Effect of Dealing Patterns on Consumer Perceptions of Deal Frequency and Willingness to Pay

Research has shown that brands with higher deal frequency obtain a smaller market share gain on deal and have a lower expected price. However, the level of dealing must be perceived by consumers before it can affect consumer response to promotions. Hence, perception of deal frequency may affect consumer price perceptions and deal response much more strongly than the actual deal frequency. The author determines how consumer perceptions of deal frequency for a brand may be influenced by the dealing pattern of that brand and of other brands. She shows that the price consumers are willing to pay for a brand is correlated more highly with perceived deal frequency than with actual deal frequency. She also shows that the price consumers are willing to pay is correlated with the actual deal frequency of the brand for certain dealing patterns, but not for others.

Price promotions have become extremely frequent in the last decade (Schmitz 1987). Research has shown that brands with higher deal frequency obtain a smaller market share gain on deal than brands with lower deal frequency (Gurumurthy and Little 1987) and have a lower expected price (Kalwani et al. 1990). Frequent dealing also is associated with lower brand equity (Kim 1989). However, the level of dealing must be perceived by consumers before it can affect consumer response to promotions (Olson and Jacoby 1971, p. 73). Hence, perception of deal frequency may affect consumer price perceptions and deal response much more strongly than actual deal frequency. An important research question, therefore, is whether any factors that a manager can control might affect consumer perceptions of deal frequency.

One can think of many instances in which perceptions of stimuli are affected by the temporal pattern in which they are observed. For example, one may visit Helsinki for 10 days, experience snow every alternate day, and conclude that it snows 15 days a month in Helsinki. However, if it snows the first three days, does not snow the next two days, snows again the next two days, and then does not snow on the last three days, one may not draw the same conclusion. In fact, studies have shown that certain sequential patterns are represented and reproduced better than others (Essens and Povel 1985; Simon and Kotovsky 1963).

To see how dealing patterns can affect consumer perceptions of deal frequency and willingness to pay, consider an example. For a given deal frequency, assume Coke has two entirely different weekly dealing patterns; pattern 1 is $.79, $1.29, $.79, $1.29, $.79, $1.29, ... and pattern 2 is $.79, $1.29, $1.29, $.1.29, $.79, $.79, $.1.29, $.79, ... In pattern 1, the dealing is regular (every alternate week). In pattern 2, it is not. In these two situations, consumers may not be equally likely to perceive the deal frequency of Coke. If the consumer is less aware of the high deal frequency for a brand, he or she may not try to purchase the brand only on deal and consequently would be willing to pay a higher price for the brand. Hence, the dealing pattern may affect the consumer's perceived deal frequency for a brand and con-
sequently influence consumer willingness to pay for the brand. For the brand manager, willingness to pay appears to be a very important construct. If consumers are willing to pay more for a brand, the manager could get a higher price for it and make larger profits.

The consumer's perceived deal frequency may have other managerial significance besides its impact on willingness to pay. For example, if the consumer's perceived deal frequency is low, he or she may purchase a larger quantity on deal. Also, the brand's image may benefit if consumers do not realize that the brand is heavily promoted. Therefore, for many reasons, manufacturers may want to have a dealing pattern that is less likely to be ascertained by consumers.

Dealing patterns of other brands in the product class also may affect perceptions of the brand's deal frequency and price. For example, if Pepsi deals randomly (vs. regularly), it may cause greater confusion in consumers' minds about Coke's dealing pattern. Thus, Pepsi's dealing pattern might affect consumers' perceptions of deal frequency and willingness to pay for Coke.

A study was conducted to examine two dimensions of the dealing pattern, frequency of deals and regularity of deals. Though other determinants of the dealing pattern might affect consumer perceptions (e.g., variation in the sale price of a brand), the study focused on the effect of frequency and regularity of deals on consumer perceptions of deal frequency. Two aspects of deal frequency perceptions were examined, accuracy of perceptions (how close perceived deal frequency is to true deal frequency) and systematic biases, if any. The study objectives were to determine whether

- frequency and/or regularity of price deals for a brand affect accuracy of perceptions of deal frequency for that brand,
- frequency and/or regularity of price deals for a brand introduce any systematic biases in consumer perceptions of deal frequency for that brand,
- frequency and/or regularity in dealing of brand Y affect accuracy and biases in perception of deal frequency for brand X, and
- deal frequency perceptions for a brand affect the price the consumer is willing to pay for that brand.

In the following section, previous research on temporal patterns is reviewed. Then hypotheses are developed and the experiment used to test them is described. Finally, the results are reported and implications are discussed.

**PREVIOUS RESEARCH**

Research on recognition and representation of temporal patterns has not concentrated on marketing mix variables as the stimuli. In most studies on sequential pattern recognition, patterns formed of sequences of letters (Simon and Kotovsky 1963) or musical patterns (Essens and Povel 1985) have been used to examine how such patterns are represented and reproduced.

