CONSUMER REACTIONS TO PRICE CHANGES:
AN EXPERIMENTAL INVESTIGATION

DISSERTATION

Presented in Partial Fulfillment of the Requirements for
the Degree Doctor of Philosophy in the Graduate
School of The Ohio State University

by

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* * * * *

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CHAPTER I
INTRODUCTION

Price is a vital ingredient in the firm's marketing mix. Any changes in price directly affect the firm's overall profitability. Effective pricing strategy depends on internal and external factors such as cost and consumer demand. A knowledge of its own cost structure is important, but in addition the firm should know how consumers react to price changes, what types of consumers are more apt to react, and what kinds are more apt to be aware of price changes. The central thrust of this dissertation is to examine the price sensitivity of the consumer. Remaining portions of this first chapter are devoted to an overview of the approach taken. The next section serves to develop the objectives more fully.

Objectives of the Research

The objective of the dissertation is twofold: (1) determine empirically the relationship between preference and price,\(^1\) and (2) develop a methodologically

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\(^1\)Preference is redefined as "willingness-to-buy." The definition of willingness-to-buy and the rationale underlying it are discussed later.
suitable basis for price research. In examining the relationship between willingness-to-buy and price, a number of sub-purposes arise:

1. An examination of the ability of willingness-to-buy measures to predict brand switching behavior.


3. A determination of the relationship of attitudes to observed brand switching behavior in reaction to price changes.

4. A determination of the relationship of certain non-attitudinal (i.e., demographic and shopping behavior) variables to observed brand switching behavior.

Research purposes with empirical derivable solutions were but one facet of the overall objective. Certain methodological problems exist which hinder research in this field. Devising a final methodological solution is not the intention nor within the scope of this dissertation. Yet a second objective is to develop methodology for:

1. Collection of willingness-to-buy data.

2. Collection of brand switching data.

3. A simulation technique to examine differential price awareness.
Overview of the Methodology

The complete procedure and methodology are discussed in Chapter Four. A brief overview is presented here to provide an orientation to the study. The research was conducted using Columbus area housewives in a laboratory setting. Subjects were divided into two groups (A and B). Group A was used to develop price threshold data. Subjects in group B participated in a simulated shopping trip. Each step in the methodology is now discussed.

1. Subjects were asked questions pertaining to product use and consumption for each product category studied (groups A and B).

2. Subjects indicated the brands in each product category they had used and the frequency of purchase for those brands (groups A and B).

3. Subjects rated the brands within each product category on the V-scale. After all brands had been rated ties were broken verbally by the subject (groups A and B).

4. Subjects were again presented with the brands in each product category. This time the prices of the brands were systematically varied (group A only).

5. Subjects were asked to fill out a demographic questionnaire while the experimenter left the room. While absent the experimenter changed brand prices (one brand in each of three product categories) in a small "grocery
store." Price changes amounts were determined from V-scale distances (group B only).

6. Subjects were then given real money and a shopping list containing items to be purchased. The stated reason for the shopping trip (time guise) was to determine the time it took them to shop. After the shopping trip, purchases were recorded and questions were asked regarding price (this was the first time price was mentioned) (group B only).

7. Subjects were asked to answer certain attitudinal questions (group A and B).

8. Subjects were asked questions pertaining to their shopping behavior (groups A and B).

9. Subjects were asked to fill out the demographic questionnaire (group A only).

10. Subjects were administered the post experimental interview and debriefed by the experimenter (groups A and B).

Data collection instruments and instructions are contained in the appendices. Definitions of terms used in the procedures are contained in the next section.

**Definitions**

Certain terms and variables were defined in specific operational fashion as follows:
1. **V-scale.** An eleven-point visual scale which uses physical distances and actual products. Subjects place brands at various intervals to reflect their relative willingness-to-buy.

2. **Willingness-to-buy.** Willingness-to-buy was the subject's rating of specific brands in a product category. Ratings were confined to the three brands found in each product category and were on an eleven-point visual scale (V-scale). Scale values ranged from "most willing-to-buy" (11) to "not willing-to-buy" (1). More than one brand in a product category could receive the same rating. The brand in the experimental set that the subject was most willing-to-buy was always anchored at eleven.

3. **Willingness-to-buy rank.** Willingness-to-buy rank represented a transformation of the willingness-to-buy ratings to rank order. The brand in a product category with the highest rating was assigned the rank of one. This procedure was followed for the other two brands. When the subject rated two or more brands identically she was asked to break ties verbally.

4. **Price awareness.** Price awareness was a dichotomous variable reflecting whether a subject checked price or not during shopping. The price aware subject checked price and the non-price aware subject did not. The types of price awareness were:
a. **In-store price awareness.** In-store price awareness was whether a subject checked price on a normal shopping trip (recall).

b. **Experimental price awareness.** Experimental price awareness was whether a subject checked price on a simulated shopping trip (actual behavior).

5. **Price sensitivity.** Price sensitivity was a subject's observed brand switching behavior in response to price changes. For analytical purposes the subjects were divided into two groups:

   a. **High price sensitive.** The high price sensitive subject was one who switched from one brand to another when the price differential was one cent.

   b. **Low price sensitive.** The low price sensitive subject was one who would not switch from one brand to another until the price difference was greater than one cent.

6. **Price threshold.** Price threshold was the absolute difference between the original price of a brand and the price at which a subject switched brand choice. Price threshold could be for an increase in the price of a brand or for a decrease.

7. **Price manipulation.** Price manipulation was any systematic change in the price of a brand by increases or decreases of one cent.
8. **Time Guise.** Time guise was the stated reason for the simulated shopping trip. Subjects were told to take as little or as much time as they normally did while shopping. The time guise was employed to mask the true purpose.

**Justification**

Justification for the dissertation stems directly from a basic need for empirical research concerning price. Price is directly involved in the overall profitability of the firm. A marketer may lower the price of a product. In doing so he hopes that the reduction will stimulate sales and result in increased profits. A marketer may also raise the price of a product. In doing so he hopes that the increase will not adversely affect profitability. Charging a higher price with a comparable sales volume (unit) will result in increased profits. Often the marketer finds out *ex post facto* that the price change did not have the desired effect. Hopefully, this research will add to the *a priori* information available for decision making.

If attitudinal and non-attitudinal data can serve as effective discriminators between high and low price sensitive consumers, then the marketer has a means of deriving profiles of price sensitivity for his target markets. A knowledge of the existence of extensive differential price awareness alerts the marketer to problems
associated with a given price strategy. If attitudinal data can serve as an effective discriminator between price aware and non-price aware consumers then the marketer can better plan his price promotions.

Justification also arises from the need to integrate empirically and extend the work of Pessemier\(^2\) and Gabor and Granger\(^3\) (specifically to include the critical variable, price awareness, in a study of price sensitivity). Additional justification comes from the need for methodological refinements and innovation in conducting basic price research.

**Overview of the Presentation**

Chapter Two of the dissertation first examines price in an economic context and then reviews the relevant literature. The literature review serves to illustrate


basic paradigms employed in conducting price research and to state some of the findings.

Chapter Three presents the conceptual foundation. A model reflecting price in an experimental setting is advanced. Also examined are the stages in the decision process and communication of price information. In the chapter's concluding portion, the research hypotheses are advanced.

Chapter Four details the procedure and methodology employed in investigating reactions to price changes. The rationale underlying the methodology is discussed as are the associated limitations. Finally, analytical techniques are elaborated.

Chapter Five contains the data analysis. The first section examines price thresholds as they are derived empirically. The second section considers the relationship between price sensitivity and various predictor variables (attitudinal and non-attitudinal). The third section considers the relationship between price awareness and attitudinal variables.

Chapter Six summarizes the findings, discusses implications, and suggests future research.
CHAPTER II

REVIEW OF THE LITERATURE

The totality of price and price related literature is substantial. Economists, cost accountants, and marketers have pursued price from many different perspectives. The literature review begins by developing the broader economic context of price. The subsequent coverage of price literature is confined to the specific works which prompted the dissertation and the related studies that bear directly.

Economic Context of Price

Price in an economic context is viewed from two perspectives. First, the view of microeconomic price theory is presented. Second, pricing as it exists in big business is viewed briefly.

Microeconomic theory considers price from the standpoint of both the consumer and the firm. Consumer behavior and utility theory deal with rational man and his desire to maximize utility.¹ Consumers are assumed to possess

complete information vis-a-vis their consumption alternatives. Given a set of commodity prices they consume so as to maximize some utility function. As a body of normative theory, microeconomics prescribes how consumers ought to act. Often "economic man" bears little resemblance to his real world counterpart.

The theory of the firm examines price setting under various market structures. Different market structures (e.g., perfect competition, monopoly, and oligopoly) define sets of conditions which when coupled with the firm's characteristics and demand dictate price levels. However, the market structures as defined seldom ever exist, complete demand curves are rarely measured, and costs at all levels of production are difficult to derive. In summary, microeconomic theory is intellectually appealing and theoretically rigorous, but it lacks the empirical grounding that would make it useful in price setting.

Pricing, as it is practiced in big business, bears some resemblance to economic theory. The marketer wishing to price his goods or service has many alternatives available. Prices can be set with regard to internal cost factors, external market conditions, or both. Cost is a fundamental factor in pricing decisions. If cost is neglected then eventually the overall profitability of the
firm is placed in jeopardy.\(^2\) Cost factors often indicate the lowest price at which a product can be sold. In addition, prevailing market prices for similar products influence the selling price and might warrant a higher selling price than costs alone suggest. The marketer is faced with three basic alternatives: (1) price at market levels, (2) price above market levels, or (3) price below market levels.\(^3\)

Actual pricing practices in big business reflect these basic approaches. In a landmark study, Kaplan et al. examined the pricing practices of twenty large corporations.\(^4\) The most frequently mentioned pricing goal was return on investment with maintenance of market share a close second.


Price-Quantity Research

Some of the earliest marketing studies of price examined the relationship between the price of a product and the quantity sold. Conceptually, these studies grew out of microeconomic utility theory and represent attempts to estimate demand curves. In reality demand was only estimated for a few points along the curve.

Price-quantity studies appear as early as 1930 in the marketing literature. Joel Dean reports the results of a test conducted by the Parker Pen Company in which the identical ink sold approximately the same amount at 15 cents and 25 cents. Applebaum and Spears report the results of a study in the Stop and Shop grocery chain. They found that price increases adversely affected sales. Grieg, et al., recognizing the limitations of the before-after without control group designs previously employed,

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Latin squared their price manipulations. They found that price decreases significantly increased product sales over the test period.

The results of the few price quantity studies presented indicate that price changes do affect sales volume. One of the major limitations is that no attempt is made to examine the determinants of price sensitivity. Individuals are viewed as faceless units of demand who react to price manipulations. A necessary extension of the price quantity paradigm, then, is to gather data which helps describe and define these units of demand.

**Price-Quality Research**

Empirical research conducted by marketers (the term is used in its broadest sense) initially centered on the price-quality relationship. Impetus for this work is often attributed (although indirectly) to an economist, Scitovsky, who speculated about a price-quality relationship. Although the price-quality literature does not bear

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substantively on the present study it does illustrate the first attempts to deal experimentally with price.

In the genealogy of price-quality research, Leavitt's study is frequently mentioned first.\textsuperscript{10} Using a pencil and paper approach he found subjects frequently chose the higher priced item (in a two brand forced choice situation) when they perceived a quality difference to exist. Still using a pencil and paper instrument Tull, Boring, and Gonsior replicated and extended Leavitt's study.\textsuperscript{11} A reference point was induced (i.e., the "normal" selling price for that product category). A low price reference caused fewer indicated purchases of the higher priced product than the median and high reference price conditions.

Both studies suffer from the same types of limitations: demand characteristics abound, there is no real cost associated with a "purchase" decision, and a forced choice may be unrealistic (the consumer frequently exercises his unalienable right not to purchase any of a given product category). Demand characteristics pose the most severe


limitation. Many consumers in an experimental situation feel they should choose the most expensive product and with no strictures placed upon their choice they will do so. Thus, their choice behavior may be an artifact of the methodology and not reflect any perceived quality differences attributable to price that would apply to the real world.

Continuing in the same research tradition Olander conducted two experiments. Finding no significant difference between perceived quality of curtains in high and low price conditions he altered his methodology. In a second experiment, subjects were presented with 45 pairs (ten taken two at a time) of differently priced terry cloth towels and asked which they would prefer to have. Subjects were also told that they would receive two of their choices (randomly drawn) upon completion of the task. A significantly greater number of women chose the higher priced terry cloth towel. Olander's major contribution was the use of the physical product and actual differences


in product quality present (one must presume that sub-
jects were able to discern quality differences). His
findings were confounded by demand characteristics and
cannot be interpreted as unequivocal support of a price-
quality relationship.

Employing a rather innovative methodology, McConnell examed the price-quality relationship with beer.\textsuperscript{14} Subjects were given their choice of three brands of beer (over 24 purchase trials) for in-home consumption. Price was found to influence the perception of quality.
Stafford and Enis examined the effect price and store image had on the perception of quality.\textsuperscript{15} Price was found to influence the perception of product quality, but store image did not. The central thrust of their effort was not so much a further test of the price-quality relation-
ship, but the inclusion of an additional independent variable, store image.

\textsuperscript{14} J. D. McConnell, "An Experimental Examination of the Price-Quality Relationship," \textit{Journal of Business}, XXXI (October, 1968), 439-44.

\textsuperscript{15} James B. Stafford and Ben M. Enis, "The Price-
Additional studies have continued to examine the price-quality relationship, but in a broader context. 16 Researchers, realizing that price is only one of the many cues the consumer has at his disposal, have examined the effect of brand and other identifiable product attributes. These more recent studies have cast serious doubt on the validity of a generalizable price-quality relationship.

Price-Consciousness Research

Another aspect examined by marketers has been the consumer's price awareness. In observational studies conducted by Wells and Lo Sciuto only 25 percent of the shoppers observed appeared to check the prices of detergents before purchase. 17 Although the observational approach has some inherent limitations, its use does provide unobtrusive indication of the phenomenon under

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study. Progressive Grocer found that price consciousness varied significantly (as measured by accurate price recall) by products, but not by age, sex, or income. Gabor and Granger found similar relationships to hold. Seventy-nine percent of their respondents knew the correct price of tea while only 35 percent knew the price of breakfast cereal.

Gabor and Granger's 1966 study suggests that consumers perceive acceptable ranges for specific products. However, it is difficult to determine whether the range is a result of some utility function or merely customary pricing.

