research, (November), 31, 505-515.

-------- and Rohit Deshpandè (1994) "The Impact of Household Stockpiling on Usage Rates." Marketing Letters. Vol. 5:1, 91-100.

-------- and Michael Ray (1996), "Advertising Strategies to Increase Usage Frequency," Journal of Marketing, 60:1 (January), 31-48.