For price patterns specifically, research has concentrated mainly on primacy effects of price patterns on consumer price perceptions. Büyükkurt (1986) explored the influence of different discount structures on the perceived value of an observed basket of items, where prices of different items were observed serially. In a computer-controlled laboratory experiment, he found that primacy effects were statistically significant but not strong. Della Bitta and Monroe (1974, p. 302) found evidence that "extreme prices presented first in a series of price stimuli anchor price perceptions, thereby pulling the adaptation level toward the extreme and resulting in depressed or accentuated price judgments." That effect is also suggested by adaptation level theory (Helson 1964) and by Tversky and Kahneman's (1974) anchoring and adjustment hypothesis. The implication is that subjects' frames of reference are sensitive to the order of presentation of prices.

Reference price reflects some aspects of the mix of past prices; for example, it captures the effect of trends in prices when operationalized by extrapolative expectations (Winer 1986) or adaptive expectations (Gurumurthy and Little 1987). However, reference price research has not examined the effect of the exact pattern of past prices on consumer price perceptions for a brand. Hence, for example, it does not account for the effect of regularity in the dealing pattern on the consumer's reference price.

The current study extends previous research to determine the effect of regularity and frequency of dealing on consumer perceptions of deal frequency and willingness to pay.

**HYPOTHESES**

The hypotheses relate to the effect of frequency and regularity of deals on perceived deal frequency and to the effect of perceived deal frequency on willingness to pay. The deal patterns of both brands X and Y are hypothesized to affect perceived deal frequency for the subject brand. A dealing pattern is defined as being regular if deals occur at regular intervals (i.e., there is no variation in the time between deals) and random if deals occur randomly.

**Effect of Deal Patterns of Subject Brand on Perceived Deal Frequency**

Consider the potential effect of the two variables of interest, deal frequency and regularity, on perceived deal frequency. Those two variables can affect how accurate the perception of deal frequency is and also may bias the perception of deal frequency.

**Accuracy of perceptions.** One can observe a variation in the regularity of dealing for different brands in a market. Some brands are promoted fairly regularly, with sales every other week (e.g., Coke and Pepsi) or in every n

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1 The effect of dealing patterns on total sales and on market share of the brand is not considered.
week of the month (individual brands of bathroom tissue or potato chips). Other brands are promoted irregularly (e.g., Bounty paper towels, Minute Maid orange juice). The manager needs to know whether having an irregular or regular dealing pattern is a better policy to follow. One would think that a more random dealing pattern would be more difficult for consumers to remember. In this case, if the brand were being promoted frequently, consumers would be less aware of the high level of dealing for the brand and consequently may be more responsive to deals on the brand.

Greater awareness of stimuli that are seen regularly (vs. irregularly) is supported by literature on representation and reproduction of metrical (where the pattern is mapped on a frame formed of equal time intervals) versus nonmetrical (where the pattern cannot be divided into equal time intervals) temporal music patterns. Metrical patterns have been shown to be better represented and reproduced (Essens and Povel 1985) than nonmetrical patterns.

Research on the ease of representation of serial patterns (Simon and Kotovsky 1963) also has found that subjects’ extrapolations are based on simple periodic patterns. In addition, patterns are easier to represent in memory and to recall later if they can be described in terms of fewer symbols. In Simon and Kotovsky’s symbolic language for representing patterns, price patterns with equal time intervals would need fewer descriptive symbols than random patterns. Hence, deal frequency perceptions should be more accurate when deals occur at equal time intervals.

H1b: If a brand is regular (vs. random) in its promotions, perceptions of deal frequency of the brand are more accurate.

One may think that deal frequency must be high for regularity to be significant. However, that need not be the case. For example, in many department stores a white sale occurs with very low frequency (maybe once a year), but regularly (around the same time each year). Many consumers know when to expect a white sale in the store and wait for it to buy their linen. Therefore, though frequency is low, consumers know the dealing pattern and the deal frequency because of the regularity of the dealing pattern.

To examine the interaction between regularity and frequency, one can define periodicity as the length of a distinct dealing pattern before the pattern is repeated. Hence, in Coke’s pattern 1 in the introductory example, the period is two weeks long; in pattern 2, the period is longer than eight weeks. Previous work has shown that message repetition enhances the opportunity to process the content of a message (Cacioppo and Petty 1979) and that recall is an increasing function of the frequency of the stimuli (Kintsch 1970). The shorter the period of the dealing pattern, the more often consumers will be able to see the pattern in a given time period, and therefore consumers will have more accurate recall of that pattern.

Another argument that shorter periodicity would enhance recall of the dealing pattern is that the shorter the pattern, the easier it is to understand (Simon and Kotovsky 1963). Consequently, the shorter the periodicity, the more easily the deal pattern is perceived and the more accurate is the perception of deal frequency. As a result, consumers’ inclination to purchase the brand only on deal might increase if the deal frequency for the brand is high, and thus the profitability of dealing would be reduced.

When deals are regular, the period of the dealing pattern is one interdeal time period. Hence, for regular deals, the period of the pattern becomes shorter as the deal frequency increases. For random deals, the periodicity is long irrespective of the deal frequency. The preceding arguments suggest an interaction between regularity and frequency. When deals are regular and the deal frequency is high, recall of deal frequency should be much more accurate.