In the studies just cited by Gabor and Granger price consciousness was operationally defined in terms of the

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ability to accurately recall price. In their 1964 study they state, "high price sensitivity is inconceivable without corresponding high price awareness, though the reverse may not be true."\textsuperscript{23} No empirical evidence was offered to support this contention. Since so little is known about the consumer's use of price and price information, such an assertion seems premature. Conceivably, the consumer makes extensive in-store inter-brand comparisons before making a purchase. Her ability to recall price accurately would be low since after the comparisons are made, price information is rapidly forgotten. Or perhaps the housewife makes intra-brand comparisons to determine the cheapest way to buy her favorite brand. Price recall in both cases would not be highly related to price sensitivity. An alternative approach would be to merely ask whether she checks the price of a product before purchasing. It is a far simpler question and does not require checking of actual store prices. However, there could be a tendency for housewives to say yes so as to appear the careful shopper.

One thing is clear from the foregoing discussion, differential price awareness (no matter how defined) does

\textsuperscript{23}Gabor and Granger, \textit{op. cit.} (1964), p. 41.
exist. Any attempt to examine price sensitivity must, therefore, consider not only the magnitude of the price change but also the probability of attention.

**Price Sensitivity Research**

Research has been conducted on brand switching behavior in reaction to price change.\(^{24}\) The studies that bear most directly on this dissertation were those by Pessemier. His studies essentially share a common methodology with minor modifications. Of primary importance to this dissertation is not so much his findings but his experimental methodology. The following is a brief description of the approach:

For each of the product categories, the housewife was presented with a series of all possible pairs of brands. The brands in each pair were marked with their "regular" prices. In each case the subject selected the brand she would "buy" in a forced choice purchase by circling the most preferred brand in the pair. Next, she indicated the price to which the preferred brand must rise to induce her to switch her original preferences. This price was circled in a series of prices shown below the pair of brands. Every subject was paid off on

one pair, receiving the brand circled and the change from 75c called for by the brand's regular price.25

In some of the studies pictures of the products were shown to the subject.26 In a later study Pessemier extended the experimental methodology to include a self-administered questionnaire and a purchase diary.27 Scaled preference data, demographics, AIO (activities, interests, and opinions), and non-demographic variables were used to predict purchase behavior (frequency and quantity) over a seven month period using multiple regression. The predictive ability varied substantially (r-squares ranged from .685 to .08).28

A slightly different tack was taken by Gabor, Granger, and Sowter with similar results.29 They examined differential price awareness (recall) but did not have it enter into their predictive analysis. They layered price changes and did not present their subjects with every possible price change. Choice was between pairs of products.

25 Pessemier and Teach, op. cit., p. 207.


27 Pessemier and Teach, op. cit.

28 Pessemier, Burger, Teach and Tigert, op. cit., pp. 26 and 29.

29 Gabor, Granger, and Sowter, op. cit.
Summary

An attempt has been to cover the relevant literature to develop a perspective from which to view the current study. The broader economic aspects of price were first viewed to provide a backdrop. Price-quantity and price-quality studies were included since they represented initial efforts to use price as an independent variable and illustrate some of the methodological problems. Price consciousness studies were cited to highlight the fundamental problem of differential price awareness. Finally, studies dealing directly with brand switching behavior and reaction to price change were examined to illustrate the basic paradigm for the intended study.
CHAPTER III
CONCEPTUAL FRAMEWORK

The conceptual framework for this dissertation grew out of the literature. A model is presented which structures the basic components under investigation. In addition to the model relevant conceptual variables are introduced.

The Model

The Three Brand Willingness-to-Buy/Price Model (Figure 1) portrays the basic relationships hypothesized. In its present state the model is best suited to branded non-durable (food and non-food) consumer products. Items should be of low unit value, have a distinct brand identity, and be frequently purchased.

The model conforms to the experimental methodology in that only one brand price is allowed to vary at a time. Given that constraint, the model begins with the subject's willingness-to-buy rank and evaluates each brand within a product category in decreasing willingness-to-buy order. In some instances the subject always buys the brand she is most willing-to-buy regardless of price conditions. Others may not always buy the same brand. Certain factors may
Figure 1. Three Brand Willingness-to-Buy/Price Model.
cause this: (1) random vacillation, (2) a high degree of indifference, or (3) a change in some situational variable. A central situational determinant (in the model) is price change. For the subject to act the price change must be attended. Operationally this has been conceived in terms of a binary choice. If price is not attended, then irrespective of price conditions the subject buys brand one (subject to noise and extra-model determinants). Given an attended price change, the subject then determines whether the change is sufficient to cause a situational reordering of the willingness-to-buy hierarchy. Parenthetically, it should be added that a price change in a real world context is neither necessary nor sufficient for a change in buying behavior. However, within the confines of this normative model it is viewed as the primary determinant.

Actual purchase outcomes depend on the magnitude of the price change. Subjects are viewed as possessing price thresholds. Below the threshold subjects will remain brand loyal and at or beyond the threshold switching will occur. Mediators which affect the magnitude of an individual's thresholds are discussed in the following section.

Stages in the Decision Process

For discussion purposes the model has been divided into three stages (indicated by the capital Roman numerals to the left of Figure 1). Stage I addresses habitual
versus non-habitual behavior. Although this phenomenon can be attributed to a number of causes, for analytical simplicity it has been relegated to salience of brand in the evaluative criteria. Reasons for brand salience could range from its use as the primary purchase cue to simplify the purchase process to distinct attributes it may possess relative to others.

Stage II reflects the salience of price in the overall evaluative criteria. Subjects who do not check price are apt to buy brand one, but the probability associated with that outcome is not as high as the "always buy" in stage I.

Stage III of the model examines price thresholds in terms of their derived existence, not in terms of moderators that affect threshold magnitude. Salience of price is the aggregate descriptor for the individual components. Components would include: (1) attitude toward price and price related topics, (2) socio-economic characteristics, (3) behavior, and (4) perceived differences between alternatives. The relationship is shown in Figure 2.
As price becomes more salient to the consumer the absolute magnitude of the price threshold decreases. This relationship is illustrated graphically in Figure 3.
The model (Figure 1) attempts to relate the variables under investigation. It purposely does not include such variables as coupons, specials, or in-store display since they are not manipulated. Alternatives such as postponed purchase or purchase at an alternative store were not modeled since these choices were not allowed in the experimental setting.

Communication of Price Information

Price information, like other external stimuli, must be communicated to the shopper. Four steps in the communication process are examined in the study.\(^1\) These steps are shown in Figure 4.

In a supermarket context shoppers are exposed (exposure) to many price changes on any given shopping trip. A shopper may or may not receive (reception) the specific price change. The probability of reception could be increased through attention-getting devices such as package alterations and point of purchase display. Reception is also influenced by acceptance (i.e., attitude toward price and price related matters). The acceptance

of the stimulus (price change) determines in part what action will be taken by the shopper. Thus, Figure 4 can be viewed stochastically with each step being necessary but not sufficient for the next.

**Research Hypotheses**

The majority of research hypotheses centered around brand switching behavior in reaction to price changes. It should be remembered that switching was stated by the subject and was not a behavioral measure. The research hypotheses and method of testing are as follows:

$H_1$ There are differences in price threshold attributable to product category and willingness-to-buy rank.
Hypotheses one was tested using a factorial analysis of variance.

H₂ There is a positive relationship between willingness-to-buy data (V-scale distances) and price threshold. Hypothesis two was tested using multiple linear regression. Hypothesis two was also tested using canonical correlation.

H₃ High price sensitive subjects are different in their attitude toward price and price related topics than low price sensitive subjects. Hypothesis three was tested by correlating price threshold data with factor scores derived from attitudinal questions concerning price.

H₄ Attitudinal variables serve as effective discriminators between high and low price sensitive subjects. Hypothesis four was tested using multiple discriminant analysis.

H₅ Non-attitudinal variables (i.e., demographic and purchase behavior) serve as effective discriminators between high and low price sensitive subjects. Hypothesis five was tested using multiple discriminant analysis.

H₆ Attitudinal variables serve as effective discriminators between price aware and non-price aware subjects. Hypothesis six was tested using multiple discriminant analysis.

H₇ Price aware subjects tend to be high price sensitive while non-price aware subjects tend to be low
price sensitive. Hypothesis seven was tested using the contingency coefficient.

All hypotheses have been stated as research hypotheses to indicate the nature and direction of the relationship being examined. Appropriate null hypotheses were assumed to be implicit in the initial statement. In presenting the research findings appropriate statistical tests were applied to null hypotheses. When the null hypothesis was rejected the findings were stated in support of the research hypothesis.

Summary

The Three Brand Willingness-to-Buy/Price Model portrayed the basic relationships under investigation. Mediators that influence the model components were examined as they related to stages in the decision process. Communication of price information was also covered to enhance the conceptual discussion. Finally, the research hypotheses were presented.
CHAPTER IV
METHODOLOGY

The procedures followed in executing the study are detailed in Chapter Four. Data collection instruments and instructions have been placed in the appendices for easy reference. A very brief description of each statistical technique employed in the analysis has been included.

Procedures

The Sample

The experimentation was conducted on Columbus area housewives. Sampling was non-random as subjects were recruited from church groups and civic organizations. Subjects were not paid directly for participation, but money was donated to their group's treasury. It was felt that this was preferable to compensating the subjects directly as those induced to participate through an economic incentive might be systematically different than the general population in terms of price sensitivity. However, it is also realized that members of the chosen organizations might also be systematically different along other dimensions.
There were two experimental groups. Group A (n=49) was used to develop price threshold data while Group B (n=30) participated in a simulated shopping trip. To refine the procedures a pilot study was conducted using fewer subjects (n=35). Depth interviews conducted during the pilot study provided the basis for additional questions and modifications of the original procedure. The pilot data were not formally analyzed as experimental procedures were modified throughout. Interviewing time in the pilot ranged from 45 minutes to two hours. Interviews for Group A required 40 minutes while interviews for Group B required 50 minutes.

**Experimental Set Selection**

Certain criteria were established for product category selection. These criteria are as follows:

1. The product category should be frequently purchased by most housewives.

2. Three national brands should account for at least fifty percent of the market share.

3. The three national brands should be comparable along all dimensions.

4. The three national brands should "regularly" sell for the same price.

5. The three brands should be available in most supermarkets.
The Columbus Home Audit provided information on the first criterion.\textsuperscript{1} Using the above criteria ten product categories were selected for use in the pilot study. From the original ten, five were selected for use in the experiment. Of these five, three were selected as the experimental product categories (catsup, cake mix, and tooth paste). Two categories (cola soft drinks and peanut butter) were dropped because they were not used by as many subjects as the other three.

Thus, the three product categories selected for analysis were (1) catsup, (2) cake mix, and (3) tooth paste.\textsuperscript{2} Complete comparability along all physical dimensions (except package) was achieved for both catsup and cake mix. All three tooth pastes contained fluoride. However, only two had been approved by the American Dental Association's Council on Dental Therapeutics. Also, one brand had a tooth whitener. In spite of the differential attributes tooth paste was retained in the analysis since it is a frequently studied product category.

\textsuperscript{1}Columbus Home Audit, 1965-June, 1970, conducted by Carl J. Nelson Research, Chicago, Ill.

\textsuperscript{2}See Appendix C for a list of brands, sizes and prices.
The V-scale

The V-scale consists of a yard long piece of white cardboard calibrated in three-inch intervals (11 intervals numbered consecutively from 11 to 1). Subjects were handed the actual products and asked to place them on the scale to indicate their relative willingness-to-buy for the various brands. The appellation for the scale is derived from the fact that everything is visual and concrete.

The V-scale is unidimensional. In its present application all of the products used were nearly comparable along all dimensions (physically but perhaps not perceptually). It is not known whether dimensional comparability poses an actual limitation for future application of the V-scale. While being a bit cumbersome for field studies, the V-scale does present a number of advantages to the laboratory researcher.

1. It is a fairly rapid means of collecting data (slower than pencil and paper but faster than dyadic comparisons).

2. It helps maintain the subject's interest in the task.
3. It allows the subject to deal with the physical product directly. There is no need to envision what the brand is like.³

4. It allows the housewife to visualize concretely and establish the distances she perceives between products.

5. Its unidimension can readily be altered through different instructions.

6. The subject is presented with the stimuli in a manner more consistent with an actual shopping trip.

There are, however, certain drawbacks to the V-scale:

1. It is not well suited to field research since all the products being rated must be carried along.

2. It is not well suited for products that cannot be easily handled by the subject.

3. It may not be suited to stimuli that are non-comparable along all dimensions.

Variables

Independent Variables

Product category and willingness-to-buy rank were the independent variables in the analysis of variance.

³In the pilot a pencil-and-paper rating was used initially. After the rating the subject was presented with the physical products. Frequently, upon seeing the actual products the subject changed her rating. Thus, it appears that the brand name written on a piece of paper is not the same to her as the actual package.
There were three levels of product category (catsup, cake mix, and tooth paste) and three levels of willingness-to-buy order (most, second, and third).

Dependent Variable

The dependent variable was price switching behavior. As a numerical value it was the price threshold or the absolute difference between a base price and the price at which switching occurred. In this form it was incorporated in the analysis of variance. In other portions of the analysis price threshold was dichotomized into high and low price sensitivity. In these instances the term dependent variable was inappropriate since it connoted causality. Therefore price sensitivity was used as the criterion variable in much of the analysis.

Predictor Variables

There were numerous predictor variables. Some of them were product specific while others reflected attitudes and behavior in general. Demographic variables were also included. The following were the product specific predictor variables:

1. Willingness-to-buy rating
2. Price awareness

Answers to the fifteen attitudinal questions served as predictor variables (see Appendix A).
Two predictor variables pertained to shopping behavior. These were:

1. Number of stores shopped at
2. Number of people regularly shopped for

The demographic variables were:

1. Number of years married
2. Age of youngest child
3. Home ownership
4. Age of subject
5. Educational attainment of subject
6. Family income

Appendix A contains the data collection instrument with all of the questions used to obtain values for the variables.

Experimental Groups

Experimental Group A

Subjects in Group A were run first. Data collected provided the basis for unobtrusive price changes with the second group. Procedures for Group A are as follows:

1. Subjects were welcomed to the experiment and given a brief explanation of its nature (see Appendix B, Welcoming Instructions).

2. Subjects were then asked (by the experimenter) a series of questions pertaining to product consumption in five product categories (see Appendix A, Produce Use Sheet).
3. Subjects then filled out a sheet indicating the brands that they had used and the frequency of purchase for those brands (see Appendix A, Brand Use Sheet).

4. Subjects were asked to rate the brands in each product category (three brands in each of five product categories). The rating instructions were read to the subject (see Appendix B, Rating Instructions). The V-scale along with the first group of products was placed in front of the subject. The order in which the products were placed in front of the subject was changed so that within a sub-group of three subjects a specific brand appeared in a position only once. The first two product categories served to acquaint the subject with the experimental procedure. To insure understanding of the scale, the meaning of the rating for the first product category was gone over with the subject.

5. After a subject had rated brands in all five product categories they were asked to break ties verbally. For those brands in a product category that they rated the same they were forced to choose one. All ties were broken so that the brands could be rank ordered.