H1c: There is an interaction effect between regularity and frequency of deals for a brand that increases the accuracy of perception of deal frequency for the brand.

Intuitively, one might think frequency of dealing should affect a consumer’s accuracy of perception of deal frequency. However, though increasing deal frequency would lead consumers to have a higher perceived deal frequency, there is no reason for a consumer to be more (or less) likely to know that there have been six deals this month when there have been six deals than to know that there have been three deals when there have been three deals. Therefore, an increase in deal frequency should have no effect on accuracy of recall of deal frequency.

Biases in perceptions. Inaccurate consumer perceptions of deal frequency (not equal to true deal frequency) may or may not be beneficial for the manager, depending on whether inaccuracy in perception causes any systematic biases in consumers’ perceived deal frequency and the direction of the biases. If consumers systematically underestimate deal frequency when they have inaccurate perceptions, they might react more favorably to a deal. If consumers systematically overestimate deal frequency when they have inaccurate perceptions, the brand image may suffer.

When consumer perceptions of deal frequency are inaccurate, a bias in consumer estimates of deal frequency is hypothesized that follows Kahneman and Tversky’s (1979) subjective probability function. Kahneman and Tversky show that consumers have a tendency to underestimate high probabilities and overestimate low probabilities. Hence, when recall is inaccurate, consumers’ perceptions of deal frequency are hypothesized to regress to the mean.
H3: When recall is inaccurate, (a) high deal frequency is underestimated and (b) low deal frequency is overestimated.

Effect of Deal Patterns of Another Brand on Perceived Deal Frequency

The dealing pattern of another brand in the product class may affect the accuracy of perception of the subject brand and also bias the perception of that brand.

Accuracy of perceptions. Less preferred brands seemingly have incentive to confuse consumers about the dealing pattern for the preferred brand. For example, in a heavily promoted product class, if the dealing pattern for a less preferred brand interferes with or distracts consumers from perceiving the high deal frequency of the preferred brand, the consumer may be less prone to try to buy the preferred brand from deal to deal. Consequently, the consumer may respond more to deals on the less preferred brand.

Though no studies have been done (to the author’s knowledge) to determine the distracting or interfering effect of a promotion for brand Y on a promotion for brand X, research in advertising has advanced two opposing hypotheses for the effect of distraction on the persuasive impact of a communication. Festinger and Macoby (1964) hypothesized that individuals would change their attitudes more if distracted during the presentation of a persuasive communication because the active process of counterargument would be inhibited. McGuire (1966) noted that a learning theory approach would predict opposite results because distraction should inhibit reception of the persuasive material. In trying to determine which theory is more appropriate, Haaland and Venkatesan (HK, 1968) found that less attitude change occurred in the distraction conditions, and that distracted subjects were also less able to recall arguments presented. Here, as the focus is on recall of the stimulus, and message acceptance is not of relevance, HK’s view is taken—that is, distraction caused by brand Y hinders recall of deals for brand X.

The hypotheses on the effects of brand Y on brand X are based on the premise that the easier it is for the consumer to perceive the dealing pattern of brand X, the less distraction or interference that pattern causes in perceiving the dealing pattern for brand X. On the basis of HK’s findings, when there is less distraction or interference caused by brand Y, the recall for brand X is more accurate.

In terms of regularity, if brand Y deals randomly, its dealing pattern is less easily perceived, recall of its deal frequency is less accurate (H3a), and it causes greater distraction or interference for deals on brand X. In addition, if brand Y creates more interference for deals on brand X, the recall for brand X is less accurate (HK). Hence,

H3a: If brand Y deals regularly (vs. randomly), perceptions of deal frequency for brand X are more accurate.

H10 states that an interaction effect between frequency and regularity in dealing of brand Y increases the accuracy of perceived deal frequency for brand Y. In that situation, brand Y’s dealing pattern is more easily perceived and causes less distraction or interference in perceiving brand X’s dealing pattern, and recall of deal frequency of brand X is better.

H6b: There is an interaction effect between regularity and frequency of deals for brand Y that increases the accuracy of perception of deal frequency for brand X.

Biases in perceptions. It is useful for a manager to know whether the deal frequency of other brands can affect consumer perceptions of deal frequency for his or her own brand and vice versa. For example, suppose brand X promotes little, but other brands promote a lot. The high deal frequency of other brands may bias consumer perceptions of deal frequency for brand X. They might think brand X promotes often, and the manager may not get as good a reaction to deals as he or she anticipates.

Burke and Srull (1988) argue that “the similarity of brands . . . may make it difficult for consumers to retrieve the specific characteristics of individual brands from memory and may cause confusion of the recalled brands and attributes.” In a series of experiments, they show that a consumer’s ability to recall distinctive brand information conveyed in an ad is hindered if the consumer sees another ad for a different brand in the same product class. Applying their findings to the promotion environment, one could hypothesize that if Coke is on deal frequently, consumers might assume that Pepsi, a similar product, is also on deal frequently. Thus, overestimation of deal frequency for brand X would be greater when brand Y deals more often and vice versa.

H6c: Low deal frequency of brand X is overestimated more if brand Y deals more often (vs. less often).

H6d: High deal frequency of brand X is underestimated more if brand Y deals less often (vs. more often).

Impact of Perceived Deal Frequency on Willingness to Pay

Monroe (1973) suggests that the extent to which buyers are conscious of the prices they pay influences the role price plays in buyers’ choice process, and that buyers consider past prices as a basis for a product’s fair price. Because willingness to pay would be related to a consumer’s perception of fair price, willingness to pay would be based on the consumer’s perceptions of the prices that he or she has observed for a brand. Hence,

H5: When consumers perceive a lower deal frequency for a brand, they are willing to pay a higher price for that brand.

If H5 is supported, the factors found to be associated with a perception of lower deal frequency of a brand will also be associated with a willingness to pay more for the brand. For example, in a high dealing scenario, deal fre-
EFFECT OF DEALING PATTERNS ON CONSUMER PERCEPTIONS

frequency for brand X is hypothesized to be underestimated when deals for brand X are random (H₁a and H₂a, in conjunction), or deals for brand Y are random (H₂a and H₃b in conjunction). This scenario would also lead to a willingness to pay more for brand X. In contrast, in a low dealing scenario, deal frequency for brand X is hypothesized to be overestimated when deals for brand X are random (H₁a and H₂b) or deals for brand Y are random (H₂b and H₃a). The result would be a lower willingness to pay for brand X.

Effect of Brand Preference on Accuracy of Recall of Deal Frequency

Celsi and Olson (1988) provide evidence that involvement plays a motivational role in consumers’ attention and comprehension processes. Motivation to process information has been conceptualized by many researchers in terms of consumer involvement with the information stimulus (e.g., Bloch and Richins 1983; Cohen 1983). Presumably the consumer will be more involved with his or her preferred brand than with a less preferred brand. Hence,

H₃: Consumers have a more accurate perception of deal frequency for a more preferred brand.

METHOD

An attempt was made to test the hypotheses with data on consumer perceptions of deal frequency for different products in supermarkets. Eighteen brand-sizes were selected that were thought a priori to be on price deal at least three times in a 20-week period so that some dealing pattern could be observed. For those 18 brand-sizes, prices were tracked over 20 weeks in a Manhattan supermarket. Twelve of the 18 brand-sizes were offered on sale three or more times in the 20-week period. Dealing patterns of those 12 brand-sizes are given in Table 1. Random-infrequent dealing patterns were most common. No case of regular-infrequent dealing was found.

There were three complications in using supermarket data. First, to have enough variation in deal frequency and regularity, the analysis would have to be done across product classes. However, having different product classes would cause variation in other variables that might affect consumer perceptions (e.g., frequency of purchase of the product class). Second, there were no examples of low frequency regular dealing. Third, data to study the effect of dealing patterns of a second brand on perceptions of a subject brand were not possible to find, even across product classes. Therefore an experiment was necessary to test the hypotheses. An experiment allowed deal frequency and regularity to be varied in desired combinations while other variables were held constant.

Description of Experiment

In an interactive between-subjects experiment, the stimuli were presented on personal computers. Computer-simulated shopping experiments have been used by other researchers to study the effect of price patterns on consumer price perceptions (Büyükkurt 1986). Burke et al. (1990) found that laboratory experiments with soft drinks closely paralleled real shopping trips in terms of brand switching, average length of run, and market share. Simonson and Winer (1990) also replicated laboratory settings with scanner data and obtained similar results.

Subjects were 159 undergraduate and graduate business students who participated in the experiment as part of a course requirement. They were assigned randomly to the experiment condition. A handout describing the experimental procedure was given to each subject before the experiment. In addition, the experimenter briefly explained the working of the GC. During the experiment, subjects were encouraged to deliberate as much as they normally would for such purchases. Subjects worked independently.

A 2 (deal frequency of brand A) × 2 (deal frequency of brand B) × 2 (regularity of dealing of brand A) × 2 (regularity of dealing of brand B) full factorial design was used. Deal frequency for both brands was either low (3 times in 12 weeks) or high (6 times in 12 weeks). Regularity of dealing pattern for both brands was either regular (deals occurred at regular intervals) or random (deals occurred randomly). The 16 treatments and the number of subjects in each cell are reported in Table 2.

Operationalization of Variables

The experimental period was 12 weeks. If the period had been longer, subjects may have had a greater chance