6. Subjects were again presented with the product categories. A pile of price cards was placed in front of
each brand. As before the first two product categories served to acquaint the subject with the experimental procedures. The subject was read the manipulation instructions (see Appendix B, Manipulation Instructions). Initially (when all of the prices were the same), the subject was asked which brand she would purchase. Then the prices of the brands were systematically varied. Only the price of one brand was changed at a time and prices were always re-set to the base price when a switch occurred.

The brands were placed randomly so the subject did not become accustomed to the brand she was most willing-to-buy appearing in the same position. There were three basic manipulations: (1) an increase in the price of the brand the subject was most willing-to-buy, (2) a decrease in the price of the brand the subject was second most willing-to-buy, and (3) a decrease in the price of the brand the subject was third most willing-to-buy. Manipulations were by increases or decreases of one cent. Prices of the other brands in a set were held constant while one was being manipulated. The order of the manipulations was rotated so that in some product categories the manipulation began

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4The price cards were 2½ x 3 pieces of paper (card stock) with large numbers on each card. All three piles began with the same number. Two of the piles were arranged in descending sequence while the third was ascending sequence.
with an increase and in others the manipulations began with a decrease in either the second or third most willing-to-buy brand.

7. Subjects were read the instructions for the attitudinal questionnaire and then asked to fill it out (see Appendix A, Attitudinal Questionnaire).

8. Subjects were asked the shopping data questions by the experimenter (see Appendix A, Shopping Questions).

9. Subjects were asked to answer certain demographic questions (see Appendix A, Demographic Questions).

10. Subjects were administered the post experimental interview and debriefed by the experimenter (see Appendix A, Post Experimental Interview).

Experimental Group B

Procedures were altered somewhat for Group B. Particular care was taken to eliminate any demand characteristics that might vitiate the results. The procedure for Group B was as follows:

1. Step one was the same as step one for Group A.

2. The experimenter asked all the questions on the Product Use Sheet except the question pertaining to price checking behavior (On a regular shopping trip do you normally check the price (product category) before purchasing).

3. Same as step three for Group A.

4. Same as step four for Group A.
5. Same as step five for Group A.

6. The experimenter handed the subject the demographic questionnaire and asked the subject to fill it out. He then excused himself from the room (using a situationally suitable pretext) and went to another room which housed a small grocery store. The experimenter first determined what size manipulation (based on willingness-to-buy data) was required to induce switching. From the data gathered in part A it had been decided to set the price change equal to V-scale distance. A V-scale distance of zero was assigned a price value of one cent. The manipulations were pre-assigned as indicated on the following page.

In each of the three experimental product categories the price of one brand was changed while the other two sold for their regular price. When the experimenter had finished making the manipulations he returned to the subject and checked over the demographic questionnaire answers.

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5The store consisted of a small room with two large tables. On the table were ten different product categories with three brands in each product category.
\[
\begin{array}{ccc}
A_1 & A_2 & A_3 \\
S_1 & P_1 & P_2 & P_3 \\
S_2 & P_2 & P_3 & P_1 \\
S_n & P_3 & P_1 & P_2 \\
\end{array}
\]

\[A_i = \text{product category}\]
\[S_i = \text{subject}\]
\[P_1 = \text{increase in the price of the most willing-to-buy brand}\]
\[P_2 = \text{decrease in the price of the second most willing-to-buy brand}\]
\[P_3 = \text{decrease in the price of the third most willing-to-buy brand}\]

7. Subjects were read the Shopping Instructions (see Appendix B, Shopping Instructions). Then the experimenter handed the subject real money and a shopping list for her shopping trip. After the experimenter was certain that the
subject understood the instructions she was lead to the grocery store. The subject was made to wait at the door to the store while the experimenter made a rather obvious show of looking at his watch. After a short pause the experimenter then told the subject to begin. Both these things were done to lend credibility to the time guise.

After the shopping trip the subject's purchases were recorded and she was lead back to the experimental room. She was then asked the questions on the Trip Sheet (see Appendix A, Trip Sheet).

8. Same as step 7 for Group A.
9. Same as step 8 for Group A, only this time questions regarding price checking behavior were asked.
10. Same as step 6 for Group A.
11. Same as step 10 for Group A.

Rationale Underlying Methodology and Procedures

The methodology used in the experiment incorporates, what were hoped to be, some refinements and improvements over previous approaches. The rationale underlying the methodology is now discussed.
Reason for Two Groups

Using only one group seriously limits the interpretation of the results. The experimental manipulations had inherent demand characteristics. The subject was presented with three brands and the price of one was changed. To begin with in a supermarket it is doubtful whether all housewives attend price changes. After successive manipulations the subject may have felt she was expected to switch and did so even though she would not in an actual shopping situation. Also, some of the questions may have sensitized the subject to price.

Price was not mentioned to Group B until after the simulated shopping trip. A time guise was adopted to supply a plausible reason for the subject's participation in the simulated shopping trip. An individual's V-scale distances were used to set prices for the simulated shopping trip making the manipulation more efficient than random exposure to pre-set price changes. Group B provided an indication of how many people attended price. This procedure minimized the demand characteristics mentioned earlier.

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6 Aronson and Carlsmith, op. cit.

7 Wells and LoSchiuto, op. cit.
Instructions

The welcoming instructions were important since they assure the subject that no manufacturers were involved. It was felt that subjects would express themselves more freely if they knew that none of the brand manufacturers were sponsoring the research. Also, in the pilot study, subjects seemed reluctant to derogate brands for that reason. They were also assured that there were no right or wrong answers. In the pilot study, subjects often asked whether a certain response was "all right." During the post experimental interview, the pilot subjects asked how they had done, apparently indicating that they perceived some performance norm.

The rating instructions were a very crucial part of the experiment. It was essential that the subject understood the scale and what she was to do. Initially (in the pilot study), a pencil-and-paper preference rating was used. Stated price switching behavior was usually inconsistent with the preference data. A number of alternatives were tried and the V-scale and willingness-to-buy as the stated dimension finally decided upon. It was felt that willingness-to-buy was preferable to preference for the following reasons:

1. There is no perceived consequence associated with preference.
2. Preference is subsumed by willingness-to-buy.

3. Willingness-to-buy included not only the act but the consequences (i.e., purchasing the brand, taking it home, and having one's family use it).

To help insure full understanding of the scale the central sentence of the instructions was repeated. Also, after the first product category had been rated (this was a practice set), the subject was asked to verbalize her interpretation.

The manipulation instructions were straightforward. "Never buy" was allowed as a response since it seemed in keeping with the options available to the housewife while shopping. Two other options, postponed purchase and purchase at alternative store, were considered but not included. Even use of the "never buy" option presented certain analytical problems.

The shopping trip instructions were also an important part of the methodology. In the pilot study subjects became suspicious of the shopping trip and tried to figure out why they were doing it. It was, therefore, necessary to mask the true purpose. It was felt that the most innocuous guise would be time. Also it was important that subjects shopped as they normally did. The time guise fulfilled both objectives. The subjects in Group B were led to believe that they got to keep the products they
purchased and the change from their purchases. After the experiment was over they were given a dollar instead of the products.\(^8\)

**Price Manipulations**

There were three systematic price manipulations in each of five product categories for Group A. The price of the brand the subject was most willing-to-buy was increased. When switching occurred the brand prices were all re-set and the price of the second most willing-to-buy brand decreased. Again, when switching occurred the brand prices were re-set and the price of the third most willing-to-buy decreased. While the price of one brand was being manipulated the other two in that experimental set were held constant. The order of the manipulations was changed with each product category so that the subject did not always experience an increase or decrease first.

Other manipulations could have been made, but none appeared to make sense in a marketing context. If the price of the most willing-to-buy brand were decreased the subject would no doubt continue to buy it. Likewise if the prices of the second or third willing-to-buy were increased the subject would probably continue to buy her

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\(^8\) This was done to eliminate an inventory problem. The subjects were made to understand the problem and none objected to the exchange.
first choice. Switching behavior between the second and third brands was not examined as it was thought to be redundant. If choice were limited to the second and third brands the situation becomes similar to a choice between one and two and does not impart additional substantive information.

Many alternative methods of price manipulation are possible. Pesse'mier presented subjects with pictures of products in his earlier studies and later shifted to pencil and paper methods. Brands were presented in pairs with prices equal. Subjects first indicated the brand they would purchase and then a price that would cause them to purchase the other.\(^9\) Gabor, Granger, and Sowter layered price changes to prevent an anchoring effect or bias that might result from seeing the same brand with different prices in immediate succession.\(^10\) They also presented the subject with the names of brands in pairs and used only certain prices out of all possible price changes.

Both these alternative methods of data collection were considered and rejected. Allowing choice between all three brands at one time seemed more consistent with choice alternatives in an actual supermarket. The paired

\(^9\)Pesse'mier, Burger, Teach, and Tigert, op. cit.

\(^10\)Gabor, Granger, and Sowter, op. cit., p. 358.
comparison approach was also rejected since it adds to the experimental time. With a pencil-and-paper, picture, or card presentation of the brands there are few handling problems. However, with the physical products dyadic comparisons become somewhat more time consuming. An anchoring effect may be present, but it was felt that layering every possible price change would be confusing to the subject and induce experimental fatigue earlier. Also, an intelligence factor might confound the results.

Limitations

A general limitation, common to this and most laboratory experimentation, was the lack of generality. This was due to the sample's non-random nature, the limited number of products studied, and the lack of realism encountered in a laboratory setting. Since the experimental purpose was to develop a relationship, show an effect, and make a prediction, the laboratory setting did not pose an actual limitation. However, it did limit the universality of the implications.

The experiment's demand characteristics may have interjected a systematic bias. Subjects may have sensed that they should switch when the price was changed and be prone to do so even when they would remain brand loyal in the field. Price was a sensitive topic and questions
pertaining to it may have elicited normative replies.

The manipulations themselves may have lacked realism, i.e., alerting the subject to price changes. Subjects had no choice but to attend all price changes. In the role-playing situation only one manipulation was made in each product category. In a real life situation all other brands might not have been held constant. Additionally, the methodology only allowed for intra-product category substitution.

The conceptual model was by necessity overly simplistic. Effects of new products, point-of-purchase display, and special offers were not considered in the model or in the experiment. In the real world these may be significant situational determinants of brand switching behavior. Switching may have occurred at specific price points (e.g., amounts ending in 5, 9 or 0) rather than an increment. There were no manipulations to a point but only in equal increments.

Another limitation concerns price threshold. The price threshold measure was not a behavioral measure, but was a stated response by the subject. It, therefore, may not reflect in-store brand switching behavior in reaction to price changes and may lack external validity.

Due to the sample's small size it was not feasible to employ a split-half approach in the multiple discriminant analysis. As a result, there may be an upward bias
since the data categorized by the discriminant function were the same data used to develop it.

In the analysis certain assumptions regarding the data were made. Analytical techniques such as canonical correlations, factor analysis, multiple regression, and multiple discriminant analysis assume interval data. Many of the data were ordinal and dichotomous nominal, yet these techniques were employed. Willingness-to-buy data and scores on the attitudinal questions occupied the void between ordinal data and metric data. The nature of the analysis required dictated that the interval assumption be violated.

If comparable statistics for ordinal and nominal data had existed they would have been employed. All the variables were monotonic so that a meaningful interpretation of the output was possible. However, all conclusions must be tempered by the knowledge that the distances between the scale values (V-scale distances and attitudinal scores) may not have been equal and that the analyses linearly related the variables to each other. This limitation necessitated that the statistical techniques be used in a primarily descriptive fashion with no inferences being made to a larger population.
Analysis Techniques

A number of analytical techniques were used in the analysis. For certain analytical purposes the data were transformed. The procedure for data transformation is discussed first. Then the techniques and method of use are discussed.

Data Transformation

For analytical purposes willingness-to-buy data were transformed from ratings on the V-scale to distance scores. The most willing-to-buy brand was always anchored at 11. The rating of the second most willing-to-buy, B, was subtracted from the most, A, giving the distance between A and B. The rating of the third most willing-to-buy, C, was subtracted from the most, giving the distance between A and C. The distance between B and C was not considered. The steps are summarized as follows:

\[ A - B = \overline{AB} = W_1 \]

\[ A - C = \overline{AC} = W_2 \]

If \( \overline{AB} \) or \( \overline{AC} \) equaled zero \( W_1 \) was assigned a value of one in the analysis. Thus, a subject who rated brands equally and the subject who rated them as next to each other were analytically the same. This seemed to be a tenable
assumption as later subjects were able to rank order brands that they had rated as identical.

Willingness-to-buy data were analyzed in conjunction with price threshold data. Price threshold data were derived in a similar manner. The base price was subtracted from the price at which the subject switched from A to B when the price of A was increased to give $P_1$. The price at which the subject switched from A to B when the price of B was decreased was subtracted from the base price to give $P_2$. Finally, the price at which the subject switched from A to C when the price of C was decreased was subtracted from the base price to give $P_3$.

For any subject there were 15 measurements: two willingness-to-buy distances ($W_1$ and $W_2$) for each experimental set and three price threshold values ($P_1$, $P_2$, and $P_3$) for each experimental set. However, if the subject would only buy a certain brand or never buy a certain brand data on $P_1$, $P_2$, and $P_3$ might not exist. These subjects were excluded from certain analyses.

Level of Significance

Throughout the analysis the same level of significance was employed for reporting results. The alpha level was set at .05. Thus, the probability of committing a type I error (accepting the alternative hypothesis when the null hypothesis is in fact true) is less than or equal to .05.
Results with a probability (p) of less or equal to .05 are reported in the analysis.  

**Linear Regression**

In its simplest form (univariate) linear regression relates a predictor variable to a criterion variable. In multiple regression a set of predictor variables are linearly related to a criterion variable. The basic equation in matrix notation is:

\[ Y = X\beta + e \]

where \( Y \) is the vector of observations on the regressand (criterion)

\( X \) is the matrix of observations on the regressors (predictors)

\( \beta \) is the vector of coefficients, and

\( e \) is the vector of residuals.\(^{12}\)

For the analysis at hand the statistic of greatest interest is the coefficient of multiple determination (\( R^2 \)) which "represents the proportion of variation in the dependent variable \( \bar{\text{criterion}} \) that is accounted for by the net linear association of all the independent \( \bar{\text{predictor}} \)s."\(^{11}\)

---


variables included in the analysis.  Multiple regression was employed in the study to examine the relationship between willingness-to-buy (V-scale distances used as the predictor variable) and price threshold (criterion variable) (H_{2}).