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Table 1

DEALING PATTERNS OBSERVED IN THE MARKET

<table>
<thead>
<tr>
<th>Deal Frequency</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular-frequent</td>
<td>Coke (2 liters)</td>
</tr>
<tr>
<td></td>
<td>Pepsi (2 liters)</td>
</tr>
<tr>
<td>Regular-infrequent</td>
<td>None</td>
</tr>
<tr>
<td>Random-frequent</td>
<td>Minute Maid orange juice (1/2 gallon)</td>
</tr>
<tr>
<td></td>
<td>Tropicana orange juice (1/2 gallon)</td>
</tr>
<tr>
<td></td>
<td>Store brand orange juice (16 oz.)</td>
</tr>
<tr>
<td>Random-infrequent</td>
<td>Bounty paper towels (1 roll)</td>
</tr>
<tr>
<td></td>
<td>Brawny paper towels (1 roll)</td>
</tr>
<tr>
<td></td>
<td>Ruffles potato chips (7 oz.)</td>
</tr>
<tr>
<td></td>
<td>Lay’s potato chips (7 oz.)</td>
</tr>
<tr>
<td></td>
<td>Sealtest ice cream (1/2 gallon)</td>
</tr>
<tr>
<td></td>
<td>Dolly Madison ice cream (1/2 gallon)</td>
</tr>
<tr>
<td></td>
<td>Charmin bathroom tissue (4 rolls)</td>
</tr>
</tbody>
</table>

*On sale every x weeks.

*On sale six or more times in the 20-week period for which data were collected.

*Number of times the brand-size was on deal over 20 weeks.

*On sale five or fewer times in the 20-week period for which data were collected.
Table 2  
EXPERIMENT TREATMENTS

<table>
<thead>
<tr>
<th>Cell</th>
<th>No. of subjects</th>
<th>DF of A</th>
<th>DF of B</th>
<th>Reg. of A</th>
<th>Reg. of B</th>
<th>Mean perceived DF of A</th>
<th>Mean accuracy of A</th>
<th>Mean perceived DF of B</th>
<th>Mean accuracy of B</th>
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<tr>
<td>1</td>
<td>14</td>
<td>6</td>
<td>6</td>
<td>Regular</td>
<td>Regular</td>
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<td>.048</td>
<td>5.50</td>
<td>.083</td>
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<td>6</td>
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<td>Random</td>
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<td>.128</td>
<td>4.62</td>
<td>.256</td>
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<tr>
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<td>Random</td>
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<td>.333</td>
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<td>Regular</td>
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<td>.303</td>
<td>3.09</td>
<td>.273</td>
</tr>
<tr>
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<td>14</td>
<td>3</td>
<td>3</td>
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<td>Random</td>
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<td>.500</td>
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<td>.483</td>
<td>5.00</td>
<td>.567</td>
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<td>6</td>
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<td>Regular</td>
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<td>.148</td>
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<tr>
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<td>Regular</td>
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<td>.426</td>
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<tr>
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<td>Regular</td>
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<td>.071</td>
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<td>.143</td>
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<tr>
<td>14</td>
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<td>6</td>
<td>3</td>
<td>Random</td>
<td>Random</td>
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<td>7</td>
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<td>.119</td>
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<tr>
<td>16</td>
<td>7</td>
<td>3</td>
<td>6</td>
<td>Random</td>
<td>Random</td>
<td>4.43</td>
<td>.476</td>
<td>3.86</td>
<td>.357</td>
</tr>
</tbody>
</table>

1Deal frequency of brand A (times in 12 weeks).
2Regularity of dealing of brand A.
3Mean \(\left\{\text{Absolute} \left(\text{perceived deal frequency} - \text{true deal frequency}\right)\right\} / \text{true deal frequency}\).
4A higher figure shows a lower accuracy level.

of lacking involvement in the experiment. A shorter period would not have allowed manipulation of both regularity and frequency. Deal frequency need not be dichotomous, but such an operationalization seemed useful for an initial study of the hypotheses. To measure regularity, at least two interdeal time periods were needed. Therefore, the minimum deal frequency was three times in 12 weeks. The high deal frequency was six times in 12 weeks.

**Procedure**

Subjects were told that they were in a foreign country where the price and promotion environment was very different from that of the U.S. However, as in their regular store, products were available on sale sometimes and at the regular price at other times. Subjects were instructed to make successive purchase decisions over 12 simulated weeks between two hypothetical brands (A and B) of soft drinks, and were asked to assume that they preferred brand A to brand B. They were told to make purchase decisions as they normally would in a store. They were shown prices of the two brands in each of the 12 weeks. When the brand was on deal, the screen showed the deal price and indicated that the brand was on deal, which was similar to having an on-sale tag in the supermarket. At the end of the 12-week period, subjects were asked their recall of deal frequency, sale price, and regular price for both brands. They also were asked in an open-ended question the price they would be willing to pay for brand A. The experiment took between 10 and 25 minutes for each subject.

At the end of the experiment, to check subjects' motivation level, subjects were given the option to learn why the experiment was being conducted. All subjects exercised the option to learn the reason for the experiment. They also were asked what they had thought the experiment was testing. Most subjects stated that they thought the experiment was designed to test how much they purchased at different prices. None of the subjects realized the true purpose of the experiment. Subjects' perceptions of sale price and regular price were very accurate (more than 80% of the subjects got all four prices correct), which shows that they took the experiment seriously and paid attention to the information provided.