Analysis of Variance

Analysis of variance was used to test differences in price threshold attributable to product category and willingness-to-buy rank (H_{1}). The design for the analysis was a 26 x 3 x 3 factorial design. The dependent measure was price threshold. The first independent variable was subjects, the second product category, and the third willingness-to-buy rank. The levels are as follows:

A -- Subjects

\[ a_1, a_2, \ldots, a_{26} \]

B -- Product Category

\[ b_1 = \text{catsup} \]
\[ b_2 = \text{cake mix} \]
\[ b_3 = \text{tooth paste} \]

---


C -- Willingness-to-buy rank

\[ c_1 = \text{most willing-to-buy} \]
\[ c_2 = \text{second most willing-to-buy} \]
\[ c_3 = \text{third most willing-to-buy} \]

**Factor Analysis**

"Factor analysis is a generic name given to a class of techniques whose purpose often consists of data reduction and summarization."\(^{15}\) The technique can be used to examine the intercorrelations within a set of variables and eliminates the redundancy. In principle components analysis (the type employed in this study), factors which are linear combinations of the original variables, are extracted systematically.\(^{16}\) The original variables are then correlated with the factors to yield factor loadings. Factors can be given verbal labels on the basis of these loadings. Factor scores may also be calculated for each individual and used in subsequent analysis.

The approach taken in this study was to factor analyze the 15 attitudinal variables. The factors were


\(^{16}\)Frank and Green, *op. cit.*, p. 76.
labeled on the basis of the factor loadings and factor scores were computed for each individual. The individuals' factor scores then served as the basis for a correlational analysis. Individuals' factor scores were correlated with their price thresholds to determine the degree of association. Factor analysis and correlation were used to see if higher price sensitive subjects were different in their attitude toward price and price related topics than lower price sensitive subjects ($H_3$).

**Canonical Correlation**

Canonical correlation is a multivariate technique which correlates sets of predictor and criterion variables.\(^{17}\) It can be used to find "linear combinations of predictor and criterion sets that maximize correlation when the linear combinations themselves are then correlated in a two variable sense."\(^{18}\) It is well suited to this study in that it allows price and willingness-to-buy data to be treated as vectors rather than as individual values.

The technique, as incorporated in this study, does not require multinormality. It does, however, assume


\(^{18}\)Green and Tull, op. cit., p. 377.
interval scaled data (V-scale distances were assumed to be interval) and relates the sets of variables by linear functions.\textsuperscript{19} Given two criterion variables and three predictor variables there will be two sets of linear combinations orthogonal to each other and two correlations.\textsuperscript{20} The correlation provides "a measure of the overall correlation between the two sets of criterion and predictor variables."\textsuperscript{21}

Canonical correlation was used to test the association between willingness-to-buy and price threshold ($W_2$). Willingness-to-buy data were treated as a two-dimensional vector ($W$). The first element of the vector, $w_1$, was the distance between the most willing-to-buy and the second most willing-to-buy ($AB$). The second element, $w_2$, was the distance between the most willing-to-buy and the third most willing-to-buy ($AC$). Price threshold data were treated as a three-dimensional vector, $p$. The first element, $p_1$, was the price threshold for increases in the price of the most willing-to-buy. The second element, $p_2$, was the price threshold for decreases in the price of the second most willing-to-buy. The third element, $p_3$, was the price threshold for decreases in the price of the third most willing-to-buy. Thus, the two vectors were:

\textsuperscript{19} Ibid., p. 378.

\textsuperscript{20} Ibid.

\textsuperscript{21} Ibid., p. 381.
\[ W = \begin{pmatrix} w_1 & w_2 \end{pmatrix} \]
\[ P = \begin{pmatrix} p_1 & p_2 & p_3 \end{pmatrix} \]

**Multiple Discriminant Analysis**

Multiple discriminant analysis is a multivariate statistical technique which uses categorical data as the criterion variable and interval-scaled data as the predictors. The technique, as it is employed in this study, finds a linear combination of predictor variables that maximizes the among-group relative to the within-group separation.\(^{22}\) A discriminant function is computed for each predictor variable. Using the discriminant function and the scores on each variable, a probability of group membership (membership in one of the categorical groups) is computed. On the basis of the probabilities individuals are assigned to groups. A classification matrix indicates the number of individuals correctly classified.

Multiple discriminant analysis was used to test a number of hypotheses: (1) attitudinal variables served as predictors between high and low price sensitive subjects (H4); (2) non-attitudinal variables (i.e., demographic and purchase behavior) served as predictors between high

\(^{22}\)Ibid., p. 369; see also, Frank and Green, *op. cit.*, pp. 70-75.
and low price sensitive ($H_5$); (3) attitudinal variables served as predictors between price aware and non-price aware subjects ($H_6$).

**Contingency Coefficient**

The contingency coefficient ($C$) is a nonparametric measure of correlation. It can be used to measure the extent of association between two sets of nominal data. There are certain limitations in the use of the contingency coefficient and the results of its application should be interpreted with them in mind. The upper limit of $C$ for a $2 \times 2$ table is .707 and for two coefficients to be comparable they must be computed from the same size table. The contingency coefficient is not directly comparable to any other measure of correlation and the data must initially be amenable to computation of the $X^2$ statistic. The association between price awareness and price sensitivity was examined using the contingency coefficient ($H_7$).

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Summary

A detailed account of the methodology employed in the dissertation was given in this chapter. An attempt was made to develop the rationale underlying the experimental approach taken. The limitations that temper the interpretation of the findings were also included. Finally, the statistical techniques employed in the data analysis were described briefly. In each instance a comprehensive source on the statistic was cited for the interested reader.
CHAPTER V
DATA ANALYSIS

Data analysis centered around the basic relationship hypothesized between willingness-to-buy and price threshold. Once the relationship's nature had been determined certain ancillary analyses were begun. Secondary analyses focused on attitudinal and non-attitudinal discriminants of price sensitivity. In addition to price sensitivity, attitudinal discriminants of price awareness were considered. Finally, unless otherwise specified all analysis concerned group A (n=49).

Price Threshold

Differences in Price Threshold

\( H_1 \) There are differences in price threshold attributable to product category and willingness-to-buy rank.

A 26 x 3 x 3 factorial design was used to analyze data on subjects, product category, and willingness-to-buy rank. Only subjects who switched brand choice for all three price manipulations were included in the analysis (n=26). Analysis of variance was performed using the
BMD02V computer program.\(^1\) Table 1 summarizes the analysis of variance while Figure 5 shows the plot of the group means for each product category.

**TABLE 1**

ANALYSIS OF VARIANCE SUMMARY TABLE: PRICE THRESHOLD DATA FOR ALL PRODUCT CATEGORIES

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>Level of Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product</td>
<td>2</td>
<td>81.87</td>
<td>40.93</td>
<td>2.28</td>
<td>N.S.</td>
</tr>
<tr>
<td>Rank</td>
<td>2</td>
<td>37.87</td>
<td>18.93</td>
<td>11.50</td>
<td>p &lt; .01</td>
</tr>
<tr>
<td>Subjects x Product</td>
<td>50</td>
<td>709.68</td>
<td>14.19</td>
<td>15.49</td>
<td>p &lt; .01</td>
</tr>
<tr>
<td>Subjects x Rank</td>
<td>50</td>
<td>82.35</td>
<td>1.64</td>
<td>1.58</td>
<td>p &lt; .05</td>
</tr>
<tr>
<td>Residual</td>
<td>100</td>
<td>91.59</td>
<td>.92</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The analysis of variance indicates that willingness-to-buy rank does influence the magnitude of price threshold (p < .01). The influence of product category was not significant. This was due to the significant interaction of product category and subjects. Subjects differed

A mean increase of approximately two cents was required to cause subjects to switch from the brand they were most willing-to-buy to the brand they were second most willing to buy.

Figure 5. Plot of Mean Price Thresholds for All Product Categories and Willingness-to-buy Rank
widely in their price thresholds between products but they tended to be consistent within product categories. Stated alternatively, subjects who reacted a certain way toward increase tended to react in a similar way toward decreases within the same product category. The basic trend is portrayed graphically in Figure 5. The great within subject variance across product categories caused the product main not to be significant. Hypothesis one was substantiated for willingness-to-buy rank only.

**Relationship Between Willingness-to-buy and Price Threshold**

The relationship between willingness-to-buy and price threshold was examined via two analytical techniques. Data were first analyzed employing canonical correlation which allowed treatment of each major variable as an n-dimensional vector. After viewing the interdependency between the two vectors, the direction of the dependency was assumed. This assumption was essential to the multiple linear regression performed.

$H_2$ There is a positive relationship between willingness-to-buy data (V-scale distances) and price threshold.

Data input for this analysis consisted of the following two vectors:
\[ W = \begin{pmatrix} w_1 & w_2 \end{pmatrix} \]
\[ P = \begin{pmatrix} p_1 & p_2 & p_3 \end{pmatrix} \]

The \( P \) vector was interval data while the \( W \) vector was assumed to be interval scaled. Analysis was performed using the CANON program for canonical correlation.\(^2\)

Canonical correlations and canonical coefficients were computed for the three experimental sets (catsup, cake mix, and toothpaste). Only those subjects with complete data sets in a given product category were incorporated in the analysis. Table 2 summarizes the canonical correlation for all three product categories.

**TABLE 2**

**CANONICAL CORRELATIONS BETWEEN WILLINGNESS-TO-BUY AND PRICE THRESHOLD FOR ALL PRODUCT CATEGORIES**

<table>
<thead>
<tr>
<th>Product Category</th>
<th>Sample Size</th>
<th>First Canonical Correlation</th>
<th>Percent of the Variance Explained</th>
<th>Level of Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catsup</td>
<td>41</td>
<td>.71</td>
<td>50</td>
<td>( p &lt; .005 )</td>
</tr>
<tr>
<td>Cake mix</td>
<td>43</td>
<td>.73</td>
<td>53</td>
<td>( p &lt; .005 )</td>
</tr>
<tr>
<td>Tooth paste</td>
<td>28</td>
<td>.78</td>
<td>61</td>
<td>( p &lt; .005 )</td>
</tr>
</tbody>
</table>

\(^a\)None of the second canonical correlations (which were orthogonal to the first) were significant.

\(^2\)Robert J. Wherry, CANON, Columbus, Ohio, Psychology Department Computer Programs, 1969. (Mimeoographed)
In each instance the first canonical correlation was found to be significant. The square of the canonical correlation indicates the percent of the variance in one vector explained by the other vector. Thus, fifty percent of the variance in price threshold is explained by willingness-to-buy. Fifty-three percent of the variance in price threshold for cake mix is explained by willingness-to-buy. Finally, sixty-one percent of the variance in price threshold for tooth paste is explained by willingness-to-buy. It should be noted that willingness-to-buy data were product specific.

For the three experimental product categories, research hypothesis two is supported. A significant relationship \((p < .005)\) was found to exist between willingness-to-buy and price threshold.

Multiple linear regression also was used to examine the relationship posited in research hypothesis two. The criterion variable was price threshold and the predictor variables were willingness-to-buy distances. Analysis was performed using the BMD02R program for stepwise multiple regression. The basic regression equation was:

\[
P_i = \beta_0 + \beta_1 W_1 + \beta_2 W_2 +
\]

The basic equation was used three times with each product category. Thus, willingness-to-buy data \((W_1\) and \(W_2\)) were always used as predictors and the criterion variable

\[3\text{Dixon, op. cit., pp. 233-57.}\]
changed from \( P_1 \) to \( P_2 \) to \( P_3 \). Tables 3, 4, and 5 summarize the results of the multiple regression.

### TABLE 3

**SUMMARY OF MULTIPLE REGRESSION USING WILLINGNESS-TO-BUY AND PRICE THRESHOLD DATA FOR CATSUP\(^a\)**

<table>
<thead>
<tr>
<th>Criterion Variable</th>
<th>Predictor Variables</th>
<th>Multiple R</th>
<th>Multiple R Squared</th>
<th>Level of Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>( P_1 )</td>
<td>( W_1, W_2 )</td>
<td>.138</td>
<td>.017</td>
<td>N.S.</td>
</tr>
<tr>
<td>( P_2 )</td>
<td>( W_1, W_2 )</td>
<td>.125</td>
<td>.016</td>
<td>N.S.</td>
</tr>
<tr>
<td>( P_3 )</td>
<td>( W_1, W_2 )</td>
<td>.515</td>
<td>.265</td>
<td>( p &lt; .01 )</td>
</tr>
</tbody>
</table>

\(^a\)Sample size equals 41.

### TABLE 4

**SUMMARY OF MULTIPLE REGRESSION USING WILLINGNESS-TO-BUY AND PRICE THRESHOLD DATA FOR CAKE MIX\(^a\)**

<table>
<thead>
<tr>
<th>Criterion Variable</th>
<th>Predictor Variables</th>
<th>Multiple R</th>
<th>Multiple R Squared</th>
<th>Level of Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>( P_1 )</td>
<td>( W_1, W_2 )</td>
<td>.275</td>
<td>.076</td>
<td>N.S.</td>
</tr>
<tr>
<td>( P_2 )</td>
<td>( W_1, W_2 )</td>
<td>.318</td>
<td>.101</td>
<td>N.S.</td>
</tr>
<tr>
<td>( P_3 )</td>
<td>( W_1, W_2 )</td>
<td>.535</td>
<td>.286</td>
<td>( p &lt; .01 )</td>
</tr>
</tbody>
</table>

\(^a\)Sample size equals 43.
TABLE 5

SUMMARY OF MULTIPLE REGRESSION USING WILLINGNESS-TO-BUY AND PRICE THRESHOLD DATA FOR TOOTH PASTE\textsuperscript{a}

<table>
<thead>
<tr>
<th>Criterion Variable</th>
<th>Predictor Variables</th>
<th>Multiple R</th>
<th>Multiple R Squared</th>
<th>Level of Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>( P_1 )</td>
<td>( W_1, W_2 )</td>
<td>.597</td>
<td>.357</td>
<td>( p &lt; .01 )</td>
</tr>
<tr>
<td>( P_2 )</td>
<td>( W_1, W_2 )</td>
<td>.567</td>
<td>.322</td>
<td>( p &lt; .01 )</td>
</tr>
<tr>
<td>( P_3 )</td>
<td>( W_1, W_2 )</td>
<td>.701</td>
<td>.491</td>
<td>( p &lt; .01 )</td>
</tr>
</tbody>
</table>

\textsuperscript{a}Sample size equals 28.

The results of the multiple regression lent equivocal support for research hypothesis two in the case of catsup and cake mix. The coefficients were in the direction hypothesized, but were only found to be significant for price decreases in the price of the third most willing-to-buy. Even in those two instances less than thirty percent of the variance in price threshold was explained by willingness-to-buy data.

The results of the multiple regression supported research hypothesis two in the case of tooth paste. All coefficients were in the direction hypothesized and all were found to be statistically significant (\( p < .01 \)). Between thirty-two percent and forty-nine percent of the
variance in price threshold was explained by willingness-to-buy data.

Predictive Ability of Willingness-to-Buy Data

This portion of the analysis was not undertaken to test an hypothesis, but as a necessary prelude to the simulated shopping trip (Group B). Prior price studies have used the same price changes for all subjects. It was felt that a more efficient approach would be to tailor price changes to the individual subjects. In order to accomplish this, a proxy measure of price threshold was needed. Previously, it had been determined to use willingness-to-buy data (V-scale distances). Thus, it was essential to determine the extent of agreement between the two. Willingness-to-buy data ($w_1$ and $w_2$) were cross tabulated with price threshold data to determine the number of times willingness-to-buy data were greater than or equal to price threshold. Table 6 summarizes the results of the analysis.

Thus, a very simple way to use willingness-to-buy data to predict price switching behavior would be to equate price threshold with willingness-to-buy distance. Predictions would be correct at least 50 percent of the time. This, of course, assumes that all price changes are attended and that subjects would behave in a like manner while actually shopping.
<table>
<thead>
<tr>
<th>Product Category</th>
<th>$W_1 = P_1$</th>
<th>$W_1 &gt; P_1$</th>
<th>$W_2 = P_2$</th>
<th>$W_2 &gt; P_2$</th>
<th>$W_3 = P_3$</th>
<th>$W_3 &gt; P_3$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cat'sup</td>
<td>50.0</td>
<td>15.3</td>
<td>65.3</td>
<td>44.4</td>
<td>15.4</td>
<td>59.6</td>
</tr>
<tr>
<td>Cake mix</td>
<td>41.3</td>
<td>13.1</td>
<td>54.4</td>
<td>47.8</td>
<td>17.5</td>
<td>65.3</td>
</tr>
<tr>
<td>Tooth paste</td>
<td>34.3</td>
<td>15.7</td>
<td>50.0</td>
<td>42.1</td>
<td>15.7</td>
<td>57.8</td>
</tr>
</tbody>
</table>

All table values are expressed in percents.

$w_W_1$ = Distance between most willing-to-buy and second most willing-to-buy

$w_P_1$ = Distance between second most willing-to-buy and third most willing-to-buy

$P_1$ = Price threshold, increase in the price of the most willing-to-buy

$P_2$ = Price threshold, decrease in the price of the second most willing-to-buy

$P_3$ = Price threshold, decrease in the price of the third most willing-to-buy
A partial answer to the preceding question was provided by the simulated shopping trip conducted using a different group of subjects (Group B). The relationship found earlier (price threshold equals willingness-to-buy distance) was used to set prices (without the subjects' knowledge) in the experimental product categories. In each product category the price of only one brand was changed (the brand to be changed had been predetermined). The results of the experimental manipulation are presented in Table 7.

**TABLE 7**

**SUMMARY OF PREDICTED BRAND SWITCHING BEHAVIOR IN SIMULATED SHOPPING TRIP FOR ALL PRODUCT CATEGORIES**

<table>
<thead>
<tr>
<th>Product Category</th>
<th>Number of times predicted brand was purchased</th>
<th>Percent of times predicted brand was purchased</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catsup</td>
<td>7</td>
<td>23</td>
</tr>
<tr>
<td>Cake mix</td>
<td>6</td>
<td>20</td>
</tr>
<tr>
<td>Tooth paste</td>
<td>2</td>
<td>7</td>
</tr>
</tbody>
</table>

aData are for Group B.

Thus, far fewer subjects actually switched brand choice in a simulated shopping trip. One plausible explanation of this phenomenon was differential price awareness. All subjects were asked immediately after the shopping trip
whether the prices in each product category had been the same or different. Forty-three percent said the prices of catsup were different. Forty-three percent said the prices of cake mix were different. Only twenty-three percent of the subjects said the prices of tooth paste were different. Overall subjects who purchased the predicted brand, ninety-three percent, said the prices were different (i.e., they attended the price change and acted accordingly).

**Price Sensitivity**

**Relationship between Attitudinal Variables and Price Sensitivity**

The analytical strategy used to examine the relationship between attitudinal variables and price threshold was multifaceted. The first step involved a factor analysis of the attitudinal variables and then a correlation of the derived factor scores (for individuals) with observed brand switching behavior in reaction to price changes (price threshold). The second step involved the use of multiple discriminant analysis to discriminate between high and low price sensitive subjects.

H₃ High price sensitive subjects are different in their attitudes toward price and price related topics than low price sensitive subjects.
The data analysis for this research hypothesis represented the first step in the exploration of the relationship between attitudinal variables and price threshold. As the first stage in this portion of the analysis the subjects' scores on the fifteen attitudinal questions were factor analyzed using the BMDX72 computer program for factor analysis.\(^4\) Certain specific procedures were followed: (1) the correlation matrix was used, (2) diagonal elements were not altered, (3) one iteration for communalities was performed, (4) factors were orthogonally rotated (varimax criterion), and (5) Kaiser normalization was used. The factor analysis yielded five factors which explained sixty-one percent of the total variance (see Table 8). Based on the factor loadings the five factors were labeled as follows:

Factor 1 = Non-Price Sensitive Shopper  
Factor 2 = Careful/Social Shopper  
Factor 3 = High Price/Superior Quality Shopper  
Factor 4 = Price Sensitive Shopper  
Factor 5 = National Brand Shopper

Factor scores were computed for each individual on all five factors and correlated with price threshold data. This portion of the analysis was performed to provide a

<table>
<thead>
<tr>
<th>Variable Number and Shortened Name</th>
<th>Factor One</th>
<th>Factor Two</th>
<th>Factor Three</th>
<th>Factor Four</th>
<th>Factor Five</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Clipping coupon wastes time.</td>
<td>-.32</td>
<td>.60</td>
<td>-.14</td>
<td>.28</td>
<td>.27</td>
</tr>
<tr>
<td>2. Looks forward to grocery shopping.</td>
<td>-.21</td>
<td>-.78</td>
<td>-.03</td>
<td>-.09</td>
<td>.21</td>
</tr>
<tr>
<td>3. Food price change every week.</td>
<td>.13</td>
<td>-.18</td>
<td>.02</td>
<td>.70</td>
<td>-.11</td>
</tr>
<tr>
<td>4. Likes to take time shopping.</td>
<td>.01</td>
<td>-.71</td>
<td>-.20</td>
<td>.21</td>
<td>-.11</td>
</tr>
<tr>
<td>5. Considers self price conscious</td>
<td>.65</td>
<td>-.23</td>
<td>.23</td>
<td>-.06</td>
<td>.35</td>
</tr>
<tr>
<td>6. Quality of brands on TV same.</td>
<td>-.01</td>
<td>-.31</td>
<td>.01</td>
<td>.09</td>
<td>.76</td>
</tr>
<tr>
<td>7. Likes to stock up on specials.</td>
<td>.62</td>
<td>-.31</td>
<td>-.12</td>
<td>.17</td>
<td>-.10</td>
</tr>
<tr>
<td>8. Stores own brand gives good value.</td>
<td>.59</td>
<td>.12</td>
<td>.13</td>
<td>.04</td>
<td>.14</td>
</tr>
<tr>
<td>9. Tries to buy the brand on sale.</td>
<td>.78</td>
<td>.19</td>
<td>.10</td>
<td>-.13</td>
<td>-.11</td>
</tr>
<tr>
<td>10. Advertised brands worth more.</td>
<td>-.20</td>
<td>-.21</td>
<td>-.47</td>
<td>.28</td>
<td>-.50</td>
</tr>
<tr>
<td>11. Quality more important than price.</td>
<td>-.38</td>
<td>-.13</td>
<td>-.63</td>
<td>-.15</td>
<td>.01</td>
</tr>
<tr>
<td>12. Looking for bargains wastes time.</td>
<td>-.18</td>
<td>.24</td>
<td>.03</td>
<td>.74</td>
<td>-.20</td>
</tr>
<tr>
<td>13. Lower price more important than brand.</td>
<td>.35</td>
<td>.07</td>
<td>.58</td>
<td>.21</td>
<td>-.01</td>
</tr>
<tr>
<td>14. Higher price indicates quality.</td>
<td>.21</td>
<td>.04</td>
<td>-.84</td>
<td>.19</td>
<td>-.15</td>
</tr>
<tr>
<td>15. Doesn't mind paying more.</td>
<td>-.51</td>
<td>-.03</td>
<td>-.27</td>
<td>.25</td>
<td>-.52</td>
</tr>
</tbody>
</table>

Percent of Variance Explained by Each Factor:

<table>
<thead>
<tr>
<th></th>
<th>23</th>
<th>13</th>
<th>10</th>
<th>9</th>
<th>7</th>
</tr>
</thead>
</table>

77
check for the labels given Factors 4 and 1. If price threshold data correlated negatively with Factor 4 and positively with Factor 1, then some validity would be established for the verbal labels.

Individuals' factor scores were correlated with price threshold data for all three product categories. This resulted in a 9 x 5 correlation matrix (9 price thresholds and 5 factor scores). Only five correlations were found to be significantly different from zero \( (p < .05) \). These coefficients ranged from .381 to .522 and all correlated with Factor 1. Factor 4 had more correlations in the direction predicted than any other factor, but as previously mentioned none were significantly different from zero.

The data analysis provided a partial validation of the verbal label given to factor 1 (non-price sensitive shopper). Virtually no support was provided to validate the verbal label given to factor 4. Thus, hypothesis three was not substantiated. It was not possible (using factor analysis and correlation) to identify price sensitivity.

---

\(^5\)Ferguson, op. cit., p. 413.
H₄ Attitudinal variables serve as effective discriminators between high and low price sensitive subjects.

The equivocal results encountered using factor analysis prompted the use of another analytical technique, multiple discriminant analysis. Analysis was performed using the BMD07M computer program for stepwise discriminant analysis and the BMD05M program for discriminant analysis for several groups.⁶

Subjects were divided into two groups: (1) those who were induced to switch brands when prices changed by one cent, and (2) those who required a price change greater than one cent to induce switching. These two groups have been previously defined as high and low price sensitivity. The predictor variables were the subjects' scores on the fifteen attitudinal questions. The analysis was first run using all fifteen variables in the stepwise discriminant analysis program. Prediction varied over the three product categories. Table 9 shows the resultant classification matrices using all fifteen predictor variables.

The first nine variables entered into the calculation were then used as input for the several group discriminant

⁶Dixon, op. cit. (1968), pp. 196-206 and 214a-t. √
TABLE 9

CLASSIFICATION MATRICES SUMMARIZING RESULTS OF
PRICE SENSITIVITY DISCRIMINANT ANALYSIS USING
FIFTEEN ATTITUDINAL VARIABLES AS
PREDICTORS FOR ALL PRODUCTS

<table>
<thead>
<tr>
<th>Product Category</th>
<th>Actual Group Membership</th>
<th>Predicted Group One</th>
<th>Predicted Group Two</th>
<th>Percent Correctly Classified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catsup</td>
<td>Group 1</td>
<td>19</td>
<td>6</td>
<td>78</td>
</tr>
<tr>
<td></td>
<td>Group 2</td>
<td>5</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Cake mix</td>
<td>Group 1</td>
<td>18</td>
<td>3</td>
<td>82</td>
</tr>
<tr>
<td></td>
<td>Group 2</td>
<td>6</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>Tooth paste</td>
<td>Group 1</td>
<td>13</td>
<td>1</td>
<td>82</td>
</tr>
<tr>
<td></td>
<td>Group 2</td>
<td>8</td>
<td>27</td>
<td></td>
</tr>
</tbody>
</table>

\textsuperscript{a}Group 1 was high price sensitive while Group 2 was low price sensitive.

analysis for each product category. Table 10 contains a list of the variables and an indication of the discriminant equation (and order) they entered. Scale values for these questions were: 1 - strongly agree, 2 - agree, 3 - neutral, 4 - disagree, and 5 - strongly disagree.
### TABLE 10

**ATTITUdINAL VARIABLES USED IN PRICE SENSITIVITY DISCRIMINANT ANALYSIS AND INDICATION OF THE FIRST NINE TO ENTER THE EQUATION**

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Catsup</th>
<th>Cake mix</th>
<th>Tooth paste</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clipping coupons is a waste of time[a]</td>
<td>6⁵</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>I look forward to doing the family grocery shopping</td>
<td>8</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Food prices seem to change every week</td>
<td>7</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>When I go grocery shopping I like to take my time</td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>I consider myself price conscious</td>
<td></td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>In general the quality of brands advertised on TV is about the same</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>When a store has specials I like to stock up</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>A store's own brand usually gives you good value for the money</td>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>One should try to buy the brand that is on sale</td>
<td>3</td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>Nationally advertised brands are worth a few pennies more</td>
<td>4</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>High quality is more important than a low price</td>
<td>1</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>The housewife who goes from store to store looking for bargains wastes a lot of time and energy</td>
<td>5</td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>
TABLE 10 (continued)

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Catsup</th>
<th>Cake mix</th>
<th>Tooth paste</th>
</tr>
</thead>
<tbody>
<tr>
<td>A lower price is more important than my regular brand</td>
<td>9</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>A higher price generally indicates that a brand is superior in quality</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>I don't mind paying a little more than others for groceries</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

\(^a\)Number indicates order of entrance into equation.

\(^b\)See Appendix D for direction of group means.

In the next step of the analysis only the nine variables identified in Table 10 for each product category were used. Significance of difference between group means was tested using the Mahalanobis D-square statistic.\(^7\)

Table 11 portrays the results of the several group discriminant analysis.

Using only nine predictors affected the discrimination only minimally. Chance prediction of group membership would have been fifty percent for each group. Predictions were better than chance: 72 percent correct for catsup, 82 percent correct for cake mix, and 78 percent correct for tooth paste.

\(^7\)Its distribution approximates the chi-square distribution.
TABLE 11
CLASSIFICATION MATRICES SUMMARIZING RESULTS OF PRICE SENSITIVITY
DISCRIMINANT ANALYSIS USING NINE ATTITUDINAL VARIABLES
AS PREDICTORS FOR ALL PRODUCTS

<table>
<thead>
<tr>
<th>Product Category</th>
<th>Actual Group Membership</th>
<th>Predicted Group One</th>
<th>Predicted Group Two</th>
<th>Percent Correctly Classified</th>
<th>Level of Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catsup</td>
<td>Group 1</td>
<td>17</td>
<td>8</td>
<td>72</td>
<td>p &lt; .005</td>
</tr>
<tr>
<td></td>
<td>Group 2</td>
<td>6</td>
<td>18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cake mix</td>
<td>Group 1</td>
<td>18</td>
<td>3</td>
<td>82</td>
<td>p &lt; .005</td>
</tr>
<tr>
<td></td>
<td>Group 2</td>
<td>6</td>
<td>22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tooth paste</td>
<td>Group 1</td>
<td>13</td>
<td>1</td>
<td>78</td>
<td>p &lt; .025</td>
</tr>
<tr>
<td></td>
<td>Group 2</td>
<td>10</td>
<td>25</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a The nine predictors were different for each product category (see Table 7).

b Group 1 was high price sensitive while Group 2 was low price sensitive.
The differences between group means (i.e., the mean score on each attitudinal variable for the high price sensitive group and the mean score on each attitudinal variable for the low price sensitive group) were found to be significant ($p < .025$) for all three product categories.

The data analysis supported research hypothesis four. Attitudinal variables served as effective discriminators between high and low price sensitive subjects and the respective group means were significantly different. This finding is limited to the housewives who participated in the study. Application beyond the 49 subjects would be gratuitous. However, the significance does not lie in the universality but in the mere fact that responses did serve as effective discriminators of behavior.