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3There may be a threshold deal frequency level below which the dealing pattern is not perceived. However, three times in 12 weeks was considered high enough to be perceptible.
4This was one more measure taken to make subjects purchase as they normally would in a store.
5This was done to test H2. The degree of preference may have varied across subjects, but was not of concern as long as brand A was preferred to brand B.
6Many consumers need not go to the store each week. The results are not expected to change substantially if 12 purchase occasions are used rather than 12 weeks.
Method of Analysis

Dummy variable regression was the analysis technique. The dependent variable was accuracy of recall of deal frequency for the brand. Accuracy of perceived deal frequency was measured by the absolute proportional deviation from the true deal frequency. This operationalization for measuring accuracy of recall has been used previously by Conover (1986), Dickson and Sawyer (1990), and Zeithaml (1982). Table 2 shows the mean perceived deal frequency and mean accuracy of both brands for each of the 16 treatments. Because accuracy is measured as deviation from true deal frequency, the lower the mean accuracy figure, the greater is the accuracy of recall of deal frequency. Independent variables included main effects for brand preference (coded 1 for the preferred brand and 0 for the less preferred brand) and regularity and frequency of both brands (coded 1 when high and 0 when low). Independent variables also included two-way interactions between the regularity and frequency variables. Nested-model tests revealed that the explained variation in accuracy of perception was not significantly different between a full model and a model with main effects and two-way interactions. The analysis was done on data pooled across the two brands. Regression results are reported in Table 3.

One brand also was considered as a replicate of the other to see whether similar results were obtained for both brands. If they were, the results would have greater validity. A nested-model test was used, which revealed that the explained variation in accuracy of perception was not significantly different between a model with and a model without brand-treatment interactions. Separate analyses for both brands revealed similar results for both brands, providing greater confidence in the results.

RESULTS

Effect of Dealing Patterns of Subject Brand on Perceived Deal Frequency

Accuracy of perceptions. Figure 1A shows the mean accuracy for different regularity-frequency conditions. In Figure 1A, the highest accuracy for the brand is in the high frequency/regular dealing condition for the brand, as predicted in H1b. Also, accuracy is greater when deals are regular, which is consistent with H1a.

H1a states that regularity in deals for a brand is associated with a higher accuracy of perceived deal frequency. Regression analysis shows a significant main ef-

![Figure 1](https://via.placeholder.com/150)

**Table 3**

<table>
<thead>
<tr>
<th>Regression Results</th>
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<tbody>
<tr>
<td><strong>Main effects</strong></td>
</tr>
<tr>
<td>( F ) Frequency of dealing of subject brand</td>
</tr>
<tr>
<td>( R ) Regularity of dealing of subject brand</td>
</tr>
<tr>
<td>( F \times R ) Frequency of dealing of other brand</td>
</tr>
<tr>
<td>( R \times R ) Regularity of dealing of other brand</td>
</tr>
<tr>
<td>( P ) Preferred brand or other</td>
</tr>
<tr>
<td><strong>Two-way interactions</strong></td>
</tr>
<tr>
<td>( F \times R )</td>
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<td>( F \times R )</td>
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<tr>
<td>( F \times R )</td>
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<tr>
<td>( R \times R )</td>
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<tr>
<td>( R^2 )</td>
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</table>

*Significant at the .01 level.
fect for regularity of a brand \((p < .01)\). However, the main effect is qualified by an interaction. To ensure that it is not the interaction that is driving the results, a check is needed to see whether regularity affects deal perceptions significantly at each level of frequency. Simple main effect tests show that regularity in deals of a brand significantly increases the accuracy of perception of deal frequency for that brand, both at the low level \((F_{1,306} = \) 8.22, \(p < .01)\) and at the high level \((F_{1,306} = 54.52, p < .01)\) of deal frequency. Hence, the more regular the dealing pattern for a brand, the more accurate the recall of deal frequency for that brand \((\beta = -.13)\). \(H_{1a}\) is supported.

As predicted in \(H_{1b}\), a significant interaction effect between regularity and frequency of deals increases the accuracy of perception of deal frequency for the brand \((\beta = -.17, p < .01)\). This finding suggests that if the brand offers deals often and in addition deals regularly, accuracy of recall of deal frequency for the brand will be high. Mean deviation of accuracy of recall is .1 when a brand promotes frequently and regularly. That is, the mean error in recall of frequency is within 10% of the actual deal frequency.

The main effect for frequency of dealing for a brand is not significant. Frequency of dealing of a brand by itself has no effect on accuracy of perception of deal frequency for that brand. It affects accuracy of perception of deal frequency only when the regularity of dealing is high. As one would expect, however, perceived deal frequency is associated with actual deal frequency. The correlation between perceived deal frequency and actual deal frequency is .46 \((p < .01)\).

**Bias in perceptions.** To test for systematic bias in estimating deal frequency when perceptions are inaccurate, the mean deviation from true deal frequency was calculated for the low and high deal frequency treatments.8 Low deal frequency was overestimated. In the low deal frequency condition, across all inaccurate subjects, the mean stated frequency \((3.54)\) is significantly more than the true deal frequency of 3 \((p < .01)\). Also, 39 subjects underestimated the deal frequency, whereas 75 subjects overestimated it. \(H_{2a}\) is supported. High deal frequency was underestimated. Across all inaccurate subjects, the mean stated frequency \((4.49)\) is significantly less than the true deal frequency of 6 \((p < .01)\). Also, 96 subjects underestimated the deal frequency and 10 subjects overestimated it. \(H_{2b}\) is supported.