**Relationship between Non-attitudinal Variables and Price Sensitivity**

$H_5$ Non-attitudinal variables (i.e., demographic and purchase behavior) serve as effective discriminators between high and low price sensitive subjects.

Essentially the same analytical strategy was followed for non-attitudinal variables as had been followed for attitudinal data. As before, subjects were divided into two groups: (1) high price sensitive, and (2) low price sensitive. Input for the analysis consisted of the demographic and behavioral variables listed in Table 12.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Product Category</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Catsup</td>
<td>Cake mix</td>
<td>Tooth paste</td>
<td></td>
</tr>
<tr>
<td>Number of stores shopped at</td>
<td>2</td>
<td>2</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Check price of that product</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Years married</td>
<td>6</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Number of people shopped for</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Age of youngest child</td>
<td>6</td>
<td>6</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Home ownership (rent or own)</td>
<td>5</td>
<td>5</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Age of subject</td>
<td>5</td>
<td>5</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Subject's educational attainment</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Family income</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

- Numbers 1 through 6 indicate order of entrance into discriminant equation.
- See Appendix D for direction of group means.

A stepwise discriminant analysis was performed for all three product categories. Table 13 contains the results of the initial analysis.
### TABLE 13
CLASSIFICATION MATRICES SUMMARIZING THE RESULTS OF PRICE SENSITIVITY DISCRIMINANT ANALYSIS USING NINE DEMOGRAPHIC AND SHOPPING BEHAVIOR VARIABLES AS PREDICTORS FOR ALL PRODUCTS

<table>
<thead>
<tr>
<th>Product Category</th>
<th>Actual Group Membership</th>
<th>Predicted Group One</th>
<th>Predicted Group Two</th>
<th>Percent Correctly Classified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catsup</td>
<td>Group 1</td>
<td>22</td>
<td>3</td>
<td>85</td>
</tr>
<tr>
<td></td>
<td>Group 2</td>
<td>5</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Cake mix</td>
<td>Group 1</td>
<td>17</td>
<td>4</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>Group 2</td>
<td>6</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>Tooth paste</td>
<td>Group 1</td>
<td>11</td>
<td>3</td>
<td>88</td>
</tr>
<tr>
<td></td>
<td>Group 2</td>
<td>3</td>
<td>32</td>
<td></td>
</tr>
</tbody>
</table>

*aGroup 1 was high price sensitive while Group 2 was low price sensitive.

The six variables that entered into the discriminant equation first were then selected for subsequent analysis. As before, the criterion variable was high and low price sensitivity. The predictor variables were the first six variables entered into the stepwise discriminant analysis. Significance of the differences between group means was tested using the Mahalanobis D-square statistic. Table 14 summarizes the results of the several group discriminant analysis using only six predictor variables.
## TABLE 14

CLASSIFICATION MATRICES SUMMARIZING THE RESULTS OF PRICE SENSITIVITY DISCRIMINANT ANALYSIS USING SIX DEMOGRAPHIC AND SHOPPING BEHAVIOR VARIABLES AS PREDICTORS FOR ALL PRODUCTS\(^a\)

<table>
<thead>
<tr>
<th>Product Category</th>
<th>Actual Group Membership</th>
<th>Predicted Group One</th>
<th>Predicted Group Two</th>
<th>Percent Correctly Classified</th>
<th>Level of Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catsup</td>
<td>Group 1</td>
<td>21</td>
<td>4</td>
<td>80</td>
<td>p &lt; .005</td>
</tr>
<tr>
<td></td>
<td>Group 2</td>
<td>7</td>
<td>17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cake mix</td>
<td>Group 1</td>
<td>18</td>
<td>3</td>
<td>82</td>
<td>p &lt; .005</td>
</tr>
<tr>
<td></td>
<td>Group 2</td>
<td>6</td>
<td>22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tooth paste</td>
<td>Group 1</td>
<td>10</td>
<td>4</td>
<td>84</td>
<td>p &lt; .005</td>
</tr>
<tr>
<td></td>
<td>Group 2</td>
<td>3</td>
<td>32</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^a\)The six predictors were different for each product category (see Table 12).

\(^b\)Group 1 was high price sensitive while Group 2 was low price sensitive.
Using only six predictors affected the discrimination minimally. Chance prediction of group membership would have been fifty percent for each group. Prediction was better than chance: 80 percent correct for catsup, 82 percent for cake mix, and 84 percent correct for tooth paste.

The differences between group means (i.e., the mean scores on demographic and shopping behavior variables for the high price sensitive group and the mean scores for the low sensitive group) were found to be significant \( p < .005 \) for all three experimental product categories. The data analysis support research hypothesis five. Non-attitudinal variables served as effective discriminators between high and low price sensitive subjects and the group means were significantly different.

**Price Awareness**

**Relationship between Attitudinal Variables and Price Awareness**

\( H_0 \) Attitudinal variables serve as effective discriminators between price aware and non-price aware subjects.

The analytical strategy for this hypothesis involved dividing the subjects who participated in the simulated shopping trip into two groups for each product category: (1) subjects who checked prices before purchasing, and (2) those subjects who did not check price before purchasing.
<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Catsup</th>
<th>Cake mix</th>
<th>Tooth paste</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clipping coupons is a waste of time</td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I look forward to doing the family grocery shopping</td>
<td>7b</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food prices seem to change every week</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>When I go grocery shopping I like to take my time</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I consider myself price conscious</td>
<td>8</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>In general, the quality of brands advertised on TV is about the same</td>
<td>4</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>When a store has specials I like to stock up</td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A store's own brand usually gives you good value for the money</td>
<td>3</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>One should try to buy the brand that is on sale</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nationally advertised brands are worth a few pennies more</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>High quality is more important than a low price</td>
<td>1</td>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>
TABLE 15 (continued)

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Catsup</th>
<th>Cake mix</th>
<th>Tooth paste</th>
</tr>
</thead>
<tbody>
<tr>
<td>The housewife who goes from store to store looking for bargains wastes a lot of time and energy</td>
<td></td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>A lower price is more important than my regular brand</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>A higher price generally indicates that a brand is superior in quality</td>
<td>6</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>I don't mind paying a little more than others for groceries</td>
<td>7</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

aNNumber indicates order of entrance into equation. Data are for Group B.

bSee Appendix D for direction of group means.

These groups were labeled price aware and non-price aware. The predictor variables for this analysis were the subjects' raw scores on the fifteen attitudinal questions.

The first discriminant analysis was performed using the BMD07M program for stepwise discriminant analysis. The variables used are contained in Table 15. Resultant classification matrices are contained in Table 16.
TABLE 16
CLASSIFICATION MATRICES SUMMARIZING RESULTS OF PRICE AWARENESS DISCRIMINANT ANALYSIS USING FIFTEEN ATTITUDINAL VARIABLES AS PREDICTORS FOR ALL PRODUCTS

<table>
<thead>
<tr>
<th>Product Category</th>
<th>Actual Group Membership&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Predicted Group One</th>
<th>Predicted Group Two</th>
<th>Percent Correctly Classified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catsup</td>
<td>Group 1</td>
<td>16</td>
<td>3</td>
<td>83</td>
</tr>
<tr>
<td></td>
<td>Group 2</td>
<td>2</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Cake mix</td>
<td>Group 1</td>
<td>15</td>
<td>0</td>
<td>93</td>
</tr>
<tr>
<td></td>
<td>Group 2</td>
<td>2</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Tooth paste</td>
<td>Group 1</td>
<td>5</td>
<td>1</td>
<td>87</td>
</tr>
<tr>
<td></td>
<td>Group 2</td>
<td>3</td>
<td>21</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup>Group 1 was price aware while Group 2 was non-price aware. Data are for Group B.

The first nine variables entered into the calculation were then used as input for the several group discriminant analysis for each product category. Table 15 contains the list of variables and the discriminant equation (and order of entrance) they entered into. Table 17 presents the results of the several group discriminant analysis using nine predictor variables.
TABLE 17
CLASSIFICATION MATRICES SUMMARIZING RESULTS OF PRICE AWARENESS
DISCRIMINANT ANALYSIS USING NINE ATTITUINAL
VARIABLES AS PREDICTORS FOR ALL PRODUCTS

<table>
<thead>
<tr>
<th>Product Category</th>
<th>Actual Group Membership</th>
<th>Predicted Group One</th>
<th>Predicted Group Two</th>
<th>Percent Correctly Classified</th>
<th>Level of Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catsup</td>
<td>Group 1</td>
<td>16</td>
<td>3</td>
<td>80</td>
<td>p &lt; .025</td>
</tr>
<tr>
<td></td>
<td>Group 2</td>
<td>3</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cake mix</td>
<td>Group 1</td>
<td>13</td>
<td>2</td>
<td>87</td>
<td>p &lt; .005</td>
</tr>
<tr>
<td></td>
<td>Group 2</td>
<td>2</td>
<td>13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tooth paste</td>
<td>Group 1</td>
<td>5</td>
<td>1</td>
<td>80</td>
<td>p &lt; .05</td>
</tr>
<tr>
<td></td>
<td>Group 2</td>
<td>5</td>
<td>19</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a The nine predictors were different for each product category (see Table 15).

b Group 1 was price aware while Group 2 was non-price aware. Data are for Group B.
Using only nine predictor variables affected the discrimination minimally. Chance prediction of group membership would have been fifty percent for each group. Predictions were better than chance: 80 percent correct for catsup, 87 percent correct for cake mix, and 80 percent correct for tooth paste. The difference between group means (i.e., the mean scores on each attitudinal variable for the price aware group and the mean scores on each attitudinal variable for the non-price aware group) was found to be significant (p < .05) for all three product categories. The data analysis substantiate research hypothesis six. Attitudinal variables served as effective discriminators between price aware and non-price aware subjects.

**Relationship between Price Awareness and Price Sensitivity**

$H_7$ Price aware subjects tend to be more price sensitive while non-price aware subjects tend to be low price sensitive.

The extent of interdependency between price sensitivity and price awareness was a crucial question. If high price sensitive subjects also tended to be price aware then there exists a greater probability that price promotion would be effective. However, if the phenomena tended to be independent then alternative strategies would become more attractive.
Analysis for this hypothesis was limited to cross tabulation of the variables for all product categories. Price aware subjects were those who checked price (in a specific product category) while non-price aware subjects were those who did not. High and low price sensitivity were operationally defined as in previous analyses. Table 18 presents the results of the analysis.

**TABLE 18**  
ASSOCIATION BETWEEN PRICE AWARENESS AND PRICE SENSITIVITY FOR ALL PRODUCTS

<table>
<thead>
<tr>
<th>Product Category</th>
<th>Price Awareness</th>
<th>High Price Sensitive</th>
<th>Low Price Sensitive</th>
<th>Contingency Coefficient</th>
<th>Level of Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catsup</td>
<td>Price Aware</td>
<td>37&lt;sup&gt;b&lt;/sup&gt;</td>
<td>27</td>
<td>.349</td>
<td>p &lt; .01</td>
</tr>
<tr>
<td></td>
<td>Non-price Aware</td>
<td>3</td>
<td>33</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cake mix</td>
<td>Price Aware</td>
<td>30</td>
<td>20</td>
<td>.196</td>
<td>N.S.</td>
</tr>
<tr>
<td></td>
<td>Non-price Aware</td>
<td>20</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tooth paste</td>
<td>Price Aware</td>
<td>3</td>
<td>17</td>
<td>.238</td>
<td>N.S.</td>
</tr>
<tr>
<td></td>
<td>Non-price Aware</td>
<td>3</td>
<td>77</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup>Data are for Group B.

<sup>b</sup>Results of cross tabulation expressed in terms of percent.
Association between price awareness and price sensitivity ($C = .349$) was found to be significant ($p < .01$) for catsup. Association between price awareness and price sensitivity for cake mix and tooth paste was not found to be significant. Thus, hypothesis seven was substantiated for catsup only.
CHAPTER VI

SUMMARY AND CONCLUSIONS

This chapter summarizes the major findings of the dissertation research. The implications of each finding are presented and areas are indicated where marketing strategists could incorporate the findings. Finally, directions for future research are discussed.

Willingness-to-buy and Price Threshold

A major finding was the existence of a relationship between willingness-to-buy and price threshold. Data on willingness-to-buy (behavioral intentions) collected on the V-scale were found to be positively related to price threshold data.\(^1\) This relationship was found to exist across all experimental product categories (catsup, cake mix, and tooth paste). A high positive correlation was found between willingness-to-buy and price threshold, convincingly demonstrating the direction and extent of the relationship. Thus, the more a subject preferred (was

\(^1\)Price threshold was the absolute difference between the original price of the brand and the price at which a subject switched brand choice.
willing-to-buy) a brand the greater the price change necessary to induce brand switching.

Canonical correlation treated willingness-to-buy and price threshold as vectors associating one set of data with another. An attempt was made to utilize willingness-to-buy data as predictors of price threshold. Multiple linear regression (with willingness-to-buy as the predictor variables and price threshold as the criterion variable) was employed to delineate the specific character of the relationship. This attempt met with only moderate success. All correlation coefficients were positive; however, meaningful significance was found only with tooth paste data.

Neither approach (canonical correlation or multiple regression) provided a means to use willingness-to-buy as a surrogate of price threshold. Essential to the successful execution of the second part of the study (Group B and the simulated shopping trip) was a method to relate willingness-to-buy data to price thresholds. After the limited success encountered employing the first two analytical techniques, a simpler more direct approach was tried. Willingness-to-buy data were cross tabulated with price threshold data (from Group A) to determine the agreement between the two variables. Not only did a relationship emerge but it held in a sufficient number of cases to make it useful later. The willingness-to-buy data were found
to be equal to (range 34 to 50 percent) or greater than 
(range 50 to 75 percent) price threshold no less than 
50 percent of the time (see Table 6).

For over one-third of the subjects the distances on 
the V-scale equated with a price difference and for over 
half the subjects the V-scale distances were greater than 
price threshold. Thus, the most direct way to use 
willingsness-to-buy data as a surrogate of price threshold 
was to equate them. This approach was more efficient 
than randomly exposing subjects to pre-set price changes. 
Its use in this manner (as a surrogate for price threshold) 
also tests the utility of its application in determining 
field price changes (its success will be discussed in the 
price awareness section).

Implications

Perhaps the positive relationship between willingness-
to-buy and price threshold is not too startling. It seems 
to make sense that the more a brand is desired relative 
to its alternatives the greater the price change required 
to induce switching. This relationship is important to 
the marketer embarking on a price promotion. He must be 
cognizant of differential price thresholds. A price 
change less than the threshold will result in the same 
unit sales at a lower price. If his brand is desired 
appreciably less than the leading alternatives then the
magnitude of the price change required may adversely affect profitability even if unit sales increase. Thus, successful price promotion depends on getting the most people to switch brand choice with the smallest possible price change.

The possibility exists, particularly with the recent rise in consumer prices, that many store brands are currently priced above a threshold. If the store would lower price to the threshold, unit sales might increase dramatically. The current study did not examine store brands, however, the methodology could easily incorporate them. This would provide a chain with information regarding the probable effect of price reductions.

If a marketer's brand is desired appreciably more (i.e., his current customers are more willing-to-buy his brand vis-a-vis identically price competitive offerings) than competitive brands, he would be able to raise his price to just below the threshold and increase his profits.

Thus, willingness-to-buy data seem to serve as a good proxy variable for price threshold. As willingness-to-buy distances increase so does the absolute value of the price change necessary to induce brand switching behavior. By gathering willingness-to-buy data on his brand and competitive brands the marketer will have some indication of the probable effect of a price change. These data should allow him to plan better price promotions and also
indicate situations where price promotion is the least desirable strategy. In those instances, money is best spent improving the desirability of the brand before attempting price cuts.

Critical Nature of Price Awareness

The preceding section discussed the relationship between willingness-to-buy and price threshold. Implicit in that discussion was the fact that subjects were forced to receive price change information. However, in an actual shopping situation the housewife may not be aware of price differentials and behave as if there were none. The crucial question then becomes, if a price has been changed to the threshold will the housewife attend it? The second part of the experiment was aimed at answering this question.

Subjects were sent on a simulated shopping trip. Without the subject's knowledge the prices of specific brands were set at their thresholds. If awareness were not a factor then these subjects could be expected to switch brand choice at least 50 percent of the time (see Table 6). However, in the simulated shopping trip subjects purchased the predicted brand (the brand they should have purchased after price manipulations were made) less than 25 percent of the time (23 percent for catsup, 20 percent for cake mix, and 7 percent for tooth paste).
The apparent deterioration can be attributed to differential price awareness between subjects. Differential price awareness was found to exist: 43 percent of the subjects said that the prices of catsup were different and the same percent said that the prices of cake mix were different while only 23 percent of the subjects said that the prices of tooth paste were different. Thus, only a certain percentage of the subjects attended the price change and of that group only a certain percentage switched brand choice.

Price Awareness and Price Sensitivity

The relationship between price awareness and price sensitivity is central to successful price promotion. Association between these variables was found to be significant in only one of the experimental sets, catsup. Thus, overall it appears that price awareness and price sensitivity do not go hand in hand. Those individuals who are prone to check price are not necessarily more apt to change brand choice when a small price difference exists. Also, those subjects who were more likely to switch brand choice when a small price difference existed were not more apt to check price on the simulated shopping trip.

The reader should treat these conclusions as extremely tentative. Price sensitivity measures for this analysis were taken at the end of 45 minutes of experimentation and
may be confounded by experimental fatigue and a desire to leave. Conclusions have been offered since the relationship between these two variables is critical for effective price promotion.

**Implications**

Price awareness appears to have a moderating effect on price sensitivity. Given a price change of a specific magnitude a certain percentage of housewives will alter their purchase choice accordingly, but if and only if they attend the price change. Thus, *ceteris paribus*, a price change is necessary but not sufficient to induce brand switching behavior. Price awareness (checking price) is also necessary but not sufficient for brand switching behavior.

The marketer who knows the magnitude of price threshold and the extent of differential price awareness for his product category is in a better position to assess the probable outcome of a price change. If he is attempting to increase sales through a price cut it is essential that high price awareness exist in his target market or that he stimulate price awareness. Also the aggregate price threshold must be sufficiently small so that the increase in total revenue is not offset by the decline in unit profits. Conversely, if the marketer contemplates a price increase he would want low price
awareness or high price thresholds. This example, of course, does not attempt to consider the many other factors that may enter into the overall efficacy of price strategy.

**Discriminants of Price Sensitivity and Price Awareness**

Knowledge of differential brand switching behavior in reaction to price changes and differential price awareness are of little value to the marketer unless consumers possessing these characteristics can be identified. With that problem in mind the analysis focused on a means to identify these consumers.

**Attitudinal Variables and Price Sensitivity**

Subjects were divided into two managerially relevant groups (high and low price sensitive). The 15 attitudinal variables were used as predictors of group membership in a multiple discriminant analysis. These 15 variables (later reduced to 9) served as effective discriminators, correctly classifying (range across product categories was 72 to 82 percent correct) the subjects into their respective groups. The results of the discriminant analysis are intriguing for two reasons: (1) the ability of attitudinal data to discriminate between behavioral groups, and (2) the fact that different attitudinal
variables predicted better for certain product categories (see Appendix D for direction of group means).

**Non-attitudinal Variables and Price Sensitivity**

Multiple discriminant analysis was also used in this analysis. The same criterion variable was used with demographic and shopping behavior as predictor variables. Nine variables were used initially (later reduced to six) to discriminate. Subjects were correctly classified (range across product categories was 80 to 84 percent correct) into their respective behavioral groups. As with attitudinal variables, different demographic and shopping behavior variables predicted better for certain product categories (see Appendix D for direction of group means).

**Attitudinal Variables and Price Awareness**

Earlier in the discussion the problem of differential price awareness was discussed. As with price sensitivity, it comforts the marketer little to know differential price awareness exists unless those consumers can be identified. One seemingly direct way of getting at this would be to ask the consumer whether she checks the price of a certain product before purchasing. This, however, is influenced by her ability to recall her behavior and a possible tendency to respond yes so as to appear the prudent shopper.
The problems associated with the recall measure prompted the use of a direct behavioral measure (check price--did not check price, on the simulated shopping trip) as the criterion variable. Attitudinal variables served as discriminators between the two types of observed behavior in all experimental product categories. Using only nine attitudinal variables, subjects were correctly classified (range across product categories was 80 to 87 percent correct) into their respective groups. Again the results of the analysis strongly suggest the utility of using attitudinal variables to predict behavioral group membership (see Appendix D for direction of group means).

Implications

The extent of price sensitivity and price awareness are critical to successful price promotion. Obviously, the laboratory methodology employed presents certain real constraints with respect to widespread field application. However, data on attitudes, demographics, and shopping habits have been and will continue to be collected by researchers through mail surveys. In this study, these variables were found to be related to observed brand switching behavior in reaction to price change and to price awareness. Thus, a more feasible method for mass data collection and prediction presents itself.
The analysis suggests the utility of using attitude measures as a means of developing customer profiles. Attitudinal variables would then be used to determine the probable number of consumers who would switch brand choice when the prices were changed slightly. Attitudinal variables would also be used to discriminate between price aware and non-price aware consumers. These combined groups would then provide a strong indication of the probable effect of a price change. Based on the profiles he would use price promotion (if his customers were highly price sensitive) or some alternative strategy (if they were not).

Non-attitudinal variables would also serve as discriminators between high and low price sensitive consumers. However, the reader is cautioned that the findings were based on a non-random sample that was definitely upscale (above median income and education levels). The implications may not be universal, but may hold only for the limited sample chosen.

Methodological Implications

The primary methodological implication centers around the method for gathering and the kind of data to be gathered in a laboratory setting. Collection of brand switching behavior data in reaction to price changes alone is not sufficient. Data must be collected on price aware-
ness. Without the latter, the applicability of the former to real world situations is at best tenuous. Management must not only know what portion of their potential market will switch brand preference at a given price change, but also what percentage of the initial group will actually attend the price change. Effective price promotion depends on both sensitivity and awareness.

The results of the study suggest the utility of using the laboratory to take behavioral measures under controlled conditions and then using those as criterion variables. Any number of non-behavioral measures may then be taken and used as predictor variables in subsequent analyses. Ordinary field research asks for the respondents' recall of behavior. Often there is a substantial delay between the act and the question, or, even worse, a tendency to color the response. The current methodology insures that the behavior recorded was the behavior that took place. However, the microcasem constructed must be sufficiently realistic so that the behavior taking place is similar (hopefully, identical) to real world action. Using this approach the marketer can eliminate much noise from the system and begin to understand the consumer. Also, this methodological approach seems to hold promise for viewing the relationship between attitude and behavior.
The V-scale presents other methodological implications. It is a direct and concrete method for collecting data. Any confusion regarding the brands is avoided and the subject is able to visualize the relationship. Products are presented as they are normally encountered while shopping, thus adding a degree of realism. The V-scale also could be used to gather similarities or differences data for multidimensional scaling. Extensive product handling encountered in dyadic comparisons might render the technique unsuitable. However, the subjects appeared to enjoy seeing and moving the products, so fatigue may not be a problem. The marketer employing the V-scale for data collection also avoids the confounding effect that the discrepancy between brand name and physical product interjects into the analysis.

Closely related to the V-scale is the stated dimension, willingness-to-buy. Willingness-to-buy seemed more consistent with brand switching behavior than the preference measure used during the initial phases of the pilot study. It is felt that this is since willingness-to-buy makes the subject consider the act of purchase and the consequences. Also, with the preference rating it seemed far easier for subjects to assume expertise and rate the brands for the illusive "universal" consumer. However, the reader is cautioned that this was not tested directly; thus, only anecdotal support is offered.
Research Directions

The obvious next step would be to replicate the present study using a random sample. If any of the implications spelled out in the preceding sections are to be implemented, it is imperative that the generality of the findings be established. Replication would be three-pronged: (1) external validation of the relationship between willingness-to-buy and price threshold, (2) further examination of differential price awareness, and (3) use of attitudinal and non-attitudinal variables to predict group membership. Once the relationship between willingness-to-buy and price threshold is externally validated then the marketer has a method to predetermine the probable effect of price changes. In doing so he must also weight the effect of differential price awareness and concentrate on means of getting attention. Once a validated discriminant function is developed, it can be used in conjunction with survey data to map market segments (i.e., predict group membership).

Research studies should be conducted to find out how the consumer uses price and price-related information, e.g., coupons, flyers, newspaper ads, in-store displays, word-of-mouth, and specials. Much of this can be accomplished through in-store interviewing immediately after a purchase (right after the brand is placed in the shopping cart).
All of the pertinent information that contributed to that decision should be fresh in the consumer's mind. The major drawback to this approach is each shopper could only be interviewed once. However, the technique would provide great insight into the decision process.

Laboratory research should be done simulating actual purchase situations to examine the variables in a controlled milieu. This should be augmented with in-store studies, particularly those aimed at differential awareness. Variables such as point-of-purchase display, time of shopping trip, and number of items purchased could be manipulated.

Two basic in-store studies should be conducted. The first, aimed at price awareness, would follow the price-quantity paradigm. The same brand would have one set of shelf facings at one price and another set at a different price. The relative sales of the facings would provide an indication of price awareness. This would be done for a number of different product categories to help identify product clusters with similar price awareness to serve as a basis for price promotion.

Still employing the price-quantity paradigm brand prices within product categories would be changed. An interviewer would be stationed at the check-out counter. Those housewives purchasing brands in the manipulated product categories would be administered a combined
attitude, demographic, and shopping behavior questionnaire. Only after all questions were answered would the housewife be asked why she purchased the brands she did. In this manner the behavior takes place in a completely natural setting and the housewife does not associate the questions with her purchase behavior. Product clusters with similar price sensitivity would be identified to serve as the basis for price promotion. An attempt should also be made to identify those clusters which are most helpful in projecting an image of low prices.

Ideally, with most of the preceding information as a basis, a longitudinal study should be conducted. Panel members would be selected from certain areas. Cooperation of the stores at which they shopped would be enlisted and price changes made over the study period. Data from the study would provide a wealth of information concerning the price conscious consumer. Particularly, the extent to which brand choices remained changed when prices revert to their original levels. Finally, after more is known about consumer reactions to price changes for supermarket type products, the range of products studied should be expanded to include durables.
APPENDICES
APPENDIX A

PRODUCT USE SHEET

2. Peanut Butter 5. Tooth paste
3. Catsup

1. How often do you purchase (product)?

2. How much do you normally purchase at a time?
   SIZE QUANTITY

3. In your home who is the chief consumer of (product)?

4. What are the factors that you take into consideration when deciding (product) to buy?

1 3
2 4

5. Do you regularly buy the same brand or do you buy different brands of (product)? same different

6. What brands (or brand) of (product) do you regularly buy?

1 3
2 4

7. Is it important to you or someone in your family to always get (brand)? yes no

   IF YES: Who is it important to?

   Why is it important?

8. Do you check the price of (product) before purchasing?
   yes no

ASK QUESTION 8 ONLY IF GROUP A. GROUP B IS ASKED THIS SAME QUESTION LATER.

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APPENDIX A (continued)

BRAND USE SHEET

PLACE A CHECK MARK TO THE LEFT OF THE BRANDS THAT YOU HAVE USED.

IF YOU HAVE USED BRANDS THAT ARE NOT LISTED WRITE THEM IN THE SPACES PROVIDED.

COLA SOFT DRINKS

_____ Coke
______ Pepsi
______ Royal Crown
______ Faygo
______ 3V

CAKE MIX

______ Swanson
______ Betty Crocker
______ Duncan Hines
______ Pillsbury
______ Jiffy

PEANUT BUTTER

_____ Jif
______ Peter Pan
______ Planter's
______ Skippy

TOOTH PASTE

______ Vote
______ Colgate
______ Gleem
______ Crest
______ Ultrabrite
______ Macleans
______ Pepsodent
______ Close-up

CATSUP

_____ Hunts
______ Delmonte
______ Heinz
______ Stokley

After you have checked all the brands that you have used go back and for each product category rank the brands in terms of the frequency you purchase them.

Within each product category place a 1 to the right of the brand that you purchase most frequently. Place a 2 to the right of the brand that you purchase second most frequently. Place a 3 next to the brand that you purchase third most frequently and so on for as many brands in each product category that you have checked.
## APPENDIX A (continued)

### RATING AND SWITCH SHEET

<table>
<thead>
<tr>
<th>Check 1st Brand choice</th>
<th>RANK</th>
<th>RATING</th>
<th>PRICE</th>
<th>DIFFERENCE</th>
<th>PRICE DIFFERENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coke</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pepsi</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Royal Crown</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jiffy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peter Pan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skippy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hunts</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delmonte</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heinz</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Betty Crocker</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duncan Hines</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pillsbury</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Colgate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gleem</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crest</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX A (continued)

TRIP SHEET - Group B  Number ___

1. Why did you purchase the (product category) that you did?

   CATHUP
   Heinz  Hunts  Delmonte
   CAKE MIX
   Betty C  Pillsbury  Duncan H
   TOOTH PASTE
   Crest  Colgate  Gleem

   REASON AND COMMENTS

2. Were the prices of (product category) the same of different?

   CATHUP  same  different
   CAKE MIX  same  different
   TOOTH PASTE  same  different

3. Do you remember what the prices of (product category) were?

   CATHUP  Price  CAKE MIX  Price  TOOTH PASTE  Price
   Heinz    ___  Betty C    ___  Crest    ___
   Hunts    ___  Pillsbury  ___  Colgate  ___
   Delmonte  ___  Duncan H  ___  Gleem   ___

4. IF NOT EVIDENT FROM ANSWERS ASK THE FOLLOWING QUESTION:
   Did you check the price of (product category) before purchasing?