**Effect of Deal Patterns of Another Brand on Perceived Deal Frequency**

**Accuracy of perceptions.** In Figure 1B, the highest accuracy for the subject brand is in the high frequency/high regularity condition for the other brand, as predicted in \(H_{3a}\). However, the other means are not as predicted. They appear to be very similar.

\(H_{3a}\) predicts that when deals for the other brand are regular (vs. random), the accuracy of perceived deal frequency for the subject brand will be higher. The regression analysis shows a main effect for regularity in the direction predicted, but it is not significant. \(H_{3a}\) is not supported.

As predicted in \(H_{3b}\), there is a significant interaction effect between regularity and deal frequency of the other brand, which increases the accuracy of perceived deal frequency for the subject brand \((p < .01)\). In fact, this interaction has the biggest effect on accuracy of a brand \((\beta = -.18)\). This finding implies that another brand creates the least distraction in the perception of deal frequency of the subject brand when the other brand is promoted both regularly and frequently.

The main effect for frequency is not significant. Frequency of dealing of another brand seems to have no effect on accuracy of perceived deal frequency for the subject brand.

**Bias in perceptions.** The correlation coefficient between the other brand’s deal frequency and the subject brand’s perceived deal frequency is .25 \((p < .01)\), indicating that the deal frequency of the other brand affects perceived deal frequency of the subject brand. \(H_{4a}\) and \(H_{4b}\) suggest that deal frequency of a second brand will have an effect on the level of under/overestimation of deal frequency of the subject brand.

\(H_4\) suggests that low deal frequency of the subject brand is overestimated more if the other brand deals often. Table 4 shows that the mean overestimation across all inaccurate subjects is significantly higher \((p < .01)\) when the other brand has a high deal frequency (.93) than when the other brand has a low deal frequency (.29). Note that overestimation is significant only when the other brand deals frequently and is not significant when it deals less frequently.9

Mean underestimation is significantly higher \((p < .025)\) when the other brand has a low deal frequency (−1.94) than when the other brand has a high deal frequency (−1.17; see Table 4). However, there is no significant difference in the proportion of inaccurate subjects underestimating the subject brand’s deal frequency whether the other brand’s deal frequency is high or low. This finding suggests a strong tendency to underestimate high deal frequency. Most inaccurate subjects tended to underestimate high deal frequency, and the deal frequency of other brands did not significantly affect the proportion of subjects underestimating it. That is, if Coke deals often, inaccurate subjects will think that it deals less often than it does, irrespective of the deal frequency for Pepsi. However, overestimation of low deal frequency is sig-

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8 Though the number of subjects in regular versus irregular treatments might affect whether subjects are accurate or inaccurate, regularity should not affect whether inaccurate subjects overestimate or underestimate deal frequency.

9 This result may depend on the specific deal frequency used and should be explored further.
nificant only when the other brand deals frequently. That is, if Coke deals often and Pepsi does not, consumers may think that Pepsi also deals often. If both Coke and Pepsi deal less often, however, consumers may not wrongly think that deals for Coke and Pepsi occur frequently.

**Impact of Perceived Deal Frequency on Willingness to Pay**

After the shopping experiment, subjects were asked in an open-ended question what price they would be willing to pay for brand A. Many subjects indicated a willingness to pay either the sale price or the regular price (44%). The proportion of subjects who were willing to pay only the sale price was larger in the high deal frequency condition (28%) than in the low deal frequency condition (10%, \( p < .01 \)). Fifty-three percent of subjects stated a price between the sale and the regular price as the price they were willing to pay. Only 2.6% were willing to pay a price higher than the regular price.

The correlation coefficient between the perceived deal frequency and willingness to pay is \(-.51\) (\( p < .001 \)), which means that the higher the perceived deal frequency, the lower the willingness to pay. \( H_5 \) is supported.

The correlation coefficient between the actual deal frequency and price willing to pay is \(-.2\) (\( p < .01 \)). However, if the data are split along regularity of brand A and the correlations recomputed, a very different picture emerges. When brand A deals regularly, the correlation between actual deal frequency and price willing to pay is \(-.41\) (\( p < .001 \)); when brand A deals randomly, the correlation is \(-.002\) (\( p < .5 \)).

The corresponding correlations between willingness to pay and perceived deal frequency for regular dealing and random dealing are \(-.59\) (\( p < .001 \)) and \(-.44\) (\( p < .001 \)). These findings show that when dealing patterns are random, there is no significant relationship between willingness to pay and actual deal frequency. However, there is still a significant relationship between perceived deal frequency and price consumers are willing to pay.

**Effect of Brand Preference on Accuracy of Recall**

\( H_6 \) states that consumers have more accurate recall for the preferred brand. The main effect for the preferred brand in the regression is significant (\( p < .01 \); see Table 2). \( H_6 \) is supported.

**CONCLUSIONS**

The following conclusions emerge from the research findings.

1. If a brand deals regularly (vs. randomly), recall accuracy of deal frequency for that brand will be higher.
2. If a brand deals regularly and more frequently (vs. less frequently), recall accuracy for deal frequency for that brand will be even higher.
3. If a second brand in the market also offers deals, the recall for the first brand is most accurate when the second brand deals regularly and frequently.
4. High deal frequency for a brand is underestimated irrespective of the deal frequency for the other brand.
5. Low deal frequency for a brand is overestimated when the deal frequency of the other brand is high.
6. Consumers have more accurate recall of deal frequency for the preferred brand.
7. The price consumers are willing to pay is significantly negatively correlated with perception of deal frequency, both when deals are regular and when they are random. Willingness to pay is correlated significantly with actual deal frequency only when deals are regular and not when deals are random.

The study is not without limitations. Shopping experience simulated in the laboratory is not necessarily a true replicate of the real world. Also, much other information and many competing promotions are present in a store and may interfere with the consumer’s ability to perceive a single brand’s promotions. Consumers therefore may find it much easier to perceive a brand’s deal frequency in the laboratory. Consequently, one would expect that any aid for recall would be more useful in the real world than in the experimental situation. Hence, dealing patterns may be even more significant in explaining consumer perceptions of deal frequency and
willingness to pay in the real world than in the laboratory. The external validity of the experiment was assessed in two ways. First, previous studies using store data that could support some of the results were examined. Krishna, Currim, and Shoemaker (KCS, 1990) surveyed nine brand-sizes that fit into three types of dealing patterns—high frequency regular, high frequency random, and low frequency random. The most accurate recall was for the first type, as would be predicted from the results reported here. Results in the KCS study may be based on other factors—for example, the frequency of purchasing the product class. However, the study provides some support for external validity. In addition, KCS found that deal frequency was overestimated for brand-sizes that were offered on deal often (5 or 6 times in 12 weeks) and was underestimated for those that were not offered on deal often (1 or 2 times in 12 weeks). This finding is also consistent with the present results.

Second, interviews were conducted with consumers to learn whether they had perceived the dealing patterns in a nearby supermarket. Responses from several subjects revealed that they were aware of the regular and frequent dealing patterns (on deal every alternate week) for Coke and Pepsi in that store. However, the inevitable problems of external validity associated with laboratory experiments should be kept in mind.

IMPLICATIONS

One would presume that managers attempt to increase sales by offering deals. The study findings suggest that regularity in the dealing pattern makes it easier for consumers to perceive the deal frequency. Thus, in a heavily promoted product class, if a brand is promoted regularly, consumers would be more likely to perceive the high deal frequency for the brand and may be less inclined to buy large quantities of the brand on deal, thus reducing sales.

From the retailer's perspective, the findings suggest that when brands deal frequently, a random dealing pattern would lead to lower accuracy in perception of deal frequency and to underestimation of deal frequency. The result might be greater stockpiling of the brand by consumers, a shift in the inventory carrying cost from the consumer to the retailer (Blattberg, Eppen, and Lieberman 1981), and an increase in retailer margins.

The study findings also indicate that the dealing pattern of one brand can change the perception of deal frequency for another brand. Managers of less preferred brands can attempt to promote in a way that alters consumer perceptions of deal frequency for the preferred brand. For example, the findings show that in a heavily promoted product class, if less preferred brands deal randomly, consumer perceptions of deal frequency for the preferred brand are less accurate and deal frequency is underestimated. In that case, consumers may be less prone to try to buy the preferred brand from deal to deal and they may respond more to deals on the less preferred brand. However, because consumers now underestimate the deal frequency of the preferred brand, they may value deals on the preferred brand more when they see them. Hence, the manager of the less preferred brand must consider a tradeoff. Though consumers may be less prone to wait for deals of the preferred brand, they may be more responsive to such deals when they do come across them.

Another finding is that the price consumers are willing to pay is correlated significantly with perceived deal frequency. Thus willingness to pay is affected by the accuracy of consumer perceptions of deal frequency and by whether the perceptions are biased upward or downward. The results indicate that consumers will be willing to pay a higher price for a heavily promoted brand if that brand deals randomly versus regularly, if other brands deal randomly and frequently versus regularly and frequently, or if other brands deal less often rather than more often.

In addition, willingness to pay need not be correlated significantly with actual deal frequency. When dealing patterns vary, there may be no correlation between actual deal frequency and willingness to pay. However, there may be a significant relationship between perceived deal frequency and price consumers are willing to pay.

The results indicate the situations in which consumer perceptions of deal frequency are likely to be inaccurate and also show when they are likely to be biased upward or downward. By putting these two results together, a manager can get an idea of a consumer's perceived deal frequency.

Clearly, factors within the manager's control may affect consumers' perception of deal frequency for a brand, and thereby affect consumer willingness to pay, brand equity, and response to deals. The findings show that many factors in the price environment besides the actual deal frequency and the actual price can affect consumer perceptions of deal frequency and consequently affect consumer willingness to pay. Future research should address the effect of factors not considered here, such as variation in the sale price for a brand across deal occasions and variation in the sale price across brands. The research also should be extended to other product categories.

REFERENCES