   CATHUP  yes  no  CAKE MIX  yes  no  TOOTH PASTE  yes  no

5. Did you really want to buy the (product category) or did you just buy it because it was on the list?

   REALLY WANT
   CATHUP  yes  no
   CAKE MIX  yes  no
   TOOTH PASTE  yes  no

Probe on reasons why they bought products. Find out whether they really wanted the brand they purchased and would use it.

ADDITIONAL COMMENTS REGARDING SHOPPING TRIP:
APPENDIX A (continued)

ATTITUDINAL QUESTIONNAIRE

Please indicate below how you feel about the following statements. There are no right or wrong answers. Therefore, just say what you feel—not what you think others believe nor what you feel others would expect you to say. Indicate your feelings by circling a number from 1 to 5.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Clipping coupons is a waste of time.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2. I look forward to doing the family grocery shopping.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>3. Food prices seem to change every week.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4. When I go grocery shopping I like to take my time.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5. I consider myself price conscious</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>6. In general the quality of brands advertised on TV is about the same</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>7. When a store has specials I like to stock up.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>8. A store's own brand usually gives you good value for the money.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
### ATTITUDINAL QUESTIONNAIRE (continued)

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
</table>

9. One should try to buy the brand that is on sale 1 2 3 4 5

10. Nationally advertised brands are worth a few pennies more 1 2 3 4 5

11. High quality is more important than a low price 1 2 3 4 5

12. The housewife who goes from store to store looking for bargains wastes a lot of time and energy 1 2 3 4 5

13. A lower price is more important than my regular brand 1 2 3 4 5

14. A higher price generally indicates that a brand is superior in quality 1 2 3 4 5

15. I don't mind paying a little more than others for groceries 1 2 3 4 5
APPENDIX A (continued)

SHOPPING QUESTIONS

1. What would tend to make you more price conscious than you are?

2. What would tend to make you less price conscious than you are?

3. Where do you shop for groceries?

<table>
<thead>
<tr>
<th>STORE</th>
<th>REASON</th>
<th>TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1____</td>
<td>______</td>
<td>major fill-in</td>
</tr>
<tr>
<td>2____</td>
<td>______</td>
<td>major fill-in</td>
</tr>
<tr>
<td>3____</td>
<td>______</td>
<td>major fill-in</td>
</tr>
</tbody>
</table>

Ask why they shop at each and whether it is for major trips or fill-in purposes.

TOTAL STORES SHopped AT = ________

READ: Here's a list of reasons why people might shop at the super markets they do. Overall could you tell me which reason you consider to be most important, second most important, and third most important.

____ Convenience ______ Friendly ______ Personnel and service
____ Low prices ______ Good meats and produce ______ High quality
____ Wide selection ______ Stamps ______ Pleasant and clean

4. On a regular shopping trip do you check the price of ______ before purchasing?
APPENDIX A (continued)

SHOPPING QUESTIONS (continued)

<table>
<thead>
<tr>
<th>Item</th>
<th>Code</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cola soft drinks</td>
<td>CODE</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>Peanut butter</td>
<td>CODE</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>Catsup</td>
<td>CODE</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>Cake Mix</td>
<td>CODE</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>Tooth Paste</td>
<td>CODE</td>
<td>yes</td>
<td>no</td>
</tr>
</tbody>
</table>

CODE FOR WHY: 1. To find cheapest brand  
2. To find cheapest way of buying a specific brand  
3. To look for sale  
4. To determine whether to buy this time
LIST OF REASONS

Convenient, easy to get to
Low prices
Wide selection of brands and products
Friendly place to shop
Good meats and produce
Trading stamps
Good personnel and service
High quality
Pleasant and clean place to shop
APPENDIX A (continued)

DEMOGRAPHIC QUESTIONS

NAME_____________________________TELEPHONE NO. ____________

ADDRESS_________________________ZIP CODE __________________

1. How long have you been married? _________ (years)

2. How many people do you regularly shop for (including yourself)? __________________________

3. How old is your youngest child? ________________

4. Do you own or rent your home? ______________________

5. Place a check mark next to the appropriate age category.
   1. 24 and younger ______
   2. 25 to 34 ______
   3. 35 to 49 ______
   4. 50 to 64 ______
   5. 65 and older ______

6. Place a check mark next to the category that indicates your highest educational attainment.
   1. Grade school or less ______
      (grades 1-8)
   2. Some high school ______
   3. Graduated high school ______
   4. Some college ______
   5. Graduated college ______

7. Place a check mark next to the category that indicates your employment status.
   1. Employed outside the home ______
   2. Employed full time ______
      (30 hours or more per week)
   3. Employed part time ______
      (less than 30 hours per week)
   4. Not employed outside the home ______
   5. Unemployed—looking for work ______
   6. Other (write in) ______________________

8. Place a check mark next to the category that indicates your family's income before taxes last year.
   1. Under $5,000 ______
   2. $5,000 to $7,999 ______
   3. $8,000 to $9,999 ______
   4. Over $10,000 ______
POST EXPERIMENTAL INTERVIEW  Number _____

1. Do you have any questions about the experiment?
2. What do you think the experiment's purpose was?
3. Did everything seem realistic?
4. Were you ever confused?
5. Do you think that you would behave like that in a supermarket?
6. Were any of the questions unclear?

READ: I'm always trying to improve the experiment and make it clearer. I've found that once a person has gone through the experiment they are in a good position to evaluate it. I'd appreciate any comments or suggestions you might have.

COMMENTS:
APPENDIX B

WELCOMING INSTRUCTIONS

Good morning (or afternoon). I appreciate you taking time out to participate in this study. This study is part of my dissertation at Ohio State. There are no manufacturers involved so I'm not interested in any specific brands. What I am interested in is your opinion. There are no right or wrong answers to any of the questions. I'm just interested in what you think. Are there any questions? All right we're ready to begin.
APPENDIX B (continued)

RATING INSTRUCTIONS

This part of the experiment is a shopping trip. It is very important that you behave as you do when actually shopping. You are going to be shown a number of different products. In each product category there will be a number of brands. On this shopping trip your choice is limited to the brands shown. All brands sell for the same price and are the same size.

Now this is what you are to do. (I'd like you to rate the brands in terms of your willingness to buy them, take them home and have your family use them.) REPEAT I'm interested in what you think--not what you feel others believe or what you think others would expect you to do. Place the brand you would be most willing to buy at the 11 (down at this end). Your placement of the other brands should indicate your willingness to buy them in relation to the first. If you are equally willing to buy a number of brands place them at the same number. If you are unwilling to buy a brand place it at the 1 (down at this end). When you rate the brands assume that all of them are always available. Take your time rating them as this is a very important part of the experiment. Are these instructions clear? GO OVER IF NOT
APPENDIX B (continued)

MANIPULATION INSTRUCTIONS

Suppose you are still on a shopping trip. This time the prices of the products will change. Please tell me which brand you would purchase. Also tell me if you would never buy a brand regardless of its price or if you would always buy a brand regardless of its price. Are these instructions clear? GO OVER IF NOT
APPENDIX B (continued)

SHOPPING TRIP INSTRUCTIONS

In this part of the experiment I am interested in the time it takes you to shop for certain products. Shopping fast or slow is not necessarily good or bad. What I'm interested in is how long it takes you to shop. So please shop for these products as you would on a normal shopping trip.

Now, here's a shopping list (HAND THE SUBJECT THE LIST). I'd like you to buy one of each item on the list. So, you'll be buying a bottle of catsup, a box of cake mix, and a tube of tooth paste. Here's more than enough money to buy one of each item on the list. The dollar I am giving you now is in addition to the dollar that is being donated to the church. In the other room is a small store with all these items and more. This is a normal shopping trip and you need all the items listed. After the trip you get to take home the products that you purchased and the change left over. Remember, take as much or as little time as you normally would. Are these instructions clear? IF NOT RE-READ, OR CLARIFY.
LEAD SUBJECT TO THE "STORE." BEFORE OPENING DOOR
HAVE THE SUBJECT WAIT AT THE DOOR. MAKE A RATHER OBVIOUS
SHOW OF LOOKING AT YOUR WATCH AND THEN TELL SUBJECT TO
BEGIN. STAND IN THE DOORWAY AND CASUALLY OBSERVE. IF
SUBJECT ASKS ABOUT PRICES BEFORE GOING INTO STORE TELL
HER THAT THEY ARE SIMILAR TO THOSE SHE MIGHT FIND IN A
GROCERY STORE.
APPENDIX C

LIST OF BRANDS AND PRICES

Experimental Set

Catsup (14 oz.) -- Hunts, Delmonte, Heinz $ .23
Cake mix (18½ oz.) -- Betty Crocker, Duncan Hines, Pillsbury .35
Tooth paste (1.75 oz.) -- Colgate, Crest, Gleem .37

Background Set

Facial tissue (200) -- Puffs, Scotties, Kleenex .31
Instant coffee (2 oz.) -- Maxwell House, Folgers, Nescafé .55
Dishwashing liquid (12 oz.) -- Dove, Joy Ivory .32
Cola soft drink (16 oz.) -- Pepsi, Coke, Royal Crown .12
Gelatin dessert (3 oz.) -- Jello, Royal Kroger .11
Peanut butter (12 oz.) -- Jif, Peter Pan, Skippy .41
Toilet soap (personal) -- Zest, Dial, Safeguard .16
# APPENDIX D

GRAND MEAN AND DIRECTION OF HIGH PRICE SENSITIVE GROUP MEAN IN DISCRIMINANT ANALYSIS USING ATTITUINAL VARIABLES AS PREDICTORS FOR ALL PRODUCTS

<table>
<thead>
<tr>
<th>Predictor Variable</th>
<th>Grand Mean</th>
<th>Catsup</th>
<th>Cake Mix</th>
<th>Tooth Paste</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clipping coupons is a waste of time</td>
<td>3.69</td>
<td>+a</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>I look forward to doing the family grocery shopping</td>
<td>3.02</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Food prices seem to change every week</td>
<td>2.22</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>When I go grocery shopping I like to take my time</td>
<td>2.14</td>
<td>+</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>I consider myself price conscious</td>
<td>2.20</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>In general the quality of brands advertised on TV is about the same</td>
<td>3.16</td>
<td>-</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>When a store has specials I like to stock up</td>
<td>1.97</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>A store's own brand usually gives you good value for the money</td>
<td>2.32</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>One should try to buy the brand that is on sale</td>
<td>3.00</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Nationally advertised brands are worth a few pennies more</td>
<td>2.96</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>High quality is more important than a low price</td>
<td>1.86</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>The housewife who goes from store to store looking for bargains wastes a lot of time and energy</td>
<td>2.10</td>
<td>-</td>
<td>+</td>
<td>-</td>
</tr>
</tbody>
</table>
APPENDIX D (continued)

<table>
<thead>
<tr>
<th>Predictor Variable</th>
<th>Grand Mean</th>
<th>Catsup</th>
<th>Cake Mix</th>
<th>Tooth Paste</th>
</tr>
</thead>
<tbody>
<tr>
<td>A lower price is more important than my regular brand</td>
<td>3.73</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>A higher price generally indicates that a brand is superior in quality</td>
<td>3.53</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>I don't mind paying a little more than others for groceries</td>
<td>3.26</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

\(^a\text{Plus indicates that group mean for high price sensitive subjects was above grand mean. Minus indicates that group mean for high price sensitive subjects was below grand mean.}\)

\(^b\text{Scale values range from 1 - Strongly Agree to 5 - Strongly Disagree.}\)
APPENDIX D (continued)

GRAND MEAN AND DIRECTION OF HIGH PRICE SENSITIVE GROUP MEAN IN DISCRIMINANT ANALYSIS USING DEMOGRAPHIC AND SHOPPING BEHAVIOR VARIABLES AS PREDICTORS FOR ALL PRODUCTS

<table>
<thead>
<tr>
<th>Predictor Variables</th>
<th>Grand Mean</th>
<th>Catsup</th>
<th>Cake Mix</th>
<th>Tooth Paste</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of stores shopped at</td>
<td>2.55</td>
<td>+^a</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Check price (1= yes, 2= no)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Catsup</td>
<td>1.35</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cake Mix</td>
<td>1.37</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tooth paste</td>
<td>1.35</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Years married</td>
<td>17.51</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Number of people shopped for</td>
<td>3.88</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Age of youngest child</td>
<td>11.14</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Home ownership (1= own, 2= rent)</td>
<td>1.33</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Age of subject</td>
<td>2.88</td>
<td>-</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Subject's educational attainment</td>
<td>4.25</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Family income</td>
<td>3.31</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

^aPlus indicates that group mean for high price sensitive subjects was above grand mean. Minus indicates that group mean for high price sensitive subjects was below grand mean.
APPENDIX D (continued)

GRAND MEAN AND DIRECTION OF PRICE AWARE GROUP MEAN IN DISCRIMINANT ANALYSIS USING ATTITUINAL VARIABLES AS PREDICTORS FOR ALL PRODUCTS

<table>
<thead>
<tr>
<th>Predictor Variable</th>
<th>Grand Mean</th>
<th>Catsup</th>
<th>Cake Mix</th>
<th>Tooth Paste</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clipping coupons is a waste of time</td>
<td>3.77</td>
<td>-a</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>I look forward to doing the family grocery shopping</td>
<td>2.67</td>
<td>b</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Food prices seem to change every week</td>
<td>2.03</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>When I go grocery shopping I like to take my time</td>
<td>2.17</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>I consider myself price conscious</td>
<td>2.17</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>In general the quality of brands advertised on TV is about the same</td>
<td>3.03</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>When a store has specials I like to stock up</td>
<td>2.23</td>
<td>+</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>A store's own brand usually gives you good value for the money</td>
<td>2.23</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>One should try to buy the brand that is on sale</td>
<td>2.93</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Nationally advertised brands are worth a few pennies more</td>
<td>3.10</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>High quality is more important than a low price</td>
<td>1.86</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
</tbody>
</table>
APPENDIX D (continued)

<table>
<thead>
<tr>
<th>Predictor Variable</th>
<th>Grand Mean</th>
<th>Catup Mix</th>
<th>Cake Mix</th>
<th>Tooth Paste</th>
</tr>
</thead>
<tbody>
<tr>
<td>The housewife who goes from store to store looking for bargains wastes a lot of time and energy</td>
<td>2.16</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>A lower price is more important than my regular brand</td>
<td>3.50</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>A higher price generally indicates that a brand is superior in quality</td>
<td>2.77</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>I don't mind paying a little more than others for groceries</td>
<td>3.20</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

aPlus indicates that group mean for price aware subjects was above grand mean. Minus indicates that group mean for price aware subjects was below grand mean.

bScale values range from 1 - Strongly Agree to 5 - Strongly Disagree.
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